

# Water Resources Data Michigan Water Year 2000

Water-Data Report MI-00-1



U.S. Department of the Interior  
U.S. Geological Survey



Prepared in cooperation with the  
State of Michigan  
and with other agencies

## CALENDAR FOR WATER YEAR 2000

1999

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2000

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# Water Resources Data Michigan Water Year 2000

By S.P. Blumer, T.E. Behrendt, J.M. Ellis, R.J. Minnerick,  
R.L. LeuVoy, and C.R. Whited

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**U.S. DEPARTMENT OF THE INTERIOR**

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2001

## PREFACE

This volume of the annual hydrologic data report of Michigan is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each state, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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Letters after station name designate type of data collected: (d) discharge, (b) biological, (c) chemical, (e) elevation, gauge heights, or contents, (m) microbiological, (o) dissolved oxygen, (p) pH, (s) sediment, (t) water temperature, (sc) specific conductance.

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## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Michigan have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (\*) after the station number have had previous or subsequent operation as a crest-stage partial-record station. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

[Letters after station name designate type of data collected: (d) discharge, (e) elevation (stage only). Letter (a) before drainage area means approximately.]

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE SUPERIOR			
Montreal River at Ironwood, MI (d)	04028000	63.0	1918-22, 1924-26, 1949-54
Montreal River near Saxon, WI (d)	04030000	262	1938-70
Black River at Ramsay, MI (d)	04030500	a82	1924-25
Black River near Bessemer, MI (d)	04031000	200	1955-82
Presque Isle River at Marenisco, MI (d)	04031500	171	1945-82
Presque Isle River near Tula, MI (d)	04032000*	261	1945-73
Iron River near White Pine, MI (d)	04032500	98.1	1952-57
Middle Branch Ontonagon River near Paulding, MI (d)	04033000	164	1942-95
East Branch Ontonagon River near Mass, MI (d)	04035000	272	1942-79
Cisco Branch Ontonagon River near Watersmeet, MI (d)	04038000	62.2	1942-44
South Branch Ontonagon River at Ewen, MI (d)	04039500*	348	1942-71
Perch River near Sidnaw, MI (d)	04041000*	63.1	1913-15
Sturgeon River near Baraga, MI (d)	04042000	379	1927-31, 1943-47
Otter River near Elo, MI (d)	04042500*	162	1942-72
Sturgeon River near Arnheim, MI (d)	04043000	705	1942-74
Dead River near Negaunee, MI (d)	04043500	138	1902-03
Dead River at Forestville, MI (d)	04044000	158	1899-1902
Carp River near Negaunee, MI (d)	04044400	51.4	1961-87
Carp River near Marquette, MI (d)	04044500	a86	1902-04
Silver Lead Creek near Gwinn, MI (d)	040445315	a2.1	1997-99
Big Creek near Harvey, MI (d)	04044563	17.0	1979-81
Cedar Creek near Harvey, MI (d)	04044573	9.04	1979-81
Cherry Creek near Harvey, MI (d)	04044583	4.53	1965-70, 1979-81
Silver Creek at Harvey, MI (d)	04044595	8.58	1979-81
Tahquamenon River at Newberry, MI (d)	04045000	a200	1934-36
STREAMS TRIBUTARY TO LAKE MICHIGAN			
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North Manistique Lake Outlet at Helmer, MI (d)	04047000	a15	1942-44
Manistique Lake near Curtis, MI (e)	04047200	118	1942-91
Manistique River near Germfask, MI (d)	04047500	a120	1942-50
Fox River at Seney, MI (d)	04048000	107	1942-44
East Branch Fox River near Germfask, MI (d)	04048500	104	1942-44
Holland Creek near Seney, MI (d)	04049000	a13	1938-42
Manistique River at Germfask, MI (d)	04049500*	341	1938-70
Goose Pen Outlet at Germfask, MI (d)	04050000	--	1939-41
Grays Creek near Germfask, MI (d)	04050500	a36	1938-40
Pine Creek near Germfask, MI (d)	04051000	a11	1938-40
Sand Creek near Germfask, MI (d)	04051500	a6	1938-40
Driggs River near Seney, MI (d)	04052000	a70	1938-42
Walsh Creek near Seney, MI (d)	04052500	a12	1938-42
Driggs River near Germfask, MI (d)	04053000	114	1938-41
Marsh Creek near Shingleton, MI (d)	04053500	a20	1938-42
Marsh Creek near Germfask, MI (d)	04054000	--	1938-41
Duck Creek near Blaney, MI (d)	04054500	a92	1938-54
Manistique River near Blaney, MI (d)	04055000*	704	1938-70
Creighton River near Shingleton, MI (d)	04055500	a35	1938-42

## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued			
West Branch Manistique River near Manistique, MI (d)	04056000	322	1938-56
Indian Lake near Manistique, MI (e)	04057000	302	1938-95
Indian River near Manistique, MI (d)	04057000*	302	1938-71, 1992-93
Manistique River above Manistique, MI (d)	04057004	a1,445	1994-96
Sturgeon River near St. Jacques, MI (d)	04057500	167	1950-52
Middle Branch Escanaba River near Greenwood, MI (d)	04057820*	73.3	1973-82
Black River near Republic, MI (d)	04057900*	34.4	1961-63
Middle Branch Escanaba River near Ishpeming, MI (d)	04058000	128	1954-75
Green Creek near Princeton, MI (d)	04058130	13.8	1977-82
Warner Creek near Palmer, MI (d)	04058300*	14.2	1961-63 1972-73
Goose Lake Outlet near Sands Station, MI (d)	04058400*	37.5	1966-82
East Branch Escanaba River at Gwinn, MI (d)	04058500	124	1955-80
Tenmile Creek at Perronville, MI (d)	04059400*	38.4	1971-77
Iron River near Iron River, MI (d)	04060000	a65	1901-04
Iron River at Caspian, MI (d)	04060500	92.1	1948-80
Paint River at Crystal Falls, MI (d)	04061500*	597	1944-96
Peshekee River near Michigamme, MI (d)	04062100	66.5	1961-68, 1993-95
Peshekee River near Champion, MI (d)	04062200*	133	1961-78
Lake Michigamme near Champion, MI (e)	04062228	193	1942-91
Michigamme River near Michigamme, MI (d)	04062230	194	1969-82
Michigamme River near Champion, MI (d)	04062270	231	1964-69
Michigamme River at Republic, MI (d)	04062300*	240	1961-75
Michigamme River near Witch Lake, MI (d)	04062400*	316	1964-80
Menominee River near Iron Mountain, MI (d)	04065000	2,430	1898-99, 1903-14
West Branch Sturgeon River near Randville, MI (d)	04065300	56.1	1958-81
East Branch Sturgeon River below Skunk Creek near Felch, MI (d)	04065393	61.8	1974-84
East Branch Sturgeon River at Hardwood, MI (d)	04065397	90.8	1978-88
Sturgeon River near Foster City, MI (d)	04065500	237	1955-80
Pine Creek near Iron Mountain, MI (d)	04065600	16.8	1972-81
Menominee River below Koss, MI (d)	04067000	3,720	1907-08, 1913-81
Galien River near New Troy, MI (d)	04095500	a47	1945-47
East Branch Galien River near New Troy, MI (d)	04096000	19.2	1945-47
Beebe Creek near Hillsdale, MI (d)	04096272*	42.4	1974-78
Sand Creek at Litchfield, MI (d)	04096312*	20.6	1974-77
Soap Creek near Litchfield, MI (d)	04096325	10.9	1975-77
St. Joseph River at Clarendon, MI (d)	04096340*	144	1974-77
Sauk (East Branch Coldwater) River at Coldwater, MI (d)	04096500	--	1938-62
Coldwater River near Hodunk, MI (d)	04096600	293	1963-88
Nottawa Creek near Athens, MI (d)	04096900	162	1967-97
St. Joseph River at Mendon, MI (d)	04097000	918	1903-05
Little Portage Creek near Fulton, MI (d)	04097060*	27.0	1965-67
Portage River near Vicksburg, MI (d)	04097170*	68.2	1946-51, 1965-80
Gourdneck Canal near Schoolcraft, MI (d)	04097195	--	1966-73, 1983-92
Gourdneck Creek near Schoolcraft, MI (d)	04097200	7.29	1964-73
Fawn River near White Pigeon, MI (d)	04098500*	192	1903-04, 1958-75

## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued			
St. Joseph River at Berrien Springs, MI (d)	04102000*	4,081	1911-07, 1919-32, 1911-56
Paw Paw River near Paw Paw, MI (d)	04102320	195	1910-82
Paw Paw River near Hartford, MI (d)	04102420	311	1910-82
St. Joseph River at St. Joseph, MI (d)	04102533	4,670	1914-96
South Branch Kalamazoo River near Albion, MI (d)	04102850	146	1972-76
Reed's Springs near Albion, MI (d)	04103000	--	1915-06
Kalamazoo River at Marshall, MI (d)	04103500	449	1919-82
Battle Creek at Charlotte, MI (d)	04104000	a67	1918-54
Battle Creek at Bellevue, MI (d)	04104500	178	1918-53
Gull Creek near Galesburg, MI (d)	04105800*	38.1	1915-73
Portage Creek near Portage, MI (d)	04106190	18.6	1915-67
Portage Creek at Kalamazoo, MI (d)	04106500	46.8	1948-58, 1975-86
Gun River at dam near Shelbyville, MI (d)	04107000	a30	1916-47
Gun River near Martin, MI (d)	04107500	a35	1916-47
Kalamazoo River near Allegan, MI (d)	04108000	a1,470	1913-08
Kalamazoo River near Fennville, MI (d)	04108500	a 1,600	1919-36, 1918-93
Kalamazoo River at New Richmond, MI (d)	04108660	a1,980	1914-96
Portage River below Little Portage Lake near Munith, MI (d)	04109500	a55	1914-56
Orchard Creek at Munith, MI (d)	04110000	a49	1914-56
Portage River near Munith, MI (d)	04110500	118	1914-46
Red Cedar River near Williamston, MI (d)	04111379	163	1975-89
Sycamore Creek near Holt, MI (d)	04112850	80.6	1975-80, 1919-90, 1915-98
Mud Lake Drain at Lansing, MI (d)	04112904	4.28	1975-76
Carrier Creek near Lansing, MI (d)	04113097	12.1	1975-80
Sebewa Creek near Sunfield, MI (d)	04113500	24.1	1914-56
Looking Glass River near Eagle, MI (d)	04114500	281	1914-96
Fish Creek near Carson City, MI (d)	04115500	145	1916-38
Flat River at Smyrna, MI (d)	04116500*	528	1911-86
Thornapple River near Caledonia, MI (d)	04118000*	773	1911-38, 1912-82, 1914-94
Grand River at Eastmanville, MI (d)	04119300	a5,230	1976-77
Crockery Creek at Slocums Grove, MI (d)	04120000	--	1903
Grand River at Grand Haven, MI (d)	04120250	5,518	1914-96
Higgins Lake Outlet (head of Muskegon River) near Roscommon, MI (d)	04120500	49.2	1912-50
Muskegon River near Merritt, MI (d)	04121000*	355	1917-74
Little Muskegon River near Morley, MI (d)	04121900	121	1917-96
Muskegon River at Newaygo, MI (d)	04122000	a2,350	1918-20, 1911-93
Muskegon River at Muskegon, MI (d)	04122150	2,680	1914-96
Big Sable River near Freesoil, MI (d)	04123000*	115	1912-74
Manistee River near Grayling, MI (d)	04123500*	123	1913-74
Pine River near Le Roy, MI (d)	04125000*	128	1912-63
Manistee River near Manistee, MI (d)	04126000	1,677	1912-93
Little Manistee River near Freesoil, MI (d)	04126200*	178	1917-75
Little Manistee River near Stronach, MI (d)	04126500	a196	1931
Boardman River near Mayfield, MI (d)	04127000	182	1912-89
Boardman River at Traverse City, MI (d)	04127500	--	1913-04
Intermediate River at Bellaire, MI (d)	04127565	146	1991
Elk Lake near Elk Rapids, MI (e)	445256085240001	a410	1912-95

## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE HURON			
Burt Lake at Indian River, MI (e)	04128500	598	1942-8 <sup>7</sup>
Indian River at Indian River, MI (d)	04128500	598	1942-8 <sup>7</sup>
Pigeon River at Afton, MI (d)	04129500	139	1942-81
Cheboygan River near Cheboygan, MI (d)	04130000	889	1943-8 <sup>7</sup>
Mullett Lake near Cheboygan, MI (e)	04130000	889	1943-91
Rainy River near Onaway, MI (d)	04131000	75.7	1942-52
Rainy River near Ocqueoc, MI (d)	04131500*	87.9	1953-7 <sup>7</sup>
Black River near Cheboygan, MI (d)	04132000*	558	1943-74
Cheboygan Pond at Cheboygan, MI (e)	04132052	a1,500	1943-91
Thunder Bay River near Hillman, MI (d)	04132500*	232	1945-7 <sup>7</sup>
Upper South Branch Thunder Bay River near Lachine, MI (d)	04133000	171	1945-54
Thunder Bay River near Bolton, MI (d)	04133500	588	1945-8 <sup>7</sup>
North Branch Thunder Bay River near Bolton, MI (d)	04134000	184	1945-8 <sup>7</sup>
Lower South Branch Thunder Bay River near Hubbard Lake, MI (d)	04134500	146	1945-54
Thunder Bay River near Alpena, MI (d)	04135000	1,238	1901-0 <sup>7</sup> 1980-9 <sup>7</sup>
Au Sable River at Grayling, MI (d)	04135500*	110	1943-9 <sup>7</sup>
East Branch Au Sable River at Grayling, MI (d)	04135600	76.0	1958-84
Au Sable River at Bamfield, MI (d)	04137000	a1,420	1902-14
East Branch Au Gres River at McIvor, MI (d)	04138000*	a84	1951-74
Au Gres River near National City, MI (d)	04138500	154	1951-81
Houghton Creek near Lupton, MI (d)	04139000*	29.7	1950-73
Rifle River at "The Ranch" near Lupton, MI (d)	04139500	56.8	1950-71
Prior Creek near Selkirk, MI (d)	04140000*	21.4	1950-73
Rifle River at Selkirk, MI (d)	04140500*	117	1950-8 <sup>7</sup>
South Branch Shepards Creek near Selkirk, MI (d)	04141000*	1.15	1952-78
West Branch Rifle River near Selkirk, MI (d)	04141500*	a52	1952-6 <sup>9</sup>
Rifle River at Omer, MI (d)	04143000	364	1902-04
North Branch Kawawlin River near Kawawlin, MI (d)	04143500	101	1951-8 <sup>7</sup>
Shiawassee River at Linden, MI (d)	04143900	83.7	1968-94
Shiawassee River at Byron, MI (d)	04144000	365	1948-8 <sup>9</sup>
Shiawassee River near Fergus, MI (d)	04145000	637	1940-84, 1989-94
Bad River near Brant, MI (d)	04145500*	a89	1949-59
Flint River at Columbiaville, MI (d)	04146500	470	1932-3 <sup>9</sup> , 1948-52
Holloway Reservoir near Otisville, MI (e)	04147000	526	1954-91
Butternut Creek near Genesee, MI (d)	04147990	34.7	1970-84
Flint River at Genesee, MI (d)	04148000	a593	1931-52
Gilkey Creek near Flint, MI (d)	04148160	6.43	1970-84
Swartz Creek near Holly, MI (d)	04148200*	12.1	1956-75
Swartz Creek at Flint, MI (d)	04148300*	115	1970-84
Thread Creek near Flint, MI (d)	04148440*	54.4	1970-84
Brent Run near Montrose, MI (d)	04148720	20.8	1970-84
Flint River near Fosters, MI (d)	04149000	1,188	1940-84, 1988-92
Flint River near Alicia, MI (e)	04149500	--	1949-84
South Branch Cass River near Cass City, MI (d)	04150000	238	1949-8 <sup>7</sup>
Cass River at Cass City, MI (d)	04150500	359	1948-97
Cass River at Wahjamega, MI (d)	04150800	645	1969-94
Cass River at Vassar, MI (d)	04151000*	710	1910-28, 1949-70
Tobacco River at Beaverton, MI (d)	04152500	487	1948-82
Kinney Creek near Clare, MI (d)	04153000	a9	1935-36
Salt River near North Bradley, MI (d)	04153500	138	1934-71



## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE HURON--Continued			
Chippewa River near Midland, MI (d)	04154500*	597	1948-73
Pine River near Midland, MI (d)	04155500	a390	1934-38, 1948-97
Tittabawassee River at Freeland, MI (d)	04156500	a2,530	1903-10, 1912-36
State Drain near Sebawaing, MI (d)	04157500	67.3	1940-54
Columbia Drain near Sebawaing, MI (d)	04158000	33.9	1940-54, 1988-90
Pigeon River near Owendale, MI (d)	04158500	53.2	1953-82
Pigeon River near Pigeon, MI (d)	04159000	93.3	1947-52
Pigeon River near Caseville, MI (d)	04159010	125	1987-93
STREAMS TRIBUTARY TO ST. CLAIR RIVER			
Silver Creek near Jeddo, MI (d)	04159488	20.6	1978-82
Mill Creek near Abbottsford, MI (d)	04160000*	185	1947-64
Black River near Port Huron, MI (d)	04160050	684	1931, 1933-44
STREAMS TRIBUTARY TO LAKE ST. CLAIR			
Clinton River at Auburn Heights, MI (d)	04161000*	123	1935-40, 1957-82
Galloway Creek near Auburn Heights, MI (d)	04161100	17.9	1960-91
Paint Creek near Lake Orion, MI (d)	04161500*	38.5	1955-75, 1989-91
Clinton River at Sterling Heights, MI (d)	04161820	309	1979-83 1996-98
Red Run near Warren, MI (d)	04162010	--	1980-88
Bear Creek at Warren, MI (d)	04162500	17.3	1954-57
Big Beaver Creek near Warren, MI (d)	04162900	--	1959-88
Big Beaver Creek at Warren, MI (d)	04163000	25.2	1954-58
Plum Brook near Utica, MI (d)	04163500	22.9	1954-66
Red Run near Cady, MI (e)	04163900	--	1980-82
North Branch Clinton River at Almont, MI (d)	04164010*	9.56	1963-68
North Branch Clinton River near Romeo, MI (d)	04164050*	49.7	1965-69
North Branch Clinton River near Meade, MI (d)	04164150*	89.6	1968-72
Coon Creek near Armada, MI (d)	04164200*	10.0	1966-70
Tupper Brook at Ray Center, MI (d)	04164250*	8.62	1960-64
Highbank Creek near Armada, MI (d)	04164350*	14.9	1965-70
East Branch Coon Creek near New Haven, MI (d)	04164360*	36.1	1968-72
Deer Creek near Meade, MI (d)	04164400*	12.7	1960-65
McBride Drain near Macomb, MI (d)	04164450*	5.79	1960-64
Middle Branch Clinton River near Macomb, MI (d)	04164600*	22.2	1965-69
Middle Branch Clinton River at Macomb, MI (d)	04164800*	41.0	1963-68, 1970-82
Middle Branch Clinton River near Mount Clemens, MI (d)	04165000	a51	1947-49
Gloede Ditch near Waldenburg, MI (d)	04165200*	16.0	1959-64
Clinton River By-Pass below weir at Mount Clemens, MI (e)	04165556	--	1980-83
Clinton River By-Pass at mouth at Mount Clemens, MI (e)	04165557	--	1990-83
STREAMS TRIBUTARY TO DETROIT RIVER			
Lower River Rouge at Dearborn, MI (d)	04168500	91.9	1931-33
STREAMS TRIBUTARY TO LAKE ERIE			
Hayes Creek at Commerce, MI (d)	04169000	a8	1946-51
Huron River at Commerce, MI (d)	04169500*	57.3	1946-75
Davis Creek near Whitmore Lake, MI (d)	04171000	65.8	1953-54
Ore Creek near Brighton, MI (d)	04171500	a31	1951-68
Portage River near Pinckney, MI (d)	04172500*	79.1	1945-71

## DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Period of record
STREAMS TRIBUTARY TO LAKE ERIE--Continued			
Huron River near Dexter, MI (d)	04173000*	522	190 <sup>4</sup> , 1946-7 <sup>7</sup> , 1976-77
Huron River at Dexter, MI (e)	04174000	--	1904-16
Huron River at Ypsilanti, MI (d)	04174800	807	1974-8 <sup>4</sup> , 1990-94
Willow Run near Rawsonville (d)	04174950	--	1986-87
Stony Creek at Oakville, MI (d)	04175340	68.0	1970-81
Huron River at Flat Rock, MI (d)	04175100	851	1904-11
Huron River at Flat Rock, MI (e)	04175100	851	1912-22
River Raisin near Tecumseh, MI (d)	04175700	267	1956-80
South Branch River Raisin at Adrian, MI (d)	04175957	164	1992-95
Saline River near Saline, MI (d)	04176400*	94.6	1966-77

## DISCONTINUED SURFACE-WATER-QUALITY STATIONS

The following continuous-record surface-water-quality stations in Michigan have been discontinued. Daily records of temperature, specific conductance, or sediment were collected and published for the record shown for each station. Information regarding these stations may be obtained from the District office at the address given on the back side of the title page of this report.

[Type of record: Temp. (temperature), S.C. (specific conductance), Sed. (sediment). Letter (a) before drainage area means approximately.]

Station name	Station number	Drainage area (mi <sup>2</sup> )	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE SUPERIOR				
Washington Creek at Windigo, MI	04001000	13.2	Temp.	1965-91
Black River near Bessemer, MI	04031000	200	Temp.	1955-71
Ontonagon River near Rockland, MI	04040000	1,340	Temp., S.C.	1975-81
Sturgeon River near Chassell, MI	04043004	723	Temp., S.C.	1978-81
Trap Rock River near Lake Linden, MI	04043050	28.0	Temp.	1972-83
Salmon Trout River near Big Bay, MI	04043250	37.8	Temp.	1971-73
Tahquamenon River near Paradise, MI	04045500	790	Temp., S.C.	1975-81
STREAMS TRIBUTARY TO ST. MARYS RIVER				
St. Marys River above Sault Ste. Marie, MI	04045580	a80,900	Temp., S.C.	1974-81
STREAMS TRIBUTARY TO LAKE MICHIGAN				
Black River near Garnet, MI	04046000	a28	Temp.	1952-75 1977-78
Manistique River above Manistique, MI	04057004	a1,445	Temp., S.C.	1976-81
Manistique River at Manistique, MI	04057005	a1,450	Temp., S.C.	1975
Middle Branch Escanaba River at Humboldt, MI	04057800	46.0	Temp.	1973-78
Greenwood Afterbay near Greenwood, MI	04057812	67.4	Temp.	1973-86
Greenwood Diverson near Greenwood, MI	04057813	--	Temp.	1973-82
Greenwood Release near Greenwood, MI	04057814	67.4	Temp.	1973-82
Middle Branch Escanaba River near Greenwood, MI	04057820	73.3	Temp.	1973-78
Black River near Republic, MI	04057900	34.4	Sed.	1962-63, 1975, 1962-68
Middle Branch Escanaba River near Ishpeming, MI	04058000	128	Temp.	1962-75, 1977-82
Green Creek near Palmer, MI	04058120	8.42	Temp., Sed.	1975, 1979-80
Green Creek near Princeton, MI	04058130	13.8	Temp.	1977-81
Schweitzer Creek near Palmer, MI	04058200	23.6	Temp.	1962-71
Goose Lake Outlet near Sands Station, MI	04058400	37.5	Temp.	1977-81
East Branch Escanaba River at Gwinn, MI	04058500	124	Temp. Sed.	1955-64 1962-63
Ford River near Hyde, MI	04059500	450	Temp. S.C.	1956-81 1975-81
Paint River near Alpha, MI	04062000	631	Temp.	1953-54, 1956-57
Peshekee River near Champion, MI	04062200	133	Temp.	1972, 1964-78
Michigamme River near Witch Lake, MI	04062400	316	Temp., Sed.	1965-69
East Branch Sturgeon River at Hardwood, MI	04065397	90.8	Temp.	1978-83
Sturgeon River near Foster City, MI	04065500	237	Temp.	1957-80
Pine Creek near Iron Mountain, MI	04065600	16.8	Temp.	1972-81
Beebe Creek near Hillsdale, MI	04096272	42.4	Sed.	1975
Sand Creek at Litchfield, MI	04096312	20.6	Temp., Sed. Temp., Sed.	1976-77 1975-76, 1977
Soap Creek near Litchfield, MI	04096325	10.9	Temp., Sed.	1975-76, 1977

## DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued				
St. Joseph River at Clarendon, MI	04096340	144	Temp., Sed.	1975-76, 1977
St. Joseph River at Niles, MI	04101500	3,666	Temp., S.C.	1979-84
Paw Paw River near Paw Paw, MI	04102320	195	Temp., Sed.	1981-82
Paw Paw River near Hartford, MI	04102420	311	Sed.	1981-82
Black River near Bangor, MI	04102700	83.6	Temp., Sed.	1981-82
Kalamazoo River at Comstock, MI	04106000	a1,010	Temp.	1969-75
Portage Creek near Kalamazoo, MI	04106300	22.4	Temp., S.C.	1968-71
West Fork Portage Creek at Kalamazoo, MI	04106400	18.7	Temp., S.C.	1971, 1972-73
Portage Creek at Kalamazoo, MI	04106500	46.8	S.C. Temp., S.C.	1968, 1972-75,
Kalamazoo River near Cooper Center, MI	04106770	1,248	Temp. Temp., S.C.	1976-86 1968, 1970, 1969, 1971-75
Kalamazoo River at Saugatuck, MI	04108690	a2,020	S.C. Temp., S.C.	1974, 1975-81
Grand River near Eaton Rapids, MI	04111000	661	Temp.	1964-74, 1976-77
Grand River at Lansing, MI	04113000	a1,230	Temp.	1964, 1967-68, 1970-73
Grand River at Portland, MI	04114000	1,385	Temp.	1964-68
Grand River at Eastmanville, MI	04119300	a5,230	Temp., S.C.	1979-83
Muskegon River at Evart, MI	04121500	a1,450	Temp.	1957-83
Little Muskegon River near Morley, MI	04121900	138	Temp.	1967-83
Muskegon River near Bridgeton, MI	04122030	a2,420	Temp., S.C.	1975-81
Pere Marquette River near Scottville, MI	04122500	681	Temp.	1968-83
Manistee River near Grayling, MI	04123500	123	Temp.	1957-77
East Branch Pine River near Tustin, MI	04124500	60	Temp.	1952-63
Pine River near LeRoy, MI	04125000	128	Temp.	1953-63
Pine River near Luther, MI	04125200		Sed.	1967-70
Silver Creek near Luther, MI	04125210		Sed.	1969-70
Poplar Creek near Hoxeyville, MI	04125350		Sed.	1969-70
Pine River near Dublin, MI	04125450		Sed.	1968-70
Pine River near Hoxeyville, MI	04125500	251	Temp.	1952-63
Pine River near Wellston, MI	04125510		Sed.	1967-70
Little Manistee River near Freesoil, MI	04126200	178	Temp.	1957-77
Manistee River at Manistee	04126520	1,928	Temp., S.C.	1975-81
Boardman River at Brown Bridge Road nr Mayfield	04126970	141	Temp., S.C.	1998
Boardman River near Mayfield, MI	04127000	182	Temp.	1962-77
Boardman River at Traverse City	04127499	283	Temp., S.C.	1998
Jordan River near East Jordan, MI	04127800	67.9	Temp.	1967-83
STREAMS TRIBUTARY TO LAKE HURON				
Sturgeon River near Wolverine, MI	04128000	198	Temp.	1959-83
Pigeon River near Vanderbilt, MI	04129000	62.6	Temp.	1951-66
Cheboygan River at Cheboygan, MI	04132052	a1,500	Temp., S.C.	1975-81
Thunder Bay River near Alpena, MI	04135000	1,238	Temp., S.C.	1980-85
Thunder Bay River at Alpena, MI	04135020	a1,240	Temp., S.C.	1979

## DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi <sup>2</sup> )	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE HURON--Continued				
Au Sable River at Grayling, MI	04135500	110	Temp.	1953-8 <sup>^</sup>
South Branch Au Sable River near Luzerne, MI	04135700	401	Temp.	1967-8 <sup>^</sup>
East Branch Au Gres River at McIvor, MI	04138000	a84	Temp.	1952-6 <sup>^</sup>
Au Gres River near National City, MI	04138500	154	Temp.	1952-5 <sup>^</sup>
Houghton Creek near Lupton, MI	04139000	29.7	Temp.	1950-6 <sup>^</sup>
Rifle River near Lupton, MI	04139500	56.8	Temp.	1950-71
Prior Creek near Selkirk, MI	04140000	21.4	Temp.	1951-6 <sup>^</sup>
Rifle River at Selkirk, MI	04140500	117	Temp.	1951-7 <sup>^</sup>
West Branch Rifle River near Selkirk, MI	04141500	a52	Temp.	1952-61
Rifle River near Sterling, MI	04142000	a320	Sed.	196 <sup>^</sup> ,
			Temp., S.C.	1970-7 <sup>^</sup> , 1975-81
Shiawassee River at Byron, MI	04144000	365	Temp.	1962-81
Shiawassee River at Owosso, MI	04144500	538	Sed.	1966-7 <sup>^</sup>
Cass River at Frankenmuth, MI	04151500	841	Sed.	1966-7 <sup>^</sup>
Pigeon River near Caseville	04159010	125	Temp., S.C.	1978-81
STREAMS TRIBUTARY TO ST. CLAIR RIVER				
St. Clair River at Port Huron, MI	04159130	a222,400	Temp., S.C.	1978-81
Black River near Jeddo, MI	04159492	464	Temp.	1997
Black River at Fargo, MI	04159500	480	Sed.	196 <sup>^</sup> ,
			Temp.	1979-8 <sup>^</sup>
STREAMS TRIBUTARY TO LAKE ST. CLAIR				
Clinton River near Drayton Plains, MI	04160900	79.2	Temp.	1962-74
Clinton River at Sterling Heights, MI	04161820	309	Temp.	1996-9 <sup>^</sup>
Clinton River near Fraser, MI	04164000	444	Sed.	196 <sup>^</sup>
Clinton River at Mount Clemens, MI	04165500	734	Temp., S.C.	1975-81
STREAMS TRIBUTARY TO DETROIT RIVER				
Detroit River at Detroit, MI	04165700	a228,800	Temp., S.C.	1974-81
STREAMS TRIBUTARY TO LAKE ERIE				
River Raisin near Manchester, MI	04175600	132	Temp.	1997
River Raisin near Monroe, MI	04176500	1,042	Temp., Sed.	1966-7 <sup>^</sup>
			Temp., S.C.	1978-81

## WATER RESOURCES DATA - MICHIGAN, 2000

### INTRODUCTION

The Water Resources Division of the U.S. Geological Survey, in cooperation with State agencies, obtains a large amount of data pertaining to the water resources of Michigan each water year. These data, accumulated during many water years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the Geological Survey, the data are published annually in this report series entitled "Water Resources Data - Michigan."

This report includes records on both surface and ground water in the State. Specifically, it contains: (1) Discharge records for 147 streamflow-gaging stations, 30 crest-stage partial-record stations and 76 miscellaneous sites; (2) stage only records for 2 stream-gaging stations and 25 lake-gaging stations; (3) stage and content records for 1 reservoir; (4) water-quality records for 29 streamflow-gaging stations, 1 lake-gaging station, and 34 ground water special-study sites; (5) water-level records for 40 ground-water wells. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

This series of annual reports for Michigan began with the 1961 water year with a report that contained only data relating to the quantities of surface water. For the 1964 water year, a similar report was introduced that contained only data relating to water quality. Beginning with the 1975 water year, the report format was changed to present, in one volume, data on quantities of surface water, quality of surface and ground water, and ground-water levels.

Prior to introduction of this series and for several water years concurrent with it, water-resources data for Michigan were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States, Part 4." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply Papers may be consulted in the libraries of the principal cities of the United States and may be purchased from U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225.

Publications similar to this report are published annually by the Geological Survey for all states. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-00-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephone (517) 887-8903.

### COOPERATION

The U.S. Geological Survey and agencies of the State of Michigan have had cooperative agreements for the collection of water-resource records since 1930. Organizations that assisted in collecting the data in this report through cooperative agreement with the Survey are:

Michigan Department of Environmental Quality, Russell Harding, Director, through Land and Water Management Division, Richard A. Powers, Chief.

Michigan Department of Natural Resources, K. L. Cool, Director.

Michigan Department of Transportation, James R. DeSana, Director.

Assistance with funds or services was given by the U.S. Army Corps of Engineers in collecting records for 6 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, and U.S. Department of Commerce.

The following organizations aided in collecting records:

Macomb County Board of Supervisors; Oakland County Drain Commission; Washtenaw County Drain Commission; Delta Township (Eaton County); Huron County; Kalamazoo County; Otsego County; Washtenaw County; Wayne County; Huron-Clinton Metropolitan Authority; Ann Arbor, Battle Creek, Cadillac, Coldwater, Flint, Imlay City, Kalamazoo, Norway, Portage, and Sturgis; American Aggregates Co.; Consumers Energy; Cleveland Cliffs Iron Co.; Dow Chemical Co.; French Paper Co.; Lansing Board of Water and Light; Mead Corporation; Indiana Michigan Power Co.; Pharmacia & Upjohn; STS Hydropower, Ltd; Swift-Eckrich, Inc.; Upper Peninsula Power Co.; White's Bridge Hydro Co.; Wisconsin-Electric Power Co.; and Wolverine Power Supply Cooperative, Inc.

Organizations that supplied data are acknowledged in the station descriptions.

## WATER RESOURCES DATA - MICHIGAN, 2000

## SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

In the Upper Peninsula, streamflow of the Sturgeon River near Sidnaw (fig. 1) began the year below normal, equalling the 25<sup>th</sup> percentile in December. Unseasonably warm temperatures that occurred in late-February through early-March were accompanied by rapid snowmelt and runoff; streamflow exceeded the 75<sup>th</sup> percentile in February and March before falling below the 25<sup>th</sup> percentile in April and May, as a result of the early runoff. Streamflow recovered to about average in June and somewhat above average in July, before falling below average in August and below the 25<sup>th</sup> percentile in September. The 2000 annual mean discharge of 165 ft<sup>3</sup>/s (cubic feet per second) is below the 25<sup>th</sup> percentile of 1961-1990 annual median discharge of 218 ft<sup>3</sup>/s as well as being below the period of record (1913-1999) annual mean discharge of 210 ft<sup>3</sup>/s.

Drought-like hydrologic conditions prevailed in the eastern Upper Peninsula throughout 2000. Streamflow of the Tahquamenon River near Paradise began the year about average in October, but was below average in November through January. Warm temperatures accompanied by rapid snowmelt and runoff occurred in the Tahquamenon River basin in late-February and early-March and streamflow was average in February and considerably above-average in March. The earliest peak flow for period of record (1953-2000) occurred March 10. Lack of precipitation prevailed from April through September resulting in below-average streamflow through the period and a new period of record instantaneous-low streamflow of 136 ft<sup>3</sup>/s occurred August 29.

In the northern Lower Peninsula, streamflow of the Muskegon River at Evart (fig. 1) was below normal in October, and below the 25<sup>th</sup> percentile in November through January. Unseasonably-warm temperatures occurred in late-February and early-March and were accompanied by rapid snowmelt of a lighter-than-normal snowpack. Near-normal streamflow occurred in February and March before falling below the 25<sup>th</sup> percentile in April. Streamflow in May was above the 75<sup>th</sup> percentile in response to heavy precipitation that occurred mid-month. Streamflow was above-average in June, dropping to about the 25<sup>th</sup> percentile in July, recovering to near average in August, and dropping below the 25<sup>th</sup> percentile in September. The 2000 annual mean discharge of 829 ft<sup>3</sup>/s was about 25 percent less than the 1961-1990 annual median discharge of 1,069 ft<sup>3</sup>/s.

In the southern Lower Peninsula, streamflow of the Red Cedar River at East Lansing (fig. 1) was below the 25<sup>th</sup> percentile in October through January, recovering to about the 25<sup>th</sup> percentile in February, before falling much below the 25<sup>th</sup> percentile in March and April. Abundant rainfall, which began in May and continued through the remainder of the water year, resulted in streamflow above the 75<sup>th</sup> percentile in May through September. The 2000 annual mean discharge of 154 ft<sup>3</sup>/s was about 25 percent less than the 1961-1990 annual median discharge of 208 ft<sup>3</sup>/s.

Precipitation patterns resulted in some unusual conditions in the southern Lower Peninsula during the 2000 water year. A number of stations which have operated continuously for as long as 48 years had new monthly mean minimum flows during one or more months from October to April. Heavy precipitation in subsequent months resulted in monthly mean maximum flows in September at several stations in the River Rouge Basin, which have operated continuously for as long as 70 years.

Climatic conditions in the northern and southern parts of the Great Lakes-St. Lawrence River system were quite different in the 2000 water year. Normal to greater than normal precipitation occurred in the southern part of the region throughout the late-spring and summer months and continued into the fall. In contrast, the northern half of the Lake Michigan and Huron Basins received less than normal precipitation during the period. The western part of the Lake Superior Basin received near normal precipitation while the eastern part of the Lake Superior Basin was at near-drought conditions, continuing a trend begun in June 1998. The National Weather Service indicated that the snowpack water content in the Lake Superior Basin during the winter of 1999-2000 was substantially below normal, which resulted in less than normal streamflow into the Basin during spring runoff.

Near normal precipitation fell in all the Great Lakes Basins except Lake Superior during the 2000 water year, but monthly water levels in the Great Lakes were typically lower in 2000 than in 1999. The exception was Lake Ontario, where monthly water levels were higher than 1999 levels the entire year. Monthly water levels in Lakes Michigan, Huron, St. Clair, and Erie trended lower throughout the year when compared with the previous year, with the following exceptions; Lake Michigan level was higher in July, and Lake Erie level was higher in July, August, and September. Monthly water level in Lake Superior differed from the previous year as follows; higher from October through April, with the exception of February, and lower from May through September.

At the end of September, Great Lakes water levels varied from long-term (1918-99) September mean levels as follows; Lakes Michigan and Huron were about 1.5 ft lower; Lake Superior was about 1.0 ft lower; Lake St. Clair was about 0.6 ft lower; Lake Erie was about 0.2 ft lower; and Lake Ontario was about 0.2 ft higher. The water level in Lakes Michigan and Huron is about 4.2 ft lower than record high levels recorded in 1986, although the level remains about 1.1 ft higher than the minimum monthly level for September, which occurred during the drought period in 1964. No new record high- or low-water levels on any of the Great Lakes were recorded during the year.

Water Quality

Surface-water-quality data were collected at a number of sites in 2000. Daily records of water temperature were collected at two stations in the Upper Peninsula. Daily records of one or more water-quality parameters including specific conductance, pH, water temperature, and dissolved oxygen were collected at 17 stations in the northern Lower Peninsula and 8 stations in the southeastern Lower Peninsula.



## WATER RESOURCES DATA - MICHIGAN, 2000

Ground Water

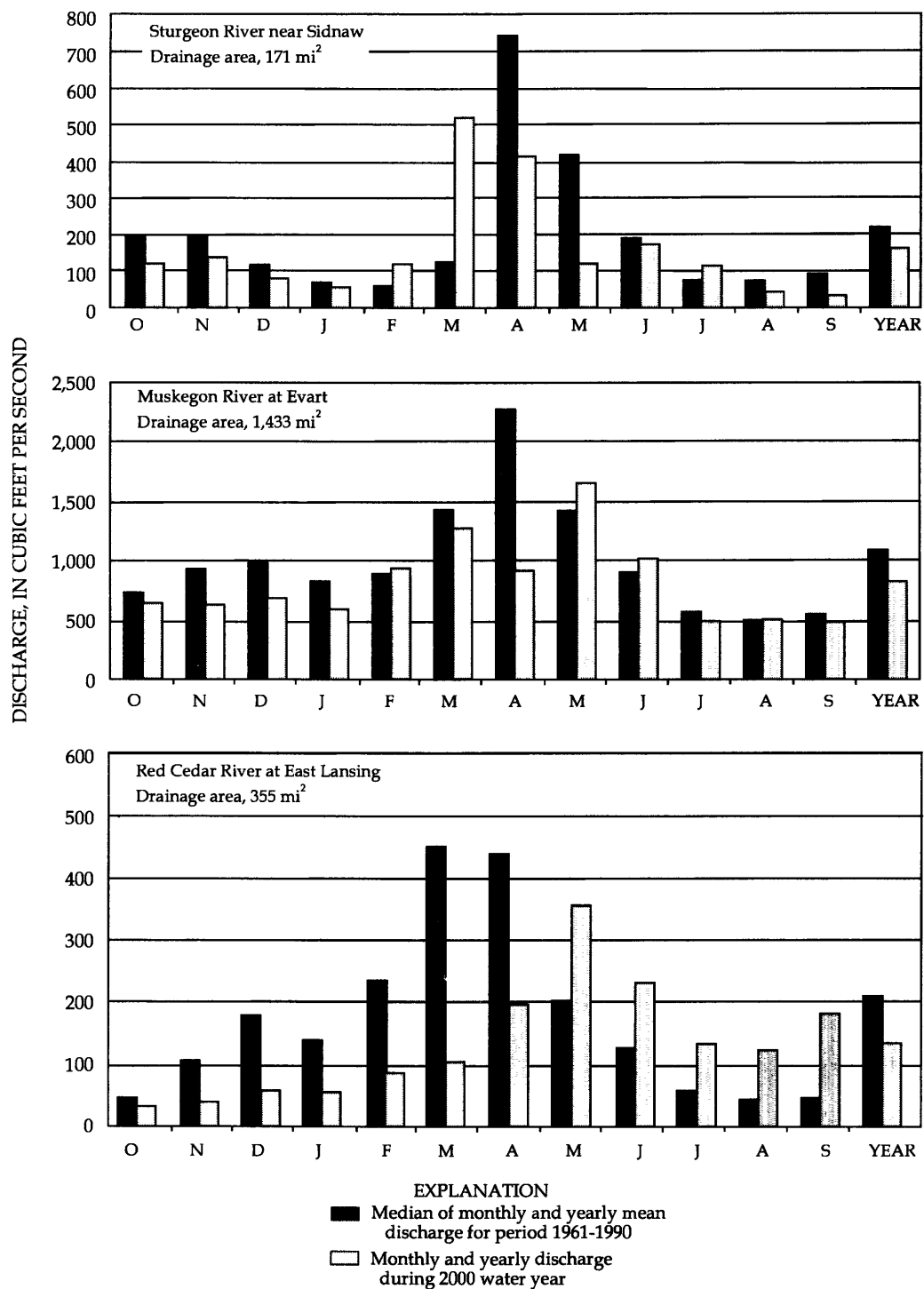
Pleistocene glacial deposits cover most of the State. Outwash sand and gravel in these deposits form the most productive aquifers, although lacustrine sand aquifers are also productive. Till deposits formed of poorly-sorted, relatively impermeable mixtures of clay, silt, sand, and gravel tend to be poor aquifers; clay deposits generally yield little or no water. In most areas, glacial deposits are less than 200 ft thick, although deposits greater than 800 ft thick are found in some areas of the northern Lower Peninsula.

Sandstone, limestone, and dolomite are the principal bedrock aquifers. Where bedrock aquifers are hydraulically connected to overlying freshwater-bearing units, they yield freshwater. However, when bedrock aquifers are isolated from overlying freshwater-bearing units by impermeable deposits (confining units) such as till, clay, or shale, they typically yield brackish, saline, or briny water. Annual recharge to aquifers in Michigan ranges from 3 to 18 in. and is derived from precipitation, which averages 31 in. annually.

Ground-water levels were measured at 40 wells statewide during the 2000 water year (fig. 9). Distribution of the wells equipped with continuous recorders primarily defines localized ground-water conditions. In addition to wells equipped with continuous recorders, periodic measurements were made at several other wells located throughout the state. Three of these wells are far from major municipal, industrial, or agricultural ground-water users and, as a result, reflect regional ground-water conditions.

Ground-water levels typically follow seasonal precipitation patterns with lows occurring during the mid- to late-summer months followed by recovery in late-winter and spring. New period of record low-water levels were measured in 17 wells statewide during the 2000 water year. Although several of the wells have a fairly-short period of record, many have at least a decade of previous record available for comparison. In Kalamazoo County, 10 of 18 wells measured had new period of record low water levels, as did wells located in Huron and Monroe Counties. Above normal precipitation occurred in much of the southern part of the Lower Peninsula in April through July, and again in September, and water levels in many of the wells reflect above-normal recharge during months that are typically periods when levels decline. Notably, water levels in several wells in the southern Lower Peninsula continued to decline throughout much of the year, but that phenomena could be the result of modified pumping strategies by large municipal users, or localized deficiencies in precipitation. None of the wells measured had period of record high levels.

## WATER RESOURCES DATA-MICHIGAN, 2000



**Figure 1.** Discharge during 2000 water year compared with median discharge for period 1961-90 for three representative stations.

## WATER RESOURCES DATA - MICHIGAN, 2000

The principal aquifers in Michigan are glacial outwash deposits and sandstone, limestone, and dolomite bedrock. The following table lists the aquifers and some of their characteristics.

Aquifer name and description	Well characteristics		Remarks
	Depth, in feet	Yield, in gallons per minute	
	Common range	Common range	
Glacial aquifers:			
Outwash: Mostly sand and gravel.	25-200	1-1,000	Water generally hard; iron concentrations common; deep wells may produce salty water in places.
Lacustrine sand: Mostly sand, some gravel.	25-100	80-500	Used for domestic supply in Saginaw Bay and Detroit areas; is salty in places at depth
Till: Intermixed clay, silt, sand, gravel and boulders; abundant sand and gravel lenses in some areas.	25-200	5-200	Primary source of domestic supply in western Upper Peninsula.
Bedrock aquifers:			
Saginaw Formation: Sandstone, siltstone, some shale, limestone, and coal	25-300	100-300	One of Michigan's most important bedrock aquifers; water generally hard; salty in places at depth.
Marshall Formation: Sandstone and siltstone.	25-200	100-500	Another of Michigan's important bedrock aquifers; salty in places and at depth.
Silurian-Devonian rocks: Limestone and dolomite; some shale and sandstone.	25-150	10-300	Important aquifer in parts of eastern Upper Peninsula; water commonly hard.
Cambrian-Ordovician rocks: Sandstone, limestone, and dolomite.	25-150	10-100	Important aquifer in eastern Upper Peninsula; water commonly very hard; salty in places and at depth.
Precambrian sandstone: Sandstone interbedded with siltstone.	25-400	5-50	Important aquifer in western Upper Peninsula; salty in places.

Natural chemical characteristics of ground water in Michigan are determined primarily by the geologic environment through which the water flows. Natural ground water generally is suitable for human consumption and most other uses. Water from glacial deposits, at places, contains elevated concentrations of iron (2.5 to 5.0 mg/L (milligrams per liter)); water from carbonate rocks is likely to be very hard (400 to 900 mg/L as calcium carbonate); and water from the Saginaw Formation in the Saginaw Bay-Thumb area commonly is highly mineralized (2,000 to 80,000 mg/L of dissolved solids). Throughout the State, salty water underlies and is in contact with freshwater at depths ranging from about 100 ft to about 900 ft. Average dissolved-solids concentration of water from bedrock (535 mg/L) is about twice as great as the average concentration from glacial deposits (241 mg/L) (Cummings, 1980).

## REFERENCES CITED

Cummings, T.R., 1980, Chemical and physical characteristics of natural ground waters in Michigan--A preliminary report: U.S. Geological Survey Open-File Report 80-953, 34 p.

## WATER RESOURCES DATA - MICHIGAN, 2000

### SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 50 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by human activities.

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within four of the Nation's largest river basins--the Mississippi, Columbia, Colorado, and Rio Grande. The network consists of 39 stations. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment Program (NAWQA); (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical climate of precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to accomplish the following objectives; (1) Provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 191 precipitation chemistry monitoring sites. (2) Provide the mechanism to evaluate the effectiveness of the significant reduction in SO<sub>2</sub> emissions that began in 1975 as implementation of the Clean Air Act Amendments (CAAA) occurred. (3) Provide the scientific basis and nationwide evaluation mechanism for implementation of the Phase II CAAA emission reductions for SO<sub>2</sub> and NO<sub>x</sub> scheduled to begin in 2000.

Data from the network, as well as information about individual sites, are available through the world wide web at:

<http://nadp.sws.uiuc.edu/>

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; provide an improved understanding of the primary natural and human factors affecting the observed conditions and trends; and provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 53 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies.

Additional information about the NAWQA Program is available through the world wide web at:

[http://www.rvares.er.usgs.gov/nawqa/nawqa\\_home.html](http://www.rvares.er.usgs.gov/nawqa/nawqa_home.html)

### EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 2000 water year that began October 1, 1999, and ended September 30, 2000. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, stage and content data for lakes and reservoirs, water-quality data for surface water, and ground-water level data. The locations of the stations and wells where the data were collected are shown in figures 4-9. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

#### Station Identification Numbers

Each data station, whether streamsite, lake, or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The systems used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for all surface-water stations except some lakes and the "latitude-longitude" system is used for wells and lakes.

## WATER RESOURCES DATA - MICHIGAN, 2000

## Downstream Order System

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary with respect to the stream to which it is immediately tributary is indicated by an indentation in the "List of Stations" in the front of this report. Each indentation represents one rank. This downstream order and system of indentation shows which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete eight-digit number for each station, such as 04037500, which appears just to the left of the station name, includes the two-digit Part number "04" plus the six-digit downstream-order number "037500." The Part number designates the major river basin; for example, Part "04" is the St. Lawrence River basin.

## Latitude-Longitude System

The identification numbers for wells are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a 1-second grid. This site-identification number, once assigned, is a pure number and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description. (See figure 2.)

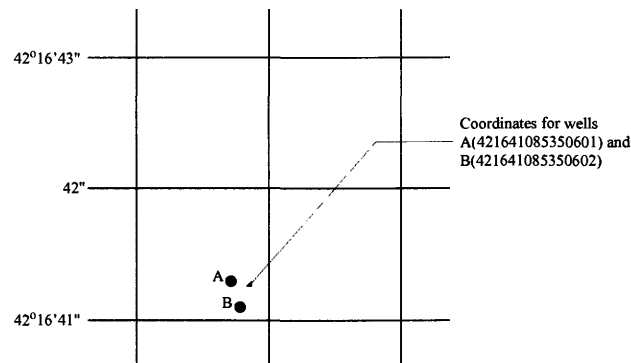


Figure 2.--System for numbering wells (latitude and longitude).

## Local Well Numbering System

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre tract, a sequential number designation follows the letter designations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

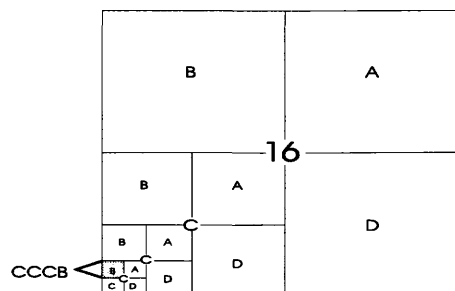


Figure 3.--Local well numbering system in Michigan.

## WATER RESOURCES DATA - MICHIGAN, 2000

Records of Stage and Water Discharge

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean daily discharges may be computed for anytime, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-month contents commonly are published for such stations, they are referred to as "daily stations."

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "Crest-stage partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report. Location of all complete-record water-discharge stations for which data are given in this report are shown in figures 4 and 5.

## Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relationships between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relationship between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Continuous records of stage are obtained with analog recorders that trace continuous graphs of stage, with digital recorders that punch stage values on paper tapes at selected time intervals, or with electronic data loggers. Measurements of discharge are made with current meters using methods adopted by the Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A6.

In computing discharge records, results of individual measurements are plotted against the corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of the current-meter measurements, the curves are extended using: (1) logarithmic plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow over dams or weirs; or (4) step-backwater techniques.

Discharges are computed by applying the stages (gage heights) to the stage-discharge curves or tables. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the discharge is determined by the shifting-control method, in which correction factors based on the individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control. For some stations, formation of ice in the winter may so obscure the stage-discharge relations that daily mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

At some stream-gaging stations, the stage-discharge relation is affected by the backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage.

At some gaging stations, acoustic velocity meter (AVM) systems are used to compute discharge. The AVM system measures the stream's velocity at one or more paths in the cross section. Coefficients are developed to relate this path velocity to the mean velocity in the cross section. Because the AVM sensors are fixed in position, the adjustment coefficients generally vary with stage. Cross-sectional area curves are developed to relate stage, recorded as noted above, to cross section area. Discharge is computed by multiplying path velocity by the appropriate stage related coefficient and area.

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves or tables defining the relationship of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relationship changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relationship. Even when this is done, the contents computed may become increasingly in error as the lapsed time since the last survey increases. Discharges over lake or reservoir spillways are computed from stage-discharge relationships much as other stream discharges are computed.

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For some gaging stations, there are periods when no gage-height record is obtained, or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or for various reasons fails to operate properly. For such periods, the daily discharges are estimated from the recorded range in stage, previous or following record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous or following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the next two sections, "Data Presentation" (REMARKS paragraph) and "Identifying Estimated Daily Discharge."

### Data Presentation

The records published for each continuous-record surface-water discharge station (gaging station) consist of four parts, the manuscript or station description; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; and a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration.

#### Station manuscripts

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

**LOCATION.**--Information on locations is obtained from the most accurate maps available. The location of the gaging station with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

**DRAINAGE AREA.**--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

**PERIOD OF RECORD.**--This indicates the period for which records have been published for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not and whose location was such that flow at it can reasonably be considered equivalent to flow at the present station.

**REVISED RECORDS.**--Because of new information, published records occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all the reports in which revisions have been published for the station and the water years to which the revisions apply. If a revision did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

**GAGE.**--The type of gage in current use, the datum of the current gage referred to sea level (see glossary), and a condensed history of the types, locations, and datums of previous gages are given under this heading.

**REMARKS.**--All periods of estimated daily-discharge are flagged in the daily-discharge table. (See next section, "Identifying Estimated Daily Discharge".) The REMARKS paragraph is used to present information relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

**COOPERATION.**--Records provided by a cooperating organization or obtained for the U.S. Geological Survey by a cooperating organization are identified here.

**EXTREMES OUTSIDE PERIOD OF RECORD.**--Included here is information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the U.S. Geological Survey.

**REVISIONS.**--If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.



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Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a "Revised Records" entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the District Office (address given on the back of the title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data for a discontinued station were obtained by computer retrieval, the data would be current and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the "Remarks" and in the inclusion of a skeleton stage-capacity table when daily contents are given.

Headings for AVERAGE DISCHARGE, EXTREMES FOR PERIOD OF RECORD, AND EXTREMES FOR CURRENT YEAR are presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate.

#### Data table of daily mean values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed "TOTAL" gives the sum of the daily figures for each month; the line headed "MEAN" gives the average flow in cubic feet per second for the month; and the lines headed "MAX" and "MIN" give the maximum and minimum daily mean discharges, respectively, for month. Discharge for the month also is usually expressed in cubic feet per second per square mile (line headed "CFSM"); or in inches (line headed "IN."); or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

#### Statistics of monthly mean data

A tabular summary of the mean (line headed "MEAN"), maximum (line headed "MAX"), and minimum (line headed "MIN") of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as "FOR WATER YEARS \_\_\_\_ - \_\_\_\_, BY WATER YEAR (WY)," and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

#### Summary statistics

A table titled "SUMMARY STATISTICS" follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, "WATER YEARS \_\_\_\_ - \_\_\_\_, " will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (See line headings below.), except for the "ANNUAL 7-DAY MINIMUM" statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted with footnotes or in the REMARKS paragraph of the manuscript. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designate-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

**ANNUAL TOTAL.**--The sum of the daily mean values of discharge for the year. At some stations the annual total discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

**ANNUAL MEAN.**--The arithmetic mean of the individual daily mean discharges for the year noted or for the designated period. At some stations the yearly mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

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**HIGHEST ANNUAL MEAN.**--The maximum annual mean discharge occurring for the designated period.

**LOWEST ANNUAL MEAN.**--The minimum annual mean discharge occurring for the designated period.

**HIGHEST DAILY MEAN.**--The maximum daily mean discharge for the year or for the designated period.

**LOWEST DAILY MEAN.**--The minimum daily mean discharge for the year or for the designated period.

**ANNUAL 7-DAY MINIMUM.**--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The data shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

**INSTANTANEOUS PEAK FLOW.**--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District Office. (See address on back of title page of this report.)

**INSTANTANEOUS PEAK STAGE.**--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

**INSTANTANEOUS LOW FLOW.**--The minimum instantaneous discharge occurring for the water year or for the designated period.

**ANNUAL RUNOFF.**--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

**10 PERCENT EXCEEDS.**--The discharge that has been exceeded 10 percent of the time for the designated period.

**50 PERCENT EXCEEDS.**--The discharge that has been exceeded 50 percent of the time for the designated period.

**90 PERCENT EXCEEDS.**--The discharge that has been exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of annual maximum stage and discharge at crest-stage partial-record stations, and the second is a table of discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

### Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated".

### Accuracy of the Records

The accuracy of streamflow records depends primarily on: (1) The stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements; and (2) the accuracy of measurements of stage, measurements of discharge, and interpretation of records.

The accuracy attributed to the records is indicated under "REMARKS." "Excellent" means that about 95 percent of the daily discharges are within 5 percent of their true values; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft<sup>3</sup>/s; to the nearest tenth between 1.0 and 10 ft<sup>3</sup>/s; to whole numbers between 10 and 1,000 ft<sup>3</sup>/s; and to 3 significant figures for more than 1,000 ft<sup>3</sup>/s. The number of significant figures used is based solely on the magnitude of the discharge value.

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Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff, in inches, are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

### Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables are on file in the Michigan District Office. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the Michigan District Office.

### Records of Surface-Water Quality

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

### Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A continuing-record station is a site where data are collected on a regularly scheduled basis. Frequency may be once or more times daily, weekly, monthly, or quarterly. A partial-record station is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A miscellaneous sampling site is a location other than a continuing or partial-record station where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between "continuing records", as used in this report, and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 6.

### Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence.

### On-site Measurements and Sample Collection

In obtaining water-quality data, a major concern needs to be assuring that the data obtained represent the in situ quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made on site when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for on site measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations," Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4. All of these references are listed under "PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS", which appears at the end of the introductory text. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey district office.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. Many samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis.

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For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the Geological Survey district office whose address is given on the back of the title page of this report.

### Water Temperature

Water temperatures are measured at all the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, either mean temperatures and/or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the Michigan District Office.

### Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section.

At some stations, suspended-sediment samples were collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

### Laboratory Measurements

Sediment samples were analyzed in the Geological Survey laboratory in Louisville, Kentucky and Heidelberg College water quality laboratory in Tiffin, Ohio. All other samples were analyzed in the Geological Survey laboratories in Arvada, Colorado. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the Geological Survey laboratories are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4. In March 1989 the National Water-Quality Laboratory discovered a bias in the turbidimetric method for sulfate analysis, indicating that values below 75 mg/L have a median positive bias of 2 mg/L above the true value for the period between 1982 and 1989.

### Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance and water temperature then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, as appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

**LOCATION.**--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

**DRAINAGE AREA.**--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

**PERIOD OF RECORD.**--This indicates the periods for which there are published water-quality records for the station. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

**INSTRUMENTATION.**--Information is given only if a water-quality monitor or temperature recorder is or was in operation at a station.

**REMARKS.**--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

**COOPERATION.**--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

**EXTREMES.**--Maximums and minimums are given only for parameters measured daily or more frequently. None are given for parameters measured weekly or less frequently, because the true maximums or minimums may not have been sampled. Extremes, when given, are provided for both the period of record and for the current water year.

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**REVISIONS.**--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

The surface-water quality records for miscellaneous sampling sites are published in a separate table following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

### Remark Codes

The following remark codes may appear with the water-quality data in this report:

<u>PRINTED OUTPUT</u>	<u>REMARK</u>
E	Estimated value.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
K	Results based on colony count outside the acceptance range (non-ideal colony count).
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted).
D	Biological organism count equal to or greater than 15 percent (dominant).
&	Biological organism estimated as dominant.
V	Analyte was detected in both the environmental sample and the associated blanks.

### Dissolved Trace-Element Concentrations

**NOTE:** Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter ( $\mu\text{g/L}$ ) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's to 100's of nanograms per liter ( $\text{ng/L}$ ). Data above the  $\mu\text{g/L}$  level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey began using new trace-element protocols at some stations in water year 1994.

### Change in National Trends Network Procedures

**NOTE:** Sample handling procedures at all National Trends Network stations were changed substantially on January 11, 1994, in order to reduce contamination from the sample shipping container. The data for samples before and after that date are different and not directly comparable. A tabular summary of the differences based on a special intercomparison study, is available from the NADP/NTN Coordination Office, Colorado State University, Fort Collins, Colorado, 80523 (Telephone: 303-491-5643).

### Records of Ground-Water Levels

Only water-level data from a national network of observation wells are given in this report. These data are intended to provide a sampling and historical record of water-level changes in the Nation's most important aquifers. Locations of the observation wells in this network in Michigan are shown in figure 9.

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### Data Collection and Computation

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by counties arranged in alphabetical order. The prime identification number for a given well is the 15-digit number that appears at the top of the station description. The secondary identification number is the local well number, an alphanumeric number, derived from the township-range location of the well.

Water-level records are obtained from direct measurements with a steel tape, electric tape, or from electronic data loggers. The water-level measurements in this report are given in feet with reference to land-surface datum (LSD). Land-surface datum is a datum plane that is approximately at land surface at each well. If known, the elevation of the land-surface datum, in feet above sea level, is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given to a tenth of a foot or a larger unit.

### Data Presentation

Each well record consists of three parts, the station description, the data table of water levels observed during the current water year, and a graph of the water levels for the current water year or other selected period. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the various headings of the well description.

**LOCATION.**--This paragraph follows the well-identification number and reports the latitude and longitude (given in degrees, minutes, and seconds); a landline location designation; the hydrologic-unit number; the distance and direction from a geographic point of reference; and the owner's name.

**AQUIFER.**--This entry designates by name (if a name exists) and geologic age the aquifer(s) open to the well.

**WELL CHARACTERISTICS.**--This entry describes the well in terms of depth, diameter, casing depth and/or screened interval, method of construction, use, and additional information such as casing breaks, collapsed screen, and other changes since construction.

**INSTRUMENTATION.**--This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on weekly, monthly, or some other frequency of measurement.

**DATUM.**--This entry describes both the measuring point and the land-surface elevation at the well. The measuring point is described physically (such as plywood instrument shelf, top of casing, top of shelter base and so on), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) sea level; it is reported with a precision depending on the method of determination.

**REMARKS.**--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that also are water-quality observation wells, and may be used to acknowledge the assistance of local (non-Survey) observers.

**PERIOD OF RECORD.**--This entry indicates the period for which there are published records for the well. It reports the month and year of the start of publication of water-level records by the U.S. Geological Survey and the words "to current year" if the records are to be continued into the following year. Periods for which water-level records are available, but are not published by the Geological Survey, may be noted.

**EXTREMES FOR PERIOD OF RECORD.**--This entry contains the highest and lowest water levels of the period of published record, with respect to land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet below land-surface datum and all taped measurements of water level are listed. For wells equipped with recorders, only abbreviated tables are published; only water-level lows are listed for every fifth day and at the end of the month (EOM). The highest and lowest water levels of the water year and their dates of occurrence are shown on a line below the abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level. A hydrograph for a selected period of record follows each water-level table.

## WATER RESOURCES DATA - MICHIGAN, 2000

## ACCESS TO USGS WATER DATA

The U.S. Geological Survey provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the world wide web (WWW). These data may be accessed at:

<http://water.usgs.gov>

Some water-quality and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on magnetic tape or 3-1/2 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division District offices (see address on the back of the title page).

## DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also table for converting English units to International System (SI) Units on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is an organic, phosphate-rich, compound important in the transfer of energy in organisms. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C plus or minus 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5°C plus or minus 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as Gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C plus or minus 1.0°C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by micro-organisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area or volume of habitat.



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Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter ( $\text{g/m}^3$ ), and periphyton and benthic organisms in grams per square meter ( $\text{g/m}^2$ ).

Dry mass refers to the mass of residue present after drying in an oven at 105°C for zooplankton and periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common green pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report series is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second ( $\text{ft}^3/\text{s}$ ) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Cubic foot per second-day ( $\text{ft}^3/\text{s}/\text{d}$ ) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons, or 2,445 cubic meters.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment) that passes a given point within a given period of time.

Annual 7-Day minimum is the lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

Instantaneous discharge is the discharge at a particular instant of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Dissolved refers to that material in a representative water sample which passes through a 0.45  $\mu\text{m}$  membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During the analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.492 to reflect the change.

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Drainage area of a stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations and is expressed as the equivalent concentration of calcium carbonate ( $\text{CaCO}_3$ ).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an eight-digit number.

Land-surface datum (LSD) is a datum plane that is approximately at land surface at each ground-water observation well.

Measuring point (MP) is an arbitrary permanent reference point from which the distance to the water surface in a well is measured to obtain the water level.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substances (MBAS) are apparent detergents. The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represents the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L and is based on the mass of dry sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD of 1929) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter ( $\text{m}^2$ ), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Parameter Code is a 5-digit number used in the U.S. Geological Survey's data system, National Water Information System (NWIS), to uniquely identify a specific constituent. The codes used in NWIS are the same as those used in the U.S. Environmental Protection Agency's data system, STORET.

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Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle size is the diameter, in millimeters (mm), of a particle determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

<u>Classification</u>	<u>Size (mm)</u>	<u>Method of analysis</u>
Clay.....	0.00024 - 0.004	Sedimentation
Silt.....	.004 - .062	Sedimentation
Sand.....	.062 - 2.0	Sedimentation or sieve
Gravel.....	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic matter is removed, and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native-water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass, or volume.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

Picocurie (PC, pCi) is one trillionth ( $1 \times 10^{-12}$ ) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radioactivity that yields  $3.7 \times 10^{10}$  radioactive disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algae mats or floating "moss" in lakes. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Milligrams of carbon per area or volume per unit time [ $\text{mg (C/m}^2\text{) / time}$  for periphyton and macrophytes and  $\text{mg (C/m}^3\text{) / time}$  for phytoplankton] are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

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Milligrams of oxygen per area or volume per unit time [ $\text{mg } (\text{O}_2/\text{m}^2) / \text{time}$ ] for periphyton and macrophytes and [ $\text{mg } (\text{O}_2/\text{m}^3) / \text{time}$ ] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Recoverable from bottom material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Return period is the average time interval between occurrences of a hydrological event of a given or greater magnitude, usually expressed in years. May also be called recurrence interval.

Runoff in inches (IN., in.) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sea level in this report refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Bed load is the sediment that is transported in a stream by rolling, sliding, or skipping along the bed and very close to it. In this report, bed load is considered to consist of particles in transit within 0.25 ft of the streambed.

Bed load discharge (tons per day) is the quantity of bed load measured by dry weight that moves past a section as bed load in a given time.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Suspended-sediment discharge (tons/day) is the rate at which dry mass of sediment passes a section of a stream or is the quantity of sediment, as measured by dry mass or volume, that passes a section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge ( $\text{ft}^3/\text{s}$ ) x 0.0027.

Suspended-sediment load is a general term that refers to material in suspension. It is not synonymous with either discharge or concentration.

Total-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry mass or volume, that passes a section during a given time.

Total-sediment load or total load is a term which refers to the total sediment (bed load plus suspended-sediment load) that is in transport. It is not synonymous with total-sediment discharge.

7-day 10-year low flow (7 Q 10) is the discharge at the 10-year recurrence interval taken from a frequency curve of annual values of the lowest mean discharge for 7 consecutive days (the 7-day low flow).

Sodium-adsorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions with in soil and is an index of sodium or alkali hazard to the soil. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Solute is any substance that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

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Stage-discharge relation is the relation between gage height (stage) and volume of water, per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lives.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Natural substrate refers to any naturally occurring emerged or submersed solid surface, such as a rock or tree, upon which an organism lives.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is the part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is associated with the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative water-suspended sediment sample that is retained on a 0.45 um membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Determinations of "suspended, recoverable" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total recoverable concentrations of the constituent.

Suspended, total is the total amount of a given constituent in the part of a representative water-suspended sediment sample that is retained on a 0.45 um membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

Determinations of "suspended, total" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total concentrations of the constituent.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata, is the following:

Kingdom .....	Animal
Phylum .....	Arthropoda
Class .....	Insecta
Order.....	Ephemeroptera
Family.....	Ephemeridae
<u>Genus</u> .....	<u>Hexagenia</u>
<u>Species</u> .....	<u>Hexagenia limbata</u>

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term "temperature recorder" is used in the table headings and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

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Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY) is the quantity of a substance in solution or suspension that passes a stream section during a 24-hour period.

Total is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituent's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the word "total" does double duty here, indicating both that the sample consists of a water-suspended sediment mixture and that the analytical method determined all of the constituent in the sample.)

Total discharge is the total quantity of any individual constituent, as measured by dry mass or volume, that passes through a stream cross-section per unit of time. This term needs to be qualified, such as "total sediment discharge," "total chloride discharge," and so on.

Total recoverable is the amount of a given constituent that is in solution after a representative water-suspended sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Water year in Geological Survey reports dealing with surface-water supply is the 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 2000, is called the "2000 water year."

WDR is used as an abbreviation for "Water-Data Report" in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports (WRD was used as an abbreviation for "Water-Resources Data" in reports published prior to 1976).

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WSP is used as an abbreviation for "Water-Supply Paper" in reference to previously published reports.

## TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY

The U.S.G.S. publishes a series of manuals describing procedures for planning and conducting specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, section A of book 3 (Applications of Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

The reports listed below are for sale by the U.S.G.S., Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be made in the form of a check or money order payable to the "U.S. Geological Survey." Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations."

### Book 1. Collection of Water Data by Direct Measurement

#### Section D. Water Quality

- 1-D1. *Water temperature—influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J.F. Ficke, and G. F. Smoot: USGS–TWRI book 1, chap. D1. 1975. 65 p.
- 1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 p.

### Book 2. Collection of Environmental Data

#### Section D. Surface Geophysical Methods

- 2-D1. *Application of surface geophysics to ground-water investigations*, by A.A. R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS–TWRI book 2, chap. D1. 1974. 116 p.
- 2-D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 p.

#### Section E. Subsurface Geophysical Methods

- 2-E1. *Application of borehole geophysics to water-resources investigations*, by W.S. Keys and L.M. MacCary: USGS–TWRI book 2, chap. E1. 1971. 126 p.
- 2-E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 p.

#### Section F. Drilling and Sampling Methods

- 2-F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS–TWRI book 2, chap. F1. 1989. 97 p.

### Book 3. Applications of Hydraulics

#### Section A. Surface-Water Techniques

- 3-A1. *General field and office procedures for indirect discharge measurements*, by M.A. Benson and Tate Dalrymple: USGS–TWRI book 3, chap. A1. 1967. 30 p.
- 3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 p.
- 3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 p.
- 3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS–TWRI book 3, chap. A4. 1967. 44 p.
- 3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS–TWRI book 3, chap. A5. 1967. 29 p.

- 3-A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS-TWRI book 3, chap. A6. 1968. 13 p.
- 3-A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS-TWRI book 3, chap. A7. 1968. 28 p.
- 3-A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS-TWRI book 3, chap. A8. 1969. 65 p.
- 3-A9. *Measurement of time of travel in streams by dye tracing*, by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS-TWRI book 3, chap. A9. 1989. 27 p.
- 3-A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS-TWRI book 3, chap. A10. 1984. 59 p.
- 3-A11. *Measurement of discharge by the moving-boat method*, by G.F. Smoot and C.E. Novak: USGS-TWRI book 3, chap. A11. 1969. 22 p.
- 3-A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS-TWRI book 3, chap. A12. 1986. 34 p.
- 3-A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS-TWRI book 3, chap. A13. 1983. 53 p.
- 3-A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS-TWRI book 3, chap. A14. 1983. 46 p.
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- 3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS-TWRI book 3, chap. A17. 1985. 38 p.
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- 3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS-TWRI book 3, chap. A19. 1990. 31 p.
- 3-A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS-TWRI book 3, chap. A20. 1993. 38 p.
- 3-A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS-TWRI book 3, chap. A21. 1995. 56 p.

### **Section B. Ground-Water Techniques**

- 3-B1. *Aquifer-test design, observation, and data analysis*, by R.W. Stallman: USGS-TWRI book 3, chap. B1. 1971. 26 p.
- 3-B2. *Introduction to ground-water hydraulics, a programmed text for self-instruction*, by G.D. Bennett: USGS-TWRI book 3, chap. B2. 1976. 172 p.
- 3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS-TWRI book 3, chap. B3. 1980. 106 p.
- 3-B4. *Regression modeling of ground-water flow*, by R.L. Cooley and R.L. Naff: USGS-TWRI book 3, chap. B4. 1990. 232 p.
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- 3-C1. *Fluvial sediment concepts*, by H.P. Guy: USGS–TWRI book 3, chap. C1. 1970. 55 p.
- 3-C2. *Field methods for measurement of fluvial sediment*, by T.K. Edwards and G.D. Glysson: USGS–TWRI book 3, chap. C2. 1999. 89 p.
- 3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS–TWRI book 3, chap. C3. 1972. 66 p.

## **Book 4. Hydrologic Analysis and Interpretation**

### **Section A. Statistical Analysis**

- 4-A1. *Some statistical tools in hydrology*, by H.C. Riggs: USGS–TWRI book 4, chap. A1. 1968. 39 p.
- 4-A2. *Frequency curves*, by H.C. Riggs: USGS–TWRI book 4, chap. A2. 1968. 15 p.

### **Section B. Surface Water**

- 4-B1. *Low-flow investigations*, by H.C. Riggs: USGS–TWRI book 4, chap. B1. 1972. 18 p.
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- 4-B3. *Regional analyses of streamflow characteristics*, by H.C. Riggs: USGS–TWRI book 4, chap. B3. 1972. 15 p.

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- 4-D1. *Computation of rate and volume of stream depletion by wells*, by C.T. Jenkins: USGS–TWRI book 4, chap. D1. 1970. 17 p.

## **Book 5. Laboratory Analysis**

### **Section A. Water Analysis**

- 5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M.J. Fishman and L.C. Friedman, editors: USGS–TWRI book 5, chap. A1. 1989. 545 p.
- 5-A2. *Determination of minor elements in water by emission spectroscopy*, by P.R. Barnett and E.C. Mallory, Jr.: USGS–TWRI book 5, chap. A2. 1971. 31 p.
- 5-A3. *Methods for the determination of organic substances in water and fluvial sediments*, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS–TWRI book 5, chap. A3. 1987. 80 p.
- 5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, by L.J. Britton and P.E. Greeson, editors: USGS–TWRI book 5, chap. A4. 1989. 363 p.
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- 5-A6. *Quality assurance practices for the chemical and biological analyses of water and fluvial sediments*, by L.C. Friedman and D.E. Erdmann: USGS–TWRI book 5, chap. A6. 1982. 181 p.

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### **Section A. Ground Water**

- 6-A1. *A modular three-dimensional finite-difference ground-water flow model*, by M.G. McDonald and A.W. Harbaugh: USGS-TWRI book 6, chap. A1. 1988. 586 p.
- 6-A2. *Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model*, by S.A. Leake and D.E. Prudic: USGS-TWRI book 6, chap. A2. 1991. 68 p.
- 6-A3. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual*, by L.J. Torak: USGS-TWRI book 6, chap. A3. 1993. 136 p.
- 6-A4. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions*, by R.L. Cooley: USGS-TWRI book 6, chap. A4. 1992. 108 p.
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#### **Section C. Computer Programs**

- 7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS-TWRI book 7, chap. C1. 1976. 116 p.
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#### **Section A. Instruments for Measurement of Water Level**

- 8-A1. *Methods of measuring water levels in deep wells*, by M.S. Garber and F.C. Koopman: USGS-TWRI book 8, chap. A1. 1968. 23 p.
- 8-A2. *Installation and service manual for U.S. Geological Survey manometers*, by J.D. Craig: USGS-TWRI book 8, chap. A2. 1983. 57 p.

#### **Section B. Instruments for Measurement of Discharge**

- 8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G.F. Smoot and C.E. Novak: USGS-TWRI book 8, chap. B2. 1968. 15 p.

### **Book 9. Handbooks for Water-Resources Investigations**

#### **Section A. National Field Manual for the Collection of Water-Quality Data**

- 9-A1. *National Field Manual for the Collection of Water-Quality Data: Preparations for Water Sampling*, by F.D. Wilde, D.B. Radtke, Jacob Gibbs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A1. 1998. 47 p.
- 9-A2. *National Field Manual for the Collection of Water-Quality Data: Selection of Equipment for Water Sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibbs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A2. 1998. 94 p.
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- 9-A4. *National Field Manual for the Collection of Water-Quality Data: Collection of Water Samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibbs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A4. 1999. 156 p.

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- 9-A6. *National Field Manual for the Collection of Water-Quality Data: Field Measurements*, edited by F.D. Wilde and D.B. Radtke: USGS–TWRI book 9, chap. A6. 1998. Variouslly paginated.
- 9-A7. *National Field Manual for the Collection of Water-Quality Data: Biological Indicators*, edited by D.N. Myers and F.D. Wilde: USGS–TWRI book 9, chap. A7. 1997 and 1999. Variouslly paginated.
- 9-A8. *National Field Manual for the Collection of Water-Quality Data: Bottom-material samples*, by D.B. Radtke: USGS–TWRI book 9, chap. A8. 1998. 48 p.
- 9-A9. *National Field Manual for the Collection of Water-Quality Data: Safety in Field Activities*, by S.L. Lane and R.G. Fay: USGS–TWRI book 9, chap. A9. 1998. 60 p.

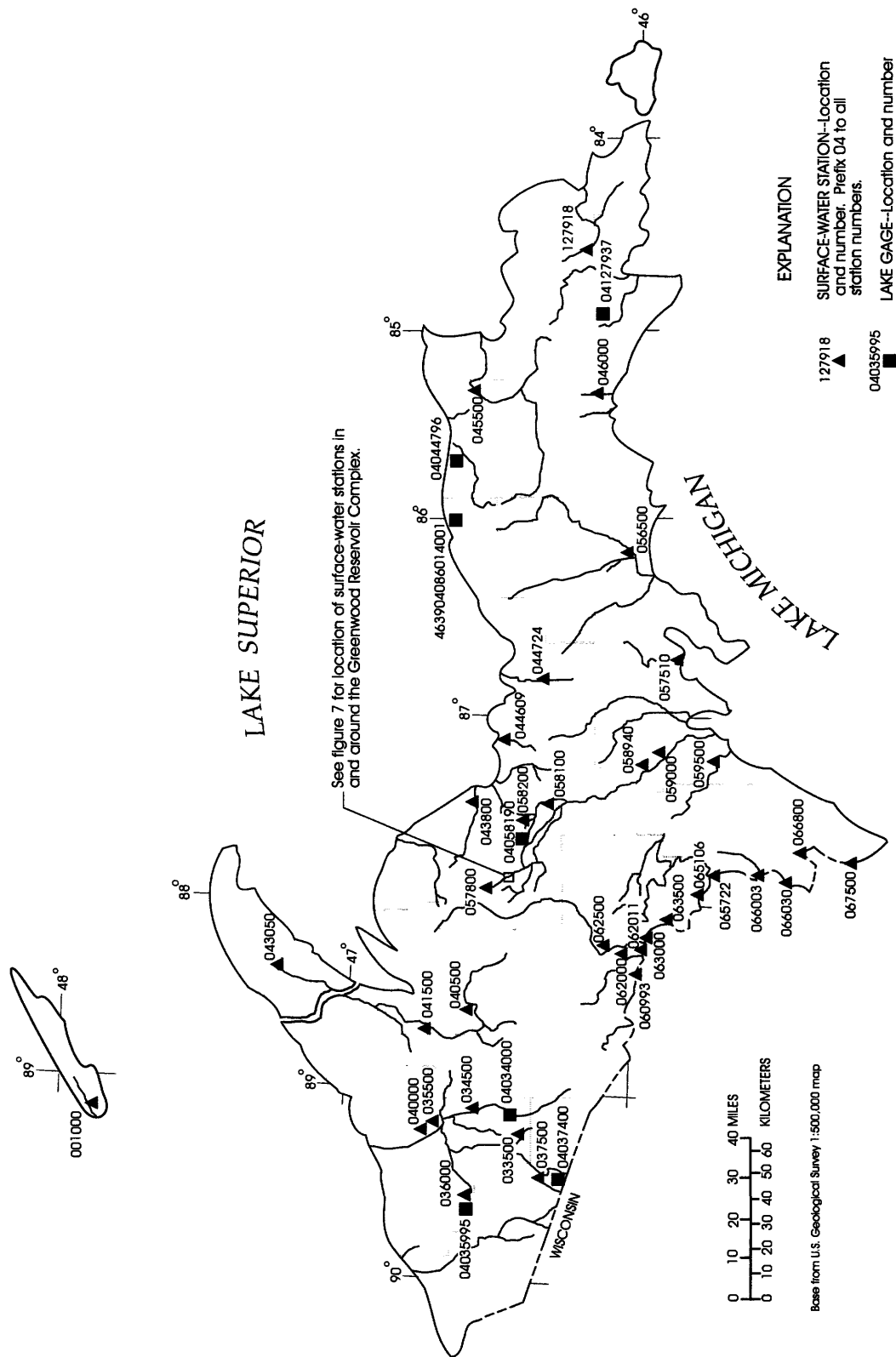
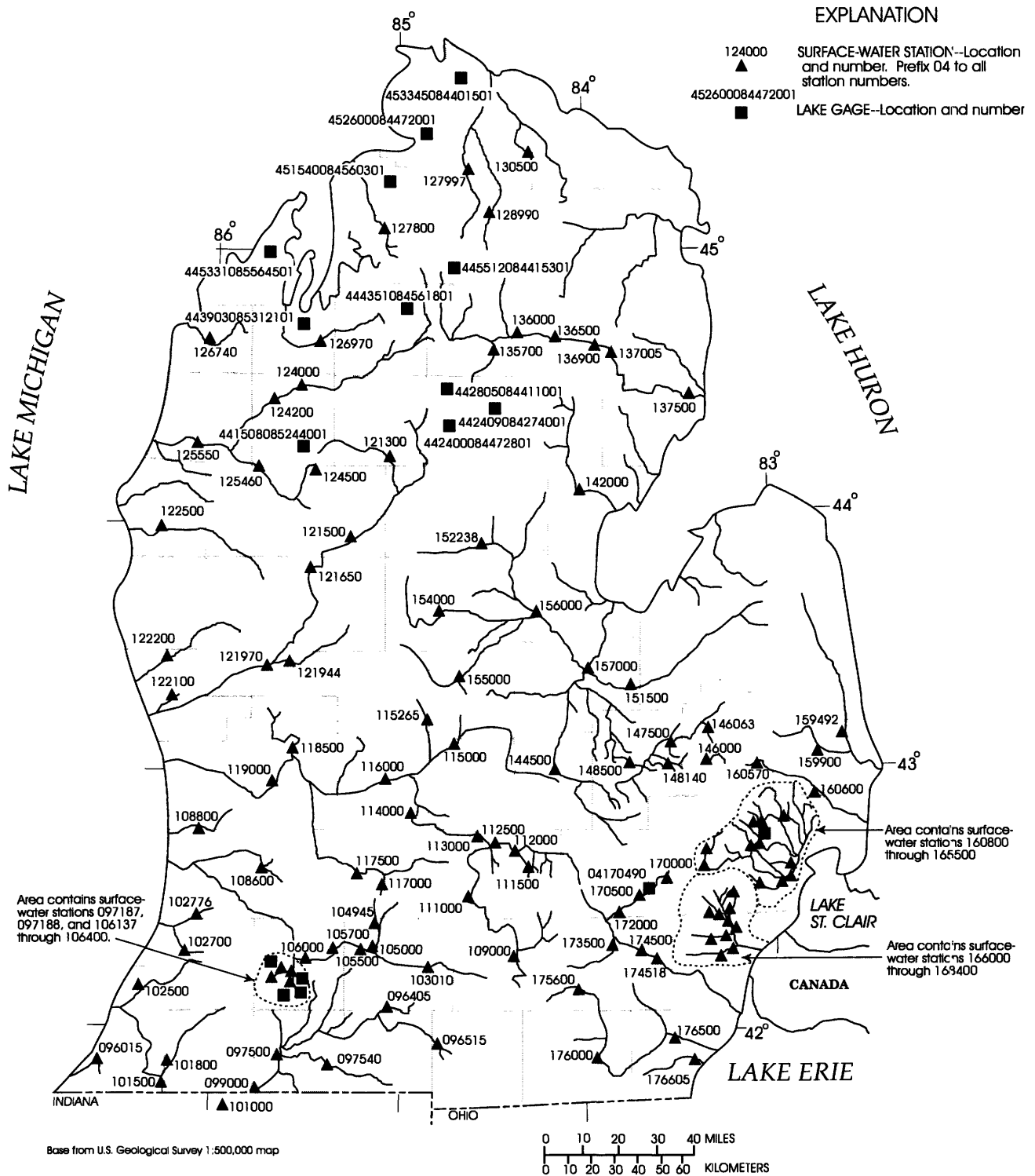
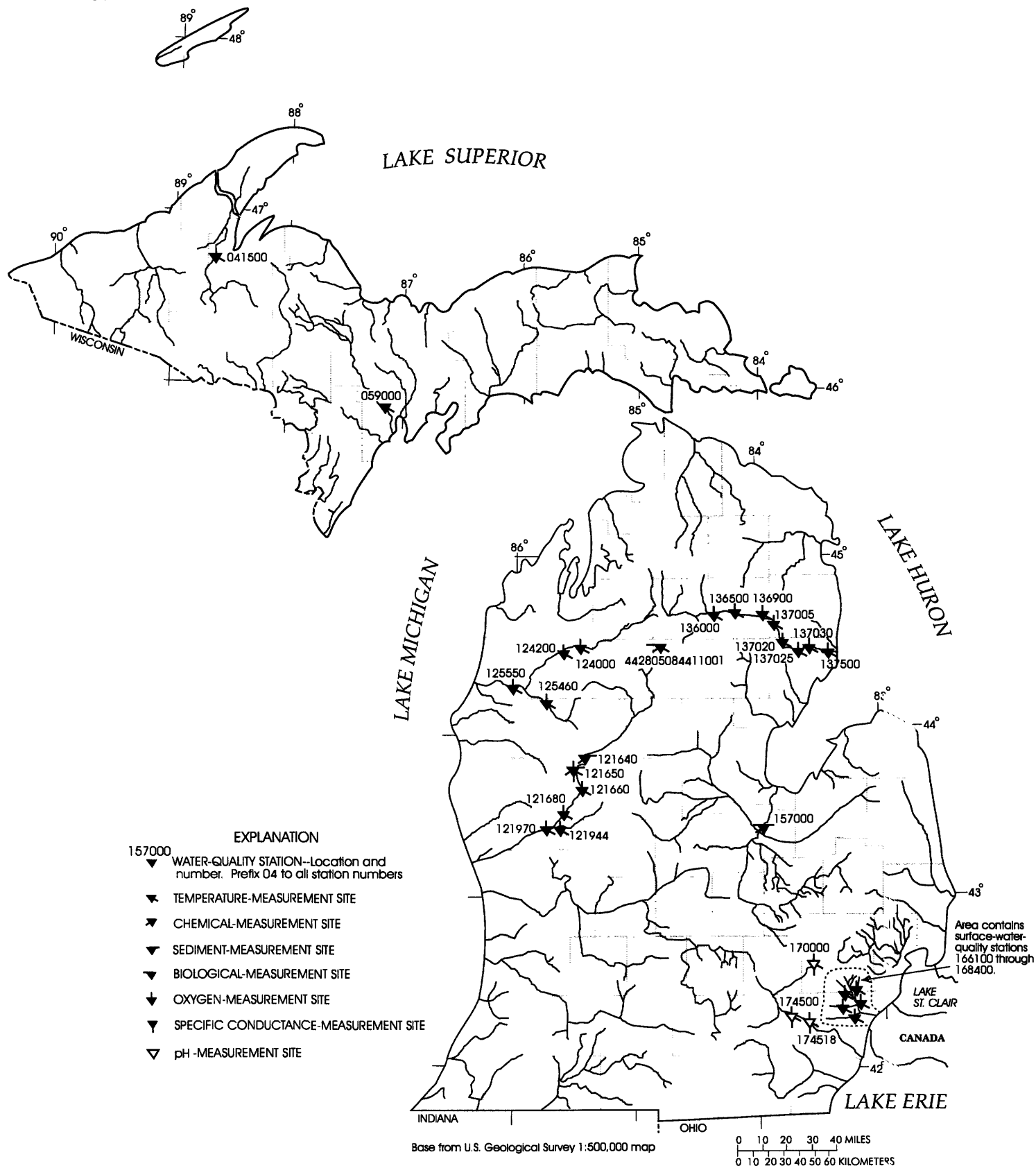


Figure 4. Identification number and location of active surface-water gaging stations in the Upper Peninsula of Michigan.



**Figure 5.** Identification number and location of active surface-water gaging stations in the Lower Peninsula of Michigan.



**Figure 6.** Identification number and location of active surface-water-quality stations in Michigan.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI  
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW1/4 sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi northeast of Windigo, and 35 mi southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder, crest-stage gage, and concrete control. Elevation of gage is 605 ft above sea level, from topographic map.

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	16	13	e3.1	2.3	29	27	18	6.5	7.6	2.9	2.4
2	4.7	14	14	e3.1	2.2	29	27	18	14	17	3.1	1.5
3	4.1	11	12	e3.1	e2.2	24	31	17	12	13	1.9	1.8
4	3.9	9.8	13	e3.1	e2.1	23	29	16	10	9.6	1.6	1.6
5	e4.0	9.4	13	3.1	2.1	34	26	20	9.4	7.8	1.5	1.3
6	e4.2	8.4	13	3.1	e2.1	25	34	21	7.7	7.0	2.0	1.2
7	e4.5	7.7	13	3.1	e2.1	35	34	20	6.4	5.6	2.5	1.4
8	9.7	7.5	9.9	3.1	e2.0	43	29	66	5.8	6.9	2.2	1.3
9	8.6	7.4	9.6	3.2	e2.0	65	25	77	5.3	6.4	1.8	1.3
10	7.9	6.8	8.9	3.2	e1.9	84	23	53	9.3	4.7	1.6	1.4
11	7.0	6.3	12	3.5	e1.9	25	20	38	16	3.5	1.4	1.2
12	6.1	6.2	8.1	3.5	e1.9	18	19	31	13	2.9	1.5	1.0
13	5.3	6.2	10	3.5	1.9	e17	19	29	11	6.4	1.6	.99
14	4.9	6.0	7.6	3.4	e1.8	13	19	26	11	11	1.3	.93
15	5.5	5.6	7.4	3.3	e1.8	11	19	22	11	6.8	1.3	.89
16	6.8	5.3	6.5	3.3	e1.8	10	19	19	15	4.7	1.1	.85
17	8.4	5.2	4.5	3.2	1.8	9.0	19	17	15	3.6	1.1	.85
18	8.1	5.2	3.7	3.1	1.7	8.5	22	16	13	2.8	1.3	.83
19	7.5	5.7	e3.5	3.1	1.7	8.5	25	14	11	2.4	1.1	.80
20	7.5	6.8	e3.3	3.1	1.7	8.8	25	13	22	2.4	1.0	.82
21	7.0	6.4	e3.0	3.0	1.7	9.7	24	12	26	2.3	1.0	.78
22	6.6	6.9	e2.8	2.9	1.8	13	23	12	23	2.1	1.0	.77
23	6.0	9.4	2.8	2.8	1.8	20	24	12	20	2.2	.96	.97
24	5.6	22	2.7	2.8	2.1	29	24	11	16	2.1	.91	.94
25	5.4	22	e2.8	2.8	1.4	55	23	10	13	2.6	.87	.86
26	5.0	27	e2.8	2.7	2.6	45	21	9.3	17	3.6	.88	.89
27	4.8	27	e2.8	2.6	44	54	21	8.2	15	2.7	.83	.96
28	4.6	22	2.9	2.5	37	49	21	7.5	11	2.4	.81	.89
29	4.4	19	3.0	2.4	23	38	19	7.2	9.6	2.0	.86	.91
30	16	26	e3.1	2.3	---	32	18	6.7	8.3	1.7	.83	.81
31	19	---	e3.1	2.3	---	28	---	6.8	---	1.6	2.8	---
TOTAL	207.6	344.2	217.8	93.3	190.4	892.5	709	653.7	383.3	157.4	45.55	33.14
MEAN	6.70	11.5	7.03	3.01	6.57	28.8	23.6	21.1	12.8	5.08	1.47	1.10
MAX	19	27	14	3.5	44	84	34	77	26	17	3.1	2.4
MIN	3.9	5.2	2.7	2.3	1.7	8.5	18	6.7	5.3	1.6	.81	.77
CFSM	.51	.87	.53	.23	.50	2.18	1.79	1.60	.97	.38	.11	.08
IN.	.59	.97	.61	.26	.54	2.52	2.00	1.84	1.08	.44	.13	.09

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

MEAN	11.5	14.7	7.44	4.19	3.90	12.9	66.8	39.0	13.1	7.33	4.31	7.14
MAX	33.8	47.2	18.3	18.1	13.0	58.7	154	108	34.2	23.6	14.0	55.1
(WY)	1986	1992	1966	1966	1966	1966	1967	1996	1968	1999	1966	1977
MIN	.76	.88	.63	.60	.61	1.10	20.3	4.87	2.47	.87	.65	.57
(WY)	1977	1977	1977	1977	1977	1965	1987	1998	1998	1998	1998	1976

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1965 - 2070
ANNUAL TOTAL	6284.3	3927.89	
ANNUAL MEAN	17.2	10.7	16.0
HIGHEST ANNUAL MEAN			33.1
LOWEST ANNUAL MEAN			8.12
HIGHEST DAILY MEAN	144	84	439
LOWEST DAILY MEAN	2.7	.77	.44
ANNUAL SEVEN-DAY MINIMUM	2.8	.81	.47
INSTANTANEOUS PEAK FLOW		152	(a)657
INSTANTANEOUS PEAK STAGE		4.57	8.17
INSTANTANEOUS LOW FLOW		.67	1.21
ANNUAL RUNOFF (CFSM)	1.30	.81	1.21
ANNUAL RUNOFF (INCHES)	17.71	11.07	16.50
10 PERCENT EXCEEDS	44	26	38
50 PERCENT EXCEEDS	7.7	6.4	5.8
90 PERCENT EXCEEDS	3.5	1.3	1.4

(a) From rating curve extended above 280 ft<sup>3</sup>/s.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW1/4 NE1/4 sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 40 ft upstream from intake to pipeline No. 2, 0.8 mi downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft above sea level. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 3.00 ft higher.

REMARKS.--Records good except for daily discharges below 5.0 ft<sup>3</sup>/s, which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	290	103	92	115	58	6.4	e1.7	e40	101	39	162	151
2	289	103	115	115	58	6.4	e1.7	16	101	40	161	150
3	287	103	120	102	59	6.5	e1.7	16	101	39	161	150
4	286	103	120	88	60	6.6	e1.7	16	101	40	161	149
5	283	102	120	85	59	6.7	e1.7	44	100	29	160	149
6	281	103	120	83	60	6.8	e1.7	84	100	17	160	148
7	281	103	120	84	60	6.8	1.4	84	101	17	159	148
8	279	110	120	89	59	6.1	1.9	55	100	17	159	148
9	277	134	119	88	62	4.0	2.3	22	101	17	158	147
10	275	151	119	89	e60	1.3	2.5	21	100	17	158	147
11	230	151	119	88	e60	.50	2.6	22	100	17	158	147
12	183	151	119	e86	e60	.30	2.5	27	100	17	158	147
13	176	150	119	e86	e60	.20	1.2	37	100	17	158	147
14	170	150	119	e86	e60	.20	1.4	37	100	17	158	147
15	169	149	119	e86	e60	.40	2.0	32	100	17	156	146
16	168	149	118	e86	e61	.30	2.0	27	100	17	156	146
17	168	149	118	e86	e61	.10	1.9	43	99	71	156	145
18	168	148	117	e86	e61	.00	.50	59	99	147	155	145
19	167	148	117	e86	e61	.00	.98	58	99	154	155	145
20	137	148	117	e86	e61	.00	e16	56	100	165	155	145
21	104	147	116	e86	63	.00	e16	56	99	164	155	144
22	103	147	113	e86	67	.10	e16	65	87	164	154	190
23	103	147	113	e86	67	.30	e16	77	75	164	153	261
24	103	119	114	e86	36	e.30	e16	77	57	163	153	259
25	103	74	114	86	6.6	e.40	e16	89	39	163	152	209
26	103	74	114	e86	6.7	e1.1	e18	101	40	163	152	158
27	103	74	110	e85	6.4	e1.6	e18	101	39	162	152	158
28	103	74	108	e84	6.4	e1.7	e40	101	39	162	152	157
29	103	74	113	e83	6.5	e1.7	e66	101	39	162	151	156
30	103	74	115	e82	---	e1.7	e66	101	40	162	151	156
31	103	---	115	68	---	e1.7	---	101	---	162	151	---
TOTAL	5698	3612	3592	2718	1465.6	70.20	337.38	1766	2557	2702	4840	4795
MEAN	184	120	116	87.7	50.5	2.26	11.2	57.0	85.2	87.2	156	160
MAX	290	151	120	115	67	6.8	66	101	101	165	162	261
MIN	103	74	92	68	6.4	.00	.50	16	39	17	151	144

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

	MEAN	109	98.8	142	183	199	133	30.4	112	165	170	163	139
MAX	296	253	292	303	305	287	194	310	312	300	320	275	
(WY)	1998	1972	1972	1986	1969	1984	1973	1986	1966	1997	1947	1944	
MIN	.000	6.24	10.2	55.2	35.8	2.21	.33	.92	3.37	14.5	2.98	1.37	
(WY)	1965	1944	1948	1990	1999	1959	1962	1962	1943	1949	1966	1959	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1942 - 2000
ANNUAL TOTAL	38613.0	34153.18	
ANNUAL MEAN	106	93.3	137
HIGHEST ANNUAL MEAN			206
LOWEST ANNUAL MEAN			55.9
HIGHEST DAILY MEAN	310	290	368
LOWEST DAILY MEAN	2.3	.00	(a)
ANNUAL SEVEN-DAY MINIMUM	3.0	.07	(b)
10 PERCENT EXCEEDS	226	161	296
50 PERCENT EXCEEDS	103	100	134
90 PERCENT EXCEEDS	7.2	2.0	5.1

(a) No flow for several days in 1963-70, 1973-75, 1982, 1987, 1991, 1994, 2000.

(b) No flow in 1963-65, 1967, 1975, 1987, 1991.

(c) Estimated.



## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi east of Paulding.

DRAINAGE AREA.--190 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft above sea level.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed in 1937. Capacity of reservoir, 41,300 acre-ft between gage heights of 120 ft (maximum drawdown) and 141 ft (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record provided by Upper Peninsula Power Co. and converted to acre-feet by U.S. Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft, July 3, 1953, gage height, 141.7 ft, of which 1,680 acre-ft was uncontrolled storage; no usable storage at times; minimum gage height observed, 116.0 ft, Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents observed, 36,830 acre-ft, July 17, gage height, 139.1 ft; minimum observed, 8,740 acre-ft, Jan. 31, Feb. 1, 2, gage height, 125.3 ft.

## MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

Date	Gage height (feet)	Contents (acre-feet)	Change in contents	
			(acre- feet)	(equivalent in ft <sup>3</sup> /s)
Sept. 30 .....	131.0	19,500		
Oct. 31 .....	128.0	13,800	-5,700	-92.7
Nov. 30 .....	127.1	12,090	-1,710	-28.7
Dec. 31 .....	125.8	9,640	-2,450	-39.8
CAL YR 1999 .....			-930	-1.3
Jan. 31 .....	125.3	8,740	-900	-14.6
Feb. 29 .....	126.7	11,330	+2,590	+45.0
Mar. 31 .....	133.1	23,700	+12,370	+201
Apr. 30 .....	137.5	33,150	+9,450	+159
May 31 .....	137.7	33,610	+460	+7.5
June 30 .....	137.3	32,690	-920	-15.5
July 31 .....	137.8	33,840	+1,150	+18.7
Aug. 31 .....	134.5	26,550	-7,290	-119
Sept. 30 .....	131.6	20,700	-5,850	-98.3
WTR YR 2000 .....			+1,200	+1.7

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW1/4 sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi upstream from State Highway 28, 3.8 mi west of village of Trout Creek, and 7.5 mi downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi upstream. Diversion to South Branch Ontonagon River 8.5 mi upstream by Bond Falls Canal (station 04033500). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	40	46	44	42	54	49	42	45	51	52	51
2	42	39	46	44	42	49	47	42	51	56	54	51
3	41	39	46	44	42	47	47	42	51	52	52	52
4	41	39	46	44	43	46	47	42	51	52	52	51
5	41	39	46	43	43	46	47	41	51	52	52	49
6	41	39	46	45	e43	46	48	41	51	54	53	44
7	42	39	45	43	44	47	47	41	51	52	52	44
8	42	39	46	44	e45	47	47	43	51	54	54	44
9	41	39	45	43	44	46	46	42	53	54	55	44
10	41	39	46	45	44	46	46	42	53	52	52	44
11	41	39	44	43	44	45	46	43	57	52	52	48
12	41	39	47	41	e44	44	46	42	52	52	52	47
13	41	39	45	43	e44	44	47	42	51	52	52	44
14	40	39	45	44	e44	44	47	42	51	52	51	44
15	41	39	46	45	44	44	48	42	51	52	52	44
16	41	38	43	45	44	e44	47	42	54	52	51	44
17	41	39	41	e45	e44	e44	48	42	52	52	51	44
18	41	39	e42	e45	44	44	51	42	51	52	51	44
19	41	39	e42	44	44	44	51	42	51	52	51	44
20	41	39	e42	44	44	44	49	42	53	53	51	44
21	41	39	e42	e44	43	45	48	42	52	53	51	44
22	43	40	e42	e44	43	50	47	42	53	52	51	44
23	42	49	e42	e44	44	52	47	42	52	54	51	44
24	42	52	e43	e44	45	55	45	42	52	53	51	44
25	41	47	e45	e44	47	57	42	42	51	52	51	44
26	41	47	46	44	56	56	42	42	56	53	52	44
27	41	46	45	e44	54	66	42	42	52	54	51	44
28	41	46	44	e43	51	57	42	42	51	54	51	44
29	41	46	44	42	54	51	42	42	51	53	51	44
30	41	46	44	42	---	50	42	42	51	52	51	44
31	41	---	44	42	---	50	---	42	---	52	51	---
TOTAL	1278	1238	1376	1355	1309	1504	1390	1301	1552	1632	1604	1361
MEAN	41.2	41.3	44.4	43.7	45.1	48.5	46.3	42.0	51.7	52.6	51.7	45.4
MAX	43	52	47	45	56	66	51	43	57	56	55	52
MIN	40	38	41	41	42	44	42	41	45	51	51	44

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

	MEAN	54.4	55.6	48.2	46.8	46.3	50.6	86.2	120	95.4	69.5	57.6	53.1
MAX	221	239	102	84.7	76.8	118	297	745	461	253	105	216	
(WY)	1943	1943	1943	1943	1943	1943	1943	1996	1943	1953	1952	1942	
MIN	41.2	33.1	32.0	31.7	31.0	32.4	36.5	38.8	50.1	49.3	42.6	43.2	
(WY)	2000	1949	1949	1949	1949	1949	1949	1949	1998	1998	1944	1967	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1942 - 2000

ANNUAL TOTAL	22816	16900	
ANNUAL MEAN	62.5	46.2	65.0
HIGHEST ANNUAL MEAN			187
LOWEST ANNUAL MEAN			42.4
HIGHEST DAILY MEAN	392	66	1550
LOWEST DAILY MEAN	38	38	30
ANNUAL SEVEN-DAY MINIMUM	39	39	31
INSTANTANEOUS PEAK FLOW		(a)71	1750
INSTANTANEOUS PEAK STAGE		(c)2.13	5.05
INSTANTANEOUS LOW FLOW		(d)29	14
10 PERCENT EXCEEDS	63	52	66
50 PERCENT EXCEEDS	46	44	50
90 PERCENT EXCEEDS	41	41	44

(a) Gage height 1.67 ft.

(b) Mar. 27, June 11.

(c) Backwater from ice.

(d) Result of freezeup.

(e) Estimated.

(f) Sometime during period Jan. 23 to Feb. 13, 1947, result of ice jam upstream.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE1/4 sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft upstream from bridge on U.S. Highway 45, 700 ft downstream from East Branch, and 2.8 mi southeast of Rockland.

DRAINAGE AREA.--671 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 661.1 ft above sea level. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft upstream at same datum. Apr. 1, 1959, to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi upstream. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e200	263	257	e205	e190	2240	1010	246	219	199	194	179
2	e200	245	263	e210	e190	1230	750	247	236	246	250	184
3	e200	231	253	e210	e190	845	619	241	238	486	248	197
4	203	224	264	e215	e190	772	558	231	236	295	206	195
5	204	220	271	e220	e190	801	509	223	235	226	191	190
6	204	215	261	e220	e190	877	922	219	233	255	193	180
7	210	212	228	e220	e190	1140	805	213	235	288	205	175
8	232	213	252	e220	e190	1080	545	232	239	326	200	173
9	245	215	243	e220	e190	959	447	249	289	606	262	172
10	238	215	231	e220	e190	651	389	238	353	396	272	171
11	225	214	196	e220	e190	525	357	241	508	279	225	179
12	218	211	e200	e220	e190	500	353	252	e410	232	210	272
13	217	212	e200	e220	e190	385	363	246	e360	218	204	232
14	216	209	e200	e220	e190	e370	391	232	e320	207	195	197
15	219	205	e195	e220	e190	339	474	221	e330	197	196	188
16	228	205	e190	e210	e190	275	576	219	e352	190	188	184
17	229	205	e185	e200	e190	e270	560	218	330	186	185	179
18	231	204	e180	e200	e190	e280	669	213	258	180	188	176
19	232	208	e180	e200	e190	e290	608	205	253	180	183	173
20	235	208	e175	e200	e200	304	490	201	254	190	181	179
21	234	208	e175	e200	e200	375	418	199	346	197	181	196
22	258	211	e175	e200	e210	1160	374	203	366	195	181	190
23	320	249	e175	e200	e230	1740	342	208	309	193	178	194
24	314	705	e175	e200	e290	1260	313	211	263	195	174	191
25	284	595	e180	e200	e400	1340	288	209	240	190	175	187
26	260	442	e185	e190	2010	1660	270	204	253	187	350	183
27	243	394	e190	e190	3570	2810	255	206	304	199	296	180
28	233	341	e190	e190	1890	1990	248	206	250	235	219	177
29	227	304	e190	e190	1710	1190	246	206	215	244	191	175
30	235	271	e200	e190	---	900	244	213	205	216	180	172
31	266	---	e200	e190	---	1130	---	217	---	198	179	---
TOTAL	7260	8054	6459	6410	14320	29688	14393	6869	8639	7631	6480	5620
MEAN	234	268	208	207	494	958	480	222	288	246	209	187
MAX	320	705	271	220	3570	2810	1010	252	508	606	350	272
MIN	200	204	175	190	190	270	244	199	205	180	174	171

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

	MEAN	429	455	321	265	277	586	1527	764	533	362	326	348
MAX	1026	1145	618	378	634	1652	2919	1974	1396	1181	1091	1254	1254
(WY)	1986	1989	1983	1946	1984	1973	1971	1996	1944	1949	1953	1942	1942
MIN	191	214	208	193	187	183	385	222	189	182	173	175	175
(WY)	1949	1949	2000	1995	1949	1965	1987	2000	1992	1988	1976	1948	1948

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1942 - 2000
ANNUAL TOTAL	170615	121823	
ANNUAL MEAN	467	333	513
HIGHEST ANNUAL MEAN			756
LOWEST ANNUAL MEAN			331
HIGHEST DAILY MEAN	4920	3570	16300
LOWEST DAILY MEAN	175	171	145
ANNUAL SEVEN-DAY MINIMUM	176	176	163
INSTANTANEOUS PEAK FLOW		4760	(a)27000
INSTANTANEOUS PEAK STAGE		8.28	(b)21.2
INSTANTANEOUS LOW FLOW		164	(c)142
10 PERCENT EXCEEDS	864	559	1000
50 PERCENT EXCEEDS	245	220	290
90 PERCENT EXCEEDS	204	184	210

(a) From rating curve extended above 7,500 ft<sup>3</sup>/s on basis of slope-area measurement of peak flow.

(b) From floodmark.

(c) Discharge measurement.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04035995 LAKE GOGEBIC NEAR BERGLAND, MI

LOCATION.--Lat 46°35'19", long 89°32'52", in SW1/4 NW1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, at upstream side of dam on lake outlet, 1.0 mi southeast of Bergland, and 4.3 mi east of Merriweather.

**DRAINAGE AREA.**--162 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1958 to September 1959 (no winter record), February 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,292.70 ft above sea level. July 1958 to September 1959, nonrecording gage at mouth of Merriweather Creek at different datum. February 1969 to September 1988, at datum 1.00 ft higher.

REMARKS.--Lake Gogebic is used as a storage reservoir (capacity 35,200 acre-ft) by Upper Peninsula Power Co. for power production at Victoria Dam near Rockland. Lake level is controlled at the outlet by a concrete and steel dam with removable flash boards. Major inlets to Lake Gogebic are Slate River, Trout Brook, and Merriweather Creek. Streamflow records are currently collected at the outlet, West Branch Ontonagon River (station 04036000). Surface area of lake is 14,780 acres. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 4.44 ft, present datum, May 9, 1996; minimum daily, 0.68 ft, present datum, Apr. 5, 6, 1970.

**EXTREMES FOR CURRENT YEAR.**--Maximum daily gage height, 3.52 ft, July 4; minimum daily, 1.63 ft, Feb. 24, 25.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.56	2.40	2.09	2.07	1.87	1.84	2.71	3.39	3.18	3.10	2.71	2.44
2	2.55	2.22	2.05	2.09	1.86	1.87	2.72	3.39	3.18	3.38	2.65	2.46
3	2.50	2.21	2.03	2.09	1.86	1.90	2.74	3.44	3.18	3.50	2.68	2.48
4	2.51	2.23	2.06	2.08	1.87	1.92	2.73	3.42	3.14	3.52	2.66	2.45
5	2.48	2.26	2.03	2.06	1.86	1.94	2.74	3.44	3.14	3.49	2.67	2.46
6	2.45	2.18	2.06	2.07	1.85	1.97	2.78	3.47	3.14	3.45	2.67	2.47
7	2.51	2.18	2.07	2.06	1.83	2.00	2.80	3.42	3.14	3.41	2.67	2.47
8	2.51	2.16	2.05	2.04	1.83	2.04	2.87	3.47	3.11	3.38	2.62	2.41
9	2.52	2.14	2.04	2.03	1.81	2.13	2.89	3.46	3.09	3.39	2.71	2.44
10	2.48	2.07	2.03	2.04	1.82	2.19	2.89	3.48	3.13	3.34	2.71	2.41
11	2.47	2.10	2.04	2.05	1.79	2.21	2.92	3.47	3.12	3.28	2.71	2.43
12	2.47	2.09	2.03	2.03	1.76	2.21	2.94	3.48	3.10	3.23	2.74	2.49
13	2.40	2.09	2.03	2.02	1.74	2.22	2.99	3.51	3.11	3.16	2.69	2.47
14	2.47	2.02	2.03	2.01	1.73	2.22	2.96	3.49	3.13	3.07	2.70	2.42
15	2.41	2.02	2.04	1.99	1.73	2.24	3.00	3.41	3.14	2.99	2.73	2.39
16	2.42	2.00	2.09	1.99	1.73	2.25	3.04	3.38	3.14	2.94	2.64	2.43
17	2.40	2.00	2.09	1.97	1.72	2.23	3.09	3.37	3.11	2.91	2.66	2.39
18	2.39	1.96	2.07	1.98	1.71	2.23	3.15	3.31	3.12	2.87	2.62	2.43
19	2.38	1.95	2.08	1.97	1.69	2.20	3.15	3.34	3.12	2.87	2.61	2.41
20	2.41	1.95	2.11	1.96	1.68	2.18	3.16	3.34	3.19	2.86	2.62	2.40
21	2.40	1.95	2.10	1.95	1.66	2.17	3.22	3.34	3.31	2.83	2.61	2.34
22	2.27	1.96	2.09	1.95	1.65	2.19	3.28	3.33	3.21	2.80	2.57	2.33
23	2.25	1.92	2.06	1.95	1.64	2.21	3.28	3.36	3.20	2.81	2.55	2.31
24	2.34	2.07	2.07	1.94	1.63	2.26	3.31	3.33	3.20	2.81	2.56	2.33
25	2.36	2.08	2.06	1.92	1.63	2.36	3.33	3.28	3.17	2.80	2.57	2.31
26	2.28	2.11	2.07	1.92	1.66	2.40	3.35	3.24	3.19	2.77	2.56	2.31
27	2.31	2.11	2.07	1.91	1.72	2.52	3.34	3.22	3.15	2.73	2.56	2.27
28	2.25	2.07	2.09	1.90	1.74	2.59	3.34	3.21	3.12	2.71	2.59	2.29
29	2.26	2.04	2.09	1.89	1.78	2.65	3.36	3.23	3.08	2.70	2.54	2.37
30	2.28	2.08	2.08	1.88	---	2.66	3.39	3.21	3.10	2.70	2.54	2.28
31	2.28	---	2.08	1.88	---	2.68	---	3.21	---	2.70	2.53	---
MEAN	2.41	2.09	2.06	1.99	1.75	2.22	3.05	3.37	3.15	3.05	2.63	2.40
MAX	2.56	2.40	2.11	2.09	1.87	2.68	3.39	3.51	3.31	3.52	2.74	2.49
MIN	2.25	1.92	2.03	1.88	1.63	1.84	2.71	3.21	3.08	2.70	2.53	2.27

WTR YR 2000      MEAN 2.52    MAX 3.52    MIN 1.63

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW1/4 NE1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi downstream from dam at outlet of Lake Gogebic, and 1.5 mi east of Bergland.

DRAINAGE AREA.--162 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft above sea level. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi upstream at different datum.

REMARKS.--Records good except for daily discharges below 5.0 ft<sup>3</sup>/s, which are fair. Flow regulated by Lake Gogebic (station 04035995). Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e24	106	42	41	88	145	324	51	52	149	54	e16
2	e24	82	39	41	87	150	325	41	52	389	34	e16
3	e23	80	39	41	87	154	332	45	52	662	33	e16
4	e19	83	40	88	88	158	329	43	52	721	32	e16
5	19	87	38	116	87	162	332	45	52	713	31	e16
6	18	77	40	113	85	166	229	48	52	745	30	16
7	18	76	41	110	83	173	49	45	52	736	30	16
8	17	122	39	109	83	180	51	53	52	727	31	16
9	16	132	39	107	80	197	51	51	52	727	28	16
10	16	114	38	108	81	209	52	52	54	704	27	17
11	15	118	39	109	113	212	53	54	62	682	27	18
12	80	116	38	107	135	213	53	54	59	661	27	18
13	109	117	38	106	132	214	45	62	51	634	27	18
14	117	110	38	105	130	213	36	97	52	595	27	17
15	110	108	39	104	129	217	37	119	90	563	27	17
16	110	105	41	102	131	218	37	116	93	546	26	16
17	108	105	41	101	129	216	37	97	77	408	24	16
18	107	101	41	101	127	213	38	62	70	194	23	16
19	107	99	41	100	125	209	37	51	70	116	22	16
20	109	100	42	99	123	206	36	51	73	80	22	15
21	107	101	42	98	122	206	37	51	77	79	22	14
22	93	99	41	97	120	208	37	52	145	71	21	12
23	88	95	40	98	119	213	37	53	177	64	21	9 4
24	99	86	40	96	118	223	38	52	159	62	20	8 9
25	102	54	40	95	118	244	39	51	156	60	19	8 4
26	92	44	39	94	122	252	40	51	159	60	19	7 8
27	95	44	39	93	129	278	40	51	153	59	18	7 5
28	89	41	40	92	132	295	40	51	149	59	17	7 3
29	88	38	41	91	137	307	49	52	144	58	16	7 7
30	91	41	41	90	---	312	53	52	145	58	16	7 6
31	91	---	41	89	---	316	---	52	---	58	e16	---
TOTAL	2201	2681	1237	2941	3240	6679	2893	1805	2683	11440	787	418 6
MEAN	71.0	89.4	39.9	94.9	112	215	96.4	58.2	89.4	369	25.4	14 0
MAX	117	132	42	116	137	316	332	119	177	745	54	18
MIN	15	38	38	41	80	145	36	41	51	58	16	7 3

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

MEAN	128	155	168	168	156	148	327	292	211	140	79.5	78 5
MAX	698	489	346	360	257	327	742	995	550	578	550	40 8
(WY)	1986	1989	1968	1966	1969	1973	1943	1996	1954	1952	1972	1980
MIN	.65	2.99	18.5	23.3	35.8	55.8	10.7	3.09	21.5	7.09	1.25	.8
(WY)	1990	1999	1949	1949	1949	1949	1949	1987	1986	1988	1963	1963

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1942 - 2000

ANNUAL TOTAL	55780	39005.6	170
ANNUAL MEAN	153	107	288
HIGHEST ANNUAL MEAN			70.1
LOWEST ANNUAL MEAN			1952
HIGHEST DAILY MEAN	665	745	1380
LOWEST DAILY MEAN	15	7.3	.38
ANNUAL SEVEN-DAY MINIMUM	17	7.9	.39
INSTANTANEOUS PEAK FLOW		802	1400
INSTANTANEOUS PEAK STAGE		4.57	5.98
ANNUAL RUNOFF (CFSM)	.94	.66	1.05
ANNUAL RUNOFF (INCHES)	12.81	8.96	14.26
10 PERCENT EXCEEDS	464	213	361
50 PERCENT EXCEEDS	109	62	126
90 PERCENT EXCEEDS	32	18	8.6

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04037400 CISCO LAKE NEAR WATERSMEET, MI

LOCATION.--Lat 46°15'10", long 89°27'07", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on right bank at outlet, 100 ft upstream from dam, 13 mi west of Watersmeet.

DRAINAGE AREA.--50.6 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,679.53 ft above sea level (levels by Michigan Department of Natural Resources). July 15, 1942, to Oct. 28, 1969, nonrecording gage, and Oct. 28, 1969, to Oct. 23, 1989, water-stage recorder at site 90 ft downstream at same datum.

REMARKS.--Cisco Lake (capacity 15,600 acre-ft) is the downstream lake in a chain of lakes used as storage reservoirs by Upper Peninsula Power Company for power production at Victoria Dam near Rockland. Lake level is controlled at the outlet by a concrete dam with two bays and removable flash boards. The major inlet to Cisco Lake is the combined outlet from Lindsley Lake and Thousand Island Lake. Streamflow records are currently collected at the outlet, Cisco Branch Ontonagon River (station 04037500). The lake level is maintained at an elevation of approximately 1,683.5 ft, above sea level, during winter months and 1,684.0 ft, above sea level, during summer months. Surface area of lake is 506 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 4.69 ft, July 19, 1942; minimum, 1.72 ft, Mar. 20-22, 1948.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 4.25 ft, July 2; minimum, 3.43 ft, Jan. 9, 10, Mar. 6.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.97	3.89	3.50	3.49	3.50	3.52	3.50	3.96	3.98	3.98	4.01	3.94
2	3.97	3.85	3.47	3.51	3.50	3.50	3.51	3.98	3.96	4.24	3.98	3.95
3	3.98	3.85	3.47	3.51	3.50	3.48	3.51	3.99	3.98	4.22	3.99	4.00
4	3.98	3.86	3.48	3.49	3.50	3.46	3.54	3.99	3.98	4.18	3.98	4.00
5	3.97	3.82	3.48	3.48	3.49	3.45	3.62	4.01	3.97	4.13	4.00	4.01
6	3.98	3.82	3.50	3.48	3.49	3.44	3.62	4.02	3.97	4.07	3.98	4.01
7	4.03	3.82	3.51	3.47	3.48	3.46	3.64	4.01	4.00	4.03	3.96	3.99
8	4.02	3.81	3.51	3.45	3.49	3.49	3.67	4.04	4.01	4.11	4.00	3.97
9	4.01	3.80	3.51	3.44	3.49	3.58	3.67	4.01	4.03	4.14	4.07	4.00
10	3.96	3.78	3.51	3.44	3.50	3.61	3.70	4.02	4.03	4.11	4.06	3.99
11	3.95	3.79	3.51	3.46	3.51	3.59	3.72	4.05	4.05	4.07	4.07	4.01
12	3.96	3.76	3.51	3.47	3.50	3.57	3.73	3.99	4.06	4.03	4.08	4.01
13	3.93	3.75	3.51	3.48	3.50	3.54	3.79	3.94	4.04	3.98	4.05	4.00
14	3.99	3.70	3.51	3.50	3.50	3.50	3.78	3.89	4.01	3.99	4.05	3.99
15	3.99	3.70	3.53	3.50	3.50	3.49	3.81	3.88	3.98	4.01	4.00	3.99
16	3.98	3.69	3.54	3.50	3.52	3.47	3.84	3.89	3.99	4.03	3.98	4.00
17	3.99	3.69	3.52	3.51	3.51	3.48	3.88	3.89	3.98	4.02	4.00	3.98
18	4.02	3.68	3.51	3.50	3.49	3.49	3.91	3.88	3.99	4.02	3.97	4.00
19	4.01	3.65	3.49	3.50	3.47	3.50	3.92	3.88	4.00	4.01	3.98	3.99
20	4.00	3.64	3.48	3.49	3.46	3.51	3.94	3.89	4.06	4.00	3.99	3.99
21	3.98	3.66	3.48	3.49	3.45	3.51	3.98	3.90	4.06	3.99	3.98	3.97
22	3.91	3.62	3.48	3.49	3.45	3.52	4.01	3.89	4.03	3.98	3.96	3.99
23	3.93	3.63	3.48	3.49	3.46	3.53	4.03	3.89	4.01	3.98	3.96	3.96
24	3.96	3.67	3.48	3.48	3.47	3.54	4.03	3.89	3.99	3.99	3.96	3.94
25	3.94	3.67	3.48	3.50	3.49	3.52	4.03	3.88	3.98	3.99	3.96	3.94
26	3.92	3.65	3.48	3.51	3.53	3.52	4.02	3.90	3.99	3.99	3.97	3.94
27	3.94	3.59	3.49	3.52	3.54	3.52	3.99	3.91	3.98	3.99	3.98	3.92
28	3.90	3.56	3.51	3.52	3.55	3.52	3.96	3.93	3.98	4.00	4.00	3.95
29	3.90	3.53	3.51	3.51	3.54	3.52	3.96	3.94	3.96	4.00	3.95	3.96
30	3.91	3.52	3.51	3.50	---	3.49	3.97	3.94	3.97	4.01	3.98	3.95
31	3.90	---	3.50	3.50	---	3.48	---	3.94	---	4.01	3.96	---
MEAN	3.96	3.71	3.50	3.49	3.50	3.51	3.81	3.94	4.00	4.04	4.00	3.98
MAX	4.03	3.89	3.54	3.52	3.55	3.61	4.03	4.05	4.06	4.24	4.08	4.01
MIN	3.90	3.52	3.47	3.44	3.45	3.44	3.50	3.88	3.96	3.98	3.95	3.92
CAL YR 1999	MEAN 3.77		MAX 4.16		MIN 3.46							
WTR YR 2000	MEAN 3.79		MAX 4.24		MIN 3.44							

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 60 ft downstream from Cisco Lake Dam, 2.5 mi upstream from Langford Creek, 5.0 mi upstream from U.S. Highway 2, and 13 mi west of Watersmeet.

DRAINAGE AREA.--50.7 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft above sea level. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft higher.

REMARKS.--Records excellent except for daily discharges below 3.0 ft<sup>3</sup>/s, which are poor. Flow regulated by Cisco Lake (station 04037470). Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.79	39	79	35	33	80	36	19	.50	2.1	22	1.2
2	.70	36	51	36	33	79	37	2.6	.45	101	20	1.2
3	.65	36	11	46	33	78	37	1.7	.46	188	14	1.2
4	.58	37	3.5	56	33	76	38	1.1	.48	184	8.5	1.2
5	.52	35	3.5	56	33	75	18	1.0	.47	181	3.0	7.6
6	.52	34	3.8	55	33	41	2.5	.86	.49	175	2.8	19
7	.24	35	4.0	55	25	2.0	2.1	.81	.53	147	2.5	18
8	.57	34	12	53	18	.88	1.9	12	.59	164	2.7	8.0
9	.67	33	19	52	17	20	1.5	23	6.7	185	9.9	1.1
10	.64	32	19	26	18	67	1.6	37	12	181	16	.93
11	.40	42	19	2.6	25	85	1.6	72	13	176	16	1.0
12	.11	50	19	2.6	34	84	1.5	93	35	171	16	15
13	5.8	49	19	2.6	33	101	1.5	89	62	105	15	20
14	1.2	46	19	9.3	33	117	1.4	85	70	19	53	12
15	.93	46	29	18	34	117	1.6	42	68	4.8	73	12
16	.90	45	48	18	48	89	1.5	1.1	39	4.7	44	13
17	.90	45	58	26	57	35	1.7	.69	13	9.2	22	12
18	.12	44	57	34	56	19	1.6	.53	13	22	12	13
19	.34	43	56	33	54	19	1.5	.52	13	27	2.8	13
20	.46	43	46	33	54	19	1.8	.47	44	27	2.6	12
21	.45	43	27	33	35	29	1.9	.41	89	26	2.4	12
22	.40	41	18	33	21	37	1.4	.42	111	25	2.2	28
23	.41	54	18	33	22	49	1.2	.41	123	26	2.2	46
24	.43	80	18	19	22	82	16	.37	75	21	2.2	45
25	.42	92	18	3.3	21	101	35	.35	49	15	2.0	18
26	.41	90	18	3.5	23	102	61	.37	49	15	1.8	.99
27	.43	86	18	11	23	114	68	.39	43	7.8	1.7	.98
28	.40	83	19	25	40	123	52	.42	38	3.3	1.4	.89
29	.40	81	29	34	69	122	32	.44	22	3.3	1.3	.81
30	.40	80	36	33	---	119	31	.44	2.9	3.3	1.2	.74
31	.40	---	35	33	---	68	---	.45	---	10	1.2	---
TOTAL	823.49	1534	829.8	909.9	980	2149.88	490.8	487.85	994.57	2229.5	377.4	335.84
MEAN	26.6	51.1	26.8	29.4	33.8	69.4	16.4	15.7	33.2	71.9	12.2	11.2
MAX	67	92	79	56	69	123	68	93	123	188	73	46
MIN	.52	32	3.5	2.6	17	.88	1.2	.35	.45	2.1	1.2	.74

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2000, BY WATER YEAR (WY)

	MEAN	68.1	67.1	47.7	39.2	34.9	44.1	60.3	46.4	44.9	33.0	25.5	37.1
MAX	151	116	84.1	62.6	81.0	92.1	117	160	123	113	99.7	104	104
(WY)	1986	1968	1961	1983	1945	1973	1997	1996	1953	1953	1978	1977	1977
MIN	13.1	14.5	23.5	23.1	20.6	24.1	2.02	.17	.11	.25	.15	.23	.23
(WY)	1958	1945	1990	1959	1950	1956	1948	1977	1977	1977	1970	1976	1976

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1945 - 2000
ANNUAL TOTAL	13352.83	12143.03	
ANNUAL MEAN	36.6	33.2	45.7
HIGHEST ANNUAL MEAN			65.9
LOWEST ANNUAL MEAN			25.2
HIGHEST DAILY MEAN	174	188	288
LOWEST DAILY MEAN	.30	.35	.08
ANNUAL SEVEN-DAY MINIMUM	.34	.39	.09
INSTANTANEOUS PEAK FLOW		190	288
INSTANTANEOUS PEAK STAGE		5.64	(a)6.10
ANNUAL RUNOFF (CFSM)	.72	.65	.90
ANNUAL RUNOFF (INCHES)	9.80	8.91	12.25
10 PERCENT EXCEEDS	87	80	103
50 PERCENT EXCEEDS	28	22	37
90 PERCENT EXCEEDS	.74	.90	.92

(a) Present datum.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04040000 ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°43'15", long 89°12'25", in NE1/4 sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 150 ft downstream from bridge on Victoria Road, 1.8 mi southwest of Rockland, and 2.4 mi downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 638.72 ft above sea level. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft upstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by Victoria powerplant on West Branch 5 mi upstream; Bond Falls Reservoir (station 04034000) 34 mi upstream; Lake Gogebic (station 04035995) and Cisco Lake (station 04037400), in headwaters. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	590	778	516	e540	e500	4690	3200	633	435	422	549	e400
2	563	712	576	e540	e500	3160	2500	642	449	812	406	e400
3	e650	514	574	e540	e500	2520	1890	517	451	2930	454	e400
4	598	550	890	e550	e500	2270	1900	515	445	2790	510	e400
5	698	512	618	e560	e500	2100	1620	483	441	1960	495	e400
6	571	700	645	e560	e500	2390	2210	503	442	1750	517	406
7	582	612	480	e570	e500	2630	1890	503	433	1740	571	365
8	676	e520	659	e580	e500	2930	1250	556	422	1690	447	391
9	614	e620	590	e580	e500	2760	1100	644	478	2200	626	379
10	700	e680	642	e600	e500	1760	912	607	510	2260	482	450
11	711	e660	448	e600	e500	1450	874	523	752	1700	724	431
12	696	e660	501	e600	e500	1340	745	571	673	1430	473	470
13	668	e660	583	e600	e500	e1250	932	562	584	1380	559	573
14	648	e670	521	e600	e500	e1190	921	562	544	1240	389	466
15	694	e680	578	e590	e500	1090	958	706	539	1060	596	437
16	616	e690	574	e580	e500	987	1260	608	743	985	366	332
17	576	676	309	e560	e500	890	1210	629	821	985	555	472
18	688	507	e320	e550	e500	e900	1380	587	713	643	514	413
19	634	651	e350	e530	e500	e920	1380	459	630	687	506	396
20	e650	649	e400	e510	e520	939	1330	391	784	501	480	350
21	e650	676	e450	e500	e530	959	1100	390	683	668	404	489
22	646	748	e470	e500	e550	1930	1010	528	1080	573	391	387
23	709	683	e480	e500	e700	3580	963	374	980	414	398	455
24	812	e1400	e490	e500	e900	3200	682	381	947	683	415	646
25	666	e1200	e500	e500	e1600	3430	815	379	952	506	496	398
26	686	e1050	e500	e500	e3500	3900	653	402	830	673	600	558
27	559	e1000	e510	e500	e7000	5450	683	442	742	595	531	529
28	655	e960	e520	e500	4230	4840	710	435	810	542	484	355
29	531	e900	e520	e500	3770	3320	572	433	637	579	417	336
30	741	e790	e520	e500	---	2660	762	435	664	512	400	362
31	615	---	e530	e500	---	2630	---	436	---	604	e400	---
TOTAL	20093	22108	16264	16840	32800	74065	37412	15836	19614	35514	15155	12846
MEAN	648	737	525	543	1131	2389	1247	511	654	1146	489	428
MAX	812	1400	890	600	7000	5450	3200	706	1080	2930	724	646
MIN	531	507	309	500	500	890	572	374	422	414	366	332

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

	MEAN	1121	1239	934	834	868	1555	3999	2034	1446	1011	801	865
MAX	3767	3232	1683	1473	1525	4355	6912	5257	3309	2879	2563	2679	
(WY)	1986	1989	1983	1969	1984	1973	1971	1996	1951	1952	1942	1942	
MIN	333	400	410	396	505	667	922	404	431	314	359	312	
(WY)	1949	1949	1949	1949	1949	1956	1987	1977	1988	1988	1976	1976	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1942 - 2000

ANNUAL TOTAL	449285	318547	
ANNUAL MEAN	1231	870	1384
HIGHEST ANNUAL MEAN			1967
LOWEST ANNUAL MEAN			774
HIGHEST DAILY MEAN	10300	Apr 1	31200
LOWEST DAILY MEAN	309	Dec 17	170
ANNUAL SEVEN-DAY MINIMUM	397	Dec 17	246
INSTANTANEOUS PEAK FLOW		(e)8500	(b)42000
INSTANTANEOUS PEAK STAGE		(c)20.11	(d)28.6
ANNUAL RUNOFF (CFSM)	.92	.65	1.03
ANNUAL RUNOFF (INCHES)	12.47	8.84	14.03
10 PERCENT EXCEEDS	2580	1740	2740
50 PERCENT EXCEEDS	720	584	880
90 PERCENT EXCEEDS	509	414	518

(a) Aug. 13, 14, 1991.

(b) From rating curve extended above 14,000 ft<sup>3</sup>/s on basis of slope-area measurement of peak flow.

(c) Backwater from ice.

(d) From floodmark.

(e) Estimated.





## STREAMS TRIBUTARY TO LAKE SUPERIOR

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE1/4 sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi upstream from Clear Creek, 5.0 mi southeast of Alston, and at mile 45.

DRAINAGE AREA.--346 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 709.64 ft above sea level. Prior to Jan. 5, 1948, nonrecording gage, and Jan. 5, 1948 to Sept. 30, 1963, water-stage recorder at same site at datum 39.34 ft lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	244	443	316	207	154	870	1370	369	197	274	119	171
2	273	330	302	196	155	1060	1110	359	156	274	206	156
3	270	423	248	199	158	835	1190	357	134	273	235	145
4	183	259	220	193	162	708	1220	354	134	274	234	144
5	122	370	221	193	167	708	1100	355	133	274	233	145
6	236	300	220	192	167	594	979	355	133	274	211	144
7	232	258	242	192	166	736	1030	318	133	328	153	144
8	168	245	271	190	166	1070	907	279	113	370	149	144
9	143	228	271	188	159	1080	746	274	233	911	149	145
10	156	196	231	189	153	1080	478	275	317	758	148	144
11	287	196	195	188	165	1070	516	280	668	360	149	129
12	326	293	194	206	176	985	595	280	673	360	149	123
13	241	304	214	216	175	771	597	280	473	359	149	136
14	216	302	225	193	166	544	595	289	404	358	148	136
15	169	196	223	173	159	545	592	316	280	305	147	136
16	214	158	224	175	160	504	532	322	233	232	147	136
17	165	159	224	176	162	470	348	322	321	226	147	137
18	260	160	219	172	160	473	626	320	473	205	147	136
19	201	197	177	171	160	474	716	267	366	164	147	135
20	204	233	178	174	159	473	621	192	244	152	145	135
21	208	230	179	182	159	359	562	193	226	128	137	135
22	319	228	144	188	158	462	560	199	538	125	131	135
23	330	216	120	185	171	1030	560	200	539	126	121	135
24	416	560	125	183	191	962	561	201	546	127	113	136
25	316	709	124	183	220	929	492	220	545	131	113	142
26	393	534	167	167	543	1420	554	229	492	129	114	144
27	312	352	206	159	1680	1770	544	231	415	122	114	135
28	406	353	209	160	1080	1900	380	231	417	281	113	136
29	311	348	209	159	1060	1260	383	229	371	333	113	136
30	420	338	207	160	---	1220	379	221	273	298	113	135
31	420	---	206	156	---	1190	---	197	---	119	191	---
TOTAL	8161	9118	6511	5665	8511	27552	20843	8514	10180	8650	4685	4190
MEAN	263	304	210	183	293	889	695	275	339	279	151	140
MAX	420	709	316	216	1680	1900	1370	369	673	911	235	171
MIN	122	158	120	156	153	359	348	192	113	119	113	123
CFSM	.76	.88	.61	.53	.85	2.57	2.01	.79	.98	.81	.44	.40
IN.	.88	.98	.70	.61	.92	2.96	2.24	.92	1.09	.93	.50	.45

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 2000, BY WATER YEAR (WY)

	MEAN	341	381	266	210	202	376	1150	795	435	303	227	268
MAX	973	1001	433	380	412	1255	2093	1799	973	894	595	1056	
(WY)	1986	1989	1988	1969	1984	1973	1960	1996	1944	1968	1978	1968	
MIN	99.4	120	101	111	133	164	420	146	138	94.2	100	70.9	
(WY)	1949	1949	1977	1977	1964	1940	1987	1998	1988	1988	1976	1976	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1932 - 2000

ANNUAL TOTAL	158468						122580						
ANNUAL MEAN	434						335						
HIGHEST ANNUAL MEAN										415			
LOWEST ANNUAL MEAN										582			1960
HIGHEST DAILY MEAN										247			1948
LOWEST DAILY MEAN										6820		Apr 25	1960
ANNUAL SEVEN-DAY MINIMUM	3340				May 26		1900		Mar 28				
INSTANTANEOUS PEAK FLOW	98				Sep 1		113		Jun 8	(a)1.0		(b)	
INSTANTANEOUS PEAK STAGE	131				Sep 9		113		Aug 24	1.1		Aug 14	1960
ANNUAL RUNOFF (CFSM)	1.25						2070		Mar 27	7360		Apr 24	1960
ANNUAL RUNOFF (INCHES)	17.04						7.07		Mar 27	(c)13.75		Apr 24	1960
10 PERCENT EXCEEDS	956						.97			1.20			
50 PERCENT EXCEEDS	267						13.18			16.28			
90 PERCENT EXCEEDS	158						708			843			
							224			263			
							135			138			

(a) Approximately; result of draining pond for dam repair.

(b) Aug. 14-19, 1960.

(c) Present datum.

STREAMS TRIBUTARY TO LAKE SUPERIOR  
04041500 STURGEON RIVER NEAR ALSTON, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: April 1998 to current year.

INSTRUMENTATION.--Water temperature recorder with telemetry since Apr. 7, 1998.

REMARKS.--Records represent water temperature at sensor within 0.5°C, from Apr. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 27.0°C, July 13, 15, 1998.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 26.0°C, July 16.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	4.0	1.5	2.5	13.0	10.0	11.5
2	---	---	---	---	---	---	4.5	2.0	3.0	13.0	9.5	11.0
3	---	---	---	---	---	---	4.5	2.5	3.5	14.5	9.5	12.5
4	---	---	---	---	---	---	5.0	2.5	4.0	14.5	12.0	13.5
5	---	---	---	---	---	---	5.5	3.0	4.0	16.5	12.5	14.0
6	---	---	---	---	---	---	5.0	3.0	4.0	17.5	14.0	16.0
7	---	---	---	---	---	---	5.5	3.0	4.5	17.5	14.5	16.5
8	---	---	---	---	---	---	5.5	3.0	4.0	17.5	14.5	15.5
9	---	---	---	---	---	---	5.5	3.0	4.5	17.5	15.5	16.5
10	---	---	---	---	---	---	5.0	3.0	4.0	17.5	15.0	16.5
11	---	---	---	---	---	---	5.0	3.0	4.0	17.5	15.5	16.5
12	---	---	---	---	---	---	5.0	3.0	4.0	18.0	15.5	16.5
13	---	---	---	---	---	---	5.0	3.0	4.0	17.5	15.0	16.0
14	---	---	---	---	---	---	5.0	3.0	4.0	16.0	14.0	15.0
15	---	---	---	---	---	---	5.0	3.0	4.0	16.0	13.5	15.0
16	---	---	---	---	---	---	5.0	3.0	4.0	15.5	12.5	14.0
17	---	---	---	---	---	---	5.0	3.0	3.5	16.0	13.0	14.5
18	---	---	---	---	---	---	5.5	3.0	4.0	14.5	10.5	12.5
19	---	---	---	---	---	---	5.0	3.0	4.5	14.5	12.0	13.0
20	---	---	---	---	---	---	5.5	3.5	4.5	16.0	12.0	13.5
21	---	---	---	---	---	---	5.5	3.5	4.5	17.0	13.0	15.0
22	---	---	---	---	---	---	7.0	3.5	5.5	16.5	14.5	15.5
23	---	---	---	---	---	---	6.5	4.0	5.5	17.0	14.0	15.5
24	---	---	---	---	---	---	6.5	4.0	5.5	17.5	15.5	16.5
25	---	---	---	---	---	---	8.5	5.0	6.5	17.5	15.5	16.5
26	---	---	---	---	---	---	8.0	5.5	6.5	17.0	14.0	16.0
27	---	---	---	---	---	---	9.0	6.0	7.5	16.5	13.5	15.0
28	---	---	---	---	---	---	9.0	7.0	8.0	16.0	13.5	15.0
29	---	---	---	---	---	---	9.5	7.5	8.5	18.5	14.5	16.5
30	---	---	---	---	---	---	12.5	8.0	10.5	18.5	15.5	17.5
31	---	---	---	---	---	---	---	---	---	18.0	15.5	17.0
MONTH	---	---	---	---	---	---	12.5	1.5	4.9	18.5	9.5	15.0

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04041500 STURGEON RIVER NEAR ALSTON, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	17.5	14.5	16.0	23.0	20.5	21.5	25.5	21.5	23.5	21.5	18.5	20.0
2	17.0	15.0	16.0	22.5	19.5	21.0	25.0	20.0	22.0	20.0	18.5	19.0
3	17.5	14.5	16.0	21.0	18.5	20.0	23.5	20.5	22.0	20.0	18.0	19.0
4	16.5	13.5	15.0	21.0	18.5	19.5	23.5	21.0	22.0	19.5	17.0	18.5
5	17.0	14.0	15.5	21.0	18.5	19.5	24.0	21.5	22.5	20.5	17.0	18.5
6	18.0	15.0	16.0	20.0	18.0	19.0	23.0	21.5	22.5	20.0	18.0	19.0
7	18.0	15.0	16.5	21.5	18.5	20.0	23.0	21.0	22.0	19.5	17.5	18.5
8	19.0	15.5	17.5	22.0	19.5	20.5	22.5	20.0	21.5	19.5	17.5	18.5
9	17.5	14.5	16.0	22.5	20.0	21.0	22.5	20.0	21.0	20.0	17.0	18.5
10	18.0	16.0	17.0	21.5	18.0	19.5	22.5	20.5	21.5	20.0	18.0	19.0
11	17.0	15.0	16.0	21.5	18.5	20.0	22.5	20.5	21.5	20.5	17.5	19.0
12	17.0	15.0	16.0	23.0	20.0	21.0	23.0	20.0	21.5	19.5	17.5	18.5
13	17.0	15.5	16.0	24.5	21.0	22.5	23.0	21.0	22.0	19.0	17.5	18.5
14	19.0	16.5	18.0	23.5	20.5	22.0	24.0	20.5	22.0	19.0	17.0	18.0
15	19.0	17.0	18.0	23.0	20.0	21.5	24.0	22.0	23.0	18.0	16.0	17.0
16	19.0	17.0	18.0	26.0	21.5	23.5	23.5	20.5	22.0	18.0	15.5	17.0
17	19.5	17.0	18.0	25.5	22.0	24.0	22.0	20.5	21.0	18.0	16.0	17.0
18	19.0	17.0	18.0	23.0	20.0	21.5	21.5	20.0	21.0	18.5	16.0	17.0
19	19.5	17.0	18.0	23.0	20.0	21.5	21.5	19.5	20.5	18.0	16.5	17.0
20	19.0	16.5	18.0	23.0	20.5	21.5	22.0	19.0	20.5	17.5	15.5	16.5
21	19.5	17.5	18.5	22.0	19.5	21.0	21.5	20.0	20.5	17.5	15.5	16.0
22	19.5	17.5	18.5	21.0	18.5	19.5	21.5	19.5	20.5	16.5	15.0	16.0
23	20.0	17.5	18.5	22.0	18.5	20.0	22.5	19.5	21.0	16.5	14.5	15.5
24	21.0	18.5	19.5	23.5	20.0	21.5	22.5	20.0	21.0	16.0	14.0	15.0
25	20.5	18.0	19.0	23.0	21.0	22.0	24.0	20.5	22.0	16.5	13.5	15.0
26	21.0	17.5	19.0	23.0	21.0	22.0	23.5	20.0	21.5	16.0	13.5	15.0
27	21.5	19.0	20.0	22.5	20.0	21.0	23.5	20.0	21.5	15.0	13.0	14.0
28	21.5	19.0	20.0	21.0	18.5	20.0	24.0	21.5	22.5	15.0	12.5	14.0
29	21.5	19.0	20.0	21.5	19.0	20.5	23.5	21.5	22.5	15.0	13.0	14.0
30	23.0	20.0	21.0	22.0	20.0	21.0	22.5	21.0	22.0	16.5	13.0	14.5
31	---	---	---	23.5	20.5	22.0	23.0	20.5	21.5	---	---	---
MONTH	23.0	13.5	17.6	26.0	18.0	21.0	25.5	19.0	21.7	21.5	12.5	17.1

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE1/4 SE1/4 sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft upstream from bridge on county highway, 2.0 mi northeast of Lake Linden, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--28.0 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft above sea level.

REMARKS.--Records good. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SE <sup>1</sup>
1	15	25	22	e16	e18	113	182	34	17	15	9.3	8.7
2	15	22	21	16	18	79	200	33	18	21	12	8.9
3	14	19	21	16	18	63	206	30	18	20	11	8.9
4	14	18	22	16	17	72	201	29	17	16	10	8.5
5	14	18	22	16	17	94	115	30	17	15	9.7	8.2
6	14	17	21	16	16	103	169	28	16	14	10	8.1
7	14	16	20	16	e16	165	147	26	15	14	12	8.1
8	22	16	18	16	16	e240	92	47	14	14	11	8.2
9	22	16	18	16	e16	e226	89	84	14	15	11	8.1
10	21	15	18	17	e16	115	69	54	16	14	10	8.1
11	18	15	18	19	16	81	61	44	39	13	9.7	8.1
12	17	16	17	18	16	62	58	40	31	12	9.8	1 <sup>^</sup>
13	16	15	17	e18	16	47	60	37	23	13	10	9.5
14	16	15	17	18	16	43	65	37	19	13	9.7	9.1
15	16	15	17	18	16	38	89	31	17	12	9.5	8.3
16	16	15	17	17	16	e37	71	27	37	11	9.0	8.1
17	17	14	17	16	15	e34	70	25	43	11	9.0	7.9
18	17	14	16	17	15	30	73	23	27	11	9.3	7.7
19	19	14	16	17	15	30	72	22	24	10	8.9	7.9
20	25	14	16	17	15	31	68	21	22	10	8.9	7.6
21	24	14	16	17	15	37	60	20	32	11	8.8	7.7
22	22	14	e16	17	15	67	56	20	46	11	8.8	8.1
23	22	23	16	17	15	111	54	20	31	11	8.7	8.1
24	21	92	16	17	18	141	53	20	25	10	8.7	8.0
25	19	56	16	17	29	232	49	19	21	10	8.2	7.8
26	18	40	16	17	63	251	43	18	18	10	8.1	7.8
27	18	38	16	17	121	270	40	19	18	10	7.9	8.0
28	17	32	16	17	104	220	37	17	16	10	7.8	7.7
29	17	26	16	e18	82	131	36	17	15	10	7.6	7.8
30	19	23	16	e18	---	107	34	16	14	9.7	7.3	8.2
31	30	---	16	e19	---	130	---	17	---	9.4	7.8	---
TOTAL	569	687	547	527	786	3400	2619	905	680	386.1	289.5	247.2
MEAN	18.4	22.9	17.6	17.0	27.1	110	87.3	29.2	22.7	12.5	9.34	8.24
MAX	30	92	22	19	121	270	206	84	46	21	12	1 <sup>^</sup>
MIN	14	14	16	16	15	30	34	16	14	9.4	7.3	7.6
CFSM	.66	.82	.63	.61	.97	3.92	3.12	1.04	.81	.44	.33	.29
IN.	.76	.91	.73	.70	1.04	4.52	3.48	1.20	.90	.51	.38	.3 <sup>?</sup>

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 2000, BY WATER YEAR (WY)

	MEAN	31.4	39.4	26.0	20.4	20.6	44.8	174	78.3	37.2	21.6	17.2	21.8
MAX	94.6	134	43.9	33.2	42.8	112	283	223	117	63.5	70.2	92.5	
(WY)	1986	1989	1988	1969	1984	1973	1976	1972	1968	1968	1988	196 <sup>?</sup>	
MIN	8.71	9.66	9.28	9.03	9.00	16.1	63.5	16.5	11.7	11.4	9.34	7.84	
(WY)	1977	1977	1977	1977	1977	1972	1998	1998	1977	1967	2000	199 <sup>?</sup>	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1967 - 200 <sup>1</sup>
ANNUAL TOTAL	17241	11642.8	
ANNUAL MEAN	47.2	31.8	44.3
HIGHEST ANNUAL MEAN			62.6
LOWEST ANNUAL MEAN			26.8
HIGHEST DAILY MEAN	488	270	1120
LOWEST DAILY MEAN	11	7.3	6.5
ANNUAL SEVEN-DAY MINIMUM	12	7.8	6.8
INSTANTANEOUS PEAK FLOW		335	1590
INSTANTANEOUS PEAK STAGE		6.60	10.72
INSTANTANEOUS LOW FLOW		6.6	(b)1.7
ANNUAL RUNOFF (CFSM)	1.69	1.14	1.58
ANNUAL RUNOFF (INCHES)	22.91	15.47	21.52
10 PERCENT EXCEEDS	100	71	89
50 PERCENT EXCEEDS	21	17	22
90 PERCENT EXCEEDS	14	8.9	12

(a) Aug. 30, Sept. 20.

(b) Result of ice jam upstream.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04043800 McCLURE STORAGE BASIN RELEASE NEAR MARQUETTE, MI

LOCATION.--Lat 46°34'19", long 87°28'35", in SW1/4 NE1/4 sec.7, T.48 N., R.25 W., Marquette County, Hydrologic Unit 04020105, or left bank in power house of Upper Peninsula Power Co., 600 ft upstream from Reany Creek, 2.5 mi downstream from McClure Dam, and 4.3 mi northwest of Marquette.

PERIOD OF RECORD.--April 1990 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 785 ft above sea level, from topographic map.

REMARKS.--Records good except for daily discharges below 10 ft<sup>3</sup>/s, which are poor. Flow completely regulated by powerplant at station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	73	.00	176	151	173	349	114	91	118	175	165
2	178	.00	.00	175	116	172	350	120	96	119	285	172
3	178	.00	105	174	96	195	349	119	101	120	349	174
4	179	.00	176	174	91	271	350	117	102	119	348	173
5	178	.00	174	175	87	336	350	117	145	116	348	174
6	177	.00	175	170	87	343	350	116	148	108	349	173
7	179	.00	170	176	85	348	349	117	110	97	349	129
8	179	.00	179	175	81	e350	348	118	88	91	350	101
9	179	.00	179	175	107	e350	348	120	88	90	350	102
10	177	.00	178	174	64	348	300	103	86	87	349	100
11	176	.00	178	174	65	347	267	92	88	83	350	93
12	170	.00	176	175	65	346	207	92	123	78	349	96
13	166	.00	177	174	65	348	171	93	127	76	348	95
14	137	.00	177	175	65	346	166	93	133	75	349	87
15	98	.00	177	175	65	346	165	93	135	74	342	79
16	86	.00	177	174	65	346	165	92	133	74	308	77
17	86	.00	177	174	66	346	165	92	132	141	266	76
18	87	.00	177	175	67	345	164	91	132	179	254	68
19	88	.00	177	174	67	345	165	89	129	167	256	61
20	93	.00	178	174	67	335	160	88	121	134	255	65
21	95	.00	176	176	66	325	156	89	125	164	232	68
22	92	.00	176	177	66	315	156	89	142	166	217	67
23	91	.70	176	177	78	331	155	92	149	166	176	66
24	92	1.9	175	177	90	353	141	93	148	158	158	66
25	95	.27	176	176	105	e350	135	93	148	152	161	65
26	97	.07	175	176	117	e350	135	93	162	152	162	65
27	113	.01	175	175	117	e350	121	93	173	152	162	64
28	160	.00	176	175	149	351	115	93	149	166	168	65
29	174	.00	177	175	171	350	116	93	125	168	171	63
30	178	.00	176	176	---	349	115	92	119	167	170	61
31	178	---	175	169	---	349	---	92	---	168	164	---
TOTAL	4334	75.95	5040.00	5417	2581	10109	6583	3088	3748	3925	8270	2910
MEAN	140	2.53	163	175	89.0	326	219	99.6	125	127	267	97.0
MAX	179	73	179	177	171	353	350	120	173	179	350	174
MIN	86	.00	.00	169	64	172	115	88	86	74	158	61

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 2000, BY WATER YEAR (WY)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
MEAN	123	147	172	160	181	242	278	249	189	137	107
MAX	213	295	304	254	337	334	348	355	347	242	194
(WY)	1991	1991	1992	1997	1997	1998	1998	1996	1996	1996	1997
MIN	78.6	2.53	89.2	83.2	89.0	170	195	99.6	73.7	14.9	57.3
(WY)	1999	2000	1998	1998	2000	1999	1995	2000	1991	1997	1993

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1990 - 2000

ANNUAL TOTAL	63943.95	56080.95	
ANNUAL MEAN	175	153	174
HIGHEST ANNUAL MEAN			234
LOWEST ANNUAL MEAN			140
HIGHEST DAILY MEAN	349	353	(e)370
LOWEST DAILY MEAN	.00	.00	.00
ANNUAL SEVEN-DAY MINIMUM	.00	.00	.00
10 PERCENT EXCEEDS	338	346	340
50 PERCENT EXCEEDS	177	152	169
90 PERCENT EXCEEDS	63	65	64

(a) On several days in water years 1992, 1994, 1998, 1999, 2000.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04044609 SAND RIVER WILDLIFE FLOODING AT SAND RIVER, MI

LOCATION.--Lat 46°29'14", long 87°07'30", in SW1/4 NE1/4 sec.12, T.47 N., R.23 W., Marquette County, Hydrologic Unit 04020201, on right bank at dam at Sand River, 1.2 mi upstream from mouth.

DRAINAGE AREA.--28.6 mi<sup>2</sup>. Area of Sand River Wildlife Flooding is 0.6 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1983 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 600.0 ft above sea level (Michigan Department of Natural Resources bench mark).

REMARKS.--Pond level regulated by concrete dam with two 20-foot stop-log bays and a 20-foot radial gate. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 11.84 ft, Nov. 6, 1988; minimum, 4.46 ft, Aug. 5, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 9.40 ft, June 28; minimum, 4.81 ft, Dec. 24.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.53	9.18	9.27	4.86	---	6.18	5.45	5.49	8.20	9.33	8.42	7.60
2	8.54	9.13	9.26	4.88	---	6.15	5.39	6.00	8.22	9.31	8.38	7.62
3	8.54	9.12	9.21	4.88	---	5.95	5.37	6.24	8.23	9.30	8.35	7.68
4	8.54	9.14	9.16	4.88	---	5.87	5.37	6.18	8.23	9.26	8.32	7.71
5	8.54	9.13	9.11	4.89	4.89	5.82	5.34	6.16	8.23	9.22	8.30	7.72
6	8.55	9.10	9.05	4.89	4.89	5.84	5.33	6.16	8.22	9.22	8.27	7.73
7	8.58	9.10	8.89	4.90	4.89	6.02	5.29	6.19	8.23	9.20	8.26	7.74
8	8.63	9.10	8.72	4.91	4.88	6.22	5.26	6.33	8.21	9.19	8.24	7.73
9	8.68	9.08	8.55	---	4.88	6.35	5.21	6.52	8.27	9.15	8.24	7.74
10	8.69	9.05	8.38	---	4.88	6.38	5.18	6.71	8.35	9.11	8.22	7.73
11	8.70	9.06	8.21	---	4.88	5.90	5.17	6.92	8.49	9.07	8.18	7.75
12	8.73	9.05	8.06	4.94	4.88	5.72	5.16	7.11	8.63	9.05	8.16	7.78
13	8.71	9.05	7.90	4.94	4.88	5.54	5.15	7.33	8.73	9.00	8.13	7.78
14	8.75	9.01	7.72	4.93	4.87	5.51	5.14	7.49	8.83	8.96	8.10	7.76
15	8.76	9.01	7.45	4.93	4.88	5.42	5.15	7.62	8.86	8.92	8.06	7.77
16	8.80	9.00	7.14	4.93	4.89	5.37	5.16	7.72	8.91	8.88	8.01	7.80
17	8.83	9.00	6.76	4.93	4.88	5.34	5.20	7.81	8.92	8.83	---	7.80
18	8.88	8.99	6.30	4.92	4.88	5.30	5.34	7.86	8.95	8.79	7.95	7.81
19	8.91	8.99	5.69	4.92	4.88	5.28	5.52	7.92	8.94	8.76	7.92	7.80
20	8.94	8.99	5.27	4.92	4.86	5.29	5.90	7.96	8.97	8.75	7.89	7.81
21	8.97	9.00	5.06	4.92	4.87	5.39	6.08	8.00	9.07	8.74	7.87	7.80
22	8.96	8.99	4.92	4.91	4.88	5.66	6.14	8.03	9.14	8.71	7.83	7.80
23	9.01	9.01	4.83	4.91	4.91	5.85	6.12	8.07	9.20	8.68	7.80	7.80
24	9.11	9.09	4.82	4.91	4.95	5.92	6.05	8.09	9.23	8.66	7.77	7.79
25	9.15	9.15	4.82	4.90	5.03	6.03	5.93	8.10	9.23	8.63	7.75	7.79
26	9.16	9.19	4.83	4.90	5.47	5.91	5.79	8.13	9.27	8.59	7.72	7.79
27	9.19	9.21	4.83	4.89	5.78	6.09	5.63	8.14	9.35	8.55	7.71	7.77
28	9.17	9.22	4.84	4.89	5.88	6.18	5.49	8.16	9.39	8.54	7.70	7.78
29	9.17	9.23	4.85	4.89	5.97	5.90	5.43	8.18	9.38	8.52	7.67	7.80
30	9.18	9.25	4.85	4.88	---	5.69	5.36	8.19	9.36	8.49	7.65	7.76
31	9.17	---	4.86	4.88	---	5.55	---	8.19	---	8.45	7.63	---
MEAN	8.84	9.09	6.89	---	---	5.79	5.47	7.32	8.77	8.90	---	7.76
MAX	9.19	9.25	9.27	---	---	6.38	6.14	8.19	9.39	9.33	---	7.81
MIN	8.53	8.99	4.82	---	---	5.28	5.14	5.49	8.20	8.45	---	7.60

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 04044724 AU TRAIN RIVER AT FOREST LAKE, MI

LOCATION.--Lat 46°20'22", long 86°51'00", in SE1/4 NE1/4 sec.31, T.46N., R.20W., Alger County, Hydrologic Unit 04020201, on left bank 800 ft downstream from Upper Peninsula Power Co. powerhouse, 0.6 mi downstream from Au Train Dam, and 0.6 mi northwest of Forest Lake.

DRAINAGE AREA.--81 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--October 1993 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 650 ft above sea level, from topographic map.

REMARKS.--Records good. Flow regulated by powerplant 800 ft upstream and by Au Train Basin, capacity 12,342 acre-ft, 0.6 mi upstream. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	47	34	47	88	129	149	49	37	56	73	48
2	40	49	34	47	88	129	148	45	35	55	73	47
3	40	47	34	52	88	129	143	47	33	54	73	48
4	44	46	34	62	88	128	142	47	33	53	73	47
5	46	46	34	67	88	128	147	47	33	53	72	47
6	46	46	34	68	88	128	144	47	32	54	72	47
7	46	46	34	68	88	129	143	46	32	54	72	47
8	47	46	34	68	91	129	143	47	32	55	72	44
9	46	46	34	67	97	131	144	47	32	54	72	41
10	46	46	34	67	97	126	143	47	32	52	72	41
11	46	46	34	67	97	129	143	47	31	49	72	43
12	45	46	34	67	97	129	143	48	31	50	72	51
13	45	45	34	67	97	129	145	48	32	49	73	67
14	45	46	34	67	97	129	142	48	35	49	73	71
15	45	42	34	67	97	129	142	49	34	49	73	71
16	46	37	34	67	97	129	142	49	35	49	73	71
17	45	37	34	67	97	129	141	49	33	52	73	71
18	45	36	34	67	97	129	140	49	34	54	73	91
19	45	35	33	66	96	129	139	49	36	54	73	110
20	45	34	34	78	96	130	136	49	61	54	73	105
21	45	34	34	88	81	130	134	49	125	54	69	102
22	35	34	33	88	63	131	130	49	154	54	63	88
23	46	34	33	88	63	131	128	49	152	54	58	72
24	41	34	33	88	64	131	96	48	148	57	55	72
25	44	34	33	88	64	132	73	44	144	61	55	72
26	47	34	30	89	65	135	70	42	142	64	53	72
27	47	34	32	89	64	139	63	43	132	67	54	70
28	47	34	34	89	98	141	56	42	101	72	54	68
29	47	34	36	89	129	145	53	41	63	73	50	65
30	47	34	42	88	---	148	53	41	52	73	45	62
31	47	---	46	88	---	149	---	39	---	73	46	---
TOTAL	1386	1209	1065	2265	2560	4089	3715	1441	1906	1751	2054	1951
MEAN	44.7	40.3	34.4	73.1	88.3	132	124	46.5	63.5	56.5	66.3	65.0
MAX	47	49	46	89	129	149	149	49	154	73	73	110
MIN	35	34	30	47	63	126	53	39	31	49	45	41
CFSM	.55	.50	.42	.90	1.09	1.63	1.53	.57	.78	.70	.82	.80
IN.	.64	.56	.49	1.04	1.18	1.88	1.71	.66	.88	.80	.94	.90

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1994 - 2000, BY WATER YEAR (WY)

	MEAN	66.1	79.6	62.9	70.2	90.7	115	139	154	73.9	56.5	66.9	75.6
MAX	116	136	82.7	99.5	127	133	192	428	124	90.3	86.8	109	
(WY)	1997	1994	1996	1997	1996	1999	1997	1996	1996	1999	1997	1998	
MIN	35.0	25.4	27.4	48.6	57.8	84.4	82.6	46.5	51.3	30.7	45.5	53.0	
(WY)	1995	1995	1999	1999	1995	1995	1994	2000	1994	1998	1994	1995	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR		FOR 2000 WATER YEAR		WATER YEARS 1994 - 2000	
ANNUAL TOTAL	30402		25392			
ANNUAL MEAN	83.3		69.4		87.4	
HIGHEST ANNUAL MEAN					127	
LOWEST ANNUAL MEAN					65.8	
HIGHEST DAILY MEAN	359	May 27	154	Jun 22	670	May 11 1996
LOWEST DAILY MEAN	28	Jan 1	30	Dec 26	16	Jul 15 1998
ANNUAL SEVEN-DAY MINIMUM	29	Jan 4	32	Jun 6	22	Jul 14 1998
INSTANTANEOUS PEAK FLOW			173	Jun 21	686	May 11 1996
INSTANTANEOUS PEAK STAGE			3.94	Jun 21	6.08	May 11 1996
ANNUAL RUNOFF (CFSM)	1.03		.86		1.08	
ANNUAL RUNOFF (INCHES)	13.96		11.66		14.66	
10 PERCENT EXCEEDS	142		131		139	
50 PERCENT EXCEEDS	70		54		71	
90 PERCENT EXCEEDS	34		34		36	



## STREAMS TRIBUTARY TO LAKE SUPERIOR

463910086014201 GRAND SABLE LAKE NEAR GRAND MARAIS, MI

LOCATION.--Lat 46°39'10", long 86°01'42", in SW1/4 SW1/4 sec.11, T.49 N., R.14 W., Alger County, Hydrologic Unit 04020201, at National Park Service Public Access Site, 2.5 mi southwest of Grand Marais.

DRAINAGE AREA.--15 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--October 1944 to September 1950, June 1979 to September 1982, October 1992 to current year.

GAGE.--Nonrecording gage. Datum of gage is 743.44 ft above sea level. Oct. 18, 1944 to Sept. 23, 1950, nonrecording gage at different site and datum.

REMARKS.--Staff gage read by observer. Intermittent record only for some periods. Inlets are Rhody Creek, DeMull Creek, and Towes Creek. The outlet is Sable Creek. Partial-record site at outlet 1979-82. Surface area of lake is 628 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 3.30 ft, Apr. 28, 1994, May 2, 1995, July 30, 1996; minimum observed, 0.55 ft, Sept. 5, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 2.98 ft, Mar. 28; minimum observed, 1.36 ft, Sept. 16.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	2.88	---	2.15	2.66	2.66	---
2	---	2.70	2.64	---	---	---	---	2.30	2.16	2.66	---	---
3	2.58	2.74	---	---	---	---	2.78	---	---	---	2.66	1.58
4	---	2.70	2.64	---	---	---	---	2.24	2.20	---	---	---
5	2.56	---	---	---	---	---	2.78	---	---	2.64	---	---
6	---	2.70	2.64	---	---	---	---	2.24	2.18	---	---	1.46
7	2.56	2.70	---	---	---	---	---	2.24	---	2.66	---	---
8	---	---	---	---	---	2.72	2.76	---	2.20	---	2.66	1.40
9	---	2.66	2.62	---	---	---	---	2.24	---	2.66	---	---
10	---	---	---	---	---	---	2.68	2.26	---	---	2.66	1.38
11	2.68	2.64	---	---	---	---	---	---	2.28	---	---	---
12	---	---	---	---	---	---	2.62	---	---	2.65	2.66	1.40
13	2.68	---	---	---	---	---	2.63	2.24	2.34	---	---	---
14	---	---	---	---	---	---	2.58	---	---	2.68	2.66	1.38
15	2.70	---	---	---	---	---	---	2.22	2.40	---	2.66	---
16	---	---	2.60	---	---	---	2.50	---	2.40	2.66	---	1.36
17	---	---	---	---	---	---	---	2.19	2.46	---	---	1.38
18	2.80	---	---	---	---	---	2.50	---	---	---	---	---
19	---	---	---	---	---	---	---	2.16	2.52	2.60	---	1.38
20	2.82	---	---	---	---	---	---	---	---	---	2.30	---
21	---	---	---	---	---	---	2.46	2.16	---	2.62	---	1.40
22	---	---	---	---	---	---	---	---	2.64	---	---	---
23	---	2.58	---	---	---	---	2.46	2.16	---	---	2.06	---
24	2.90	2.62	---	---	---	---	---	2.16	---	2.60	1.96	1.46
25	---	---	---	---	---	---	---	---	2.68	---	---	---
26	2.90	2.66	---	2.55	---	---	2.38	2.14	---	2.60	1.94	1.48
27	---	---	---	---	---	---	---	---	2.70	---	---	---
28	2.80	2.66	---	---	---	2.98	---	---	---	2.66	---	---
29	---	---	---	---	---	---	2.34	2.16	---	---	1.68	---
30	2.80	2.66	---	---	---	---	2.34	---	2.66	2.66	---	---
31	2.80	---	---	---	---	---	---	2.16	---	---	---	---

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04044796 MUSKALLONGE LAKE NEAR DEER PARK, MI

LOCATION.--Lat 46°40'34", long 85°37'35", in SE1/4 NW1/4 sec.1, T.49 N., R.11 W., Luce County, Hydrologic Unit 04020201, at Muskallonge Lake State Park, 0.5 mi west of Deer Park.

**DRAINAGE AREA.**--11 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--October 1958 to September 1964, May 1971 to September 1982, October 1992 to current year.

**GAGE.**--Nonrecording gage. Datum of gage is 612.98 ft above sea level.

REMARKS.--Staff gage read by observer. The inlet to Muskallonge Lake is Trout Creek. There is no continuous outlet, however during periods of high lake level, water flows through an intermittent stream channel to Cranberry Lake. Surface area of lake is 786 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 22.32 ft, May 23, 1979, Feb. 16, 1994; minimum observed, 18.65 ft, Aug. 4, 1964.

**EXTREMES FOR CURRENT YEAR.**--Maximum gage height observed, 21.07 ft, Mar. 10; minimum observed, 20.05 ft, Aug. 23.

**GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000**  
**DAILY INSTANTANEOUS VALUES**

[illegible]

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR PARADISE, MI

LOCATION.--Lat 46°34'30", long 85°16'10", in NE1/4 sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi upstream from Tahquamenon Falls (upper), 11.5 mi west of Paradise, and 19 mi northeast of Newberry.

DRAINAGE AREA.--790 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1953 to current year. Prior to October 1989, published as "near Tahquamenon Paradise".

GAGE.--Water-stage recorder. Datum of gage is 698.03 ft above sea level.

REMARKS.--Records good. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	542	1210	601	328	386	1670	2400	487	261	489	191	151
2	549	1080	587	338	384	1900	2290	483	261	451	190	162
3	539	985	601	346	382	2080	2170	481	271	447	187	176
4	516	941	614	352	382	2240	2060	450	265	440	184	195
5	481	843	611	355	383	e2400	2000	442	263	413	185	210
6	447	748	615	360	382	e2550	1930	431	252	374	178	212
7	435	680	610	362	379	e2730	1840	405	253	347	175	211
8	432	619	588	366	383	2890	1750	389	237	319	175	201
9	490	568	564	372	375	3240	1690	365	238	290	175	203
10	541	522	580	384	373	3480	1570	359	249	272	177	200
11	581	507	631	401	377	3550	1510	359	263	262	181	207
12	605	479	645	417	378	3500	1400	346	293	250	186	219
13	562	469	643	428	374	3370	1300	350	310	237	181	237
14	573	433	627	437	370	3220	1180	365	314	225	179	235
15	578	438	615	440	371	3020	1090	382	314	224	175	232
16	604	426	605	442	373	2780	1030	387	318	228	166	238
17	667	424	533	448	368	2580	975	373	333	217	172	229
18	709	409	511	447	364	2400	937	346	349	208	160	239
19	745	405	508	440	364	2190	873	347	333	203	158	228
20	833	396	509	438	363	2000	830	335	333	197	156	229
21	912	402	477	438	364	1880	813	324	379	193	156	231
22	967	397	428	438	366	1850	824	309	418	189	149	239
23	1130	397	396	435	378	1860	801	303	450	192	146	242
24	1380	438	368	431	404	1940	768	297	446	191	147	246
25	1490	504	345	e420	476	2080	735	299	424	193	152	245
26	1520	550	330	e410	637	2230	700	295	431	186	143	243
27	1530	581	320	405	1000	2390	642	292	496	186	147	234
28	1490	596	318	400	1240	2460	591	281	550	186	152	240
29	1440	605	319	394	1420	2510	550	280	536	190	145	240
30	1370	608	321	391	---	2540	530	272	516	191	150	229
31	1280	---	326	391	---	2500	---	258	---	192	155	---
TOTAL	25938	17660	15746	12454	13796	78030	37779	11092	10356	8182	5173	6603
MEAN	837	589	508	402	476	2517	1259	358	345	264	167	220
MAX	1530	1210	645	448	1420	3550	2400	487	550	489	191	246
MIN	432	396	318	328	363	1670	530	258	237	186	143	151
CFSM	1.06	.75	.64	.51	.60	3.19	1.59	.45	.44	.33	.21	.28
IN.	1.22	.83	.74	.59	.65	3.67	1.78	.52	.49	.39	.24	.31

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2000, BY WATER YEAR (WY)

	MEAN	851	1015	772	494	483	763	2689	1629	674	495	422	600
MAX	1768	2284	1756	983	894	2517	4575	4511	1736	1081	1126	1623	
(WY)	1979	1989	1967	1983	1999	2000	1976	1960	1974	1956	1973	1970	
MIN	256	420	339	303	279	335	1259	323	244	209	167	220	
(WY)	1964	1977	1977	1963	1963	1956	2000	1998	1988	1963	2000	2000	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1953 - 2000

ANNUAL TOTAL	260957						242809						
ANNUAL MEAN	715						663						
HIGHEST ANNUAL MEAN										907			
LOWEST ANNUAL MEAN										1294			1971
HIGHEST DAILY MEAN										600			1998
LOWEST DAILY MEAN										6820			May 10 1960
ANNUAL SEVEN-DAY MINIMUM	4220				Apr 8		3550		Mar 11	143			Aug 26 2000
INSTANTANEOUS PEAK FLOW	215				Jun 28		147		Aug 23	147			Aug 23 2000
INSTANTANEOUS PEAK STAGE	227				Sep 5		3560		Mar 10	6990			May 10 1960
INSTANTANEOUS LOW FLOW							7.87		Mar 10	10.26			May 10 1960
ANNUAL RUNOFF (CFSM)							136		Aug 29	136			Aug 29 2000
ANNUAL RUNOFF (INCHES)	.91						.84			1.15			
10 PERCENT EXCEEDS	12.29						11.43			15.60			
50 PERCENT EXCEEDS	1210						1840			1880			
90 PERCENT EXCEEDS	511						403			574			
	264						190			296			

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04046000 BLACK RIVER NEAR GARNET, MI

LOCATION.--Lat 46°07'05", long 85°21'55", in SE1/4 sec.13, T.43 N., R.9 W., Mackinac County, Hydrologic Unit 04060107, on right bank 20 ft upstream from footbridge, 15 ft downstream from Peters Creek, 3.5 mi upstream from mouth, and 3.7 mi southwest of Garnet.

DRAINAGE AREA.--28 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--September 1951 to September 1978, October 1978 to September 1994 (operated as a crest-stage partial-record station), October 1994 to current year.

REVISED RECORDS.--WSP 1707: 1959.

GAGE.--Water-stage recorder. Datum of gage is 629.7 ft above sea level. Oct. 1, 1978 to Sept. 30, 1994, nonrecording gage at same site and datum.

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	22	14	9.0	8.3	57	42	17	8.7	13	6.4	5.7
2	15	20	16	8.9	8.3	60	39	17	9.1	14	6.2	6.1
3	13	19	15	9.2	8.3	62	41	16	8.7	14	5.9	8.4
4	13	18	15	9.5	8.2	70	44	15	8.4	12	5.6	7.4
5	12	17	14	9.0	8.0	74	39	15	8.1	11	5.6	6.1
6	12	17	14	9.0	8.0	72	41	14	8.0	10	5.8	5.7
7	12	16	13	9.0	7.9	74	40	13	7.9	9.2	6.0	5.4
8	15	16	13	9.0	e8.0	79	36	13	7.9	8.6	6.0	5.4
9	22	15	13	8.9	8.0	130	33	12	8.9	8.4	6.3	5.1
10	19	15	15	9.5	8.0	102	31	12	8.8	7.8	6.1	5.1
11	17	14	15	e10	8.0	86	29	11	8.7	7.1	5.7	7.2
12	16	14	14	10	e8.0	61	27	12	8.3	6.8	5.4	7.9
13	15	13	14	e10	8.0	53	26	12	8.0	6.8	5.1	6.5
14	14	13	13	9.7	8.0	41	26	12	7.9	6.5	5.3	6.1
15	17	12	14	9.7	7.7	39	25	12	8.8	6.4	5.3	5.5
16	19	12	14	9.5	7.7	40	25	11	9.7	6.3	5.1	5.4
17	21	12	13	e9.5	7.9	e35	25	11	9.1	6.1	5.1	5.2
18	19	12	12	9.5	7.7	32	24	11	8.4	5.9	5.1	5.1
19	33	12	12	9.3	7.7	31	23	11	8.1	6.0	5.1	5.1
20	37	11	12	9.5	7.7	32	23	10	9.1	6.3	5.0	6.5
21	32	11	e12	9.4	7.7	40	30	10	13	6.4	5.1	6.2
22	35	11	11	e9.5	7.9	50	26	10	11	6.2	5.1	6.0
23	42	12	9.9	9.3	8.7	54	24	11	10	5.9	5.0	6.1
24	45	15	9.4	9.0	9.5	57	22	10	10	5.9	4.9	5.8
25	38	15	9.0	8.9	13	68	21	9.6	10	5.9	4.8	5.7
26	34	14	9.0	8.6	23	74	20	9.5	14	5.6	5.1	5.7
27	31	14	9.0	9.0	44	86	19	9.1	19	7.3	4.9	5.5
28	28	14	9.0	8.6	37	75	18	9.0	16	7.9	5.0	5.4
29	26	14	9.0	8.6	37	63	17	8.7	15	6.9	5.0	5.4
30	24	14	8.9	8.5	---	53	16	8.6	15	6.6	5.0	5.4
31	23	---	8.9	8.4	---	47	---	8.8	---	6.4	4.9	---
TOTAL	715	434	380.1	285.5	347.2	1897	852	361.3	303.6	243.2	166.9	178.1
MEAN	23.1	14.5	12.3	9.21	12.0	61.2	28.4	11.7	10.1	7.85	5.38	5.94
MAX	45	22	16	10	44	130	44	17	19	14	6.4	8.4
MIN	12	11	8.9	8.4	7.7	31	16	8.6	7.9	5.6	4.8	5.1
CFSM	.82	.52	.44	.33	.43	2.19	1.01	.42	.36	.28	.19	.21
IN.	.95	.58	.50	.38	.46	2.52	1.13	.48	.40	.32	.22	.24

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	23.8	29.9	23.7	15.2	13.5	22.6	86.3	45.8	24.0	17.5	14.0	18.7
MAX	68.0	69.9	60.0	26.0	24.7	61.7	168	141	75.3	38.6	38.7	65.5	65.5
(WY)	1960	1978	1971	1967	1966	1953	1971	1960	1974	1952	1973	1970	1970
MIN	6.06	7.12	7.75	7.09	7.09	7.43	28.4	11.2	10.1	7.64	5.38	5.94	5.94
(WY)	1964	1977	1977	1977	1995	1956	2000	1998	2000	1998	2000	2000	2000

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1952 - 2000

ANNUAL TOTAL	6785.6						6163.9						
ANNUAL MEAN	18.6						16.8						
HIGHEST ANNUAL MEAN										27.9			
LOWEST ANNUAL MEAN										49.9			1971
HIGHEST DAILY MEAN	142						130			14.2			1998
LOWEST DAILY MEAN	7.3						4.8			4.8			May 7 1960
ANNUAL SEVEN-DAY MINIMUM	7.5						5.0			5.0			Aug 25 2000
INSTANTANEOUS PEAK FLOW							147			5.0			Aug 23 2000
INSTANTANEOUS PEAK STAGE							4.46			Mar 9			May 7 1960
INSTANTANEOUS LOW FLOW							4.8			Mar 9			May 7 1960
ANNUAL RUNOFF (CFSM)	.66						.60			(b)			(b)
ANNUAL RUNOFF (INCHES)	9.02						8.19			1.00			
10 PERCENT EXCEEDS	31						39			13.53			
50 PERCENT EXCEEDS	14						10			56			
90 PERCENT EXCEEDS	8.6						5.7			17			
										8.4			

(a) From rating curve extended above 400 ft<sup>3</sup>/s.

(b) Part of each day Aug. 20, 23-25, Aug. 27 to Sept. 1, 2000.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE1/4 sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi downstream from West Branch, 6.0 mi northeast of Manistique, and at mile 19.5.

DRAINAGE AREA.--1,100 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Datum of gage is 608.46 ft above sea level. Prior to July 15, 1939, non-recording gage at site 1,600 ft upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	530	1050	944	e620	e600	e1800	3520	989	609	880	476	375
2	523	1010	951	e620	e600	e2000	3300	964	613	841	467	408
3	517	975	971	e620	e600	e2200	3080	934	617	813	457	437
4	518	939	987	e620	e600	e2500	2930	915	616	799	456	469
5	521	916	1000	e620	e600	e2800	2830	899	606	790	446	477
6	515	890	1010	e620	e600	e3200	2760	877	586	741	437	469
7	514	867	1010	e620	e600	e3500	2700	866	569	693	433	445
8	538	847	992	e620	e600	3820	2630	843	559	667	434	427
9	597	832	970	e620	e600	3930	2520	836	554	651	440	413
10	657	822	968	e640	e600	4060	2390	833	560	639	445	406
11	711	809	979	e650	e600	4120	2240	835	589	629	442	420
12	719	811	994	e660	e600	e4100	2100	826	632	606	436	470
13	690	799	988	e680	e600	e4100	1920	828	694	580	430	544
14	651	790	965	e680	e600	3950	1710	831	719	577	420	605
15	646	772	950	e680	e600	3720	1600	839	720	566	412	610
16	678	763	938	e680	e600	3340	1540	827	754	542	405	562
17	732	753	825	e680	e600	2980	1500	800	798	525	393	521
18	769	744	e800	e680	e600	2780	1460	780	804	506	389	458
19	790	736	e800	e680	e600	2560	1410	757	784	493	391	481
20	819	734	e800	e680	e600	2390	1370	738	757	502	390	482
21	830	728	e780	e680	e620	2290	1380	718	832	508	387	452
22	852	723	e740	e680	e660	2210	1370	707	944	503	383	459
23	911	730	e660	e680	e700	2270	1350	705	1010	497	381	514
24	1020	778	e620	e660	e800	2390	1310	707	1020	487	378	517
25	1150	859	e620	e660	e950	2520	1270	705	997	470	376	511
26	1240	946	e620	e660	e1050	2650	1230	691	948	459	377	500
27	1320	984	e620	e640	e1300	2840	1170	671	958	469	371	488
28	1300	967	e620	e640	e1400	3090	1110	656	975	496	366	473
29	1230	956	e620	e620	e1500	3370	1060	639	1000	502	367	462
30	1160	953	e620	e620	---	3570	1010	625	943	501	361	455
31	1100	---	e620	e610	---	3630	---	616	---	488	355	---
TOTAL	24748	25483	25982	20120	20980	94680	57770	24457	22767	18420	12701	14420
MEAN	798	849	838	649	723	3054	1926	789	759	594	410	481
MAX	1320	1050	1010	680	1500	4120	3520	989	1020	880	476	610
MIN	514	723	620	610	600	1800	1010	616	554	459	355	375
CFSM	.73	.77	.76	.59	.66	2.78	1.75	.72	.69	.54	.37	.44
IN.	.84	.86	.88	.68	.71	3.20	1.95	.83	.77	.62	.43	.49

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 2000, BY WATER YEAR (WY)

	MEAN	1131	1503	1249	942	866	1336	3971	2310	1288	883	688	759
MAX	2720	3777	2569	1777	1516	3358	6401	6963	4531	1783	1733	2657	
(WY)	1979	1989	1966	1966	1966	1946	1976	1960	1943	1993	1996	1978	
MIN	386	606	480	469	480	547	1926	789	602	402	384	350	
(WY)	1949	1977	1977	1977	1963	1963	2000	2000	1988	1955	1963	1948	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1938 - 2000
ANNUAL TOTAL	415863	362538	
ANNUAL MEAN	1139	991	1413
HIGHEST ANNUAL MEAN			2229
LOWEST ANNUAL MEAN			806
HIGHEST DAILY MEAN	7500	Apr 8	16500
LOWEST DAILY MEAN	433	Sep 8	290
ANNUAL SEVEN-DAY MINIMUM	440	Sep 4	294
INSTANTANEOUS PEAK FLOW		4130	16900
INSTANTANEOUS PEAK STAGE		9.37	12.85
INSTANTANEOUS LOW FLOW		351	288
ANNUAL RUNOFF (CFSM)	1.04	.90	1.28
ANNUAL RUNOFF (INCHES)	14.06	12.26	17.45
10 PERCENT EXCEEDS	1670	2280	2720
50 PERCENT EXCEEDS	830	705	1000
90 PERCENT EXCEEDS	518	456	556

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW1/4 SE1/4 sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft upstream from bridge on Forest Service Road 2231, 500 ft downstream from Mormon Creek, 0.1 mi east of Federal Forest Highway 13, and 3.2 mi north of Nahma Junction.

DRAINAGE AREA.--183 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	107	103	e66	e66	e260	397	113	69	187	76	61
2	57	102	103	e66	e66	e270	354	112	72	179	72	78
3	54	99	104	e66	e66	e280	332	110	73	165	66	86
4	52	96	107	e68	e64	e300	336	100	69	140	61	91
5	51	93	106	e68	e64	e320	305	122	67	122	57	75
6	57	91	103	e68	e64	e340	289	118	65	115	56	66
7	71	87	100	e68	e64	e370	275	109	64	105	60	61
8	92	86	97	e68	e64	e410	249	148	62	98	60	58
9	132	84	94	e68	e64	672	232	167	69	125	64	54
10	122	82	e90	e68	e62	624	218	155	75	109	64	52
11	110	81	e90	e68	e62	e540	206	143	80	92	61	119
12	100	78	e90	e68	e62	e480	201	144	83	82	57	249
13	91	77	e90	e68	e62	445	200	157	86	77	54	236
14	84	76	e88	e68	e62	359	194	151	82	73	51	184
15	86	74	e88	e68	e62	306	188	136	89	69	51	172
16	90	73	e82	e68	e62	277	185	125	101	66	48	178
17	99	73	e76	e68	e62	e250	187	117	103	63	46	148
18	96	72	e74	e68	e62	234	195	117	91	60	45	126
19	96	72	e70	e68	e62	216	196	111	104	57	44	110
20	98	73	e70	e68	e64	211	189	103	119	59	43	121
21	94	71	e66	e68	e64	225	223	97	281	62	43	123
22	100	71	e66	e68	e66	269	210	96	255	59	42	111
23	179	77	e66	e68	e70	330	194	107	213	56	42	112
24	206	134	e66	e68	e74	388	177	107	189	54	41	107
25	185	137	e66	e70	e80	499	164	103	177	52	40	96
26	166	130	e66	e70	e120	529	155	97	175	51	42	88
27	150	125	e66	e70	e160	633	141	91	204	55	46	81
28	137	119	e66	e70	e210	668	136	85	183	82	43	74
29	125	114	e66	e70	e242	596	126	79	172	100	42	71
30	121	109	e66	e68	---	521	115	74	154	96	40	69
31	114	---	e66	e68	---	451	---	73	---	82	39	---
TOTAL	3275	2763	2551	2112	2352	12273	6569	3567	3626	2792	1596	3257
MEAN	106	92.1	82.3	68.1	81.1	396	219	115	121	90.1	51.5	109
MAX	206	137	107	70	242	672	397	167	281	187	76	249
MIN	51	71	66	66	62	211	115	73	62	51	39	52
CFSM	.58	.50	.45	.37	.44	2.16	1.20	.63	.66	.49	.28	.59
IN.	.67	.56	.52	.43	.48	2.49	1.34	.73	.74	.57	.32	.66

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 2000, BY WATER YEAR (WY)

	174	219	164	106	98.1	181	539	285	176	117	107	125
MEAN	174	219	164	106	98.1	181	539	285	176	117	107	125
MAX	337	532	369	198	181	396	847	590	411	254	330	354
(WY)	1983	1978	1971	1997	1984	2000	1979	1996	1979	1968	1978	1978
MIN	55.5	64.4	49.8	50.0	54.2	72.6	219	88.4	50.3	45.7	48.1	40.7
(WY)	1977	1977	1977	1977	1977	1994	2000	1998	1988	1988	1976	1976

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1967 - 2000

ANNUAL TOTAL	53282		46733	
ANNUAL MEAN	146		128	
HIGHEST ANNUAL MEAN				191
LOWEST ANNUAL MEAN				289
HIGHEST DAILY MEAN				121
LOWEST DAILY MEAN	1230	Apr 7	672	Mar 9
ANNUAL SEVEN-DAY MINIMUM	41	Sep 5	39	Aug 31
INSTANTANEOUS PEAK FLOW	44	Sep 2	42	Aug 25
INSTANTANEOUS LOW FLOW			714	Mar 9
ANNUAL RUNOFF (CFSM)			6.97	Mar 9
ANNUAL RUNOFF (INCHES)			39	(a)
10 PERCENT EXCEEDS	226		249	
50 PERCENT EXCEEDS	100		90	
90 PERCENT EXCEEDS	58		59	

(a) Aug. 30, 31.

(b) July 8, 1988, Aug. 5-7, 1998.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW1/4 sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft upstream from county road FX, 1.5 mi downstream from Halfway Creek, and 0.3 mi north of Humboldt.

DRAINAGE AREA.--46.0 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. From July 1960 to June 1972, some diversion 100 ft upstream by industry for iron ore processing; figures of runoff adjusted. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

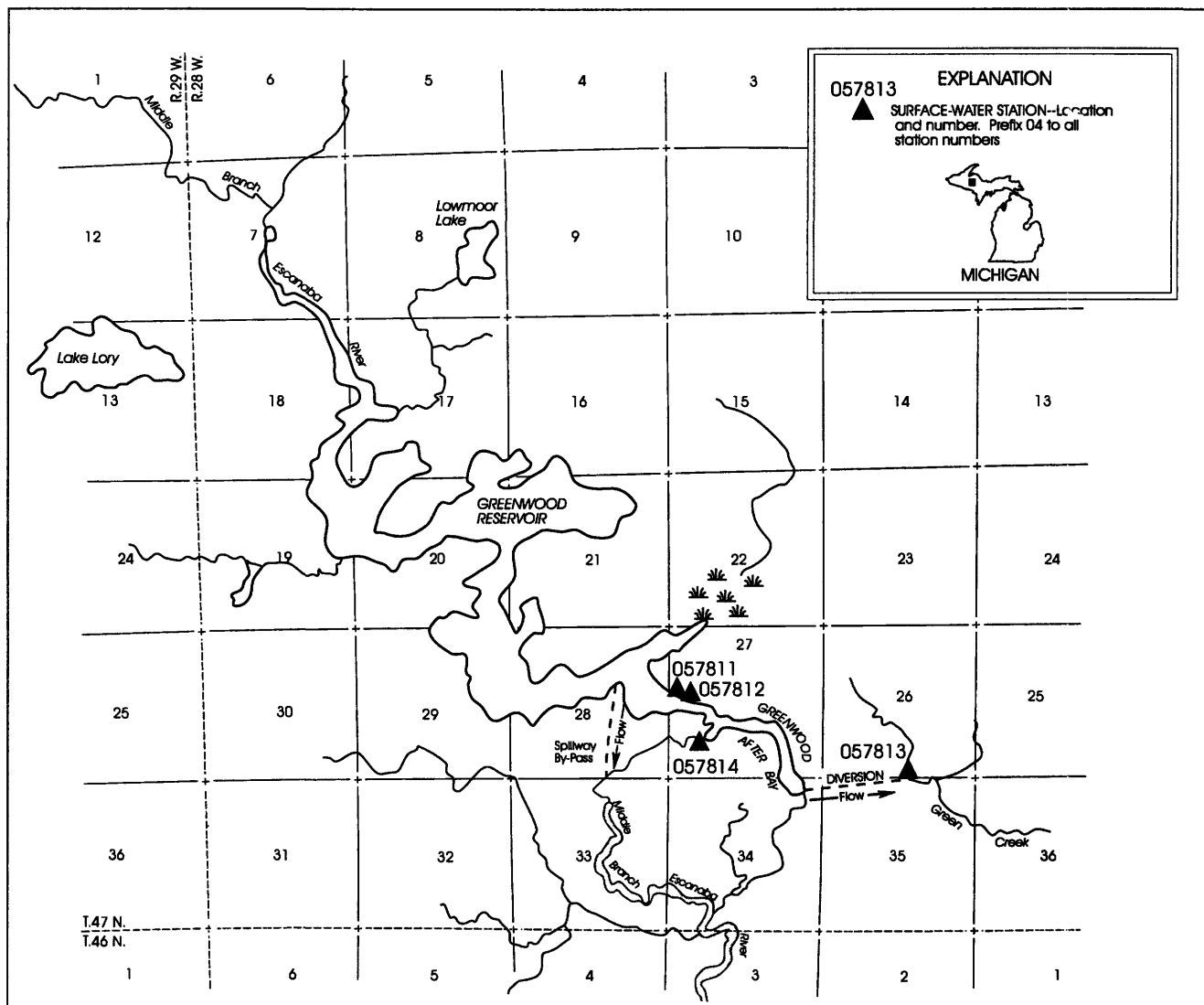
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e15	e29	e22	e20	e12	102	190	59	e14	e20	e10	e38
2	e15	e24	e21	e20	e12	102	195	e55	e15	e22	e20	e33
3	e14	e21	e21	e20	e12	98	202	e49	e14	e28	e18	e35
4	e13	e18	e22	e21	e12	90	214	e43	e13	e23	e14	e30
5	e13	e18	e22	e20	e12	94	192	e41	e12	e18	e13	e19
6	e13	e17	e20	e21	e11	98	177	e36	e12	e21	e15	e17
7	e13	e15	e20	e20	e11	123	162	e33	e12	e19	e18	e15
8	e20	e14	e20	e20	e11	157	139	e32	e12	e19	e17	e13
9	e27	e15	e20	e20	e11	207	126	e32	e16	e34	e36	e9.9
10	e23	e15	e20	e20	e11	226	112	e28	e21	e31	e27	e11
11	e19	e16	e20	e20	e11	219	104	e30	e19	e25	e16	e15
12	e18	e15	e20	e20	e11	163	98	e33	e17	e20	e14	e17
13	e16	e14	e20	e19	e11	134	94	e37	e16	e18	e14	e19
14	e15	e13	e20	e19	e11	108	89	e36	e16	e16	e13	e19
15	e18	e12	e20	e18	e11	99	92	e34	e17	e15	e11	e18
16	e19	e12	e20	e18	e11	113	88	e30	e19	e13	e10	e17
17	e18	e11	e20	e17	e11	98	86	e26	e19	e13	e9.0	e16
18	e17	e11	e20	e16	e11	80	93	e25	e16	e12	e8.0	e15
19	e17	e13	e19	e16	e11	71	95	e23	e24	e12	e7.0	e15
20	e17	e14	e20	e15	e11	67	93	e20	e32	e12	e6.0	e14
21	e17	e13	e20	e15	e11	69	88	e18	e93	e12	e5.8	e13
22	e21	e13	e20	e15	e12	87	86	e20	e82	e11	e5.7	e11
23	e37	e20	e20	e15	e12	110	86	e23	e66	e10	e5.6	e11
24	e33	e51	e20	e14	e14	140	88	e20	e52	e9.7	e5.5	e10
25	e34	e43	e20	e14	e18	193	83	e18	e44	e8.5	e5.4	e10
26	e39	e36	e20	e14	48	225	77	e17	e41	e8.4	e8.0	e9.8
27	e34	e33	e20	e14	82	258	71	e16	e45	e13	e20	e9.6
28	e31	e30	e20	e14	88	273	67	e15	e35	e26	e21	e9.2
29	e27	e27	e20	e13	87	232	66	e14	e29	e17	e19	e9.0
30	e32	e24	e20	e13	---	189	61	e14	e24	e12	e14	e9.0
31	e34	---	e20	e13	---	179	---	e14	---	e11	e14	---
TOTAL	679	607	627	534	597	4404	3414	891	847	529.6	420.0	487.5
MEAN	21.9	20.2	20.2	17.2	20.6	142	114	28.7	28.2	17.1	13.5	16.2
MAX	39	51	22	21	88	273	214	59	93	34	36	38
MIN	13	11	19	13	11	67	61	14	12	8.4	5.4	9.0
CFSM	.48	.44	.44	.37	.45	3.09	2.47	.62	.61	.37	.29	.35
IN.	.55	.49	.51	.43	.48	3.56	2.76	.72	.68	.43	.34	.39

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2000, BY WATER YEAR (WY)

	MEAN	53.0	56.8	37.0	23.5	20.9	41.6	197	124	59.1	32.3	25.7	35.5
MAX	191	198	77.5	41.5	55.9	149	423	326	153	89.9	76.5	184	184
(WY)	1986	1989	1992	1966	1984	1973	1985	1972	1989	1968	1978	1978	1978
MIN	5.87	5.97	5.57	5.30	6.00	11.5	74.9	21.1	13.3	7.57	5.80	4.91	4.91
(WY)	1977	1977	1977	1977	1977	1964	1987	1998	1988	1988	1976	1976	1976

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1959 - 2000
ANNUAL TOTAL	20340.6	14037.1	
ANNUAL MEAN	55.7	38.4	58.6
HIGHEST ANNUAL MEAN			95.3
LOWEST ANNUAL MEAN			30.7
HIGHEST DAILY MEAN	446	273	1830
LOWEST DAILY MEAN	9.6	5.4	4.2
ANNUAL SEVEN-DAY MINIMUM	11	5.9	4.5
INSTANTANEOUS PEAK FLOW		283	1930
INSTANTANEOUS PEAK STAGE		4.44	9.21
INSTANTANEOUS LOW FLOW			3.5
ANNUAL RUNOFF (CFSM)	1.21	.83	1.27
ANNUAL RUNOFF (INCHES)	16.45	11.35	17.31
10 PERCENT EXCEEDS	151	96	128
50 PERCENT EXCEEDS	24	20	30
90 PERCENT EXCEEDS	13	11	12

(e) Estimated.



**Figure 7.** Identification number and location of active surface-water gaging stations in and around the Greenwood Reservoir Complex.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam on Middle Branch Escanaba River, 3.7 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi<sup>2</sup>.

PERIOD OF RECORD.--December 1972 to current year. Prior to October 1997 monthend elevations and contents only.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above sea level (levels by Cleveland-Cliffs Iron Co.); EXTREMES reported below have been converted to sea level elevations. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. Capacity of reservoir, 23,300 acre-ft at spillway elevation 1,515 ft. Above elevation 1,515 ft, water flows over concrete spillway into Middle Branch Escanaba River approximately 2,000 ft downstream from Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to Greenwood Afterbay (station 04057812) which has a capacity of 420 acre-ft at elevation 1,480 ft. Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,517.3 ft, Apr. 21, 22, 23, 1985; minimum since first filling, 1,491.1 ft, Mar. 12, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,515.50 ft, Apr. 4, 5; minimum, 1,509.22 ft, Sept. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	114.32	114.10	113.18	111.81	110.62	109.99	115.44	115.16	114.35	114.21	112.96	111.23
2	114.30	114.09	113.15	111.81	110.57	110.13	115.45	115.15	114.33	114.22	112.96	111.16
3	114.27	114.06	113.12	111.78	110.53	110.26	115.47	115.14	114.28	114.23	112.89	111.13
4	114.23	114.03	113.08	111.75	110.49	110.39	115.48	115.12	114.23	114.22	112.83	111.08
5	114.21	114.01	113.05	111.71	110.45	110.52	115.48	115.11	114.18	114.19	112.76	111.00
6	114.18	113.97	113.01	111.68	110.39	110.67	115.47	115.09	114.13	114.19	112.71	110.94
7	114.16	113.93	112.96	111.63	110.34	110.86	115.44	115.08	114.07	114.16	112.70	110.89
8	114.17	113.90	112.92	111.59	110.29	111.10	115.40	115.06	114.02	114.15	112.67	110.84
9	114.18	113.86	112.88	111.55	110.24	111.48	115.37	115.03	114.01	114.16	112.65	110.78
10	114.18	113.83	112.85	111.53	110.19	111.78	115.34	115.01	114.00	114.14	112.60	110.73
11	114.16	113.78	112.80	111.50	110.14	112.07	115.32	115.00	114.00	114.11	112.54	110.70
12	114.13	113.74	112.76	111.46	110.09	112.34	115.30	115.00	113.95	114.08	112.48	110.65
13	114.13	113.70	112.72	111.42	110.04	112.52	115.29	115.00	113.91	114.06	112.42	110.57
14	114.10	113.65	112.68	111.37	109.98	112.68	115.28	114.98	113.89	114.02	112.35	110.50
15	114.09	113.59	112.66	111.33	109.94	112.83	115.29	114.96	113.86	113.97	112.31	110.44
16	114.09	113.54	112.63	111.29	109.91	112.94	115.28	114.93	113.84	113.92	112.25	110.36
17	114.07	113.48	112.59	111.25	109.86	113.04	115.27	114.91	113.79	113.87	112.20	110.29
18	114.04	113.43	112.54	111.23	109.80	113.12	115.27	114.88	113.76	113.68	112.16	110.21
19	114.03	113.40	112.50	111.18	109.74	113.21	115.26	114.83	113.77	113.61	112.09	110.15
20	114.01	113.36	112.44	111.14	109.69	113.28	115.23	114.79	113.78	113.56	112.03	110.10
21	113.99	113.31	---	111.09	109.64	113.35	115.22	114.75	113.87	113.50	111.96	110.03
22	114.01	113.27	---	111.05	109.59	113.43	115.21	114.72	113.96	113.44	111.90	109.95
23	114.04	113.25	---	111.01	109.54	113.54	115.21	114.71	114.02	113.38	111.83	109.88
24	114.04	113.29	112.12	110.96	109.51	113.71	115.21	114.67	114.08	113.33	111.76	109.80
25	114.05	113.28	112.07	110.92	109.48	113.96	115.21	114.63	114.11	113.26	111.68	109.71
26	114.05	113.27	112.04	110.88	109.50	114.28	115.20	114.58	114.15	113.21	111.62	109.62
27	114.05	113.27	111.99	110.83	109.61	114.68	115.20	114.54	114.19	113.17	111.54	109.54
28	114.06	113.25	111.97	110.79	109.71	115.09	115.19	114.50	114.20	113.13	111.47	109.45
29	114.06	113.24	111.93	110.74	109.83	115.34	115.18	114.46	114.22	113.08	111.41	109.35
30	114.09	113.21	111.89	110.70	---	115.42	115.17	114.42	114.21	113.04	111.33	109.27
31	114.10	---	111.85	110.66	---	115.43	---	114.39	---	113.00	111.26	---
MEAN	114.12	113.60	---	111.28	109.99	112.69	115.30	114.86	114.04	113.75	112.20	110.55
MAX	114.32	114.10	---	111.81	110.62	115.43	115.48	115.16	114.35	114.23	112.96	111.23
MIN	113.99	113.21	---	110.66	109.48	109.99	115.17	114.39	113.76	113.00	111.26	109.27

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110 in control house at downstream side of dam on the Middle Branch Escanaba River, 3.7 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi<sup>2</sup>.

PERIOD OF RECORD.--March 1999 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above sea level (levels by Cleveland-Cliffs Iron Co.).

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 81.04 ft, July 29, 2000; minimum, 79.32 ft, Nov. 7, 2000.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 81.04 ft, July 29; minimum, 79.32 ft, Nov. 7.

REMARKS.--Flow completely regulated by four valve outlet structure from Greenwood Reservoir (station 04057811) immediately upstream.

Capacity of afterbay, 420 acre-ft at elevation 1,480 ft. Two outlet systems provide for diversion for use in iron ore processing and for release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814).

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80.13	79.52	80.28	80.11	79.75	79.98	79.95	80.12	80.27	80.07	79.90	80.04
2	80.12	79.66	80.26	80.15	79.74	80.01	79.87	80.04	80.23	79.99	79.87	80.04
3	80.11	79.79	80.24	80.16	79.74	80.03	79.84	79.96	80.29	79.96	79.77	80.06
4	80.10	79.88	80.22	80.16	79.75	80.11	79.97	79.91	80.30	79.98	79.70	80.05
5	80.08	79.80	80.20	80.10	79.82	80.18	80.12	79.90	80.32	80.01	79.70	80.03
6	79.97	79.57	80.17	80.04	79.87	80.24	80.27	79.91	80.33	80.13	79.72	79.99
7	79.85	79.41	80.15	79.97	79.90	80.19	80.37	79.91	80.24	80.20	79.76	79.77
8	79.80	79.42	80.14	79.93	79.92	80.15	80.45	79.97	80.12	80.32	79.79	79.67
9	79.72	79.48	80.15	79.88	79.94	80.18	80.51	80.10	80.07	80.44	79.89	79.62
10	79.63	79.50	80.14	79.93	79.97	80.17	80.55	79.96	80.08	80.53	79.93	79.73
11	79.53	79.51	80.11	80.07	80.00	80.13	80.52	79.76	80.13	80.59	79.97	79.86
12	79.50	79.68	80.11	80.14	80.00	80.09	80.48	79.61	80.11	80.55	80.01	80.08
13	79.53	79.88	80.09	80.15	80.02	80.06	80.33	79.65	80.16	80.46	80.06	80.27
14	79.59	80.03	80.08	80.14	80.02	80.02	80.05	79.68	80.26	80.37	80.08	80.35
15	79.65	80.14	80.10	80.14	80.03	80.01	79.81	79.70	80.31	80.27	80.06	80.31
16	79.70	80.23	80.09	80.14	80.05	79.98	79.61	79.73	80.35	80.19	79.79	80.40
17	79.74	80.32	80.05	80.15	80.04	79.95	79.44	79.74	80.36	80.14	79.58	80.50
18	79.78	80.40	80.01	80.16	80.04	79.91	79.47	79.77	80.40	80.15	79.55	80.55
19	79.82	80.41	79.98	80.15	80.03	79.88	79.69	79.89	80.43	80.18	79.70	80.49
20	79.83	80.44	79.97	80.14	80.03	79.83	79.91	80.00	80.40	80.23	79.84	80.32
21	79.81	80.43	79.93	80.12	80.02	79.75	80.09	80.07	80.57	80.27	79.96	80.08
22	79.82	80.45	79.90	80.12	80.00	79.87	80.24	80.15	80.63	80.29	80.10	79.88
23	79.86	80.45	79.87	80.12	79.95	80.11	80.36	80.29	80.57	80.31	80.30	79.88
24	79.86	80.47	79.85	80.11	79.91	80.27	80.44	80.39	80.54	80.33	80.35	79.90
25	79.85	80.45	79.84	80.09	79.89	80.25	80.44	80.46	80.49	80.27	80.37	79.91
26	79.84	80.42	79.83	80.00	79.93	80.21	80.37	80.51	80.48	80.02	80.47	79.90
27	79.83	80.40	79.80	79.92	79.98	80.22	80.30	80.46	80.50	80.34	80.49	79.90
28	79.72	80.37	79.87	79.85	79.83	80.21	80.24	80.40	80.42	80.76	80.45	79.92
29	79.64	80.35	79.95	79.80	79.89	80.17	80.20	80.35	80.33	80.93	80.19	80.03
30	79.61	80.32	80.04	79.77	---	80.12	80.15	80.32	80.20	80.53	79.99	80.13
31	79.56	---	80.09	79.75	---	80.04	---	80.29	---	80.13	80.00	---
MEAN	79.79	80.04	80.05	80.05	79.93	80.07	80.13	80.03	80.33	80.29	79.98	80.06
MAX	80.13	80.47	80.28	80.16	80.05	80.27	80.55	80.51	80.63	80.93	80.49	80.55
MIN	79.50	79.41	79.80	79.75	79.74	79.75	79.44	79.61	80.07	79.96	79.55	79.62

WTR YR 2000 MEAN 80.06 MAX 80.93 MIN 79.41

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW1/4 NE1/4 sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft upstream from Green Creek, 0.7 mi downstream from Greenwood Afterbay, and 3.6 mi south of Greenwood.

PERIOD OF RECORD.--January 1973 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,454.57 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow completely regulated; diversion began January 7, 1973. A pipeline, 0.7 mi long, diverts water from Greenwood Afterbay (station 04057812), which regulates released flow from Greenwood Reservoir (station 04057811), into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing, some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek, some returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	11	24	22	17	4.1	2.4	7.6	17	8.7	23	24
2	6.5	14	24	23	17	3.8	2.4	8.3	17	9.1	e23	23
3	6.5	14	24	23	17	3.1	2.4	8.7	17	10	e23	23
4	6.5	15	24	23	17	2.2	2.4	9.1	18	11	e23	23
5	6.5	20	24	22	17	2.2	2.4	9.4	19	12	e23	23
6	6.4	21	24	22	17	2.2	2.5	9.4	22	12	e23	21
7	6.3	21	24	22	18	2.2	2.5	9.4	23	13	e23	19
8	6.3	21	24	22	18	2.2	2.5	14	23	13	e23	19
9	6.3	21	24	22	18	2.2	2.5	18	23	14	e23	18
10	6.2	21	24	19	18	2.2	2.5	21	23	15	e23	19
11	6.2	21	24	18	18	2.2	2.5	22	23	16	e23	19
12	6.2	22	24	18	18	2.2	2.5	22	20	19	e23	20
13	6.2	22	24	18	18	2.2	5.9	22	17	20	e23	20
14	6.2	23	24	18	18	2.1	7.2	22	18	20	e23	20
15	6.2	23	24	18	18	2.2	7.1	22	18	e20	e19	18
16	6.3	24	24	18	18	2.1	7.0	22	18	e20	16	15
17	6.3	24	24	18	18	2.1	6.9	22	18	e20	15	16
18	6.3	24	24	18	18	2.1	6.9	22	18	e21	15	16
19	6.3	24	24	18	18	2.1	7.0	23	18	23	16	16
20	6.3	24	24	18	18	5.0	7.2	23	16	23	16	18
21	6.3	24	24	18	18	8.0	7.3	23	10	23	16	20
22	6.3	24	24	18	e18	4.7	7.4	23	7.6	23	18	23
23	6.3	24	24	18	18	1.3	7.4	23	7.5	23	22	23
24	6.3	24	24	18	18	1.6	7.4	24	7.5	23	24	23
25	6.3	24	24	18	18	2.5	7.4	20	7.5	23	24	23
26	6.3	24	24	18	18	2.5	7.3	18	4.4	23	24	23
27	7.5	24	24	18	16	2.5	7.3	18	4.3	24	24	23
28	8.8	24	23	17	e4.5	2.5	7.3	18	5.1	23	24	23
29	8.7	24	23	17	e2.4	2.4	7.3	18	6.2	23	24	23
30	8.7	24	22	17	---	2.4	7.3	18	7.7	23	23	23
31	8.7	---	22	17	---	2.4	---	18	---	23	23	---
TOTAL	206.7	650	738	594	484.9	83.5	158.1	557.9	453.8	573.8	665	617
MEAN	6.67	21.7	23.8	19.2	16.7	2.69	5.27	18.0	15.1	18.5	21.5	20.6
MAX	8.8	24	24	23	18	8.0	7.4	24	23	24	24	24
MIN	6.2	11	22	17	2.4	1.3	2.4	7.6	4.3	8.7	15	15

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 2000, BY WATER YEAR (WY)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
MEAN	14.4	12.7	14.8	18.1	17.3	13.0	6.60	9.75	12.5	17.5	17.4	16.6																
MAX	26.5	26.4	25.5	26.0	26.0	25.8	17.2	24.2	26.0	26.1	28.5	28.1																
(WY)	1995	1995	1995	1994	1995	1982	1980	1998	1977	1988	1994	1994																
MIN	.046	.37	.19	.19	.28	.31	.11	.22	.28	1.63	1.20	.39																
(WY)	1978	1974	1974	1974	1974	1974	1977	1973	1974	1982	1977	1977																

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1973 - 2000
ANNUAL TOTAL	3658.13	5782.7	
ANNUAL MEAN	10.0	15.8	14.3
HIGHEST ANNUAL MEAN			22.4
LOWEST ANNUAL MEAN			4.06
HIGHEST DAILY MEAN	24	Nov 16	30
LOWEST DAILY MEAN	.04	Apr 3	.00
ANNUAL SEVEN-DAY MINIMUM	.04	Apr 3	.00
10 PERCENT EXCEEDS	24	24	26
50 PERCENT EXCEEDS	6.3	18	14
90 PERCENT EXCEEDS	3.3	2.5	1.2

(a) June 25-28, 1977, Nov. 9, 1979.

(b) Apr. 6-13, 1998; result of shutdown of flume for maintenance.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi upstream from Bell Creek, and 3.8 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,473.77 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft is completely regulated by Greenwood Afterbay release structure (station 04057812) into the Middle Branch Escanaba River. Since January 1973, water diverted immediately upstream from station via Greenwood Diversion (station 04057813) to Green Creek for iron ore processing and some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek. Since October 1979, some of the diversion returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River. Overflow from reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi downstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	25	26	26	e25	26	25	27	25	e25	24	25
2	26	26	26	26	e25	25	25	26	25	e25	24	25
3	26	27	26	26	e25	25	25	26	25	e25	24	25
4	26	27	26	26	25	26	25	26	25	e25	24	25
5	26	27	25	26	25	26	25	26	25	e25	24	25
6	26	26	25	26	26	26	26	26	25	e25	24	24
7	25	25	25	26	26	26	26	26	25	e25	24	24
8	25	25	25	25	26	25	26	26	25	e25	24	24
9	25	25	25	25	26	25	27	26	25	e25	24	24
10	25	26	25	25	26	25	27	26	25	e25	24	24
11	25	26	25	e25	25	25	27	25	25	26	24	24
12	25	26	25	e25	25	25	26	25	25	26	25	24
13	25	26	25	e25	26	25	26	25	25	24	25	24
14	25	26	25	e25	26	25	25	25	25	24	24	24
15	26	27	25	e25	26	25	24	25	25	24	24	24
16	25	26	25	e25	26	25	24	25	25	24	24	24
17	25	26	26	e25	26	25	25	25	25	24	24	25
18	25	27	26	e25	26	25	25	25	25	24	24	24
19	26	27	26	e25	26	25	26	26	25	24	25	24
20	26	26	26	e25	26	25	26	26	25	24	25	24
21	27	26	25	e25	26	25	26	26	26	24	25	24
22	27	26	25	e25	25	25	27	26	26	24	25	24
23	27	26	25	e25	25	26	27	26	25	24	25	24
24	27	26	25	e25	25	26	28	25	25	25	25	24
25	27	26	25	e25	25	25	28	26	25	24	25	24
26	26	26	25	e25	25	25	27	25	25	24	25	24
27	26	26	25	e25	26	25	27	25	25	25	25	24
28	26	26	25	e25	26	25	27	25	25	25	24	24
29	26	26	25	e25	26	25	27	25	25	25	24	24
30	25	26	25	e25	---	25	27	25	25	24	24	25
31	25	---	25	e25	---	25	---	25	---	24	24	---
TOTAL	797	782	783	782	742	782	782	792	752	762	755	727
MEAN	25.7	26.1	25.3	25.2	25.6	25.2	26.1	25.5	25.1	24.6	24.4	24.2
MAX	27	27	26	26	26	26	28	27	26	26	25	25
MIN	25	25	25	25	25	25	24	25	25	24	24	24

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 2000, BY WATER YEAR (WY)

MEAN	29.7	29.0	25.8	25.4	26.4	28.6	27.6	26.8	27.0	26.3	25.7	25.7																	
MAX	141	122	35.6	32.6	35.9	56.3	44.9	40.3	42.2	42.2	30.6	30.2																	
(WY)	1973	1973	1974	1974	1986	1989	1989	1976	1975	1974	1997	1984																	
MIN	21.7	14.1	13.0	18.9	22.0	22.0	12.1	17.3	21.7	20.3	21.8	22.0																	
(WY)	1996	1999	1999	1973	1973	1973	1998	1999	1995	1973	1995	1995																	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1973 - 2000

ANNUAL TOTAL	8430	9238																											
ANNUAL MEAN	23.1	25.2																											
HIGHEST ANNUAL MEAN																													
LOWEST ANNUAL MEAN																													
HIGHEST DAILY MEAN	28	Sep 26					28	Apr 24		(a)290	Oct 1	1972																	
LOWEST DAILY MEAN	13	Apr 1					24	Apr 15		.00																			
ANNUAL SEVEN-DAY MINIMUM	13	Apr 1					24	Jul 13		.00																			
10 PERCENT EXCEEDS	26						26			29																			
50 PERCENT EXCEEDS	25						25			26																			
90 PERCENT EXCEEDS	13						24			24																			

(a) Prior to regulation; since regulation began, 63 ft<sup>3</sup>/s, July 10, 11, 1974.

(b) Apr. 15-29, 1998; result of shutdown of flume for maintenance.

(c) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE1/4 NW1/4 sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft upstream from dam on Schweitzer Creek, 3.0 mi southwest of Palmer.

DRAINAGE AREA.--23.1 mi<sup>2</sup>.

PERIOD OF RECORD.--January 1963 to current year. Prior to October 1997 monthend elevations and contents only.

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft above sea level (Cleveland-Cliffs Iron Co. reference mark); EXTREMES reported below have been converted to sea level elevations. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Capacity of reservoir, 5,370 acre-ft at spillway elevation, 1,338.00 ft. The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 26 ft<sup>3</sup>/s (figure furnished by Cleveland Cliffs Iron Co.) was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 15.8 ft<sup>3</sup>/s for the year. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation recorded, 1,339.5 ft, May 31, 1970, Apr. 20, 1985; minimum recorded since first filling, 1,329.7 ft, Apr. 10, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,338.13 ft, Apr. 6; minimum, 1,335.91 ft, Nov. 21, 23.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36.98	36.64	36.68	37.29	37.12	37.27	38.07	37.72	37.32	37.24	36.89	36.89
2	37.03	36.57	36.71	37.32	37.09	37.37	38.06	37.69	37.32	37.21	37.08	36.96
3	37.06	36.51	36.73	37.33	37.09	37.36	38.07	37.64	37.29	37.20	37.12	37.09
4	37.10	36.43	36.78	37.36	37.07	37.32	38.10	37.62	37.26	37.16	37.12	37.19
5	37.14	36.36	36.83	37.36	37.04	37.28	38.10	37.60	37.21	37.11	37.11	37.24
6	37.18	36.30	36.85	37.41	37.00	37.26	38.12	37.58	37.15	37.12	37.12	37.27
7	37.21	36.26	36.85	37.43	36.96	37.30	38.10	37.52	37.13	37.09	37.17	37.27
8	37.30	36.23	36.87	37.46	36.91	37.41	38.07	37.48	37.10	37.09	37.18	37.27
9	37.41	36.20	36.88	37.50	36.89	37.64	38.05	37.47	---	37.10	37.26	37.25
10	37.48	36.18	36.91	37.53	36.87	37.75	38.02	37.45	---	37.07	37.29	37.24
11	37.52	36.14	36.92	37.53	36.84	37.73	38.00	37.51	---	37.03	37.28	37.25
12	37.56	36.11	36.94	37.49	36.79	37.69	37.99	37.58	---	37.00	37.28	37.31
13	37.61	36.08	36.96	37.45	36.77	37.63	37.99	37.59	37.41	36.98	37.27	37.33
14	37.63	36.05	37.00	37.41	36.70	37.58	38.01	37.56	37.40	36.97	37.26	37.34
15	37.61	36.01	37.08	37.40	36.65	37.53	38.03	37.51	37.34	36.95	37.26	37.35
16	37.67	35.99	37.13	37.40	36.64	37.44	38.03	37.44	37.32	36.92	37.21	37.29
17	37.69	35.98	37.12	37.37	36.57	37.34	38.01	37.38	37.31	36.89	37.15	37.24
18	37.62	35.97	37.14	37.38	36.54	37.21	38.04	37.40	37.32	36.85	37.09	37.20
19	37.52	35.97	37.16	37.35	36.52	37.08	38.07	37.41	37.41	36.83	37.02	37.14
20	37.42	35.95	37.20	37.32	36.49	36.95	38.08	37.43	37.49	36.84	36.96	37.04
21	37.36	35.93	37.16	37.29	36.46	36.87	38.08	37.43	37.78	36.84	36.88	36.91
22	37.34	35.93	37.17	37.30	36.43	36.90	38.06	37.42	37.97	36.84	36.80	36.84
23	37.35	35.97	37.16	37.32	36.43	36.95	38.03	37.43	37.97	36.83	36.68	36.84
24	37.32	36.17	37.16	37.30	36.45	37.03	38.00	37.45	37.90	36.83	36.62	36.85
25	37.28	36.32	37.17	37.30	36.47	37.27	37.97	37.47	37.81	36.82	36.61	36.84
26	37.19	36.43	37.19	37.27	36.55	37.53	37.94	37.46	37.74	36.81	36.66	36.81
27	37.07	36.53	37.20	37.25	36.78	37.77	37.89	37.44	37.64	36.83	36.71	36.73
28	36.96	36.59	37.25	37.22	36.97	37.99	37.84	37.41	37.51	36.87	36.71	36.65
29	36.85	36.65	37.28	37.17	37.11	38.06	37.78	37.39	37.41	36.87	36.72	36.58
30	36.78	36.68	37.31	37.15	---	38.04	37.73	37.37	37.32	36.84	36.71	36.59
31	36.71	---	37.30	37.13	---	38.04	---	37.35	---	36.83	36.70	---
MEAN	37.29	36.24	37.04	37.35	36.77	37.44	38.01	37.49	---	36.96	37.00	37.06
MAX	37.69	36.68	37.31	37.53	37.12	38.06	38.12	37.72	---	37.24	37.29	37.35
MIN	36.71	35.93	36.68	37.13	36.43	36.87	37.73	37.35	---	36.81	36.61	36.58

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW1/4 sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft upstream from highway bridge, 1.0 mi downstream from Schweitzer Reservoir, and 2.5 mi southwest of Palmer.

DRAINAGE AREA.--23.6 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Datum of gage is 1,268.28 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi upstream. Prior to June 1994, some diversion from headwaters of basin for municipal supply and the effluent discharged to the Carp River basin. An average of 26 ft<sup>3</sup>/s (figure furnished by Cleveland Cliffs Iron Co.) was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek and some returned via Goose Lake Outlet and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813). Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e3.0	e3.6	e4.5	e4.6	e4.7	5.6	e13	3.8	e3.6	e4.9	e5.0	5.2
2	e2.8	e3.6	e4.5	e4.6	e4.7	5.0	e12	3.8	e3.5	e5.2	e5.4	4.4
3	e2.8	e3.6	e4.8	e4.5	e4.7	4.9	e14	e3.8	e3.6	e4.9	5.0	5.5
4	e2.6	e3.6	e5.0	e4.7	e4.7	5.0	e19	e3.8	e3.5	e4.7	4.9	4.6
5	e2.8	e3.6	e4.9	e4.7	e4.7	5.0	e19	e3.8	e3.3	e4.6	4.9	4.3
6	e2.8	e3.6	e5.1	e4.7	e4.7	5.1	e21	e3.8	e3.3	e4.9	5.4	4.3
7	e2.6	e3.6	e4.7	e4.7	e4.7	5.3	e20	e3.8	e3.2	e4.7	5.0	4.3
8	e2.8	e3.6	e4.6	e4.7	e4.7	5.6	e15	e3.8	e3.6	e5.2	5.0	4.3
9	e2.6	e3.6	e4.4	e4.7	e4.7	5.5	e13	e3.8	e4.1	e4.8	5.1	4.3
10	e2.6	e3.6	e4.4	e4.7	e4.7	5.0	e8.8	e3.7	e6.7	e4.6	4.7	4.3
11	e2.6	e3.6	e4.3	e4.7	e4.7	4.7	e8.2	e3.9	e5.0	e4.6	4.6	4.5
12	e2.7	e3.6	e4.4	e4.7	e4.7	e4.5	e6.0	e3.9	e4.1	e4.8	4.6	4.7
13	e2.7	e3.6	e4.2	e4.7	e4.7	e4.3	e5.4	e3.9	e4.0	e4.9	4.8	4.2
14	e2.7	e3.6	e4.2	e4.7	e4.7	e4.2	e6.6	e3.9	e5.4	e4.9	4.9	4.4
15	e2.9	e3.6	e4.0	e4.7	e4.7	e4.1	e8.4	e4.0	e9.9	e4.7	4.8	4.2
16	e3.1	e3.6	e4.0	e4.7	e4.7	e3.8	e8.5	e4.0	e4.6	e4.7	4.8	4.1
17	e3.1	e3.6	e4.0	e4.7	e4.7	e3.7	e8.3	e4.0	e4.7	e4.6	4.8	4.2
18	e2.8	e3.6	e4.0	e4.7	e4.7	e3.6	e10	e4.0	e4.9	e4.5	5.0	4.2
19	e2.5	e3.6	e4.0	e4.7	e4.7	e3.4	e13	e4.0	e4.8	e4.6	4.9	4.3
20	e2.7	e3.6	e4.0	e4.7	e4.7	e3.3	e14	e4.0	e5.9	e4.8	4.8	4.3
21	e2.9	e3.6	e4.0	e4.7	e4.8	e3.4	e15	e3.9	e5.1	e4.7	4.8	5.0
22	e2.8	e3.6	e4.0	e4.7	e4.8	e3.5	e12	e3.8	e5.3	e4.7	4.7	4.2
23	e2.8	e3.5	e4.1	e4.7	e4.9	e3.3	e9.2	e3.9	e4.9	e4.8	4.6	4.4
24	e2.8	e4.3	e4.2	e4.7	e5.0	e3.4	e6.6	e3.8	e4.2	e4.6	4.6	4.4
25	e2.8	e3.9	e4.2	e4.7	5.4	e3.7	4.5	e3.6	e3.9	e4.5	4.2	4.4
26	e2.8	e4.0	e4.3	e4.7	6.5	e3.4	3.8	e3.6	e5.2	e4.6	4.2	4.3
27	e2.8	e4.2	e4.4	e4.7	6.4	e4.0	3.5	e3.5	e4.4	e5.1	3.9	4.1
28	e2.8	e4.3	e4.4	e4.7	5.6	e6.3	3.7	e3.5	e4.4	e5.3	3.8	4.1
29	e3.6	e4.4	e4.4	e4.7	5.2	e13	3.7	e3.3	e4.7	e4.7	3.8	4.0
30	e3.6	e4.4	e4.5	e4.7	---	e10	3.7	e3.4	e5.2	e4.6	3.9	4.0
31	e3.6	---	e4.6	e4.7	---	e9.9	---	e3.4	---	e4.4	5.1	---
TOTAL	88.5	112.2	135.1	145.3	142.6	155.5	308.9	117.2	139.0	147.6	146.0	131.5
MEAN	2.85	3.74	4.36	4.69	4.92	5.02	10.3	3.78	4.63	4.76	4.71	4.38
MAX	3.6	4.4	5.1	4.7	6.5	13	21	4.0	9.9	5.3	5.4	5.5
MIN	2.5	3.5	4.0	4.5	4.7	3.3	3.5	3.3	3.2	4.4	3.8	4.0

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2000, BY WATER YEAR (WY)

	MEAN	10.4	11.4	7.54	5.61	5.09	7.39	45.9	27.2	14.8	8.07	6.86	8.77
MAX	41.8	41.3	24.0	13.5	9.98	35.3	115	98.1	55.8	24.2	28.9	56.5	
(WY)	1986	1989	1966	1966	1961	1966	1985	1972	1968	1979	1973	1978	
MIN	2.85	3.02	2.90	2.15	1.92	2.40	1.45	1.69	4.07	3.80	3.46	3.62	
(WY)	2000	1999	1999	1963	1963	1963	1963	1963	1998	1999	1963	1963	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1961 - 2000
ANNUAL TOTAL	2195.2	1769.4	
ANNUAL MEAN	6.01	4.83	
HIGHEST ANNUAL MEAN			13.2
LOWEST ANNUAL MEAN			26.4
HIGHEST DAILY MEAN	86	21	4.64
LOWEST DAILY MEAN	2.5	2.5	699
ANNUAL SEVEN-DAY MINIMUM	2.7	2.7	1.0
INSTANTANEOUS PEAK FLOW		(e)22	1.0
INSTANTANEOUS PEAK STAGE		(b)3.50	860
INSTANTANEOUS LOW FLOW			6.50
10 PERCENT EXCEEDS	5.8	5.5	.40
50 PERCENT EXCEEDS	4.0	4.5	28
90 PERCENT EXCEEDS	3.4	3.4	5.4

(a) Apr. 9-18, May 5, 6, 1963.  
(b) Backwater from beaver dam.  
(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04058940 ESCANABA RIVER NEAR ST. NICHOLAS, MI

LOCATION.--Lat 45°58'45", long 87°16'13", in SW1/4 NE1/4 sec.2, T.41 N., R.24 W., Delta County, Hydrologic Unit 04030110, on right bank 600 ft downstream from Boney Falls Dam, 2.1 mi west of St. Nicholas, and 23 mi upstream from mouth.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--December 1987 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 854.03 ft above sea level.

REMARKS.--Diurnal fluctuation caused by hydroelectric plant 600 ft upstream. Some regulation by Schweitzer Reservoir (station 4058190) approximately 40 mi upstream and Greenwood Reservoir (station 04057811) approximately 50 mi upstream. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 7.09 ft, Apr. 29, 1996, result of unusual regulation; minimum daily, 1.81 ft, July 26, 27, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.19 ft, Apr. 6; minimum daily, 1.88 ft, Dec. 23.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.19	2.35	2.39	2.13	2.08	3.02	3.65	2.53	2.12	2.55	2.10	2.42
2	2.18	2.32	2.38	2.15	2.09	3.12	3.56	2.54	2.13	2.52	2.08	2.88
3	2.17	2.30	2.36	2.13	2.08	3.11	3.51	2.53	2.19	2.52	2.01	2.77
4	2.14	2.29	2.38	2.15	---	3.15	3.52	2.51	2.17	2.43	2.08	2.84
5	2.12	2.25	2.39	2.17	---	3.26	3.46	2.46	2.14	2.34	2.07	2.76
6	2.11	2.26	2.35	2.18	---	3.37	3.40	2.45	2.08	2.32	2.08	2.61
7	2.15	2.23	2.30	2.17	---	3.55	3.35	2.41	2.05	2.37	2.11	2.43
8	2.26	2.23	2.32	2.16	2.11	3.72	3.25	2.42	2.05	2.39	2.19	2.32
9	2.40	2.23	2.26	2.16	2.09	3.94	3.16	2.45	2.11	2.50	2.24	2.28
10	2.38	2.22	2.29	2.18	2.13	3.78	3.08	2.41	2.21	2.47	2.29	2.39
11	2.32	2.21	2.23	2.17	2.11	3.73	3.01	2.36	2.33	2.38	2.28	2.46
12	2.26	2.21	2.28	2.16	2.11	3.66	2.92	2.43	2.60	2.32	2.10	2.63
13	2.23	2.21	2.29	2.17	2.10	3.46	2.90	2.52	2.60	2.23	2.12	2.84
14	2.23	2.20	2.25	2.17	2.10	3.40	2.86	2.53	2.39	2.19	2.09	2.63
15	2.25	2.19	2.27	2.17	2.11	3.05	2.86	2.47	2.45	2.14	2.12	2.40
16	2.31	2.19	2.19	2.17	2.07	2.99	2.86	2.41	2.48	2.19	1.99	2.45
17	2.37	2.17	1.83	2.15	2.07	2.97	2.86	2.35	2.44	2.07	1.97	2.39
18	2.42	2.18	2.08	2.14	2.07	2.95	2.92	2.29	2.41	2.08	2.00	2.34
19	2.44	2.18	2.12	2.15	2.10	2.89	2.96	2.26	2.50	2.00	2.00	2.28
20	2.41	2.18	2.17	2.15	2.10	2.85	2.99	2.21	2.53	2.08	1.99	2.25
21	2.37	2.18	1.97	2.14	2.11	2.87	3.04	2.17	2.78	1.99	1.97	2.23
22	2.37	2.18	2.03	2.13	2.11	3.04	3.02	2.21	3.04	2.02	1.97	2.25
23	2.44	2.23	2.08	2.13	2.13	3.27	2.98	2.49	2.95	2.04	1.96	2.21
24	2.50	2.58	2.10	2.12	2.17	3.49	2.90	2.64	2.77	2.03	1.96	2.18
25	2.48	2.87	2.12	2.12	2.25	3.82	2.78	2.53	2.74	2.03	1.87	2.18
26	2.47	2.77	2.14	2.10	2.38	3.94	2.72	2.40	2.83	2.00	1.90	2.13
27	2.43	2.66	2.12	2.10	2.64	4.26	2.67	2.31	3.11	2.02	1.97	2.13
28	2.39	2.60	2.11	2.10	2.73	4.25	2.59	2.25	2.89	2.14	2.12	2.13
29	2.37	2.55	2.10	2.09	2.92	4.13	2.57	2.20	2.72	2.26	2.25	2.11
30	2.36	2.46	2.12	2.08	---	3.91	2.55	2.17	2.65	2.21	2.03	2.09
31	2.34	---	2.13	2.09	---	3.74	---	2.12	---	2.15	2.01	---
MEAN	2.32	2.32	2.20	2.14	---	3.44	3.03	2.39	2.48	2.23	2.06	2.40
MAX	2.50	2.87	2.39	2.18	---	4.26	3.65	2.64	3.11	2.55	2.29	2.88
MIN	2.11	2.17	1.83	2.08	---	2.85	2.55	2.12	2.05	1.99	1.87	2.09



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04059000 ESCANABA RIVER AT CORNELL, MI

LOCATION.--Lat 45°54'31", long 87°12'49", in NW1/4 sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft downstream from bridge on County Road 519, 0.4 mi downstream from Bobs Creek, 0.7 mi northeast of Cornell, and 16 mi upstream from mouth.  
DRAINAGE AREA.--870 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year.

Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904. WDR MI-85-1: 1970 (M).

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft above sea level (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi downstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since 1950, diurnal fluctuation and slight regulation by Boney Falls powerplant 7 mi upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) approximately 50 mi upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) approximately 60 mi upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	340	433	490	e300	e270	e1200	1930	666	308	650	292	536
2	337	418	473	e300	e270	e1300	1780	669	326	620	277	937
3	327	397	452	e300	e270	e1400	1720	645	360	620	242	831
4	310	388	465	e310	e270	e1600	1690	620	345	547	273	871
5	304	370	464	e320	e270	e1700	1600	603	326	464	271	736
6	290	364	451	e320	e270	e1900	1550	569	299	440	281	637
7	324	355	491	e320	e270	2150	1470	542	274	466	286	537
8	452	347	414	e320	e280	2450	1350	566	275	482	341	445
9	527	351	420	e320	e280	2980	1260	579	298	559	374	431
10	508	344	398	e320	e280	2690	1150	538	370	538	402	450
11	457	335	443	e320	e280	e2400	1100	513	443	480	404	e530
12	409	335	382	e320	e280	2320	1030	577	624	422	288	e630
13	377	334	385	e320	e280	1950	1010	669	644	375	304	e930
14	376	328	364	e320	e280	1730	975	664	486	341	289	811
15	390	326	379	e320	e280	1300	966	592	519	321	317	578
16	460	313	355	e320	e270	1230	989	546	555	347	237	532
17	490	314	249	e310	e260	1190	980	503	520	270	225	541
18	515	313	e240	e300	e260	e1150	1070	459	496	273	237	433
19	524	313	e235	e300	e270	1050	1100	421	559	228	235	450
20	506	316	e230	e300	e270	1030	1170	390	677	280	229	420
21	484	313	e230	e290	e280	1100	1270	365	1080	227	223	335
22	473	e306	e240	e290	e280	1330	1200	385	1360	239	224	411
23	518	e375	e250	e290	e290	1610	1120	558	1120	247	217	332
24	565	614	e260	e290	e300	1870	1020	692	923	244	218	358
25	552	843	e280	e290	e400	2300	901	612	855	244	189	339
26	542	785	e290	e280	e500	2430	813	512	1020	235	176	325
27	502	690	e290	e280	e720	2890	772	441	1270	239	223	311
28	478	630	e290	e275	e880	2880	686	401	1000	298	294	311
29	453	595	e290	e270	e1050	2650	666	364	830	370	368	303
30	449	534	e290	e270	---	2370	647	346	730	351	270	235
31	438	---	e300	e270	---	2110	---	318	---	330	242	---
TOTAL	13677	12679	10790	9355	10160	58260	34985	16325	18892	11747	8448	15835
MEAN	441	423	348	302	350	1879	1166	527	630	379	273	527
MAX	565	843	491	320	1050	2980	1930	692	1360	650	404	907
MIN	290	306	230	270	260	1030	647	318	274	227	176	235
CFSM	.51	.49	.40	.35	.40	2.16	1.34	.61	.72	.44	.31	.61
IN.	.58	.54	.46	.40	.43	2.49	1.50	.70	.81	.50	.36	.68

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 2000, BY WATER YEAR (WY)

	MEAN	701	773	534	367	346	602	2534	1666	929	599	491	609
	MAX	1690	2230	945	720	959	1879	4329	4388	2172	1859	2014	1874
(WY)	1986	1989	1907	1969	1984	2000	1951	1907	1968	1951	1911	1978	1978
	MIN	196	218	230	190	185	227	830	312	255	193	191	194
(WY)	1964	1977	1977	1964	1959	1964	1990	1998	1988	1998	1998	1998	1976

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1903 - 2000

ANNUAL TOTAL	245113	221134	(a)819
ANNUAL MEAN	672	604	1385
HIGHEST ANNUAL MEAN			1960
LOWEST ANNUAL MEAN			506
HIGHEST DAILY MEAN	4430	Apr 7	10400
LOWEST DAILY MEAN	180	Jan 13	(b)90
ANNUAL SEVEN-DAY MINIMUM	180	Jan 13	131
INSTANTANEOUS PEAK FLOW			(d)10700
INSTANTANEOUS PEAK STAGE		(f)3.66	(f)6.40
INSTANTANEOUS LOW FLOW		139	(b)90
ANNUAL RUNOFF (CFSM)	.77	.69	.94
ANNUAL RUNOFF (INCHES)	10.48	9.46	12.79
10 PERCENT EXCEEDS	1400	1240	1840
50 PERCENT EXCEEDS	433	402	509
90 PERCENT EXCEEDS	220	270	254

(a) Does not include water years 1904-12.

(b) Observed; site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

(c) Gage height 3.14 ft.

(d) Gage height 5.00 ft.

(e) Estimated.

(f) Backwater from ice.

(g) Aug. 25, 26.

STREAMS TRIBUTARY TO LAKE MICHIGAN  
04059000 ESCANABA RIVER AT CORNELL, MI--Continued  
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1969-73, 1975-94, 1998 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February 1975 to September 1981.

WATER TEMPERATURE: February 1975 to September 1981, April 1998 to current year.

INSTRUMENTATION.--Water-quality monitor from Oct. 15, 1975 to Sept. 30, 1981. Water-temperature recorder with telemetry since Apr. 14, 1998.

REMARKS.--Records represent water temperature at sensor within 0.5°C, from Apr. 1 to Sept. 30. Interruptions in water-quality record were due to instrument malfunctions.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975, 1978-81): Maximum daily recorded (more than 20 percent missing record), 360 microsiemens, Sept. 10, 1975; minimum measured, 114 microsiemens, Apr. 15, 1981.

WATER TEMPERATURE (water years 1975, 1977-81, 1998 to current year): Maximum daily recorded (more than 20 percent missing record), 35.0°C, July 31, 1975; minimum, 0.0°C on many days during winter.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 72 microsiemens was measured Apr. 24, 1985.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 30.0°C, July 16.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	6.0	4.0	5.0	13.5	9.5	11.5
2	---	---	---	---	---	---	7.0	4.0	5.5	15.0	8.5	11.5
3	---	---	---	---	---	---	6.0	4.5	5.5	16.5	9.0	12.5
4	---	---	---	---	---	---	5.0	3.0	4.0	17.5	11.5	14.0
5	---	---	---	---	---	---	4.5	2.0	3.0	20.0	12.0	15.5
6	---	---	---	---	---	---	4.5	3.0	3.5	21.5	14.5	17.5
7	---	---	---	---	---	---	3.5	1.5	2.5	22.5	16.0	18.5
8	---	---	---	---	---	---	5.0	1.0	2.5	18.0	16.0	16.5
9	---	---	---	---	---	---	4.5	2.0	3.0	18.5	14.0	16.0
10	---	---	---	---	---	---	5.5	1.0	3.0	19.5	12.0	15.0
11	---	---	---	---	---	---	4.0	1.5	2.5	14.0	13.0	13.5
12	---	---	---	---	---	---	5.0	1.5	3.0	14.0	12.5	13.5
13	---	---	---	---	---	---	3.5	2.0	2.5	14.0	11.5	13.0
14	---	---	---	---	---	---	7.5	2.0	4.0	14.5	10.0	12.0
15	---	---	---	---	---	---	4.0	2.0	3.5	14.5	8.5	11.5
16	---	---	---	---	---	---	2.5	1.5	2.0	17.5	10.5	13.0
17	---	---	---	---	---	---	3.0	1.5	2.0	16.5	11.0	13.0
18	---	---	---	---	---	---	4.0	2.5	3.0	14.5	10.0	12.0
19	---	---	---	---	---	---	6.0	2.5	4.5	17.5	8.0	12.0
20	---	---	---	---	---	---	4.5	3.5	4.0	18.5	8.0	13.0
21	---	---	---	---	---	---	7.5	3.0	5.0	18.5	9.0	13.5
22	---	---	---	---	---	---	9.0	4.0	6.5	15.5	12.0	13.5
23	---	---	---	---	---	---	11.0	6.0	8.5	18.5	13.0	15.0
24	---	---	---	---	---	---	12.0	7.0	9.5	19.0	12.5	15.5
25	---	---	---	---	---	---	12.5	7.0	9.5	18.0	12.5	14.5
26	---	---	---	---	---	---	13.5	7.5	10.0	20.5	10.5	15.5
27	---	---	---	---	---	---	14.5	8.0	---	19.5	11.0	15.0
28	---	---	---	---	---	---	13.0	9.0	10.5	20.0	12.0	15.5
29	---	---	---	---	---	---	13.5	7.5	10.0	20.5	11.0	15.5
30	---	---	---	---	---	---	14.5	7.0	10.5	15.5	12.0	14.0
31	---	---	---	---	---	---	---	---	---	24.0	13.5	18.0
MONTH	---	---	---	---	---	---	14.5	1.0	---	24.0	8.0	14.2

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04059000 ESCANABA RIVER AT CORNELL, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	14.0	15.0	22.0	16.5	19.5	29.0	19.0	23.0	21.0	16.5	17.5
2	18.5	13.0	15.0	19.5	17.0	18.5	24.5	18.0	21.0	17.5	16.5	17.0
3	22.0	10.0	15.5	23.0	15.0	18.5	27.0	14.5	20.5	17.5	15.5	16.5
4	21.0	12.5	16.0	24.0	16.0	19.5	28.0	16.0	---	18.5	14.0	13.0
5	22.0	11.5	16.0	23.5	16.5	20.0	26.0	16.0	20.5	19.0	13.0	15.0
6	21.0	11.0	16.5	23.0	17.5	20.0	23.0	18.5	20.5	18.5	12.0	14.5
7	20.0	12.5	16.5	23.0	15.5	19.0	25.0	18.0	21.0	18.5	13.0	15.5
8	28.5	14.0	20.0	20.0	17.0	18.5	21.5	17.5	19.0	21.0	13.0	13.5
9	20.0	15.0	17.0	25.5	18.0	21.5	23.5	18.0	20.0	21.0	13.0	13.5
10	23.5	15.0	19.5	26.0	18.5	---	26.0	16.5	20.5	22.0	17.0	13.0
11	19.5	14.0	16.0	27.0	17.5	21.5	27.0	16.5	21.5	---	---	---
12	20.0	13.5	16.0	23.5	17.5	20.0	25.5	17.0	21.0	---	---	---
13	20.0	14.5	16.5	27.5	18.0	22.5	25.5	19.0	21.5	---	---	---
14	20.0	15.5	17.5	27.0	19.5	22.5	26.5	16.5	21.0	16.5	13.5	15.0
15	21.0	16.0	18.0	27.0	18.5	22.5	27.0	19.0	22.0	14.0	11.5	13.0
16	21.5	16.0	18.5	30.0	18.0	23.0	26.0	16.0	20.5	15.0	10.0	12.0
17	21.5	14.0	17.5	29.0	19.0	23.0	20.0	16.5	18.5	16.5	11.5	13.5
18	21.5	14.5	18.0	20.0	16.0	18.0	23.5	16.5	19.5	18.5	12.0	15.0
19	23.5	15.5	19.0	27.5	13.0	19.5	24.0	13.0	18.0	16.5	15.0	15.5
20	17.5	16.0	16.5	22.5	16.5	19.0	24.5	12.5	18.0	16.5	13.5	15.0
21	19.5	15.0	17.0	19.0	16.0	17.5	21.5	13.0	17.0	15.5	11.5	13.0
22	19.5	16.0	17.5	21.0	14.5	18.0	26.0	17.5	21.0	12.5	10.5	11.5
23	20.0	16.5	18.0	24.5	13.5	19.0	28.0	15.5	21.0	14.0	10.0	12.0
24	19.0	16.5	17.5	26.0	15.5	20.5	27.5	14.5	---	14.5	8.0	10.5
25	22.0	16.5	19.0	25.5	15.5	20.5	25.5	16.0	21.0	14.0	7.0	10.5
26	19.5	17.5	18.5	25.5	18.0	21.0	24.0	19.0	21.0	16.5	8.0	11.5
27	19.0	16.5	17.5	21.0	19.0	20.0	25.0	16.5	20.0	13.0	8.5	11.0
28	18.5	16.0	17.0	23.0	19.0	20.5	24.0	16.0	19.5	12.0	6.0	8.5
29	19.0	15.0	17.0	25.5	18.5	21.5	25.5	19.0	21.5	16.5	8.0	12.0
30	22.5	15.5	18.0	27.5	17.5	22.5	23.5	15.0	19.5	18.0	11.5	14.0
31	---	---	---	27.5	18.5	23.0	28.0	18.5	22.0	---	---	---
MONTH	28.5	10.0	17.2	30.0	13.0	---	29.0	12.5	---	---	---	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04059500 FORD RIVER NEAR HYDE, MI

LOCATION.--Lat 45°45'20", long 87°12'05", in SW1/4 sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft downstream from bridge on County Road 533, 1.4 mi downstream from Tenmile Creek, and 1.5 mi north of Hyde.

DRAINAGE AREA.--450 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	152	209	e52	e80	e410	982	335	97	313	89	105
2	94	149	238	e54	e80	e500	856	326	95	285	81	250
3	87	146	223	e54	e80	e610	740	303	96	252	74	344
4	83	145	205	e56	e80	e700	674	284	95	220	68	358
5	80	133	187	e58	e80	e820	611	278	93	192	62	330
6	77	126	180	e60	e80	e1000	588	268	86	206	62	280
7	78	121	156	e62	e80	e1300	544	254	79	201	70	234
8	100	118	153	e64	e80	e1600	494	248	75	203	71	199
9	149	115	144	e66	e80	e1900	462	238	82	247	122	169
10	204	113	158	e68	e80	e1800	431	217	81	261	136	148
11	217	111	121	e70	e80	1570	410	207	100	243	136	269
12	208	109	132	e72	e80	1450	395	238	93	213	126	606
13	197	108	138	e72	e80	1310	400	283	91	178	111	659
14	183	107	137	e74	e80	1190	408	301	94	148	94	608
15	176	106	120	e76	e80	1050	414	289	90	125	101	562
16	183	104	104	e76	e80	e750	449	272	102	108	91	472
17	220	102	e90	e78	e80	704	478	243	107	94	83	395
18	233	100	e76	e78	e80	713	542	230	108	82	75	330
19	233	99	e66	e80	e80	655	593	204	120	76	68	278
20	229	98	e60	e80	e82	605	729	181	148	70	63	256
21	228	99	e58	e80	e84	593	1020	163	313	71	58	239
22	224	103	e55	e80	e88	685	1000	156	399	66	55	207
23	226	114	e53	e80	e94	837	915	162	396	64	53	194
24	225	164	e52	e80	e120	948	810	162	400	61	53	180
25	220	274	e50	e80	e150	1070	674	165	384	57	44	165
26	213	327	e50	e80	e200	1120	568	160	404	55	47	150
27	197	335	e50	e80	e250	1240	490	145	465	59	44	136
28	183	317	e50	e80	e320	1270	430	133	456	58	41	124
29	173	293	e50	e80	e370	1240	384	118	434	63	44	114
30	164	259	e50	e80	---	1180	350	109	369	98	42	106
31	158	---	e50	e80	---	1090	---	103	---	104	41	---
TOTAL	5342	4648	3455	2230	3278	31910	17841	6775	5952	4473	2305	8467
MEAN	172	155	112	71.9	113	1029	595	219	198	144	74.4	282
MAX	233	335	238	80	370	1900	1020	335	465	313	136	659
MIN	77	98	50	52	80	410	350	103	75	55	41	105
CFSM	.38	.34	.25	.16	.25	2.29	1.32	.49	.44	.32	.17	.63
IN.	.44	.38	.29	.18	.27	2.64	1.47	.56	.49	.37	.19	.70

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1955 - 2000, BY WATER YEAR (WY)

MEAN	298	377	202	114	104	276	1292	785	396	208	163	248
MAX	819	1246	589	346	493	1078	2353	2483	1006	793	713	1013
(WY)	1960	1986	1966	1966	1984	1973	1979	1960	1966	1968	1978	1978
MIN	39.9	42.5	27.7	26.5	29.6	48.5	345	99.7	52.4	34.7	38.8	26.2
(WY)	1977	1977	1977	1977	1977	1964	1990	1998	1988	1988	1970	1976

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1955 - 2000

ANNUAL TOTAL	116963	96686	
ANNUAL MEAN	320	264	
HIGHEST ANNUAL MEAN			372
LOWEST ANNUAL MEAN			640
HIGHEST DAILY MEAN			183
LOWEST DAILY MEAN	2480	1900	6850
ANNUAL SEVEN-DAY MINIMUM	44	41	19
INSTANTANEOUS PEAK FLOW	46	43	22
INSTANTANEOUS PEAK STAGE		(a)2000	7590
INSTANTANEOUS LOW FLOW		(b)5.87	8.27
ANNUAL RUNOFF (CFSM)	.71	.59	.83
ANNUAL RUNOFF (INCHES)	9.67	7.99	11.22
10 PERCENT EXCEEDS	814	656	915
50 PERCENT EXCEEDS	177	147	175
90 PERCENT EXCEEDS	50	62	54

(a) Gage height 4.92 ft.

(b) Backwater from ice.

(c) Aug. 30, 1976, July 7, 8, 1988.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04060993 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'39", long 88°18'57", in NW1/4 SE1/4 sec.9, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 30 ft upstream from bridge on U.S. Highway 2, 4.0 mi upstream from Paint River, 4.0 mi northwest of Florence, WI, and 8.0 mi upstream from confluence with Michigamme River.

DRAINAGE AREA.--366 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,240 ft above sea level, from topographic map. Prior to Aug. 29, 1944, nonrecording gage, and Aug. 29, 1944 to Apr. 4, 1994, water-stage recorder at site 3.0 mi downstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Discharge includes some mine pumpage prior to August 1977. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	243	270	e240	e220	e170	e430	397	294	216	284	282	243
2	229	244	e240	e220	e180	e400	370	294	232	309	280	279
3	218	238	e240	e220	e180	e350	354	277	224	445	253	327
4	209	227	e240	e220	e190	e350	346	266	217	419	236	333
5	209	232	e240	e220	e190	362	330	263	211	348	224	270
6	203	222	e240	e220	e190	363	320	257	203	379	221	237
7	236	218	e230	e220	e200	408	310	247	196	372	224	224
8	323	218	e230	e220	e210	483	295	251	199	531	241	278
9	309	219	e230	e220	e210	626	287	254	246	721	407	211
10	276	219	e220	e220	e220	548	275	240	238	617	381	271
11	270	223	e220	e220	e220	474	275	248	232	465	300	276
12	244	217	e220	e220	e220	415	275	280	230	384	262	410
13	228	216	e260	e220	e230	364	279	287	206	343	243	354
14	230	213	227	e210	e230	342	289	267	212	310	230	279
15	267	210	230	e210	e230	333	302	254	211	284	240	273
16	277	209	210	e210	e230	309	312	241	216	262	255	253
17	280	210	154	e210	e240	314	309	234	211	268	234	230
18	259	210	e160	e210	e240	313	336	231	200	256	225	224
19	250	214	e160	e210	e240	295	367	227	210	231	222	278
20	246	216	e170	e210	e240	291	415	224	263	235	230	234
21	239	219	e180	e200	e240	295	467	224	544	240	218	237
22	244	220	e190	e200	e240	320	446	228	447	232	210	237
23	253	260	e190	e190	e250	376	402	231	345	225	205	271
24	246	e290	e200	e190	e260	439	359	225	364	222	199	272
25	233	e320	e200	e180	e270	559	332	224	782	214	189	229
26	227	e300	e200	e180	e300	543	313	214	665	249	193	223
27	236	e280	e200	e180	e430	684	306	210	540	488	204	216
28	219	e270	e200	e170	e440	703	296	209	408	581	199	207
29	217	e260	e210	e170	e440	589	295	215	364	520	192	200
30	235	e250	e210	e170	---	497	292	216	316	418	188	196
31	281	---	e210	e170	---	436	---	216	---	317	187	---
TOTAL	7636	7114	6551	6330	7130	13211	9951	7548	9148	11169	7374	7545
MEAN	246	237	211	204	246	426	332	243	305	360	238	252
MAX	323	320	260	220	440	703	467	294	782	721	407	410
MIN	203	209	154	170	170	291	275	209	196	214	187	196
CFSM	.67	.65	.58	.56	.67	1.16	.91	.67	.83	.98	.65	.69
IN.	.78	.72	.67	.64	.72	1.34	1.01	.77	.93	1.14	.75	.77

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2000, BY WATER YEAR (WY)

	MEAN	325	334	275	251	244	322	645	496	392	339	289	369
MAX	612	600	424	369	406	833	1235	1104	712	983	604	582	
(WY)	1986	1916	1986	1984	1984	1973	1967	1965	1981	1953	1972	1959	
MIN	179	202	175	156	163	178	235	242	194	185	186	172	
(WY)	1949	1990	1990	1995	1995	1965	1990	1998	1988	1989	1948	1948	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1914 - 2000
ANNUAL TOTAL	118026	100707	
ANNUAL MEAN	323	275	350
HIGHEST ANNUAL MEAN			512
LOWEST ANNUAL MEAN			221
HIGHEST DAILY MEAN	3170	782	4420
LOWEST DAILY MEAN	154	154	130
ANNUAL SEVEN-DAY MINIMUM	172	172	140
INSTANTANEOUS PEAK FLOW		(a)814	4700
INSTANTANEOUS PEAK STAGE		(b)6.06	(c)8.41
INSTANTANEOUS LOW FLOW		(d)95	(d)95
ANNUAL RUNOFF (CFSM)	.88	.75	.96
ANNUAL RUNOFF (INCHES)	12.00	10.24	13.00
10 PERCENT EXCEEDS	500	409	550
50 PERCENT EXCEEDS	246	240	289
90 PERCENT EXCEEDS	213	200	205

(a) Gage height 4.72 ft.

(b) Backwater from ice.

(c) Present site and datum; peak stage at previous site and datum, 8.60 ft, Dec. 20, 1983, backwater from ice.

(d) Result of freezeup.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04062011 BRULE RIVER NEAR COMMONWEALTH, WI

LOCATION.--Lat 45°56'51", long 88°12'55", in NW1/4 sec. 14, T.40 N., R.18 E., Wisconsin Meridian, Florence County, Hydrologic Unit 04030106, on right bank 900 ft downstream from Brule Island Dam, 1.5 mi upstream from confluence with Michigamme River, and 2.8 mi north of Commonwealth, WI.

DRAINAGE AREA.--1,020 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1989 to current year.

REVISED RECORDS.--WDR MI-91-1: 1990(M).

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,130 ft above sea level, from topographic map.

REMARKS.--Records good. Flow regulated by powerplant 900 ft upstream and by Lower Paint Dam 8.2 mi upstream. Records not adjusted for diversion to Michigamme River by Paint River Diversion Canal. Gage-height telemeter at station.

COOPERATION.--Gage-height record was provided by Wisconsin Electric Power Co., under general supervision of the Geological Survey.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	349	417	357	349	292	652	523	418	320	425	424	382
2	346	370	393	355	331	582	493	393	336	438	418	393
3	338	334	388	350	322	472	474	418	334	519	367	495
4	304	371	368	327	322	499	460	368	330	530	356	413
5	323	378	367	337	323	543	449	389	336	489	321	382
6	329	310	383	339	322	472	459	402	325	474	345	340
7	342	363	328	344	310	549	417	361	301	514	377	375
8	e462	360	344	348	326	594	432	338	315	706	354	308
9	459	327	369	337	321	774	398	380	373	923	565	349
10	385	361	371	358	320	711	399	373	445	700	486	340
11	395	344	257	335	321	594	397	343	265	618	404	432
12	359	382	387	341	326	532	408	441	353	524	421	513
13	367	331	402	311	324	461	390	416	331	455	335	451
14	333	330	343	343	321	502	413	374	338	406	369	471
15	390	338	374	369	308	461	430	373	331	420	395	342
16	424	346	328	341	342	427	458	364	348	400	353	354
17	380	323	235	279	318	404	451	354	327	348	361	384
18	404	336	224	347	304	436	445	341	318	395	357	323
19	369	332	292	343	348	435	509	312	311	368	330	323
20	369	349	406	325	344	419	568	370	404	361	350	376
21	368	352	282	322	e319	438	591	306	736	351	361	318
22	378	355	289	341	e307	443	557	359	579	349	330	347
23	353	397	318	317	363	523	499	364	453	343	358	397
24	389	539	304	295	371	550	521	339	430	340	317	371
25	343	495	304	335	405	665	432	330	920	344	319	311
26	348	428	345	331	480	662	432	320	869	386	317	331
27	352	428	313	304	670	806	452	320	633	575	280	370
28	360	386	315	312	554	846	411	317	520	776	311	310
29	339	399	330	328	564	688	394	311	495	659	e340	317
30	361	355	338	314	---	600	428	318	421	533	311	313
31	402	---	351	313	---	557	---	356	---	412	275	---
TOTAL	11420	11136	10405	10290	10478	17297	13690	11168	12797	15081	11207	10971
MEAN	368	371	336	332	361	558	456	360	427	486	362	376
MAX	462	539	406	369	670	846	591	441	920	923	565	513
MIN	304	310	224	279	292	404	390	306	265	340	275	375

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 2000, BY WATER YEAR (WY)

MEAN	417	399	344	331	339	439	937	851	478	464	364	372
MAX	712	571	416	424	410	634	2288	2757	730	887	465	497
(WY)	1991	1993	1992	1997	1997	1998	1996	1996	1996	1999	1996	1977
MIN	276	307	270	259	270	359	322	355	334	272	296	275
(WY)	1990	1990	1990	1991	1991	1994	1990	1998	1992	1990	1990	1978

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1990 - 2010
ANNUAL TOTAL	186777	145940	
ANNUAL MEAN	512	399	477
HIGHEST ANNUAL MEAN			810
LOWEST ANNUAL MEAN			325
HIGHEST DAILY MEAN	3390	923	7750
LOWEST DAILY MEAN	224	224	182
ANNUAL SEVEN-DAY MINIMUM	292	292	202
INSTANTANEOUS PEAK FLOW		1880	8480
INSTANTANEOUS PEAK STAGE		8.54	13.91
10 PERCENT EXCEEDS	1010	535	651
50 PERCENT EXCEEDS	371	361	370
90 PERCENT EXCEEDS	314	313	281

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW1/4 sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft upstream from highway bridge, 5.0 mi downstream from Michigamme Reservoir, 6.0 mi east of Crystal Falls, and 15 mi upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,300 ft above sea level, from topographic map.

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft, 5 mi upstream. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	365	193	192	192	1020	321	e208	669	411	624	613	255
2	274	190	192	198	1010	180	206	754	411	544	439	235
3	274	189	192	518	1020	170	390	933	410	428	283	240
4	261	e540	192	656	1020	173	462	930	410	351	282	234
5	247	397	192	707	1010	175	463	843	409	352	279	230
6	245	184	461	845	1000	179	545	634	410	734	281	227
7	237	184	826	841	991	192	589	406	409	930	697	227
8	194	372	745	836	1010	205	589	830	410	907	902	226
9	191	286	467	831	1010	246	590	777	415	546	709	225
10	189	473	379	832	1020	237	588	660	417	494	637	228
11	188	475	378	827	1060	213	629	668	416	732	477	438
12	188	399	377	625	1070	209	669	685	412	756	273	319
13	186	396	502	815	1040	205	673	660	411	729	276	244
14	187	391	584	811	1040	203	674	703	415	698	563	240
15	188	389	588	810	1050	204	677	573	390	697	629	236
16	191	386	587	804	1040	201	680	480	369	696	612	234
17	189	367	584	801	1030	198	552	479	368	691	387	233
18	189	353	581	796	1030	198	483	480	370	689	263	240
19	190	352	581	797	1020	198	589	438	422	687	261	261
20	189	351	582	788	1010	197	685	436	466	691	260	262
21	190	351	579	958	999	180	694	436	404	693	511	251
22	193	351	578	1090	718	186	696	461	274	687	493	242
23	191	305	578	1080	500	195	683	480	190	683	461	243
24	191	210	572	1080	457	204	640	480	196	681	475	241
25	190	203	578	1070	458	217	645	e478	193	680	476	241
26	190	197	574	1060	471	220	689	478	399	697	475	240
27	189	196	574	1060	474	247	682	476	624	554	473	241
28	190	194	576	1050	474	243	821	475	654	299	473	247
29	190	193	326	1040	480	231	906	439	652	288	472	246
30	193	192	191	1040	---	220	907	386	651	285	472	246
31	193	---	193	1030	---	e212	---	407	---	486	463	---
TOTAL	6462	9259	14501	25888	25532	6459	18304	18034	12388	19009	14367	7472
MEAN	208	309	468	835	880	208	610	582	413	613	463	249
MAX	365	540	826	1090	1070	321	907	933	654	930	902	438
MIN	186	184	191	192	457	170	206	386	190	285	260	225

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2000, BY WATER YEAR (WY)

	MEAN	498	550	785	867	828	526	644	1083	808	673	590	515
MAX	1220	1432	1427	1274	1252	819	1662	2865	1650	1461	1035	1325	
(WY)	1952	1989	1989	1983	1983	1971	1973	1960	1983	1953	1987	1968	
MIN	151	88.3	238	390	350	160	142	130	257	261	292	157	
(WY)	1970	1949	1949	1977	1948	1977	1987	1987	1987	1959	1977	1975	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1944 - 2000

ANNUAL TOTAL	235916	177675	
ANNUAL MEAN	646	485	
HIGHEST ANNUAL MEAN			697
LOWEST ANNUAL MEAN			1049
HIGHEST DAILY MEAN	2190	1090	382
LOWEST DAILY MEAN	184	170	382
ANNUAL SEVEN-DAY MINIMUM	188	182	6940
INSTANTANEOUS PEAK FLOW		1330	71
INSTANTANEOUS PEAK STAGE		5.16	83
10 PERCENT EXCEEDS	1090	907	7260
50 PERCENT EXCEEDS	611	439	10.73
90 PERCENT EXCEEDS	193	192	1180
			646
			173

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE1/4 sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi downstream from confluence of Brule and Michigamme Rivers, 3.5 mi northeast of Florence, WI, and at mile 117.

DRAINAGE AREA.--1,760 mi<sup>2</sup>.

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI", January 1914 to June 1950, October 1996 to September 1998. Records published for both sites July 1950 to September 1957, October 1989 to September 1996, October 1998 to current year.

REVISED RECORDS.--WSP 1707: 1953(M). WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft above sea level (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi downstream.

REMARKS.--Records fair. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill; ratings developed by U.S. Geological Survey. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	894	1200	1020	e850	1540	e1500	1670	1650	1060	1030	1040	1330
2	632	1150	1040	e850	1580	e1600	1820	2120	1190	1300	1130	759
3	976	1460	1010	e1150	1630	e2000	1920	1820	688	1330	1190	663
4	782	1250	594	e1300	1630	e2400	1990	1880	962	1400	1300	726
5	842	1010	708	e1350	1650	e2500	1710	1750	1280	1630	739	1280
6	772	845	1100	1420	1640	e2400	1710	1460	1030	2110	955	874
7	630	833	1400	1270	e1600	e2200	1690	741	1060	1800	1440	768
8	1210	991	1500	1370	e1600	e2000	1180	1650	964	2090	905	888
9	515	909	1240	1360	e1600	e2100	1340	1850	917	2430	1580	659
10	895	1060	1320	1500	e1600	e2200	1400	1870	749	2700	1670	752
11	973	1010	987	1330	e1600	e2300	1480	1530	938	2330	1640	1150
12	964	816	976	1420	e1600	e2500	1750	1430	971	2090	858	1200
13	927	804	1180	1430	e1600	e2600	1910	752	1230	1570	1050	1130
14	822	809	e1150	1370	e1600	e2600	1430	937	1170	1800	1190	1320
15	742	981	e1250	1410	e1600	e2700	695	1570	1190	1220	1190	870
16	702	1020	e1300	1400	e1600	2660	716	1470	1450	881	984	471
17	737	1140	e1200	1390	e1600	2600	1560	1450	850	1490	998	726
18	1050	1090	e900	1370	e1600	2220	1740	1320	881	1520	1120	964
19	1010	1010	e1000	1370	e1600	2280	1620	1250	1100	1420	994	955
20	831	872	e1250	1530	e1600	2420	2140	724	1320	1360	751	837
21	729	945	e1250	1630	e1300	2150	2010	840	1540	1460	1190	877
22	761	1030	e1250	1670	e1000	1270	1680	1040	1630	907	1150	810
23	969	916	e1200	1660	e1000	1220	1740	1240	1470	868	1120	755
24	617	1040	e1000	1710	e1300	1030	2100	1250	1360	1510	864	810
25	1090	1050	e950	1780	e1600	733	2060	1210	1410	1340	880	951
26	870	1150	e1050	1790	e1900	759	1860	1320	2120	1280	915	762
27	1010	1370	e1200	1730	e1700	961	1720	829	2420	1450	853	868
28	844	1040	e1400	1680	e1650	903	1540	666	1950	2160	991	859
29	875	1130	e1200	1660	e1600	1290	1220	954	2090	2140	989	905
30	816	965	e1000	1430	---	1610	1270	1230	1610	1840	852	902
31	819	---	e800	1720	---	1720	---	1320	---	1120	995	---
TOTAL	26306	30896	34425	44900	45120	59426	48671	41123	38600	49576	33523	26969
MEAN	849	1030	1110	1448	1556	1917	1622	1327	1287	1599	1081	900
MAX	1210	1460	1500	1790	1900	2700	2140	2120	2420	2700	1670	1330
MIN	515	804	594	850	1000	733	695	666	688	868	739	471

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2000, BY WATER YEAR (WY)

	MEAN	1463	1587	1449	1397	1379	1597	3142	3030	2117	1598	1293	1391
MAX	3537	3465	2640	2253	2514	3544	8159	6319	5035	4253	2359	3140	
(WY)	1986	1986	1984	1983	1984	1973	1916	1960	1916	1953	1972	1968	
MIN	726	725	765	691	647	692	735	595	799	721	545	718	
(WY)	1949	1964	1925	1924	1926	1914	1990	1987	1988	1925	1925	1925	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1914 - 2000

ANNUAL TOTAL	603885						479555						
ANNUAL MEAN	1654						1310						
HIGHEST ANNUAL MEAN										1787			
LOWEST ANNUAL MEAN										3069			1910
HIGHEST DAILY MEAN	6030						2700		Mar 15	18800		Jul 2	1953
LOWEST DAILY MEAN	515						471		Sep 16	57		Sep 26	1975
ANNUAL SEVEN-DAY MINIMUM	790						790		Oct 1	277		Oct 18	1975
INSTANTANEOUS PEAK FLOW							3220		Aug 9	19500		Apr 26	1960
INSTANTANEOUS PEAK STAGE							5.71		Aug 9	14.15		Apr 26	1960
INSTANTANEOUS LOW FLOW										38			(e)
10 PERCENT EXCEEDS	2520						1960			3010			
50 PERCENT EXCEEDS	1400						1240			1460			
90 PERCENT EXCEEDS	905						803			845			

(a) Aug. 21, 1962, Sept. 26, 1975.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04063500 MENOMINEE RIVER AT TWIN FALLS NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°52'17", long 88°04'12", in NE1/4 SE1/4 sec. 12, T.40 N., R.31 W., Michigan Meridian, Dickinson County, Hydro'logic Unit 04030108, on left bank 150 ft downstream from Wisconsin Electric Power Company powerhouse at Twin Falls Dam, 3.6 mi north of Iron Mountain, and at mile 106.6.

DRAINAGE AREA.--1,800 mi<sup>2</sup>.

PERIOD OF RECORD.--January 1914 to current year. Published as "near Florence, WI", October 1957 to September 1989. Records published for both sites July 1950 to September 1957, October 1989 to September 1996, October 1998 to current year.

REVISED RECORDS.--WDR MI-91-1: 1990(M). WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 1,062 ft above sea level (levels by Wisconsin Electric Power Co.). Prior to September 1957, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees. October 1957 to September 1989, water-stage recorder at site 10.4 mi upstream at different datum. November 1989 to July 1993, water-stage recorder at site 150 ft upstream at same datum.

REMARKS.--Records good. Prior to September 1957, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill; ratings developed by U.S. Geological Survey. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	883	1250	1090	966	1610	1560	1830	1650	1050	1110	1160	1450
2	791	1210	1060	799	1610	1550	1830	2130	1180	1360	1230	790
3	964	1410	1040	1240	1610	2090	2010	1840	836	1400	1300	689
4	781	1320	653	1320	1620	2580	2000	1930	936	1450	1220	954
5	872	1040	841	1340	1670	2580	1690	1800	1170	1660	837	1260
6	764	892	1160	1350	1670	2480	1770	1530	1030	2100	923	969
7	749	876	1360	1370	1620	2260	1800	842	1050	1960	1350	799
8	1300	1010	1470	1410	1650	1990	1320	1620	959	2130	1130	870
9	655	1060	1260	1410	1620	2120	1380	1870	378	2650	1580	729
10	868	1030	1340	1410	1620	2300	1350	1770	374	2760	1730	805
11	1030	1050	1080	1380	1620	2420	1520	1650	931	2370	1740	1270
12	984	924	1010	1410	1630	2560	1810	1500	962	2120	983	1230
13	1020	825	1280	1350	1640	2640	1820	902	1200	1720	1080	1390
14	860	820	1140	1400	1650	2630	1560	1020	1270	1810	1190	1340
15	845	1050	1270	1400	1640	2720	819	1600	1220	1400	1220	838
16	917	1080	1300	1410	1640	2620	742	1500	1420	851	1020	647
17	831	1140	1410	1410	1650	2550	1540	1470	885	1470	1030	650
18	1070	1150	901	1410	1640	2390	1830	1400	886	1530	1150	915
19	1070	1080	962	1410	1670	2400	1780	1270	1130	1490	875	956
20	904	881	1290	1510	1660	2410	2140	746	1440	1410	989	899
21	882	1100	1310	1680	1260	2110	2150	824	1550	1500	1160	921
22	891	1020	1290	1690	1020	1420	1840	1100	1710	919	1230	818
23	912	974	1220	1690	1060	1290	1850	1200	1560	914	1130	853
24	853	1080	1000	1740	1390	1140	2070	1340	1540	1460	852	888
25	1030	1210	1010	1810	1950	961	2070	1230	1380	1380	918	929
26	965	1230	991	1790	1920	843	1850	1270	2240	1330	916	765
27	992	1420	1180	1730	1790	953	1740	835	2440	1540	914	884
28	989	1150	1420	1620	1660	1130	1650	690	2040	2280	966	907
29	883	1040	1390	1640	1610	1190	1250	884	2170	2240	967	822
30	880	1070	1040	1620	---	1660	1430	1300	1770	1960	882	937
31	839	---	738	1620	---	1710	---	1250	---	1070	989	---
TOTAL	28174	32382	35506	45335	46410	61262	50441	41863	39707	51344	34661	28174
MEAN	909	1079	1145	1462	1600	1976	1681	1350	1324	1656	1118	939
MAX	1300	1420	1470	1810	1950	2720	2150	2130	2440	2760	1740	1450
MIN	655	820	653	799	1030	843	742	690	336	851	337	647

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2000, BY WATER YEAR (WY)

	MEAN	1472	1599	1458	1406	1387	1610	3158	3042	2133	1612	1307	1403
MAX	3537	3465	2640	2253	2514	3544	8159	6319	5035	4309	2359	3149	
(WY)	1986	1986	1984	1983	1984	1973	1916	1960	1916	1953	1972	1968	
MIN	726	725	765	691	647	692	707	595	799	721	545	718	
(WY)	1949	1964	1925	1924	1926	1914	1990	1987	1988	1925	1925	1925	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1914 - 2000

ANNUAL TOTAL	606506		495259	
ANNUAL MEAN	1662		1353	
HIGHEST ANNUAL MEAN				1799
LOWEST ANNUAL MEAN				3069
HIGHEST DAILY MEAN	6110	May 10	2760	Jul 10
LOWEST DAILY MEAN	653	Dec 4	647	Sep 16
ANNUAL SEVEN-DAY MINIMUM	829	Oct 1	829	Oct 1
INSTANTANEOUS PEAK FLOW			4230	May 4
INSTANTANEOUS PEAK STAGE			8.93	May 4
10 PERCENT EXCEEDS	2560		2000	
50 PERCENT EXCEEDS	1400		1230	
90 PERCENT EXCEEDS	925		844	

(a) Gage height 14.15 ft, site and datum then in use.

(b) Present site and datum.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04065106 MENOMINEE RIVER AT NIAGARA, WI

LOCATION.--Lat 45°46'04", long 87°58'50", in NE1/4 NE1/4 sec.15, T.38 N., R.20 E., Wisconsin Meridian, Marinette County, Hydrologic Unit 04030108, on right bank 0.7 mi downstream from Little Quinnesec Falls Dam, at Niagara, WI.

DRAINAGE AREA.--2,470 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1992 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 880 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1290	1540	1350	1100	e1800	2440	2520	2150	1480	1790	1520	1590
2	1170	1610	1400	e1100	e1800	2610	2520	2530	1420	1750	1690	1480
3	1140	1660	1380	e1500	e1800	2810	2490	2350	1290	2210	1730	1380
4	1120	1660	1160	e1500	e1700	3340	2460	2390	1120	2390	1690	1600
5	1110	1300	1180	e1500	e1800	3370	2260	2330	1470	2440	1240	1850
6	1110	1160	1450	e1500	e1700	3330	2250	1960	1340	2880	1260	1570
7	1020	1220	1610	e1500	e1800	3290	2300	1240	1270	2780	1540	1340
8	1520	1300	1640	e1600	e1800	3050	1810	2020	1190	2830	1440	1290
9	1260	1310	1580	e1600	e1700	3440	1740	2290	1180	3770	2160	1240
10	1270	1330	1630	e1600	e1800	3430	1810	2200	1100	3800	2180	1220
11	1400	1340	1300	e1600	e1800	3470	1900	2100	1120	3260	2220	1890
12	1370	1220	1260	e1600	e1800	3440	2180	1890	1250	2860	1410	2420
13	1330	1080	1530	e1600	e1800	3410	2260	1490	1390	2380	1380	2370
14	1210	1080	1590	e1500	e1700	3470	2150	1490	1520	2310	1590	2190
15	1220	1400	1530	e1400	e1800	3360	1240	2060	1500	2070	1800	1560
16	1210	1350	1610	e1500	e1900	3220	1300	1950	1710	1280	1650	1270
17	1210	1370	e1500	e1500	e1800	2880	1900	1880	1140	1890	1770	1220
18	1390	1420	1190	e1500	e1800	2920	2420	1850	1140	1870	1720	1240
19	1480	1380	1180	e1500	e1800	2930	2390	1640	1410	1790	1330	1310
20	1350	1120	e1500	e1600	e1800	2900	2920	1150	1740	1800	1340	1260
21	1250	1260	e1600	e1700	e1500	2670	3350	1140	2030	1800	1660	1210
22	1260	1350	e1500	e1700	e1300	2080	3030	1410	2500	1190	1600	1330
23	1250	1360	e1400	e1700	e1300	1800	2960	1610	2390	1240	1550	1190
24	1180	1450	e1200	e1800	e1500	2030	2880	1710	2200	1680	1280	1190
25	1360	1660	e1200	e1800	e2200	1830	3050	1660	1960	1740	1230	1210
26	1290	1820	e1200	e1800	e2300	1900	2550	1570	2930	1640	1250	1200
27	1290	1960	e1500	e1800	2590	2030	2360	1080	3340	2160	1280	1180
28	1340	1450	e1600	e1800	2360	2260	2320	1070	2890	3180	1270	1190
29	1270	1450	e1600	e1700	2390	2050	1950	1190	2930	2830	1210	1150
30	1180	1480	e1300	e1800	---	2500	1990	1590	2540	2700	1200	1210
31	1080	---	e1100	e1700	---	2540	---	1480	---	1620	1200	---
TOTAL	38930	42090	43770	49100	53140	86800	69260	54470	52490	69930	47390	43690
MEAN	1256	1403	1412	1584	1832	2800	2309	1757	1750	2256	1529	1453
MAX	1520	1960	1640	1800	2590	3470	3350	2530	3340	3800	2220	2420
MIN	1020	1080	1100	1100	1300	1800	1240	1070	1100	1190	1200	1150

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 2000, BY WATER YEAR (WY)

	1993	1994	1995	1996	1997	1998	1999	2000
MEAN	1744	1784	1768	1775	1934	2163	3388	3609
MAX	2810	2531	2458	2258	2286	2800	6167	7555
(WY)	1996	1993	1993	1993	1997	2000	1996	1993
MIN	1256	1283	1263	1369	1391	1764	1953	1175
(WY)	2000	1995	1999	1995	1995	1994	1994	1998

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1993 - 2000
ANNUAL TOTAL	778430	650970	
ANNUAL MEAN	2133	1779	2189
HIGHEST ANNUAL MEAN			3135
LOWEST ANNUAL MEAN			1707
HIGHEST DAILY MEAN	7830	Jul 15	16000
LOWEST DAILY MEAN	1020	Oct 7	917
ANNUAL SEVEN-DAY MINIMUM	1140	Oct 1	951
INSTANTANEOUS PEAK FLOW			16100
INSTANTANEOUS PEAK STAGE			15.11
10 PERCENT EXCEEDS	3690	2790	3440
50 PERCENT EXCEEDS	1700	1600	1880
90 PERCENT EXCEEDS	1240	1190	1220

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04065722 MENOMINEE RIVER NEAR VULCAN, MI

LOCATION.--Lat 45°44'12", long 87°51'48", sec.34, T.39 N., R.29 W., Michigan Meridian, Dickinson County, Hydrologic Unit 04030108, on left bank 0.35 mi downstream from Sturgeon Falls Dam, 3.0 mi south of Vulcan, and at mile 78.7.

DRAINAGE AREA.--2,900 mi<sup>2</sup>.

PERIOD OF RECORD.--December 1987 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 820 ft above sea level, from topographic map.

REMARKS.--Records good. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by smaller reservoirs upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1470	e1800	1620	1210	e2000	3130	3340	2530	1590	2250	1630	2480
2	1340	e2000	1620	1280	e2000	3360	3220	2970	1570	1930	1800	2090
3	1280	e2100	1550	1600	e2070	3560	3200	2810	1440	2420	1860	1920
4	1260	e2100	1300	1720	1990	4290	3100	2740	1270	2730	1850	2020
5	1230	e1600	1350	1750	2030	4310	2910	2740	1610	2710	1360	2360
6	1220	e1400	1630	1740	1960	4380	2820	2240	1480	3030	1280	1900
7	1220	e1400	1770	1760	2100	4410	2890	1600	1430	3190	1620	1650
8	1660	e1500	1840	1800	2110	4320	2270	2200	1310	3010	1520	1500
9	1530	e1470	1790	1830	1900	4800	2200	2690	1280	4160	2280	1460
10	1560	1480	1780	1900	2080	4780	2180	2500	1220	4380	2490	1420
11	1700	1480	1460	1900	2050	4770	2360	2490	1290	3920	2580	1950
12	1670	1390	1370	1840	2070	4520	2650	2130	1400	e3100	1700	3550
13	1530	1220	1600	1850	2030	4400	2720	1860	1600	e2800	1530	3420
14	1470	1210	1780	e1720	1990	4430	2660	1860	1720	e2700	1740	3080
15	1420	1530	1720	e1700	2020	4130	1620	2500	1680	e2200	1940	2300
16	1340	1460	1770	e1700	2090	3960	1730	2320	1860	e1400	1800	1640
17	1440	1540	1690	e1700	2070	3500	2410	2240	1330	e2300	1860	1600
18	1700	1540	1380	e1700	1960	3550	2960	2200	1270	e2300	1880	1500
19	e1730	1540	1310	e1700	2020	3500	3070	1940	1560	e2300	1330	1600
20	e1500	1280	1650	e1800	2070	3460	3740	1320	2000	e2200	1400	1520
21	e1450	1370	1740	e2000	1710	3300	4310	1370	2450	e1700	1740	1440
22	e1450	1470	1700	e2100	1450	2720	4110	1630	3070	1360	1690	1470
23	e1450	1480	1580	e2100	1480	2470	3920	1800	2920	1270	1620	1370
24	e1450	1780	1400	e2200	1640	2790	3700	1990	2750	1760	1250	1370
25	e1600	2010	1260	e2200	2450	2580	3800	1910	2360	1800	1310	1420
26	e1600	2220	1250	e2200	2530	2830	3190	1840	3270	1810	1310	1350
27	e1600	2360	1620	e2100	2850	3020	2930	1230	3770	2180	1300	1400
28	e1600	1840	1710	e2000	2780	3420	2940	1240	3540	3310	1330	1270
29	e1500	1730	1790	e2000	2910	3080	2360	1330	3340	3000	1270	1280
30	e1400	1720	1540	e2000	---	3510	2360	1810	3120	3000	1260	1340
31	e1400	---	1160	e2000	---	3460	---	1650	---	1800	1210	---
TOTAL	45770	49020	48730	57100	60410	114740	87670	63680	60500	78020	50740	54690
MEAN	1476	1634	1572	1842	2083	3701	2922	2054	2017	2517	1637	1823
MAX	1730	2360	1840	2200	2910	4800	4310	2970	3770	4380	2580	3550
MIN	1220	1210	1160	1210	1450	2470	1620	1230	1220	1270	1210	1270

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 2000, BY WATER YEAR (WY)

	1955	2253	2136	2017	2053	2573	4187	3779	2825	2283	1699	1866
MEAN	1955	2253	2136	2017	2053	2573	4187	3779	2825	2283	1699	1866
MAX	3401	4412	3008	2533	2548	3701	8159	8850	4832	4196	2598	2456
(WY)	1996	1989	1989	1993	1997	2000	1996	1996	1993	1999	1996	1994
MIN	1081	1382	1388	1489	1442	2028	1356	1344	1062	1100	1184	1223
(WY)	1990	1990	1999	1995	1995	1994	1990	1998	1988	1988	1998	1989

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1988 - 2000

ANNUAL TOTAL	922670		771070		2512	
ANNUAL MEAN	2528		2107		3781	1996
HIGHEST ANNUAL MEAN					1864	1990
LOWEST ANNUAL MEAN					21500	Apr 27 1996
HIGHEST DAILY MEAN	9290	May 10	4800	Mar 9	846	Aug 3 1988
LOWEST DAILY MEAN	1160	Dec 31	1160	Dec 31	932	Oct 1 1989
ANNUAL SEVEN-DAY MINIMUM	1290	Oct 1	1280	Aug 25	22000	Apr 27 1996
INSTANTANEOUS PEAK FLOW			5250	Mar 9	17.39	Apr 27 1996
INSTANTANEOUS PEAK STAGE			8.80	Mar 9	603	Aug 1 1992
INSTANTANEOUS LOW FLOW			837	Aug 21	4040	
10 PERCENT EXCEEDS	4660		3340		2060	
50 PERCENT EXCEEDS	1970		1820		1320	
90 PERCENT EXCEEDS	1390		1330			

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04066003 MENOMINEE RIVER BELOW PEMENE CREEK NEAR PEMBINE, WI

LOCATION.--Lat 45°34'46", long 87°47'13", in NE1/4, sec.29, T. 37 N., R.28 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank 40 ft downstream from County Trunk Z bridge, 0.9 mi downstream from Pemene Creek, 3.9 mi west of Nathán, 10.6 mi southeast of Pembine, WI, and at mile 64.3.

DRAINAGE AREA.--3,140 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1949 to current year. Published as "near Pembine" (04066000) prior to August 1982. Monthly discharges for some periods published in WSP 1307.

GAGE.--Water-stage recorder. Elevation of gage is 740 ft above sea level, from topographic map. October 1949 to Oct. 27, 1972, water-stage recorder at site 1.0 mi upstream at elevation 745 ft, from river-profile map, and Oct. 28, 1972, to August 1982, water-stage recorder at site 1.5 mi upstream at elevation 770 ft, from river-profile map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1630	1510	1840	e1400	e1900	e3200	3520	2460	1540	2340	1710	2270
2	1480	1980	1740	e1400	e2000	e3600	3400	2970	1490	1700	1830	3070
3	1380	1910	1740	e1600	e2000	e4000	3300	2800	1340	2250	1950	2480
4	1310	1960	1550	e1800	e2100	4640	3340	2660	1330	2730	1990	2640
5	1290	1740	1430	e1700	e2100	4580	3070	2720	1470	2540	1630	2930
6	1280	1430	1550	e1800	e2000	4730	2990	2190	1420	2640	1350	2430
7	1280	1410	1870	e1700	e2000	4710	2990	1930	1350	3170	1590	2040
8	1470	1490	1920	e1800	e2100	4760	2450	1790	1260	2560	1680	1770
9	1830	1530	1870	e1900	e2000	5150	2430	2750	1270	4140	2130	1530
10	1600	1540	1900	e2000	e2000	5310	2260	2430	1210	4500	2650	1530
11	1690	1560	1700	e1900	e2100	5140	2410	2460	1210	3920	2710	2070
12	1820	1540	1500	e1900	e2100	4810	2840	2080	1230	3460	2180	3830
13	1600	1350	1610	e1900	e2000	4650	2790	2090	1460	2780	1580	4150
14	1630	1280	1890	e2000	e2000	4560	2980	1980	1560	2630	1690	3840
15	1550	1420	e1700	e1900	e2100	4330	2040	2300	1660	2490	2000	3110
16	1510	1650	e1600	e1900	e2100	4140	1860	2370	1680	1710	2260	2010
17	1570	1510	e1600	e1900	e2000	3700	2240	2200	1500	1640	2080	1870
18	1770	1610	e1500	e1900	e2100	3660	3110	2150	1240	2050	2030	1570
19	1910	1650	e1400	e2000	e2100	3650	3300	2100	1500	1960	1660	1590
20	1820	1540	e1500	e2000	e2100	3610	3640	1490	1750	1880	1550	1640
21	1590	1330	e1500	e2000	e2000	3590	4760	1350	2350	1960	1620	1550
22	1590	1610	e1500	e2000	e1700	2990	4410	1510	2990	1740	1790	1440
23	1640	1580	e1500	e2100	e1700	2740	4250	1660	2900	1290	1670	1530
24	1510	1960	e1500	e2200	e1700	3010	3830	1930	2640	1570	1540	1390
25	1500	2160	e1400	e2200	e2400	2870	3920	1880	2270	1800	1400	1480
26	1690	2320	e1500	e2200	e2600	3210	3470	1820	2780	1870	1380	1390
27	1690	2640	e1500	e2200	e2700	3320	2960	1480	3650	1960	1390	1450
28	1570	2220	e1700	e2100	e2900	3700	2980	1220	3640	3170	1400	1330
29	1640	1760	e1800	e2000	e3000	3370	2390	1240	3010	3350	1350	1250
30	1460	1850	e1700	e2000	---	3680	2320	1650	3270	3190	1340	1240
31	1320	---	e1600	e2000	---	3720	---	1630	---	2320	1300	---
TOTAL	48620	51040	50610	59400	61600	123130	92250	63290	57970	77310	54430	62310
MEAN	1568	1701	1633	1916	2124	3972	3075	2042	1932	2494	1756	2077
MAX	1910	2640	1920	2200	3000	5310	4760	2970	3650	4500	2710	4150
MIN	1280	1280	1400	1400	1700	2740	1860	1220	1210	1290	1300	1240

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 2000, BY WATER YEAR (WY)

MEAN	2467	2606	2289	2124	2108	2643	5525	4773	3360	2558	2087	2305
MAX	5660	5766	3939	3035	3810	7461	10000	12100	6118	6523	3505	5375
(WY)	1986	1986	1986	1986	1984	1973	1967	1960	1953	1953	1952	1968
MIN	1028	1043	1167	1080	1201	1461	1432	1341	1152	1201	1003	1009
(WY)	1977	1977	1977	1977	1964	1964	1990	1987	1988	1988	1977	1976

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1950 - 2000
ANNUAL TOTAL	969850	801960	
ANNUAL MEAN	2657	2191	2904
HIGHEST ANNUAL MEAN			4318
LOWEST ANNUAL MEAN			1778
HIGHEST DAILY MEAN	10400	5310	26700
LOWEST DAILY MEAN	1270	1210	840
ANNUAL SEVEN-DAY MINIMUM	1360	1280	914
INSTANTANEOUS PEAK FLOW		(a)5620	(b)26900
INSTANTANEOUS PEAK STAGE		(c)10.94	(c)18.94
10 PERCENT EXCEEDS	4930	3590	4910
50 PERCENT EXCEEDS	2010	1910	2300
90 PERCENT EXCEEDS	1500	1400	1450

- (a) Gage height, 10.01 ft.  
 (b) Gage height, 13.90 ft, site and datum then in use.  
 (c) Backwater from ice.  
 (e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04066030 MENOMINEE RIVER AT WHITE RAPIDS DAM NEAR BANAT, MI

LOCATION.--Lat 45°28'55", long 87°48'08", in SE1/4 SE1/4, sec.30, T. 36 N., R.28 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank at powerplant at White Rapids Dam, 5.7 mi southwest of Banat.

DRAINAGE AREA.--3,190 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is 680.00 ft above sea level (levels by Wisconsin Electric Power Company).

REMARKS.--Records good. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1860	1460	1570	1300	2050	3710	3760	2530	1720	2540	1420	2660
2	1290	1790	1910	1240	2080	3860	3460	2960	1510	2050	1880	3390
3	1500	1910	1580	1320	2190	4110	3440	3210	1670	2530	1940	2320
4	1310	2030	1680	2130	2260	4540	3320	2750	1240	2620	1880	2740
5	1280	1840	1680	1800	2440	4750	3090	2630	1480	2940	1770	2860
6	1310	1480	1440	1970	2100	4950	3140	2650	1670	2930	1300	2640
7	1320	1320	1860	1800	2250	4910	2940	2040	1530	3410	1650	2260
8	1350	1620	2010	1900	2140	4920	2640	1700	1230	2770	1770	1780
9	2100	1540	2030	2050	2150	5200	2290	2900	1380	4310	2040	1610
10	1730	1790	1840	2130	2220	5650	2460	2720	1390	4420	2800	1380
11	1530	1450	1460	2040	2330	5430	2390	2550	1260	3990	2690	2340
12	1970	1620	1870	2130	2340	5020	2650	2270	1330	3630	2110	3870
13	1740	1310	1480	1950	2120	4830	2850	2300	1630	2950	1710	4270
14	1580	1310	1900	2170	2250	4680	2850	1800	1610	2540	1750	4180
15	1590	1380	2020	1870	2340	4410	2330	2510	1630	2490	1970	3390
16	1600	1840	1600	2000	2270	4250	1810	2530	1870	1780	2160	2110
17	1390	1550	1690	2000	2200	3950	2220	2450	1650	1680	2240	2020
18	1680	1460	1500	2010	2190	3550	3030	2150	1270	2060	2190	1900
19	1970	1610	1360	2070	2270	3810	3470	2160	1540	2110	1470	1600
20	1940	1550	1580	2100	2260	3640	3690	1750	1880	1880	1470	1830
21	1670	1370	1640	2110	2170	3800	4640	1220	2820	1940	1490	1690
22	1670	1610	1480	2210	1870	3040	4690	1410	3090	1810	2050	1700
23	1620	1690	1560	2340	1690	2770	4410	1750	3380	1320	1740	1700
24	1600	1840	1500	2290	1590	3250	4150	2310	2790	1350	1530	1540
25	1450	2400	1460	2280	2360	3010	3890	1950	2520	1940	1360	1570
26	1560	2420	1430	2480	2910	3280	3640	1890	3110	1720	1210	1510
27	1650	2420	1480	2560	3060	3600	3170	1530	3590	2190	1330	1520
28	1660	2500	1600	2280	3500	3580	2840	1320	3960	2930	1350	1690
29	1590	1650	2220	2110	3000	3740	2730	1310	3210	3670	1310	1660
30	1570	2060	1700	2330	---	3690	2420	1680	3640	3060	1270	1390
31	1440	---	1690	2270	---	3730	---	1910	---	2640	1280	---
TOTAL	49520	51820	51820	63240	66600	127660	94410	66840	62600	80200	54130	67120
MEAN	1597	1727	1672	2040	2297	4118	3147	2156	2087	2587	1746	2237
MAX	2100	2500	2220	2560	3500	5650	4690	3210	3960	4420	2800	4270
MIN	1280	1310	1360	1240	1590	2770	1810	1220	1230	1320	1210	1380

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1999 - 2000, BY WATER YEAR (WY)

MEAN	1578	1693	1597	1907	2320	3452	3390	3697	2584	3585	2129	1926
MAX	1597	1727	1672	2040	2345	4118	3634	5238	3081	4584	2511	2237
(WY)	2000	2000	2000	2000	1999	2000	1999	1999	1999	1999	1999	2000
MIN	1558	1659	1522	1774	2297	2787	3147	2156	2087	2587	1746	1616
(WY)	1999	1999	1999	1999	2000	1999	2000	2000	2000	2000	2000	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1999 - 2000

ANNUAL TOTAL	992420						835960					
ANNUAL MEAN	2719						2284			2490		
HIGHEST ANNUAL MEAN										2697		1999
LOWEST ANNUAL MEAN										2284		2000
HIGHEST DAILY MEAN	10600				Jul 16		5650		Mar 10	10600		Jul 15 1999
LOWEST DAILY MEAN	1230				Sep 6		1210		Aug 26	1160		Dec 23 1998
ANNUAL SEVEN-DAY MINIMUM	1340				Oct 2		1300		Aug 25	1290		Nov 2 1998
INSTANTANEOUS PEAK FLOW							6530		Mar 9	12000		May 17 1999
INSTANTANEOUS PEAK STAGE							9.64		Mar 9	11.70		May 17 1999
10 PERCENT EXCEEDS	4990						3680			4140		
50 PERCENT EXCEEDS	2150						2040			2080		
90 PERCENT EXCEEDS	1480						1390			1410		

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04066800 MENOMINEE RIVER AT KOSS, MI

LOCATION.--Lat 45°23'14", long 87°42'07", in SE1/4 NE1/4, sec.36, T. 35 N., R.28 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left upstream bank 30 ft from river and 18 ft west of County Trunk JJ (Koss) bridge, 0.3 mi southeast of Koss and 3.4 mi upstream of Grand Rapids Dam.

DRAINAGE AREA.--3,700 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1907 to March 1909 (published as "at Koss"), July 1913 to September 1981 (published as 04067000 Menominee River below Koss, MI), June 1998 to current year. Records prior to October 1913 published in WSP 244, 264, and 384.

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 665 ft above sea level, from topographic map. June 1913 to September 1981, headwater and tailwater gages and generation data entered hourly in daily log sheet by Wisconsin Public Service Corp. employees at powerplant 4 mi downstream. Records of daily discharge furnished by Wisconsin Public Service Corp. Prior to June 1913, chain gage on railroad bridge at Koss.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1420	1430	2020	e1800	e2300	e3900	4230	2800	1910	3400	2100	2500
2	1570	1660	1810	e2100	e2300	e4300	4040	3020	1770	2660	1780	3630
3	1790	1890	1810	e1600	e2200	e4700	3730	3610	1810	2250	2240	3390
4	1640	1990	1720	e1800	e2300	e5200	3610	3170	1630	2920	2180	3250
5	1330	1850	1720	e2000	e2300	e5600	3800	2950	1570	2950	2220	3240
6	1330	1690	1630	e1900	e2400	e6000	3120	2880	1760	3190	1730	3250
7	1350	1490	1670	e2100	e2300	e6600	3430	2720	1710	3220	1660	2560
8	1400	1490	1940	e2000	e2300	e6380	3170	1680	1540	3390	1820	2140
9	1660	1570	2010	e2100	e2300	5800	2800	2470	1470	3770	2060	1650
10	1980	1570	1980	e2300	e2400	6330	2620	3190	1530	4690	2470	1640
11	1660	1620	1700	e2300	e2400	6250	2670	2850	1470	4790	2940	1920
12	1590	1680	1670	e2300	e2400	5830	2800	2760	1540	4060	2620	3460
13	2020	1460	1770	e2300	e2300	5420	3100	2500	1660	3680	1940	5110
14	1530	1420	1540	e2200	e2300	5090	3150	2340	1720	2810	1800	4580
15	1630	1470	2170	e2200	e2400	4810	3040	2490	1730	2740	1890	4630
16	1640	1550	e1600	e2200	e2400	4540	2280	2810	1810	2600	2130	3230
17	1540	1840	e1600	e2100	e2400	4370	2550	2830	1910	1630	2350	2640
18	1540	1560	e1700	e2100	e2300	3760	2910	2450	1590	1960	2240	2370
19	1850	1520	e1700	e2200	e2300	3830	3780	2450	1570	2100	2070	1690
20	2010	1700	e1500	e2200	e2400	3820	4090	2310	1950	2040	1620	1780
21	1790	1530	e1600	e2200	e2300	3820	4690	1790	2530	1760	1600	1590
22	1700	1470	e1700	e2300	e2200	3810	5560	1570	3090	1920	1770	1520
23	1680	1780	e1600	e2200	e2000	3290	5410	1890	3570	1690	2070	1890
24	1680	1820	e1700	e2400	e2000	3360	4920	2050	3270	1430	1610	1850
25	1620	2300	e1700	e2400	e2100	3850	4650	2190	2920	1670	1640	1760
26	1520	2580	e1600	e2400	e2700	3570	4200	2160	2640	1800	1470	1640
27	1620	2520	e1600	e2500	e3100	4010	3880	1890	3660	1920	1390	1640
28	1670	2520	e1700	e2400	e3500	4180	3330	1710	4010	2750	1600	1670
29	1640	2360	e1800	e2300	e3700	4410	3310	1490	3990	3840	1530	1640
30	1520	1920	e2000	e2300	---	4220	3030	1720	3410	3470	1600	1550
31	1550	---	e2100	e2400	---	4140	---	1920	---	3210	1540	---
TOTAL	50470	53250	54360	67100	70200	145190	107900	74660	66740	86310	59680	75610
MEAN	1628	1775	1754	2165	2421	4684	3597	2408	2225	2784	1925	2520
MAX	2020	2580	2170	2500	3700	6600	5560	3610	4010	4790	2940	5110
MIN	1330	1420	1500	1600	2000	3290	2280	1490	1470	1430	1390	1550

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2000, BY WATER YEAR (WY)

MEAN	2554	2822	2197	1983	1880	2722	6575	5706	3869	2775	2157	2434
MAX	6178	5597	3588	3174	3176	7973	13650	13180	10780	6159	3800	5538
(WY)	1929	1917	1919	1969	1969	1973	1916	1960	1916	1953	1972	1928
MIN	1131	1170	1166	989	864	1199	2479	2220	1708	1111	731	1013
(WY)	1977	1977	1931	1926	1926	1934	1964	1977	1977	1934	1934	1973

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1913 - 2070

ANNUAL TOTAL	1094520		911470									
ANNUAL MEAN	2999		2490							3145		
HIGHEST ANNUAL MEAN										5262		1916
LOWEST ANNUAL MEAN										1642		1971
HIGHEST DAILY MEAN	10700	May 11	6600	Mar 7						33000	May 10	1970
LOWEST DAILY MEAN	1280	Sep 13	1330	Oct 5						162	Sep 15	1971
ANNUAL SEVEN-DAY MINIMUM	1490	Oct 2	1490	Oct 2						402	Sep 9	1971
INSTANTANEOUS PEAK FLOW			(a)									
INSTANTANEOUS PEAK STAGE			(b)13.38	Mar 7								
10 PERCENT EXCEEDS	5780		4010							5920		
50 PERCENT EXCEEDS	2330		2180							2330		
90 PERCENT EXCEEDS	1580		1570							1380		

(a) Not determined.

(b) Backwater from ice.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04067500 MENOMINEE RIVER NEAR McALLISTER, WI

LOCATION.--Lat 45°19'33", long 87°39'48", in SW1/4 SE1/4 sec.17, T.33 N., R.23 E., Wisconsin Meridian, Marinette County, Hydrologic Unit 04030108, on right bank 85 ft downstream from bridge on County Highway JJ, 2.9 mi downstream from Grand Rapids Dam, 2.6 mi east of McAllister, WI, 1.9 mi downstream from Little Cedar River, and at mile 22.6.

DRAINAGE AREA.--3,930 mi<sup>2</sup>.

PERIOD OF RECORD.--March 1945 to September 1961; October 1961 to September 1979, miscellaneous measurements and peaks only; October 1979 to September 1986; October 1986 to March 1987, crest-stage partial-record station; April 1988 to September 1990 April 1993 to September 1995; October 1997 to current year.

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 622.20 ft above sea level (Michigan Department of Transportation reference mark). Prior to May 15, 1945, nonrecording gage 1,400 ft downstream at same datum; May 16, 1945 to September 1961, water-stage recorder 1,000 ft downstream at same datum; October 1961 to September 1979, crest-stage gage 1,100 ft downstream at same datum; October 1979 to September 1986, water-stage recorder at same site and datum; October 1986 to March 1987, crest-stage gage at same site and datum. April 1988 to September 1990, and April 1993 to September 1995, water-stage recorder at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft on Michigamme River, and by many smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1400	1450	2150	e2000	e2500	e4100	4350	2890	2070	3610	2430	2140
2	1390	1710	1920	e1700	e2400	e4500	4220	3020	1870	2730	1800	3680
3	1380	1940	2000	e1700	e2400	e5000	3930	3730	1820	2270	2180	3740
4	1720	2100	1870	e1800	e2400	e5400	3780	3410	1720	2980	2290	3520
5	1430	2050	1860	e2100	e2500	e5800	3840	3100	1490	2950	2230	3520
6	1400	1840	1770	e2100	e2500	e6200	3320	3050	1840	3220	1800	3540
7	1430	1550	1730	e2200	e2400	e6600	3580	2910	1790	3170	1550	2950
8	1470	1500	2050	e2200	e2500	e6400	3240	2130	1630	3470	1890	2540
9	1700	1780	2140	e2300	e2500	e6200	2950	2420	1460	3700	2160	2080
10	2140	1640	2150	e2500	e2500	6770	2660	3300	1670	4690	2420	1900
11	1780	1780	1770	e2400	e2500	6750	2730	2890	1520	4850	3060	2070
12	1690	1770	1770	e2400	e2600	6390	2850	2910	1420	4100	2820	3440
13	2190	1580	1890	e2400	e2400	6010	3110	2600	1680	3850	2150	5380
14	1610	1440	1640	e2400	e2400	5750	3210	2510	1780	2890	1850	5300
15	1760	1450	2320	e2400	e2500	5380	3180	2530	1820	2710	2030	4910
16	1770	1530	1850	e2300	e2600	5020	2410	2940	1980	2620	2190	3590
17	1700	1920	1500	e2300	e2500	4780	2480	2970	2120	1700	2480	2440
18	1640	1680	1880	e2300	e2400	4350	2990	2710	1620	1980	2410	2630
19	1890	1640	1750	e2300	e2500	4200	3870	2600	1620	2200	2160	2180
20	2160	1760	1580	e2400	e2500	4290	4200	2440	1960	2280	1720	1900
21	1930	1620	e1700	e2400	e2500	4190	4890	1980	2620	1870	1630	2090
22	1810	1570	e1800	e2400	e2400	4150	5930	1680	3270	2110	1750	e2100
23	1780	1900	e1700	e2300	e2200	3520	5740	2020	3680	1780	2220	e2100
24	1720	1950	e1800	e2500	e2100	3500	5200	2160	3500	1490	1680	e2000
25	1740	2380	e1800	e2500	e2100	4030	4850	2440	3040	1690	1690	e2000
26	1570	2730	e1800	e2600	e2900	3760	4480	2330	2690	1930	1490	1820
27	1710	2670	e1700	e2700	e3400	4250	4110	2010	3680	2040	1380	1680
28	1780	2650	e1800	e2600	e3700	4330	3440	1790	4010	2890	1530	1760
29	1780	2550	e1900	e2500	e3900	4490	3350	1490	4170	3740	1480	1810
30	1730	1910	e2200	e2500	---	4370	3090	1700	3390	3650	1430	1760
31	1760	---	e2300	e2600	---	4300	---	2010	---	3360	1480	---
TOTAL	52960	56040	58090	71800	74700	154780	111980	78670	68930	88520	61380	82570
MEAN	1708	1868	1874	2316	2576	4993	3733	2538	2298	2855	1980	2752
MAX	2190	2730	2320	2700	3900	6770	5930	3730	4170	4850	3060	5380
MIN	1380	1440	1500	1700	2100	3500	2410	1490	1420	1490	1380	1680

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2000, BY WATER YEAR (WY)

	MEAN	2918	3209	2575	2387	2408	3111	6433	5240	3884	3205	2368	2659
MAX	6755	7332	4561	3777	4710	5687	12800	15930	6958	7127	4056	5952	
(WY)	1986	1986	1986	1983	1984	1983	1951	1960	1993	1951	1952	1959	
MIN	1195	1753	1532	1621	1245	1897	1869	1636	1296	1374	1312	1390	
(WY)	1949	1990	1990	1949	1948	1956	1990	1998	1988	1988	1998	1989	

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1945 - 2000

ANNUAL TOTAL	1128960	960420	
ANNUAL MEAN	3093	2624	
HIGHEST ANNUAL MEAN			3376
LOWEST ANNUAL MEAN			5496
HIGHEST DAILY MEAN			2118
LOWEST DAILY MEAN			31800
ANNUAL SEVEN-DAY MINIMUM	10500	May 11	May 5 1960
INSTANTANEOUS PEAK FLOW	1360	Sep 13	Oct 26 1948
INSTANTANEOUS PEAK STAGE	1450	Oct 1	Oct 24 1948
INSTANTANEOUS LOW FLOW			May 5 1960
10 PERCENT EXCEEDS	5980	(a)7300	May 5 1960
50 PERCENT EXCEEDS	2380	(b)12.90	Oct 6 1946
90 PERCENT EXCEEDS	1650		

(a) Gage height, 12.50 ft.

(b) Backwater from ice.

(c) From graph based on gage readings.

(d) Observed.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04096015 GALIEN RIVER NEAR SAWYER, MI

LOCATION.--Lat 41°52'25", long 86°34'30", in SE1/4 sec.12, T.7 S., R.20 W., Berrien County, Hydrologic Unit 04040001, on right bank 10 ft downstream from bridge on Minnich Road, 1.3 mi southeast of Sawyer.

DRAINAGE AREA.--80.7 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1995 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 610 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	18	21	32	e27	74	32	51	100	60	76	15
2	16	20	21	36	e28	65	33	59	78	53	60	14
3	17	21	22	45	e29	59	33	50	64	53	51	14
4	23	20	24	43	e28	56	32	45	57	62	46	14
5	19	20	37	40	e28	52	31	43	84	52	42	14
6	17	20	44	37	e28	49	31	38	126	51	40	14
7	16	20	34	35	e27	46	33	36	79	55	47	13
8	16	20	30	33	e27	45	33	35	62	51	33	13
9	17	20	27	36	e28	44	54	39	51	47	30	14
10	18	20	27	42	e30	41	46	49	44	73	27	14
11	16	20	25	42	e29	40	43	46	40	88	25	18
12	16	19	25	38	e30	39	39	46	43	62	24	35
13	16	19	25	36	e29	38	37	39	61	56	23	25
14	18	19	34	33	e28	39	36	34	55	55	23	21
15	18	19	51	33	e28	40	34	32	74	47	21	23
16	17	19	66	32	e28	48	32	32	52	45	20	22
17	17	19	53	e31	e28	43	34	35	44	44	24	20
18	17	20	e40	e30	e29	40	34	36	40	42	25	19
19	17	20	40	e30	e30	40	36	114	37	44	22	18
20	16	21	40	e30	e28	46	85	84	36	45	21	18
21	17	20	e38	e29	e30	47	337	65	48	45	21	24
22	16	20	e37	e30	e48	44	206	56	39	41	30	22
23	17	23	e36	e30	e150	42	117	51	33	38	23	24
24	20	27	e34	e29	219	40	95	44	45	37	19	26
25	21	24	e33	e28	232	39	79	37	701	29	17	25
26	19	23	e32	e27	131	36	68	34	378	26	17	23
27	18	23	e31	e26	144	36	61	34	166	20	17	22
28	18	24	e31	e27	107	37	54	315	111	19	17	22
29	18	22	e31	e27	84	36	54	244	89	23	16	22
30	18	21	e32	e28	---	34	60	116	72	141	16	21
31	18	---	32	e28	---	33	---	89	---	121	15	---
TOTAL	543	621	1053	1023	1712	1368	1922	2028	2909	1635	888	589
MEAN	17.5	20.7	34.0	33.0	59.0	44.1	64.1	65.4	97.0	52.7	28.6	19.6
MAX	23	27	66	45	232	74	337	315	701	141	76	75
MIN	16	18	21	26	27	33	31	32	33	19	15	13
CFSM	22	26	42	41	73	55	79	81	120	65	35	24
IN.	25	29	49	47	79	63	89	93	134	75	41	27

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 2000, BY WATER YEAR (WY)

MEAN	35.5	78.1	79.1	138	126	120	125	146	99.4	57.5	37.0	25.8
MAX	62.0	134	174	229	292	228	196	449	213	127	51.5	38.5
(WY)	1997	1997	1997	1998	1997	1998	1999	1996	1996	1996	1995	1997
MIN	17.5	20.7	34.0	33.0	59.0	44.1	64.1	54.2	35.8	26.5	17.4	14.2
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	1998	1998	1999	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1995 - 2000
ANNUAL TOTAL	25011	16291	
ANNUAL MEAN	68.5	44.5	88.6
HIGHEST ANNUAL MEAN			119
LOWEST ANNUAL MEAN			44.5
HIGHEST DAILY MEAN	1200	701	2640
LOWEST DAILY MEAN	13	13	13
ANNUAL SEVEN-DAY MINIMUM	14	14	14
INSTANTANEOUS PEAK FLOW		884	3440
INSTANTANEOUS LOW FLOW		10.87	14.13
ANNUAL RUNOFF (CFSM)	.85	(a)12	12
ANNUAL RUNOFF (INCHES)	11.53	.55	1.10
10 PERCENT EXCEEDS	126	72	164
50 PERCENT EXCEEDS	33	33	47
90 PERCENT EXCEEDS	16	18	23

(a) Result of freezeup.

(b) Sept. 27, 1999; Jan. 17, 2000, result of freezeup.

(c) Estimated.

(a) Mar. 21, 1982, June 1, 5, 1989.  
(b) Gage height 5.82 ft, site and datum then in use.  
(c) Present site and datum.  
(d) Oct. 31, Nov. 1.  
(e) Estimated.  
(f) Aug. 9, 10, 11, 1964.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04096515 SOUTH BRANCH HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE1/4 SE1/4 sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft downstream from bridge on U.S. Highway 12, 1.0 mi downstream from Little Hog Creek, and 3.1 mi west of Allen.

DRAINAGE AREA.--48.7 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1969 to current year. Prior to October 1987, published as Hog Creek near Allen.

GAGE.--Water-stage recorder. Elevation of gage is 1,010 ft above sea level, from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	3.0	5.3	e9.8	e9.2	31	19	56	77	67	39	31
2	3.4	4.0	5.6	e10	e9.3	29	18	62	66	58	35	27
3	3.8	3.7	5.7	e11	e9.4	25	18	59	57	61	32	23
4	7.0	3.6	5.7	e12	e9.4	23	17	53	49	69	28	21
5	5.4	3.6	16	e11	e9.5	21	16	48	50	66	24	19
6	4.4	3.9	22	e11	e9.5	20	16	43	68	59	25	16
7	3.0	10	16	10	e9.5	19	17	38	73	51	25	14
8	2.9	12	12	e10	e9.5	19	30	35	69	44	22	12
9	3.2	4.1	11	11	e9.6	17	29	35	61	41	20	12
10	2.8	2.9	10	15	e9.6	16	26	44	52	41	18	15
11	2.2	3.0	9.5	14	e9.6	15	25	46	45	43	16	34
12	1.8	2.6	9.0	13	e9.6	14	24	48	49	39	15	57
13	2.0	2.6	12	e13	e9.6	14	23	58	66	35	13	69
14	3.2	2.8	11	e12	e9.6	14	21	58	94	31	13	67
15	2.8	2.6	14	e11	e9.6	17	20	52	128	28	12	63
16	2.9	2.6	16	e11	e9.7	28	19	46	130	26	11	55
17	3.6	2.7	e14	e10	e9.7	25	18	45	114	24	11	46
18	4.0	2.5	e13	e9.8	e9.8	21	17	47	97	21	12	38
19	3.6	2.7	e12	e9.7	e9.8	21	17	91	82	20	10	33
20	3.2	5.0	e12	e9.6	e9.9	27	50	164	70	18	9.1	29
21	2.7	4.9	e11	e9.5	e10	34	174	202	80	17	8.3	27
22	3.1	4.0	e11	e9.5	e10	32	308	186	91	15	7.7	24
23	4.0	3.7	e11	e9.4	e24	30	296	157	83	14	8.4	23
24	4.4	7.1	e10	e9.3	e31	27	245	128	72	13	8.8	26
25	3.8	6.8	e10	e9.3	32	27	194	101	90	12	8.1	25
26	3.3	8.5	e10	e9.2	29	25	151	79	122	12	8.1	23
27	2.9	6.6	e9.8	e9.2	42	24	116	66	132	11	31	21
28	2.8	4.4	e9.7	e9.1	41	24	88	73	114	13	49	19
29	2.7	4.7	e9.7	e9.1	34	24	71	95	93	33	49	17
30	2.8	5.2	e9.6	e9.0	---	22	61	104	78	43	42	15
31	3.1	---	e9.7	e9.0	---	20	---	93	---	45	36	---
TOTAL	105.2	135.8	343.3	325.5	449.4	705	2144	2412	2452	1070	646.5	901
MEAN	3.39	4.53	11.1	10.5	15.5	22.7	71.5	77.8	81.7	34.5	20.9	31.0
MAX	7.0	12	22	15	42	34	308	202	132	69	49	69
MIN	1.8	2.5	5.3	9.0	9.2	14	16	35	45	11	7.7	12
CFSM	.07	.09	.23	.22	.32	.47	1.47	1.60	1.68	.71	.43	.62
IN.	.08	.10	.26	.25	.34	.54	1.64	1.84	1.87	.82	.49	.69

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2000, BY WATER YEAR (WY)

	MEAN	20.8	32.9	42.8	48.4	53.1	85.6	81.0	54.3	47.6	21.8	18.1	17.8
MAX	75.0	110	80.2	159	112	220	163	114	159	62.4	67.9	61.3	61.3
(WY)	1987	1993	1991	1993	1976	1982	1978	1983	1989	1981	1981	1981	1981
MIN	3.39	4.53	8.77	7.11	13.5	22.7	34.3	20.1	4.18	1.55	1.86	1.93	1.93
(WY)	2000	2000	1977	1977	1972	2000	1971	1971	1988	1988	1988	1988	1988

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1970 - 2000

ANNUAL TOTAL	12488.0	11689.7	
ANNUAL MEAN	34.2	31.9	
HIGHEST ANNUAL MEAN			43.6
LOWEST ANNUAL MEAN			23.8
HIGHEST DAILY MEAN	434	308	629
LOWEST DAILY MEAN	1.4	1.8	.58
ANNUAL SEVEN-DAY MINIMUM	1.4	2.5	.84
INSTANTANEOUS PEAK FLOW		318	(a)664
INSTANTANEOUS PEAK STAGE		4.78	6.20
INSTANTANEOUS LOW FLOW		1.5	.48
ANNUAL RUNOFF (CFSM)	.70	.66	.90
ANNUAL RUNOFF (INCHES)	9.54	8.93	12.17
10 PERCENT EXCEEDS	70	73	94
50 PERCENT EXCEEDS	13	17	30
90 PERCENT EXCEEDS	2.7	3.7	6.9

(a) Gage height 6.0 ft, from floodmark.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04097187 LONG LAKE NEAR KALAMAZOO, MI

LOCATION.--Lat 42°11'45", long 85°31'03", in SW1/4 NE1/4 sec. 19, T.3 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, on east side of lake, 1.7 mi southeast of Portage, and 5 mi south of Kalamazoo.

DRAINAGE AREA.--6.59 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1958 to March 1963, December 1963 to December 1970, September 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is 847.59 ft above sea level (City of Portage bench mark). Prior to March 2000, nonrecording gage at different datums.

REMARKS.--The channel connecting Long Lake and Austin Lake is both an inlet and an outlet, depending on relative lake levels. Under natural conditions with fairly high water levels, flow will be from Long to Austin Lake. In recent years, the levels of Austin and West Lakes have been raised by water diverted from Gourdneck Creek plus water piped to Austin Lake from the nearby Pharmacia & Upjohn recharge ponds. Under these conditions flow has been from Austin to Long Lake. During the drought years of 1963-64, the channel was dry.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 8.68 ft, June 13-15, 1969, present datum; minimum, 2.63 ft, Apr. 7, 2000.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 4.57 ft, Sept. 12, 13; minimum, 2.63 ft, Apr. 7.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	2.70	3.21	4.17	4.38	4.46	4.46
2	---	---	---	---	---	---	2.70	3.24	4.18	4.37	4.48	4.45
3	---	---	---	---	---	---	2.70	3.25	4.18	4.42	4.48	4.44
4	---	---	---	---	---	---	2.69	3.26	4.17	4.42	4.47	4.42
5	---	---	---	---	---	---	2.67	3.28	4.19	4.42	4.47	4.39
6	---	---	---	---	---	---	2.66	3.29	4.20	4.48	4.51	4.37
7	---	---	---	---	---	---	2.65	3.29	4.20	4.46	4.51	4.36
8	---	---	---	---	---	---	2.71	3.30	4.20	4.47	4.50	4.35
9	---	---	---	---	---	---	2.70	3.37	4.19	4.48	4.49	4.35
10	---	---	---	---	---	---	2.69	3.48	4.19	4.50	4.48	4.44
11	---	---	---	---	---	---	2.69	3.48	4.18	4.50	4.46	4.52
12	---	---	---	---	---	---	2.68	3.55	4.22	4.49	4.45	4.56
13	---	---	---	---	---	---	2.67	3.58	4.28	4.48	4.44	4.54
14	---	---	---	---	---	---	2.69	3.56	4.29	4.47	4.43	4.54
15	---	---	---	---	---	---	2.71	3.56	4.30	4.45	4.42	4.54
16	---	---	---	---	---	---	2.72	3.57	4.29	4.44	4.40	4.52
17	---	---	---	---	---	---	2.74	3.59	4.28	4.43	4.41	4.51
18	---	---	---	---	---	---	2.75	3.69	4.27	4.41	4.41	4.49
19	---	---	---	---	---	---	2.79	3.94	4.27	4.40	4.39	4.48
20	---	---	---	---	---	---	2.96	3.97	4.27	4.39	4.37	4.48
21	---	---	---	---	---	---	3.07	3.98	4.32	4.39	4.36	4.48
22	---	---	---	---	---	---	2.80	3.09	3.99	4.31	4.37	4.35
23	---	---	---	---	---	---	2.79	3.10	4.00	4.30	4.36	4.39
24	---	---	---	---	---	---	2.79	3.11	4.01	4.32	4.35	4.38
25	---	---	---	---	---	---	2.78	3.11	4.00	4.41	4.34	4.37
26	---	---	---	---	---	---	2.76	3.11	3.99	4.41	4.33	4.40
27	---	---	---	---	---	---	2.76	3.12	4.01	4.41	4.33	4.50
28	---	---	---	---	---	---	2.75	3.14	4.12	4.40	4.33	4.49
29	---	---	---	---	---	---	2.74	3.15	4.15	4.40	4.37	4.48
30	---	---	---	---	---	---	2.72	3.16	4.15	4.38	4.44	4.47
31	---	---	---	---	---	---	2.71	---	4.16	---	4.46	---
MEAN	---	---	---	---	---	---	2.85	3.68	4.27	4.42	4.44	4.46
MAX	---	---	---	---	---	---	3.16	4.16	4.41	4.50	4.51	4.56
MIN	---	---	---	---	---	---	2.65	3.21	4.17	4.33	4.35	4.35

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04097188 AUSTIN LAKE NEAR KALAMAZOO, MI

LOCATION.--Lat 42°11'04", long 85°32'35", in NW1/4 sec. 24, T.3 S., R 11 W., Kalamazoo County, Hydrologic Unit 04050001, at entrance of connecting channel to Long Lake, 1.5 mi southeast of Portage, and 5.0 mi south of Kalamazoo.

DRAINAGE AREA.--14.2 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1944 to July 1950, April 1958 to March 1963, December 1963 to September 1979, September 1998 to current year.

GAGE.--Nonrecording gage. Datum of gage is 849.83 ft above sea level (City of Portage bench mark). Prior to September 1998, nonrecording gage at different datums.

REMARKS.--Staff gage read by observer. The principal inlet is the diversion canal from Gourdneck Creek which flows through West Lake into the northwest side of Austin Lake. At times, depending on relative lake levels, water will flow through a connecting channel from Long Lake into the northeast side of Austin Lake. At other times the flow will be reversed, or if both lake levels are low, there will be no flow. Inflow to Austin Lake is also supplemented at times by water discharge from the nearby Pharmacia & Upjohn recharge ponds. The outlet leaves the southeast end of the lake and flows south about 1.5 mi to Gourdneck Creek. Surface area is 1,050 acres. Established legal level is 855.64 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.04 ft, May 2-4, 1950, present datum; minimum observed, 2.55 ft, Oct. 20, Dec. 10, 1964, present datum.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 5.00 ft, May 30; minimum observed, 4.26 ft, Nov. 29 to Dec. 3.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.46	4.36	4.26	--	--	--	--	4.64	--	4.88	4.76	4.76
2	4.44	4.40	4.26	4.32	4.46	4.58	4.54	4.66	4.96	4.84	4.74	4.74
3	4.42	--	4.26	4.32	--	--	--	4.64	4.94	4.86	4.74	4.74
4	4.46	--	4.28	4.32	--	4.58	4.54	4.62	4.94	4.80	4.72	4.68
5	4.48	4.40	4.34	4.32	--	4.58	4.52	--	4.96	4.80	4.70	4.66
6	4.44	4.40	4.36	--	--	4.57	4.52	--	--	--	4.76	4.64
7	--	4.40	4.38	--	4.48	--	4.50	--	4.94	4.82	4.76	--
8	4.44	4.40	4.38	--	--	4.58	4.56	4.60	4.92	4.80	4.76	4.64
9	4.44	4.40	4.38	--	4.48	--	4.56	4.58	4.90	4.82	4.72	--
10	--	4.40	4.38	--	--	4.56	4.56	4.72	--	4.82	--	4.76
11	4.44	4.38	4.36	--	--	4.54	4.56	4.72	4.88	4.80	4.72	4.78
12	--	4.38	4.38	--	4.48	4.52	--	4.76	4.88	4.78	4.70	--
13	4.42	4.38	4.38	--	--	--	4.56	4.78	4.96	4.78	4.70	4.80
14	4.44	4.36	4.42	--	4.48	4.54	--	4.62	4.96	4.76	4.70	4.82
15	4.45	4.36	--	--	--	4.54	4.56	--	4.92	--	--	4.78
16	--	--	4.50	--	4.48	4.54	4.54	--	4.94	4.72	4.66	--
17	4.43	4.36	4.54	--	4.48	4.54	4.52	--	--	4.72	4.68	4.78
18	4.40	4.36	4.50	--	--	--	--	4.68	4.88	4.70	--	4.78
19	--	4.36	4.50	--	4.50	4.54	4.50	4.90	4.88	4.70	--	--
20	4.40	4.36	--	--	--	4.56	4.62	4.92	--	4.68	--	4.78
21	4.40	4.34	--	--	4.50	4.58	4.68	4.90	4.90	4.68	4.66	4.78
22	4.38	4.34	--	--	--	4.58	4.70	4.92	4.88	4.66	4.64	4.74
23	4.36	--	--	--	4.50	--	4.70	4.92	4.86	4.64	4.70	--
24	4.36	4.34	--	--	4.52	4.60	4.68	--	4.86	4.64	4.68	4.78
25	--	4.32	--	4.44	4.54	4.60	4.66	4.88	4.94	4.64	4.68	4.78
26	4.36	4.30	--	--	4.56	4.58	--	4.88	4.94	4.62	--	4.78
27	4.36	4.30	--	4.44	4.60	--	4.64	--	--	4.62	--	4.76
28	4.34	4.28	--	4.44	4.58	4.58	--	4.98	4.90	--	4.78	4.74
29	4.36	4.26	--	4.44	4.58	--	4.62	4.98	4.88	4.66	4.76	4.74
30	4.36	4.26	--	4.46	--	4.56	--	5.00	--	4.74	4.76	4.74
31	4.36	--	4.34	--	--	4.56	--	4.98	--	4.72	4.76	--

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°37'58", in SW1/4 SE1/4 sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft downstream from Rocky River, and at mile 112.

DRAINAGE AREA.--1,350 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1953 to September 1983, October 1992 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Flow regulated by powerplant upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft<sup>3</sup>/s, Apr. 27, 1950.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	520	370	470	527	462	1100	698	1900	2340	2470	834	919
2	324	372	465	533	465	1020	674	1800	2290	2200	986	558
3	237	375	464	539	501	908	698	1600	2230	2210	1060	518
4	333	483	435	558	513	839	674	1470	1980	2220	844	661
5	400	536	459	560	514	827	723	1530	1490	1900	753	611
6	389	396	624	606	510	855	401	1370	1740	2070	978	808
7	385	388	668	626	511	810	631	1330	1820	2120	932	481
8	394	388	641	632	493	720	793	1200	1670	2050	866	377
9	411	393	624	641	491	716	883	1240	1580	1870	859	379
10	410	392	593	617	493	703	866	1370	1390	1840	844	748
11	407	386	540	645	493	692	858	1550	1320	1700	822	1620
12	411	393	532	676	486	685	851	1680	1440	1620	780	1490
13	305	399	563	671	538	487	844	1770	1740	1520	728	1560
14	332	388	577	652	526	497	839	1710	2260	1450	450	1510
15	386	383	633	658	499	681	631	1670	2450	1040	392	1580
16	382	384	667	651	491	774	625	1640	2190	772	584	1440
17	377	385	656	577	490	728	736	1690	1560	849	593	1380
18	375	385	632	552	490	790	722	1600	1750	971	569	1420
19	357	393	645	549	491	825	730	2230	1670	833	554	1290
20	343	399	662	547	499	779	825	2250	1550	833	540	1200
21	330	397	543	507	533	847	1500	2600	1750	808	550	1170
22	353	400	523	495	574	895	2010	2830	1770	690	541	1140
23	332	490	532	527	612	885	2540	2750	2020	559	522	938
24	336	501	510	499	701	917	2460	2610	2270	688	485	949
25	362	555	522	495	744	917	2520	2370	2820	731	506	1030
26	373	517	516	488	881	726	2440	2280	2810	517	473	988
27	368	389	516	486	1160	744	2320	2150	3000	460	531	945
28	370	387	543	495	1150	833	1780	2250	3230	662	986	718
29	368	388	595	485	1100	818	1900	2290	3070	741	682	791
30	363	477	562	464	---	785	1870	2340	2860	810	760	788
31	359	---	527	462	---	732	---	2380	---	800	947	---
TOTAL	11392	12489	17439	17420	17411	24535	36042	59450	62060	40004	21951	30007
MEAN	367	416	563	562	600	791	1201	1918	2069	1290	708	1000
MAX	520	555	668	676	1160	1100	2540	2830	3230	2470	1060	1620
MIN	237	370	435	462	462	487	401	1200	1320	460	392	377
CFSM	.27	.31	.42	.42	.44	.59	.89	1.42	1.53	.96	.52	.74
IN.	.31	.34	.48	.48	.48	.68	.99	1.64	1.71	1.10	.60	.83

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2000, BY WATER YEAR (WY)

	MEAN	721	912	1099	1208	1327	1944	2032	1613	1184	804	649	637
MAX	1865	2582	2053	3493	2716	3969	3320	2870	2587	1780	1639	1628	
(WY)	1994	1993	1983	1993	1968	1982	1982	1983	1980	1978	1981	1980	
MIN	218	294	288	328	328	488	793	650	286	243	187	199	
(WY)	1964	1965	1964	1963	1963	1964	1964	1964	1964	1964	1964	1964	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1953 - 2000

ANNUAL TOTAL	360365											
ANNUAL MEAN	987											
HIGHEST ANNUAL MEAN										1180		
LOWEST ANNUAL MEAN										1850		1993
HIGHEST DAILY MEAN										365		1964
LOWEST DAILY MEAN										7810		Mar 21 1982
ANNUAL SEVEN-DAY MINIMUM	3740						3230		Jun 28	78		Sep 12 1964
INSTANTANEOUS PEAK FLOW	201						237		Oct 3	126		Sep 2 1964
INSTANTANEOUS PEAK STAGE	256						345		Oct 19	8180		Mar 21 1982
ANNUAL RUNOFF (CFSM)							3350		Jun 27	10.69		Mar 21 1982
ANNUAL RUNOFF (INCHES)							6.65		Jun 27	.87		
10 PERCENT EXCEEDS							.71			11.88		
50 PERCENT EXCEEDS	2040						2080			2290		
90 PERCENT EXCEEDS	644						689			956		
	332						388			401		

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW1/4 SW1/4 sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft upstream from bridge on State Highway 66, 3.0 mi upstream from unnamed tributary, and 3.0 mi southeast of Nottawa.

DRAINAGE AREA.--106 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since 1987, some diversion by pumping for sprinkler irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	37	40	47	e44	92	67	116	156	125	75	54
2	43	39	39	49	e45	87	66	122	145	117	76	53
3	43	39	40	52	e46	83	66	122	134	151	76	52
4	47	40	40	56	e47	80	65	117	126	181	73	50
5	47	40	47	56	e48	77	66	112	125	196	70	47
6	45	39	58	56	e47	74	64	106	133	198	71	43
7	43	39	59	55	e46	71	66	100	133	181	70	42
8	42	39	58	53	e45	70	80	97	127	160	69	42
9	42	39	55	55	e46	68	86	102	118	143	67	41
10	41	40	54	60	46	66	86	117	110	135	64	60
11	40	40	51	64	47	65	84	120	105	131	60	74
12	38	39	50	63	e47	63	81	120	110	124	55	88
13	39	39	48	62	48	63	77	131	114	117	52	93
14	40	40	52	e60	47	64	74	129	116	109	47	91
15	40	44	60	57	47	65	71	119	119	103	44	86
16	40	44	67	57	47	75	69	112	117	99	41	80
17	41	43	67	e54	47	77	67	107	113	93	42	75
18	41	42	64	52	47	76	66	111	109	88	44	71
19	40	42	60	e52	49	75	66	159	103	82	46	67
20	39	43	60	52	48	80	98	192	99	76	47	64
21	38	43	58	e52	e47	85	149	210	130	73	47	64
22	39	43	54	e52	50	86	181	196	131	70	47	62
23	39	43	53	e51	61	85	199	176	120	67	45	62
24	38	43	e52	e50	76	82	186	160	111	63	42	63
25	37	42	50	e46	87	79	167	146	141	60	42	63
26	36	42	48	e43	92	76	151	135	162	55	40	63
27	36	42	48	e48	100	73	139	127	167	50	40	62
28	35	41	e48	e48	102	73	130	136	161	53	46	61
29	36	40	48	e46	98	72	123	147	150	54	55	61
30	37	40	47	e45	---	70	117	162	137	64	57	61
31	37	---	47	e44	---	69	---	165	---	73	56	---
TOTAL	1245	1226	1622	1637	1647	2321	3007	4171	3822	3291	1706	1895
MEAN	40.2	40.9	52.3	52.8	56.8	74.9	100	135	127	106	55.0	63.2
MAX	47	44	67	64	102	92	199	210	167	198	76	93
MIN	35	37	39	43	44	63	64	97	99	50	40	41
CFSM	.38	.39	.49	.50	.54	.71	.95	1.27	1.20	1.00	.52	.60
IN.	.44	.43	.57	.57	.58	.81	1.06	1.46	1.34	1.15	.60	.67

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 2000, BY WATER YEAR (WY)

	MEAN	63.5	82.9	105	109	114	152	158	121	99.7	65.3	53.9	54.8
MAX	150	222	177	258	218	336	259	226	254	144	148	148	135
(WY)	1987	1993	1983	1993	1968	1982	1978	1983	1989	1986	1981	1997	
MIN	17.2	22.9	25.2	29.7	29.1	47.2	75.6	58.7	32.9	13.3	15.8	14.1	
(WY)	1965	1965	1964	1963	1963	1964	1964	1963	1964	1988	1964	1964	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1963 - 2000
ANNUAL TOTAL	34032	27590	
ANNUAL MEAN	93.2	75.4	98.2
HIGHEST ANNUAL MEAN			153
LOWEST ANNUAL MEAN			33.5
HIGHEST DAILY MEAN	352	210	782
LOWEST DAILY MEAN	32	35	5.7
ANNUAL SEVEN-DAY MINIMUM	32	36	7.9
INSTANTANEOUS PEAK FLOW		211	797
INSTANTANEOUS PEAK STAGE		4.38	6.30
INSTANTANEOUS LOW FLOW		35	5.4
ANNUAL RUNOFF (CFSM)	.88	.71	.93
ANNUAL RUNOFF (INCHES)	11.94	9.68	12.58
10 PERCENT EXCEEDS	172	133	175
50 PERCENT EXCEEDS	74	62	84
90 PERCENT EXCEEDS	36	40	35

(a) Oct. 27-29.

(b) Aug. 4, 5, 1988.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW1/4 sec.6, T.8 S., R.12 W., St. Joseph County, Hydrologic Unit 04050001, on right bank 575 ft upstream from bridge on U.S. Highway 12 in Mottville, 0.4 mi downstream from Indiana Michigan Power Co. hydroelectric plant, 4 mi upstream from Pigeon River, and at mile 96.

DRAINAGE AREA.--1,866 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft above sea level (Indiana Michigan Power Co. bench mark). Prior to Oct. 1, 1951, at site 0.4 mi upstream at datum 4.2 ft higher.

REMARKS.--Records good. Flow regulated by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	779	620	724	819	738	1490	1030	2400	2880	3300	1170	1160
2	602	625	717	832	742	1400	999	2420	2860	2850	1350	901
3	509	613	750	877	766	1290	1010	2270	2770	3080	1370	728
4	599	675	726	855	796	1210	973	1970	2680	3040	1260	944
5	672	785	847	852	794	1200	982	2020	2110	2760	1100	836
6	645	590	959	879	785	1160	735	1850	2200	2670	1330	1050
7	669	643	981	914	780	1170	1020	1770	2360	2790	1330	757
8	657	635	984	891	764	1020	1150	1580	2250	2790	1250	659
9	666	604	943	921	779	1060	1270	1710	2100	2650	1220	631
10	652	635	931	918	777	1040	1230	1810	1830	2580	1170	1130
11	607	605	855	951	792	976	1230	1990	1750	2420	1100	1990
12	663	633	849	970	754	990	1220	2150	1910	2280	1080	2010
13	525	664	874	953	823	857	1180	2320	2180	2110	998	2050
14	574	687	941	925	798	812	1170	2240	2460	2000	766	2010
15	651	692	985	934	769	1020	1030	2210	3100	1600	696	2050
16	631	649	1080	937	776	1140	965	2090	2830	1270	792	1920
17	616	673	1000	825	759	1080	1020	2110	2310	1430	878	1800
18	607	644	963	792	797	1110	1040	2020	2120	1620	890	1800
19	631	695	949	835	767	1230	1120	2660	2160	1010	824	1750
20	586	683	1020	848	783	1260	1290	2840	1960	1070	804	1560
21	561	690	883	769	788	1260	1920	2930	2320	1170	816	1530
22	595	680	780	750	874	1340	2360	3470	2350	1070	805	1500
23	599	741	824	813	944	1320	2960	3360	2480	854	821	1320
24	575	806	804	796	1060	1260	3100	3260	2710	978	778	1270
25	585	826	848	796	1130	1250	3080	2980	3470	1020	732	1360
26	601	816	818	810	1240	1100	2930	2870	3660	815	737	1290
27	603	654	932	771	1640	1080	2950	2710	3520	700	730	1270
28	620	661	821	786	1560	1140	2540	2920	3890	880	1180	1040
29	647	643	873	762	1480	1150	2350	2950	3800	1020	949	1140
30	622	757	868	748	---	1100	2410	2910	3540	1180	974	1130
31	625	---	814	745	---	1060	---	2920	---	1170	1160	---
TOTAL	19174	20324	27343	26274	26255	35575	48264	75710	78560	56177	31060	40586
MEAN	619	677	882	848	905	1148	1609	2442	2619	1812	1002	1353
MAX	779	826	1080	970	1640	1490	3100	3470	3890	3300	1370	2050
MIN	509	590	717	745	738	812	735	1580	1750	700	696	631
CFSM	.33	.36	.47	.45	.49	.61	.86	1.31	1.40	.97	.54	.73
IN.	.38	.41	.55	.52	.52	.71	.96	1.51	1.57	1.12	.62	.81

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 2000, BY WATER YEAR (WY)

	MEAN	1097	1333	1559	1741	1869	2550	2682	2134	1685	1173	955	960
MAX	3290	3378	4065	4589	3451	5335	7646	5009	5004	2953	2413	2286	
(WY)	1987	1993	1928	1993	1968	1982	1950	1943	1989	1937	1981	1980	
MIN	372	483	507	531	505	751	904	786	509	407	335	357	
(WY)	1964	1965	1964	1963	1963	1964	1931	1931	1964	1988	1964	1964	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1924 - 2000

ANNUAL TOTAL	518237		485302										
ANNUAL MEAN	1420		1326							(a)1646			
HIGHEST ANNUAL MEAN										2856		1950	
LOWEST ANNUAL MEAN										580		1964	
HIGHEST DAILY MEAN	4720				Apr 26		3890		Jun 28	10700		Jun 4 1989	
LOWEST DAILY MEAN	344				Sep 26		509		Oct 3	39		Oct 19 1963	
ANNUAL SEVEN-DAY MINIMUM	433				Sep 20		586		Oct 20	278		Aug 1 1964	
INSTANTANEOUS PEAK FLOW							4270		Jun 28	(b)11400		Jun 4 1989	
INSTANTANEOUS PEAK STAGE							5.97		Jun 28	(c)10.76		Apr 27 1950	
ANNUAL RUNOFF (CFSM)	.76		.71							.88			
ANNUAL RUNOFF (INCHES)	10.33		9.67							11.98			
10 PERCENT EXCEEDS	2770		2690							3000			
50 PERCENT EXCEEDS	975		1010							1390			
90 PERCENT EXCEEDS	571		648							639			

(a) Does not include water year 1924.

(b) Gage height 10.41 ft.

(c) Present datum.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW1/4 NE1/4 sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft downstream from Elkhart River, 200 ft upstream from Main Street bridge in Elkhart, IN, 2,000 ft downstream from Christiana Creek, 0.5 mi downstream from Elkhart Hydroelectric Plant, and at mile 76.5.

DRAINAGE AREA.--3,370 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mi downstream at different datum from September 1924 to March 1926 are available from the Indiana District Office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft above sea level.

REMARKS.--Records good. Flow regulated by Elkhart Hydroelectric Plant.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1480	1230	1430	1670	1540	2900	2020	3810	4200	4770	2030	1850
2	1360	1370	1420	1670	1520	2780	2040	3870	4150	4250	2070	1650
3	1160	1230	1420	1740	1550	2680	1960	3670	4030	4290	2190	1350
4	1340	1310	1420	1750	1630	2520	1960	3360	3920	4340	2110	1610
5	1430	1450	1640	1780	1590	2540	1920	3250	3640	4060	1860	1420
6	1440	1370	1850	1730	1580	2430	1800	3100	3630	3800	2040	1550
7	1350	1290	1900	1790	1580	2330	1830	2910	3650	3850	2250	1470
8	1370	1290	1860	1740	1560	2060	2270	2750	3490	3820	2190	1240
9	1360	1270	1800	1810	1580	2060	2350	2770	3290	3700	2160	1250
10	1350	1320	1770	1860	1590	2040	2280	2990	3000	3660	2020	1580
11	1370	1280	1700	1850	1610	2090	2230	3070	2840	3520	1920	2470
12	1320	1280	1670	1900	1560	2040	2200	3220	3070	3280	1860	2870
13	1340	1320	1650	1840	1620	1910	2160	3370	3360	3090	1770	3110
14	1170	1370	1860	1780	1650	1810	2110	3300	3720	2930	1610	1250
15	1300	1340	1970	1760	1550	1980	2040	3180	4300	2690	1400	2880
16	1310	1330	2120	1800	1590	2310	1810	3070	4150	2240	1440	2770
17	1340	1320	2080	1620	1560	2180	1960	3070	3740	2110	1610	2680
18	1300	1330	1940	1560	1600	2120	1940	3080	3170	2440	1590	2540
19	1260	1340	1820	1650	1580	2250	2030	3660	3280	2060	1560	2500
20	1270	1400	1980	1720	1570	2330	2590	4170	3110	1760	1500	2300
21	1210	1380	1830	1450	1560	2350	4590	4080	3920	1940	1470	2240
22	1250	1350	1490	1370	1690	2450	4790	4510	4190	1890	1450	2150
23	1250	1380	1590	1620	1930	2390	4740	4510	3940	1630	1450	2150
24	1210	1520	1560	1500	2420	2310	5030	4430	3930	1630	1410	1950
25	1200	1550	1610	1530	2510	2320	4760	4130	5650	1680	1340	2040
26	1260	1530	1640	1560	2510	2220	4650	3950	5970	1600	1420	1980
27	1250	1390	1910	1470	3090	2030	4630	3780	5450	1370	1300	1950
28	1240	1360	1730	1500	3170	2240	4320	4300	5530	1560	1710	1750
29	1270	1370	1940	1530	2960	2170	3900	4510	5380	1720	1780	1750
30	1250	1370	1810	1530	---	2150	3880	4320	5040	1920	1590	1780
31	1270	---	1720	1560	---	2100	---	4260	---	1910	1760	---
TOTAL	40280	40640	54130	51640	53450	70090	86790	112450	120740	85510	53860	61900
MEAN	1299	1355	1746	1666	1843	2261	2893	3627	4025	2758	1737	2063
MAX	1480	1550	2120	1900	3170	2900	5030	4510	5970	4770	2250	3110
MIN	1160	1230	1420	1370	1520	1810	1800	2750	2840	1370	1300	1240
CFSM	.39	.40	.52	.49	.55	.67	.86	1.08	1.19	.82	.52	.61
IN.	.44	.45	.60	.57	.59	.77	.96	1.24	1.33	.94	.59	.69

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 2000, BY WATER YEAR (WY)

	MEAN	2181	2619	3183	3611	3860	5080	5208	4114	3275	2386	1970	1897
MAX	5752	5883	5795	9270	7039	10760	12690	7725	7535	4409	4180	3855	
(WY)	1987	1993	1991	1993	1968	1982	1950	1956	1989	1968	1981	1981	
MIN	791	856	958	1127	1120	1679	2633	1911	1280	898	737	721	
(WY)	1964	1965	1964	1964	1963	1964	1958	1958	1988	1988	1964	1964	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1948 - 2001

ANNUAL TOTAL	1026222	831480		
ANNUAL MEAN	2812	2272		
HIGHEST ANNUAL MEAN			3278	
LOWEST ANNUAL MEAN			5264	1957
HIGHEST DAILY MEAN	10000	5970	18500	Mar 21 1987
LOWEST DAILY MEAN	856	1160	336	Aug 5 1964
ANNUAL SEVEN-DAY MINIMUM	953	1230	561	Aug 2 1964
INSTANTANEOUS PEAK FLOW		6360	18800	Feb 27 1985
INSTANTANEOUS PEAK STAGE		21.51	27.91	Mar 21 1982
ANNUAL RUNOFF (CFSM)	.83	.67	.97	
ANNUAL RUNOFF (INCHES)	11.33	9.18	13.22	
10 PERCENT EXCEEDS	5520	3940	5820	
50 PERCENT EXCEEDS	1880	1900	2790	
90 PERCENT EXCEEDS	1210	1340	1390	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04101500 ST. JOSEPH RIVER AT NILES, MI

LOCATION.--Lat 41°49'45", long 86°15'35", in SW1/4 sec.26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft upstream from Main Street Bridge in Niles, 0.6 mi downstream from dam at French Paper Co., 1.3 mi upstream from Dowagiac River, and at mile 44.

DRAINAGE AREA.--3,666 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft above sea level. Prior to Oct. 1, 1968, at datum 2.00 ft higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft upstream from present site (gage heights referred to sea level datum). Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi downstream from base gage at different datum. Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi downstream from base gage at same datum.

REMARKS.--Records good. Flow regulated by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1740	1650	1800	1990	1800	3480	2400	4510	4950	5450	2480	2130
2	1750	1750	1760	1960	1790	3450	2400	4590	4780	5020	2540	2040
3	1540	1660	1510	2070	1790	3240	2400	4360	4720	5010	2710	1720
4	1690	1560	1610	2040	1840	3090	2320	4010	4540	5020	2660	1510
5	1700	1660	2150	2100	1890	3070	2300	3780	4620	4810	2480	1790
6	1790	1790	2250	2030	1840	2910	2230	3710	4730	4500	2420	1540
7	1780	1540	2260	2080	1850	2830	2220	3440	4320	4420	3000	1890
8	1590	1560	2240	2060	1840	2580	2790	3340	4170	4450	2630	1460
9	1720	1600	2080	2190	1830	2430	2770	3310	3880	4320	2640	1360
10	1630	1580	2150	2180	1910	2450	2860	3630	3590	4370	2340	1640
11	1560	1550	2010	2210	1890	2480	2720	3610	3310	4290	2370	2740
12	1630	1550	1950	2260	1880	2420	2640	3690	3710	3940	2190	3480
13	e1600	1540	2000	2220	1890	2430	2650	4100	4610	3720	2090	3430
14	e1560	1640	2310	2160	1970	2180	2480	3950	4730	3490	1820	3530
15	e1550	1660	2370	2120	1880	2250	2590	3780	4880	3330	1600	3310
16	1550	1620	2510	2130	1810	2800	2270	3770	4970	2800	1600	3250
17	1660	1530	2520	2040	1850	2660	2360	3600	4600	2520	1770	3050
18	1580	1620	2380	1880	1870	2550	2330	3770	3790	2970	1760	2960
19	1560	1590	2260	1890	1930	2640	2450	4100	3880	2750	1760	2980
20	1540	1670	2270	2040	1840	2790	3290	4760	3690	2050	1690	2810
21	1530	1650	2250	1760	1860	2830	5800	4760	4720	2400	1670	2650
22	1470	1610	1970	1590	1960	2920	6070	4970	5380	2370	1700	2590
23	1560	1780	1810	1710	2220	2880	5440	5170	4800	2140	1620	2580
24	1540	1800	1820	1960	2960	2830	5980	5060	4670	2010	1530	2400
25	1500	1780	1850	1770	3100	2730	5500	4830	6670	2110	1400	2490
26	1490	1640	1860	1800	3100	2690	5410	4570	7140	1980	1520	2320
27	1550	1690	2110	1760	3650	2430	5290	4450	6580	1900	1500	2330
28	1530	1690	2160	1530	4020	2630	5100	5290	6230	1700	1730	2270
29	1570	1580	2140	1730	3690	2660	4530	5580	6200	2170	2080	2060
30	1500	1610	2150	1830	---	2540	4550	5150	5770	2450	1780	2120
31	1480	---	2060	1890	---	2530	---	4930	---	2550	1880	---
TOTAL	49440	49060	64570	60980	63750	84400	104140	132570	144630	103010	62960	72430
MEAN	1595	1635	2083	1967	2198	2723	3471	4276	4821	3323	2031	2414
MAX	1790	1800	2520	2260	4020	3480	6070	5580	7140	5450	3000	3530
MIN	1470	1530	1510	1530	1790	2180	2220	3310	3310	1700	1400	1360
CFSM	.44	.45	.57	.54	.60	.74	.95	1.17	1.32	.91	.55	.66
IN.	.50	.50	.66	.62	.65	.86	1.06	1.35	1.47	1.05	.64	.73

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	2337	2739	3167	3617	3941	5246	5472	4423	3513	2554	2132	2061
MAX	6217	6564	6689	9810	7371	11560	13590	10760	8176	4989	4497	4103	
(WY)	1987	1993	1991	1993	1968	1982	1950	1943	1989	1981	1981	1981	
MIN	1056	932	1131	1239	1196	1857	2164	1579	1254	1033	828	885	
(WY)	1964	1965	1964	1964	1964	1964	1931	1931	1934	1934	1941	1941	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1931 - 2000
ANNUAL TOTAL	1217302	991940	
ANNUAL MEAN	3335	2710	3429
HIGHEST ANNUAL MEAN			5718
LOWEST ANNUAL MEAN			1464
HIGHEST DAILY MEAN	12400	7140	19800
LOWEST DAILY MEAN	962	1360	420
ANNUAL SEVEN-DAY MINIMUM	1200	1520	728
INSTANTANEOUS PEAK FLOW		7450	20200
INSTANTANEOUS PEAK STAGE		8.43	(a)15.10
ANNUAL RUNOFF (CFSM)	.91	.74	.94
ANNUAL RUNOFF (INCHES)	12.35	10.07	12.71
10 PERCENT EXCEEDS	6440	4730	6140
50 PERCENT EXCEEDS	2270	2260	2840
90 PERCENT EXCEEDS	1490	1580	1500

(a) Present datum.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'48", long 86°12'47", in SE1/4 sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft downstream from bridge on Indian Lake Road, 0.3 mi west of Sumnerville.

DRAINAGE AREA.--255 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by millpond and lake-level control dam downstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	131	153	161	202	185	290	193	240	311	218	289	122
2	130	179	161	218	181	268	195	274	273	204	266	123
3	134	186	164	254	188	253	198	244	249	523	247	124
4	157	182	177	254	189	243	193	231	236	496	222	127
5	150	177	236	252	186	236	191	220	258	377	207	125
6	146	170	300	242	182	229	187	211	303	519	217	122
7	142	166	263	233	186	223	193	203	256	518	231	117
8	141	164	241	223	181	219	253	198	235	406	213	116
9	144	162	226	248	186	214	246	230	217	354	207	119
10	144	160	221	277	191	208	230	297	202	339	200	217
11	142	158	211	278	198	205	228	274	193	344	191	289
12	139	156	206	259	193	201	220	279	229	303	182	361
13	140	156	203	246	194	200	211	264	343	276	173	273
14	144	155	235	231	189	207	204	237	287	253	169	248
15	145	153	299	223	186	209	199	219	266	234	154	236
16	145	153	348	218	186	259	194	215	241	221	146	200
17	145	158	323	204	185	241	210	225	223	211	159	175
18	145	160	281	205	189	226	220	231	211	202	180	161
19	145	164	255	203	194	223	226	565	203	191	169	e150
20	145	173	253	206	192	248	359	495	194	183	163	e160
21	145	169	246	197	188	251	586	391	222	179	161	e170
22	144	167	232	193	211	240	512	337	206	175	156	e160
23	150	168	225	208	311	231	406	311	192	168	161	e200
24	169	180	215	195	386	224	357	278	191	166	157	e290
25	161	175	212	185	391	219	311	245	490	162	147	e230
26	157	171	208	187	346	208	282	227	405	159	142	e200
27	154	168	205	170	393	208	262	223	319	160	146	e180
28	153	164	202	183	354	207	247	480	280	161	143	e170
29	152	162	203	178	313	203	234	479	262	174	137	e160
30	152	162	206	183	---	200	225	371	239	297	133	e150
31	151	---	204	186	---	196	---	326	---	361	128	---
TOTAL	4542	4971	7122	6741	6654	6989	7772	9020	7736	8534	5596	5475
MEAN	147	166	230	217	229	225	259	291	258	275	181	182
MAX	169	186	348	278	393	290	586	565	490	523	289	361
MIN	130	153	161	170	181	196	187	198	191	159	128	116
CFSM	.57	.65	.90	.85	.90	.88	1.02	1.14	1.01	1.08	.71	.72
IN.	.66	.73	1.04	.98	.97	1.02	1.13	1.32	1.13	1.24	.82	.80

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2000, BY WATER YEAR (WY)

	MEAN	255	305	328	318	335	405	402	331	271	220	195	210
MAX	530	490	513	548	508	629	629	552	490	414	333	326	401
(WY)	1987	1991	1992	1993	1985	1985	1993	1981	1996	1978	1992	1993	1993
MIN	132	166	179	166	177	225	259	205	142	133	101	112	112
(WY)	1964	2000	1964	1963	1963	2000	2000	1964	1964	1988	1964	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1961 - 2000

ANNUAL TOTAL	87982												
ANNUAL MEAN	241												
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	1070												
LOWEST DAILY MEAN	96												
ANNUAL SEVEN-DAY MINIMUM	99												
INSTANTANEOUS PEAK FLOW													
INSTANTANEOUS PEAK STAGE													
INSTANTANEOUS LOW FLOW													
ANNUAL RUNOFF (CFSM)	.95												
ANNUAL RUNOFF (INCHES)	12.84												
10 PERCENT EXCEEDS	380												
50 PERCENT EXCEEDS	212												
90 PERCENT EXCEEDS	116												

(a) Result of regulation.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW1/4 SE1/4 sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft upstream from bridge on Coloma Road, 0.8 mi east of Riverside.

DRAINAGE AREA.--390 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft above sea level. May 10, 1966 to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation, principally during low flow, caused by paper mill upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	209	238	237	e270	e260	479	292	390	703	307	330	209
2	226	241	236	273	e260	450	284	405	738	305	330	203
3	229	240	233	302	e250	409	275	402	696	359	287	200
4	226	246	240	314	e260	375	279	409	602	390	252	197
5	220	254	282	325	e270	355	283	401	528	362	251	198
6	225	254	337	332	e260	336	276	367	499	369	264	204
7	239	247	343	325	e260	321	269	345	473	404	265	197
8	225	243	345	311	e260	316	306	323	449	390	264	189
9	220	240	345	304	e260	315	337	345	422	380	270	197
10	218	238	337	341	e250	312	362	388	388	384	261	219
11	227	235	311	359	e270	301	378	401	364	387	252	267
12	221	231	293	353	277	294	378	446	349	381	228	397
13	213	235	278	352	281	289	357	545	376	361	228	421
14	216	236	282	338	278	287	344	629	422	327	226	404
15	220	232	310	317	274	289	330	583	479	292	215	394
16	227	227	354	301	273	314	309	544	484	280	217	363
17	234	228	375	287	274	331	316	536	476	275	218	341
18	230	233	371	e270	273	338	349	515	431	254	229	321
19	225	237	362	e260	276	334	368	663	377	249	233	283
20	225	237	348	e250	280	328	453	1200	338	234	237	273
21	226	237	317	e270	281	338	592	1120	354	236	228	295
22	224	245	318	e280	290	355	737	1230	347	239	219	287
23	226	247	e330	e280	352	368	748	1400	356	232	216	344
24	238	244	e300	e270	404	351	757	1190	354	223	227	378
25	239	240	e280	e260	457	336	827	971	370	219	254	377
26	240	254	e270	e260	484	330	831	807	397	218	226	383
27	240	254	e270	e250	498	330	725	672	398	218	215	361
28	236	244	e260	e250	514	319	582	626	398	227	224	324
29	234	238	e260	e240	506	306	465	695	382	229	223	300
30	234	239	e270	e250	---	306	402	727	326	282	218	288
31	236	---	e270	e260	---	299	---	693	---	360	213	---
TOTAL	7048	7214	9364	9054	9132	10411	13211	19968	13276	9373	7520	8814
MEAN	227	240	302	292	315	336	440	644	443	302	243	294
MAX	240	254	375	359	514	479	831	1400	738	404	330	421
MIN	209	227	233	240	250	287	269	323	326	218	213	189
CFSM	.58	.62	.77	.75	.81	.86	1.13	1.65	1.13	.78	.62	.75
IN.	.67	.69	.89	.86	.87	.99	1.26	1.90	1.27	.89	.72	.84

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	374	440	503	509	539	670	645	506	401	318	282	300
MAX	1217	826	906	1038	1004	1234	961	799	686	581	557	569	
(WY)	1987	1989	1991	1952	1997	1979	1985	1974	1969	1982	1980	1975	
MIN	178	223	232	226	256	336	361	287	200	180	163	158	
(WY)	1964	1954	1959	1959	1963	2000	1958	1958	1964	1963	1964	1963	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1952 - 2000
ANNUAL TOTAL	130388	124385	
ANNUAL MEAN	357	340	457
HIGHEST ANNUAL MEAN			606
LOWEST ANNUAL MEAN			273
HIGHEST DAILY MEAN	1500	1400	3460
LOWEST DAILY MEAN	172	189	120
ANNUAL SEVEN-DAY MINIMUM	178	197	134
INSTANTANEOUS PEAK FLOW		1450	3580
INSTANTANEOUS PEAK STAGE		8.94	10.90
INSTANTANEOUS LOW FLOW		187	99
ANNUAL RUNOFF (CFSM)	.92	.87	1.17
ANNUAL RUNOFF (INCHES)	12.44	11.86	15.92
10 PERCENT EXCEEDS	550	488	750
50 PERCENT EXCEEDS	282	292	400
90 PERCENT EXCEEDS	196	225	230

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW1/4 sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft upstream from bridge on 66th Street, 4.9 mi northwest of Bangor.

DRAINAGE AREA.--83.6 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1966 to current year. Prior to October 1981, published as Black River near Bangor.

REVISED RECORDS.--WDR MI-81-1: 1973-75(M), 1979(M).

GAGE.--Water-stage recorder. Elevation of gage is 610 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation caused by mills upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	25	27	36	e30	78	45	75	175	44	40	24
2	26	27	27	38	e31	71	45	89	149	41	36	24
3	27	29	28	48	e31	66	44	82	129	59	32	25
4	30	28	29	48	e32	61	44	73	111	58	31	25
5	27	27	46	47	e32	56	42	66	104	54	31	25
6	26	27	69	45	e31	53	41	61	106	70	36	23
7	26	26	51	43	e32	51	42	57	98	79	35	22
8	27	27	43	40	e32	49	61	53	90	63	34	24
9	27	27	38	46	e32	47	76	68	81	77	33	23
10	28	28	36	62	e33	46	77	103	71	88	33	59
11	37	28	34	65	e33	45	74	95	65	86	32	90
12	37	28	32	57	e33	43	73	128	74	72	31	190
13	33	27	31	52	e34	42	69	263	93	60	30	128
14	33	27	34	47	e34	42	64	191	114	52	30	101
15	31	26	45	44	34	43	59	133	136	46	29	104
16	30	27	61	43	35	48	55	108	111	43	28	94
17	29	26	58	e41	35	49	52	103	94	40	31	75
18	29	27	48	e40	36	48	59	151	83	38	32	61
19	28	27	e44	e39	36	47	67	705	72	36	29	51
20	29	28	40	e38	36	51	233	669	65	34	27	46
21	29	28	40	e37	36	58	420	456	70	34	27	61
22	28	28	e39	e36	41	59	371	354	65	33	27	71
23	28	28	e39	e35	86	58	264	290	59	32	35	186
24	30	31	e38	e34	100	56	208	232	54	31	30	163
25	29	30	e38	e33	109	57	171	176	61	30	27	129
26	28	29	e38	e32	101	56	133	131	61	30	26	104
27	27	28	e37	e31	101	56	109	113	59	28	27	90
28	26	28	e37	e31	97	55	96	348	53	32	26	77
29	25	27	e37	e30	87	52	89	469	50	32	26	65
30	25	28	e36	e30	---	50	80	316	47	37	26	56
31	25	---	e36	e30	---	47	---	226	---	43	24	---
TOTAL	885	827	1236	1278	1420	1640	3263	6384	2600	1502	941	2216
MEAN	28.5	27.6	39.9	41.2	49.0	52.9	109	206	86.7	48.5	30.4	73.9
MAX	37	31	69	65	109	78	420	705	175	88	40	190
MIN	25	25	27	30	30	42	41	53	47	28	24	22
CFSM	.34	.33	.48	.49	.59	.63	1.30	2.46	1.04	.58	.36	.88
IN.	.39	.37	.55	.57	.63	.73	1.45	2.84	1.16	.67	.42	.99

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2000, BY WATER YEAR (WY)

MEAN	65.8	93.1	127	123	140	182	165	105	86.6	58.7	44.5	58.1
MAX	362	282	272	244	377	389	327	206	261	181	141	379
(WY)	1987	1991	1983	1973	1997	1979	1975	2000	1997	1986	1980	1976
MIN	28.5	27.6	39.9	41.2	49.0	52.9	68.9	44.4	31.7	28.4	22.5	20.1
(WY)	2000	2000	2000	2000	2000	2000	1971	1971	1971	1988	1999	1979

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1966 - 2000
ANNUAL TOTAL	21795	24192	
ANNUAL MEAN	59.7	66.1	104
HIGHEST ANNUAL MEAN			134
LOWEST ANNUAL MEAN			61.2
HIGHEST DAILY MEAN	741	705	1810
LOWEST DAILY MEAN	18	22	18
ANNUAL SEVEN-DAY MINIMUM	19	24	19
INSTANTANEOUS PEAK FLOW		828	(a)2390
INSTANTANEOUS PEAK STAGE		10.26	14.90
INSTANTANEOUS LOW FLOW			16
ANNUAL RUNOFF (CFSM)	.71	.79	1.24
ANNUAL RUNOFF (INCHES)	9.70	10.76	16.90
10 PERCENT EXCEEDS	112	111	200
50 PERCENT EXCEEDS	36	42	72
90 PERCENT EXCEEDS	22	27	33

(a) From rating curve extended above 1,800 ft<sup>3</sup>/s.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04102776 MIDDLE BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI

LOCATION.--Lat 42°25'57", long 86°12'25", in NE1/4 NE1/4 sec.32, T.1 N., R.16 W., Allegan County, Hydrologic Unit 04050002, on left bank 10 ft downstream from bridge on 68th Street, 4.0 mi northeast of South Haven.

DRAINAGE AREA.--83.0 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1994 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 590 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	24	28	e47	e35	84	48	88	223	72	45	30
2	22	25	28	51	e35	77	48	99	196	67	43	29
3	24	26	29	66	e36	72	47	90	184	143	37	31
4	28	26	31	65	e36	67	46	83	159	150	35	32
5	29	25	49	63	e36	63	46	78	147	106	35	31
6	26	26	83	60	e36	59	45	72	140	90	57	29
7	25	26	68	57	e36	57	46	67	126	78	59	28
8	24	26	58	53	e36	55	70	65	117	77	50	28
9	24	26	53	60	e37	53	85	102	107	117	46	28
10	23	26	49	77	e37	51	80	167	98	104	43	32
11	22	26	45	80	e38	50	76	143	109	95	40	56
12	22	26	43	71	e38	49	76	151	199	82	38	113
13	22	25	41	66	e39	48	71	214	218	74	37	118
14	23	25	45	59	e40	49	67	202	194	68	36	98
15	23	25	59	e54	42	49	62	153	261	62	35	116
16	22	25	66	e51	42	52	59	138	214	58	33	106
17	23	25	68	e48	43	53	58	138	161	55	36	89
18	23	25	58	e46	43	50	58	164	137	51	42	78
19	23	25	e54	e44	e43	50	61	657	119	48	38	68
20	23	26	e50	e43	e42	57	143	542	108	47	35	63
21	23	27	e48	e42	42	64	295	501	114	45	34	76
22	23	27	e46	e41	49	62	315	382	101	43	33	79
23	23	27	e45	e40	79	59	260	301	90	42	42	206
24	24	29	e44	e39	102	57	245	248	83	40	44	274
25	24	30	e43	e38	121	57	198	190	92	39	38	219
26	23	29	e42	e37	108	55	150	153	91	38	36	179
27	23	29	e41	e36	107	54	123	155	83	36	37	147
28	23	29	e40	e35	100	54	107	320	77	39	36	119
29	23	28	e41	e35	91	52	96	445	86	40	35	101
30	23	28	e42	e34	---	51	88	302	81	42	34	90
31	24	---	e44	e34	---	49	---	255	---	46	33	---
TOTAL	730	792	1481	1572	1569	1759	3169	6665	4115	2094	1222	2693
MEAN	23.5	26.4	47.8	50.7	54.1	56.7	106	215	137	67.5	39.4	89.8
MAX	29	30	83	80	121	84	315	657	261	150	59	274
MIN	22	24	28	34	35	48	45	65	77	36	33	28
CFSM	.28	.32	.58	.61	.65	.68	1.27	2.59	1.65	.81	.47	1.08
IN.	.33	.35	.66	.70	.70	.79	1.42	2.99	1.84	.94	.55	1.21

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 2000, BY WATER YEAR (WY)

MEAN	42.3	83.9	85.4	121	134	127	128	120	138	51.3	36.5	42.3
MAX	53.9	155	122	167	317	200	162	215	397	90.5	58.3	89.8
(WY)	1998	1995	1997	1997	1997	1998	1998	2000	1997	1997	1997	2000
MIN	23.5	26.4	47.8	50.7	54.1	56.7	79.0	70.4	40.2	28.4	23.5	17.6
(WY)	2000	2000	2000	2000	2000	2000	1996	1999	1998	1998	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1995 - 2000

ANNUAL TOTAL	21651	27861	
ANNUAL MEAN	59.3	76.1	92.1
HIGHEST ANNUAL MEAN			145
LOWEST ANNUAL MEAN			63.0
HIGHEST DAILY MEAN	380	657	2980
LOWEST DAILY MEAN	16	22	16
ANNUAL SEVEN-DAY MINIMUM	16	22	16
INSTANTANEOUS PEAK FLOW		817	(a)4340
INSTANTANEOUS PEAK STAGE		8.44	12.85
INSTANTANEOUS LOW FLOW		21	15
ANNUAL RUNOFF (CFSM)	.71	.92	1.11
ANNUAL RUNOFF (INCHES)	9.70	12.49	15.07
10 PERCENT EXCEEDS	109	153	160
50 PERCENT EXCEEDS	40	50	70
90 PERCENT EXCEEDS	22	25	28

(a) From rating curve extended above 1,400 ft<sup>3</sup>/s.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04103010 KALAMAZOO RIVER NEAR MARENGO, MI

LOCATION.--Lat 42°15'42", long 84°51'21", in SW1/4 SE1/4 sec.26, T.2 S., R.5 W., Calhoun County, Hydrologic Unit 04050003, on right bank at upstream side of bridge on B Drive North, 0.8 mi south of Marengo, and 5.0 mi west of Albion.

DRAINAGE AREA.--267 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1986 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 910 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some diversion by pumping for irrigation. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	141	124	122	136	e120	222	146	235	284	297	209	149
2	134	134	123	144	e125	201	145	248	253	269	214	145
3	132	127	126	153	e125	191	146	252	232	335	208	143
4	146	125	128	167	e130	181	143	235	220	318	192	148
5	131	126	170	165	e120	173	142	217	226	282	183	147
6	126	122	201	159	e115	170	142	e205	246	263	237	136
7	124	121	206	152	e125	167	145	e200	244	248	227	130
8	145	122	201	142	e120	164	177	191	228	236	218	128
9	145	122	186	154	e125	161	179	219	213	231	206	130
10	149	121	175	163	131	157	174	253	201	235	191	146
11	145	127	164	165	132	156	173	232	196	231	179	173
12	128	132	158	161	120	153	168	240	e230	221	172	132
13	137	131	154	158	135	152	161	252	e340	210	165	200
14	129	129	166	136	128	152	157	245	e310	203	163	210
15	124	127	180	152	124	155	152	231	e290	197	164	215
16	121	125	198	154	127	176	147	217	271	200	157	203
17	118	124	192	135	122	178	146	210	248	191	160	189
18	121	122	177	e130	129	171	144	244	234	184	162	176
19	123	130	161	e130	129	167	145	474	224	181	158	148
20	121	142	184	e140	127	176	255	471	219	179	154	141
21	122	137	170	e120	123	183	490	435	274	175	151	160
22	119	144	152	e120	136	185	571	373	288	171	148	155
23	115	137	e150	e120	155	179	554	339	282	167	170	143
24	120	141	e145	e130	199	173	502	292	275	166	159	159
25	124	137	e145	e130	227	168	418	260	552	163	156	158
26	122	136	e140	e120	235	158	334	237	611	161	152	156
27	122	132	e140	e120	265	161	289	239	576	159	e250	152
28	124	128	e140	e120	264	160	263	322	499	164	e200	147
29	123	126	e140	e120	244	158	244	365	421	192	176	145
30	123	124	143	e120	---	153	230	354	345	208	164	142
31	122	---	140	e120	---	150	---	321	---	212	157	---
TOTAL	3976	3875	4977	4336	4357	5251	7082	8614	9032	6649	5602	4526
MEAN	128	129	161	140	150	169	236	278	301	214	181	161
MAX	149	144	206	167	265	222	571	474	611	335	250	215
MIN	115	121	122	120	115	150	142	191	196	159	148	128
CFSM	.48	.48	.60	.52	.56	.63	.88	1.04	1.13	.80	.68	.60
IN.	.55	.54	.69	.60	.61	.73	.99	1.20	1.26	.93	.78	.67

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 2000, BY WATER YEAR (WY)

MEAN	208	239	228	259	251	302	317	257	244	188	173	175
MAX	349	383	356	466	340	445	468	386	530	274	226	272
(WY)	1987	1989	1991	1993	1991	1990	1993	1990	1989	1993	1989	1993
MIN	128	129	160	140	150	169	225	177	126	111	116	111
(WY)	2000	2000	1996	2000	2000	2000	1987	1987	1988	1988	1996	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1987 - 2000
ANNUAL TOTAL	70764	68577	
ANNUAL MEAN	194	187	237
HIGHEST ANNUAL MEAN			332
LOWEST ANNUAL MEAN			176
HIGHEST DAILY MEAN	735	611	1140
LOWEST DAILY MEAN	105	115	95
ANNUAL SEVEN-DAY MINIMUM	105	120	98
INSTANTANEOUS PEAK FLOW		636	1160
INSTANTANEOUS PEAK STAGE		8.50	10.18
INSTANTANEOUS LOW FLOW		(a)86	(a)86
ANNUAL RUNOFF (CFSM)	.73	.70	.89
ANNUAL RUNOFF (INCHES)	9.86	9.55	12.04
10 PERCENT EXCEEDS	294	270	363
50 PERCENT EXCEEDS	165	161	213
90 PERCENT EXCEEDS	120	123	135

(a) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04104945 WANADOGA CREEK NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°23'47", long 85°07'54", in NW1/4 SE1/4 sec.9, T.1 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 30 ft upstream from bridge on State Highway 66, 5.0 mi north of Battle Creek.

DRAINAGE AREA.--48.3 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1994 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 830 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	13	13	17	e14	43	18	31	113	19	27	11
2	e14	21	14	19	e15	36	18	36	83	18	24	10
3	e12	22	16	24	e15	30	19	34	63	41	24	9.5
4	e14	e17	17	25	e15	27	19	30	49	66	18	9.5
5	e17	e15	25	23	e15	25	18	28	42	49	16	10
6	e15	e15	35	19	e16	23	17	26	38	31	41	10
7	e13	e14	32	19	e16	23	17	24	34	25	56	9.6
8	e12	e14	26	18	e15	23	28	22	30	22	52	9.7
9	e12	e14	22	21	e15	23	33	27	27	22	41	10
10	e13	e14	19	27	e16	22	32	41	24	23	28	25
11	e13	e14	18	33	e16	20	29	46	22	27	19	40
12	e12	e15	17	30	e16	19	29	45	25	24	16	38
13	e12	e15	17	24	e16	19	28	41	43	20	14	32
14	e13	e15	20	e21	e15	20	25	35	49	18	13	29
15	e14	e14	29	e19	e15	21	23	30	43	16	13	35
16	e13	e14	34	e18	e15	28	22	28	35	16	12	33
17	e13	e14	32	e17	e14	28	20	31	28	16	13	26
18	e13	15	25	e16	e15	24	19	39	25	15	16	20
19	e13	16	22	e16	e16	23	19	103	23	14	14	17
20	e13	18	e20	e15	16	28	40	253	21	14	12	15
21	e12	19	e19	e15	16	33	97	295	26	14	12	18
22	e12	18	e18	e14	19	32	143	202	24	13	11	18
23	e12	17	e17	e14	31	29	162	140	20	13	28	30
24	e12	19	e17	e14	42	26	131	101	20	13	27	35
25	12	19	17	e14	52	24	97	73	36	12	18	38
26	12	17	17	e14	54	22	70	56	39	12	14	37
27	12	17	17	e14	64	21	52	50	32	12	14	30
28	12	16	16	e14	61	21	41	76	25	14	13	23
29	13	15	17	e14	53	21	33	112	24	21	12	19
30	13	14	17	e14	---	20	30	149	23	24	12	17
31	14	---	17	e14	---	18	---	146	---	30	11	---
TOTAL	404	480	642	576	698	772	1329	2350	1086	674	641	664.3
MEAN	13.0	16.0	20.7	18.6	24.1	24.9	44.3	75.8	36.2	21.7	20.7	22.1
MAX	17	22	35	33	64	43	162	295	113	66	56	40
MIN	12	13	13	14	14	18	17	22	20	12	11	9.5
CFSM	.27	.33	.43	.38	.50	.52	.92	1.57	.75	.45	.43	.46
IN.	.31	.37	.49	.44	.54	.59	1.02	1.81	.84	.52	.49	.51

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 2000, BY WATER YEAR (WY)

MEAN	21.1	33.8	34.8	45.0	51.0	55.3	63.0	51.2	32.2	20.2	16.9	17.0
MAX	35.0	69.0	60.0	66.1	94.8	86.8	86.6	75.8	45.8	25.2	24.4	27.6
(WY)	1995	1995	1995	1998	1997	1998	1998	2000	1997	1998	1995	1997
MIN	13.0	16.0	20.7	18.6	24.1	24.9	44.3	26.7	18.4	12.1	10.5	9.45
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	1999	1996	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1995 - 2000

ANNUAL TOTAL	10725.2	10316.3	
ANNUAL MEAN	29.4	28.2	
HIGHEST ANNUAL MEAN			36.7
LOWEST ANNUAL MEAN			44.3
HIGHEST DAILY MEAN			28.2
LOWEST DAILY MEAN	336	295	440
ANNUAL SEVEN-DAY MINIMUM	7.9	9.5	7.9
INSTANTANEOUS PEAK FLOW	8.1	9.8	8.1
INSTANTANEOUS PEAK STAGE		6.63	488
ANNUAL RUNOFF (CFSM)	.61	.58	7.36
ANNUAL RUNOFF (INCHES)	8.26	7.95	.76
10 PERCENT EXCEEDS	56	44	10.32
50 PERCENT EXCEEDS	17	19	70
90 PERCENT EXCEEDS	9.6	13	27
			13

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW1/4 sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft upstream from bridge on Emmett Street in Battle Creek, 3.0 mi upstream from mouth.

DRAINAGE AREA.--241 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft above sea level (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good. Occasional slight regulation prior to November 1943. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SF <sup>2</sup>
1	59	49	61	69	65	282	115	223	843	126	117	67
2	44	58	63	82	73	277	114	223	671	118	114	72
3	45	63	67	93	69	249	115	226	510	129	114	66
4	43	68	74	100	75	207	115	218	404	175	107	71
5	49	69	82	99	74	167	112	197	342	233	99	63
6	51	58	111	96	70	153	111	167	292	270	131	60
7	49	56	120	94	77	144	115	151	255	259	165	60
8	48	56	122	73	75	135	135	140	230	221	195	59
9	48	58	111	101	73	128	158	148	210	191	209	60
10	48	58	99	103	72	125	172	197	187	177	191	85
11	46	63	89	123	84	120	184	232	155	169	153	126
12	46	64	85	138	82	114	173	266	148	163	119	144
13	43	64	83	130	86	111	162	313	175	152	100	144
14	43	64	86	86	81	110	159	325	209	144	90	136
15	42	62	101	110	81	113	155	300	234	132	84	138
16	42	61	121	103	80	129	149	267	250	123	77	142
17	42	61	132	72	73	141	141	235	246	115	78	139
18	43	60	117	91	83	145	136	228	219	103	82	122
19	43	61	101	80	71	143	135	308	185	96	82	105
20	45	69	114	85	83	149	177	458	151	90	79	94
21	45	77	92	79	73	168	298	850	148	82	75	90
22	47	68	84	74	93	175	386	970	141	78	70	88
23	48	72	87	71	119	175	576	836	133	76	87	118
24	48	72	70	70	173	158	747	672	127	74	111	142
25	48	68	84	80	211	148	663	533	147	70	109	165
26	43	72	79	76	231	145	534	429	159	66	100	164
27	47	70	76	72	255	134	436	380	167	63	92	160
28	46	74	72	66	271	130	368	388	175	71	84	153
29	47	66	70	58	276	130	308	439	166	78	74	154
30	49	70	67	69	---	126	257	597	141	100	77	110
31	49	---	74	63	---	120	---	871	---	113	73	---
TOTAL	1436	1931	2794	2706	3229	4751	7406	11787	7420	4057	3338	3367
MEAN	46.3	64.4	90.1	87.3	111	153	247	380	247	131	108	110
MAX	59	77	132	138	276	282	747	970	843	270	209	164
MIN	42	49	61	58	65	110	111	140	127	63	70	59
CFSM	.19	.27	.37	.36	.46	.64	1.02	1.58	1.03	.54	.45	.46
IN.	.22	.30	.43	.42	.50	.73	1.14	1.82	1.15	.63	.52	.51

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	122	161	193	209	244	409	393	264	190	110	88.0	97.5
MAX	673	474	468	591	593	936	1162	825	678	281	313	276	
(WY)	1987	1993	1991	1952	1943	1948	1947	1943	1943	1968	1994	1950	
MIN	32.4	46.1	46.8	57.5	61.5	87.6	93.7	69.6	49.2	34.3	27.8	30.6	
(WY)	1964	1964	1964	1964	1963	1931	1931	1931	1964	1936	1936	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1931 - 2000

ANNUAL TOTAL	54416	54162	(a)210
ANNUAL MEAN	149	148	394
HIGHEST ANNUAL MEAN			64.1
LOWEST ANNUAL MEAN			1943
HIGHEST DAILY MEAN	1380	970	3560
LOWEST DAILY MEAN	29	42	22
ANNUAL SEVEN-DAY MINIMUM	32	43	25
INSTANTANEOUS PEAK FLOW		991	3640
INSTANTANEOUS PEAK STAGE		2.09	(b)4.48
INSTANTANEOUS LOW FLOW		39	22
ANNUAL RUNOFF (CFSM)	.62	.61	.87
ANNUAL RUNOFF (INCHES)	8.40	8.36	11.82
10 PERCENT EXCEEDS	300	268	420
50 PERCENT EXCEEDS	79	110	136
90 PERCENT EXCEEDS	44	58	60

(a) Does not include water year 1931.

(b) From floodmark.

(c) Oct. 4, 16, 26.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW1/4 sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Elevation of gage is 815 ft above sea level, from topographic map. Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi downstream at different datum. Oct. 1, 1957 to June 15, 1959, nonrecording gage at bridge 1,800 ft upstream at different datum. June 16, 1959 to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records fair. Diurnal fluctuation below 1,500 ft<sup>3</sup>/s caused by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	359	333	352	400	349	808	424	738	1580	741	557	430
2	332	406	337	429	363	767	425	777	1360	666	548	412
3	333	374	346	450	361	704	435	765	1150	742	658	400
4	350	349	390	475	379	620	408	707	935	836	553	402
5	345	352	463	496	362	565	413	671	847	821	521	384
6	337	339	576	455	339	519	393	598	810	844	678	381
7	322	335	572	440	370	496	440	574	761	778	730	390
8	320	324	554	408	346	478	509	559	702	710	718	371
9	339	332	508	442	383	460	578	709	638	695	704	375
10	353	336	469	493	381	460	548	1060	570	684	633	626
11	344	356	435	521	399	456	572	1000	520	673	568	773
12	332	335	416	528	371	433	547	e1050	608	655	500	751
13	316	350	395	511	386	427	514	e1100	945	615	465	700
14	334	342	448	410	377	430	492	e1100	1060	547	427	672
15	331	335	492	444	373	448	473	e900	955	518	426	686
16	332	342	568	452	370	523	452	777	897	497	421	663
17	324	328	578	360	364	536	442	731	803	503	430	613
18	326	332	519	366	368	518	428	835	722	495	426	547
19	323	355	462	400	377	510	437	1390	654	475	423	504
20	322	369	490	407	370	553	771	1570	593	462	412	482
21	321	390	468	355	374	600	1360	1770	653	445	395	465
22	323	370	382	323	404	596	1570	1840	660	437	391	453
23	318	390	e340	374	480	568	1670	1700	613	428	499	575
24	322	394	e310	383	641	537	1760	1450	600	427	504	568
25	323	392	e310	375	738	509	1620	1200	940	417	471	550
26	320	379	e440	355	810	493	1390	1030	1170	389	499	562
27	296	364	e400	349	927	484	1140	976	1200	401	843	553
28	341	359	e350	349	913	481	950	1310	1140	393	651	520
29	324	361	391	351	874	478	841	1470	1050	428	534	477
30	315	366	434	352	---	463	745	1500	894	560	478	450
31	313	---	412	354	---	443	---	1640	---	578	449	---
TOTAL	10190	10689	13607	12807	13549	16363	22747	33497	26030	17860	16512	15735
MEAN	329	356	439	413	467	528	758	1081	868	576	533	524
MAX	359	406	578	528	927	808	1760	1840	1580	844	843	773
MIN	296	324	310	323	339	427	393	559	520	389	391	371
CFSM	.40	.43	.53	.50	.57	.64	.92	1.31	1.05	.70	.65	.64
IN.	.46	.48	.61	.58	.61	.74	1.03	1.51	1.18	.81	.75	.71

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 2000, BY WATER YEAR (WY)

MEAN	489	584	649	680	768	1110	1102	847	680	492	423	432
MAX	1446	1284	1248	1557	1500	2183	2834	1998	1703	1000	899	855
(WY)	1987	1993	1991	1993	1976	1948	1947	1943	1943	1943	1994	1975
MIN	173	204	215	229	218	317	441	336	238	186	189	167
(WY)	1964	1965	1964	1964	1964	1964	1946	1958	1964	1964	1964	1963

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1937 - 2000

ANNUAL TOTAL	218343	209586	
ANNUAL MEAN	598	573	687
HIGHEST ANNUAL MEAN			1081
LOWEST ANNUAL MEAN			250
HIGHEST DAILY MEAN	2810	1840	7130
LOWEST DAILY MEAN	232	296	86
ANNUAL SEVEN-DAY MINIMUM	267	318	106
INSTANTANEOUS PEAK FLOW		1880	(a)7290
INSTANTANEOUS PEAK STAGE		4.89	(b)7.95
INSTANTANEOUS LOW FLOW		(c)256	50
ANNUAL RUNOFF (CFSM)	.73	.69	.83
ANNUAL RUNOFF (INCHES)	9.86	9.46	11.33
10 PERCENT EXCEEDS	1030	942	1220
50 PERCENT EXCEEDS	449	470	550
90 PERCENT EXCEEDS	314	337	298

(a) Gage height 9.13 ft, site and datum then in use.

(b) Present site and datum.

(c) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW1/4 sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft downstream from bridge on EF Road, 1.3 mi north of Augusta.

DRAINAGE AREA.--38.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 815 ft above sea level, from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	22	23	28	e26	45	27	31	50	27	38	21
2	24	32	23	32	e27	42	28	35	47	26	41	20
3	24	30	24	37	e27	39	28	30	43	35	34	19
4	28	27	25	37	27	37	27	28	40	33	28	19
5	26	26	40	35	24	35	26	26	38	29	26	18
6	25	25	52	33	24	34	26	26	36	28	53	20
7	23	24	46	32	26	33	27	25	34	27	51	19
8	23	24	38	29	21	32	39	23	30	26	36	19
9	24	24	34	34	27	32	42	33	29	29	29	19
10	24	24	32	39	28	30	40	52	28	36	27	38
11	23	26	30	44	28	30	38	44	30	35	26	51
12	23	25	28	40	26	29	38	46	42	31	28	55
13	23	25	28	36	29	29	35	43	53	28	25	46
14	25	24	31	30	27	29	33	36	47	26	24	43
15	24	24	38	33	26	31	31	32	44	24	22	47
16	24	23	42	31	27	37	29	33	39	23	21	40
17	24	23	38	25	26	34	28	37	36	21	29	34
18	24	23	31	30	28	31	28	56	34	21	31	31
19	23	24	31	27	28	31	29	111	32	23	28	28
20	23	28	33	29	28	37	57	119	31	22	25	27
21	23	27	32	26	26	41	89	94	35	21	23	30
22	23	25	31	e24	33	37	83	70	31	20	25	29
23	23	25	31	e25	45	35	66	55	29	19	42	49
24	22	27	28	e24	54	33	52	44	29	18	36	51
25	22	27	31	e23	60	32	43	39	43	17	30	43
26	21	26	29	e23	58	30	39	35	36	17	28	37
27	21	25	29	e25	63	31	35	43	35	16	28	33
28	21	24	27	e25	58	31	33	76	32	21	25	30
29	21	24	30	e25	50	31	31	88	33	30	24	28
30	21	23	29	e26	---	29	28	73	30	37	23	27
31	21	---	29	e26	---	28	---	63	---	46	22	---
TOTAL	723	756	993	933	977	1035	1155	1546	1096	812	928	971
MEAN	23.3	25.2	32.0	30.1	33.7	33.4	38.5	49.9	36.5	26.2	29.9	32.4
MAX	28	32	52	44	63	45	89	119	53	46	53	55
MIN	21	22	23	21	21	28	26	23	28	16	21	18
CFSM	.60	.65	.82	.77	.87	.86	.99	1.28	.94	.67	.77	.83
IN.	.69	.72	.95	.89	.93	.99	1.10	1.48	1.05	.78	.89	.93

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

	MEAN	39.9	45.6	47.3	43.8	46.1	56.3	58.8	47.3	42.5	35.4	33.5	35.9
MAX	85.2	67.3	65.3	66.3	66.3	81.3	86.9	81.8	73.2	51.4	53.8	70.7	
(WY)	1987	1986	1992	1993	1976	1985	1975	1975	1978	1986	1980	1986	
MIN	18.9	23.4	31.9	26.9	30.1	33.4	38.5	30.0	23.9	17.4	17.9	17.5	
(WY)	1965	1965	1965	1971	1970	2000	2000	1965	1988	1965	1984	1999	

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1965 - 2000

	ANNUAL TOTAL	11979	11925	
ANNUAL MEAN	32.8	32.6	44.3	
HIGHEST ANNUAL MEAN			57.5	1975
LOWEST ANNUAL MEAN			30.3	1965
HIGHEST DAILY MEAN	112	Jan 24	454	Jun 27 1978
LOWEST DAILY MEAN	15	Sep 23	14	Aug 24 1964
ANNUAL SEVEN-DAY MINIMUM	16	Sep 17	18	Jul 21 1964
INSTANTANEOUS PEAK FLOW			125	May 18 1978
INSTANTANEOUS PEAK STAGE			2.17	May 18 1978
INSTANTANEOUS LOW FLOW			(a)6.3	Feb 8 2000
ANNUAL RUNOFF (CFSM)	.84		.84	
ANNUAL RUNOFF (INCHES)	11.46		11.40	
10 PERCENT EXCEEDS	49		46	
50 PERCENT EXCEEDS	31		29	
90 PERCENT EXCEEDS	18		23	

(a) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04106000 KALAMAZOO RIVER AT COMSTOCK, MI

LOCATION.--Lat 42°17'08", long 85°30'50", in NE1/4 sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on River Street in Comstock, 0.2 mi downstream from Comstock Creek.

DRAINAGE AREA.--1,010 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--April to August 1931, October 1932 to December 1979, October 1984 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1933-36. WSP 1387: 1933, 1934(M), 1935, 1936(M), 1938(M), 1940(M), 1941.

GAGE.--Water-stage recorder. Datum of gage is 756.12 ft above sea level. Prior to Oct. 1, 1987, at datum 3.00 ft higher. Prior to November 1945, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by powerplant 1.2 mi upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	484	416	476	498	500	984	545	922	1850	971	826	539
2	487	640	406	510	494	867	608	918	1810	906	615	469
3	433	430	427	580	498	968	528	909	1570	898	653	476
4	436	565	615	646	502	927	514	898	1250	899	855	554
5	494	418	557	596	505	828	497	771	1110	890	697	471
6	510	441	749	623	499	685	497	701	1050	903	589	408
7	404	573	811	632	494	685	637	750	991	912	884	412
8	430	407	628	555	493	678	625	618	949	905	939	480
9	486	422	690	542	493	546	621	741	930	895	919	487
10	478	529	674	607	495	620	826	971	889	889	820	560
11	476	409	532	661	498	627	737	1130	824	807	696	813
12	472	482	683	772	500	556	678	1130	681	820	698	897
13	417	486	545	633	498	617	607	1080	859	807	692	872
14	426	484	561	641	499	591	630	1060	1130	679	562	858
15	483	482	693	562	498	509	682	989	1190	753	487	871
16	407	412	696	587	498	687	617	968	1080	691	635	933
17	435	431	818	562	497	685	486	972	1030	594	592	834
18	479	495	675	490	497	681	633	1140	994	621	482	692
19	395	488	618	502	498	679	602	1660	935	599	629	692
20	431	490	620	572	499	683	756	1820	900	486	539	637
21	483	589	729	543	497	744	1380	1940	802	638	476	630
22	398	469	605	482	503	805	1540	1930	831	548	478	612
23	426	477	473	483	636	753	1580	2050	877	482	632	637
24	436	613	346	494	704	685	1690	1940	744	485	692	856
25	419	544	468	494	857	557	1770	1540	859	487	605	781
26	431	476	612	492	928	634	1620	1370	1050	585	550	632
27	422	476	626	397	977	701	1420	1320	1260	476	691	634
28	392	476	497	430	1090	607	1160	1410	1340	486	852	706
29	426	476	444	500	1040	618	1050	1770	1220	633	786	693
30	477	476	640	503	---	610	959	1790	1080	548	550	616
31	428	---	565	501	---	620	---	1760	---	714	611	---
TOTAL	13801	14572	18479	17090	17187	21437	26495	38968	32085	21997	20732	19752
MEAN	445	486	596	551	593	692	883	1257	1070	710	669	658
MAX	510	640	818	772	1090	984	1770	2050	1850	971	939	933
MIN	392	407	346	397	493	509	486	618	681	476	476	408
CFSM	.44	.48	.59	.55	.59	.68	.87	1.24	1.06	.70	.66	.65
IN.	.51	.54	.68	.63	.63	.79	.98	1.44	1.18	.81	.76	.73

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	677	793	856	919	981	1361	1351	1061	873	677	576	582
MAX	1990	1652	1674	1958	1758	2802	3018	2484	2063	1446	1217	1170	
(WY)	1987	1993	1991	1993	1976	1985	1950	1943	1989	1943	1994	1975	
MIN	268	285	347	371	370	461	617	405	302	269	235	278	
(WY)	1964	1964	1964	1964	1964	1964	1964	1931	1934	1934	1934	1963	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1931 - 2000
ANNUAL TOTAL	276950	262595	
ANNUAL MEAN	759	717	893
HIGHEST ANNUAL MEAN			1387
LOWEST ANNUAL MEAN			368
HIGHEST DAILY MEAN	3270	2050	6830
LOWEST DAILY MEAN	279	346	185
ANNUAL SEVEN-DAY MINIMUM	351	418	217
INSTANTANEOUS PEAK FLOW		2140	6910
INSTANTANEOUS PEAK STAGE		6.04	(a)10.94
INSTANTANEOUS LOW FLOW		106	106
ANNUAL RUNOFF (CFSM)	.75	.71	.88
ANNUAL RUNOFF (INCHES)	10.20	9.67	12.01
10 PERCENT EXCEEDS	1200	1080	1520
50 PERCENT EXCEEDS	631	621	745
90 PERCENT EXCEEDS	413	461	412

(a) Present datum.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S*P
1	2.11	2.10	2.04	1.97	1.92	2.03	1.92	2.03	2.18	2.30	2.37	2.32
2	2.08	2.29	2.05	2.01	1.92	2.00	1.94	2.07	2.18	2.30	2.34	2.31
3	2.08	2.22	2.06	2.06	1.93	1.99	1.94	2.02	2.16	2.41	2.32	2.30
4	2.13	2.16	2.09	2.08	1.93	1.98	1.93	2.00	2.16	2.38	2.30	2.29
5	2.10	2.13	2.23	2.05	1.92	1.97	1.92	1.98	2.20	2.35	2.30	2.27
6	2.08	2.11	2.28	2.03	1.91	1.97	1.91	1.97	2.21	2.44	2.37	2.27
7	2.07	2.10	2.17	2.01	1.91	1.97	1.95	1.96	2.20	2.39	2.36	2.26
8	2.07	2.10	2.11	1.99	1.91	1.96	2.06	1.95	2.19	2.37	2.34	2.26
9	2.08	2.10	2.08	2.03	1.92	1.96	2.06	2.07	2.19	2.39	2.33	2.26
10	2.08	2.09	2.07	2.07	1.93	1.95	2.01	2.22	2.18	2.41	2.31	2.49
11	2.07	2.09	2.05	2.08	1.93	1.95	2.01	2.12	2.19	2.40	2.31	2.67
12	2.06	2.09	2.06	2.04	1.92	1.94	2.00	2.19	2.23	2.38	2.30	2.68
13	2.08	2.08	2.06	2.03	1.92	1.94	1.97	2.18	2.28	2.37	2.30	2.49
14	2.10	2.08	2.11	2.00	1.92	1.95	1.96	2.10	2.28	2.36	2.30	2.42
15	2.10	2.07	2.18	1.99	1.91	1.96	1.95	2.06	2.28	2.34	2.30	2.41
16	2.10	2.07	2.22	1.98	1.92	2.01	1.94	2.08	2.27	2.34	2.30	2.36
17	2.11	2.06	2.16	1.97	1.91	1.98	1.93	2.09	2.25	2.34	2.32	2.33
18	2.10	2.07	2.10	1.96	1.93	1.96	1.93	2.23	2.25	2.34	2.34	2.31
19	2.10	2.08	2.06	1.96	1.95	1.97	1.98	2.85	2.25	2.34	2.33	2.30
20	2.10	2.10	2.06	1.97	1.93	2.04	2.39	2.53	2.26	2.33	2.31	2.30
21	2.09	2.09	2.05	1.97	1.92	2.06	2.59	2.33	2.32	2.34	2.31	2.31
22	2.10	2.08	2.02	1.96	1.95	2.02	2.31	2.23	2.29	2.33	2.31	2.30
23	2.12	2.08	2.01	1.96	2.04	1.99	2.17	2.19	2.27	2.32	2.40	2.33
24	2.11	2.10	2.00	1.95	2.15	1.97	2.09	2.15	2.27	2.31	2.37	2.33
25	2.10	2.09	2.00	1.95	2.18	1.96	2.05	2.12	2.39	2.30	2.34	2.31
26	2.10	2.08	1.99	1.94	2.14	1.94	2.02	2.11	2.34	2.30	2.34	2.29
27	2.09	2.07	1.99	1.93	2.24	1.95	2.00	2.13	2.31	2.30	2.40	2.28
28	2.10	2.06	1.98	1.93	2.14	1.96	1.99	2.46	2.30	2.32	2.36	2.27
29	2.10	2.05	1.98	1.93	2.06	1.94	1.98	2.39	2.31	2.39	2.35	2.27
30	2.10	2.05	1.98	1.94	---	1.93	1.97	2.26	2.30	2.44	2.34	2.26
31	2.09	---	1.98	1.93	---	1.93	---	2.20	---	2.43	2.33	---
MEAN	2.09	2.10	2.07	1.99	1.97	1.97	2.03	2.17	2.25	2.36	2.33	2.34
MAX	2.13	2.29	2.28	2.08	2.24	2.06	2.59	2.85	2.39	2.44	2.40	2.68
MIN	2.06	2.05	1.98	1.93	1.91	1.93	1.91	1.95	2.16	2.30	2.30	2.26

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04106180 PORTAGE CREEK AT PORTAGE, MI

LOCATION.--Lat 42°12'21", long 85°35'23", in SE1/4 sec.16, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 750 ft upstream from bridge on Westnedge Avenue in Portage.

DRAINAGE AREA.--16.5 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges for Oct. 1-31, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e14	12	10	11	10	14	10	15	15	11	13	10
2	e12	16	11	13	10	13	11	14	15	11	12	9.9
3	e11	14	11	15	10	12	11	12	15	17	12	9.9
4	e13	12	12	15	10	12	10	11	14	13	11	9.8
5	e12	12	19	14	10	12	10	11	16	12	12	9.7
6	e11	11	19	13	10	12	11	10	15	18	14	9.5
7	e10	11	15	12	10	12	14	10	14	14	13	9.4
8	e10	11	13	12	10	12	17	9.9	13	13	12	9.6
9	e11	11	12	14	10	11	16	16	12	14	11	9.6
10	e11	11	12	16	11	11	14	19	12	14	11	23
11	e10	11	12	15	11	11	14	15	12	13	10	26
12	e10	11	12	14	10	11	14	19	13	12	10	25
13	e10	11	12	13	10	11	13	17	14	12	10	18
14	e11	11	15	12	10	11	13	13	13	12	9.9	17
15	e11	11	17	12	10	12	12	12	13	12	9.9	16
16	e11	10	18	12	10	13	12	13	12	12	9.6	14
17	e10	10	15	11	10	12	12	13	12	11	11	13
18	e10	10	13	11	10	11	12	24	12	11	11	13
19	e10	11	13	11	11	12	15	43	12	10	10	12
20	e10	12	14	11	10	15	33	26	12	10	9.8	13
21	e10	11	13	11	10	15	34	20	15	11	9.7	13
22	e10	11	12	11	12	14	23	17	12	10	10	13
23	e10	11	12	11	16	13	18	16	12	10	14	14
24	e10	12	12	11	20	12	16	15	13	10	11	14
25	e9.8	11	12	10	20	12	14	14	18	10	11	13
26	e9.6	11	12	e10	18	11	14	13	14	10	13	12
27	e9.5	11	11	e10	23	12	13	14	13	10	14	12
28	e9.5	10	11	e10	17	12	12	30	12	11	12	12
29	e9.5	10	11	10	15	11	12	23	12	13	11	11
30	e9.5	10	11	10	---	11	12	18	12	17	11	11
31	e9.5	---	11	10	---	10	---	17	---	15	11	---
TOTAL	324.9	337	403	371	354	373	442	519.9	399	379	349.9	402.4
MEAN	10.5	11.2	13.0	12.0	12.2	12.0	14.7	16.8	13.3	12.2	11.3	13.4
MAX	14	16	19	16	23	15	34	43	18	18	14	26
MIN	9.5	10	10	10	10	10	10	9.9	12	10	9.6	9.4
CFSM	.64	.68	.79	.73	.74	.73	.89	1.02	.81	.74	.68	.81
IN.	.73	.76	.91	.84	.80	.84	1.00	1.17	.90	.85	.79	.91

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 2000, BY WATER YEAR (WY)

MEAN	17.4	19.2	18.5	18.0	18.1	20.0	20.7	19.2	17.5	16.1	15.5	15.8
MAX	25.7	25.5	23.6	21.4	21.5	28.1	26.6	24.1	24.9	21.4	19.2	20.3
(WY)	1992	1991	1991	1992	1985	1985	1985	1983	1989	1986	1994	1993
MIN	10.5	11.2	13.0	12.0	12.2	12.0	14.7	15.5	13.3	12.2	11.0	10.7
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	2000	2000	1999	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR			FOR 2000 WATER YEAR			WATER YEARS 1983 - 2000		
ANNUAL TOTAL	5063.2			4655.1					
ANNUAL MEAN	13.9			12.7			18.0		
HIGHEST ANNUAL MEAN							21.2		
LOWEST ANNUAL MEAN							12.7		
HIGHEST DAILY MEAN	58			43			87		
LOWEST DAILY MEAN	9.5			9.4			9.4		
ANNUAL SEVEN-DAY MINIMUM	9.6			9.6			9.6		
INSTANTANEOUS PEAK FLOW				57			(a)118		
INSTANTANEOUS PEAK STAGE				3.16			4.11		
ANNUAL RUNOFF (CFSM)	.84			.77			1.09		
ANNUAL RUNOFF (INCHES)	11.42			10.50			14.83		
10 PERCENT EXCEEDS	18			16			23		
50 PERCENT EXCEEDS	13			12			17		
90 PERCENT EXCEEDS	10			10			13		

(a) Gage height 3.87 ft.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE1/4 sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 5 ft upstream from bridge on Lovers Lane, 3.0 mi south of Kalamazoo.

DRAINAGE AREA.--22.4 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft above sea level.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	24	23	22	26	24	27	37	35	17	30	31
2	19	41	24	23	23	23	29	34	34	17	29	29
3	20	32	26	25	22	22	27	30	32	35	28	30
4	24	29	26	27	24	21	28	31	32	22	26	29
5	23	31	39	28	29	21	27	30	35	20	27	30
6	21	29	31	23	28	21	28	31	35	31	35	32
7	21	33	28	23	30	20	33	30	35	22	29	31
8	22	34	27	23	29	24	36	30	33	24	28	30
9	21	34	26	26	30	28	32	45	30	29	28	31
10	21	35	23	30	29	26	31	41	31	29	23	69
11	21	35	26	27	29	27	32	34	33	27	21	62
12	21	35	29	27	28	26	30	48	35	24	25	58
13	23	33	22	26	28	26	30	39	36	21	26	45
14	23	33	29	23	27	28	30	33	32	20	31	47
15	19	32	33	22	26	28	30	31	32	20	28	42
16	20	32	32	23	28	33	29	33	30	20	26	38
17	22	31	27	22	26	26	27	31	29	19	26	33
18	22	30	25	20	26	27	29	62	30	22	26	39
19	21	32	25	21	26	28	37	89	29	26	25	39
20	22	28	26	22	27	33	69	45	31	24	26	25
21	22	30	25	21	28	30	55	38	33	29	24	24
22	22	28	23	22	27	28	41	34	29	27	26	24
23	22	25	23	27	30	22	32	30	28	23	36	28
24	23	26	19	22	33	25	32	26	31	18	29	25
25	22	25	18	22	31	30	27	25	55	19	28	24
26	22	24	20	21	31	28	26	26	28	27	33	23
27	22	25	21	20	39	30	29	33	23	26	37	23
28	23	21	21	20	30	30	32	65	24	29	31	23
29	23	22	22	22	25	29	31	43	22	31	33	23
30	22	22	23	23	---	28	31	38	19	46	32	22
31	23	---	23	23	---	28	---	36	---	30	31	---
TOTAL	671	891	786	726	815	820	977	1178	941	774	883	1004
MEAN	21.6	29.7	25.4	23.4	28.1	26.5	32.6	38.0	31.4	25.0	28.5	33.5
MAX	24	41	39	30	39	33	69	89	55	46	37	69
MIN	19	21	18	20	22	20	26	25	19	17	21	22

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

MEAN	36.7	38.9	39.3	39.1	41.3	46.2	48.4	44.2	41.3	38.6	37.1	36.4
MAX	56.0	56.4	53.5	48.9	53.0	61.4	63.3	57.5	55.3	54.0	50.3	51.9
(WY)	1992	1991	1992	1988	1971	1985	1991	1991	1989	1991	1980	1992
MIN	21.6	26.5	25.4	23.4	25.7	26.5	32.6	30.4	24.7	25.0	26.8	23.0
(WY)	2000	1972	2000	2000	1972	2000	2000	1977	1988	2000	1977	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1965 - 2000
ANNUAL TOTAL	11644	10466	
ANNUAL MEAN	31.9	28.6	40.6
HIGHEST ANNUAL MEAN			51.5
LOWEST ANNUAL MEAN			28.6
HIGHEST DAILY MEAN	119	89	257
LOWEST DAILY MEAN	15	17	15
ANNUAL SEVEN-DAY MINIMUM	17	21	17
INSTANTANEOUS PEAK FLOW		163	(a)407
INSTANTANEOUS PEAK STAGE		2.08	4.49
INSTANTANEOUS LOW FLOW		10	(b)8.0
10 PERCENT EXCEEDS	40	35	53
50 PERCENT EXCEEDS	31	28	39
90 PERCENT EXCEEDS	22	21	29

(a) Gage height 3.09 ft.

(b) Result of bridge construction upstream.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE1/4 sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft above sea level (Kalamazoo County Road Commission bench mark).

REMARKS.--Records good. At times, flow is affected by ground-water withdrawals. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	2.1	2.3	3.6	2.7	4.3	3.4	2.5	5.7	2.0	1.2	.97
2	1.9	3.0	2.4	3.8	2.6	3.8	3.4	2.7	5.6	1.7	1.2	.83
3	1.8	3.1	2.6	4.2	2.7	3.3	3.3	2.4	5.0	2.2	1.2	1.2
4	2.0	3.0	3.0	4.5	2.7	3.1	3.4	2.3	4.3	2.0	1.1	1.4
5	1.9	2.9	5.0	4.6	2.6	2.9	3.5	2.2	3.9	1.9	1.1	1.2
6	1.9	2.7	6.8	4.5	2.5	2.8	3.4	2.0	3.5	2.3	1.2	1.0
7	1.8	2.6	6.8	4.4	2.5	2.8	3.5	1.9	3.1	2.1	1.2	.83
8	1.8	2.5	6.1	4.4	2.4	2.6	4.5	1.8	2.9	2.0	1.2	.74
9	1.8	2.5	5.6	4.6	2.4	2.5	4.6	2.1	2.5	2.3	2.5	.64
10	1.8	2.5	5.1	5.3	2.5	2.1	4.3	2.4	2.2	2.4	2.9	1.1
11	1.8	2.3	4.7	5.5	2.5	1.9	4.3	2.3	2.0	2.3	2.5	1.6
12	1.8	2.2	4.5	5.2	2.5	1.9	4.1	2.8	2.0	2.1	2.0	3.1
13	1.7	2.2	4.4	5.0	2.4	1.9	3.8	3.1	2.4	1.9	1.7	3.3
14	1.8	2.1	4.7	4.6	2.4	1.9	3.5	3.0	2.5	1.7	1.4	3.2
15	1.8	2.1	5.2	4.6	2.3	2.2	3.2	2.8	2.5	1.6	1.2	3.0
16	1.8	2.1	6.1	4.4	2.3	2.8	2.8	3.1	2.2	1.4	1.1	2.5
17	1.9	2.1	5.5	3.9	2.2	2.9	2.6	3.3	2.0	1.2	1.1	2.1
18	1.9	2.2	4.8	3.7	2.3	2.9	2.5	4.4	1.8	1.0	.99	1.8
19	1.9	2.3	4.3	3.7	2.6	3.0	2.6	8.9	1.6	.88	.84	1.6
20	1.8	2.7	4.3	3.8	2.6	3.9	4.9	8.9	1.5	.78	.75	1.5
21	1.8	2.7	4.0	3.7	2.4	4.5	7.5	7.7	1.8	.77	.65	1.4
22	1.7	2.8	3.7	3.6	2.6	4.6	7.1	6.4	1.7	.69	.58	1.3
23	1.8	2.9	3.7	3.6	2.9	4.4	6.0	5.7	1.6	.59	.80	1.5
24	1.8	3.0	3.5	3.4	3.6	4.1	5.1	5.0	1.7	.54	.76	1.5
25	1.8	2.8	3.6	3.3	4.3	3.9	4.4	4.5	2.9	.46	.72	1.4
26	1.8	2.8	3.8	3.1	4.6	3.6	4.1	4.0	3.1	.43	1.0	1.4
27	1.8	2.7	3.9	3.0	5.2	3.6	3.7	4.1	3.6	.41	1.2	1.3
28	1.8	2.6	3.9	2.9	4.8	3.5	3.3	6.0	3.3	.48	1.1	1.2
29	1.8	2.4	3.9	2.7	4.4	3.6	2.9	6.4	2.8	.55	1.2	1.1
30	1.8	2.3	3.8	2.7	---	3.5	2.3	6.4	2.3	.83	1.2	1.0
31	1.8	---	3.8	2.8	---	3.5	---	6.1	---	1.1	1.0	---
TOTAL	56.5	76.2	135.8	123.1	84.5	98.3	118.0	127.2	84.0	42.61	38.59	46.71
MEAN	1.82	2.54	4.38	3.97	2.91	3.17	3.93	4.10	2.80	1.37	1.24	1.56
MAX	2.0	3.1	6.8	5.5	5.2	4.6	7.5	8.9	5.7	2.4	2.9	3.3
MIN	1.7	2.1	2.3	2.7	2.2	1.9	2.3	1.8	1.5	.41	.58	.64

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 2000, BY WATER YEAR (WY)

	6.04	6.84	6.93	6.74	6.59	7.11	7.16	5.94	5.05	4.58	4.89	5.43
MEAN	6.04	6.84	6.93	6.74	6.59	7.11	7.16	5.94	5.05	4.58	4.89	5.43
MAX	9.74	11.0	11.8	9.79	9.63	10.4	11.2	12.5	11.4	10.7	11.8	12.6
(WY)	1976	1986	1976	1973	1976	1973	1973	1973	1973	1973	1975	1975
MIN	1.82	2.54	4.38	3.97	2.91	3.17	3.93	2.62	1.13	1.20	1.24	1.18
(WY)	2000	2000	2000	2000	2000	2000	2000	1988	1988	1988	2000	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1972 - 2000

ANNUAL TOTAL	1308.34	1031.51	
ANNUAL MEAN	3.58	2.82	6.07
HIGHEST ANNUAL MEAN			10.0
LOWEST ANNUAL MEAN			2.82
HIGHEST DAILY MEAN	15	8.9	35
LOWEST DAILY MEAN	.38	.41	.34
ANNUAL SEVEN-DAY MINIMUM	.55	.49	.49
INSTANTANEOUS PEAK FLOW		9.2	36
INSTANTANEOUS PEAK STAGE		1.42	2.47
INSTANTANEOUS LOW FLOW		.31	.20
10 PERCENT EXCEEDS	6.3	4.6	9.6
50 PERCENT EXCEEDS	2.9	2.5	5.8
90 PERCENT EXCEEDS	1.2	1.1	2.8

(a) Dec. 6, 1992, Oct. 28, 1994.

(b) Dec. 5, 1992, Oct. 28, 1994, Apr. 16, 1995.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04106362 ASYLUM LAKE NEAR KALAMAZOO, MI

LOCATION.--Lat 42°15'57", long 85°38'20", in NE1/4 SW1/4 sec. 30, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on south side of lake, 0.5 mi west of Kalamazoo.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--October 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is 863.69 ft above sea level (levels by City of Kalamazoo).

REMARKS.--Records good.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 5.11 ft, Apr. 23, 1999; minimum, 4.33 ft, Aug. 22, 2000.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 4.98 ft, May 19; minimum, 4.33 ft, Aug. 22.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.54	4.45	4.46	4.53	4.51	4.59	4.50	4.58	4.71	4.55	4.53	4.48
2	4.52	4.49	4.46	4.54	4.51	4.57	4.50	4.60	4.71	4.54	4.53	4.46
3	4.52	4.48	4.47	4.54	4.51	4.56	4.50	4.58	4.68	4.62	4.51	4.45
4	4.55	4.47	4.49	4.56	4.52	4.55	4.49	4.57	4.65	4.62	4.50	4.43
5	4.53	4.47	4.59	4.56	4.51	4.54	4.48	4.55	4.65	4.60	4.48	4.40
6	4.52	4.46	4.63	4.55	4.51	4.53	4.47	4.54	4.63	4.59	4.53	4.38
7	4.51	4.46	4.62	4.54	4.51	4.52	4.48	4.52	4.61	4.56	4.53	4.36
8	4.51	4.46	4.60	4.54	4.50	4.51	4.56	4.51	4.60	4.56	4.51	4.35
9	4.51	4.46	4.59	4.55	4.50	4.51	4.56	4.56	4.58	4.61	4.50	4.35
10	4.51	4.46	4.58	4.57	4.49	4.50	4.55	4.59	4.56	4.66	4.47	4.44
11	4.51	4.46	4.57	4.58	4.49	4.50	4.56	4.58	4.55	4.64	4.46	4.56
12	4.50	4.46	4.56	4.57	4.49	4.49	4.56	4.68	4.58	4.62	4.44	4.65
13	4.51	4.46	4.55	4.57	4.49	4.49	4.54	4.70	4.64	4.60	4.43	4.62
14	4.51	4.45	4.59	4.56	4.48	4.50	4.53	4.65	4.63	4.57	4.42	4.61
15	4.51	4.45	4.62	4.56	4.47	4.51	4.53	4.62	4.62	4.55	4.41	4.61
16	4.50	4.44	4.66	4.55	4.47	4.55	4.51	4.62	4.60	4.53	4.39	4.58
17	4.50	4.44	4.65	4.54	4.46	4.54	4.50	4.62	4.58	4.51	4.39	4.55
18	4.49	4.43	4.63	4.53	4.47	4.52	4.49	4.69	4.56	4.49	4.39	4.53
19	4.49	4.45	4.61	4.53	4.50	4.53	4.52	4.95	4.55	4.47	4.38	4.52
20	4.48	4.47	4.61	4.54	4.49	4.57	4.70	4.89	4.53	4.45	4.36	4.51
21	4.47	4.47	4.60	4.54	4.49	4.58	4.81	4.84	4.58	4.45	4.34	4.52
22	4.47	4.47	4.58	4.54	4.49	4.57	4.77	4.80	4.56	4.43	4.33	4.51
23	4.46	4.47	4.58	4.54	4.50	4.56	4.73	4.77	4.54	4.42	4.44	4.54
24	4.46	4.50	4.57	4.53	4.52	4.56	4.70	4.74	4.54	4.41	4.43	4.54
25	4.45	4.49	4.56	4.53	4.54	4.55	4.66	4.70	4.69	4.39	4.42	4.52
26	4.45	4.49	4.55	4.52	4.56	4.54	4.64	4.66	4.67	4.38	4.45	4.50
27	4.44	4.49	4.55	4.52	4.62	4.54	4.61	4.68	4.64	4.37	4.56	4.49
28	4.44	4.48	4.55	4.52	4.60	4.54	4.59	4.80	4.62	4.39	4.54	4.47
29	4.44	4.47	4.55	4.51	4.59	4.52	4.57	4.79	4.60	4.42	4.52	4.46
30	4.44	4.47	4.54	4.51	---	4.51	4.55	4.76	4.57	4.50	4.51	4.44
31	4.44	---	4.54	4.51	---	4.51	---	4.73	---	4.54	4.49	---
MEAN	4.49	4.47	4.57	4.54	4.51	4.53	4.57	4.67	4.61	4.52	4.46	4.49
MAX	4.55	4.50	4.66	4.58	4.62	4.59	4.81	4.95	4.71	4.66	4.56	4.65
MIN	4.44	4.43	4.46	4.51	4.46	4.49	4.47	4.51	4.53	4.37	4.33	4.35
CAL YR 1999	MEAN 4.64		MAX 5.08		MIN 4.37							
WTR YR 2000	MEAN 4.54		MAX 4.95		MIN 4.33							

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE1/4 sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft upstream from culvert on Oakland Drive, 2.5 mi upstream from mouth, and 3.7 mi southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are poor. At times, flow is affected by ground-water withdrawals. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	2.1	2.1	3.4	e3.0	5.7	3.2	4.3	7.0	e2.2	e.90	1.1
2	.84	3.1	2.2	3.4	e2.9	5.3	3.3	4.8	7.1	e2.5	e.90	1.0
3	.92	3.0	2.3	3.6	e2.9	4.8	3.4	4.4	5.9	e3.1	e1.0	1.1
4	1.5	2.8	2.6	4.1	e3.0	4.3	3.4	3.7	4.6	e2.5	e1.2	.92
5	1.8	2.7	4.7	4.2	e2.9	3.9	3.2	3.4	4.6	e2.5	e1.4	.78
6	1.9	2.6	6.9	4.2	e2.8	3.6	3.2	3.1	4.2	e2.9	e1.5	.72
7	1.9	2.4	6.6	4.1	e2.8	3.4	3.2	2.7	3.7	e2.6	e1.6	.71
8	1.9	2.4	7.0	4.0	2.7	3.2	4.4	2.8	3.1	e2.8	e1.8	.73
9	2.0	2.3	7.1	4.1	2.5	3.1	5.4	4.1	2.9	e3.0	e3.0	.73
10	2.0	2.2	6.5	4.7	2.4	3.1	5.1	4.6	2.8	e3.0	e4.0	2.6
11	1.9	2.1	5.7	5.6	2.3	3.0	5.0	3.7	2.8	e3.0	e3.3	3.2
12	1.6	1.9	5.3	5.6	2.3	2.8	4.9	4.6	3.2	e2.8	e2.9	3.5
13	1.6	2.0	5.1	5.5	2.3	2.7	4.4	5.0	3.8	e2.6	e2.5	2.5
14	1.8	2.0	5.7	5.5	2.3	2.7	4.0	4.1	3.2	e2.3	e2.1	2.8
15	1.8	1.9	6.7	5.1	2.2	2.7	3.6	3.3	3.1	e1.9	e1.8	2.8
16	1.7	1.7	7.5	5.0	2.2	3.0	3.3	3.4	2.6	e1.7	e1.6	2.5
17	1.8	1.6	7.0	4.8	2.2	3.2	2.9	3.4	e2.4	e1.5	e1.5	2.2
18	1.8	1.8	5.9	4.2	2.1	3.2	2.6	5.2	2.3	e1.3	e1.4	1.9
19	1.8	2.0	5.1	4.1	2.4	3.1	2.7	16	e2.0	e1.2	e1.3	1.8
20	1.8	2.2	4.9	4.1	2.7	3.7	7.3	14	e2.2	e1.0	e1.1	2.0
21	1.9	2.4	4.5	4.2	2.7	4.5	13	12	2.5	e.90	e1.0	2.1
22	1.9	2.5	4.1	e4.1	2.8	4.8	11	10	1.8	e.80	e.90	e2.1
23	1.9	2.5	3.8	e4.0	3.5	4.8	9.1	9.0	2.3	e.75	e.76	e1.9
24	1.9	2.8	3.7	e3.8	4.4	4.7	7.9	7.8	2.1	e.66	e.70	e1.7
25	2.0	2.7	e3.6	e3.7	5.6	4.6	6.8	6.8	4.6	e.58	e.80	e1.6
26	2.0	2.6	e3.5	e3.5	5.8	4.4	6.1	5.8	e4.6	e.55	e1.0	e1.5
27	2.0	2.6	e3.5	e3.4	6.9	4.2	5.5	5.7	e4.3	e.53	e1.2	e1.4
28	2.0	2.5	e3.7	e3.3	7.0	4.0	4.9	10	e3.8	e.58	e1.3	e1.3
29	2.0	2.2	e3.8	e3.2	6.2	3.7	4.6	10	e3.2	e.65	e1.3	e1.2
30	1.9	2.0	e3.7	e3.1	---	3.5	4.1	8.3	e2.6	e.75	1.2	e1.1
31	1.9	---	3.5	e3.0	---	3.4	---	7.5	---	e.85	1.2	---
TOTAL	54.76	69.6	148.3	128.6	95.8	117.1	151.5	193.5	105.3	54.00	48.16	51.49
MEAN	1.77	2.32	4.78	4.15	3.30	3.78	5.05	6.24	3.51	1.74	1.55	1.72
MAX	2.0	3.1	7.5	5.6	7.0	5.7	13	16	7.1	3.1	4.0	3.5
MIN	.84	1.6	2.1	3.0	2.1	2.7	2.6	2.7	1.8	.53	.70	.71

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2000, BY WATER YEAR (WY)

	MEAN	9.24	10.1	10.2	9.78	10.0	11.3	11.4	9.62	8.52	7.49	7.36	8.26
MAX	15.2	16.8	16.8	14.5	15.9	18.0	18.2	15.2	14.9	12.7	13.9	18.8	
(WY)	1970	1986	1992	1993	1971	1971	1975	1975	1969	1970	1975	1975	
MIN	1.77	2.32	4.78	4.15	3.30	3.78	5.05	4.18	2.36	1.74	1.55	1.30	
(WY)	2000	2000	2000	2000	2000	2000	2000	1965	1988	2000	2000	1999	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1959 - 2000

ANNUAL TOTAL	1874.47	1218.11	
ANNUAL MEAN	5.14	3.33	
HIGHEST ANNUAL MEAN			9.44
LOWEST ANNUAL MEAN			14.1
HIGHEST DAILY MEAN	30	Apr 23	16
LOWEST DAILY MEAN	.34	Sep 27	.53
ANNUAL SEVEN-DAY MINIMUM	.57	Sep 21	.61
INSTANTANEOUS PEAK FLOW			17
INSTANTANEOUS PEAK STAGE			2.70
INSTANTANEOUS LOW FLOW			
10 PERCENT EXCEEDS	10		5.7
50 PERCENT EXCEEDS	3.9		2.9
90 PERCENT EXCEEDS	1.3		1.2

(a) Dec. 7, 1992, June 21, 1997.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE1/4 sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi northeast of Hopkins.

DRAINAGE AREA.--71.4 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 700 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	15	15	25	e20	e50	24	44	84	30	e54	19
2	18	15	15	29	e20	e44	24	49	81	29	41	19
3	18	16	16	43	e21	e41	24	42	72	109	34	19
4	23	15	18	35	e21	39	23	38	66	91	31	19
5	23	15	33	31	e21	36	22	35	63	57	31	19
6	20	15	64	27	e21	34	21	33	61	56	168	18
7	18	15	45	27	e21	32	22	31	56	42	133	17
8	17	14	36	30	e21	32	48	31	52	41	68	17
9	17	14	32	35	e21	31	62	e100	48	e54	49	17
10	17	14	29	54	e22	29	51	160	44	e50	41	e19
11	16	14	27	58	e22	28	43	103	49	e45	37	e23
12	15	14	25	43	e21	27	43	e82	75	e40	33	e65
13	15	14	24	35	e21	26	39	e145	136	e38	31	48
14	17	14	24	e31	e21	27	36	e115	112	e38	29	39
15	17	13	32	e28	e21	26	33	e90	206	34	30	55
16	16	13	44	e25	e21	29	30	e94	137	32	30	40
17	17	13	41	e23	e21	27	27	e100	78	30	31	33
18	17	13	e33	e24	e22	25	27	380	62	28	41	30
19	16	13	e30	e25	e22	25	29	855	55	25	33	27
20	17	15	e28	e23	e22	33	196	478	49	24	29	26
21	19	15	e27	e22	e23	40	561	311	51	24	27	43
22	19	14	e26	e22	e35	35	383	191	45	23	25	50
23	20	14	e25	e22	86	33	221	136	41	22	27	551
24	18	16	e24	e21	107	31	125	108	39	22	26	494
25	17	16	e25	e21	148	35	89	88	41	20	24	286
26	16	15	e25	e21	104	32	72	75	39	19	23	153
27	15	16	e24	e20	99	32	62	73	38	e20	23	96
28	14	15	23	e20	77	32	55	229	34	e21	22	74
29	14	15	23	e20	e61	29	49	246	34	e23	21	62
30	15	15	26	e20	---	27	44	143	32	e24	21	54
31	14	---	26	e20	---	25	---	98	---	e46	20	---
TOTAL	535	435	885	880	1163	992	2485	4703	1980	1157	1233	2432
MEAN	17.3	14.5	28.5	28.4	40.1	32.0	82.8	152	66.0	37.3	39.8	81.1
MAX	23	16	64	58	148	50	561	855	206	109	168	551
MIN	14	13	15	20	20	25	21	31	32	19	20	17
CFSM	.24	.20	.40	.40	.56	.45	1.16	2.12	.92	.52	.56	1.14
IN.	.28	.23	.46	.46	.61	.52	1.29	2.45	1.03	.60	.64	1.27

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2000, BY WATER YEAR (WY)

	MEAN	39.3	56.7	69.9	66.9	76.5	106	95.7	64.2	57.9	33.9	28.3	37.9
	MAX	119	171	131	146	192	227	152	152	183	99.0	86.8	123
	(WY)	1987	1991	1976	1993	1997	1979	1993	2000	1997	1986	1994	1978
	MIN	15.0	14.5	21.7	19.8	25.7	32.0	49.4	25.1	16.4	13.6	12.5	17.1
	(WY)	1969	2000	1999	1970	1970	2000	1968	1977	1987	1987	1970	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1966 - 2000
ANNUAL TOTAL	15512.9	18880	
ANNUAL MEAN	42.5	51.6	60.6
HIGHEST ANNUAL MEAN			89.3
LOWEST ANNUAL MEAN			32.5
HIGHEST DAILY MEAN	630	855	2320
LOWEST DAILY MEAN	7.9	13	7.9
ANNUAL SEVEN-DAY MINIMUM	8.5	13	8.5
INSTANTANEOUS PEAK FLOW		1020	(a)3740
INSTANTANEOUS PEAK STAGE		8.87	11.11
ANNUAL RUNOFF (CFSM)	.60	.72	.85
ANNUAL RUNOFF (INCHES)	8.08	9.84	11.54
10 PERCENT EXCEEDS	74	98	114
50 PERCENT EXCEEDS	26	29	42
90 PERCENT EXCEEDS	12	16	19

(a) From rating curve extended above 1,200 ft<sup>3</sup>/s.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW1/4 sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft upstream from bridge on State Road, 0.2 mi downstream from South Branch, and 2.5 mi south of Zeeland.

DRAINAGE AREA.--65.8 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft above sea level (levels by Gove Associates, Inc.).

REMARKS.--Records good except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.6	3.7	3.0	21	e10	49	11	32	71	13	15	5.9
2	4.2	4.4	3.2	42	e10	40	11	32	62	13	12	6.1
3	4.4	3.9	3.5	78	e10	34	11	26	45	96	9.9	6.3
4	6.1	3.4	4.1	42	e11	30	11	24	38	44	3.6	6.1
5	4.9	3.4	3.1	29	e11	27	10	22	40	25	20	5.3
6	4.3	3.1	3.2	20	e11	25	9.5	20	36	143	383	5.3
7	4.1	e2.9	16	19	e11	23	12	18	30	83	69	5.2
8	3.8	3.1	9.4	e20	e11	21	44	17	27	50	31	5.3
9	4.1	3.1	7.5	32	e11	20	87	119	24	105	22	5.6
10	4.2	3.1	6.8	75	e11	18	79	518	21	50	18	6.4
11	3.9	3.1	5.9	71	e11	17	49	218	63	34	15	11
12	3.8	3.1	5.6	37	e11	16	48	142	215	23	13	67
13	3.6	3.1	5.2	24	e11	15	36	494	664	20	11	32
14	3.9	3.3	7.1	e19	e11	16	31	123	345	17	10	27
15	4.1	2.9	14	e15	e11	15	26	60	249	15	14	31
16	3.3	2.9	3.2	e13	e11	17	23	50	97	13	10	19
17	3.9	2.7	23	e13	e11	15	20	52	66	12	16	15
18	3.6	2.9	e15	e12	e11	14	22	1670	49	11	17	12
19	3.4	2.8	e12	e12	e12	14	24	2270	32	11	12	10
20	3.8	3.3	e9.5	e12	e13	22	471	1040	29	9.7	9.3	10
21	3.7	3.3	e13	e12	e15	27	1250	465	29	9.3	8.3	16
22	3.4	3.0	e12	e12	35	22	796	251	24	3.6	3.2	53
23	3.8	3.2	e11	e11	311	19	354	121	22	3.4	13	1330
24	3.6	6.5	e11	e11	420	18	168	32	21	3.1	9.1	823
25	3.4	3.9	e11	e11	414	17	92	60	21	7.2	3.1	301
26	3.3	3.2	e10	e11	212	15	72	41	20	6.8	7.4	115
27	3.2	3.5	e10	e10	157	15	52	41	19	6.1	7.1	54
28	3.2	3.3	e11	e10	94	15	39	641	17	3.8	6.7	37
29	3.3	3.1	e12	e10	62	14	34	595	16	12	6.6	29
30	3.3	3.0	e14	e10	---	12	29	222	15	27	6.6	24
31	3.8	---	e16	e10	---	12	---	92	---	33	6.3	---
TOTAL	120.0	100.2	376.8	724	1940	634	3921.5	9558	2407	923.0	803.2	3073.5
MEAN	3.87	3.34	12.2	23.4	66.9	20.5	131	308	80.2	29.8	25.9	103
MAX	6.1	6.5	32	78	420	49	1250	2270	664	143	383	1330
MIN	3.2	2.7	3.0	10	10	12	9.5	17	15	6.1	6.3	5.2
CFSM	.06	.05	.18	.35	1.02	.31	1.99	4.69	1.22	.45	.39	1.56
IN.	.07	.06	.21	.41	1.10	.36	2.22	5.40	1.36	.52	.45	1.74

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2000, BY WATER YEAR (WY)

	MEAN	29.0	73.9	94.9	86.5	114	165	107	65.0	48.1	22.3	17.0	32.7
MAX	152	333	328	278	408	499	206	308	295	185	122	252	
(WY)	1987	1991	1983	1974	1997	1979	1993	2000	1997	1982	1994	1986	
MIN	2.56	2.98	3.99	2.89	6.71	20.5	21.2	3.89	3.10	1.94	2.03	2.09	
(WY)	1964	1977	1977	1977	1963	2000	1986	1968	1987	1965	1962	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1961 - 2000

ANNUAL TOTAL	18371.5		24586.2									
ANNUAL MEAN	50.3		67.2									
HIGHEST ANNUAL MEAN										71.0		
LOWEST ANNUAL MEAN										115		1993
HIGHEST DAILY MEAN										24.6		1977
LOWEST DAILY MEAN	1960	Jan 24				2270	May 19			5540	Jun 21	1997
ANNUAL SEVEN-DAY MINIMUM	2.0	Sep 10				2.7	Nov 17			1.2	Aug 2	1987
INSTANTANEOUS PEAK FLOW	2.1	Sep 5				2.9	Nov 13			1.2	Aug 1	1987
INSTANTANEOUS PEAK STAGE						2710	May 18		(a)8810		Jun 21	1997
INSTANTANEOUS LOW FLOW						12.61	May 18		(b)16.72		Jun 21	1997
ANNUAL RUNOFF (CFSM)	.76									.83	Aug 3	1988
ANNUAL RUNOFF (INCHES)	10.39					1.02				1.08		
10 PERCENT EXCEEDS	94					13.90				14.67		
50 PERCENT EXCEEDS	11					99				150		
90 PERCENT EXCEEDS	2.9					14				20		
						3.5				3.3		

(a) From rating curve extended above 2,000 ft<sup>3</sup>/s.

(b) From floodmark.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank on ground of sewage-treatment plant, 1 mi north of Jackson, 2.2 mi upstream from Portage River, and at mile 216.

DRAINAGE AREA.--174 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above sea level (Fargo Engineering Co. bench mark). Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills upstream from station. Flow includes about 20 ft<sup>3</sup>/s as sewage effluent, which originates from ground-water sources, from the City of Jackson. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	49	57	55	61	146	76	199	170	198	166	75
2	46	52	60	62	60	141	78	169	139	170	152	69
3	62	49	56	76	61	120	82	151	150	210	162	65
4	62	47	60	80	62	110	80	163	126	166	148	64
5	55	46	110	75	61	103	76	131	145	156	159	60
6	53	46	96	76	59	100	74	118	208	176	201	59
7	51	45	143	76	63	96	86	109	149	201	161	63
8	55	47	187	68	65	93	95	93	155	186	178	60
9	51	49	170	87	66	96	82	141	135	191	171	59
10	48	48	140	91	66	138	84	193	105	156	162	93
11	50	56	93	118	64	133	94	183	124	129	161	111
12	49	50	77	118	61	90	92	194	117	114	150	136
13	63	49	75	117	63	82	99	180	163	115	131	141
14	55	49	100	106	65	82	132	136	185	110	91	135
15	53	50	97	115	66	e100	130	106	171	99	91	152
16	51	52	95	106	68	e110	89	113	176	97	95	141
17	47	50	86	88	65	e92	82	103	172	95	94	132
18	48	51	82	69	66	89	76	215	132	106	79	132
19	48	67	77	66	64	91	82	280	109	124	76	131
20	49	60	103	64	68	141	292	261	122	119	73	123
21	48	54	141	62	76	150	307	246	281	87	69	124
22	49	56	133	61	115	147	319	188	230	72	79	139
23	47	61	134	63	117	145	321	134	229	70	143	88
24	46	66	74	63	140	115	324	154	271	70	116	81
25	48	57	66	61	152	107	317	140	428	67	107	80
26	49	59	61	61	166	102	314	148	305	63	165	78
27	48	58	61	60	181	104	309	184	297	60	131	77
28	49	57	55	59	174	99	293	281	318	115	89	74
29	49	59	60	57	152	97	215	272	319	126	77	72
30	48	58	60	58	---	94	180	251	278	180	76	70
31	46	---	57	61	---	90	---	226	---	146	77	---
TOTAL	1570	1597	2866	2379	2547	3403	4880	5462	5909	3974	3830	2774
MEAN	50.6	53.2	92.5	76.7	87.8	110	163	176	197	128	124	93.1
MAX	63	67	187	118	181	150	324	281	428	210	201	175
MIN	46	45	55	55	59	82	74	93	105	60	69	59
CFSM	.29	.31	.53	.44	.50	.63	.93	1.01	1.13	.74	.71	.54
IN.	.34	.34	.61	.51	.54	.73	1.04	1.17	1.26	.85	.82	.60

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 2000, BY WATER YEAR (WY)

	MEAN	79.1	106	115	125	146	222	226	166	130	85.4	68.2	66.8
MAX	214	305	210	343	301	501	589	484	433	349	193	222	222
(WY)	1991	1993	1993	1993	1976	1976	1950	1943	1943	1968	1995	1975	1975
MIN	23.4	25.5	27.7	27.2	31.5	73.2	64.3	54.7	34.3	19.5	15.1	25.2	25.2
(WY)	1964	1964	1964	1964	1964	1964	1935	1936	1936	1936	1936	1936	1936

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1935 - 2000
ANNUAL TOTAL	40025	41211	
ANNUAL MEAN	110	113	128
HIGHEST ANNUAL MEAN			216
LOWEST ANNUAL MEAN			44.3
HIGHEST DAILY MEAN	348	428	971
LOWEST DAILY MEAN	27	45	12
ANNUAL SEVEN-DAY MINIMUM	31	47	14
INSTANTANEOUS PEAK FLOW		704	(a)1070
INSTANTANEOUS PEAK STAGE		14.47	15.44
INSTANTANEOUS LOW FLOW		31	9.2
ANNUAL RUNOFF (CFSM)	.63	.65	.74
ANNUAL RUNOFF (INCHES)	8.56	8.81	10.01
10 PERCENT EXCEEDS	209	192	258
50 PERCENT EXCEEDS	82	93	96
90 PERCENT EXCEEDS	47	51	40

(a) Gage height 13.50 ft.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'23", in NE1/4 sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft upstream from bridge on Petrieville Highway, 2 mi northeast of Eaton Rapids, 2.5 mi downstream from Spring Brook, 25 mi upstream from Red Cedar River, and at mile 178.

DRAINAGE AREA.--661 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1950 to September 1982, October 1995 to current year. Gage-height records collected in this vicinity; 1905-28 (flood seasons only) are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1707: 1951 (m).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplant at Smithville Dam and mills at Eaton Rapids. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft, discharge, 3,860 ft<sup>3</sup>/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	206	144	166	e250	e200	733	249	764	920	958	557	343
2	169	159	184	366	e180	711	384	732	827	886	600	309
3	167	164	188	317	108	656	286	732	763	944	689	309
4	141	191	211	215	113	594	323	715	687	977	747	304
5	144	180	229	261	e190	599	344	651	649	942	763	252
6	167	160	313	e360	e340	453	303	617	640	895	899	233
7	147	153	416	340	e250	478	295	587	629	767	960	239
8	142	133	378	e330	e200	499	301	477	611	703	1010	235
9	142	132	397	328	99	371	316	539	594	737	995	229
10	145	140	389	310	e190	495	491	745	576	840	880	289
11	145	166	406	326	e280	464	441	781	555	1030	752	353
12	148	190	385	379	e180	270	376	779	342	859	646	371
13	152	177	325	e330	e190	446	367	751	529	793	639	399
14	159	169	281	e360	e260	418	402	698	745	720	606	419
15	138	166	359	e370	e240	349	397	650	747	646	618	449
16	131	165	390	e360	e210	369	385	615	772	629	497	473
17	138	162	507	e340	e240	381	374	573	785	572	530	462
18	144	158	454	e280	e250	501	348	519	728	542	477	438
19	139	169	341	e250	e250	529	325	1120	659	488	466	408
20	143	185	316	e225	e260	372	480	1080	616	417	445	392
21	144	218	e250	e200	e250	377	921	1160	596	361	397	329
22	142	207	e290	e260	243	505	1060	1270	575	346	318	325
23	141	205	e300	e270	287	591	1260	1180	580	359	365	447
24	144	219	e300	e220	512	403	1180	1000	612	322	414	500
25	146	219	e300	e220	632	499	1100	912	751	284	412	441
26	144	191	e280	e200	666	567	977	782	993	261	395	403
27	143	191	e240	e180	753	344	939	719	1270	256	380	359
28	143	193	e220	e130	772	422	868	760	1340	226	436	335
29	143	187	e200	e150	762	377	810	825	1200	282	502	242
30	143	217	e190	e280	---	367	781	882	1050	412	484	277
31	140	---	e200	e280	---	296	---	927	---	478	437	---
TOTAL	4580	5310	9405	8687	9107	14436	17083	24542	22341	18932	18316	10564
MEAN	148	177	303	280	314	466	569	792	745	611	591	352
MAX	206	219	507	379	772	733	1260	1270	1340	1030	1010	500
MIN	131	132	166	130	99	270	249	477	342	226	318	229
CFSM	.22	.27	.46	.42	.48	.70	.86	1.20	1.13	.92	.89	.53
IN.	.26	.30	.53	.49	.51	.81	.96	1.38	1.26	1.07	1.03	.59

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 2000, BY WATER YEAR (WY)

	MEAN	238	335	424	472	572	925	937	656	414	278	202	195
MAX	875	670	877	1406	1280	1932	1561	1848	1041	1234	591	800	
(WY)	1955	1952	1976	1952	1971	1974	1974	1956	1968	1968	2000	1975	
MIN	64.6	94.7	86.0	96.5	111	223	378	200	138	94.7	78.8	64.6	
(WY)	1964	1964	1964	1963	1964	1964	1964	1958	1964	1965	1963	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1951 - 2000

ANNUAL TOTAL	150086		163303										
ANNUAL MEAN	411		446										
HIGHEST ANNUAL MEAN										470			
LOWEST ANNUAL MEAN										769			1974
HIGHEST DAILY MEAN										147			1964
LOWEST DAILY MEAN	2290				Apr 25		1340		Jun 28	3400		Feb 22 1971	
ANNUAL SEVEN-DAY MINIMUM	78			Sep 9		99		Feb 9	21			Oct 12 1963	
INSTANTANEOUS PEAK FLOW	81			Sep 9		140		Oct 15	52			Oct 10 1963	
INSTANTANEOUS PEAK STAGE						1440		Apr 23	(a)3500			Feb 21 1971	
INSTANTANEOUS LOW FLOW						97	4.73	Apr 23	8.19			Jun 28 1968	
ANNUAL RUNOFF (CFSM)	.62					.68		(b)	14			(c)	
ANNUAL RUNOFF (INCHES)	8.45					9.19			9.66				
10 PERCENT EXCEEDS	834					846			1000				
50 PERCENT EXCEEDS	269					371			328				
90 PERCENT EXCEEDS	139					156			119				

(a) Gage height 7.52 ft.

(b) Feb. 8, 9.

(c) Dec. 20, 1962, Oct. 14, 1966.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04111500 DEER CREEK NEAR DANVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in SE1/4 NE1/4 sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft upstream from bridge on Clark Road, 3.5 mi north of Danville, and 7.2 mi upstream from mouth.

DRAINAGE AREA.--16.3 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.96	.86	1.0	1.8	e2.3	11	3.7	7.8	29	4.0	3.7	1.4
2	.81	1.3	1.1	2.5	e2.5	9.3	3.8	8.9	20	3.7	3.5	1.3
3	.80	1.2	1.2	3.0	e2.6	7.9	3.9	7.4	15	4.4	3.5	1.3
4	1.0	1.1	1.2	3.6	e2.7	7.2	3.7	6.6	13	3.0	2.9	1.2
5	1.0	.91	1.9	3.3	e2.8	6.4	3.4	6.0	12	1.6	2.5	1.1
6	.88	.84	4.6	2.9	e2.7	5.9	3.3	5.4	20	11	14	1.1
7	.81	.81	3.4	2.4	e2.6	5.7	3.2	5.0	14	8.0	10	1.0
8	.81	.82	2.8	2.7	e2.5	5.7	5.1	4.7	12	6.4	6.3	1.0
9	.90	.88	2.5	3.0	e2.6	5.6	5.9	11	9.7	5.8	5.2	1.0
10	.88	.89	2.2	5.4	e2.8	5.0	5.2	70	8.3	5.8	3.8	2.3
11	.81	.90	2.0	6.5	e2.7	4.6	5.0	35	7.6	6.9	3.1	3.7
12	.77	.90	1.9	5.2	e2.5	4.3	5.1	24	7.6	4.9	2.6	2.6
13	.76	.90	1.9	3.8	e2.4	4.0	5.0	30	61	4.1	2.3	2.0
14	.96	.90	2.2	3.5	e2.3	4.0	4.7	19	48	3.9	2.2	2.5
15	.98	.89	4.2	3.4	e2.2	4.3	4.4	13	41	8.5	2.4	5.1
16	.90	.87	6.7	3.1	e2.1	9.4	4.0	12	24	5.4	2.1	3.7
17	.90	.82	5.1	2.3	e1.9	7.8	3.9	12	16	4.2	2.5	2.8
18	.96	.84	3.4	2.4	e2.0	6.3	3.6	31	12	3.3	3.4	2.2
19	.95	1.0	2.9	e2.4	e1.9	6.1	3.5	142	10	3.0	2.6	1.9
20	.91	1.4	3.1	e2.3	e2.1	6.9	26	75	8.4	2.7	2.1	1.6
21	.90	1.3	2.6	e2.3	2.3	7.0	81	44	8.3	2.4	1.8	1.8
22	.90	1.2	2.2	e2.2	6.3	6.6	44	32	6.4	2.3	1.8	1.7
23	.90	1.2	2.1	e2.1	21	6.2	27	29	5.5	2.1	4.3	3.3
24	.90	1.3	e2.0	e2.1	20	6.2	20	23	5.0	2.0	3.6	2.4
25	.90	1.3	e1.9	e2.0	17	6.0	15	17	8.7	1.8	2.5	1.3
26	.90	1.2	e1.8	e2.0	14	5.5	12	13	7.4	1.7	2.1	9.3
27	.86	1.2	e1.7	e1.9	27	5.6	10	12	6.6	1.7	2.1	7.2
28	.90	1.1	e1.6	e1.8	18	5.2	8.9	22	5.4	3.4	1.8	5.7
29	.90	1.1	1.7	e1.8	13	4.7	7.9	24	5.3	4.0	1.8	5.0
30	.84	1.1	1.9	e2.0	---	4.4	7.1	17	4.8	4.2	1.6	4.6
31	.81	---	1.9	e2.1	---	3.9	---	17	---	5.4	1.5	---
TOTAL	27.46	31.03	76.7	87.8	186.8	188.7	339.3	775.8	452.0	212.6	105.6	149.1
MEAN	.89	1.03	2.47	2.83	6.44	6.09	11.3	25.0	15.1	6.86	3.41	4.87
MAX	1.0	1.4	6.7	6.5	27	11	81	142	61	44	14	33
MIN	.76	.81	1.0	1.8	1.9	3.9	3.2	4.7	4.8	1.7	1.5	1.0
CFSM	.05	.06	.15	.17	.40	.37	.69	1.54	.92	.42	.21	.30
IN.	.06	.07	.18	.20	.43	.43	.77	1.77	1.03	.49	.24	.33

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 2000, BY WATER YEAR (WY)

	MEAN	5.32	9.02	11.9	11.7	16.8	29.2	24.2	12.6	8.64	4.08	2.50	3.03
MAX	33.8	45.1	32.7	40.1	52.3	70.6	64.8	57.2	43.3	30.5	17.1	21.6	
(WY)	1960	1993	1973	1974	1985	1982	1975	1956	1968	1957	1992	1992	
MIN	.35	.65	.48	.88	1.65	3.00	5.93	2.58	1.03	.39	.19	.25	
(WY)	1964	1964	1964	1977	1963	1964	1963	1958	1988	1965	1971	1979	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1954 - 2000

ANNUAL TOTAL	2966.40	2629.89	
ANNUAL MEAN	8.13	7.19	11.5
HIGHEST ANNUAL MEAN			22.8
LOWEST ANNUAL MEAN			1.86
HIGHEST DAILY MEAN	280	142	720
LOWEST DAILY MEAN	.27	.76	.05
ANNUAL SEVEN-DAY MINIMUM	.36	.82	.09
INSTANTANEOUS PEAK FLOW		160	(a)962
INSTANTANEOUS PEAK STAGE		5.88	(b)12.18
INSTANTANEOUS LOW FLOW		.58	.04
ANNUAL RUNOFF (CFSM)	.50	.44	.71
ANNUAL RUNOFF (INCHES)	6.77	6.00	9.61
10 PERCENT EXCEEDS	15	17	25
50 PERCENT EXCEEDS	2.1	3.4	4.6
90 PERCENT EXCEEDS	.78	.90	.72

(a) From rating curve extended above 610 ft<sup>3</sup>/s.

(b) From floodmark.

(c) Sept. 8, 9, 12, 1978.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE1/4 NE1/4 sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft downstream from culvert on Meridian Road, 2.1 mi upstream from mouth, and 4.2 mi west of Williamston.

DRAINAGE AREA.--9.34 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft above sea level (levels from Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. At times, low flow is affected by pumpage for irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06	.10	.14	.18	.22	2.6	.61	2.4	3.3	1.0	.49	e.29
2	.06	.16	.15	.22	.21	2.0	e.69	2.2	5.4	1.1	.67	e.28
3	.07	.13	.15	.25	.23	1.7	e.69	1.9	3.8	.23	.66	.30
4	.09	.12	.15	.35	.23	1.5	.65	1.8	3.2	.10	.54	.25
5	.08	.12	.31	.31	.22	1.3	.59	1.6	3.0	5.3	.47	.20
6	.07	.11	.41	.28	.22	1.2	e.58	1.5	2.9	3.5	4.7	.18
7	.07	.11	.27	.26	.23	1.0	e.61	1.4	2.5	2.7	3.5	.17
8	.08	.11	.24	.23	.21	1.0	e.78	1.3	2.2	2.1	2.2	.17
9	.08	.13	.21	.30	.24	1.0	e.95	1.8	1.9	1.9	1.5	.19
10	.08	e.14	.20	.47	.27	.88	e.88	9.8	1.6	1.8	1.1	2.4
11	.07	.12	.18	.54	.26	.80	e.78	6.3	2.9	1.6	.82	5.5
12	.07	.11	.18	.43	.24	.76	e.69	5.3	5.6	1.2	.64	3.5
13	.08	.12	.18	.37	.25	.74	e.63	20	47	1.1	.55	2.1
14	e.08	.12	.24	.28	.24	.71	e.66	7.9	23	1.1	.52	4.3
15	.08	.12	.38	.29	.23	.74	e.69	4.8	15	1.2	.47	6.7
16	.08	.12	.58	.29	.25	1.2	e.66	3.9	8.1	.97	.42	3.4
17	.08	.12	.44	.21	.24	1.1	e.63	3.7	5.3	.79	.89	2.4
18	.08	.12	.31	.21	.24	.91	e.63	14	4.1	.66	1.6	1.7
19	.09	.15	.26	.24	.25	.97	e.62	76	3.3	.64	1.0	1.2
20	.09	.18	.29	.24	.25	1.1	.16	36	2.8	.57	.67	1.1
21	.09	.15	.24	.22	.25	.98	40	20	2.8	.54	e.53	1.3
22	.09	.14	.20	.19	.62	.93	19	13	2.2	.50	.54	1.2
23	.09	.14	.20	.23	2.7	.91	11	12	1.8	.46	3.1	65
24	.09	.16	.18	.23	e3.8	.93	7.3	8.1	1.7	.43	1.8	28
25	.09	.14	.16	.22	e4.0	.95	5.3	5.9	2.8	.38	1.1	15
26	.09	.14	.17	.22	3.1	.88	4.1	4.4	2.2	.35	.83	8.5
27	.09	.15	.17	.19	7.0	.90	3.4	3.8	1.9	.32	.69	6.0
28	.09	.14	.16	.18	4.8	.87	2.9	6.3	1.5	.39	.56	4.4
29	.10	.14	.17	.19	3.1	.76	2.6	6.4	1.5	.43	.47	3.6
30	.09	.14	.17	.20	---	.68	2.2	4.6	1.2	.61	.40	2.9
31	.09	---	.17	.22	---	.63	---	3.8	---	.62	.34	---
TOTAL	2.54	3.95	7.26	8.24	34.10	32.63	126.82	291.9	166.5	67.26	33.77	172.23
MEAN	.082	.13	.23	.27	1.18	1.05	4.23	9.42	5.55	2.17	1.09	5.74
MAX	.10	.18	.58	.54	7.0	2.6	40	76	47	23	4.7	65
MIN	.06	.10	.14	.18	.21	.63	.58	1.3	1.2	.32	.34	.17
CFSM	.01	.01	.03	.03	.13	.11	.45	1.01	.59	.23	.12	.61
IN.	.01	.02	.03	.03	.14	.13	.51	1.16	.66	.27	.13	.69

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 2000, BY WATER YEAR (WY)

	MEAN	2.62	4.09	5.69	5.39	8.23	16.1	12.8	5.99	4.47	1.89	1.11	1.48
MAX	20.9	21.9	24.9	21.4	28.4	39.9	47.2	37.6	35.3	26.5	8.15	7.19	
(WY)	1960	1993	1973	1974	1985	1982	1975	1956	1968	1957	1980	1993	
MIN	.082	.13	.11	.11	.12	.78	1.45	.94	.25	.074	.099	.046	
(WY)	2000	2000	1964	1963	1963	1964	1963	1955	1988	1988	1999	1999	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1954 - 2000

ANNUAL TOTAL	1159.53	947.20	
ANNUAL MEAN	3.18	2.59	
HIGHEST ANNUAL MEAN			5.81
LOWEST ANNUAL MEAN			10.5
HIGHEST DAILY MEAN			.72
LOWEST DAILY MEAN	194	76	536
ANNUAL SEVEN-DAY MINIMUM	.03	.06	.02
INSTANTANEOUS PEAK FLOW	.04	.07	.03
INSTANTANEOUS PEAK STAGE		127	(b)1290
INSTANTANEOUS LOW FLOW		3.92	9.99
ANNUAL RUNOFF (CFSM)	.34	.05	.01
ANNUAL RUNOFF (INCHES)	4.62	.28	.62
10 PERCENT EXCEEDS	5.5	5.3	13
50 PERCENT EXCEEDS	.26	.62	1.6
90 PERCENT EXCEEDS	.07	.12	.18

(a) 1973, 1993.

(b) From rating curve extended above 660 ft<sup>3</sup>/s on basis of computation of peak flow through culvert and over road embankment.

(c) Oct. 1, 2.

(d) Sept. 11, 1954, Jan. 18, 1957, Aug. 3, 1988.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW1/4 sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi upstream from Sycamore Creek, and 5.6 mi upstream from mouth.

DRAINAGE AREA.--355 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage-height records collected in this vicinity 1911-19, and 1920-28 (flood seasons only), are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft above sea level. August 1902 to December 1903 nonrecording gage at site 0.8 mi downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft upstream at present datum.

REMARKS.--Records good. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft, discharge, 8,000 ft<sup>3</sup>/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	e40	35	43	47	195	75	157	212	118	159	55
2	35	52	35	45	45	167	73	160	271	107	153	51
3	37	44	36	54	46	145	73	158	242	253	127	49
4	43	49	37	65	49	130	73	153	199	460	175	49
5	38	47	67	63	52	119	73	142	173	423	184	46
6	36	46	77	59	52	110	72	133	168	292	231	44
7	32	43	75	57	50	103	72	123	201	204	274	43
8	32	40	74	44	49	99	89	113	191	154	262	42
9	31	41	69	68	49	99	90	175	161	130	222	43
10	29	39	62	75	47	96	92	289	135	124	180	136
11	29	39	58	79	49	93	95	452	136	129	139	153
12	30	39	54	83	50	88	94	398	149	145	109	138
13	31	38	51	79	47	84	91	424	311	128	91	112
14	30	37	57	46	46	82	88	382	570	117	83	124
15	31	37	72	70	45	83	86	267	605	110	80	150
16	32	36	91	72	43	99	82	200	538	104	73	148
17	34	34	93	55	46	110	79	166	402	92	90	125
18	34	35	84	60	45	117	76	329	297	80	88	113
19	35	40	58	62	45	109	71	795	221	71	87	86
20	34	43	77	61	44	108	228	1110	176	65	81	79
21	34	43	56	57	45	107	585	1040	156	61	71	84
22	35	43	49	54	52	104	723	784	145	58	74	94
23	32	42	58	52	81	101	691	616	129	56	110	435
24	29	45	57	51	174	97	546	505	122	53	125	739
25	33	41	50	46	234	96	425	398	152	51	129	714
26	33	39	46	e46	244	91	351	292	180	48	103	514
27	e32	39	45	e45	259	92	295	219	195	44	84	326
28	e32	37	43	e44	276	88	230	238	182	79	74	214
29	e31	37	41	e43	236	88	178	275	161	88	68	216
30	e31	37	41	43	---	85	149	275	139	155	63	170
31	e30	---	41	46	---	79	---	234	---	152	59	---
TOTAL	1024	1222	1789	1767	2547	3264	5945	11002	6919	4151	3848	5432
MEAN	33.0	40.7	57.7	57.0	87.8	105	198	355	231	134	124	182
MAX	43	52	93	83	276	195	723	1110	605	460	274	739
MIN	29	34	35	43	43	79	71	113	122	44	59	42
CFSM	.09	.11	.16	.16	.25	.30	.56	1.00	.65	.38	.35	.51
IN.	.11	.13	.19	.19	.27	.34	.62	1.15	.73	.43	.40	.57

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 2000, BY WATER YEAR (WY)

	MEAN	102	143	180	212	285	497	469	286	179	90.5	61.4	75.7
MAX	571	735	494	739	1024	1162	1494	1310	627	578	366	436	
(WY)	1982	1993	1995	1993	1938	1948	1947	1956	1968	1994	1992	1903	
MIN	14.8	21.2	20.5	29.0	28.6	58.6	62.3	52.9	20.4	5.70	9.24	14.6	
(WY)	1935	1964	1964	1940	1940	1934	1931	1931	1934	1934	1934	1939	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1902 - 2000
ANNUAL TOTAL	52913	48930	
ANNUAL MEAN	145	134	216
HIGHEST ANNUAL MEAN			431
LOWEST ANNUAL MEAN			43.3
HIGHEST DAILY MEAN	2150	1110	5720
LOWEST DAILY MEAN	16	29	3.0
ANNUAL SEVEN-DAY MINIMUM	17	30	3.9
INSTANTANEOUS PEAK FLOW		1140	5940
INSTANTANEOUS PEAK STAGE		5.77	11.95
INSTANTANEOUS LOW FLOW		(a)26	3.0
ANNUAL RUNOFF (CFSM)	.41	.38	.61
ANNUAL RUNOFF (INCHES)	5.54	5.13	8.27
10 PERCENT EXCEEDS	287	278	505
50 PERCENT EXCEEDS	61	82	105
90 PERCENT EXCEEDS	30	37	29

(a) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW1/4 sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi downstream from Red Cedar River, and at mile 152.

DRAINAGE AREA.--1,230 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft above sea level (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi downstream at datum 2.42 ft lower.

REMARKS.--Records good. Large diurnal fluctuation at low and medium flow caused by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	224	218	300	205	363	1030	327	1090	1340	1230	777	523
2	214	337	233	364	275	866	444	1060	1420	1110	805	390
3	244	265	248	461	260	856	523	996	1210	1820	965	406
4	347	225	259	411	186	705	257	996	1090	1590	918	409
5	219	261	485	267	184	700	549	977	841	1660	1090	362
6	320	258	424	413	202	715	415	968	933	1420	1630	290
7	302	241	485	412	437	520	438	884	951	1110	1570	339
8	221	208	501	391	304	626	544	737	863	899	1430	346
9	224	207	479	468	300	564	462	1040	863	925	1390	294
10	199	207	473	507	185	476	473	1400	803	954	1270	889
11	215	208	415	440	268	638	715	1670	870	1250	941	673
12	207	213	449	438	372	454	576	1520	833	1240	826	577
13	215	286	454	522	205	428	499	1630	703	1080	818	616
14	241	210	410	368	304	587	548	1500	1630	984	727	773
15	199	250	458	502	346	493	556	1200	1710	935	799	805
16	206	205	558	507	291	522	525	1120	1580	847	687	736
17	200	208	528	320	252	524	546	1050	1420	743	772	672
18	182	236	606	314	317	536	522	1880	1200	681	683	651
19	168	246	482	389	305	713	503	2710	969	654	579	581
20	179	272	414	347	345	546	1440	3230	905	536	588	581
21	175	269	378	327	251	575	2120	2890	872	536	566	569
22	199	310	278	243	379	519	2120	2670	773	418	528	595
23	203	294	394	345	403	e715	2290	2420	781	430	634	2020
24	195	288	400	362	581	e645	2220	1710	796	463	625	1650
25	211	300	397	292	971	530	1830	1610	1080	377	602	1650
26	189	291	390	297	1010	669	1550	1420	1100	368	573	1210
27	172	255	366	287	1130	547	1330	1240	1540	274	523	914
28	175	261	301	261	1150	543	1200	1380	1640	621	536	815
29	204	255	288	177	1110	584	1090	1400	1640	349	591	648
30	212	234	205	197	---	447	1050	1430	1260	814	610	523
31	209	---	311	367	---	478	---	1340	---	726	592	---
TOTAL	6670	7518	12369	11201	12686	18751	27662	47168	33616	27044	25645	21507
MEAN	215	251	399	361	437	605	922	1522	1121	872	827	717
MAX	347	337	606	522	1150	1030	2290	3230	1710	1820	1630	2020
MIN	168	205	205	177	184	428	257	737	703	274	523	290
CFSM	.17	.20	.32	.29	.36	.49	.75	1.24	.91	.71	.67	.58
IN.	.20	.23	.37	.34	.38	.57	.84	1.43	1.02	.82	.78	.65

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 2000, BY WATER YEAR (WY)

	MEAN	457	619	733	829	1028	1905	1778	1132	831	490	361	362
MAX	1880	2559	1666	2669	2550	7242	5113	3815	2803	2204	1178	1277	
(WY)	1987	1993	1976	1993	1976	1904	1947	1956	1905	1902	1992	1903	
MIN	88.5	138	124	150	158	348	488	330	168	98.3	61.1	93.6	
(WY)	1964	1965	1964	1963	1963	1964	1935	1958	1936	1936	1936	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1901 - 2000

ANNUAL TOTAL	247221		251837									
ANNUAL MEAN	677		688									
HIGHEST ANNUAL MEAN										875		
LOWEST ANNUAL MEAN										1638		1993
HIGHEST DAILY MEAN	5960									232		1964
LOWEST DAILY MEAN	75									22700		Mar 26 1904
ANNUAL SEVEN-DAY MINIMUM	112									20		Aug 25 1941
INSTANTANEOUS PEAK FLOW										44		Aug 15 1936
INSTANTANEOUS PEAK STAGE										(a)24500		Mar 26 1904
INSTANTANEOUS LOW FLOW										(b)15.43		Apr 20 1975
ANNUAL RUNOFF (CFSM)	.55		.56							2.8		Sep 9 1963
ANNUAL RUNOFF (INCHES)	7.48		7.62							9.66		
10 PERCENT EXCEEDS	1360		1420							1910		
50 PERCENT EXCEEDS	401		526							550		
90 PERCENT EXCEEDS	191		214							185		

(a) From rating curve extended above 15,000 ft<sup>3</sup>/s; gage height, 18.60 ft, datum then in use.

(b) Present site and datum.

(c) Aug. 3, 4.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'23", long 84°54'44", in NW1/4 sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi south of Portland, 1.9 mi upstream from Looking Glass River, and at mile 115.

DRAINAGE AREA.--1,385 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1952 to March 1982, June 1988 to current year. Gage-height records collected in this vicinity 1907-28 (flood seasons only) are contained in reports of the National Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Slight diurnal fluctuation caused by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S <sup>W</sup> P
1	311	249	280	e360	e450	1200	541	1160	1480	1250	831	676
2	266	280	363	e250	e430	1080	400	1220	1610	1220	925	609
3	246	417	290	e410	e330	951	502	1140	1460	1930	976	490
4	299	319	299	516	e310	936	557	1070	1290	1810	1130	474
5	416	283	361	466	e220	792	347	1060	1140	1760	932	497
6	260	295	715	305	e220	810	578	990	997	1670	1460	445
7	319	300	508	449	e240	763	475	1000	1050	1370	1730	418
8	351	290	563	e450	e520	615	558	891	1040	1160	1620	370
9	267	260	558	444	e360	730	648	882	981	984	1480	431
10	271	257	543	565	e360	623	549	1540	954	1050	1380	513
11	220	257	518	589	e230	561	587	1620	918	1130	1310	1240
12	266	250	456	494	e320	728	755	1790	1090	1440	973	896
13	231	251	499	494	e450	511	642	1790	1050	1220	867	724
14	276	294	512	e570	e250	529	566	1730	1040	1120	942	758
15	278	294	521	419	e370	663	608	1540	1850	1090	844	1060
16	251	289	565	542	415	609	606	1210	1680	1000	914	933
17	241	263	637	556	360	603	566	1280	1570	943	787	858
18	246	257	600	398	305	597	581	3110	1410	823	939	773
19	221	288	659	e350	397	620	552	4750	1210	781	793	743
20	220	322	539	e450	353	855	973	4590	1020	751	684	670
21	213	336	469	e410	402	609	2830	4010	986	623	684	706
22	223	318	459	e390	325	656	2870	3280	959	626	664	674
23	225	352	359	e300	512	604	2510	3090	864	507	771	3070
24	250	366	e450	e400	596	822	2540	2540	883	513	739	2750
25	242	346	e480	e430	912	685	2250	1940	1020	547	740	2260
26	253	340	e470	e350	1160	616	1910	1800	1120	467	704	1790
27	254	349	e460	e350	1310	765	1640	1490	1340	465	665	1240
28	222	300	e420	e340	1310	580	1460	1450	1570	378	613	1030
29	218	306	e370	e310	1260	639	1280	1690	1660	747	621	909
30	231	300	e340	e220	---	645	1180	1570	1540	496	686	739
31	258	---	e250	e240	---	503	---	1540	---	1080	704	---
TOTAL	8045	9028	14513	12817	14677	21900	32061	58763	36782	30951	29108	28846
MEAN	260	301	468	413	506	706	1069	1896	1226	998	939	962
MAX	416	417	715	589	1310	1200	2870	4750	1850	1930	1730	3070
MIN	213	249	250	220	220	503	347	882	864	378	613	370
CFSM	.19	.22	.34	.30	.37	.51	.77	1.37	.89	.72	.68	.69
IN.	.22	.24	.39	.34	.39	.59	.86	1.58	.99	.83	.78	.77

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	543	776	902	971	1145	2017	1957	1309	855	578	451	440
MAX	1766	2743	1975	2989	2947	4202	3936	4676	2587	2268	1297	1433	
(WY)	1982	1993	1976	1993	1976	1974	1975	1956	1989	1968	1992	1975	
MIN	132	174	161	184	186	382	683	373	258	155	166	133	
(WY)	1964	1965	1964	1963	1963	1964	1964	1958	1988	1965	1965	1963	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1952 - 2000
ANNUAL TOTAL	278518	297491	
ANNUAL MEAN	763	813	992
HIGHEST ANNUAL MEAN			1830
LOWEST ANNUAL MEAN			282
HIGHEST DAILY MEAN	6600	4750	12200
LOWEST DAILY MEAN	127	213	58
ANNUAL SEVEN-DAY MINIMUM	149	227	85
INSTANTANEOUS PEAK FLOW		4820	12400
INSTANTANEOUS PEAK STAGE		9.64	12.98
INSTANTANEOUS LOW FLOW			38
ANNUAL RUNOFF (CFSM)	.55	.59	.72
ANNUAL RUNOFF (INCHES)	7.48	7.99	9.73
10 PERCENT EXCEEDS	1490	1570	2140
50 PERCENT EXCEEDS	469	608	641
90 PERCENT EXCEEDS	238	262	238

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road in Maple Rapids, 50 ft upstream from Pine Creek, and 2.3 mi upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records fair. At times, water is pumped from the river about 8 mi upstream to fill the wetlands in the Maple River State Game Area. Some of the water is returned to the river at a later date, when water levels in the wetlands are lowered. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft, from information by local resident.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	23	38	34	32	545	79	421	567	69	100	21
2	12	34	37	34	32	501	77	385	513	64	97	21
3	12	38	37	35	32	454	74	351	466	68	100	20
4	13	38	37	36	33	410	78	321	425	67	94	25
5	12	38	39	37	33	372	78	293	392	63	79	19
6	12	38	43	37	34	338	70	264	358	57	72	16
7	13	38	45	37	34	308	75	236	329	53	62	13
8	12	37	45	36	34	285	76	210	302	48	56	14
9	12	37	45	36	34	266	81	227	275	47	51	15
10	13	39	44	37	34	243	101	349	246	50	45	27
11	13	39	43	38	34	215	124	477	225	49	40	47
12	14	38	42	38	34	190	133	545	e210	45	36	60
13	15	37	42	38	34	170	132	572	e230	42	32	73
14	16	37	41	38	34	149	129	549	e270	42	30	74
15	16	39	41	37	34	132	124	501	e280	45	31	83
16	17	39	42	38	34	124	107	457	e320	46	33	86
17	18	38	44	37	34	114	94	428	320	46	36	79
18	19	37	44	36	34	106	84	978	296	45	39	69
19	19	36	43	36	34	103	79	2820	269	39	37	55
20	20	36	43	36	34	104	149	3330	244	33	35	41
21	20	37	43	36	34	106	418	3200	218	31	31	35
22	21	39	41	35	43	106	750	2850	193	29	29	32
23	21	39	40	35	58	106	985	2530	171	28	42	e90
24	21	43	39	35	130	105	1030	2150	145	25	43	e210
25	21	43	38	35	261	102	935	1780	125	23	39	e280
26	21	43	37	34	388	105	808	1460	109	23	35	345
27	21	41	36	33	514	100	695	1180	100	22	34	373
28	21	40	36	33	583	100	600	980	90	28	28	377
29	21	40	35	32	584	94	526	828	82	46	25	366
30	21	39	35	32	---	89	464	716	75	80	26	346
31	21	---	35	32	---	84	---	633	---	95	22	---
TOTAL	520	1140	1250	1103	3267	6226	9155	32021	7845	1448	1459	3312
MEAN	16.8	38.0	40.3	35.6	113	201	305	1033	262	46.7	47.1	110
MAX	21	43	45	38	584	545	1030	3330	567	95	100	377
MIN	12	23	35	32	32	84	70	210	75	22	22	13
CFSM	.04	.09	.09	.08	.26	.46	.70	2.38	.60	.11	.11	.25
IN.	.04	.10	.11	.09	.28	.53	.78	2.74	.67	.12	.13	.28

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2000, BY WATER YEAR (WY)

MEAN	147	185	250	257	307	703	624	375	198	112	59.9	127
MAX	1461	837	813	1035	1133	2049	1582	1812	937	1243	361	1634
(WY)	1987	1991	1991	1973	1997	1985	1947	1956	1996	1994	1994	1986
MIN	9.77	21.8	20.9	17.3	16.9	103	139	74.1	24.6	10.6	8.47	11.4
(WY)	1967	1963	1963	1963	1963	1964	1945	1977	1977	1965	1965	1962

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1944 - 2000
ANNUAL TOTAL	54232.7	68746	
ANNUAL MEAN	149	188	279
HIGHEST ANNUAL MEAN			501
LOWEST ANNUAL MEAN			65.1
HIGHEST DAILY MEAN	2310	3330	6500
LOWEST DAILY MEAN	9.0	12	4.2
ANNUAL SEVEN-DAY MINIMUM	9.4	12	5.6
INSTANTANEOUS PEAK FLOW		3360	(a)8770
INSTANTANEOUS PEAK STAGE		9.52	(b)12.33
ANNUAL RUNOFF (CFSM)	.34	.43	.64
ANNUAL RUNOFF (INCHES)	4.65	5.89	8.73
10 PERCENT EXCEEDS	289	459	665
50 PERCENT EXCEEDS	44	43	120
90 PERCENT EXCEEDS	13	21	23

(a) Result of dam failure on Rainbow Lake (Pine Creek).

(b) From floodmark.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04115265 FISH CREEK NEAR CRYSTAL, MI

LOCATION.--Lat 43°14'59", long 84°58'52", in NW1/4 NE1/4 sec.23, T.10 N., R.6 W., Montcalm County, Hydrologic Unit 04050005, on left bank 10 ft downstream from bridge on Sidney Road, 3.5 mi southwest of Crystal.

DRAINAGE AREA.--39.7 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1987 to current year.

REVISED RECORDS.--WDR MI-92-1: Drainage area. WDR MI-99-1: 1988-90, 1991 (M).

GAGE.--Water-stage recorder. Elevation of gage is 795 ft above sea level, from topographic map.

REMARKS.--Records good. At times, low flow is affected by pumpage for irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	17	16	16	e18	38	21	25	29	19	29	16
2	22	22	17	18	e18	34	21	26	33	19	75	17
3	21	20	18	23	18	30	21	24	28	19	77	18
4	25	19	19	21	18	28	20	22	25	19	35	18
5	22	18	47	20	e18	27	20	21	26	16	27	16
6	20	18	50	19	e18	26	20	21	25	16	32	16
7	19	17	32	19	17	26	20	20	23	16	26	15
8	18	17	27	18	e17	26	24	20	22	17	23	16
9	18	17	25	18	17	26	27	41	21	21	21	15
10	18	17	23	21	17	25	25	71	20	21	20	21
11	17	17	21	25	17	23	23	42	20	20	18	23
12	17	17	21	21	e17	23	24	44	35	17	17	30
13	18	17	21	20	e17	23	22	48	166	15	17	23
14	20	17	21	e20	17	25	23	35	79	17	17	35
15	18	17	24	20	17	24	22	29	71	17	16	40
16	18	16	30	19	17	24	21	32	47	18	16	26
17	18	16	23	e19	e17	22	21	35	36	16	21	23
18	18	16	20	19	17	21	22	112	31	15	24	21
19	17	17	20	20	17	22	21	142	28	15	22	20
20	18	19	21	19	17	27	57	79	26	14	18	20
21	18	18	21	18	17	27	95	55	25	14	17	31
22	18	17	e19	19	19	25	67	45	23	14	17	28
23	18	17	17	19	25	24	44	47	22	13	32	64
24	18	21	16	19	50	23	36	39	21	13	22	43
25	17	19	17	e19	123	27	30	32	23	13	19	30
26	17	18	17	19	90	24	28	29	24	13	18	26
27	17	18	17	19	82	25	25	28	26	12	18	24
28	17	17	17	e19	52	23	24	33	22	19	17	23
29	17	17	17	e19	40	23	23	33	24	21	17	22
30	17	17	16	e19	---	21	23	28	21	30	17	21
31	17	---	16	e19	---	21	---	27	---	54	16	---
TOTAL	580	530	686	603	844	783	870	1285	1022	563	761	741
MEAN	18.7	17.7	22.1	19.5	29.1	25.3	29.0	41.5	34.1	18.2	24.5	24.7
MAX	27	22	50	25	123	38	95	142	166	54	77	64
MIN	17	16	16	16	17	21	20	20	12	12	16	15
CFSM	.47	.45	.56	.49	.73	.64	.73	1.04	.86	.46	.62	.62
IN.	.54	.50	.64	.57	.79	.73	.82	1.20	.96	.53	.71	.69

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 2000, BY WATER YEAR (WY)

	MEAN	29.0	37.5	32.4	32.9	37.2	49.8	44.6	36.4	30.6	22.7	23.1	22.3
MAX	39.2	59.5	46.1	48.9	61.2	75.9	66.6	45.9	44.3	50.9	41.7	33.8	33.8
(WY)	1992	1995	1992	1993	1997	1990	1991	1997	1994	1994	1994	1993	1993
MIN	18.7	17.7	19.8	19.5	25.7	25.3	29.0	26.5	15.3	11.6	11.4	13.7	13.7
(WY)	2000	2000	1990	2000	1989	2000	2000	1999	1988	1998	1998	1998	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1988 - 2000
ANNUAL TOTAL	8204.7	9268	
ANNUAL MEAN	22.5	25.3	33.2
HIGHEST ANNUAL MEAN			40.7
LOWEST ANNUAL MEAN			23.0
HIGHEST DAILY MEAN	125	166	450
LOWEST DAILY MEAN	5.6	12	5.6
ANNUAL SEVEN-DAY MINIMUM	7.7	13	7.7
INSTANTANEOUS PEAK FLOW		211	558
INSTANTANEOUS LOW FLOW		4.64	5.53
ANNUAL RUNOFF (CFSM)	.57	(a)11	.84
ANNUAL RUNOFF (INCHES)	7.69	8.68	11.35
10 PERCENT EXCEEDS	33	36	52
50 PERCENT EXCEEDS	20	21	28
90 PERCENT EXCEEDS	11	17	17

(a) Result of freezeup.  
(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW1/4 sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft downstream from bridge on State Highway 66 in Ionia, 2.7 mi downstream from Prairie Creek, and at mile 87.

DRAINAGE AREA.--2,840 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--March to June 1931, July 1951 to current year. Gage-height records collected in this vicinity 1907-28 (flood seasons only) are contained in reports of the National Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft above sea level. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation below approximately 5,000 ft<sup>3</sup>/s caused by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	767	412	540	e600	e530	2850	787	2610	3660	1760	1460	903
2	475	536	517	e680	e570	2660	920	2570	3590	1620	1260	808
3	587	505	573	666	e680	2410	739	2420	3570	1870	1270	655
4	563	719	552	683	e640	2240	842	2220	3120	2510	1460	591
5	553	438	674	940	e610	2110	857	2080	2830	2210	1660	621
6	566	592	1050	785	e550	1910	739	2030	2610	2140	1570	642
7	541	545	1200	562	e540	1890	914	1870	2380	1900	2100	599
8	535	421	769	652	e420	1700	959	1710	2250	1510	1960	573
9	606	542	927	749	e750	1550	1020	1790	2200	1460	1870	523
10	532	541	898	800	e760	1500	1130	2650	1970	1440	1680	696
11	515	547	845	901	e560	1290	1060	3370	2010	1670	1620	1350
12	391	550	849	946	e490	1260	1220	3210	2110	1700	1410	1530
13	534	538	760	e720	e600	1350	1230	3450	2500	1820	1170	1100
14	537	418	940	e750	e700	1070	1070	3370	2400	1470	1040	1110
15	419	419	725	e780	e520	1060	1110	3100	2830	1360	1080	1350
16	537	542	1000	e770	e600	1260	1140	2890	3130	1400	1060	1510
17	531	540	999	e780	e700	1060	1030	2710	2840	1190	1150	1270
18	405	548	830	e850	e650	973	920	4600	2710	1130	1090	1130
19	519	545	857	e800	e640	1160	937	10500	2400	1020	1020	1080
20	400	554	1080	e750	e700	1190	1710	15000	2120	1000	970	1030
21	408	556	692	e800	e670	1300	4840	14400	1990	914	864	948
22	534	552	e800	e700	e770	979	5800	12100	1890	783	890	1080
23	407	561	e850	e650	e700	1120	5650	10200	1660	790	856	3240
24	405	722	e700	e650	e1200	1170	5180	8980	1530	715	1100	5770
25	529	566	e750	e600	e1900	1340	4810	7370	1560	705	996	4830
26	387	578	e850	e750	2460	1050	4300	6280	1710	688	1010	3810
27	423	623	e800	e650	2840	1080	3760	5440	1700	661	893	2900
28	545	567	e780	e650	3090	1230	3380	4660	1970	705	757	2380
29	402	540	e720	e580	2850	913	3030	4580	2190	772	742	2180
30	399	534	e700	e650	---	1050	2760	4270	2120	1040	810	1950
31	400	---	e640	e570	---	1040	---	3990	---	1290	823	---
TOTAL	15352	16251	24867	22414	28690	44765	63844	156420	71550	41243	37641	48159
MEAN	495	542	802	723	989	1444	2128	5046	2385	1330	1214	1605
MAX	767	722	1200	946	3090	2850	5800	15000	3660	2510	2100	5770
MIN	387	412	517	562	420	913	739	1710	1530	661	742	523
CFSM	.17	.19	.28	.25	.35	.51	.75	1.78	.84	.47	.43	.57
IN.	.20	.21	.33	.29	.38	.59	.84	2.05	.94	.54	.49	.63

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

MEAN	1205	1592	1911	2005	2402	4330	4057	2613	1619	1077	787	931
MAX	7613	4931	4672	5715	6170	9398	7492	9715	4963	4468	2416	4613
(WY)	1987	1993	1991	1993	1976	1985	1993	1956	1989	1994	1994	1975
MIN	254	380	346	375	377	802	702	567	464	287	310	300
(WY)	1964	1965	1964	1963	1963	1964	1931	1931	1988	1965	1965	1963

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1931 - 2000

ANNUAL TOTAL	516014	571196	2052
ANNUAL MEAN	1414	1561	3482
HIGHEST ANNUAL MEAN			631
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	13100	15000	21300
LOWEST DAILY MEAN	250	387	109
ANNUAL SEVEN-DAY MINIMUM	295	424	118
INSTANTANEOUS PEAK FLOW		15500	21500
INSTANTANEOUS PEAK STAGE		21.24	23.43
INSTANTANEOUS LOW FLOW		(a)323	40
ANNUAL RUNOFF (CFSM)	.50	.55	.72
ANNUAL RUNOFF (INCHES)	6.76	7.48	9.82
10 PERCENT EXCEEDS	2740	3090	4440
50 PERCENT EXCEEDS	767	988	1290
90 PERCENT EXCEEDS	405	537	457

(a) Discharge measurement.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04117000 QUAKER BROOK NEAR NASHVILLE, MI

LOCATION.--Lat 42°33'57", long 85°05'37", in NW1/4 sec.13, T.2 N., R.7 W., Barry County, Hydrologic Unit 04050007, on left bank 150 ft upstream from culvert on Clark Road, 500 ft upstream from unnamed tributary, and 2.5 mi south of Nashville.

DRAINAGE AREA.--7.60 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1954 to September 1975, October 1975 to September 1994 (operated as a crest-stage partial-record station), October 1994 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 821.89 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	3.0	3.1	3.6	3.5	6.5	3.5	5.1	6.7	3.0	3.8	2.2
2	2.8	5.5	3.3	4.8	3.3	5.8	3.8	5.3	8.2	2.8	3.7	2.2
3	3.1	4.0	3.7	5.7	3.5	5.0	3.8	4.2	5.9	8.2	3.2	2.2
4	5.2	3.5	3.8	5.3	3.6	4.7	3.6	3.9	5.4	5.1	2.8	2.2
5	3.7	3.4	10	4.5	3.3	4.5	3.4	3.6	5.3	3.7	2.9	2.1
6	3.2	3.2	13	4.1	3.3	4.4	3.4	3.4	5.2	3.8	16	2.0
7	2.9	3.1	6.6	4.0	3.5	4.5	4.0	3.2	4.5	3.4	7.2	2.0
8	2.9	3.2	5.2	4.0	3.1	4.6	9.0	3.2	4.3	3.3	4.0	2.1
9	3.2	3.2	4.6	5.0	3.6	4.6	7.7	6.8	3.9	6.5	3.3	2.2
10	3.1	3.2	4.4	7.6	e3.6	4.4	5.4	14	3.6	8.4	3.0	9.9
11	2.9	3.6	4.0	7.3	e3.5	4.1	5.3	6.3	3.6	12	2.8	16
12	2.7	3.4	4.0	5.3	e3.4	3.9	5.6	10	5.1	5.3	2.6	8.7
13	2.9	3.3	4.1	4.4	3.3	4.0	4.9	8.2	6.9	4.1	2.6	4.7
14	3.3	3.2	6.1	3.8	3.2	4.2	4.3	5.3	5.2	3.6	2.5	6.7
15	3.1	3.1	8.7	4.1	3.1	4.7	4.0	4.1	5.5	3.2	2.9	7.8
16	3.0	3.1	8.6	e3.8	3.3	8.4	3.7	5.6	4.3	3.4	2.6	4.4
17	3.1	3.1	5.9	3.3	3.5	5.3	3.6	6.2	3.8	3.2	3.8	3.6
18	3.0	3.1	4.2	3.2	3.2	4.5	3.6	17	3.7	2.9	3.8	3.4
19	3.0	3.6	3.8	3.1	3.6	4.9	3.8	75	3.7	2.8	2.9	3.0
20	3.0	4.6	4.7	3.4	3.3	7.6	22	25	3.4	2.7	2.6	3.0
21	3.0	3.9	4.0	3.2	3.6	7.2	39	15	4.4	2.6	2.4	3.7
22	3.0	3.6	3.8	3.0	7.3	5.7	19	9.7	3.6	2.6	2.5	4.2
23	3.1	3.6	3.8	3.4	12	5.1	9.5	9.4	3.3	2.6	4.1	26
24	3.0	4.3	3.4	3.3	14	4.7	7.0	6.7	3.4	2.5	3.1	14
25	2.9	3.6	3.4	3.3	17	4.5	5.6	5.5	5.5	2.4	2.7	6.5
26	2.9	3.5	3.5	3.1	12	4.1	4.9	4.8	4.3	2.3	2.6	5.0
27	2.9	3.4	3.5	2.6	16	4.2	4.5	5.1	4.0	2.3	2.5	4.3
28	2.9	3.2	3.3	2.6	9.3	4.1	4.2	23	3.5	2.7	2.5	3.8
29	2.9	3.2	3.6	2.7	6.7	3.9	4.0	21	3.7	3.2	2.5	3.7
30	2.9	3.1	3.7	3.0	---	3.7	3.8	9.4	3.2	5.4	2.4	3.5
31	3.0	---	3.6	3.3	---	3.5	---	7.4	---	5.4	2.3	---
TOTAL	95.8	104.8	151.4	123.8	165.6	151.3	209.9	332.4	137.1	125.4	108.6	165.1
MEAN	3.09	3.49	4.88	3.99	5.71	4.88	7.00	10.7	4.57	4.05	3.50	5.50
MAX	5.2	5.5	13	7.6	17	8.4	39	75	8.2	12	16	26
MIN	2.7	3.0	3.1	2.6	3.1	3.5	3.4	3.2	3.2	2.3	2.3	2.0
CFSM	.41	.46	.64	.53	.75	.64	.92	1.41	.60	.53	.46	.72
IN.	.47	.51	.74	.61	.81	.74	1.03	1.63	.67	.61	.53	.81

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 2000, BY WATER YEAR (WY)

MEAN	4.83	6.32	6.84	6.75	8.12	11.3	10.3	8.04	5.78	3.74	3.56	3.49
MAX	14.2	14.3	14.9	15.6	17.2	25.0	23.7	15.3	12.8	7.78	13.5	8.17
(WY)	1955	1995	1973	1974	1971	1974	1975	1973	1973	1969	1972	1972
MIN	1.59	2.33	2.11	2.78	2.36	4.23	4.07	2.97	2.05	1.22	1.36	1.52
(WY)	1964	1964	1964	1964	1964	1964	1963	1958	1959	1964	1964	1933

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1954 - 2000

ANNUAL TOTAL	1953.5	1871.2	6.54
ANNUAL MEAN	5.35	5.11	11.1
HIGHEST ANNUAL MEAN			1974
LOWEST ANNUAL MEAN			1954
HIGHEST DAILY MEAN	74	75	211
LOWEST DAILY MEAN	1.8	2.0	.70
ANNUAL SEVEN-DAY MINIMUM	1.8	2.1	.73
INSTANTANEOUS PEAK FLOW		104	470
INSTANTANEOUS PEAK STAGE		4.70	9.45
INSTANTANEOUS LOW FLOW		1.7	(b).44
ANNUAL RUNOFF (CFSM)	.70	.67	.86
ANNUAL RUNOFF (INCHES)	9.56	9.16	11.69
10 PERCENT EXCEEDS	8.6	8.2	12
50 PERCENT EXCEEDS	4.0	3.7	4.5
90 PERCENT EXCEEDS	2.1	2.8	2.2

(a) Feb. 12, 21, result of freezeup.

(b) Result of freezeup.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE1/4 sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on right bank 100 ft upstream from bridge on McKeown Road, 0.6 mi downstream from Cedar Creek, 2.0 mi downstream from Thornapple Lake, and 3.2 mi southeast of Hastings.

DRAINAGE AREA.--385 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	104	93	104	127	104	376	151	288	702	154	208	90
2	100	102	104	130	108	330	150	278	645	144	196	89
3	96	109	106	145	109	287	150	264	561	170	172	87
4	103	109	112	153	111	254	148	248	483	232	151	85
5	107	106	139	155	110	234	146	232	412	284	143	82
6	106	103	201	149	110	217	138	214	357	275	206	80
7	101	103	225	144	111	203	142	201	320	233	277	77
8	95	101	213	132	111	198	165	191	284	203	292	78
9	94	100	187	142	111	188	197	215	260	183	259	79
10	93	103	166	159	115	186	218	305	235	195	211	101
11	92	111	152	181	117	178	220	413	220	233	175	151
12	89	111	141	194	115	168	216	481	227	247	151	187
13	88	109	135	187	118	162	214	630	269	241	136	187
14	91	106	139	154	120	159	204	691	310	220	129	176
15	92	105	157	155	119	163	198	630	331	190	125	186
16	89	104	183	158	116	183	192	517	332	168	122	185
17	91	104	195	131	114	192	179	440	305	156	117	171
18	92	102	176	128	117	186	170	478	264	147	122	150
19	90	103	155	130	116	180	168	1180	233	134	122	135
20	90	110	151	130	118	187	270	1960	212	125	120	125
21	90	116	148	123	115	204	704	2230	204	120	112	123
22	89	118	139	118	123	213	1110	2170	196	114	105	126
23	89	118	142	118	165	208	1140	1910	186	106	108	386
24	89	120	136	118	254	201	1060	1580	176	104	111	919
25	87	123	136	117	338	195	959	1270	178	101	111	1070
26	87	120	136	114	383	190	814	1000	186	98	109	978
27	88	115	133	109	406	181	640	774	188	96	105	838
28	88	112	125	104	425	177	490	658	182	102	102	661
29	89	109	125	100	419	169	390	687	172	116	98	490
30	91	106	127	101	---	164	324	722	164	138	96	370
31	92	---	127	102	---	157	---	729	---	186	92	---
TOTAL	2882	3251	4615	4208	4898	6290	11267	23586	8794	5215	4583	8462
MEAN	93.0	108	149	136	169	203	376	761	293	168	148	282
MAX	107	123	225	194	425	376	1140	2230	702	284	292	1070
MIN	87	93	104	100	104	157	138	191	164	96	92	77
CFSM	.24	.28	.39	.35	.44	.53	.98	1.98	.76	.44	.38	.73
IN.	.28	.31	.45	.41	.47	.61	1.09	2.28	.85	.50	.44	.82

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2000, BY WATER YEAR (WY)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MEAN	199	262	320	349	397	678	640	400	273	163	130	147
MAX	1072	939	895	1049	959	1506	1914	1391	1011	410	385	358
(WY)	1987	1991	1991	1973	1976	1948	1947	1956	1989	1968	1980	1992
MIN	54.5	73.6	75.2	90.4	87.5	129	176	111	87.0	56.0	50.2	54.4
(WY)	1964	1964	1964	1964	1963	1964	1946	1958	1964	1964	1946	1963

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1945 - 2000

ANNUAL TOTAL	81815		88051			
ANNUAL MEAN	224		241			
HIGHEST ANNUAL MEAN					329	
LOWEST ANNUAL MEAN					534	1993
HIGHEST DAILY MEAN	2330	Apr 26	2230	May 21	6590	Apr 7 1947
LOWEST DAILY MEAN	61	Sep 15	77	Sep 7	35	Jul 31 1964
ANNUAL SEVEN-DAY MINIMUM	61	Sep 15	81	Sep 3	36	Aug 7 1964
INSTANTANEOUS PEAK FLOW			2270	May 21	6810	Apr 7 1947
INSTANTANEOUS PEAK STAGE			7.01	May 21	(a)10.20	Apr 7 1947
INSTANTANEOUS LOW FLOW			75	Sep 7	33	Aug 17 1964
ANNUAL RUNOFF (CFSM)	.58		.62		.86	
ANNUAL RUNOFF (INCHES)	7.91		8.51		11.62	
10 PERCENT EXCEEDS	422		479		687	
50 PERCENT EXCEEDS	127		151		199	
90 PERCENT EXCEEDS	81		96		91	

(a) From graph based on gage readings.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°04'56", long 85°35'27", in NE1/4 sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of bridge on Packer Drive, 2.2 mi upstream from mouth, and 3.0 mi southwest of Rockford.

DRAINAGE AREA.--234 mi<sup>2</sup>.

PERIOD OF RECORD.--February 1952 to September 1982, October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 624.80 ft above sea level (levels by Johnson and Anderson, Inc.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation caused by dam 2 mi upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Sept. 12, 1986, reached a stage of 11.35 ft, from floodmark, and discharge of approximately 6,000 ft<sup>3</sup>/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	139	138	161	e140	453	166	242	297	173	256	119
2	196	151	139	170	e135	389	166	242	300	160	258	120
3	171	156	143	195	e135	334	166	243	288	199	217	125
4	164	159	145	221	e130	292	163	237	279	210	204	136
5	158	152	269	214	e130	260	160	218	278	191	201	133
6	154	144	266	200	e125	238	157	202	259	169	202	125
7	147	140	265	188	e125	227	158	193	244	154	188	120
8	142	138	266	176	e120	219	179	184	226	155	172	118
9	140	137	246	182	e120	212	199	369	212	173	156	117
10	138	137	213	195	e125	206	209	467	202	207	145	123
11	134	140	190	211	e125	200	209	499	198	227	137	138
12	132	139	179	213	e130	194	201	579	364	205	129	211
13	132	137	171	206	e130	192	194	552	538	184	126	194
14	131	135	172	176	e130	195	192	504	526	167	126	234
15	131	133	184	e170	e135	196	185	412	441	152	134	225
16	134	131	204	e160	e135	200	179	364	355	144	135	212
17	133	130	203	e155	e135	194	173	320	301	142	165	201
18	133	130	197	e155	e135	182	172	1410	259	138	175	175
19	134	131	173	e155	e135	181	175	1790	229	129	171	156
20	138	136	189	e155	e130	203	375	1480	215	125	148	155
21	139	138	170	e150	e140	221	639	1020	214	123	134	173
22	142	137	168	e150	e154	224	990	769	209	127	133	195
23	140	144	161	e150	e221	214	1090	620	196	127	152	331
24	138	172	e160	e150	378	201	836	496	187	125	151	298
25	137	167	e165	e150	494	192	613	414	186	120	150	298
26	134	173	e165	e150	621	184	474	353	196	117	139	273
27	132	166	e160	e150	624	184	385	317	186	119	132	245
28	132	155	e160	e150	590	181	322	329	177	138	126	203
29	132	148	159	e145	515	180	274	322	177	188	124	178
30	131	142	158	e145	---	175	244	315	179	224	125	166
31	136	---	162	e140	---	172	---	305	---	245	122	---
TOTAL	4436	4337	5740	5288	6342	6895	9645	15767	7918	5057	4933	5497
MEAN	143	145	185	171	219	222	322	509	264	163	159	183
MAX	201	173	269	221	624	453	1090	1790	538	245	258	331
MIN	131	130	138	140	120	172	157	184	177	117	122	117
CFSM	.61	.62	.79	.73	.93	.95	1.37	2.17	1.13	.70	.68	.78
IN.	.71	.69	.91	.84	1.01	1.10	1.53	2.51	1.26	.80	.78	.87

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	185	237	245	234	253	393	389	295	216	156	151	158
MAX	528	525	557	512	567	944	836	620	457	362	317	556	
(WY)	1982	1991	1992	1973	1976	1976	1967	1956	1989	1994	1994	1975	
MIN	100	118	126	116	107	222	175	122	108	83.8	83.2	97.7	
(WY)	1965	1965	1963	1970	1963	2000	1958	1958	1964	1964	1971	1966	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1952 - 2000
ANNUAL TOTAL	82988	81855	
ANNUAL MEAN	227	224	242
HIGHEST ANNUAL MEAN			360
LOWEST ANNUAL MEAN			155
HIGHEST DAILY MEAN	1020	1790	3290
LOWEST DAILY MEAN	111	117	49
ANNUAL SEVEN-DAY MINIMUM	113	123	58
INSTANTANEOUS PEAK FLOW		1950	3540
INSTANTANEOUS PEAK STAGE		8.62	9.29
INSTANTANEOUS LOW FLOW			28
ANNUAL RUNOFF (CFSM)	.97	.96	1.04
ANNUAL RUNOFF (INCHES)	13.19	13.01	14.07
10 PERCENT EXCEEDS	361	358	420
50 PERCENT EXCEEDS	194	173	192
90 PERCENT EXCEEDS	131	130	110

(a) 1976, 1991.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE1/4 sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft upstream from bridge on Fulton Street in Grand Rapids, 1.7 mi upstream from Plaster Creek, and at mile 41.

DRAINAGE AREA.--4,900 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft above sea level (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi downstream at datum 2.99 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1950	1180	1430	1570	e1350	5210	2140	4170	7310	3400	3660	1700
2	1800	1200	1390	1640	e1300	4990	1920	4300	6900	3060	3520	1790
3	1640	1380	1460	1810	e1350	4720	1870	4190	6550	3340	3310	1700
4	1590	1430	1550	1910	e1500	4370	1760	4030	5960	3590	2960	1570
5	1580	1540	2180	1900	e1500	4110	1860	3830	5410	3960	3130	1460
6	1560	1330	2600	2210	e1450	3910	1890	3580	4880	3760	3560	1270
7	1520	1500	2730	1890	e1450	3650	2190	3440	4600	3610	3690	1430
8	1850	1350	2970	1650	e1300	3370	2060	3240	4330	3430	3830	1380
9	1550	1290	2490	1810	1280	3320	2200	4210	4190	3010	3710	1320
10	1490	1320	2430	1880	1480	3090	2150	4880	3980	2990	3370	1360
11	1210	1440	2310	2060	e1600	2940	2400	5720	3840	3280	3080	1580
12	986	1380	2120	2210	e1450	2530	2460	6010	e4290	3330	2790	2950
13	1040	1480	2050	2270	1370	2550	2580	6720	e5940	3260	2440	2900
14	1250	1340	1940	1820	e1400	2470	2570	7490	6170	3200	2060	2690
15	1170	1270	2200	1930	e1550	2310	2420	7010	6280	2780	1990	2890
16	1320	1250	2170	e1900	e1500	2230	2310	6240	6090	2570	2080	2900
17	1290	1300	2450	e1400	e1400	2470	2360	5660	5550	2530	2110	3010
18	1330	1400	2410	e1550	e1400	2230	2180	10100	4970	2170	2280	2560
19	1220	1430	2140	e1500	e1400	2090	2020	15200	4640	2030	2170	2240
20	1300	1430	2140	e1400	1420	2400	3720	17300	4220	2020	2000	2180
21	1160	1470	2200	e1450	e1500	2640	7690	19300	3890	1870	1940	2250
22	1240	1410	1530	e1400	1580	2820	10000	21000	3920	1800	1820	2950
23	1340	1500	1160	e1500	1980	2340	10800	20700	3560	1750	1860	5470
24	1240	1590	e1300	e1550	2960	2350	10700	18700	3020	1640	1930	8400
25	1150	1760	e1500	e1550	4230	2470	9960	16400	2980	1690	2070	e9320
26	1310	1660	1490	e1500	4690	2650	9060	14300	3160	1620	2020	e8690
27	1190	1610	e1600	e1550	5080	2440	8070	12600	3290	1560	1970	e7380
28	1150	1620	e1550	e1500	5660	2230	6630	11200	3180	1640	1870	5880
29	1200	1540	1760	e1450	5530	2360	5520	9810	3350	2000	1710	4860
30	1190	1490	1760	e1300	---	2030	4810	8610	3500	2420	1690	4310
31	1230	---	1680	e1450	---	2070	---	7910	---	3510	1740	---
TOTAL	42046	42890	60690	52510	61660	91360	128300	287850	139950	82820	78360	99780
MEAN	1356	1430	1958	1694	2126	2947	4277	9285	4665	2672	2528	3326
MAX	1950	1760	2970	2270	5660	5210	10800	21000	7310	3960	3830	9320
MIN	986	1180	1160	1300	1280	2030	1760	3240	2980	1560	1690	1270
CFSM	.28	.29	.40	.35	.43	.60	.87	1.89	.95	.55	.52	.68
IN.	.32	.33	.46	.40	.47	.69	.97	2.19	1.06	.63	.59	.76

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 2000, BY WATER YEAR (WY)

	MEAN	2395	2910	3360	3717	4314	7595	7016	4774	3378	2193	1736	1974
MAX	13630	7966	8794	12020	14720	21580	17900	15650	15670	7885	5225	7600	
(WY)	1987	1991	1991	1973	1938	1904	1947	1956	1905	1994	1994	1975	
MIN	906	1004	1080	1069	1079	1858	1759	1459	930	650	617	949	
(WY)	1965	1931	1964	1963	1963	1931	1931	1931	1934	1934	1934	1964	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1901 - 2000
ANNUAL TOTAL	1079060	1168216	
ANNUAL MEAN	2956	3192	3775
HIGHEST ANNUAL MEAN			6314
LOWEST ANNUAL MEAN			1264
HIGHEST DAILY MEAN	17000	21000	53300
LOWEST DAILY MEAN	763	986	381
ANNUAL SEVEN-DAY MINIMUM	812	1180	438
INSTANTANEOUS PEAK FLOW		21400	54000
INSTANTANEOUS PEAK STAGE		17.42	(a)22.49
INSTANTANEOUS LOW FLOW		887	
ANNUAL RUNOFF (CFSM)	.60	.65	.77
ANNUAL RUNOFF (INCHES)	8.19	8.87	10.47
10 PERCENT EXCEEDS	5430	6030	7630
50 PERCENT EXCEEDS	2090	2170	2570
90 PERCENT EXCEEDS	1150	1340	1200

(a) Present datum; from graph based on gage readings.

(e) Estimated.

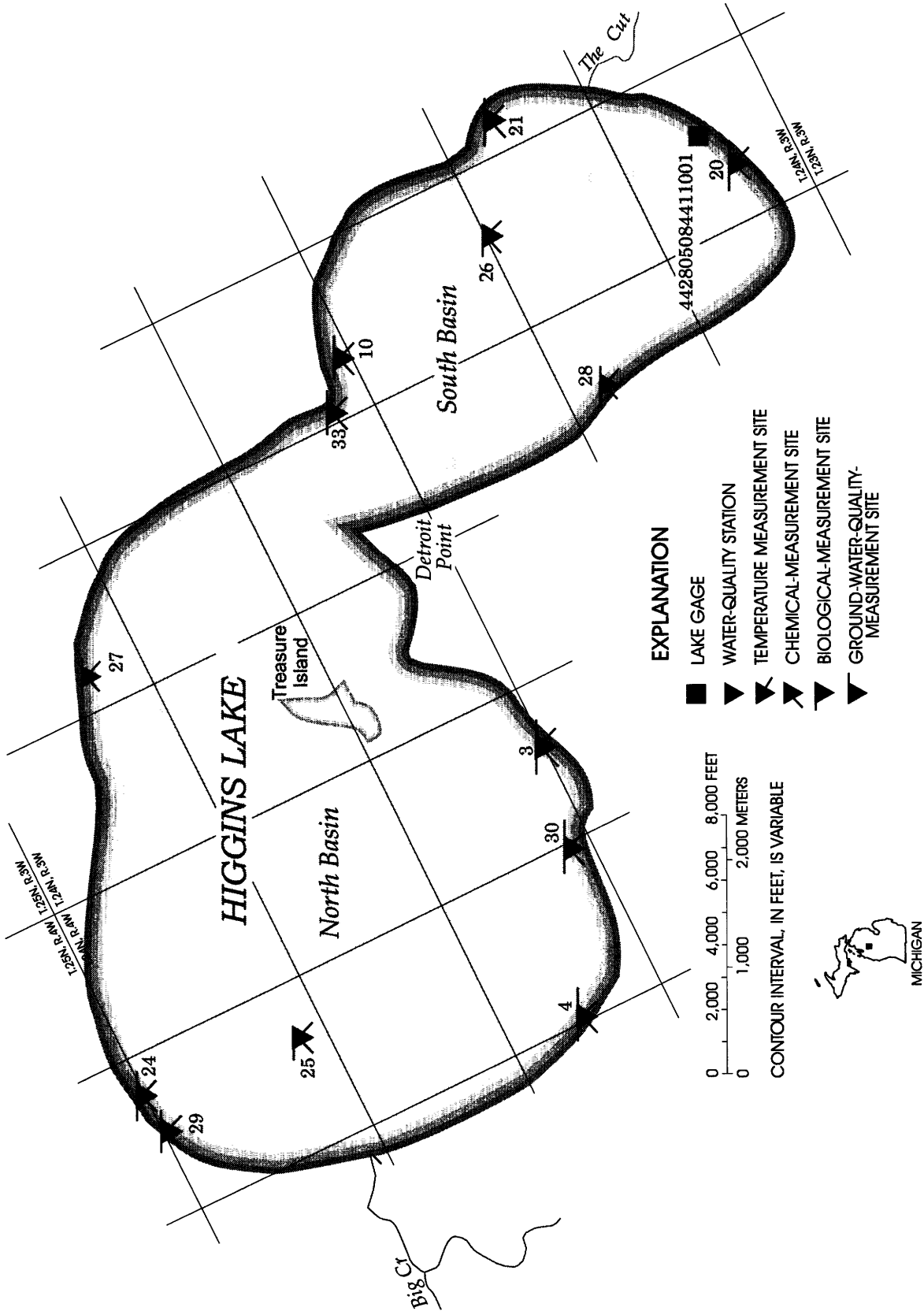


Figure 8. Identification number and location of water-level station and surface-water-sampling sites in Higgins Lake.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

442805084411001 HIGGINS LAKE NEAR ROSCOMMON, MI

LOCATION.--Lat 44°25'35", long 84°40'55", in NW1/4 SW1/4 sec.33, T.24 N., R.3 W., Roscommon County, Hydrologic Unit 04060102, at South Higgins Lake State Park, 6.7 mi southwest of Roscommon.

DRAINAGE AREA.--58 mi<sup>2</sup>, approximately.

## WATER-LEVEL RECORDS

PERIOD OF RECORD.--September 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,148.74 ft above sea level. Sept. 1, 1942 to Nov. 27, 1942, nonrecording gage at different datum. Nov. 27, 1942 to June 9, 1988, water-stage recorder at same datum. June 9, 1988 to Nov. 6, 1998, nonrecording gage at same datum.

REMARKS.--Inlets are Big Creek and Little Creek. The outlet is "The Cut". Lake elevation controlled by dam. Established legal level; summer, 1,154.11 ft, winter, 1,153.61 ft, above sea level. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 6.23 ft, June 26, 1954; minimum 4.32 ft, Oct. 3, 4, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.78 ft, June 1; minimum, 4.81 ft, Dec. 2.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.07	5.12	4.87	4.86	4.95	5.04	5.22	5.38	5.53	5.43	5.48	5.34
2	5.08	5.15	4.86	4.88	4.94	5.05	5.23	5.39	5.62	5.43	5.50	5.34
3	5.07	5.14	4.87	4.89	4.95	5.05	5.23	5.38	5.59	5.42	5.48	5.34
4	5.07	5.08	4.91	4.93	4.95	5.05	5.26	5.38	5.57	5.41	5.46	5.33
5	5.06	5.07	4.98	4.91	4.95	5.05	5.22	5.39	5.55	5.40	5.44	5.30
6	5.06	5.07	4.97	4.91	4.94	5.06	5.24	5.39	5.53	5.40	5.43	5.29
7	5.03	5.05	4.94	4.91	4.94	5.06	5.24	5.40	5.51	5.38	5.43	5.27
8	5.02	5.04	4.94	4.90	4.94	5.06	5.27	5.41	5.50	5.36	5.43	5.28
9	5.03	5.03	4.93	4.90	4.94	5.11	5.26	5.44	5.51	5.39	5.44	5.27
10	5.04	5.03	4.97	4.91	4.95	5.12	5.26	5.46	5.50	5.40	5.43	5.31
11	5.04	5.01	4.92	4.93	4.97	5.12	5.25	5.45	5.54	5.39	5.42	5.34
12	5.02	5.00	4.91	4.92	4.96	5.12	5.25	5.51	5.52	5.38	5.41	5.36
13	5.15	4.99	4.91	4.92	4.97	5.12	5.25	5.60	5.50	5.37	5.40	5.33
14	5.15	5.03	4.91	4.92	4.98	5.13	5.25	5.57	5.49	5.38	5.40	5.34
15	5.14	4.98	4.92	4.91	4.98	5.15	5.26	5.55	5.52	5.36	5.41	5.34
16	5.14	4.97	4.94	4.92	4.99	5.16	5.27	5.56	5.50	5.35	5.39	5.30
17	5.14	4.92	4.92	4.91	4.98	5.16	5.27	5.58	5.49	5.35	5.37	5.27
18	5.13	4.91	4.91	4.93	4.98	5.15	5.28	5.65	5.46	5.33	5.37	5.25
19	5.12	4.90	4.90	4.93	4.98	5.15	5.28	5.62	5.44	5.29	5.35	5.24
20	5.12	4.90	4.91	4.94	4.98	5.17	5.32	5.61	5.42	5.29	5.33	5.26
21	5.10	4.89	4.91	4.94	4.97	5.18	5.36	5.60	5.43	5.29	5.32	5.28
22	5.13	4.89	4.90	4.94	4.97	5.19	5.36	5.59	5.44	5.27	5.31	5.26
23	5.17	4.90	4.89	4.94	4.97	5.19	5.36	5.60	5.42	5.26	5.32	5.28
24	5.13	4.93	4.89	4.94	4.99	5.19	5.36	5.60	5.42	5.25	5.31	5.28
25	5.10	4.92	4.88	4.95	5.00	5.21	5.36	5.59	5.42	5.24	5.30	5.26
26	5.10	4.91	4.92	4.95	5.00	5.20	5.36	5.57	5.47	5.24	5.33	5.24
27	5.09	4.91	4.88	4.95	5.02	5.22	5.36	5.54	5.51	5.30	5.34	5.24
28	5.08	4.90	4.88	4.95	5.02	5.24	5.36	5.53	5.49	5.39	5.33	5.21
29	5.08	4.91	4.87	4.95	5.02	5.25	5.37	5.52	5.48	5.40	5.34	5.20
30	5.09	4.89	4.88	4.94	---	5.23	5.36	5.52	5.46	5.41	5.34	5.19
31	5.12	---	4.86	4.95	---	5.22	---	5.53	---	5.47	5.33	---
MEAN	5.09	4.98	4.91	4.92	4.97	5.14	5.29	5.51	5.49	5.36	5.39	5.28
MAX	5.17	5.15	4.98	4.95	5.02	5.25	5.37	5.65	5.62	5.47	5.50	5.36
MIN	5.02	4.89	4.86	4.86	4.94	5.04	5.22	5.38	5.42	5.24	5.30	5.19

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued  
WATER-QUALITY RECORDS

PERIOD OF RECORD.--May 1995 to current year.

REMARKS.--Samples for water analysis were collected from a pump sampler. All field parameters were measured on site with a water-quality multiprobe meter.

WATER-QUALITY DATA

DATE	TIME	OXYGEN, DIS- SOLVED (MGL) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLO- RIDE, DIS- SOLVED (MGL AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MGL AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MGL AS N) (00623)	
442748084444501 HIGGINS LAKE, SITE 3, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 44 45W)									
JUN 2000 07...	1015	9.6	8.0	257	16.0	8.3	.009	.12	
JUL 26...	1100	8.8	7.9	243	20.5	8.4	.004	.14	
442803084461201 HIGGINS LAKE, SITE 4, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 46 12W)									
JUN 2000 07...	1245	10.0	7.9	255	17.0	8.4	.010	.10	
JUL 24...	1530	--	--	--	--	8.4	.003	.14	
442803084411601 HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)									
JUN 2000 06...	1130	9.7	8.0	251	14.0	8.1	.013	.17	
JUL 25...	1330	8.3	7.9	246	24.0	7.8	.004	.13	
442533084410601 HIGGINS LAKE, SITE 20, NEAR ROSCOMMON,MI (LAT 44 25 33N LONG 084 41 06W)									
JUN 2000 05...	1400	10.0	8.0	250	16.0	7.9	<.002	.14	
JUL 25...	1115	8.6	7.9	244	21.5	7.7	.008	.16	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MGL AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MGL AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MGL AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MGL AS P) (00671)	PHOS- PHORUS TOTAL (MGL AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MGL) (00500)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
442748084444501 HIGGINS LAKE, SITE 3, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 44 45W)									
JUN 2000 07...	.024	.003	<.006	.001	<.008	141	.30	E10	
JUL 26...	.008	<.001	<.006	.001	<.008	144	.70	E11	
442803084461201 HIGGINS LAKE, SITE 4, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 46 12W)									
JUN 2000 07...	.025	<.001	<.006	.001	E.004	145	2.0	E9.7	
JUL 24...	<.005	<.001	<.006	.002	E.004	145	1.0	<16	
442803084411601 HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)									
JUN 2000 06...	<.005	<.001	E.004	<.001	<.008	144	.20	E15	
JUL 25...	<.005	.001	<.006	.002	E.004	143	1.1	E10	
442533084410601 HIGGINS LAKE, SITE 20, NEAR ROSCOMMON,MI (LAT 44 25 33N LONG 084 41 06W)									
JUN 2000 05...	<.005	<.001	E.004	<.001	<.008	147	.30	21	
JUL 25...	<.005	.001	<.006	.002	E.004	146	.90	<16	

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	OXYGEN, DIS- SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L ASN) (00623)	
442640084400001 HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)									
JUN 2000 06...	1015	9.5	8.0	249	13.0	8.4	.027	.16	
JUL 25...	1245	8.4	8.0	242	22.0	7.9	.005	.17	
443027084460601 HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)									
JUN 2000 07...	1345	10.1	7.9	269	18.5	11	.009	.12	
JUL 24...	1400	--	--	--	--	10	.002	.17	
442940084414901 HIGGINS LAKE, SITE 27, NEAR ROSCOMMON, MI (LAT 44 29 40N LONG 084 41 49W)									
JUN 2000 06...	1400	9.6	8.0	258	16.5	8.7	.011	.15	
JUL 24...	1100	--	--	--	--	8.4	.011	.16	
442629084421701 HIGGINS LAKE, SITE 28, NEAR ROSCOMMON, MI (LAT 44 26 29N LONG 084 42 17W)									
JUN 2000 05...	1530	9.6	8.1	254	16.0	8.2	.002	.13	
JUL 25...	1015	8.4	7.7	248	21.0	7.8	.007	.14	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS P) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
442640084400001 HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)									
JUN 2000 06...	<.005	<.001	<.006	<.001	E.005	148	.30	19	
JUL 25...	<.005	<.001	<.006	.001	E.005	145	1.1	<16	
443027084460601 HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)									
JUN 2000 07...	.038	.001	<.006	.001	<.008	149	.20	E11	
JUL 24...	.007	<.001	<.006	.002	E.004	147	1.1	<16	
442940084414901 HIGGINS LAKE, SITE 27, NEAR ROSCOMMON, MI (LAT 44 29 40N LONG 084 41 49W)									
JUN 2000 06...	.010	<.001	<.006	<.001	<.008	145	.30	E7.5	
JUL 24...	.012	<.001	E.003	.003	<.008	144	.90	E7.3	
442629084421701 HIGGINS LAKE, SITE 28, NEAR ROSCOMMON, MI (LAT 44 26 29N LONG 084 42 17W)									
JUN 2000 05...	<.005	<.001	E.003	<.001	E.006	153	.30	19	
JUL 25...	<.005	<.001	<.006	.001	.010	147	2.6	E10	

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	OXYGEN, DIS- SOLVED (MG/L (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L ASN) (00623)	
443019084461301 HIGGINS LAKE, SITE 29, NEAR ROSCOMMON, MI (LAT 44 30 19N LONG 084 46 13W)									
JUN 2000 05...	1115	9.7	8.0	289	14.5	14	.014	.11	
JUL 24...	1245	--	--	--	--	8.3	.003	.15	
442748084450601 HIGGINS LAKE, SITE 30, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 45 06W)									
JUN 2000 07...	1115	10.0	8.0	252	17.0	7.8	.006	.13	
JUL 26...	1230	9.2	8.0	239	21.5	7.7	.004	.16	
442815084412901 HIGGINS LAKE, SITE 33, NEAR ROSCOMMON, MI (LAT 44 28 15N LONG 084 41 29W)									
JUN 2000 06..	1300	9.4	8.0	251	15.5	8.1	.014	.17	
JUL 26...	1000	7.9	7.8	244	21.0	7.8	.003	.15	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
443019084461301 HIGGINS LAKE, SITE 29, NEAR ROSCOMMON, MI (LAT 44 30 19N LONG 084 46 13W)									
JUN 2000 05...	.028	<.001	E.004	.004	.013	180	2.7	20	
JUL 24...	.007	.001	<.006	.002	.011	150	2.0	<16	
442748084450601 HIGGINS LAKE, SITE 30, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 45 06W)									
JUN 2000 07...	.014	.001	<.006	.001	E.004	139	.30	E9.4	
JUL 26...	<.005	<.001	<.006	.001	E.005	141	1.0	E11	
442815084412901 HIGGINS LAKE, SITE 33, NEAR ROSCOMMON, MI (LAT 44 28 15N LONG 084 41 29W)									
JUN 2000 06..	<.005	<.001	<.006	<.001	<.008	141	.30	E7.5	
JUL 26...	<.005	<.001	<.006	.001	<.008	145	1.5	E12	

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	OXYGEN, DIS- SOLVED (MG/L (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- (MG/L AS N) (00623)	
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)									
JUN 2000 07...	1030	1.1	7.5	468	15.5	63	.014	.29	
JUL 26...	1115	6.2	7.1	694	19.0	68	.009	E.10	
442803084461204 SITE 4, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 03N LONG 084 46 12W)									
JUN 2000 07...	1300	.9	7.0	449	16.0	44	--	1.8	
JUL 24...	1545	--	--	--	--	29	.015	E.10	
442803084411604 SITE 10, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 03N LONG 084 41 16W)									
JUN 2000 06...	1145	.7	7.6	329	14.5	14	.022	.12	
JUL 25...	1345	.4	7.6	324	21.5	24	.077	.17	
442533084410604 SITE 20, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)									
JUN 2000 05...	1415	1.0	7.3	520	18.0	<.29	.012	.15	
JUL 25...	1130	.4	6.9	682	21.5	5.1	.295	.60	
442640084400004 SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)									
JUN 2000 06...	1030	1.8	7.3	583	14.0	75	.012	.13	
JUL 25...	1300	.4	7.4	703	21.5	81	.016	.14	
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)									
JUN 2000 07...	1400	2.3	7.2	364	14.0	41	.004	E.10	
JUL 24...	1415	--	--	--	--	69	.023	E.10	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	E. COLI WATER WHOLE TOTAL UREASE (COL / 100 ML) (31633)	BORON, DIS- SOLVED (UG/L ASB) (01020)
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)									
JUN 2000 07...	.245	.008	.064	.056	.075	319	K4	73	
JUL 26...	1.03	<.001	<.006	.003	.011	396	K1	39	
442803084461204 SITE 4, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 03N LONG 084 46 12W)									
JUN 2000 07...	.009	<.001	.043	.039	.054	241	K1	23	
JUL 24...	.265	.001	.055	.045	.084	224	K1	E9.9	
442803084411604 SITE 10, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 03N LONG 084 41 16W)									
JUN 2000 06...	<.005	.001	.007	.005	.020	194	<1	19	
JUL 25...	<.005	.001	.008	.003	.016	192	K6	E9.2	
442533084410604 SITE 20, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)									
JUN 2000 05...	.005	.001	.006	<.001	.011	339	K3	23	
JUL 25...	<.005	.001	E.004	.005	.018	416	K1	23	
442640084400004 SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)									
JUN 2000 06...	<.005	<.001	.046	.043	.057	348	K1	102	
JUL 25...	<.005	<.001	.055	.047	.067	452	K8	147	
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)									
JUN 2000 07...	2.62	.002	.056	.048	.070	223	K2	39	
JUL 24...	.034	<.001	.007	.007	.023	321	<1	<16	



STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	OXYGEN, DIS- SOLVED (MGL) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLO- RIDE, DIS- SOLVED (MGL AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MGL AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MGL AS N) (00623)	
442940084414904 SITE 27, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 40N LONG 084 41 49W)									
JUN 2000 06...	1415	.4	7.0	334	14.5	25	.060	.24	
JUL 24...	1045	--	--	--	--	18	.056	.31	
442629084421704 SITE 28, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 29N LONG 084 42 17W)									
JUN 2000 05...	1545	8.2	7.5	473	15.5	39	.003	E.10	
JUL 25...	1030	4.9	7.0	543	21.0	28	.017	.13	
443019084461304 SITE 29, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 19N LONG 084 46 13W)									
JUN 2000 05...	1130	5.9	7.3	319	15.0	25	.035	.20	
JUL 24...	1300	--	--	--	--	78	.027	.22	
442748084450604 SITE 30, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 45 06W)									
JUN 2000 07...	1130	4.6	7.3	818	16.5	110	.068	.13	
JUL 26...	1245	6.3	7.3	719	21.5	87	.004	.11	
442815084412904 SITE 33, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 15N LONG 084 41 29W)									
JUN 2000 06...	1315	.5	7.4	254	15.0	6.8	.093	.37	
JUL 26...	1015	.4	5.5	197	21.0	13	.615	1.0	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MGL AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MGL AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MGL AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MGL AS P) (00671)	PHOS- PHORUS TOTAL (MGL AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MGL) (00500)	E. COLI WATER WHOLE TOTAL UREASE (COL/ 100 ML) (31633)	BORON, DIS- SOLVED (UG/L ASB) (01020)
442940084414904 SITE 27, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 40N LONG 084 41 49W)									
JUN 2000 06...	.005	<.001	.007	.004	.052	225	K1	E7.4	
JUL 24...	.484	.004	.011	.007	.028	174	<1	<16	
442629084421704 SITE 28, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 29N LONG 084 42 17W)									
JUN 2000 05...	.259	<.001	.006	<.001	.028	285	--	23	
JUL 25...	.077	.001	E.004	.004	.022	288	120	E15	
443019084461304 SITE 29, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 19N LONG 084 46 13W)									
JUN 2000 05...	.047	.003	.020	.012	.034	197	--	26	
JUL 24...	.012	.002	E.005	.005	.026	387	K3	52	
442748084450604 SITE 30, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 45 06W)									
JUN 2000 07...	1.73	.005	.013	.012	.032	442	150	20	
JUL 26...	2.25	<.001	<.006	.003	.023	410	K5	29	
442815084412904 SITE 33, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 15N LONG 084 41 29W)									
JUN 2000 06...	<.005	<.001	.037	.031	.118	174	25	<16	
JUL 26...	<.005	.001	.029	.023	.069	148	<3	18	

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

TOTAL WATER COLUMN (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)
MAY 2000	02... 1300	7.2	.16	.026	.028	<.001	<.006

DATE	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
MAY 02...	.002	<.008	145	11.1	.3	21

442955084453005 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

EPIILMNION (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
AUG 2000	21... 1415	7.7	.17	.005	<.005	<.001	<.006	<.001	<.008	8.30	3.0	E9

HYPOLIMNION (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
AUG 2000	21... 1345	7.8	.15	.010	.013	.004	<.006	<.001	<.008	2.5	E12

STREAMS TRIBUTARY TO LAKE MICHIGAN  
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued  
WATER-QUALITY DATA

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

TOTAL WATER COLUMN (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L ASP) (00666)
MAY 2000	02... 0945	7.2	.006	.17	<.005	<.001	<.006

DATE	TIME	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 105 DEG. C. TOTAL (MG/L) (00500)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
MAY 2000	02...	<.001	E.004	143	10.8	.50	21

442658084404405 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

EPIPLIMNION (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
AUG 2000	21... 1230	7.8	.005	.17	<.005	<.001	<.006	<.001	<.008	8.80	3.9	E11

HYPOLIMNION (COMPOSITE SAMPLE)

DATE	TIME	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	TUR- BID- ITY (NTU) (00076)	BORON, DIS- SOLVED (UG/L ASB) (01020)
AUG 2000	21... 1145	7.7	<.002	.15	<.005	<.001	<.006	<.001	E.005	2.8	<16

STREAMS TRIBUTARY TO LAKE MICHIGAN  
 HIGGINS LAKE NEAR ROSCOMMON, MI--Continued  
 WATER-QUALITY DATA

442955084453003 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

PHOTIC ZONE

DATE	TIME	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
MAY 2000 02...	1300	E.1	<.1
AUG 21...	1345	.3	<.1

442658084404403 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

PHOTIC ZONE

DATE	TIME	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
MAY 2000 02...	0945	E.2	<.1
AUG 21...	1230	.3	<.1

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

## WATER-QUALITY DATA

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

DATE	OXYGEN, DIS- SOLVED (MGL) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)
MAY 2000					
02...	12.1	8.0	250	8.0	.50
02...	12.3	8.0	249	7.5	10.0
02...	12.3	8.0	245	7.0	20.0
02...	12.4	8.1	244	6.5	30.0
02...	12.7	8.1	250	5.5	40.0
02...	12.7	8.1	250	5.5	50.0
02...	12.7	8.2	253	5.0	60.0
02...	12.7	8.1	245	5.0	70.0
02...	12.6	8.2	250	5.0	80.0
02...	12.5	8.2	250	5.0	90.0
02...	12.4	8.1	250	4.5	100.0
02...	12.3	8.2	243	4.5	110.0
02...	12.0	8.1	245	4.5	120.0
02...	11.9	8.1	245	4.5	130.0
02...	11.9	8.1	245	4.5	135.0
AUG					
21...	8.1	8.0	242	20.5	1.00
21...	8.2	8.0	242	20.5	10.0
21...	8.2	8.1	242	20.5	20.0
21...	8.2	8.1	242	20.0	30.0
21...	8.2	8.1	242	20.0	40.0
21...	9.0	8.1	244	18.0	45.0
21...	10.6	8.2	248	13.5	50.0
21...	10.1	8.1	248	12.0	55.0
21...	10.2	8.1	250	10.5	60.0
21...	7.9	7.9	254	9.0	70.0
21...	7.6	7.9	254	8.0	80.0
21...	7.6	7.8	260	7.5	90.0
21...	6.6	7.8	260	7.0	100.0
21...	5.5	7.7	260	6.5	110.0
21...	3.4	7.7	260	6.5	120.0
21...	2.9	7.6	270	6.5	132.0

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

DATE	OXYGEN, DIS- SOLVED (MGL) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)
MAY 2000					
01...	11.6	7.9	250	8.5	.50
01...	11.7	8.0	252	8.0	10.0
01...	11.7	8.0	252	7.5	20.0
01...	11.8	8.0	248	7.5	30.0
01...	12.1	8.0	249	6.0	40.0
01...	12.1	8.1	246	5.5	50.0
01...	12.1	8.1	247	5.5	60.0
01...	12.0	8.1	243	5.0	70.0
01...	12.1	8.1	245	4.5	80.0
01...	12.0	8.1	250	4.5	90.0
01...	12.0	8.1	243	4.5	95.0
AUG					
21...	7.7	7.3	243	20.5	1.00
21...	7.6	7.5	243	20.5	10.0
21...	7.8	7.7	243	20.5	20.0
21...	7.6	7.8	243	20.5	30.0
21...	7.2	7.8	243	20.5	35.0
21...	8.5	7.9	243	19.0	40.0
21...	10.2	8.0	243	14.5	45.0
21...	10.0	8.0	250	12.5	50.0
21...	9.3	8.0	250	11.5	55.0
21...	9.6	8.0	250	11.0	60.0
21...	8.9	7.9	250	10.0	70.0
21...	8.2	7.9	250	9.5	80.0
21...	5.1	7.7	260	9.0	90.0
21...	.8	7.6	270	8.5	98.0

## STREAMS TRIBUTARY TO LAKE MICHIGAN

442400084472801 HOUGHTON LAKE NEAR HOUGHTON LAKE HEIGHTS, MI

LOCATION.--Lat 44°24'16", long 84°47'28", in NW1/4 NW1/4 sec. 10, T.23 N., R.4 W., Roscommon County, Hydrologic Unit 04060102, on right bank of Muskegon River at upstream side of bridge on Old U.S. Highway 27, 0.4 mi downstream from Houghton Lake, and 5.2 mi north of Houghton Lake Heights.

DRAINAGE AREA.--222 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to September 1991, September 1993 to current year, except winter period of 1942-43.

GAGE.--Water-stage recorder. Datum of gage is 1,130.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1960, nonrecording gage at datum 6.21 ft higher. Water-stage recorder Sept. 28, 1960 to Sept. 30, 1991. September 1993 to Nov. 26, 1996, nonrecording gage.

REMARKS.--Backus Creek and "The Cut" from Higgins Lake, join about 1 mi upstream from Houghton Lake and become the major inlet. There are also many small tributaries which feed the lake. The outlet is Muskegon River. Houghton Lake is the largest inland lake in Michigan. Established legal level, summer, 1,138.1 ft, minimum winter, 1,137.6 ft, above sea level. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 10.18 ft, Apr. 23, 1985; minimum observed, 6.95 ft, Sept. 3, 5, Nov. 8, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 9.07 ft, May 19; minimum, 7.20 ft, Nov. 14.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.08	7.83	7.63	7.66	7.64	7.84	8.25	8.51	8.87	8.70	8.70	8.53
2	8.09	7.66	7.59	7.67	7.65	7.86	8.29	8.56	8.79	8.70	8.67	8.57
3	8.08	7.59	7.59	7.67	7.64	7.88	8.28	8.57	8.87	8.70	8.66	8.53
4	8.08	7.78	7.63	7.70	7.64	7.89	8.08	8.58	8.87	8.70	8.69	8.48
5	8.08	7.74	7.63	7.71	7.65	7.89	8.29	8.56	8.85	8.72	8.70	8.50
6	8.00	7.69	7.65	7.71	7.65	7.90	8.18	8.57	8.79	8.72	8.74	8.51
7	8.09	7.72	7.76	7.70	7.63	7.91	8.26	8.57	8.81	8.72	8.66	8.48
8	8.00	7.72	7.74	7.70	7.62	7.94	8.18	8.59	8.82	8.72	8.68	8.43
9	7.98	7.70	7.72	7.69	7.62	7.95	8.28	8.52	8.83	8.67	8.64	8.45
10	7.94	7.69	7.58	7.70	7.62	8.02	8.21	8.52	8.82	8.69	8.63	8.47
11	7.91	7.72	7.71	7.70	7.63	8.03	8.33	8.67	8.81	8.70	8.64	8.48
12	7.98	7.66	7.73	7.70	7.63	7.99	8.31	8.67	8.84	8.69	8.65	8.39
13	7.89	7.69	7.71	7.70	7.63	8.09	8.36	8.69	8.83	8.65	8.65	8.43
14	7.98	7.45	7.74	7.70	7.64	8.06	8.37	8.68	8.84	8.56	8.64	8.36
15	7.99	7.55	7.74	7.70	7.64	8.08	8.33	8.73	8.81	8.57	8.61	8.26
16	7.93	7.53	7.64	7.68	7.63	8.08	8.38	8.83	8.80	8.58	8.55	8.31
17	7.90	7.62	7.71	7.69	7.64	8.11	8.39	8.88	8.72	8.54	8.62	8.32
18	7.92	7.64	7.72	7.69	7.63	8.19	8.37	8.97	8.74	8.46	8.53	8.35
19	7.94	7.65	7.72	7.69	7.63	8.16	8.38	9.03	8.71	8.50	8.53	8.38
20	7.87	7.59	7.73	7.69	7.63	8.18	8.46	8.95	8.86	8.47	8.57	8.33
21	7.92	7.63	7.74	7.68	7.62	8.16	8.41	8.96	8.75	8.45	8.57	8.25
22	7.76	7.61	7.72	7.68	7.62	8.17	8.50	8.98	8.68	8.45	8.55	8.35
23	7.72	7.67	7.71	7.68	7.62	8.18	8.52	8.95	8.76	8.46	8.51	8.38
24	7.85	7.57	7.70	7.68	7.64	8.24	8.51	8.89	8.79	8.47	8.51	8.31
25	7.89	7.64	7.70	7.67	7.67	8.11	8.51	8.87	8.75	8.47	8.51	8.32
26	7.82	7.62	7.68	7.67	7.70	8.19	8.52	8.91	8.75	8.48	8.51	8.28
27	7.88	7.55	7.67	7.67	7.75	8.19	8.55	8.95	8.74	8.51	8.55	8.14
28	7.86	7.53	7.67	7.67	7.78	8.17	8.53	8.92	8.76	8.66	8.57	8.14
29	7.85	7.52	7.68	7.66	7.81	8.06	8.51	8.88	8.74	8.64	8.56	8.17
30	7.86	7.58	7.67	7.65	---	8.18	8.54	8.90	8.71	8.64	8.55	8.17
31	7.83	---	7.67	7.65	---	8.24	---	8.85	---	8.71	8.57	---
MEAN	7.93	7.64	7.69	7.68	7.65	8.06	8.37	8.76	8.79	8.60	8.60	8.37
MAX	8.09	7.83	7.76	7.71	7.81	8.24	8.55	9.03	8.87	8.72	8.74	8.57
MIN	7.72	7.45	7.58	7.65	7.62	7.84	8.08	8.51	8.68	8.45	8.51	8.14

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 441508085244001 LAKE MITCHELL-CADILLAC AT CADILLAC, MI

LOCATION.--Lat 44°14'21", long 85°27'17", in SW1/4 SW1/4 sec.6, T.21 N., R.9 W., Wexford County, Hydrologic Unit 04060102, on right bank of channel between lakes, at William Mitchell State Park, at Cadillac.

DRAINAGE AREA.--46.6 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1942 to December 1959, July 1960 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 1,283.41 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--The major inlet is Mitchell Creek. The outlet is Clam River. Lake elevation controlled by dam. Established legal levels; annual maximum level, 1,290.0 ft, minimum winter level, 1,288.9 ft, summer minimum level, 1,289.7 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.86 ft, Sept. 6, 1975; minimum observed, 4.62 ft, Oct. 4, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 7.13 ft, May 19; minimum observed, 5.85 ft, Feb. 22, 23.

## GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.29	6.35	6.18	6.05	5.97	6.23	6.75	6.79	6.81	6.35	6.05	6.17
2	6.29	6.33	6.17	6.05	5.99	6.29	6.75	6.79	6.95	6.33	6.07	6.17
3	6.29	6.31	6.21	6.07	5.99	6.31	6.73	6.79	6.93	6.33	6.11	6.17
4	6.31	6.29	6.31	6.07	5.99	6.33	6.73	6.79	6.93	6.31	6.13	6.17
5	6.29	6.29	6.32	6.05	5.99	6.35	6.71	6.77	6.91	6.29	6.17	6.13
6	6.29	6.27	6.31	6.10	5.99	6.37	6.65	6.77	6.89	6.29	6.21	6.15
7	6.27	6.25	6.31	6.05	5.99	6.39	6.65	6.75	6.83	6.27	6.25	6.13
8	6.27	6.23	6.31	6.05	5.99	6.43	6.65	6.75	6.79	6.27	6.25	6.11
9	6.27	6.21	6.31	6.05	5.99	6.47	6.65	6.79	6.75	6.25	6.25	6.11
10	6.27	6.21	6.29	6.05	5.99	6.53	6.63	6.79	6.73	6.23	6.25	6.13
11	6.27	6.21	6.27	6.05	5.99	6.59	6.59	6.79	6.69	6.23	6.25	6.15
12	6.27	6.19	6.27	6.05	5.99	6.59	6.57	6.83	6.69	6.23	6.25	6.19
13	6.34	6.19	6.27	6.05	5.99	6.59	6.65	6.89	6.65	6.23	6.25	6.19
14	6.33	6.19	6.27	6.05	5.91	6.61	6.65	6.91	6.55	6.21	6.25	6.19
15	6.31	6.17	6.27	6.05	5.99	6.61	6.61	6.89	6.53	6.21	6.25	6.19
16	6.37	6.17	6.27	6.03	5.99	6.63	6.65	6.99	6.51	6.19	6.25	6.19
17	6.35	6.15	6.27	6.03	5.97	6.65	6.67	6.97	6.49	6.15	6.23	6.17
18	6.34	6.15	6.27	6.03	5.95	6.65	6.67	7.11	6.45	6.15	6.23	6.17
19	6.33	6.13	6.25	6.01	5.95	6.65	6.67	7.13	6.43	6.13	6.21	6.17
20	6.35	6.15	6.23	6.01	5.93	6.69	6.75	7.11	6.41	6.11	6.21	6.17
21	6.37	6.13	6.23	6.01	5.89	6.71	6.77	7.11	6.43	6.11	6.21	6.17
22	6.35	6.13	6.21	5.99	5.85	6.73	6.85	7.09	6.41	6.09	6.19	6.17
23	6.35	6.15	6.19	5.99	5.85	6.75	6.83	7.09	6.39	6.09	6.19	6.17
24	6.39	6.25	6.19	5.97	5.87	6.75	6.81	7.09	6.39	6.07	6.17	6.17
25	6.42	6.25	6.17	5.97	5.89	6.77	6.81	7.07	6.37	6.07	6.17	6.17
26	6.43	6.23	6.15	5.97	5.91	6.79	6.77	7.05	6.37	6.07	6.17	6.17
27	6.41	6.23	6.13	5.97	6.05	6.83	6.77	6.93	6.37	6.07	6.17	6.17
28	6.39	6.21	6.11	5.97	6.13	6.83	6.77	6.91	6.37	6.05	6.17	6.17
29	6.37	6.20	6.09	5.97	6.19	6.81	6.77	6.89	6.35	6.05	6.17	6.17
30	6.35	6.19	6.07	5.97	---	6.79	6.77	6.85	6.35	6.05	6.17	6.17
31	6.35	---	6.05	5.97	---	6.77	---	6.83	---	6.05	6.17	---
MEAN	6.33	6.21	6.22	6.02	5.97	6.60	6.71	6.91	6.59	6.18	6.20	6.16
MAX	6.43	6.35	6.32	6.10	6.19	6.83	6.85	7.13	6.95	6.35	6.25	6.19
MIN	6.27	6.13	6.05	5.97	5.85	6.23	6.57	6.75	6.35	6.05	6.05	6.11

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW1/4 NW1/4 sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft downstream from bridge on 8 Mile Road, 0.5 mi north of Vogel Center, and 3.5 mi southeast of Falmouth.

DRAINAGE AREA.--243 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,130 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by dams upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	100	78	89	e85	180	111	80	146	77	80	61
2	71	95	79	91	87	155	112	81	180	75	94	63
3	71	93	82	99	82	130	111	79	202	76	99	62
4	68	93	96	98	81	119	114	77	181	76	75	63
5	66	92	115	94	83	111	113	80	156	76	67	61
6	63	91	130	93	81	106	113	78	146	78	66	58
7	63	89	108	92	78	105	111	75	139	75	67	58
8	63	92	97	89	80	107	113	e74	135	75	66	57
9	63	91	91	83	76	132	117	e85	132	76	66	57
10	63	89	91	98	83	146	116	97	129	75	66	59
11	62	87	99	106	80	119	118	93	131	74	64	65
12	61	87	100	103	75	106	109	140	135	70	63	75
13	72	87	100	80	74	100	95	348	132	69	62	72
14	87	87	99	e80	80	96	92	443	131	68	61	66
15	78	83	101	e80	82	103	92	336	127	68	65	70
16	73	74	102	e80	80	106	92	228	124	68	67	64
17	71	71	95	76	80	100	87	249	121	67	65	62
18	70	69	e90	75	77	94	87	325	118	65	65	61
19	73	69	85	e80	81	92	85	394	115	66	63	58
20	68	69	103	e80	79	94	94	385	113	65	61	61
21	70	69	69	e80	80	99	136	277	118	65	60	67
22	72	69	89	e80	84	99	146	207	107	66	61	69
23	78	70	e90	e80	100	96	124	187	91	66	64	77
24	88	85	e90	e80	135	95	105	178	86	64	64	84
25	84	95	e90	e85	192	95	95	170	83	65	63	73
26	75	86	e90	e85	254	94	89	163	83	64	71	67
27	77	83	e90	e85	372	93	86	161	89	e65	85	64
28	88	81	e90	e85	399	93	84	154	84	e85	77	61
29	90	79	90	e85	259	98	82	149	82	75	68	61
30	95	79	89	e85	---	107	80	144	80	71	64	60
31	103	---	90	e85	---	113	---	142	---	77	62	---
TOTAL	2304	2504	2908	2691	3479	3383	3109	5679	3696	2202	2121	1936
MEAN	74.3	83.5	93.8	86.8	120	109	104	183	123	71.0	68.4	64.5
MAX	103	100	130	106	399	180	146	443	202	85	99	84
MIN	61	69	69	75	74	92	80	74	80	64	60	57
CFSM	.31	.34	.39	.36	.49	.45	.43	.75	.51	.29	.28	.27
IN.	.35	.38	.45	.41	.53	.52	.48	.87	.57	.34	.32	.30

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2000, BY WATER YEAR (WY)

	MEAN	115	133	135	122	123	190	235	153	113	90.3	84.0	98.0
MAX	275	248	259	187	194	389	396	245	218	238	185	281	281
(WY)	1987	1986	1992	1993	1988	1976	1976	1976	1996	1969	1969	1985	1985
MIN	62.3	70.3	64.5	62.7	63.5	100	104	67.9	57.0	53.0	58.1	59.9	59.9
(WY)	1967	1977	1977	1977	1977	1978	2000	1977	1977	1977	1978	1981	1981

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1966 - 2000

ANNUAL TOTAL	34759	36012	
ANNUAL MEAN	95.2	98.4	133
HIGHEST ANNUAL MEAN			185
LOWEST ANNUAL MEAN			81.2
HIGHEST DAILY MEAN	233	443	1680
LOWEST DAILY MEAN	57	57	47
ANNUAL SEVEN-DAY MINIMUM	58	59	50
INSTANTANEOUS PEAK FLOW		459	1710
INSTANTANEOUS PEAK STAGE		4.55	7.31
INSTANTANEOUS LOW FLOW		(a)51	(a)29
ANNUAL RUNOFF (CFSM)	.39	.40	.55
ANNUAL RUNOFF (INCHES)	5.32	5.51	7.43
10 PERCENT EXCEEDS	129	137	221
50 PERCENT EXCEEDS	88	85	110
90 PERCENT EXCEEDS	63	64	66

(a) Result of freezeup.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW1/4 NE1/4 sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi upstream from Twin Creek, and at mile 123.9.

DRAINAGE AREA.--1,433 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M), WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft above sea level. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft and 500 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by dams upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	754	702	635	e550	e575	2670	888	747	1260	660	622	442
2	737	716	646	e580	e575	2400	873	727	1480	630	605	443
3	732	701	655	e620	585	2150	846	702	1590	601	640	480
4	704	697	698	661	586	1980	810	673	1500	578	659	473
5	682	699	880	654	e580	1840	784	651	1360	560	607	454
6	662	686	1020	657	e580	1690	767	630	1260	548	573	458
7	635	660	1030	647	582	1540	751	611	1190	537	547	458
8	620	647	999	e620	e580	1420	766	602	1110	519	528	418
9	610	655	963	605	568	1350	786	1040	1040	514	573	414
10	604	652	932	662	580	1380	814	1460	979	513	551	425
11	587	633	896	823	576	1360	836	1340	961	504	516	452
12	578	633	874	874	e550	1280	848	1380	990	481	489	478
13	583	641	848	687	548	1220	844	1890	1010	465	471	480
14	599	635	821	656	e560	1160	814	2030	1020	452	460	480
15	626	622	814	635	e570	1160	787	2010	1080	440	489	457
16	652	613	823	e600	589	1150	760	1980	1040	440	542	480
17	656	603	781	e580	e600	1090	745	2100	984	433	517	462
18	657	593	781	e550	604	1010	741	2680	926	420	500	462
19	652	588	717	e520	e600	972	729	3150	886	407	483	457
20	656	584	719	e520	598	986	808	3180	868	399	465	455
21	650	581	641	e520	e600	985	1250	3090	947	406	445	468
22	669	581	460	e550	614	975	1700	2760	910	409	448	480
23	691	592	395	e550	731	950	1630	2420	854	408	535	564
24	699	660	e380	e550	926	924	1450	2210	794	403	512	625
25	707	666	e370	e550	1560	919	1240	2050	756	395	476	602
26	711	674	e370	e550	2290	895	1090	1900	746	385	453	569
27	696	665	e400	e550	3430	887	975	1760	842	397	455	530
28	679	663	e450	e550	3100	887	894	1620	778	580	459	507
29	684	655	e550	e550	2840	903	830	1480	720	626	464	487
30	686	636	e550	e550	---	903	778	1380	685	590	463	480
31	688	---	e550	e550	---	903	---	1310	---	644	452	---
TOTAL	20546	19333	21648	18721	27677	39939	27834	51563	30566	15344	15999	14395
MEAN	663	644	698	604	954	1288	928	1663	1019	495	516	480
MAX	754	716	1030	874	3430	2670	1700	3180	1590	660	659	625
MIN	578	581	370	520	548	887	729	602	685	385	445	414
CFSM	.46	.45	.49	.42	.67	.90	.65	1.16	.71	.35	.36	.33
IN.	.53	.50	.56	.49	.72	1.04	.72	1.34	.79	.40	.42	.37

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

MEAN	778	998	975	875	908	1581	2212	1353	976	683	552	634
MAX	2402	2656	2270	1700	2353	4115	3869	2709	2945	2901	1243	2269
(WY)	1987	1992	1992	1973	1938	1976	1971	1947	1945	1957	1969	1975
MIN	374	433	499	418	327	594	928	548	409	327	316	325
(WY)	1949	1950	1977	1936	1936	1940	2000	1977	1988	1934	1941	1949

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1931 - 2000

ANNUAL TOTAL	300108	303565	(a)1051
ANNUAL MEAN	822	829	1532
HIGHEST ANNUAL MEAN			1990
LOWEST ANNUAL MEAN			(b)613
HIGHEST DAILY MEAN	2030	3430	8770
LOWEST DAILY MEAN	341	370	252
ANNUAL SEVEN-DAY MINIMUM	349	400	274
INSTANTANEOUS PEAK FLOW		3600	9040
INSTANTANEOUS PEAK STAGE		10.52	14.99
INSTANTANEOUS LOW FLOW		(c)328	(c)164
ANNUAL RUNOFF (CFSM)	.57	.58	.73
ANNUAL RUNOFF (INCHES)	7.79	7.88	9.97
10 PERCENT EXCEEDS	1320	1430	1950
50 PERCENT EXCEEDS	700	655	802
90 PERCENT EXCEEDS	446	455	445

(a) Does not include water years 1931, 1934.

(b) Estimated 584 ft<sup>3</sup>/s, water year 1931.

(c) Result of freezeup.

(e) Estimated.

[illegible]

[illegible]

[illegible]

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121640 MUSKEGON RIVER NEAR BIG RAPIDS, MI--Continued

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	PENDI-METH-ALIN WAT FLT 0.7 U GF REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF REC (UG/L) (82664)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PRON-AMIDE WATER FLTRD 0.7 U GF REC (UG/L) (82676)	PROPA-CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO-PANIL WATER FLTRD 0.7 U GF REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF REC (UG/L) (82685)
FEB 2000									
28...	1445	--	--	--	--	--	--	--	--
MAR									
02...	1500	--	--	--	--	--	--	--	--
23...	1000	--	--	--	--	--	--	--	--
APR									
17...	1130	--	--	--	--	--	--	--	--
25...	1130	--	--	--	--	--	--	--	--
MAY									
19...	1400	--	--	--	--	--	--	--	--
22...	1400	<.004	<.005	<.002	<.018	<.003	<.007	<.004	<.013
AUG									
10...	1445	--	--	--	--	--	--	--	--

DATE	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU-THIURON WATER FLTRD 0.7 U GF REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF REC (UG/L) (82675)	THIO-BENCARB WATER FLTRD 0.7 U GF REC (UG/L) (82681)	TRIAL-LATE WATER FLTRD 0.7 U GF REC (UG/L) (82678)	TRI-FLUR-ALIN WAT FLT 0.7 U GF REC (UG/L) (82661)	SEDI-MENT DIS-CHARGE, BEDLOAD (TONS/ DAY) (80225)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .062 MM (80226)
FEB 2000									
28...	--	--	--	--	--	--	--	35	0
MAR									
02...	--	--	--	--	--	--	--	49	0
23...	--	--	--	--	--	--	--	10	<1
APR									
17...	--	--	--	--	--	--	--	20	0
25...	--	--	--	--	--	--	--	7.6	0
MAY									
19...	--	--	--	--	--	--	--	39	<1
22...	.012	<.010	<.007	<.013	<.002	<.001	<.002	74	<1
AUG									
10...	--	--	--	--	--	--	--	9.8	<1

DATE	SED. BEDLOAD SIEVE DIAM. % FINER THAN .125 MM (80227)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .250 MM (80228)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .500 MM (80229)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 1.00 MM (80230)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 2.00 MM (80231)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 4.00 MM (80232)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 16.0 MM (80234)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
FEB 2000									
28...	1	20	86	97	99	100	100	132	20
MAR									
02...	0	10	82	92	94	96	100	87	16
23...	0	7	76	91	97	100	100	17	54
APR									
17...	0	2	63	94	98	100	--	10	61
25...	0	11	42	84	93	98	100	25	62
MAY									
19...	0	7	33	40	50	63	86	60	42
22...	0	6	44	50	57	80	100	47	34
AUG									
10...	0	3	75	97	99	100	100	13	87

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04121650 MUSKEGON RIVER AT BIG RAPIDS, MI

LOCATION.--Lat 43°41'37", long 85°28'03", in SE1/4 NE1/4 sec.14, T.15 N., R.10 W., Mecosta County, Hydrologic Unit 04060102, on right bank at sewage treatment plant in Big Rapids.

DRAINAGE AREA.--1,751 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1999 to September 2000.

GAGE.--Water-stage recorder. Elevation of gage is 886 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e1200	e1100	e1000	e920	e920	3240	1370	1230	1830	1120	1060	732
2	e1150	e1100	e1050	e980	e950	2980	1360	1230	2050	1100	1010	731
3	e1100	e1100	e1150	e1010	e970	2670	1330	1190	2160	1040	996	754
4	e1100	e1100	e1300	e1010	e980	2460	1290	1150	2070	982	1010	772
5	e1050	e1100	e1500	e1010	e970	2320	1250	1130	1960	957	976	737
6	e1000	e1080	e1600	e1010	e970	2180	1220	1100	1890	935	925	709
7	e980	e1050	e1600	e1010	e980	2050	1220	1070	1820	922	879	692
8	e960	e1020	e1550	e1010	e970	1950	1230	1070	1760	917	838	685
9	e950	e1000	e1500	e1000	e950	1900	1260	1620	1680	901	873	672
10	e900	e1000	e1450	e1100	e930	1930	1300	2300	1630	892	912	695
11	e900	e1000	e1400	e1220	e980	1900	1330	2150	1610	875	846	730
12	e920	e1000	e1350	e1300	e930	1820	1320	2160	1700	850	796	810
13	e940	e1000	e1300	e1100	e900	1760	1330	2690	1700	826	771	806
14	e960	e980	e1300	e1020	e900	1710	1300	2660	1690	840	754	814
15	e980	e950	e1300	e1010	e930	1710	1260	2600	1620	809	781	807
16	e1000	e950	e1250	e1000	e980	1720	1220	2530	1590	799	838	781
17	e1020	e950	e1200	e950	e990	1640	1190	2720	1530	777	872	756
18	e1020	e950	e1150	e900	e990	1570	1190	3440	1450	758	826	730
19	e1020	e920	e1100	e900	e1000	1510	1180	4130	1380	743	792	715
20	e1020	e920	e1050	e880	e990	1540	1280	3880	1370	729	765	720
21	e1050	e920	e880	e880	e1000	1560	1790	3660	1500	742	731	774
22	e1050	e950	e680	e900	e1100	1540	2230	3340	1470	744	744	800
23	e1080	e1000	e620	e910	1320	1520	2140	3010	1380	736	888	889
24	e1100	e1000	e600	e910	1580	1470	1980	2800	1290	735	880	979
25	e1100	e1050	e600	e910	2200	1450	1790	2600	1240	731	808	959
26	e1100	e1050	e620	e920	2950	1430	1630	2420	1220	727	769	906
27	e1100	e1050	e700	e950	4070	1410	1520	2270	1320	741	749	852
28	e1100	e1050	e800	e950	3980	1410	1420	2150	1310	889	753	812
29	e1080	e1000	e900	e920	3440	1420	1330	2030	1210	1070	761	780
30	e1080	e1000	e910	e910	---	1410	1270	1920	1150	1050	767	768
31	e1080	---	e920	e910	---	1380	---	1850	---	1140	751	---
TOTAL	32090	30340	34330	30410	40820	56560	42530	70100	47580	27077	26121	23367
MEAN	1035	1011	1107	981	1408	1825	1418	2261	1586	873	843	779
MAX	1200	1100	1600	1300	4070	3240	2230	4130	2160	1140	1060	979
MIN	900	920	600	880	900	1380	1180	1070	1150	727	731	672
CFSM	.59	.58	.63	.56	.80	1.04	.81	1.29	.91	.50	.48	.44
IN.	.68	.64	.73	.65	.87	1.20	.90	1.49	1.01	.58	.55	.50

## SUMMARY STATISTICS

## FOR 2000 WATER YEAR

ANNUAL TOTAL	461325
ANNUAL MEAN	1260
HIGHEST DAILY MEAN	4130
LOWEST DAILY MEAN	600
ANNUAL SEVEN-DAY MINIMUM	660
INSTANTANEOUS PEAK FLOW	4450
INSTANTANEOUS PEAK STAGE	(a)8.99
ANNUAL RUNOFF (CFSM)	.72
ANNUAL RUNOFF (INCHES)	9.80
10 PERCENT EXCEEDS	2040
50 PERCENT EXCEEDS	1050
90 PERCENT EXCEEDS	760

(a) Backwater from ice.

(e) Estimated.

[illegible]

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

SPECIFIC CONDUCTANCE,  $\mu\text{S}/\text{CM}$  AT 25 DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	372	367	369	237	207	228	311	309	310	289	277	283	
2	373	368	370	229	211	222	313	308	310	300	289	295	
3	380	368	374	288	229	251	315	312	313	311	300	305	
4	403	369	377	306	288	299	316	314	315	321	311	316	
5	388	373	378	313	305	308	320	315	317	332	321	327	
6	---	---	---	316	312	314	323	320	322	344	332	338	
7	394	383	387	323	316	319	332	322	325	352	343	349	
8	---	---	---	331	323	327	335	322	327	352	304	326	
9	410	391	399	336	331	333	336	327	330	308	301	306	
10	406	394	398	337	330	334	332	327	329	301	291	297	
11	---	---	---	332	330	331	331	327	329	308	300	302	
12	---	---	---	331	326	328	332	328	330	315	302	310	
13	418	396	405	327	323	325	334	331	333	309	284	296	
14	416	396	402	326	322	324	335	331	333	297	288	293	
15	404	394	397	327	324	325	336	334	335	288	277	281	
16	461	389	412	329	326	328	338	335	337	277	262	271	
17	411	344	380	329	326	328	341	338	339	273	251	268	
18	411	394	400	330	326	329	353	341	347	266	242	253	
19	431	395	401	330	315	323	361	353	357	242	224	227	
20	399	392	395	325	321	322	362	350	358	232	224	227	
21	459	376	404	325	319	322	357	330	343	238	228	233	
22	434	387	404	324	321	322	330	282	298	248	236	242	
23	397	362	381	323	300	317	285	280	282	251	234	245	
24	375	337	359	304	293	300	293	284	288	236	228	232	
25	342	293	315	310	304	308	298	212	274	243	232	238	
26	293	249	270	312	310	311	222	212	216	254	242	249	
27	249	219	231	314	309	312	235	222	228	267	253	260	
28	226	211	222	314	311	313	248	235	241	280	267	273	
29	232	214	224	312	310	311	263	248	255	294	280	287	
30	---	---	---	313	309	311	277	263	270	306	293	299	
31	---	---	---	313	310	312	---	---	---	321	305	312	
MONTH	---	---	---	337	207	311	362	212	310	352	224	282	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
JUNE				JULY				AUGUST				SEPTEMBER	
1	334	316	324	384	377	380	359	351	356	382	372	377	
2	330	319	327	386	378	382	365	366	355	384	376	379	
3	328	317	320	384	376	381	364	354	359	384	375	379	
4	324	319	322	381	375	379	365	353	360	379	369	374	
5	325	321	322	377	369	374	357	349	355	373	367	370	
6	332	325	328	379	369	375	357	350	354	376	371	373	
7	334	327	332	384	375	379	363	356	360	381	375	377	
8	341	325	335	385	369	378	367	362	365	384	376	381	
9	347	341	344	392	384	388	369	363	366	387	379	383	
10	351	343	349	392	386	388	363	350	358	389	323	379	
11	354	343	350	389	379	383	366	361	363	390	374	382	
12	359	349	354	388	381	384	370	365	367	381	363	374	
13	356	349	353	385	376	383	372	362	370	379	375	377	
14	359	354	356	383	373	377	375	370	373	380	366	373	
15	358	352	356	391	382	386	376	358	370	378	373	376	
16	355	349	352	392	382	388	372	367	370	380	375	377	
17	351	347	349	392	380	385	370	348	362	381	378	380	
18	357	350	352	387	376	382	369	363	367	382	378	380	
19	360	354	357	386	379	383	374	369	371	385	379	382	
20	370	346	359	388	375	383	376	371	374	388	357	381	
21	365	346	354	384	376	380	380	372	376	384	375	380	
22	363	351	356	386	379	383	381	328	370	383	359	377	
23	367	356	362	387	379	383	373	361	368	377	366	374	
24	375	363	368	386	380	383	371	364	367	374	367	372	
25	384	368	373	388	380	384	374	366	370	370	366	368	
26	385	366	375	388	380	384	380	374	377	372	367	369	
27	376	364	372	391	303	377	381	374	378	375	370	372	
28	380	368	372	381	356	371	381	373	377	378	374	376	
29	377	373	375	372	345	361	384	377	379	382	378	380	
30	383	376	380	355	283	339	387	376	382	385	380	382	
31	---	---	---	351	343	348	382	373	378	---	---	---	
MONTH	385	316	351	392	283	378	387	286	368	390	323	377	



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	13.0	11.0	12.0	11.5	9.0	10.0	2.0	1.0	1.5	.0	.0	.0			
2	12.0	10.0	11.0	10.5	7.5	9.0	3.5	2.0	3.0	.0	.0	.0			
3	10.0	8.5	9.0	7.5	5.5	6.5	5.5	3.5	4.5	.0	.0	.0			
4	10.5	8.0	9.0	6.5	4.0	5.5	6.5	5.5	6.0	.0	.0	.0			
5	9.5	8.5	9.0	8.0	5.5	6.5	6.5	5.0	6.0	.0	.0	.0			
6	10.5	8.0	9.5	7.0	5.5	6.0	5.0	4.0	4.5	.0	.0	.0			
7	10.0	8.0	9.0	6.5	4.5	5.0	4.5	3.5	4.0	.0	.0	.0			
8	10.5	8.0	9.5	6.5	4.5	5.5	4.0	3.0	3.5	.0	.0	.0			
9	13.0	10.0	11.5	9.5	6.0	7.5	3.5	3.0	3.5	.0	.0	.0			
10	15.0	12.0	13.0	10.5	9.0	9.5	4.0	3.0	3.5	.0	.0	.0			
11	13.5	11.0	12.0	9.0	7.0	7.5	3.0	1.5	2.0	1.0	.0	.5			
12	12.0	10.5	11.0	7.0	6.5	6.5	2.5	2.0	2.0	.5	.0	.0			
13	11.5	10.0	11.0	8.5	7.0	7.5	3.5	2.5	2.5	.0	.0	.0			
14	10.5	8.0	9.5	8.0	6.5	7.5	2.5	2.0	2.0	.0	.0	.0			
15	11.5	8.5	10.0	6.5	5.0	5.5	2.0	2.0	2.0	.0	.0	.0			
16	11.5	10.5	11.0	5.5	4.5	5.0	2.0	1.0	1.5	.0	.0	.0			
17	10.5	9.0	10.0	4.5	3.5	4.0	1.0	.0	.0	.0	.0	.0			
18	9.0	8.0	8.5	5.0	3.0	4.0	.0	.0	.0	.0	.0	.0			
19	9.0	8.0	8.5	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0			
20	9.0	7.5	8.0	6.0	5.5	5.5	.5	.0	.0	.0	.0	.0			
21	9.0	6.5	7.5	6.0	6.0	6.0	---	---	---	.0	.0	.0			
22	8.5	7.5	8.5	8.0	6.0	7.0	---	---	---	.0	.0	.0			
23	7.5	6.5	7.0	9.0	7.0	7.5	---	---	---	.0	.0	.0			
24	7.5	5.5	6.5	8.5	5.5	7.0	.0	.0	.0	.0	.0	.0			
25	8.0	5.5	7.0	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0			
26	8.0	6.5	7.5	5.5	4.5	4.5	.0	.0	.0	.0	.0	.0			
27	8.0	6.0	7.0	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0			
28	9.0	6.5	7.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0			
29	10.0	7.5	8.5	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0			
30	11.0	8.5	10.0	3.0	2.0	2.0	.0	.0	.0	.0	.0	.0			
31	12.0	10.5	11.0	---	---	---	.0	.0	.0	.0	.0	.0			
MONTH	15.0	5.5	9.4	11.5	2.0	5.9	---	---	---	1.0	.0	.0			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	.0	.0	.0	3.5	3.0	3.0	8.5	7.5	8.0	16.0	14.0	15.0	
2	.0	.0	.0	3.5	2.0	3.0	10.5	8.0	9.0	16.5	13.5	15.0	
3	.0	.0	.0	3.5	1.5	2.5	10.0	9.0	9.5	17.0	14.0	15.5	
4	.0	.0	.0	4.0	2.5	3.0	9.5	6.5	8.0	18.0	15.5	16.5	
5	.0	.0	.0	5.0	3.0	4.0	8.0	5.5	6.5	19.5	16.5	18.0	
6	.0	.0	.0	5.5	3.5	4.5	7.5	6.5	7.0	21.0	18.0	19.5	
7	.0	.0	.0	7.0	5.0	6.0	6.5	4.0	5.5	21.5	19.0	20.0	
8	.0	.0	.0	8.5	6.5	7.5	7.0	3.5	5.0	21.0	19.5	20.5	
9	.0	.0	.0	9.0	7.5	8.5	6.0	4.5	5.5	20.0	17.5	19.0	
10	.0	.0	.0	7.5	5.5	6.5	6.5	3.5	5.0	17.5	15.5	16.5	
11	.0	.0	.0	6.0	5.0	5.5	6.0	5.0	5.5	16.5	15.0	15.0	
12	.0	.0	.0	5.0	3.5	4.5	7.0	4.0	5.5	16.0	14.5	15.5	
13	.0	.0	.0	4.0	3.0	3.5	6.5	5.5	6.0	15.5	13.5	15.0	
14	.0	.0	.0	4.5	3.0	4.0	10.5	6.5	8.0	14.0	12.5	13.0	
15	.0	.0	.0	6.0	4.5	5.0	11.5	9.5	10.5	14.5	11.5	13.0	
16	.0	.0	.0	5.5	4.5	5.0	11.0	8.5	10.0	13.5	12.5	12.5	
17	.0	.0	.0	5.5	4.0	4.5	9.5	8.0	8.5	14.5	12.0	13.0	
18	.0	.0	.0	5.0	3.5	4.5	10.5	8.5	9.5	14.0	13.0	13.5	
19	.0	.0	.0	5.0	4.0	4.5	10.5	10.0	10.0	13.5	12.0	13.0	
20	.0	.0	.0	5.0	4.0	4.5	10.0	9.0	9.5	15.0	12.0	13.5	
21	.5	.0	.0	6.0	5.0	5.5	9.0	8.0	8.5	15.5	13.0	14.0	
22	.5	.0	.0	7.0	6.0	6.5	10.5	7.5	9.0	15.0	14.0	14.5	
23	.5	.0	.0	9.0	6.0	7.5	11.0	9.5	10.0	16.5	14.5	15.5	
24	2.0	.0	1.5	10.0	8.0	9.0	13.0	10.0	11.5	17.5	15.0	16.0	
25	2.0	1.5	1.5	11.0	9.5	10.0	13.5	11.0	12.5	17.5	15.0	16.0	
26	3.0	1.5	2.0	10.5	8.5	9.5	14.5	11.5	13.0	17.5	14.5	16.0	
27	3.0	1.0	1.5	10.0	9.0	9.5	15.0	12.0	13.5	17.0	15.0	16.0	
28	3.0	1.0	2.0	9.0	8.0	8.5	15.5	13.0	14.5	16.0	14.5	15.0	
29	3.5	1.5	2.5	8.0	6.5	7.0	16.0	13.5	14.5	18.0	14.0	16.0	
30	---	---	---	8.5	5.0	6.5	16.5	13.5	15.0	17.0	15.5	16.5	
31	---	---	---	9.0	6.0	7.5	---	---	---	17.0	16.0	16.5	
MONTH	3.5	.0	.4	11.0	1.5	5.8	16.5	3.5	9.1	21.5	11.5	15.6	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	17.0	16.5	17.0	23.0	18.5	20.5	23.5	19.5	21.5	25.5	21.0	23.0
2	17.0	16.0	16.5	23.0	20.0	21.5	23.0	20.5	21.5	23.5	21.5	22.5
3	18.0	14.5	16.0	23.0	20.5	21.5	22.5	18.0	20.0	23.0	20.0	21.5
4	18.0	15.5	17.0	24.5	20.0	22.5	21.5	18.0	20.0	21.5	19.0	20.0
5	17.5	15.5	16.5	25.5	20.5	23.0	21.0	17.5	19.5	20.0	16.5	18.0
6	18.5	14.5	16.5	23.5	20.5	21.5	21.5	18.5	19.5	19.5	15.0	17.0
7	19.0	16.0	17.5	22.5	18.5	20.5	23.5	19.0	21.0	20.5	15.5	18.0
8	21.5	17.0	19.0	21.0	18.5	19.0	22.5	20.5	21.5	22.5	18.0	20.0
9	23.0	19.5	21.0	22.0	18.0	19.5	24.0	20.0	21.5	22.5	19.0	21.0
10	24.0	20.0	22.0	23.0	19.5	21.0	23.0	19.5	21.0	22.0	20.5	21.0
11	22.5	21.0	22.0	24.5	20.0	22.0	23.5	19.5	21.5	21.0	19.0	20.0
12	21.0	18.0	19.5	22.5	20.0	21.0	24.0	19.0	21.5	21.0	18.5	19.0
13	18.5	17.5	18.0	24.5	19.0	21.5	22.5	20.0	21.0	20.0	16.0	18.0
14	21.5	18.0	19.5	25.0	20.5	23.0	24.5	20.0	22.0	18.5	16.5	17.5
15	21.0	19.0	20.0	23.0	20.5	22.0	23.5	21.0	22.0	17.0	14.5	16.0
16	20.0	18.5	19.5	23.5	19.5	21.5	23.5	19.5	21.0	16.5	12.5	14.5
17	20.5	17.5	19.0	25.0	20.0	22.5	21.0	18.0	19.0	18.0	13.5	15.5
18	21.0	18.0	19.5	22.5	19.5	20.5	21.0	17.5	19.0	18.5	14.0	16.0
19	22.0	18.0	20.0	23.0	18.0	20.0	20.5	16.5	18.5	20.0	16.0	17.5
20	20.5	19.0	19.5	20.5	17.0	19.0	20.5	16.0	18.0	18.0	15.0	17.0
21	22.5	19.0	20.5	19.5	17.5	18.5	20.5	16.0	18.5	15.0	13.0	13.5
22	21.5	19.0	20.5	18.5	16.5	17.5	20.0	17.5	19.0	13.0	11.5	12.0
23	22.5	19.0	21.0	19.5	15.0	17.5	20.5	18.0	18.5	13.0	11.5	12.0
24	22.0	20.5	21.0	21.0	15.5	18.5	22.0	17.0	19.5	14.0	11.5	12.5
25	24.5	20.0	22.0	22.0	17.5	20.0	22.0	18.0	20.0	12.5	10.5	11.5
26	23.0	21.0	22.0	23.0	18.0	20.5	21.0	19.0	20.0	13.5	9.5	11.5
27	23.0	19.5	21.0	22.5	20.0	21.0	21.5	18.5	20.0	12.5	10.5	11.5
28	21.0	18.0	19.0	21.0	19.5	20.0	22.0	18.5	20.0	12.5	9.0	10.5
29	21.0	17.0	18.5	22.0	18.5	20.0	20.5	19.5	20.0	13.5	9.5	11.5
30	22.0	17.0	19.5	21.0	19.0	20.0	22.5	18.5	20.0	14.5	11.0	13.0
31	---	---	---	21.0	18.5	19.5	24.5	19.5	21.5	---	---	---
MONTH	24.5	14.5	19.4	25.5	15.0	20.5	24.5	16.0	20.2	25.5	9.0	16.4

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	9.7	8.9	9.3	10.7	9.4	9.9	14.3	13.5	13.8	12.6	12.2	12.4
2	10.2	9.0	9.6	10.6	9.3	9.9	13.6	12.9	13.3	12.7	12.2	12.4
3	11.5	10.1	10.9	11.5	10.2	10.8	12.9	12.0	12.4	12.9	12.4	12.6
4	11.3	10.2	10.8	11.9	11.0	11.4	12.1	11.6	11.9	13.1	12.6	12.8
5	11.3	10.2	10.8	11.6	10.8	11.1	12.0	11.5	11.8	13.0	12.4	12.7
6	11.1	10.0	10.6	11.8	10.7	11.2	12.6	11.5	12.3	13.0	12.6	12.8
7	10.8	9.9	10.4	12.3	11.2	11.7	12.8	12.4	12.6	13.1	12.7	12.9
8	10.6	9.6	10.1	11.9	11.0	11.5	13.2	12.6	12.9	13.3	12.9	13.1
9	9.9	8.8	9.4	11.2	10.1	10.8	13.2	12.7	13.0	13.1	12.8	12.9
10	9.1	8.2	8.6	10.6	9.6	10.1	12.9	12.5	12.7	13.0	12.7	12.8
11	9.2	8.3	8.8	11.6	10.0	10.8	13.3	12.7	13.0	13.7	12.7	13.2
12	9.8	8.7	9.2	11.4	10.6	11.0	13.3	12.9	13.1	14.1	13.1	13.5
13	9.3	8.4	8.9	11.4	10.4	10.9	13.2	12.7	13.0	---	---	---
14	10.0	8.9	9.5	11.6	10.4	10.9	13.4	13.0	13.1	---	---	---
15	10.1	9.2	9.6	12.2	11.1	11.6	13.2	13.0	13.1	13.8	13.4	13.6
16	9.9	9.5	9.7	12.5	11.4	11.9	13.9	13.1	13.5	13.8	13.3	13.5
17	10.8	9.7	10.2	13.1	12.1	12.6	14.3	13.2	13.6	13.7	13.4	13.5
18	11.4	10.3	10.8	13.2	12.5	12.7	13.9	12.1	13.3	13.4	12.6	12.9
19	11.5	10.8	11.1	12.7	12.0	12.4	13.9	11.7	13.2	12.9	12.5	12.7
20	11.7	10.9	11.3	12.1	11.5	11.8	14.1	13.3	13.7	12.9	12.6	12.7
21	11.9	10.8	11.4	12.0	11.4	11.7	---	---	---	12.9	12.4	12.7
22	11.5	10.6	11.1	12.4	11.2	11.7	---	---	---	12.6	12.4	12.5
23	11.8	11.0	11.4	12.1	11.1	11.7	---	---	---	12.5	12.0	12.3
24	12.1	11.4	11.7	12.2	11.0	11.7	12.1	11.3	11.6	12.0	11.8	11.9
25	12.0	11.1	11.5	13.5	12.2	12.9	11.9	11.4	11.6	12.0	11.7	11.8
26	11.8	11.0	11.3	13.2	12.5	12.8	11.6	11.1	11.3	11.7	11.4	11.6
27	11.9	11.1	11.5	13.1	12.3	12.7	11.4	11.2	11.3	11.7	11.2	11.4
28	11.9	11.2	11.5	13.6	12.9	13.3	11.4	11.1	11.3	11.4	11.0	11.2
29	11.6	10.1	11.1	13.9	13.3	13.5	11.6	11.1	11.3	11.0	10.7	10.9
30	11.0	9.6	10.2	14.0	13.4	13.6	12.0	11.3	11.6	11.0	10.6	10.8
31	10.5	9.2	9.8	---	---	---	12.4	11.8	12.1	10.8	10.4	10.6
MONTH	12.1	8.2	10.4	14.0	9.3	11.7	---	---	---	---	---	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	10.9	10.6	10.7	11.8	10.8	11.4	11.6	11.2	11.4	9.9	9.2	9.5	
2	11.2	10.7	11.0	11.1	10.2	10.7	11.5	11.0	11.2	10.2	9.3	9.8	
3	11.0	10.6	10.7	11.6	10.1	10.9	11.1	10.7	10.9	10.3	9.2	9.7	
4	10.9	10.5	10.7	11.8	11.4	11.6	11.9	10.8	11.3	9.8	8.6	9.2	
5	11.5	10.8	11.1	11.6	11.2	11.4	12.2	11.5	11.8	9.4	8.3	8.9	
6	11.6	11.2	11.4	11.4	10.8	11.2	12.4	11.6	11.9	9.0	7.7	8.4	
7	11.4	11.2	11.3	10.9	10.5	10.8	12.8	11.9	12.3	8.6	6.6	7.9	
8	---	---	---	10.5	9.8	10.3	13.4	12.6	12.9	8.0	7.0	7.5	
9	11.6	11.4	11.5	9.8	9.5	9.7	13.3	12.6	12.9	8.0	7.1	7.6	
10	11.4	11.3	11.3	10.8	9.8	10.4	13.6	12.8	13.2	---	---	---	
11	---	---	---	11.1	10.7	10.9	13.6	12.8	13.2	---	---	---	
12	---	---	---	11.6	11.1	11.4	13.6	13.0	13.2	8.9	8.4	8.7	
13	11.8	11.5	11.6	11.8	11.5	11.6	14.1	12.7	13.3	8.9	8.4	8.7	
14	11.7	11.3	11.5	11.8	11.4	11.6	13.3	11.8	12.7	9.6	8.9	9.3	
15	11.7	11.3	11.4	11.4	10.8	11.1	13.0	10.9	12.0	9.8	9.4	9.6	
16	11.8	11.2	11.5	11.3	10.9	11.1	12.4	10.9	11.9	9.7	9.4	9.6	
17	---	---	---	11.5	11.1	11.3	12.6	11.0	11.8	9.9	9.4	9.7	
18	11.7	11.4	11.6	11.8	11.3	11.5	12.0	10.8	11.5	9.4	9.4	9.4	
19	12.2	11.5	11.8	11.6	11.4	11.5	11.6	10.3	11.0	9.7	9.4	9.6	
20	12.2	11.6	11.8	11.6	11.3	11.5	11.3	10.3	10.9	9.8	9.4	9.6	
21	12.5	11.0	11.9	11.3	10.9	11.2	11.9	10.5	11.2	9.6	9.3	9.5	
22	12.3	11.6	11.9	10.9	10.7	10.8	11.9	10.3	11.3	9.4	9.3	9.4	
23	11.8	11.4	11.6	11.3	10.6	10.8	11.3	10.2	10.8	9.4	9.2	9.3	
24	12.6	11.5	12.3	10.9	10.3	10.7	10.8	9.9	10.4	9.4	9.2	9.3	
25	12.6	11.8	12.3	10.4	10.1	10.3	10.7	9.6	10.2	9.6	9.2	9.4	
26	12.1	11.1	11.7	10.7	10.2	10.5	11.0	10.2	10.6	9.7	9.2	9.5	
27	12.3	11.2	11.9	10.5	10.1	10.3	10.8	10.0	10.4	9.7	9.2	9.4	
28	12.5	11.7	12.2	10.9	10.4	10.6	10.5	9.8	10.1	9.8	9.4	9.6	
29	12.5	11.7	12.1	11.7	10.9	11.3	10.5	9.6	10.0	9.9	9.3	9.7	
30	---	---	---	12.1	11.4	11.7	10.6	9.7	10.1	9.7	9.2	9.4	
31	---	---	---	12.1	11.3	11.6	---	---	---	9.4	9.1	9.2	
MONTH	---	---	---	12.1	9.5	11.0	14.1	9.6	11.5	---	---	---	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		JUNE				JULY				AUGUST		SEPTEMBER	
1	9.7	9.1	9.3	7.6	6.3	6.9	8.3	7.2	7.8	9.2	7.3	8.1	
2	9.8	9.3	9.6	7.5	5.8	6.6	7.9	7.1	7.4	8.8	7.0	7.8	
3	10.1	9.5	9.8	6.7	5.6	6.2	7.8	6.8	7.2	9.1	7.3	8.0	
4	9.9	9.3	9.6	6.1	4.9	5.6	8.1	6.9	7.5	9.3	7.4	8.2	
5	10.1	9.3	9.7	4.9	3.7	4.4	8.2	6.8	7.4	9.4	7.7	8.5	
6	10.3	9.4	9.9	4.7	3.7	4.2	8.2	6.5	7.4	9.6	8.1	8.7	
7	10.2	9.2	9.6	5.3	4.3	4.8	8.5	7.1	7.7	9.4	7.8	8.6	
8	9.9	8.7	9.4	6.7	4.8	5.9	8.5	7.0	7.6	9.2	7.5	8.3	
9	9.7	8.4	8.9	7.2	6.2	6.6	8.5	7.0	7.7	8.8	7.3	7.9	
10	9.5	8.1	8.7	7.1	6.1	6.6	8.6	7.3	8.0	8.2	7.0	7.5	
11	8.9	7.9	8.4	7.6	6.4	7.0	8.9	7.3	8.0	8.2	7.0	7.5	
12	9.1	8.2	8.7	8.2	6.6	7.4	9.3	7.6	8.3	8.6	7.2	7.9	
13	9.5	8.8	9.1	8.2	7.1	7.6	9.1	7.5	8.2	8.9	7.3	8.1	
14	9.8	8.5	9.1	8.4	6.9	7.6	9.1	7.4	8.3	8.3	7.2	7.7	
15	9.6	8.2	8.8	8.7	7.1	7.8	8.6	7.0	7.8	8.9	7.5	8.2	
16	9.3	8.3	8.8	8.8	7.5	8.1	9.1	7.2	8.1	9.2	8.1	8.6	
17	10.1	8.6	9.3	9.2	7.6	8.4	8.6	7.4	7.9	9.3	8.1	8.7	
18	10.0	8.6	9.2	9.3	7.8	8.4	9.4	7.9	8.5	9.3	7.8	8.5	
19	10.2	8.5	9.2	9.2	7.7	8.3	9.6	7.9	8.7	8.8	7.5	8.1	
20	9.4	8.2	8.7	9.2	7.7	8.4	9.7	8.1	8.8	8.2	7.3	7.8	
21	9.7	7.9	8.7	9.2	7.9	8.5	9.7	8.1	8.8	9.4	7.7	8.5	
22	9.8	7.9	8.8	9.5	8.1	8.8	9.4	7.8	8.5	9.5	8.7	9.1	
23	10.2	8.2	9.1	9.7	8.4	8.9	9.2	7.7	8.4	9.9	8.6	9.2	
24	9.7	7.9	8.7	9.6	8.1	8.8	9.5	7.8	8.5	9.9	8.9	9.3	
25	10.0	7.8	8.8	9.4	7.8	8.6	9.6	7.7	8.5	9.5	8.6	9.0	
26	9.1	7.4	8.3	9.2	7.7	8.4	9.0	7.4	8.2	10.0	8.8	9.5	
27	9.6	7.7	8.6	8.8	7.4	7.9	9.6	7.6	8.5	10.0	9.0	9.4	
28	9.2	7.7	8.4	8.4	7.5	8.0	9.5	7.7	8.5	10.2	9.4	9.8	
29	9.5	7.9	8.8	8.5	7.6	8.0	8.7	7.6	8.1	9.9	8.7	9.4	
30	8.8	6.6	7.9	8.1	7.5	7.8	9.6	7.7	8.5	9.7	8.3	8.9	
31	---	---	---	8.6	7.8	8.1	9.2	7.5	8.3	---	---	---	
MONTH	10.3	6.6	9.0	9.7	3.7	7.4	9.7	6.5	8.1	10.2	7.0	8.5	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	DATE	TIME	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC 1999				MAR 2000			
22...	1101	10	54	16...	1300	7	--
JAN 2000				22...	1300	9	75
04...	1630	22	69	23...	1300	13	78
12...	1335	12	77	30...	1300	13	--
17...	1300	12	--	APR			
22...	1300	5	--	06...	1300	8	82
28...	1300	2	--	13...	1300	5	--
FEB				17...	1300	20	79
02...	1300	3	--	20...	1300	45	--
03...	1300	5	58	21...	1300	46	--
10...	1300	6	--	22...	1300	36	--
16...	1300	7	--	23...	1300	40	--
22...	1300	20	--	24...	1300	30	--
23...	1300	41	83	25...	1300	30	--
24...	1300	41	--	MAY			
25...	1300	54	71	01...	1300	7	--
25...	2400	41	--	08...	1300	22	78
26...	1300	52	80	09...	1300	35	--
26...	2400	41	--	10...	1300	38	--
27...	1300	74	87	11...	1300	32	90
27...	2400	40	--	14...	1300	27	--
28...	1300	28	83	16...	1300	24	--
28...	2400	21	--	17...	1300	23	--
29...	1300	24	91	18...	1300	47	--
29...	2400	18	--	18...	2400	30	--
MAR				19...	0600	29	--
01...	1300	16	--	19...	1300	40	97
01...	2400	13	--	20...	1300	29	--
02...	1300	16	--	21...	1300	26	--
02...	2400	11	--	22...	1300	30	79
03...	1300	12	74	23...	1300	20	88
10...	1300	14	--				
DATE	TIME	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	DATE	TIME	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
JUN 2000				JUL 2000			
01...	1300	28	--	09...	1300	22	--
02...	1300	27	--	10...	1300	42	--
03...	1300	35	--	11...	1300	19	--
04...	1300	46	79	12...	1300	34	--
05...	1300	24	--	13...	1300	14	55
06...	1300	29	--	14...	1300	29	--
07...	1300	17	--	15...	1300	23	--
08...	1300	15	--	16...	1300	14	--
09...	1300	23	--	17...	1300	23	--
10...	1300	22	--	18...	1300	15	--
11...	1300	24	--	19...	1300	8	--
12...	1300	29	55	20...	1300	10	--
13...	1300	29	--	21...	1300	35	68
14...	1300	25	--	22...	1300	12	--
15...	1300	33	--	23...	1300	20	--
16...	1300	21	--	24...	1300	17	--
17...	1300	27	--	25...	1300	7	--
18...	1300	24	--	26...	1300	4	--
19...	1300	19	--	27...	1300	11	44
20...	1300	48	84	28...	1300	10	--
21...	1300	29	--	29...	1300	12	--
22...	1300	30	--	30...	1300	11	--
23...	1300	24	--	31...	1300	48	--
24...	1300	12	--	AUG			
25...	1300	15	--	01...	1300	12	--
26...	1300	45	--	02...	1300	34	77
27...	1300	78	83	03...	1300	10	--
28...	1300	65	--	04...	1300	8	--
29...	1300	32	--	05...	1300	7	--
30...	1300	43	--	06...	1300	4	--
JUL				07...	1300	5	--
01...	1300	29	--	08...	1300	17	62
02...	1300	12	--	09...	1300	5	--
03...	1300	32	--	10...	1300	9	--
04...	1300	26	--	11...	1300	14	--
05...	1300	18	71	14...	1300	117	--
06...	1300	13	--	16...	1300	11	--
07...	1300	28	--	18...	1300	42	--
08...	1300	30	--	19...	1300	26	--
				22...	1300	16	--
				23...	1300	13	--
				25...	1300	7	--
				28...	1300	11	--

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	DATE	TIME	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
SEP 2000				SEP 2000			
06...	1300	12	--	18...	1300	13	--
08...	1300	8	--	19...	1300	29	--
09...	1300	12	93	21...	1300	10	--
10...	1300	12	--	23...	1300	11	--
12...	1300	16	--	24...	1300	16	--
14...	1300	17	--	26...	1300	24	--
15...	1300	10	--	28...	1300	11	--
				30...	1300	11	--

[illegible]



[illegible]



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121650 MUSKEGON RIVER AT BIG RAPIDS, MI--Continued

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROPA- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)
DEC 1999									
22...	1100	--	--	--	--	--	--	--	--
JAN 2000									
12...	1330	--	--	--	--	--	--	--	--
FEB									
29...	1301	--	--	--	--	--	--	--	--
MAR									
03...	1255	--	--	--	--	--	--	--	--
22...	1301	--	--	--	--	--	--	--	--
APR									
17...	1400	--	--	--	--	--	--	--	--
25...	1400	--	--	--	--	--	--	--	--
MAY									
23...	1000	<.004	<.005	<.002	<.018	<.003	<.007	<.004	<.013
AUG									
08...	1400	--	--	--	--	--	--	--	--

DATE	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL- LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)	SEDI- MENT DIS- CHARGE, BEDLOAD (TONS/ DAY) (80225)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .062 MM (80226)
DEC 1999									
22...	--	--	--	--	--	--	--	--	--
JAN 2000									
12...	--	--	--	--	--	--	--	--	--
FEB									
29...	--	--	--	--	--	--	--	35	0
MAR									
03...	--	--	--	--	--	--	--	36	0
22...	--	--	--	--	--	--	--	.80	<1
APR									
17...	--	--	--	--	--	--	--	.30	0
25...	--	--	--	--	--	--	--	2.8	<1
MAY									
23...	.011	<.010	<.007	<.013	<.002	<.001	<.002	108	<1
AUG									
08...	--	--	--	--	--	--	--	1.4	<1

DATE	SED. BEDLOAD SIEVE DIAM. % FINER THAN .125 MM (80227)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .250 MM (80228)	SED. BEDLOAD SIEVE DIAM. % FINER THAN .500 MM (80229)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 1.00 MM (80230)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 2.00 MM (80231)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 4.00 MM (80232)	SED. BEDLOAD SIEVE DIAM. % FINER THAN 16.0 MM (80234)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC 1999									
22...	--	--	--	--	--	--	--	24	40
JAN 2000									
12...	--	--	--	--	--	--	--	29	43
FEB									
29...	0	8	93	99	100	100	100	76	27
MAR									
03...	0	5	74	91	95	98	100	32	42
22...	0	13	85	95	100	100	100	9	83
APR									
17...	0	4	54	85	98	99	100	7	79
25...	0	6	86	100	100	100	100	24	61
MAY									
23...	0	4	70	92	96	98	100	33	43
AUG									
08...	0	12	47	64	71	87	100	12	73

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI

LOCATION.--Lat 43°36'47", long 85°28'40", in SE1/4 SW1/4 sec.11, T.14 N., R.10 W., Mecosta County, Hydrologic Unit 04060102, or left bank downstream from Rogers Dam, 2.8 mi northwest of Stanwood.

DRAINAGE AREA.--1,834 mi<sup>2</sup>.

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 26.5°C, June 27, 1998; minimum, -0.5°C, Feb. 25, 26, Mar. 10-12, 1999.

DISSOLVED OXYGEN: Maximum, 14.2 mg/L, Feb. 24, 1999; minimum, 4.9 mg/L, June 13, 14, 1999, Sept. 5, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 24.0°C, July 5, 6; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.2 mg/L, Feb. 14, 15; minimum, 4.9 mg/L, Sept. 5.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	13.5	13.0	13.5	11.0	10.0	10.5	3.0	2.5	3.0	.0	.0	.0
2	13.0	12.0	12.5	11.0	10.0	10.5	2.5	2.0	2.5	.0	.0	.0
3	12.0	11.0	11.5	10.0	8.5	9.0	3.0	2.0	2.5	.0	.0	.0
4	11.0	9.0	10.0	8.5	6.0	7.0	4.0	3.0	3.5	.0	.0	.0
5	9.5	9.0	9.5	6.5	6.0	6.5	5.0	4.0	4.5	.0	.0	.0
6	10.0	9.5	9.5	6.5	6.5	6.5	5.5	5.0	5.5	.0	.0	.0
7	10.0	9.5	9.5	6.5	6.5	6.5	5.0	4.5	4.5	.0	.0	.0
8	10.0	9.5	9.5	6.5	6.0	6.0	4.5	4.0	4.0	.0	.0	.0
9	11.0	9.5	10.0	6.5	6.0	6.0	4.0	3.5	3.5	.0	.0	.0
10	12.5	10.5	11.0	8.0	6.5	7.0	4.0	3.5	3.5	.0	.0	.0
11	13.0	12.0	12.0	8.0	7.5	8.0	3.5	3.0	3.5	.0	.0	.0
12	12.5	12.0	12.5	8.0	7.5	8.0	3.0	2.5	3.0	.0	.0	.0
13	12.5	11.5	12.0	7.5	7.5	7.5	2.5	2.0	2.5	.0	.0	.0
14	11.5	10.5	11.5	8.0	7.5	7.5	2.5	2.0	2.0	.0	.0	.0
15	11.0	10.0	10.5	7.5	7.5	7.5	2.5	2.0	2.0	.0	.0	.0
16	11.0	10.5	10.5	7.5	6.5	7.0	2.0	1.5	2.0	.0	.0	.0
17	11.0	11.0	11.0	6.5	5.0	6.0	1.5	1.5	1.5	.0	.0	.0
18	11.0	10.0	10.5	5.0	4.5	5.0	1.5	.5	1.0	.0	.0	.0
19	10.0	9.0	9.0	5.0	4.0	4.5	.5	.5	.5	.0	.0	.0
20	9.0	8.5	9.0	4.5	4.5	4.5	.5	.0	.5	.0	.0	.0
21	8.5	8.5	8.5	5.0	4.5	5.0	.0	.0	.0	.0	.0	.0
22	8.5	8.0	8.5	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
23	8.0	8.0	8.0	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0
24	8.0	7.0	7.5	7.5	7.0	7.0	.0	.0	.0	.0	.0	.0
25	7.0	6.5	7.0	7.0	6.5	7.0	.0	.0	.0	.0	.0	.0
26	7.5	6.5	7.0	6.5	5.5	6.0	.0	.0	.0	.0	.0	.0
27	7.5	7.0	7.0	5.5	5.0	5.5	.0	.0	.0	.0	.0	.0
28	7.5	7.5	7.5	5.0	5.0	5.0	.0	.0	.0	.0	.0	.0
29	8.5	7.5	8.0	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
30	9.0	8.0	8.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
31	10.5	9.0	10.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	13.5	6.5	9.8	11.0	3.0	6.6	5.5	.0	1.8	.0	.0	.0

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY				MARCH				APRIL		
1	.0	.0	.0	3.5	2.5	3.0	8.5	7.5	8.0	15.5	15.0	15.0
2	.0	.0	.0	3.0	2.5	3.0	9.0	8.5	8.5	15.5	14.5	15.0
3	.0	.0	.0	3.0	2.5	3.0	10.5	9.0	10.0	15.5	14.5	15.0
4	.0	.0	.0	3.5	2.5	3.0	10.0	9.5	10.0	17.0	15.5	16.0
5	.0	.0	.0	4.0	3.0	3.5	9.5	7.0	8.5	18.0	16.5	17.0
6	.0	.0	.0	5.0	4.0	4.5	8.5	7.5	8.0	19.5	18.0	18.5
7	.0	.0	.0	6.5	5.0	5.5	7.5	6.5	7.0	21.0	19.5	21.0
8	.0	.0	.0	8.5	6.5	7.5	6.5	5.5	6.0	21.5	20.5	21.0
9	.0	.0	.0	9.5	8.5	9.0	5.5	5.0	5.0	21.5	20.5	21.0
10	.0	.0	.0	9.0	7.0	8.5	6.0	5.0	5.5	20.5	17.0	19.5
11	.0	.0	.0	7.0	5.5	6.5	5.5	5.5	5.5	17.5	16.0	17.0
12	.0	.0	.0	5.5	4.5	5.5	6.0	5.5	5.5	16.0	15.5	15.5
13	.0	.0	.0	4.5	4.0	4.5	6.5	5.5	6.0	16.0	15.0	15.0
14	.0	.0	.0	4.0	3.5	4.0	7.5	6.5	6.5	15.0	13.5	14.0
15	.0	.0	.0	5.0	4.0	4.5	10.5	7.5	8.5	13.5	12.5	13.0
16	.0	.0	.0	5.5	4.5	5.0	11.0	10.5	11.0	13.5	13.0	13.5
17	.0	.0	.0	5.5	5.0	5.0	10.5	9.0	9.5	14.0	13.0	13.0
18	.0	.0	.0	5.0	4.5	4.5	9.0	8.5	8.5	14.0	13.5	14.0
19	.0	.0	.0	5.0	4.5	4.5	10.0	8.5	9.0	13.5	12.5	13.0
20	.0	.0	.0	4.5	4.5	4.5	10.0	9.0	9.5	14.0	13.0	13.0
21	.0	.0	.0	5.0	4.5	4.5	9.0	8.0	8.5	15.0	14.0	14.5
22	.0	.0	.0	6.0	5.0	5.5	8.5	7.5	8.0	15.0	15.0	15.0
23	.0	.0	.0	7.0	6.0	6.5	9.5	8.0	9.0	15.5	15.0	15.5
24	.0	.0	.0	9.5	7.0	8.0	10.5	9.0	10.0	16.5	15.5	15.5
25	.5	.0	.5	10.0	9.0	9.5	12.0	10.5	11.5	16.5	16.5	15.5
26	1.5	.5	1.0	10.5	10.0	10.0	13.0	11.5	12.0	17.0	15.5	15.5
27	2.5	1.5	2.0	10.5	10.0	10.5	14.0	12.5	13.0	17.0	16.0	15.5
28	2.0	1.0	1.0	10.0	9.5	10.0	14.0	13.0	13.5	16.0	15.0	15.5
29	2.5	2.0	2.0	9.5	8.5	9.0	15.0	14.0	14.5	16.5	15.0	15.5
30	---	---	---	8.5	8.0	8.0	15.0	14.0	14.5	17.0	16.0	15.5
31	---	---	---	7.5	7.0	7.0	---	---	---	17.0	16.5	15.5
MONTH	2.5	.0	.2	10.5	2.5	6.0	15.0	5.0	9.0	21.5	12.5	15.9

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE				JULY				AUGUST		
1	17.0	16.5	17.0	21.5	20.0	20.5	21.0	20.0	20.5	23.0	22.0	22.0
2	17.5	17.0	17.0	22.0	21.0	21.5	22.5	21.0	21.5	23.5	22.5	23.0
3	17.0	15.5	16.5	22.5	22.0	22.0	22.0	21.0	22.0	23.5	22.5	23.0
4	17.5	16.5	17.0	22.5	22.0	22.5	21.5	20.5	21.0	23.0	21.5	22.5
5	17.5	17.0	17.0	24.0	22.5	23.0	21.5	20.5	21.0	21.5	20.5	21.0
6	17.0	16.0	16.5	24.0	22.5	23.5	21.0	20.0	20.5	20.5	19.5	21.0
7	18.0	17.0	17.0	22.5	22.0	22.5	22.0	20.5	21.0	19.5	18.5	19.0
8	19.5	18.0	18.0	22.5	21.0	21.5	22.0	21.5	21.5	20.0	19.0	19.5
9	21.5	19.5	20.0	21.0	20.0	20.5	22.5	22.0	22.0	21.0	20.0	21.0
10	22.5	21.0	21.5	21.5	20.5	21.0	23.0	22.0	22.5	21.0	20.5	21.0
11	22.5	22.5	22.5	22.5	21.0	22.0	23.0	22.0	22.5	21.5	21.0	21.0
12	22.5	20.5	22.0	22.0	22.0	22.0	23.0	22.0	22.5	21.5	20.0	21.0
13	20.5	18.5	19.5	22.0	21.5	21.5	22.5	22.0	22.5	20.5	19.0	21.0
14	19.5	18.5	19.0	23.5	22.0	22.5	22.5	22.0	22.5	19.5	19.0	19.5
15	20.5	19.5	20.0	23.5	22.5	23.0	23.5	22.5	22.5	19.0	18.0	18.5
16	20.5	20.0	20.5	23.0	22.5	23.0	23.5	22.5	23.0	18.0	16.5	17.0
17	20.5	19.5	20.0	23.5	22.5	23.0	22.5	21.0	22.0	16.5	16.0	19.0
18	20.5	19.0	19.5	23.0	22.5	23.0	21.0	20.5	21.0	16.5	16.0	19.0
19	20.5	19.5	20.0	22.5	21.0	22.0	21.0	20.0	20.0	17.5	16.5	17.0
20	20.5	20.5	20.5	21.5	20.5	21.0	20.0	19.5	20.0	18.0	17.5	17.5
21	21.0	20.0	20.5	21.0	20.5	21.0	19.5	19.0	19.5	17.5	16.5	17.0
22	21.5	21.0	21.0	20.5	19.5	20.0	20.0	19.5	19.5	16.5	15.0	15.5
23	21.5	20.5	21.0	20.0	19.0	19.5	20.0	19.5	20.0	15.0	13.5	14.0
24	22.0	21.5	21.5	19.5	18.5	19.0	20.5	19.5	20.0	14.0	13.0	13.5
25	22.5	21.5	22.0	20.0	19.0	19.5	20.5	19.5	20.0	13.5	13.0	13.0
26	23.0	22.0	22.5	20.5	20.0	20.0	20.5	20.5	20.5	13.0	11.5	12.0
27	23.0	22.0	22.5	21.5	20.5	21.0	21.5	20.5	21.0	13.0	12.0	12.5
28	22.5	21.0	22.0	21.5	21.5	21.5	21.5	20.5	21.0	12.5	12.0	12.0
29	21.0	20.0	20.5	22.0	21.0	21.5	21.0	20.5	21.0	12.0	11.5	11.5
30	20.5	19.5	20.0	21.5	21.0	21.5	21.5	20.5	21.0	13.0	12.0	12.0
31	---	---	---	21.0	20.0	20.5	22.0	20.5	21.0	---	---	---
MONTH	23.0	15.5	19.8	24.0	18.5	21.5	23.5	19.0	21.2	23.5	11.5	17.6

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	9.6	8.4	9.1	9.6	9.1	9.3	12.8	12.3	12.5	11.3	11.0	11.2
2	9.8	9.0	9.4	10.2	9.0	9.6	13.0	12.8	12.9	11.6	11.3	11.4
3	10.0	8.6	9.4	10.1	9.2	9.7	13.0	12.7	12.9	11.7	11.6	11.6
4	10.1	9.3	9.8	10.8	9.4	10.0	12.8	12.2	12.4	11.7	11.5	11.6
5	10.4	9.4	9.9	11.1	10.3	10.7	12.2	11.4	11.8	12.0	11.5	11.9
6	10.5	9.8	10.2	11.4	10.6	11.0	11.4	11.1	11.2	12.2	11.9	12.0
7	10.3	9.3	9.7	11.5	10.9	11.1	11.6	11.1	11.4	12.3	12.2	12.2
8	10.4	9.5	10.0	11.5	10.8	11.2	12.2	11.6	11.8	12.2	12.1	12.2
9	10.3	9.4	9.8	11.9	11.2	11.6	12.0	11.8	11.9	12.3	12.1	12.2
10	10.2	9.3	9.6	11.8	10.9	11.5	11.9	11.8	11.9	12.2	12.1	12.2
11	10.1	9.1	9.6	11.4	10.8	11.1	11.9	11.8	11.8	12.1	11.8	11.9
12	9.7	8.8	9.2	11.1	10.6	10.9	12.2	11.8	11.9	11.8	11.7	11.7
13	9.9	8.8	9.3	11.2	10.6	10.9	12.2	12.1	12.2	11.9	11.7	11.8
14	9.7	8.5	9.0	11.3	10.6	11.0	12.2	12.1	12.2	12.1	11.9	12.1
15	9.3	8.5	8.9	11.3	10.8	11.0	12.2	12.1	12.1	12.1	12.0	12.0
16	9.9	8.8	9.2	11.3	10.9	11.1	12.1	11.9	12.0	12.2	12.1	12.1
17	10.0	8.5	9.5	11.6	11.1	11.4	12.0	11.5	11.9	12.1	12.0	12.1
18	9.9	9.6	9.7	12.0	11.6	11.8	12.6	12.0	12.4	12.1	12.0	12.1
19	10.4	9.9	10.1	12.1	11.9	12.0	12.9	12.6	12.8	12.2	12.0	12.1
20	10.5	10.2	10.3	12.1	12.0	12.0	13.0	12.9	13.0	12.0	11.7	11.8
21	10.8	10.5	10.6	12.0	11.5	11.8	13.0	12.8	12.9	11.7	11.5	11.6
22	11.1	10.7	10.9	11.5	11.2	11.3	12.8	12.6	12.8	11.5	11.3	11.4
23	11.0	10.8	10.9	11.2	11.0	11.1	12.8	12.7	12.8	11.5	11.2	11.3
24	11.2	10.9	11.0	11.2	10.8	11.0	12.8	12.6	12.7	11.3	11.1	11.2
25	11.5	11.1	11.3	10.8	10.4	10.7	12.6	12.4	12.6	11.2	10.8	11.1
26	11.7	11.4	11.6	11.3	10.4	10.8	12.5	12.1	12.3	11.1	10.9	11.0
27	11.7	11.4	11.6	11.5	11.2	11.4	12.3	12.0	12.1	11.1	10.4	11.0
28	11.7	11.4	11.5	11.7	11.5	11.6	12.1	11.7	11.8	11.1	10.8	10.9
29	11.6	11.1	11.4	12.0	11.7	11.8	11.7	11.4	11.5	11.0	10.6	10.9
30	11.2	9.7	10.6	12.3	11.9	12.1	11.4	11.1	11.2	11.1	10.9	10.9
31	10.3	9.2	9.8	---	---	---	11.1	11.0	11.0	11.0	10.8	10.9
MONTH	11.7	8.4	10.1	12.3	9.0	11.1	13.0	11.0	12.2	12.3	10.4	11.6

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	10.9	10.7	10.8	11.7	11.3	11.5	11.9	11.3	11.7	9.8	9.1	9.4
2	10.9	10.7	10.8	11.8	11.4	11.5	11.4	11.2	11.3	9.6	8.0	8.8
3	11.1	10.9	11.0	11.9	11.6	11.7	11.4	10.8	11.1	10.0	8.4	9.2
4	11.3	11.0	11.2	12.0	9.6	11.6	10.8	10.5	10.6	9.8	7.9	8.8
5	11.3	11.2	11.3	11.8	11.5	11.7	11.1	10.3	10.7	8.8	7.2	8.1
6	11.6	11.3	11.5	11.6	11.2	11.5	11.4	10.7	11.0	8.3	7.6	7.9
7	11.9	11.6	11.8	11.5	11.1	11.3	11.7	11.0	11.5	7.9	7.1	7.6
8	12.2	11.9	12.1	11.1	10.5	10.9	12.0	11.4	11.7	8.0	6.5	7.4
9	12.3	12.1	12.2	10.6	10.1	10.4	12.5	11.7	12.1	8.0	6.9	7.4
10	12.4	12.2	12.4	10.2	9.9	10.0	12.6	12.4	12.5	7.9	7.1	7.5
11	12.6	12.4	12.6	11.3	10.2	10.7	12.8	12.5	12.7	8.1	7.2	7.7
12	12.7	12.5	12.6	11.6	11.2	11.4	12.9	12.6	12.7	7.9	7.3	7.6
13	12.9	12.7	12.8	11.9	11.5	11.7	13.1	12.5	12.8	8.0	7.7	7.9
14	13.2	12.9	13.1	12.2	11.8	12.0	13.0	12.5	12.7	8.5	7.9	8.2
15	13.2	12.6	13.0	12.2	12.0	12.1	12.5	11.6	12.0	8.9	8.5	8.7
16	12.8	12.0	12.5	12.0	11.6	11.8	11.6	10.8	11.1	9.0	8.6	8.8
17	12.0	11.4	11.7	11.9	11.5	11.7	11.1	10.5	10.7	8.8	8.6	8.7
18	11.8	11.4	11.5	12.1	11.8	12.0	11.4	10.6	11.0	8.9	8.2	8.6
19	11.8	11.6	11.7	12.3	11.9	12.1	11.7	11.2	11.4	8.6	8.3	8.4
20	11.7	11.5	11.6	12.3	12.0	12.1	11.5	10.7	11.0	8.6	8.2	8.4
21	12.0	11.5	11.7	12.1	11.8	11.9	11.1	10.7	10.9	8.5	7.9	8.2
22	11.8	11.6	11.7	11.9	11.6	11.9	11.4	11.0	11.2	8.4	7.9	8.1
23	12.1	11.8	12.0	12.0	11.6	11.8	11.4	10.9	11.2	8.1	7.6	7.8
24	12.0	11.8	11.9	11.8	11.6	11.7	11.0	10.8	10.9	8.0	7.5	7.7
25	12.0	11.6	11.8	11.7	10.8	11.2	11.0	10.3	10.7	8.0	7.2	7.7
26	11.9	11.5	11.7	10.8	9.1	10.6	10.8	9.9	10.4	8.1	7.5	7.8
27	11.6	11.0	11.3	10.8	10.4	10.6	10.5	9.8	10.2	8.1	7.4	7.8
28	11.6	11.3	11.5	10.7	10.4	10.5	10.2	9.7	9.9	8.0	7.4	7.8
29	11.8	11.5	11.6	10.7	10.3	10.5	10.2	9.5	9.8	8.1	7.5	7.8
30	---	---	---	11.4	10.7	11.0	9.6	8.6	9.1	8.2	7.7	8.0
31	---	---	---	11.8	11.3	11.6	---	---	---	8.2	7.7	8.0
MONTH	13.2	10.7	11.8	12.3	9.1	11.4	13.1	8.6	11.2	10.0	6.5	8.1

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.1	7.7	7.9	8.9	8.3	8.7	7.8	7.3	7.4	8.3	7.6	7.9
2	7.8	7.5	7.7	8.9	8.0	8.5	8.5	7.8	8.0	8.1	7.1	7.7
3	8.2	7.6	7.8	8.7	8.0	8.5	8.0	7.1	7.6	7.4	6.0	6.6
4	8.3	8.0	8.1	8.1	7.1	7.7	8.2	7.1	7.6	7.3	5.9	6.7
5	8.2	7.8	8.0	8.7	7.6	8.0	8.5	7.2	8.1	6.8	4.9	6.3
6	8.3	7.8	8.0	8.5	6.9	7.9	8.5	7.7	8.1	7.2	5.9	6.6
7	8.5	7.9	8.3	7.2	6.0	6.7	9.0	7.7	8.2	7.4	6.4	6.8
8	8.9	7.9	8.3	7.5	6.7	7.2	9.1	8.1	8.6	7.9	6.9	7.3
9	8.7	7.6	8.3	7.6	6.5	7.0	9.1	8.0	8.6	7.4	6.9	7.1
10	8.6	7.3	8.1	8.3	7.2	7.6	8.9	8.2	8.6	7.4	6.2	6.9
11	8.0	7.0	7.6	8.5	7.6	8.0	9.1	8.0	8.5	7.2	6.2	6.9
12	7.3	6.5	7.0	8.1	7.8	7.9	8.9	7.0	8.1	7.3	5.8	6.8
13	7.3	6.7	7.0	8.0	6.6	7.3	8.2	6.9	7.7	7.3	6.1	6.7
14	7.7	7.3	7.4	8.7	7.9	8.2	8.2	6.8	7.6	7.4	6.2	6.8
15	7.7	7.2	7.5	8.4	7.8	8.1	8.9	7.5	8.2	8.0	6.7	7.1
16	7.5	7.1	7.3	7.8	6.8	7.3	8.3	7.2	7.8	8.8	6.8	7.5
17	7.6	6.9	7.4	8.4	7.1	7.5	7.5	6.1	7.0	8.8	7.3	8.1
18	8.1	7.4	7.7	8.4	7.3	7.9	7.9	6.3	7.2	8.7	8.0	8.3
19	8.3	7.4	7.9	7.6	6.3	7.0	8.0	6.6	7.4	9.5	8.1	8.8
20	8.4	7.4	7.9	8.1	6.9	7.4	8.5	7.6	8.0	9.5	8.1	8.9
21	7.8	7.2	7.4	8.0	7.0	7.6	8.7	7.6	8.1	8.8	7.8	8.2
22	7.7	7.1	7.6	8.0	6.8	7.6	8.6	8.0	8.4	8.6	7.6	8.2
23	8.1	7.2	7.5	7.9	7.3	7.6	8.6	7.5	8.3	9.0	8.3	8.6
24	8.2	7.4	7.8	8.4	7.7	8.0	8.2	6.9	7.8	9.1	8.4	8.8
25	8.1	7.0	7.6	8.8	8.3	8.5	8.5	7.5	7.9	9.6	9.0	9.2
26	8.1	7.2	7.5	8.8	8.5	8.7	8.5	7.8	8.1	10.2	8.9	9.5
27	7.6	6.7	7.3	8.7	8.3	8.5	8.7	7.7	8.3	10.2	9.5	9.9
28	7.9	6.9	7.4	8.5	7.7	8.3	8.5	7.0	7.5	10.3	9.5	10.0
29	8.1	7.1	7.7	8.1	7.0	7.6	7.8	6.7	7.4	10.7	9.5	10.2
30	8.9	7.7	8.2	8.0	7.5	7.7	8.0	6.3	7.4	10.6	10.1	10.4
31	--	--	--	7.7	6.9	7.1	7.9	6.6	7.3	--	--	--
MONTH	8.9	6.5	7.7	8.9	6.0	7.8	9.1	6.1	7.9	10.7	4.9	8.0

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04121680 MUSKEGON RIVER NEAR OXBOW, MI

LOCATION.--Lat 43°29'09", long 85°37'50", in SW1/4 SE1/4 sec.28, T.13 N., R.11 W., Newaygo County, Hydrologic Unit 04060102, on right bank downstream from Hardy Dam, 0.6 mi northwest of Oxbow.

DRAINAGE AREA.--1,931 mi<sup>2</sup>.

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 22.0°C, on several days during summer periods, 1996, 1999; minimum, 0.5°C, on many days during winter periods, 1996, 1997.

DISSOLVED OXYGEN: Maximum, 14.6 mg/L, Feb. 22-24, 1999; minimum, 0.5 mg/L, Sept. 4, 5, 1998.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 21.5°C, Sept. 2-4; minimum, 1.0°C, Jan. 13.

DISSOLVED OXYGEN: Maximum, 12.7 mg/L, Jan. 26; minimum, 0.6 mg/L, Aug. 31.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	18.0	17.0	17.5	11.5	10.5	11.0	8.0	7.5	8.0	3.0	2.5	2.5
2	18.0	17.0	17.5	11.0	10.0	11.0	8.0	7.5	7.5	3.0	2.5	2.5
3	17.5	17.0	17.5	11.0	10.0	10.5	8.0	7.5	7.5	2.5	2.5	2.5
4	17.5	17.0	17.0	10.5	9.5	10.0	7.5	7.5	7.5	2.5	2.0	2.0
5	17.5	17.0	17.0	10.5	9.5	10.0	7.5	7.5	7.5	2.5	2.0	2.0
6	17.0	16.5	17.0	10.5	9.5	10.0	7.5	7.0	7.5	2.5	2.0	2.0
7	16.5	16.0	16.5	10.5	9.5	10.0	7.5	7.0	7.0	2.5	2.0	2.0
8	16.5	16.0	16.0	10.5	9.5	10.0	7.0	7.0	7.0	2.5	2.0	2.0
9	16.0	15.0	15.5	10.0	9.5	10.0	7.0	7.0	7.0	2.0	2.0	2.0
10	15.5	15.0	15.5	10.5	10.0	10.0	7.0	7.0	7.0	2.5	2.0	2.0
11	15.5	14.0	15.0	10.5	10.0	10.0	7.0	6.5	6.5	2.5	2.0	2.0
12	15.0	13.5	14.5	10.0	10.0	10.0	6.5	6.5	6.5	2.0	1.5	2.0
13	14.5	13.5	14.0	10.0	10.0	10.0	6.5	6.5	6.5	1.5	1.0	1.5
14	14.5	13.0	14.0	10.0	10.0	10.0	6.5	6.0	6.0	2.0	1.5	1.5
15	14.0	13.0	13.5	10.0	10.0	10.0	6.5	6.0	6.0	2.0	1.5	1.5
16	14.0	13.0	13.5	10.0	9.5	9.5	6.0	6.0	6.0	2.0	1.5	1.5
17	14.0	12.5	13.5	9.5	9.5	9.5	6.0	5.5	5.5	2.0	1.5	1.5
18	14.0	12.5	13.5	9.5	9.5	9.5	5.5	5.5	5.5	2.0	1.5	1.5
19	13.5	12.5	13.0	9.5	9.5	9.5	5.5	5.5	5.5	2.0	1.5	1.5
20	13.5	12.5	13.0	9.5	9.0	9.5	5.5	5.0	5.5	2.0	1.5	2.0
21	13.5	12.5	13.0	9.5	9.0	9.0	5.0	4.5	5.0	2.0	1.5	1.5
22	13.5	12.5	13.0	9.0	9.0	9.0	5.0	4.5	4.5	2.5	1.5	2.0
23	13.0	12.5	13.0	9.0	9.0	9.0	4.5	4.5	4.5	2.5	1.5	2.0
24	13.0	12.5	12.5	9.0	8.5	8.5	4.5	4.0	4.0	2.5	1.5	2.0
25	12.5	12.5	12.5	8.5	8.5	8.5	4.0	4.0	4.0	2.5	1.5	1.5
26	12.5	12.5	12.5	8.5	8.5	8.5	4.0	3.5	3.5	2.5	1.5	2.0
27	12.5	12.0	12.5	8.5	8.5	8.5	3.5	2.5	3.0	2.5	1.5	2.0
28	12.5	12.0	12.0	8.5	8.5	8.5	3.0	3.0	3.0	2.5	1.5	2.0
29	12.0	12.0	12.0	8.5	8.0	8.0	3.0	2.5	3.0	2.5	1.5	2.0
30	12.0	11.5	11.5	8.0	8.0	8.0	3.0	2.5	2.5	3.0	1.5	2.0
31	11.5	11.0	11.5	--	--	--	3.0	2.5	2.5	2.5	1.5	2.0
MONTH	18.0	11.0	14.2	11.5	8.0	9.5	8.0	2.5	5.6	3.0	1.0	1.9

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	2.5	1.5	2.0	1.5	1.5	1.5	5.0	5.0	5.0	9.5	7.5	8.5	
2	2.5	1.5	2.0	1.5	1.5	1.5	5.5	5.0	5.0	9.5	7.5	9.0	
3	2.5	1.5	2.0	2.5	1.5	1.5	5.5	5.0	5.5	9.0	7.5	8.5	
4	2.5	1.5	2.0	2.5	1.5	1.5	6.0	5.0	5.5	9.0	7.5	8.0	
5	3.0	1.5	2.0	2.5	1.5	1.5	6.0	5.0	5.5	9.0	7.0	8.0	
6	3.0	1.5	2.0	2.5	2.0	2.0	5.5	5.0	5.5	9.5	7.5	8.5	
7	3.0	1.5	2.0	3.0	1.5	2.0	5.5	5.5	5.5	9.5	8.0	8.5	
8	2.5	1.5	2.0	3.0	1.5	2.0	6.0	5.5	5.5	10.5	7.5	9.5	
9	2.5	1.5	2.0	2.5	2.0	2.0	6.0	5.5	6.0	12.5	8.0	12.5	
10	3.0	1.5	2.0	2.0	2.0	2.0	6.0	5.5	6.0	12.0	8.5	11.0	
11	3.0	1.5	2.0	2.5	2.0	2.5	6.0	5.5	6.0	12.0	11.0	11.5	
12	2.5	1.5	2.0	2.5	2.0	2.0	6.0	5.5	6.0	12.0	11.0	11.5	
13	3.0	1.5	2.0	2.5	2.0	2.5	6.0	5.5	6.0	12.0	10.0	11.0	
14	3.0	1.5	2.0	2.5	2.5	2.5	6.0	5.5	6.0	11.5	11.0	11.5	
15	3.0	1.5	2.0	2.5	2.5	2.5	6.0	6.0	6.0	12.0	11.5	12.0	
16	3.0	1.5	2.0	3.0	2.5	2.5	7.0	6.0	6.5	12.0	11.5	12.0	
17	2.5	1.5	2.0	3.0	2.5	2.5	7.0	6.5	6.5	12.5	11.5	12.0	
18	3.0	1.5	2.0	3.0	2.5	3.0	7.0	6.5	6.5	13.0	12.0	12.5	
19	3.0	1.5	2.0	3.0	3.0	3.0	7.0	6.5	6.5	12.5	12.5	12.5	
20	3.0	1.5	2.0	3.5	3.0	3.5	7.5	6.5	7.0	12.5	12.0	12.5	
21	3.0	1.5	2.0	3.5	3.5	3.5	7.0	7.0	7.0	12.5	12.0	12.0	
22	3.0	1.5	2.0	3.5	3.5	3.5	7.0	7.0	7.0	12.0	12.0	12.0	
23	3.0	1.5	2.0	4.0	3.5	3.5	7.5	7.0	7.5	12.5	12.0	12.5	
24	3.0	1.5	2.0	4.0	3.5	3.5	8.0	7.0	8.0	13.0	12.0	12.5	
25	3.5	1.5	2.0	4.0	3.5	3.5	8.5	7.5	8.0	13.5	12.0	13.0	
26	2.5	1.5	1.5	4.0	4.0	4.0	9.0	7.5	8.5	14.0	12.5	13.5	
27	3.0	1.5	1.5	5.0	4.0	4.5	9.0	7.5	8.0	14.5	13.5	14.0	
28	2.5	1.5	1.5	5.0	4.0	4.5	9.0	7.0	8.0	14.5	12.5	14.0	
29	1.5	1.5	1.5	5.0	5.0	5.0	9.5	7.0	8.5	14.5	12.0	13.5	
30	---	---	---	5.5	5.0	5.0	9.0	7.5	8.5	14.0	13.0	14.0	
31	---	---	---	5.0	5.0	5.0	---	---	---	14.5	10.0	13.5	
MONTH	3.5	1.5	1.9	5.5	1.5	2.9	9.5	5.0	6.6	14.5	7.0	11.4	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	11.0	14.0	18.0	14.0	17.0	20.0	17.0	19.5	21.0	18.0	20.0
2	15.0	11.0	14.0	18.5	14.0	17.5	20.0	16.0	19.0	21.5	18.0	20.0
3	15.0	11.0	14.0	19.0	14.5	18.0	20.5	16.5	19.0	21.5	18.0	20.0
4	15.5	10.5	14.5	19.0	14.5	18.0	20.5	16.0	19.0	21.5	17.5	20.5
5	16.0	11.0	14.5	19.5	14.5	18.5	20.0	16.0	18.5	21.0	18.5	20.0
6	15.5	12.0	15.0	19.5	14.5	18.0	20.0	16.5	18.5	21.0	18.5	20.0
7	15.5	12.0	14.5	19.5	14.5	18.5	20.0	16.5	18.5	20.5	18.0	19.5
8	15.0	11.5	14.0	19.0	14.5	17.5	20.0	16.5	19.0	21.0	18.0	20.0
9	15.0	11.5	14.0	19.0	14.5	17.5	20.5	16.5	19.5	21.0	18.5	20.0
10	15.5	11.5	14.0	19.5	14.5	18.0	20.5	16.5	19.5	21.0	18.5	20.0
11	16.0	11.5	14.5	19.5	14.5	18.0	21.0	16.5	19.5	20.5	18.0	20.0
12	17.0	12.5	15.5	19.5	14.5	18.5	21.0	16.5	19.5	21.0	18.5	20.0
13	16.5	12.5	15.5	19.5	15.0	18.0	20.5	16.5	19.0	20.5	18.5	20.0
14	16.5	12.5	15.5	20.0	15.0	18.0	21.0	16.5	19.5	20.5	18.5	20.0
15	16.0	12.5	15.0	20.0	14.5	18.0	20.5	17.0	19.5	20.5	18.5	20.0
16	16.5	12.5	15.5	20.0	15.0	18.0	21.0	17.0	19.5	20.0	18.5	19.5
17	17.5	13.0	16.0	19.5	15.0	17.5	21.0	17.0	20.0	20.0	18.5	19.5
18	17.5	12.5	16.0	20.0	15.0	18.0	21.0	17.5	20.0	20.0	18.5	19.5
19	17.0	12.5	16.0	20.0	15.0	18.0	21.0	17.0	20.0	20.0	19.0	19.5
20	17.5	12.5	16.0	19.5	15.5	18.0	21.0	17.0	19.5	20.0	19.0	19.5
21	17.0	13.5	16.0	19.5	15.5	18.0	20.5	17.0	19.5	19.5	18.5	19.5
22	17.5	13.5	16.5	19.5	15.0	18.0	20.5	17.5	19.5	19.5	19.0	19.0
23	17.5	13.0	16.5	19.5	15.0	18.0	20.5	17.0	19.5	19.5	19.0	19.0
24	18.0	13.5	16.5	19.5	15.0	18.0	21.0	17.5	20.0	19.5	19.0	19.0
25	18.5	13.5	16.5	19.5	15.0	18.0	21.0	17.5	19.5	19.0	18.5	19.0
26	18.0	13.5	16.5	19.5	15.0	18.0	20.5	17.5	19.5	18.5	18.5	18.5
27	18.5	13.5	17.0	19.5	15.0	18.0	21.0	17.5	20.0	18.5	18.0	18.5
28	18.5	14.0	17.0	20.0	15.5	18.5	21.0	18.0	20.0	18.5	18.0	18.0
29	18.5	13.5	17.0	20.0	15.5	18.5	21.0	18.0	20.0	18.0	17.5	18.0
30	18.5	14.0	17.0	20.5	15.5	19.0	21.0	17.5	20.0	17.5	17.0	17.5
31	---	---	---	20.0	20.0	20.0	21.0	18.0	20.0	---	---	---
MONTH	18.5	10.5	15.5	20.5	14.0	18.1	21.0	16.0	19.5	21.5	17.0	19.5

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	6.5	5.1	5.9	8.2	7.7	8.0	10.5	7.4	9.2	11.4	11.1	11.3
2	6.8	5.3	6.3	8.6	7.9	8.2	10.6	7.2	9.2	11.5	11.1	11.3
3	6.9	5.3	6.4	8.8	7.9	8.4	10.7	7.2	9.5	11.6	11.3	11.4
4	7.1	6.4	6.9	8.8	8.1	8.5	10.6	7.3	9.5	11.7	11.3	11.4
5	7.0	6.6	6.8	8.9	8.1	8.6	10.7	6.7	9.6	11.4	11.1	11.2
6	7.1	6.4	6.8	9.3	8.1	8.8	10.7	8.2	10.1	11.4	11.1	11.2
7	7.0	6.5	6.8	9.5	8.3	8.9	11.0	6.9	10.2	11.4	11.0	11.3
8	6.9	6.5	6.7	9.4	8.3	9.0	11.0	8.7	10.2	11.6	11.0	11.3
9	7.1	6.2	6.9	9.3	8.3	8.9	10.6	10.2	10.4	11.6	11.3	11.5
10	7.1	6.6	7.0	9.9	8.4	9.2	10.6	10.3	10.4	11.6	11.3	11.5
11	7.2	6.7	7.0	10.2	9.4	9.9	10.6	10.3	10.4	11.8	11.2	11.6
12	7.4	6.8	7.2	10.0	8.8	9.7	10.6	10.2	10.4	11.9	11.5	11.8
13	7.7	7.1	7.4	10.0	9.2	9.7	10.5	10.3	10.4	12.1	11.6	12.0
14	7.8	7.5	7.7	10.6	9.4	10.1	10.6	10.3	10.5	12.2	11.6	12.0
15	7.8	7.4	7.6	10.7	10.3	10.5	10.5	10.3	10.4	12.2	11.7	12.0
16	7.6	7.1	7.5	10.6	10.1	10.4	10.5	10.2	10.4	12.3	11.7	12.1
17	7.8	7.1	7.6	10.4	10.1	10.3	10.6	10.3	10.5	12.3	11.7	12.1
18	7.8	7.3	7.6	10.4	9.9	10.2	10.6	10.4	10.5	12.4	11.7	12.1
19	7.9	7.1	7.5	10.2	9.8	10.1	10.6	10.5	10.5	12.4	11.7	12.1
20	7.8	6.9	7.4	10.1	7.3	9.6	10.7	10.4	10.5	12.4	11.6	12.1
21	7.8	6.9	7.4	10.1	7.5	9.1	10.9	10.6	10.7	12.5	11.5	12.1
22	8.0	6.8	7.6	9.8	6.2	8.5	11.0	10.6	10.7	12.5	11.3	12.1
23	8.6	6.9	8.0	9.9	6.6	8.6	11.0	10.7	10.8	12.5	11.4	12.1
24	8.6	8.2	8.5	9.9	7.0	8.7	11.0	10.7	10.8	12.6	11.5	12.2
25	8.4	8.2	8.3	10.3	6.2	9.0	11.0	10.6	10.8	12.6	11.2	12.2
26	8.6	8.0	8.4	10.1	7.3	9.2	11.2	10.8	11.0	12.7	11.0	12.1
27	8.7	8.3	8.5	10.3	7.2	9.0	11.5	11.1	11.3	12.5	11.4	12.1
28	8.6	8.3	8.5	10.1	6.9	9.2	11.4	11.1	11.3	12.5	11.4	12.1
29	8.4	7.5	8.0	10.6	8.0	9.5	11.4	10.9	11.2	12.4	11.1	12.0
30	7.9	7.6	7.8	10.5	7.0	9.4	11.4	11.1	11.3	12.2	10.5	11.7
31	8.1	7.7	7.9	---	---	---	11.5	11.2	11.4	12.2	10.5	11.7
MONTH	8.7	5.1	7.4	10.7	6.2	9.2	11.5	6.7	10.5	12.7	10.5	11.8

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.2	10.7	11.7	10.9	10.5	10.7	11.6	11.0	11.4	10.5	9.6	10.1	
2	12.0	10.8	11.7	11.0	10.7	10.8	11.7	11.2	11.5	10.5	9.5	10.1	
3	12.0	10.3	11.5	11.0	9.4	10.8	11.7	10.9	11.3	10.2	9.4	9.9	
4	11.9	10.1	11.4	11.2	9.1	11.0	12.1	10.7	11.5	10.1	9.2	9.7	
5	11.9	9.7	11.2	11.2	9.4	11.0	11.7	10.7	11.3	9.9	9.4	9.8	
6	11.8	9.4	11.1	11.2	9.3	10.8	11.4	10.6	11.1	9.8	9.2	9.6	
7	11.7	9.5	11.0	11.1	8.1	10.4	11.5	10.7	11.2	9.7	9.2	9.5	
8	11.7	9.6	11.0	11.3	9.0	10.7	11.6	11.1	11.4	9.7	9.1	9.4	
9	11.6	9.8	11.0	11.4	9.3	10.6	11.5	10.9	11.2	9.6	9.2	9.4	
10	11.5	9.0	10.7	11.5	11.2	11.4	11.5	10.9	11.3	9.4	8.3	9.2	
11	11.5	9.1	10.6	11.5	9.6	11.1	11.5	10.8	11.2	9.3	9.1	9.2	
12	11.3	9.1	10.6	11.5	11.2	11.4	11.4	10.6	11.1	9.2	9.0	9.1	
13	11.2	8.4	10.3	11.4	10.1	11.1	10.8	10.3	10.6	9.2	9.0	9.1	
14	11.3	8.5	10.3	11.4	9.7	11.0	10.7	10.2	10.4	9.1	8.9	9.0	
15	11.1	8.4	10.3	11.5	10.6	11.2	10.5	10.2	10.4	8.9	8.8	8.9	
16	11.0	8.3	10.2	11.7	10.9	11.5	10.7	10.1	10.5	8.8	8.5	8.7	
17	10.9	8.3	10.0	11.9	11.4	11.7	10.9	10.2	10.6	8.8	8.4	8.6	
18	11.0	8.1	9.9	11.7	11.5	11.7	10.7	10.2	10.5	8.6	8.3	8.4	
19	10.8	7.3	9.6	11.8	11.1	11.7	10.6	10.1	10.4	8.5	8.3	8.4	
20	10.6	7.7	9.6	11.7	11.5	11.6	10.6	9.9	10.4	8.5	8.1	8.3	
21	10.6	7.3	9.6	11.8	11.4	11.7	10.6	10.2	10.5	8.3	7.8	8.0	
22	10.6	7.6	9.8	11.9	11.5	11.8	10.5	10.4	10.5	7.9	7.5	7.7	
23	10.7	7.4	9.7	12.2	11.6	11.9	10.5	10.3	10.4	7.7	7.6	7.6	
24	10.6	7.3	9.7	11.9	11.5	11.7	10.6	10.3	10.5	7.8	7.5	7.7	
25	10.6	7.3	9.8	11.9	11.3	11.6	10.7	10.1	10.5	7.9	7.6	7.7	
26	10.7	8.5	10.4	11.8	11.4	11.6	10.6	10.0	10.5	8.2	7.6	7.9	
27	10.8	8.3	10.3	11.9	11.0	11.5	10.7	9.8	10.3	8.2	7.9	8.1	
28	10.9	9.0	10.6	11.9	10.7	11.5	10.6	9.7	10.3	8.2	7.6	8.0	
29	10.8	10.6	10.7	11.9	11.1	11.6	10.6	9.5	10.2	8.8	7.5	7.9	
30	---	---	---	11.9	11.3	11.7	10.5	9.5	10.2	7.8	7.4	7.6	
31	---	---	---	11.7	11.1	11.5	---	---	---	7.8	6.4	7.5	
MONTH	12.2	7.3	10.5	12.2	8.1	11.3	12.1	9.5	10.8	10.5	6.4	8.7	



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	7.6	6.2	7.3	6.2	3.0	5.4	4.9	2.5	4.4	3.2	.8	2.2
2	7.8	6.1	7.4	6.2	3.1	5.4	4.7	2.0	3.9	3.7	.7	2.4
3	7.7	5.8	7.2	6.4	3.3	5.6	5.0	2.0	4.1	3.8	.8	2.4
4	7.6	5.5	7.1	6.4	2.9	5.6	4.6	1.9	3.6	4.2	.8	3.1
5	7.8	5.6	7.2	6.4	2.7	5.5	4.4	2.0	3.4	4.4	1.0	3.2
6	7.6	5.7	7.2	6.2	2.7	5.2	4.6	2.0	3.5	4.3	1.5	3.1
7	7.5	5.6	7.0	6.0	2.3	4.9	3.7	1.9	3.0	3.9	1.2	2.6
8	7.3	5.3	6.7	5.6	2.3	4.5	3.9	1.8	3.1	3.9	1.0	2.8
9	7.3	4.9	6.6	5.2	2.3	4.2	4.8	1.8	3.7	3.8	1.3	2.7
10	7.3	4.8	6.5	5.8	2.1	4.6	4.5	1.7	3.6	3.6	1.3	2.6
11	7.1	4.6	6.5	5.9	2.3	4.7	5.0	1.8	3.9	3.4	1.2	2.5
12	7.4	4.7	6.7	5.6	2.0	4.7	4.5	1.7	3.5	3.9	1.2	2.8
13	7.4	4.8	6.6	5.4	2.0	4.3	4.2	1.7	3.1	3.6	1.0	2.4
14	7.1	4.7	6.4	5.5	2.1	4.3	4.2	1.6	3.1	3.6	.9	2.7
15	6.8	4.5	6.1	5.5	1.9	4.0	4.4	1.6	3.4	4.1	1.0	2.9
16	6.9	4.2	6.1	5.3	1.8	3.8	4.4	1.8	3.5	4.0	1.1	2.9
17	7.3	4.4	6.3	4.7	1.7	3.4	4.3	1.4	3.5	4.0	1.1	2.8
18	7.4	4.0	6.3	5.3	1.7	3.8	4.8	1.4	3.8	4.0	1.2	2.9
19	7.1	3.8	6.1	5.3	1.4	3.8	4.7	1.5	3.9	4.0	1.4	2.9
20	7.0	3.7	6.1	4.7	1.6	3.4	4.5	1.3	3.4	4.2	1.3	3.0
21	6.7	4.3	5.9	4.8	1.9	3.6	4.5	1.3	3.2	4.9	1.4	3.6
22	7.0	3.9	6.1	5.0	1.8	3.9	4.3	1.1	3.1	5.0	3.1	4.5
23	7.1	3.7	6.2	5.3	1.7	3.9	3.7	1.2	3.0	5.4	4.8	5.1
24	7.1	3.6	6.1	4.9	1.6	3.6	4.2	1.1	3.2	5.6	4.9	5.3
25	7.2	3.6	5.9	5.0	1.5	3.6	3.6	1.1	2.6	5.7	5.1	5.5
26	6.7	3.4	5.7	4.9	1.6	3.6	3.1	.9	2.2	5.7	5.3	5.5
27	6.8	3.7	5.9	4.7	1.4	3.5	4.1	.8	2.9	5.9	5.1	5.6
28	6.8	3.6	5.8	5.3	1.6	3.9	4.0	.8	2.9	6.1	5.5	6.0
29	6.6	3.0	5.5	5.0	1.8	4.0	3.3	.8	2.5	6.3	5.8	6.1
30	6.3	3.4	5.4	5.5	1.8	4.4	4.0	.7	2.7	6.4	5.6	6.1
31	---	---	---	5.1	4.4	4.8	3.5	.6	2.4	---	---	---
MONTH	7.8	3.0	6.4	6.4	1.4	4.3	5.0	.6	3.3	6.4	.7	3.6

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI

LOCATION.--Lat 43°25'51", long 85°35'44", in NE1/4 SW1/4 sec.14, T.13 N., R.11 W., Newaygo County, Hydrologic Unit 04060102, on left bank 1.6 mi downstream from Tamarack Creek, 3.2 mi east of Croton.

DRAINAGE AREA.--345 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1995 to current year.

REVISED RECORDS.--WDR MI-98-1: 1996-97.

GAGE.--Water-stage recorder. Elevation of gage is 750 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	264	185	193	200	e200	596	216	300	313	203	453	174
2	227	209	192	206	e200	485	218	325	354	196	384	185
3	213	216	195	240	e200	389	222	310	355	201	353	190
4	214	205	202	251	e200	329	218	292	316	189	281	186
5	213	199	265	235	e200	325	214	281	298	193	237	179
6	207	195	383	224	e200	305	212	273	284	191	233	173
7	199	191	332	217	e200	293	204	263	265	193	228	171
8	195	191	286	214	e200	297	224	e252	258	175	236	169
9	193	191	257	219	e200	295	257	e313	253	194	208	167
10	190	191	243	225	e200	296	276	465	239	211	194	176
11	187	189	233	271	202	279	274	489	283	235	183	191
12	183	187	226	265	e200	265	267	487	334	217	181	223
13	182	188	224	237	e200	267	255	509	356	e205	181	220
14	181	188	222	e230	e200	261	246	434	349	e200	175	229
15	181	185	230	e220	200	263	235	366	329	198	174	274
16	178	184	259	e210	198	259	223	342	296	191	177	250
17	186	183	257	e200	197	273	216	342	271	181	187	227
18	187	179	230	e200	194	218	218	563	245	170	197	209
19	183	182	234	e200	208	218	216	853	238	171	193	198
20	189	181	234	e200	198	251	293	798	233	166	180	200
21	188	189	230	e200	189	269	736	699	248	166	173	235
22	189	189	e230	e200	206	260	947	547	253	166	e170	244
23	189	192	e230	e200	252	248	757	444	240	167	e400	351
24	187	218	e220	e200	413	255	648	412	231	164	336	377
25	186	220	e220	e200	760	255	470	368	227	158	268	314
26	185	211	e220	e200	835	244	382	332	217	158	225	269
27	182	206	e210	e200	890	232	350	307	215	155	206	243
28	174	200	e210	e200	830	233	325	313	212	186	198	229
29	179	200	e210	e200	742	230	312	338	214	287	192	224
30	181	197	e210	e200	---	226	295	324	210	258	188	219
31	183	---	206	e200	---	220	---	308	---	534	181	---
TOTAL	5975	5841	7293	6664	9114	8836	9926	12649	8136	6279	7172	6696
MEAN	193	195	235	215	314	285	331	408	271	203	231	223
MAX	264	220	383	271	890	596	947	853	356	534	453	377
MIN	174	179	192	200	189	218	204	252	210	155	170	167
CFSM	.56	.56	.68	.62	.91	.83	.96	1.18	.79	.59	.67	.65
IN.	.64	.63	.79	.72	.98	.95	1.07	1.36	.88	.68	.77	.72

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2000, BY WATER YEAR (WY)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
MEAN	219	267	268	315	376	415	404	361	295	211	207	193
MAX	275	393	371	443	491	628	441	425	411	288	272	223
(WY)	1997	1996	1997	1997	1997	1997	1996	1996	1996	1999	1996	2000
MIN	190	195	204	215	314	270	331	256	183	131	133	152
(WY)	1998	2000	1998	2000	2000	1999	2000	1998	1998	1998	1998	1998

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1996 - 2000

ANNUAL TOTAL	96015	94581	294
ANNUAL MEAN	263	258	352
HIGHEST ANNUAL MEAN			252
LOWEST ANNUAL MEAN			1997
HIGHEST DAILY MEAN	753	947	1080
LOWEST DAILY MEAN	150	155	113
ANNUAL SEVEN-DAY MINIMUM	152	162	116
INSTANTANEOUS PEAK FLOW		1000	1160
INSTANTANEOUS PEAK STAGE		5.83	6.28
INSTANTANEOUS LOW FLOW		151	105
ANNUAL RUNOFF (CFSM)	.76	.75	.85
ANNUAL RUNOFF (INCHES)	10.35	10.20	11.56
10 PERCENT EXCEEDS	378	355	475
50 PERCENT EXCEEDS	240	218	249
90 PERCENT EXCEEDS	181	182	178

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.0°C, June 26, 1998, July 6, 1999; minimum, -0.5°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum recorded (more than 20 percent missing record), 16.5 mg/L, Dec. 7, 1995; minimum, 5.2 mg/L, Aug. 11, Sept. 2, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 22.5°C, July 5, 17; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum 14.2 mg/L, Feb. 17; minimum, 5.2 mg/L, Aug. 11, Sept. 2.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	12.5	11.5	12.0	10.5	9.0	10.0	2.5	1.5	2.0	.5	.0	.5
2	11.5	10.5	11.0	10.0	8.0	9.5	4.5	2.5	4.0	2.0	.5	1.5
3	10.5	8.5	9.0	8.0	6.0	7.0	6.5	4.5	5.5	2.0	1.0	1.5
4	9.5	8.5	9.0	6.0	4.5	5.5	7.0	6.5	7.0	1.5	1.0	1.0
5	9.5	8.5	9.0	7.5	6.0	6.5	7.0	6.0	7.0	1.0	.5	1.0
6	10.0	8.5	9.0	7.0	5.5	6.0	6.0	5.0	5.0	1.5	1.0	1.0
7	9.0	7.5	8.5	5.5	4.5	5.0	5.0	4.0	4.5	1.5	.0	1.0
8	10.5	8.5	9.5	6.0	4.5	5.5	4.0	3.5	4.0	1.0	-.5	.0
9	12.5	10.5	11.5	8.5	6.0	7.5	5.0	3.5	4.0	2.5	1.0	1.5
10	14.0	12.0	13.0	10.5	8.5	9.5	5.0	4.0	4.5	3.0	2.5	2.5
11	12.5	11.0	11.5	9.0	7.0	8.0	4.0	2.5	3.0	2.5	1.5	2.5
12	11.5	10.0	11.0	7.5	6.5	7.0	3.5	2.5	3.0	1.5	.5	1.0
13	12.0	10.5	11.5	8.5	7.5	8.0	3.5	3.0	3.5	.5	-.5	.0
14	10.5	8.5	9.5	8.5	7.0	8.0	3.0	2.5	2.5	-.5	-.5	-.5
15	10.0	8.0	9.5	7.0	5.0	5.5	3.0	2.5	3.0	.0	-.5	.0
16	12.0	10.0	11.0	5.5	4.5	5.0	3.0	2.0	2.5	.0	-.5	.0
17	11.0	9.0	10.0	4.5	3.5	4.0	2.0	.0	.5	-.5	-.5	-.5
18	9.0	8.0	8.5	4.5	3.0	4.0	.0	.0	.0	-.5	-.5	-.5
19	9.0	8.0	8.5	5.5	4.5	5.0	.0	.0	.0	-.5	-.5	-.5
20	9.0	8.0	8.5	6.5	5.5	6.0	1.5	.0	1.0	-.5	-.5	-.5
21	8.5	7.0	8.0	7.0	6.5	6.5	.5	.0	.0	-.5	-.5	-.5
22	9.0	8.0	8.5	8.0	7.0	7.5	.0	-.5	.0	-.5	-.5	-.5
23	8.0	6.5	7.5	9.0	7.0	8.0	-.5	-.5	-.5	-.5	-.5	-.5
24	7.0	6.0	6.5	9.0	6.5	8.0	-.5	-.5	-.5	-.5	-.5	-.5
25	7.0	5.5	6.5	6.5	4.5	5.5	-.5	-.5	-.5	-.5	-.5	-.5
26	8.0	6.5	7.5	5.5	5.0	5.0	-.5	-.5	-.5	-.5	-.5	-.5
27	7.0	5.5	6.5	5.5	5.0	5.5	-.5	-.5	-.5	-.5	-.5	-.5
28	8.5	6.0	7.0	5.0	3.5	4.0	-.5	-.5	-.5	-.5	-.5	-.5
29	9.5	7.5	8.5	3.5	2.5	3.0	-.5	-.5	-.5	-.5	-.5	-.5
30	11.0	9.0	10.0	3.0	2.5	2.5	.0	-.5	.0	-.5	-.5	-.5
31	11.5	10.5	11.0	---	---	---	.0	.0	.0	-.5	-.5	-.5
MONTH	14.0	5.5	9.3	10.5	2.5	6.3	7.0	-.5	2.0	3.0	-.5	.2

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	-5	-5	-5	5.5	5.0	5.5	9.0	7.5	8.5	14.5	13.0	13.5
2	-5	-5	-5	5.0	4.0	4.5	11.0	9.0	10.0	15.0	12.0	13.5
3	-5	-5	-5	4.5	3.0	4.0	11.0	9.5	10.5	16.0	13.0	14.5
4	-5	-5	-5	5.0	3.0	4.0	10.5	6.5	8.5	17.5	14.5	16.0
5	.0	-5	-5	6.0	4.0	5.0	7.5	5.0	6.5	19.0	16.5	18.0
6	.0	.0	.0	7.0	5.0	6.0	8.0	7.0	7.5	21.0	18.0	19.5
7	.0	.0	.0	9.5	7.0	8.0	7.0	3.5	6.0	21.5	19.5	20.5
8	.0	.0	.0	11.5	9.0	10.0	6.5	3.0	5.0	---	---	---
9	.0	.0	.0	11.5	9.0	10.5	6.0	5.0	5.5	---	---	---
10	.0	.0	.0	9.0	6.0	7.0	6.5	4.5	5.5	17.0	15.0	16.5
11	.5	.0	.0	6.0	5.0	5.5	6.0	5.0	5.5	16.5	14.5	15.0
12	.0	.0	.0	5.0	3.5	4.0	7.0	4.5	5.5	16.0	14.5	15.5
13	.0	.0	.0	4.5	3.5	4.0	6.5	5.5	6.0	16.0	14.0	15.0
14	.0	.0	.0	6.0	4.0	5.0	10.5	6.5	8.5	14.0	12.5	13.0
15	.5	.0	.5	7.0	6.0	6.5	13.0	10.5	11.5	14.0	11.0	12.5
16	1.5	.5	1.0	6.5	5.5	6.0	12.5	9.5	11.0	13.5	12.0	12.5
17	.5	.0	.0	5.5	4.5	5.0	9.5	8.5	9.0	14.5	12.0	13.0
18	.0	.0	.0	5.0	3.0	4.5	10.5	8.5	9.5	14.5	13.0	13.5
19	1.0	.0	.0	5.5	4.5	5.0	10.0	9.5	10.0	13.0	12.0	12.0
20	1.5	.5	1.0	6.0	5.0	5.0	9.5	9.0	9.5	13.5	11.5	12.5
21	1.5	.0	1.0	7.0	6.0	6.5	9.0	7.5	8.0	14.5	12.5	13.5
22	3.5	1.5	2.5	8.0	7.0	7.5	9.5	6.5	8.0	15.0	14.0	14.5
23	3.5	2.5	3.0	9.5	7.0	8.5	10.5	9.5	10.0	16.5	14.5	15.5
24	3.5	2.5	2.5	11.0	9.0	10.0	12.5	9.5	11.0	17.5	15.0	16.0
25	3.5	2.5	3.0	12.5	10.5	11.0	13.0	10.0	12.0	17.0	15.0	16.5
26	4.0	2.5	3.0	11.0	9.0	10.0	13.5	10.5	12.0	16.0	14.5	15.5
27	4.5	4.0	4.5	11.0	9.5	10.0	14.0	11.0	13.0	16.0	14.5	15.0
28	4.0	3.0	3.5	10.0	8.0	9.0	14.5	11.5	13.5	14.5	13.5	14.0
29	5.0	3.0	4.0	8.0	6.5	7.5	15.5	12.5	14.0	15.0	12.5	14.0
30	---	---	---	8.0	5.0	6.5	15.5	13.0	14.5	15.0	14.0	15.0
31	---	---	---	9.0	6.0	7.5	---	---	---	16.0	15.0	15.5
MONTH	5.0	-.5	.9	12.5	3.0	6.7	15.5	3.0	9.2	---	---	---

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.5	15.5	16.0	20.5	17.0	19.0	20.0	19.0	19.5	22.0	19.5	20.5
2	17.0	16.0	16.5	21.0	18.5	19.5	20.5	19.0	20.0	21.0	20.0	20.5
3	16.0	14.0	15.5	21.0	19.5	20.0	20.0	18.5	19.0	20.5	19.5	20.0
4	16.0	14.5	15.5	21.0	19.0	20.5	19.0	18.0	18.5	19.5	17.0	19.0
5	16.0	14.5	15.0	22.5	19.0	20.5	19.0	17.5	18.5	17.0	15.0	16.0
6	16.0	13.0	14.5	21.0	18.5	20.0	19.5	18.0	18.5	16.5	14.0	15.0
7	17.0	14.5	16.0	20.0	16.5	18.5	21.0	19.0	20.0	17.5	14.5	16.0
8	19.5	16.5	17.5	19.0	17.0	17.5	20.5	19.5	20.0	18.5	17.0	17.5
9	21.0	18.5	19.5	19.0	16.5	17.5	21.5	19.5	20.5	19.0	17.5	18.0
10	22.0	19.5	20.5	19.5	18.0	18.5	21.0	19.0	19.5	19.5	18.5	18.5
11	21.0	20.5	20.5	21.0	18.0	19.0	20.5	18.5	19.5	19.0	18.5	18.5
12	20.5	17.0	18.5	19.5	18.0	18.5	20.5	17.5	19.0	19.0	17.5	18.0
13	17.0	16.5	16.5	---	---	---	20.0	18.5	19.0	17.5	15.5	16.5
14	18.5	16.5	17.5	---	---	---	20.5	18.5	19.5	16.5	15.5	16.0
15	19.0	18.0	18.5	21.0	19.0	20.0	21.0	19.0	20.0	15.5	14.0	15.0
16	19.0	18.0	18.5	21.5	18.5	20.0	20.5	18.0	19.5	14.0	12.5	13.5
17	18.5	17.0	18.0	22.5	19.0	20.5	19.0	17.0	17.5	15.0	13.0	14.0
18	18.5	16.5	17.5	20.5	17.5	18.5	18.5	16.5	17.5	15.0	13.5	14.5
19	19.5	16.5	18.0	20.0	16.5	18.0	18.0	16.0	17.0	17.5	15.0	16.0
20	18.5	17.5	18.0	18.5	15.5	17.0	17.5	15.0	16.5	16.5	14.5	16.0
21	21.0	18.0	19.5	17.5	16.0	17.0	17.5	15.0	16.5	14.5	13.0	14.0
22	20.0	19.0	19.0	17.0	16.0	16.5	---	---	---	13.0	11.5	12.0
23	20.0	18.0	19.0	18.0	14.5	16.0	---	---	---	12.5	11.5	12.5
24	20.0	19.0	19.5	18.5	15.0	16.5	19.0	17.5	18.0	12.5	12.0	12.5
25	21.5	19.0	20.0	19.0	16.0	17.5	18.5	17.5	18.0	12.0	11.0	11.5
26	20.5	19.0	20.0	20.0	16.5	18.5	19.0	18.5	18.5	11.5	10.5	11.0
27	20.5	18.0	19.0	20.0	18.0	19.0	19.5	18.0	18.5	12.0	11.5	11.5
28	18.5	16.5	17.5	19.0	18.0	18.5	19.5	18.0	18.5	11.5	10.0	10.5
29	19.0	16.0	17.5	20.5	18.0	19.0	19.0	18.0	18.5	11.5	9.5	10.5
30	19.5	16.0	18.0	19.5	18.5	19.0	20.0	18.5	19.0	13.0	11.5	12.0
31	---	---	---	19.5	18.5	19.0	21.0	18.5	19.5	---	---	---
MONTH	22.0	13.0	17.9	---	---	---	---	---	---	22.0	9.5	15.2

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	9.2	8.3	8.7	11.5	9.7	10.4	13.6	12.7	13.0	13.8	12.9	13.4
2	9.1	8.5	8.8	11.1	9.6	10.3	12.8	11.7	12.4	13.3	12.7	13.1
3	10.1	8.9	9.6	12.0	10.4	11.1	11.8	11.3	11.6	13.4	12.7	13.1
4	10.9	9.8	10.3	12.7	11.3	11.9	11.7	11.1	11.3	13.3	12.5	12.8
5	10.7	10.0	10.3	12.5	11.1	11.6	11.2	10.9	11.0	13.4	12.9	13.1
6	10.5	9.8	10.1	12.5	11.0	11.7	11.9	11.0	11.6	13.2	12.7	13.0
7	10.8	9.6	10.2	13.1	11.7	12.3	12.2	11.7	12.0	13.3	12.7	13.0
8	10.3	9.1	9.6	13.1	11.5	12.2	12.6	11.9	12.2	13.6	12.4	13.2
9	9.9	8.8	9.3	12.2	10.7	11.4	12.6	11.4	12.1	12.8	12.3	12.6
10	9.4	8.5	8.9	11.8	10.3	10.7	11.9	11.1	11.5	12.3	11.8	12.0
11	9.8	8.5	9.1	12.5	10.4	11.4	12.4	11.5	12.0	12.4	11.8	12.1
12	10.2	8.9	9.4	12.2	11.0	11.5	12.5	11.8	12.1	13.1	12.4	12.8
13	9.2	8.5	8.9	12.2	10.5	11.2	12.4	11.8	12.0	13.6	10.8	12.9
14	10.4	9.0	9.7	12.1	10.4	11.1	12.4	12.0	12.1	12.7	10.8	11.7
15	10.4	9.3	9.8	12.7	11.2	11.9	12.0	11.7	11.9	13.6	11.5	12.7
16	9.5	9.0	9.2	12.7	11.7	12.0	12.4	11.7	12.1	13.6	10.5	13.1
17	10.2	9.0	9.6	13.2	11.5	12.3	13.5	12.4	13.0	12.2	10.3	11.2
18	10.8	9.6	10.2	13.1	11.8	12.4	13.7	13.3	13.4	11.8	11.2	11.5
19	10.9	9.9	10.3	12.1	11.3	11.7	13.7	11.5	12.8	11.6	10.8	11.2
20	10.8	9.9	10.3	11.9	11.1	11.4	13.1	12.6	12.8	11.6	11.0	11.3
21	11.3	10.0	10.6	11.8	10.9	11.2	13.9	11.6	13.3	11.7	10.5	11.2
22	10.9	9.6	10.2	12.0	10.8	11.2	13.8	11.6	13.3	11.7	10.7	11.2
23	11.4	10.2	10.7	11.7	10.2	10.9	13.6	13.4	13.5	13.0	11.0	12.3
24	11.8	10.7	11.1	11.2	10.1	10.6	13.8	13.4	13.5	13.1	12.4	12.9
25	11.8	10.7	11.2	12.4	11.1	11.7	13.4	10.3	13.1	13.0	12.7	12.9
26	11.6	10.5	11.0	12.1	11.3	11.7	13.3	12.9	13.1	13.3	12.7	13.0
27	12.0	10.8	11.3	12.1	11.3	11.6	13.5	13.1	13.3	13.2	12.9	13.1
28	12.1	10.5	11.3	12.8	11.6	12.2	13.4	12.0	12.7	13.2	12.9	13.0
29	12.0	10.3	10.9	13.2	12.2	12.7	13.4	11.7	12.5	13.2	12.9	13.1
30	11.7	9.8	10.5	13.3	12.6	12.9	13.6	13.0	13.3	12.9	12.6	12.7
31	11.1	9.6	10.1	---	---	---	13.7	13.2	13.4	12.7	12.0	12.5
MONTH	12.1	8.3	10.0	13.3	9.6	11.6	13.9	10.3	12.5	13.8	10.3	12.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	12.7	12.0	12.3	11.7	10.6	11.5	12.2	10.9	11.4	9.9	8.7	9.2
2	13.0	12.6	12.8	12.2	11.5	12.0	11.7	10.3	10.9	10.4	8.7	9.5
3	12.7	12.4	12.5	12.8	12.1	12.4	11.6	9.8	10.7	10.2	8.2	9.1
4	12.8	12.3	12.5	12.6	11.8	12.2	12.0	9.8	11.0	9.4	7.7	8.6
5	13.1	12.7	12.9	12.4	11.5	12.0	12.7	11.1	11.9	9.3	7.3	8.2
6	13.3	12.7	13.0	12.2	11.3	11.7	12.1	10.8	11.4	8.5	6.6	7.5
7	13.0	12.6	12.8	11.7	10.6	11.3	12.1	11.2	11.6	8.0	6.4	7.0
8	14.0	12.9	13.5	11.0	9.7	10.5	13.1	11.8	12.5	---	---	---
9	13.5	13.0	13.4	10.5	9.5	9.9	12.8	11.8	12.2	---	---	---
10	13.4	13.0	13.2	11.9	10.5	11.4	13.0	11.6	12.2	8.8	8.0	8.4
11	13.9	13.2	13.6	12.4	11.6	12.0	12.4	11.3	11.9	8.6	8.2	8.4
12	14.0	10.5	12.2	13.0	12.0	12.5	12.5	11.4	12.0	8.5	8.2	8.4
13	13.9	12.7	13.7	12.9	12.3	12.5	12.4	11.3	11.8	8.8	8.1	8.5
14	13.8	13.5	13.6	12.7	11.7	12.3	11.9	10.0	11.2	9.6	8.8	9.2
15	13.9	13.1	13.6	12.0	11.4	11.7	11.3	9.6	10.3	10.2	9.1	9.6
16	13.8	13.3	13.5	12.3	11.4	11.8	10.6	9.4	10.0	9.7	9.1	9.4
17	14.2	11.5	13.2	12.9	11.8	12.4	11.8	10.3	10.9	10.2	8.9	9.6
18	13.9	13.5	13.7	13.1	12.2	12.7	11.6	10.0	10.7	8.9	8.7	8.8
19	14.0	13.3	13.6	12.4	12.1	12.2	10.9	9.7	10.2	9.6	8.8	9.2
20	13.7	13.1	13.4	12.4	11.9	12.1	10.1	9.8	9.9	9.8	9.3	9.6
21	13.9	13.0	13.5	12.3	11.6	12.0	10.5	9.8	10.2	9.4	8.9	9.2
22	13.2	12.4	12.9	12.1	11.4	11.7	10.8	10.1	10.5	9.1	8.8	8.9
23	13.0	12.4	12.7	12.2	10.8	11.6	10.1	9.8	10.0	9.3	8.6	8.9
24	12.6	12.0	12.4	11.5	10.2	10.8	10.2	9.4	9.9	---	---	---
25	12.4	12.0	12.2	11.1	10.0	10.4	10.3	9.3	9.7	---	---	---
26	12.4	11.8	12.2	11.5	10.1	10.7	10.3	9.2	9.7	---	---	---
27	11.8	11.5	11.6	11.4	10.1	10.6	10.2	8.9	9.6	---	---	---
28	12.3	11.8	12.1	11.6	10.2	10.9	10.3	8.7	9.5	---	---	---
29	12.2	11.6	12.1	12.1	10.9	11.5	9.7	7.4	8.7	---	---	---
30	---	---	---	12.5	11.2	11.8	10.6	7.6	9.1	---	---	---
31	---	---	---	12.6	11.1	11.7	---	---	---	---	---	---
MONTH	14.2	10.5	12.9	13.1	9.5	11.6	13.1	7.4	10.7	---	---	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	--	--	--	11.1	8.0	9.2	8.2	6.9	7.8	6.8	5.3	5.9
2	--	--	--	10.9	7.8	8.9	8.2	6.7	7.5	10.3	5.2	6.7
3	--	--	--	10.1	7.7	8.5	7.7	7.0	7.3	8.8	7.0	7.7
4	--	--	--	11.1	7.7	9.0	7.8	6.5	7.3	9.3	7.1	8.1
5	--	--	--	11.1	7.5	8.8	7.8	5.9	7.0	9.8	7.8	8.7
6	--	--	--	10.7	7.5	8.6	6.5	5.5	6.0	10.1	8.3	9.0
7	--	--	--	11.4	8.1	9.3	6.4	5.4	6.0	10.5	8.1	9.1
8	--	--	--	9.7	8.0	8.8	6.8	5.5	6.0	10.5	8.0	8.8
9	--	--	--	10.6	8.3	9.1	6.8	5.4	6.1	10.4	7.9	8.8
10	--	--	--	10.0	8.1	8.7	6.6	5.4	6.1	9.1	7.8	8.3
11	--	--	--	9.8	8.0	8.6	7.3	5.2	6.2	8.7	7.9	8.2
12	--	--	--	10.2	7.9	8.8	6.5	5.5	6.0	9.6	8.0	8.6
13	--	--	--	--	--	--	8.3	5.6	7.0	10.1	8.4	9.1
14	9.6	8.3	8.9	--	--	--	7.6	6.7	7.1	9.9	8.6	9.0
15	9.4	8.2	8.7	9.7	7.4	8.4	9.1	6.7	7.8	10.0	8.8	9.4
16	9.4	8.3	8.8	10.1	7.8	8.7	10.3	7.3	8.7	10.8	9.3	9.9
17	10.2	8.4	9.1	10.2	7.6	8.6	9.3	8.2	8.7	10.9	9.4	10.0
18	10.2	8.6	9.2	10.5	7.7	9.0	10.1	8.5	9.1	11.0	9.0	9.8
19	10.6	8.4	9.3	10.8	8.3	9.3	10.6	8.5	9.3	10.9	8.8	9.5
20	9.8	8.3	8.9	10.9	8.3	9.3	10.6	8.7	9.4	9.4	8.8	9.1
21	10.0	8.0	8.8	10.5	8.4	9.3	10.9	8.7	9.6	10.6	9.2	9.8
22	10.0	7.9	8.7	11.1	8.6	9.7	--	--	--	10.6	9.9	10.2
23	10.4	8.1	9.0	11.2	8.9	9.7	--	--	--	10.2	9.9	10.0
24	10.0	7.9	8.7	11.4	8.9	9.9	9.7	7.2	8.5	10.4	9.8	10.1
25	10.5	7.8	8.8	11.4	8.5	9.7	9.3	7.8	8.3	10.7	9.8	10.3
26	9.6	7.7	8.5	11.3	8.4	9.6	8.8	7.6	8.0	11.0	10.0	10.4
27	10.9	8.1	9.1	10.8	8.2	9.1	8.6	7.5	8.1	10.9	9.9	10.3
28	10.2	8.1	9.0	9.5	8.1	8.8	8.7	7.3	7.9	11.8	10.3	11.0
29	11.0	8.4	9.4	9.9	8.3	8.9	7.8	6.7	7.2	11.5	10.5	10.9
30	11.2	8.2	9.3	8.3	7.8	8.1	7.8	6.2	7.0	11.6	10.2	10.8
31	--	--	--	8.3	7.1	7.8	7.0	5.5	6.2	--	--	--
MONTH	--	--	--	--	--	--	--	--	--	11.8	5.2	9.2

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR		FOR 2000 WATER YEAR		WATER YEARS 1996 - 2000	
ANNUAL TOTAL	561678		593821			
ANNUAL MEAN	1539		1622		1857	
HIGHEST ANNUAL MEAN					2288	1997
LOWEST ANNUAL MEAN					1550	1999
HIGHEST DAILY MEAN	3640	Jun 15	5760	May 19	7010	Apr 3 1998
LOWEST DAILY MEAN	797	Sep 17	929	Dec 25	720	Sep 11 1998
ANNUAL SEVEN-DAY MINIMUM	831	Sep 15	936	Jul 21	723	Sep 7 1998
INSTANTANEOUS PEAK FLOW			6080	May 19	7130	Apr 2 1998
INSTANTANEOUS PEAK STAGE			8.33	May 19	9.12	Apr 2 1998
INSTANTANEOUS LOW FLOW			684	Jul 6	684	Jul 6 2000
ANNUAL RUNOFF (CFSM)	.67		.70		.80	
ANNUAL RUNOFF (INCHES)	9.03		9.55		10.91	
10 PERCENT EXCEEDS	2260		2500		3050	
50 PERCENT EXCEEDS	1420		1410		1600	
90 PERCENT EXCEEDS	989		1080		1030	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.5°C, July 28, 1997, Aug. 1, 1999; minimum recorded, 0.5°C, on many days during winter periods, but may have been lower during instrument malfunction Jan. 3-29, Feb. 19, 1996.

DISSOLVED OXYGEN: Maximum, 14.4 mg/L, Mar. 12, 1998; minimum, 3.2 mg/L, Sept. 11, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 23.5°C, July 14, Aug. 11; minimum, 1.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 12.9 mg/L, Mar. 17; minimum, 3.2 mg/L, Sept. 11.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	17.0	16.5	17.0	12.0	11.0	11.5	6.5	6.5	6.5	2.5	2.0	2.5
2	17.0	16.0	16.5	11.5	11.0	11.5	6.5	6.5	6.5	3.0	2.0	2.5
3	16.0	15.5	16.0	11.0	10.0	10.5	6.5	6.0	6.5	3.0	2.0	2.5
4	16.0	15.5	15.5	10.5	10.0	10.0	7.0	6.5	6.5	2.5	2.0	2.5
5	15.5	15.0	15.5	10.5	10.0	10.0	7.0	6.5	7.0	2.5	2.0	2.5
6	15.5	15.0	15.0	10.0	9.5	10.0	7.0	6.0	6.5	2.5	2.0	2.5
7	15.0	14.5	14.5	10.0	9.5	9.5	6.5	6.0	6.5	2.5	2.0	2.0
8	14.5	14.5	14.5	9.5	9.0	9.5	6.5	6.0	6.5	2.5	2.0	2.0
9	15.5	14.5	15.0	9.5	9.5	9.5	6.5	6.0	6.5	2.5	2.0	2.0
10	16.0	15.0	15.5	10.0	9.5	10.0	6.5	6.0	6.5	2.0	2.0	2.0
11	16.0	15.0	15.5	9.5	9.5	9.5	6.0	5.5	6.0	2.0	1.5	2.0
12	15.5	14.0	15.0	9.5	9.5	9.5	6.0	5.5	6.0	2.0	2.0	2.0
13	15.0	14.5	14.5	9.5	9.5	9.5	6.0	5.5	6.0	2.0	1.5	1.5
14	14.5	13.5	14.0	9.5	9.0	9.5	5.5	5.5	5.5	1.5	1.5	1.5
15	14.0	13.5	13.5	9.0	9.0	9.0	5.5	5.0	5.5	1.5	1.5	1.5
16	14.0	13.5	14.0	9.0	8.5	9.0	5.0	5.0	5.0	1.5	1.5	1.5
17	14.0	13.5	13.5	8.5	8.5	8.5	5.0	4.0	4.5	1.5	1.0	1.5
18	13.5	13.0	13.0	8.5	8.5	8.5	4.5	4.0	4.0	1.5	1.5	1.5
19	13.0	12.5	13.0	8.5	8.0	8.5	4.0	3.5	4.0	1.5	1.5	1.5
20	13.0	12.5	12.5	8.5	8.0	8.5	4.0	3.5	3.5	1.5	1.0	1.5
21	12.5	12.0	12.5	8.5	8.0	8.0	3.5	3.0	3.0	1.5	1.0	1.0
22	12.5	12.0	12.0	8.5	8.0	8.0	3.5	3.0	3.0	1.5	1.0	1.0
23	12.0	11.0	11.5	8.5	8.0	8.5	3.0	2.5	2.5	1.5	1.0	1.5
24	11.5	11.0	11.0	8.5	8.0	8.5	3.0	2.5	2.5	1.5	1.0	1.5
25	11.0	11.0	11.0	8.5	8.0	8.0	2.5	2.0	2.5	1.5	1.0	1.5
26	11.5	11.0	11.0	8.5	8.0	8.0	2.5	2.0	2.0	1.5	1.0	1.0
27	11.0	10.5	10.5	8.0	7.5	8.0	2.5	2.0	2.5	1.5	1.0	1.0
28	11.0	10.5	11.0	8.0	7.5	7.5	2.5	2.0	2.5	1.5	1.0	1.0
29	11.5	11.0	11.0	7.5	7.0	7.5	3.0	2.0	2.5	1.5	1.0	1.5
30	11.5	11.0	11.0	7.0	6.5	7.0	3.0	2.0	2.5	1.5	1.0	1.0
31	12.0	11.5	12.0	---	---	---	2.5	2.0	2.5	1.5	1.0	1.0
MONTH	17.0	10.5	13.5	12.0	6.5	9.0	7.0	2.0	4.6	3.0	1.0	1.7



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	1.5	1.0	1.0	2.5	2.0	2.5	6.5	6.0	6.5	12.5	10.0	11.5
2	1.5	1.0	1.0	2.5	2.0	2.0	7.0	6.0	6.5	12.0	11.0	11.5
3	1.5	1.0	1.5	2.5	2.0	2.5	7.0	6.5	7.0	11.5	10.0	11.0
4	1.5	1.0	1.5	2.5	2.0	2.5	7.5	6.5	7.0	12.5	10.0	11.0
5	1.5	1.0	1.5	3.0	2.0	2.5	7.0	6.5	6.5	13.0	11.0	12.0
6	1.5	1.0	1.5	3.0	2.5	3.0	7.0	6.5	6.5	13.5	11.0	12.5
7	1.5	1.0	1.5	3.0	3.0	3.0	7.0	6.0	6.5	14.5	11.5	13.0
8	1.5	1.0	1.5	4.0	3.0	3.5	6.5	5.5	6.0	15.0	11.5	13.5
9	1.5	1.0	1.5	4.5	3.5	4.0	6.5	6.0	6.0	17.0	14.5	16.0
10	1.5	1.0	1.5	5.0	3.5	4.0	6.5	6.0	6.0	17.5	13.0	15.5
11	1.5	1.0	1.5	4.5	3.5	4.0	6.0	6.0	6.0	14.5	12.5	13.5
12	1.5	1.0	1.5	4.5	3.0	3.5	6.5	6.0	6.0	14.5	12.5	13.0
13	1.5	1.0	1.5	4.0	3.0	3.5	6.0	6.0	6.0	13.5	12.5	13.0
14	2.0	1.5	1.5	4.0	3.0	3.5	6.5	6.0	6.0	13.5	12.5	13.0
15	1.5	1.0	1.5	4.0	3.5	3.5	7.5	6.5	7.0	13.0	12.0	12.5
16	1.5	1.0	1.5	4.0	3.5	3.5	7.5	7.5	7.5	12.5	12.0	12.5
17	1.5	1.0	1.5	4.0	3.5	3.5	7.5	7.0	7.5	13.0	12.5	12.5
18	1.5	1.0	1.5	4.0	3.5	4.0	7.5	7.5	7.5	13.5	13.0	13.5
19	1.5	1.0	1.5	4.0	3.5	4.0	8.0	7.5	7.5	13.0	12.5	12.5
20	1.5	1.0	1.5	4.0	3.5	4.0	8.0	7.5	8.0	13.0	12.5	13.0
21	1.5	1.0	1.5	4.0	3.5	4.0	8.0	7.5	7.5	13.5	12.5	13.0
22	1.5	1.0	1.5	4.5	4.0	4.0	8.5	7.5	8.0	13.5	13.0	13.5
23	1.5	1.0	1.5	5.0	4.5	4.5	8.5	7.5	8.0	14.0	13.0	13.5
24	2.0	1.5	1.5	5.5	4.5	5.0	9.5	8.5	9.0	14.0	13.5	13.5
25	2.0	1.5	1.5	6.0	5.0	6.0	9.5	9.0	9.5	14.5	13.5	14.0
26	2.5	1.5	2.0	6.0	5.5	6.0	10.5	9.5	9.5	14.5	14.0	14.0
27	2.0	2.0	2.0	6.5	6.0	6.5	10.5	9.0	9.5	14.5	14.0	14.5
28	2.5	2.0	2.5	7.0	6.0	6.5	11.0	10.0	10.5	14.5	14.0	14.5
29	2.5	2.5	2.5	7.0	6.0	6.5	12.0	10.5	11.0	14.5	14.0	14.5
30	---	---	---	7.0	6.0	6.5	11.5	10.0	10.5	15.0	14.0	14.5
31	---	---	---	6.5	6.0	6.5	---	---	---	15.0	14.5	15.0
MONTH	2.5	1.0	1.6	7.0	2.0	4.1	12.0	5.5	7.6	17.5	10.0	13.3

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.0	14.5	15.0	20.0	19.0	19.5	21.0	20.0	20.5	22.5	22.0	22.0
2	16.5	15.0	15.5	20.5	20.0	20.5	21.5	20.0	21.0	23.0	22.0	22.5
3	16.0	15.0	15.5	22.0	20.5	21.0	22.0	20.5	21.5	23.0	22.0	22.5
4	16.0	15.5	15.5	21.5	21.0	21.0	21.5	20.5	21.0	22.5	21.5	22.5
5	17.0	16.0	16.5	22.0	20.5	21.0	21.5	20.0	21.0	21.5	21.0	21.5
6	16.5	15.5	16.0	22.5	21.0	21.5	21.5	20.5	21.0	21.0	20.5	21.0
7	16.0	15.5	15.5	21.5	21.0	21.0	21.5	20.5	21.0	21.0	20.5	20.5
8	17.0	16.0	16.0	21.0	19.5	20.5	21.5	20.5	21.0	21.5	20.5	21.0
9	17.0	16.0	16.5	21.0	20.0	20.5	23.0	21.5	22.0	21.0	21.0	21.0
10	18.0	16.0	17.0	21.0	20.5	20.5	23.0	21.0	22.0	21.5	21.0	21.0
11	19.0	18.0	18.5	22.0	21.0	21.5	23.5	21.5	22.0	21.5	20.5	21.0
12	19.0	18.0	18.5	21.5	21.0	21.0	22.5	22.0	22.0	21.5	20.5	21.0
13	18.5	17.5	18.0	21.0	20.5	21.0	22.0	21.5	22.0	21.0	20.5	20.5
14	17.5	16.5	17.0	23.5	20.5	22.0	22.5	21.5	22.0	21.0	20.5	20.5
15	18.0	17.0	17.5	22.5	21.0	21.5	23.0	21.5	22.0	20.5	19.5	20.0
16	18.5	17.5	18.0	22.0	21.0	21.5	23.0	21.5	22.5	20.0	19.0	19.5
17	19.5	18.0	18.5	22.0	20.5	21.5	22.5	21.5	21.5	19.5	19.0	19.5
18	18.5	18.0	18.5	22.0	21.5	21.5	22.5	21.5	22.0	19.5	19.0	19.0
19	19.0	17.5	18.0	22.0	21.0	21.5	22.0	21.0	21.5	19.5	19.0	19.0
20	19.0	17.5	18.5	21.0	20.5	20.5	21.5	21.0	21.0	19.5	19.0	19.5
21	19.5	18.0	18.5	21.0	20.5	21.0	21.5	20.5	21.0	19.0	18.5	18.5
22	20.0	18.5	19.5	21.0	20.0	20.5	21.5	21.0	21.0	18.5	17.5	18.0
23	19.5	19.0	19.0	21.5	20.0	20.5	21.5	21.0	21.0	18.0	17.5	17.5
24	19.5	18.5	19.0	21.0	20.0	20.5	22.0	21.0	21.5	17.5	17.0	17.5
25	20.0	19.0	19.5	20.5	20.0	20.5	21.5	21.0	21.0	17.5	17.0	17.0
26	21.0	18.5	19.5	21.0	20.0	20.5	21.5	21.0	21.0	17.0	16.5	17.0
27	21.0	19.0	20.0	21.5	20.5	21.0	22.0	21.5	21.5	17.5	16.5	17.0
28	20.5	19.0	20.0	21.5	21.0	21.5	22.0	21.5	21.5	17.0	16.0	16.5
29	20.5	19.0	20.0	22.5	21.0	21.5	22.0	21.5	21.5	16.5	16.0	16.5
30	20.0	19.0	19.5	22.0	21.5	22.0	22.0	21.5	22.0	16.5	16.0	16.5
31	---	---	---	21.5	20.5	21.0	22.0	21.0	21.5	---	---	---
MONTH	21.0	14.5	17.8	23.5	19.0	21.0	23.5	20.0	21.5	23.0	16.0	19.6

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	7.1	6.5	6.8	9.2	8.7	9.0	10.5	10.2	10.3	11.2	10.9	11.1
2	7.0	6.5	6.8	9.0	8.7	8.8	10.4	8.7	10.2	11.2	10.8	11.0
3	7.2	6.5	6.9	9.1	8.8	8.9	10.5	10.3	10.4	11.1	10.8	11.0
4	7.6	6.8	7.3	9.2	8.8	9.0	10.5	10.3	10.4	11.1	10.3	10.8
5	7.7	7.1	7.4	9.3	8.8	9.0	10.6	10.3	10.5	10.5	10.0	10.3
6	8.3	7.0	7.6	9.5	9.1	9.3	10.6	10.4	10.5	10.4	10.0	10.3
7	7.8	7.2	7.4	9.7	9.3	9.5	10.8	10.4	10.6	10.7	10.3	10.5
8	7.9	7.2	7.6	9.9	9.5	9.7	10.7	10.1	10.4	10.6	10.3	10.5
9	8.3	7.1	7.7	10.0	9.6	9.8	10.2	9.9	10.1	10.8	10.3	10.6
10	9.4	7.5	8.5	10.0	9.6	9.8	10.2	9.9	10.1	10.7	10.5	10.6
11	8.7	7.8	8.2	10.2	9.9	10.0	10.2	10.0	10.1	11.0	10.7	10.8
12	9.0	7.9	8.4	10.2	10.0	10.1	10.1	9.9	10.0	10.8	10.7	10.8
13	8.8	7.7	8.2	10.3	10.0	10.1	10.1	9.9	10.0	11.1	10.7	11.0
14	8.7	7.7	8.3	10.5	10.1	10.3	10.2	10.0	10.1	11.2	10.9	11.0
15	8.6	7.7	8.1	10.6	10.3	10.4	10.4	10.1	10.2	11.2	11.0	11.1
16	8.5	7.7	8.1	10.5	9.7	10.1	10.3	10.2	10.3	11.4	11.0	11.2
17	8.5	7.8	8.2	10.0	9.6	9.7	10.5	10.2	10.3	11.5	11.1	11.3
18	8.6	8.0	8.3	10.0	9.6	9.7	10.5	10.3	10.4	11.4	11.1	11.3
19	8.7	7.9	8.2	9.8	9.6	9.7	10.6	10.3	10.5	11.6	11.3	11.4
20	8.8	7.9	8.3	9.8	9.6	9.7	10.7	10.4	10.6	11.6	11.3	11.5
21	8.8	8.1	8.4	9.8	9.6	9.7	10.8	10.6	10.7	11.6	11.3	11.5
22	9.0	8.1	8.6	10.0	9.7	9.8	10.8	10.6	10.7	11.6	11.3	11.5
23	9.4	8.5	8.9	10.0	9.7	9.8	11.1	10.7	10.8	11.3	10.3	10.6
24	9.3	8.6	8.9	9.9	8.5	9.3	12.4	10.7	11.6	11.6	10.3	11.0
25	9.0	8.4	8.7	8.8	8.3	8.5	12.4	10.7	11.3	11.7	11.3	11.5
26	9.1	8.3	8.7	9.0	8.1	8.5	11.4	10.9	11.1	11.7	11.3	11.5
27	9.3	8.7	9.0	8.8	8.2	8.5	11.3	11.0	11.2	11.6	11.3	11.4
28	9.3	8.7	9.0	8.9	8.2	8.4	11.2	10.9	11.1	11.6	11.2	11.4
29	9.1	8.5	8.8	10.1	8.5	9.9	11.2	10.5	11.0	11.6	11.1	11.4
30	9.0	8.4	8.6	10.3	10.0	10.2	11.1	10.5	11.0	11.5	11.1	11.3
31	9.1	8.5	8.9	---	---	---	11.2	10.9	11.0	11.5	11.1	11.3
MONTH	9.4	6.5	8.2	10.6	8.1	9.5	12.4	8.7	10.6	11.7	10.0	11.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	11.4	11.1	11.3	12.7	12.4	12.5	11.2	10.5	10.9	10.5	9.6	10.1
2	11.4	11.0	11.2	12.7	12.1	12.5	11.3	10.6	11.0	10.5	9.2	9.9
3	11.2	10.9	11.1	12.5	11.0	11.6	11.6	10.8	11.2	10.1	9.2	9.7
4	11.3	10.9	11.1	11.3	11.0	11.1	11.8	11.0	11.4	9.9	9.2	9.6
5	11.3	10.9	11.1	11.4	11.0	11.2	11.8	10.9	11.4	10.0	9.2	9.7
6	11.4	10.9	11.1	11.4	11.1	11.2	11.6	10.9	11.2	10.0	9.4	9.7
7	11.3	10.9	11.1	11.4	11.1	11.2	11.8	10.7	11.2	10.0	9.4	9.7
8	11.3	10.9	11.1	11.4	11.1	11.2	12.2	10.8	11.5	10.1	9.2	9.6
9	11.4	10.8	11.1	11.2	11.0	11.1	12.2	10.9	11.6	9.6	8.9	9.2
10	11.3	10.9	11.1	11.4	10.6	11.2	11.9	11.2	11.6	9.5	8.8	9.2
11	11.3	10.9	11.1	11.4	10.4	11.1	11.8	11.0	11.4	9.5	9.2	9.3
12	11.3	10.9	11.1	11.4	10.2	11.2	11.9	11.2	11.6	9.5	9.2	9.4
13	11.2	10.9	11.1	11.3	10.9	11.1	11.9	11.2	11.6	9.6	9.0	9.4
14	11.3	10.9	11.1	11.4	10.9	11.1	12.0	11.3	11.7	9.7	9.3	9.5
15	11.3	10.9	11.1	11.4	11.1	11.2	12.2	11.3	11.7	9.9	9.3	9.6
16	11.4	10.9	11.2	11.7	11.1	11.4	11.7	11.0	11.4	10.1	9.5	9.8
17	11.4	10.9	11.1	12.9	11.3	11.7	11.6	10.8	11.2	10.2	9.6	9.9
18	11.2	10.7	11.0	11.7	11.3	11.5	11.5	10.7	11.1	10.6	9.6	10.1
19	11.2	10.7	11.0	11.6	11.3	11.4	11.7	10.7	11.1	10.8	10.1	10.4
20	11.3	10.8	11.0	11.7	11.4	11.5	11.7	10.5	11.1	10.3	10.0	10.2
21	11.3	10.8	11.1	11.8	11.4	11.6	12.2	10.7	11.6	10.3	9.9	10.1
22	11.4	10.7	11.0	11.6	10.9	11.3	12.3	11.5	11.9	10.1	9.7	9.9
23	11.2	10.7	10.9	12.1	10.6	11.1	11.9	11.2	11.5	9.7	9.0	9.4
24	11.1	10.7	11.0	11.1	10.2	10.7	11.5	10.8	11.2	9.0	8.1	8.6
25	11.2	11.0	11.1	11.2	10.3	10.7	11.5	10.7	11.2	9.0	8.2	8.6
26	11.3	10.7	11.0	11.0	10.1	10.6	11.4	10.7	11.1	8.8	8.1	8.4
27	11.1	10.7	11.0	11.2	10.2	10.6	11.2	10.3	10.8	8.8	8.1	8.4
28	12.7	10.8	12.0	11.0	10.3	10.6	11.2	9.9	10.6	8.7	8.0	8.4
29	12.7	12.3	12.5	11.1	10.2	10.7	10.6	9.9	10.3	8.5	7.8	8.2
30	---	---	---	11.3	10.5	10.9	10.7	9.7	10.2	8.5	7.8	8.1
31	---	---	---	11.4	10.4	11.0	---	---	---	8.5	7.3	7.9
MONTH	12.7	10.7	11.2	12.9	10.1	11.2	12.3	9.7	11.2	10.8	7.3	9.4

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.4	7.3	7.8	6.3	5.0	5.7	5.5	4.3	5.0	7.3	6.3	6.9
2	8.4	7.2	7.8	6.3	5.8	6.1	5.8	4.3	5.1	7.9	6.3	7.0
3	7.7	6.8	7.2	7.1	6.0	6.4	6.4	5.6	6.0	7.4	4.7	6.2
4	7.8	6.9	7.4	6.5	5.9	6.1	6.0	4.8	5.4	6.0	5.4	5.7
5	8.7	7.4	8.0	6.6	5.8	6.1	6.1	4.0	5.3	6.1	5.4	5.7
6	8.0	7.1	7.6	7.2	6.0	6.4	6.1	4.1	5.1	6.3	4.9	5.7
7	7.8	6.9	7.2	6.4	5.6	6.0	5.0	4.0	4.6	5.6	4.5	5.2
8	7.5	6.9	7.1	6.0	4.5	5.2	5.9	3.6	4.9	5.9	4.7	5.5
9	7.5	6.5	7.0	5.5	4.7	5.0	6.5	5.1	5.7	6.4	3.7	5.6
10	7.4	6.0	6.7	6.0	4.9	5.5	6.6	4.9	5.7	5.9	3.8	5.2
11	7.0	6.4	6.7	6.5	5.4	5.9	6.7	5.0	5.8	5.7	3.2	4.7
12	7.4	6.2	6.9	5.9	5.2	5.6	5.6	4.6	5.2	6.6	3.7	5.2
13	7.3	6.6	7.0	5.8	4.7	5.3	5.2	4.1	4.7	6.3	3.7	5.0
14	6.7	6.2	6.4	6.9	5.0	5.8	5.4	4.2	5.0	6.8	3.9	6.0
15	6.9	5.9	6.5	6.3	4.9	5.5	5.5	3.9	4.6	8.3	4.8	7.1
16	7.0	6.2	6.6	5.5	4.8	5.2	6.4	4.7	5.6	8.2	4.7	6.1
17	8.0	6.4	7.3	5.6	4.1	4.8	5.8	5.1	5.5	5.7	4.5	4.9
18	7.8	6.4	7.0	6.2	5.1	5.8	6.9	5.4	6.3	5.6	4.5	4.9
19	7.2	6.2	6.6	6.2	5.1	5.9	6.4	5.5	6.0	5.6	4.7	5.1
20	7.5	5.6	6.6	5.1	3.8	4.6	6.3	5.5	5.9	5.9	5.2	5.6
21	7.1	5.8	6.5	6.3	4.2	5.5	7.0	4.4	6.0	6.0	5.4	5.7
22	7.4	6.0	6.8	6.4	4.9	5.6	6.7	4.2	5.7	6.2	5.6	5.8
23	6.8	6.0	6.4	5.8	5.1	5.4	6.5	5.5	6.0	6.2	5.9	6.1
24	7.0	5.8	6.3	5.5	4.8	5.1	7.0	5.7	6.5	6.5	6.0	6.3
25	6.8	5.9	6.4	5.9	4.7	5.4	6.8	5.5	6.2	6.5	6.1	6.3
26	7.6	5.9	6.5	6.3	4.4	5.5	6.5	5.5	6.1	6.7	6.2	6.5
27	7.1	5.9	6.5	5.9	4.7	5.4	8.7	6.4	8.0	7.0	6.3	6.6
28	7.0	5.8	6.4	5.8	5.0	5.5	8.6	6.4	7.5	7.5	6.8	7.2
29	6.8	5.6	6.1	6.2	5.3	5.7	7.8	6.6	7.3	7.5	7.0	7.2
30	6.3	5.3	5.7	6.1	5.4	5.7	8.4	7.1	7.8	7.6	7.0	7.3
31	---	---	---	5.4	3.7	4.8	8.0	4.8	6.7	---	---	---
MONTH	8.7	5.3	6.8	7.2	3.7	5.6	8.7	3.6	5.8	8.3	3.2	5.9

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW1/4 NW1/4 sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi upstream from Little Bear Creek, and 3.9 mi northeast of Muskegon.

DRAINAGE AREA.--16.7 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976(M), 1978(M), 1979(P). WDR MI-97-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft above sea level (Michigan Department of Natural Resources bench mark). Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation during low flow by dams and irrigation upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	4.9	5.1	7.1	e6.5	15	8.7	19	22	8.3	7.0	3.1
2	4.6	5.2	5.1	10	e6.0	14	9.6	19	25	8.3	6.2	3.6
3	4.6	5.1	5.7	11	e6.0	12	9.2	17	20	12	5.5	4.2
4	4.6	5.0	6.2	12	e6.0	12	8.8	16	17	9.4	5.1	3.8
5	4.0	4.9	16	9.5	e6.0	11	8.6	14	19	8.5	5.8	3.5
6	4.2	4.8	11	8.7	e6.0	11	8.5	14	17	7.7	7.6	3.1
7	4.2	4.8	8.6	8.5	e6.0	11	11	13	15	7.3	5.7	2.8
8	4.2	4.8	7.8	8.1	e6.0	10	15	13	14	11	5.4	3.3
9	4.3	4.8	7.3	8.2	e6.0	11	17	24	13	11	5.0	3.2
10	4.2	4.9	7.0	9.6	e6.0	11	15	37	13	9.4	4.3	4.6
11	4.3	4.6	6.7	9.6	6.1	10	14	25	22	8.2	4.3	12
12	4.3	4.5	6.6	8.5	e6.0	9.8	13	29	23	7.5	4.1	11
13	4.5	4.7	6.4	8.4	e6.0	10	12	37	28	7.0	4.2	6.2
14	4.9	4.7	6.8	e8.0	e6.0	10	13	25	23	6.8	4.0	9.6
15	5.0	4.5	9.1	7.7	e6.0	9.8	12	20	23	6.5	5.0	7.8
16	5.8	4.5	11	7.4	5.8	9.5	11	23	19	6.2	4.5	6.3
17	6.1	4.6	8.2	e7.0	e6.0	9.1	12	24	16	5.7	7.4	5.5
18	5.5	4.7	7.2	e7.0	e6.0	8.8	14	56	14	5.8	5.9	5.2
19	5.5	4.9	7.3	e7.0	e6.0	9.3	13	78	13	5.7	5.0	4.8
20	6.0	5.1	e7.0	e7.0	6.2	11	39	50	14	5.4	4.5	6.1
21	5.7	4.9	e6.5	e7.0	6.6	11	99	32	17	5.4	4.1	8.1
22	5.8	4.8	e6.5	e7.0	8.9	10	66	28	14	5.0	3.6	8.7
23	6.0	5.6	e6.5	e7.0	21	9.6	35	31	12	5.2	4.9	15
24	5.6	7.9	e6.0	e7.0	26	9.8	28	25	12	4.8	4.4	9.0
25	5.2	5.7	e6.0	e7.0	25	11	24	21	11	4.5	3.9	7.6
26	5.1	5.4	e6.0	e7.0	19	9.8	21	19	10	4.5	3.3	7.0
27	4.9	5.8	e6.0	e7.0	19	11	20	18	9.8	4.7	3.6	6.5
28	4.8	5.3	e6.0	e7.0	15	11	19	28	9.6	4.7	3.5	6.0
29	4.7	5.1	e6.0	e7.0	14	9.7	18	27	9.6	4.5	3.9	5.8
30	4.8	5.2	e6.0	e7.0	---	9.2	17	21	8.7	6.5	3.6	5.4
31	4.9	---	e6.0	e7.0	---	8.8	---	20	---	8.3	3.1	---
TOTAL	153.1	151.7	223.6	247.3	275.1	326.2	611.4	823	483.7	215.8	148.4	188.8
MEAN	4.94	5.06	7.21	7.98	9.49	10.5	20.4	26.5	16.1	6.96	4.79	6.29
MAX	6.1	7.9	16	12	26	15	99	78	28	12	7.6	15
MIN	4.0	4.5	5.1	7.0	5.8	8.8	8.5	13	8.7	4.5	3.1	2.8
CFSM	.30	.30	.43	.48	.57	.63	1.22	1.59	.97	.42	.29	.38
IN.	.34	.34	.50	.55	.61	.73	1.36	1.83	1.08	.48	.33	.42

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2000, BY WATER YEAR (WY)

MEAN	13.2	17.9	19.8	18.3	20.6	29.5	27.4	18.7	12.0	6.98	8.02	8.53
MAX	45.2	55.2	40.5	31.3	47.8	87.9	50.6	45.2	23.6	17.6	30.2	43.0
(WY)	1987	1986	1992	1986	1976	1976	1982	1974	1993	1994	1980	1986
MIN	3.48	4.54	4.98	6.15	7.43	10.2	14.5	6.84	4.32	3.17	2.29	3.09
(WY)	1972	1972	1977	1977	1977	1999	1968	1977	1977	1971	1971	1971

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR				FOR 2000 WATER YEAR				WATER YEARS 1966 - 2000			
ANNUAL TOTAL	3634.5				3848.1				16.7			
ANNUAL MEAN	9.96				10.5				27.4			
HIGHEST ANNUAL MEAN									8.36			
LOWEST ANNUAL MEAN									720			
HIGHEST DAILY MEAN	90				99				Mar 5 1976			
LOWEST DAILY MEAN	2.4				2.8				1.6			
ANNUAL SEVEN-DAY MINIMUM	2.8				3.4				2.0			
INSTANTANEOUS PEAK FLOW					145				(b)930			
INSTANTANEOUS PEAK STAGE					14.26				(c)16.61			
INSTANTANEOUS LOW FLOW					2.3				1.0			
ANNUAL RUNOFF (CFSM)	.60				.63				1.00			
ANNUAL RUNOFF (INCHES)	8.10				8.57				13.60			
10 PERCENT EXCEEDS	18				20				31			
50 PERCENT EXCEEDS	7.0				7.0				13			
90 PERCENT EXCEEDS	4.1				4.5				4.5			

(a) Aug. 5, 1971, Aug. 2, 1998.

(b) Gage height 11.00 ft, datum then in use.

(c) Present datum; backwater from ice.

(d) Sept. 6, 7.

(e) Estimated.

(f) Aug. 5, 17, 22, 1971.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE1/4 NW1/4 sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft downstream from bridge on Fruitvale Road, 6.3 mi downstream from North Branch, and 6.9 mi northeast of Whitehall.

DRAINAGE AREA.--406 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1957 to current year.

REVISED RECORDS.--WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 594.10 ft above sea level. Nov. 18, 1957 to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	325	254	268	e280	e250	658	311	347	391	268	366	222
2	302	257	266	e280	e250	581	313	371	445	260	338	258
3	301	260	267	e300	e250	505	316	361	509	258	287	269
4	301	266	280	e350	e250	456	313	341	467	261	261	262
5	292	265	330	360	e250	423	309	326	417	257	246	244
6	285	259	400	344	e250	401	304	315	385	254	245	231
7	276	256	413	327	e250	383	306	304	362	254	245	223
8	270	255	373	312	e250	371	329	297	343	254	234	217
9	268	255	339	312	e250	368	360	338	330	271	227	212
10	263	253	323	319	e250	382	392	421	316	284	221	213
11	262	251	312	350	e250	381	398	478	305	271	214	248
12	259	251	303	374	e250	370	384	475	314	260	208	346
13	259	251	298	353	e250	358	370	524	343	255	204	370
14	258	251	294	337	e250	353	357	561	363	254	204	354
15	258	254	302	e320	e250	351	342	536	359	254	204	385
16	257	256	328	e300	e250	351	329	481	345	e240	212	356
17	261	253	340	299	e250	347	325	448	326	e230	227	317
18	267	252	319	295	e250	339	332	504	311	e220	250	288
19	270	252	309	e250	e250	333	343	664	300	e210	234	269
20	272	253	308	e250	e250	337	390	926	290	209	220	266
21	265	254	306	e250	e250	353	584	946	295	211	209	315
22	263	254	296	e250	e250	353	778	805	333	212	209	337
23	264	256	294	e250	355	341	880	689	330	214	361	370
24	267	283	e290	e250	457	333	737	553	312	208	515	472
25	271	321	e280	e250	591	342	599	469	299	203	373	418
26	265	301	e280	e250	714	346	468	420	290	198	294	377
27	259	293	e280	e250	765	338	413	391	287	200	270	372
28	255	286	e280	e250	760	340	384	397	283	217	256	303
29	253	277	e280	e250	723	333	361	455	279	242	246	291
30	253	271	e280	e250	---	327	345	444	275	243	233	282
31	254	---	e280	e250	---	318	---	405	---	313	227	---
TOTAL	8375	7900	9518	9062	9865	11772	12372	14992	10204	7485	8040	9046
MEAN	270	263	307	292	340	380	412	484	340	241	259	372
MAX	325	321	413	374	765	658	880	946	509	313	515	472
MIN	253	251	266	250	250	318	304	297	275	198	204	212
CFSM	.67	.65	.76	.72	.84	.94	1.02	1.19	.84	.59	.64	.74
IN.	.77	.72	.87	.83	.90	1.08	1.13	1.37	.93	.69	.74	.83

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1957 - 2000, BY WATER YEAR (WY)

	MEAN	380	455	476	452	464	636	657	493	407	310	302	344
MAX	912	906	896	641	760	1449	1224	936	747	523	484	1071	
(WY)	1987	1986	1992	1973	1985	1976	1967	1974	1989	1982	1982	1974	
MIN	226	263	286	252	240	380	315	259	230	202	186	212	
(WY)	1972	2000	1959	1959	1959	2000	1958	1958	1958	1964	1958	1977	

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1957 - 2070

ANNUAL TOTAL	127897	118631	
ANNUAL MEAN	350	324	448
HIGHEST ANNUAL MEAN			635
LOWEST ANNUAL MEAN			288
HIGHEST DAILY MEAN	870	Feb 14	4650
LOWEST DAILY MEAN	226	Sep 12	164
ANNUAL SEVEN-DAY MINIMUM	227	Sep 7	169
INSTANTANEOUS PEAK FLOW			5400
INSTANTANEOUS PEAK STAGE			7.46
INSTANTANEOUS LOW FLOW			163
ANNUAL RUNOFF (CFSM)	.86	.80	1.10
ANNUAL RUNOFF (INCHES)	11.72	10.87	14.99
10 PERCENT EXCEEDS	503	446	696
50 PERCENT EXCEEDS	310	294	392
90 PERCENT EXCEEDS	252	243	251

(a) Aug. 18, 19, 1958.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW1/4 NW1/4 sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft upstream from highway bridge at south edge of Scottville, 1.4 mi upstream from India Creek, and 5.6 mi downstream from Big South Branch.

DRAINAGE AREA.--681 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950. WDR MI-81-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft above sea level. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	569	451	470	e550	e550	1410	583	545	696	457	730	404
2	529	451	464	e550	e500	1220	577	546	806	445	774	409
3	504	451	476	584	e500	1090	571	558	873	439	655	424
4	510	449	523	632	e500	990	569	539	890	442	578	443
5	499	446	598	642	e500	881	563	520	831	441	531	443
6	480	442	670	623	e500	776	554	507	708	427	506	417
7	463	440	715	589	e500	711	547	493	649	415	485	404
8	452	438	706	555	e500	680	567	486	611	436	472	395
9	442	438	637	538	e500	717	583	519	581	459	460	390
10	439	438	589	565	e500	738	616	610	556	472	452	392
11	437	435	561	626	e500	767	632	711	538	453	439	420
12	433	432	540	676	e500	724	633	816	575	429	423	485
13	438	430	523	688	e500	681	621	877	614	417	410	533
14	442	428	515	602	e500	655	604	911	597	444	403	540
15	442	429	526	e550	e500	677	583	925	590	457	428	530
16	457	427	547	e550	e500	684	570	859	566	457	422	543
17	459	427	557	530	e500	681	558	805	541	429	437	522
18	467	429	546	e500	499	647	560	963	522	411	437	491
19	469	429	497	e500	502	621	570	1190	506	404	442	464
20	469	431	518	e550	496	625	619	1390	497	402	427	452
21	461	433	537	e550	483	640	687	1550	496	408	410	477
22	462	433	528	e550	510	652	789	1600	500	408	424	544
23	471	446	e530	e500	648	640	864	1380	502	407	517	610
24	492	487	e530	e500	893	625	872	1150	481	401	536	633
25	492	532	e530	e550	1100	630	814	985	472	392	558	659
26	478	558	e530	e550	1230	628	726	831	467	388	510	606
27	468	529	e530	e550	1370	640	641	720	476	425	470	550
28	460	501	e550	e550	1480	624	591	703	500	537	448	517
29	453	487	e550	e550	1510	617	562	686	486	654	432	493
30	451	478	e550	e550	---	613	540	687	471	719	423	476
31	454	---	e550	e550	---	602	---	687	---	685	415	---
TOTAL	14542	13625	17093	17550	19271	22886	18766	25749	17598	14180	15054	14666
MEAN	469	454	551	566	665	738	626	831	587	457	486	489
MAX	569	558	715	688	1510	1410	872	1600	890	719	774	659
MIN	433	427	464	500	483	602	540	486	467	388	403	390
CFSM	.69	.67	.81	.83	.98	1.08	.92	1.22	.86	.67	.71	.72
IN.	.79	.74	.93	.96	1.05	1.25	1.03	1.41	.96	.77	.82	.80

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 2000, BY WATER YEAR (WY)

MEAN	602	706	730	707	722	971	1031	785	674	533	495	547
MAX	1507	1523	1311	1129	1301	1779	1732	1161	1296	1232	826	1880
(WY)	1987	1986	1992	1985	1984	1976	1993	1974	1993	1969	1994	1986
MIN	379	439	449	427	440	526	550	425	408	368	354	369
(WY)	1957	1945	1945	1945	1958	1940	1945	1958	1964	1963	1941	1948

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1939 - 2000

ANNUAL TOTAL	213776	210960	
ANNUAL MEAN	586	576	
HIGHEST ANNUAL MEAN			708
LOWEST ANNUAL MEAN			1087
HIGHEST DAILY MEAN	1290	Feb 15	1986
LOWEST DAILY MEAN	345	Sep 6	1958
ANNUAL SEVEN-DAY MINIMUM	349	Sep 4	1986
INSTANTANEOUS PEAK FLOW			310
INSTANTANEOUS PEAK STAGE			322
INSTANTANEOUS LOW FLOW			6440
ANNUAL RUNOFF (CFSM)	.86		8.07
ANNUAL RUNOFF (INCHES)	11.68		209
10 PERCENT EXCEEDS	859		1.04
50 PERCENT EXCEEDS	550		14.13
90 PERCENT EXCEEDS	393		1070
			630
			428

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE 1/4 NE 1/4 sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 50 ft downstream from bridge on State Highway 37, 200 ft upstream from Wheeler Creek, 0.9 mi north of Sherman, and at mile 60.8.

DRAINAGE AREA.--857 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(M). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937. WDR MI-88-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 804.24 ft above sea level. Prior to Apr. 13, 1934, at various datums. Apr. 14, 1934 to Oct. 25, 1990, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	961	938	886	969	e800	1550	972	865	e929	811	810	699
2	922	937	879	977	e800	1430	958	868	e1260	810	802	725
3	881	915	885	1020	e800	1320	954	873	1430	911	765	757
4	854	889	918	1000	e800	1240	948	865	1300	839	737	745
5	845	871	1030	943	e800	1170	934	857	1150	793	717	729
6	828	861	1140	915	e800	1120	934	850	1040	775	713	706
7	814	852	1140	898	e800	1090	929	840	971	772	710	689
8	808	847	1100	885	e750	1080	938	835	938	769	716	690
9	808	849	1040	881	e750	1180	952	883	924	775	727	685
10	803	851	1020	888	e750	1240	953	928	938	776	721	713
11	802	841	990	941	e750	1230	942	909	1100	770	724	793
12	798	831	974	959	e750	1170	935	928	1170	750	720	866
13	861	829	963	934	e750	1100	934	1090	1130	738	706	855
14	914	832	952	901	e800	1060	926	1160	1070	733	701	827
15	920	830	951	888	e800	1070	919	1190	1020	717	715	802
16	915	822	962	890	e800	1080	921	1210	989	712	701	774
17	903	816	953	796	e800	1070	924	1270	944	711	686	737
18	888	815	928	e750	e750	1040	929	1450	905	696	690	716
19	877	822	907	e750	e800	1020	922	1620	880	682	692	709
20	884	825	908	e800	e800	1020	952	1470	866	680	684	706
21	883	826	905	e800	807	1020	1040	1310	865	690	674	731
22	897	824	e750	e750	819	1030	1050	1170	857	708	674	752
23	951	850	e750	e750	911	1030	1030	1090	840	703	680	768
24	995	952	e750	e750	1050	1020	989	1080	828	694	680	770
25	1030	993	e700	e800	1210	1030	951	1080	825	685	679	767
26	1020	1010	e750	e800	1450	1020	926	1050	838	678	766	756
27	994	982	e950	e800	1720	1040	907	1000	868	689	781	733
28	957	937	e1000	e800	1760	1030	881	963	871	735	789	719
29	918	911	e1000	e800	1670	1040	874	934	850	801	760	713
30	901	895	e970	e800	---	1040	867	917	830	765	737	711
31	925	---	e970	e800	---	998	---	924	---	799	714	---
TOTAL	27757	26253	29021	26635	27047	34578	28291	32479	29426	23167	22371	22343
MEAN	895	875	936	859	933	1115	943	1048	981	747	722	745
MAX	1030	1010	1140	1020	1760	1550	1050	1620	1430	911	810	866
MIN	798	815	700	750	750	998	867	835	825	678	674	685
CFSM	1.04	1.02	1.09	1.00	1.09	1.30	1.10	1.22	1.14	.87	.84	.87
IN.	1.20	1.14	1.26	1.16	1.17	1.50	1.23	1.41	1.28	1.01	.97	.97

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 2000, BY WATER YEAR (WY)

	MEAN	975	1052	1037	1001	987	1201	1530	1202	1053	939	885	914
MAX	1803	1597	1417	1224	1458	1811	2198	1742	1603	1336	1200	1610	
(WY)	1987	1989	1912	1916	1938	1913	1916	1904	1954	1994	1903	1986	
MIN	773	780	848	754	604	808	943	834	802	740	722	717	
(WY)	1965	1982	1979	1936	1936	1940	2000	1958	1958	1936	1964	1966	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1903 - 2000

ANNUAL TOTAL	344112												
ANNUAL MEAN	943												
HIGHEST ANNUAL MEAN										(a)1064			
LOWEST ANNUAL MEAN										1261			1912
HIGHEST DAILY MEAN	1540									888			1958
LOWEST DAILY MEAN	650									3500			Mar 25 1913
ANNUAL SEVEN-DAY MINIMUM	693									540			Feb 21 1936
INSTANTANEOUS PEAK FLOW										549			Feb 19 1936
INSTANTANEOUS PEAK STAGE										(c)3570			Mar 25 1913
ANNUAL RUNOFF (CFSM)	1.10									(f)15.25			Apr 3 1998
ANNUAL RUNOFF (INCHES)	14.94									1.24			
10 PERCENT EXCEEDS	1180									16.86			
50 PERCENT EXCEEDS	902									1090			1420
90 PERCENT EXCEEDS	750									876			980
										713			820

(a) Does not include water years 1931, 1934.

(b) Gage height 13.39 ft.

(c) Gage height 7.1 ft, from graph based on gage readings, datum then in use.

(d) Backwater from ice.

(e) Estimated.

(f) Does not include water years 1903-1990.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to current year.

DISSOLVED OXYGEN: October 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 23.5°C, July 5, 6, 1999; minimum, -0.5°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 15.3 mg/L, Nov. 15, 1996; minimum, 5.4 mg/L, Oct. 30, 1996.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 22.0°C, June 10; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded, 14.5 mg/L, Feb. 6-8; minimum recorded, 7.5 mg/L, July 15, 16.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	11.0	10.0	10.5	10.0	8.5	9.5	3.0	2.0	2.5	.0	.0	.0
2	10.5	9.0	10.0	10.0	7.5	8.5	3.5	3.0	3.0	.0	.0	.0
3	9.0	8.0	8.5	7.5	5.5	6.5	5.0	3.5	4.5	.0	.0	.0
4	8.5	7.0	8.0	5.5	4.5	5.5	6.5	5.0	6.0	.5	.0	.5
5	8.5	7.5	8.0	6.5	5.5	6.0	6.5	5.5	6.0	.5	.0	.5
6	9.0	7.5	8.5	6.0	5.0	5.5	5.5	4.5	5.0	1.0	.0	.5
7	8.0	7.0	7.5	5.0	4.0	4.5	4.5	4.0	4.5	.5	.0	.5
8	9.0	7.0	8.0	6.0	4.5	5.0	4.5	4.0	4.0	1.0	.0	.5
9	11.0	9.0	10.0	8.0	6.0	7.0	4.0	3.5	4.0	2.0	.5	1.0
10	12.0	10.5	11.0	9.0	8.0	8.5	4.0	3.5	4.0	2.5	2.0	2.0
11	11.0	9.5	10.5	8.0	6.5	7.0	3.5	3.0	3.5	2.5	2.0	2.5
12	10.5	9.0	10.0	6.5	6.0	6.5	3.5	3.0	3.0	2.0	1.0	1.5
13	10.5	9.5	10.0	7.5	6.0	6.5	3.5	3.5	3.5	1.0	.0	.5
14	9.5	8.5	9.0	7.5	6.5	7.0	3.5	2.5	3.0	.0	-.5	.0
15	9.5	8.0	8.5	6.5	6.0	6.0	3.0	3.0	3.0	.5	.0	.5
16	10.0	9.0	9.5	6.0	5.0	5.5	3.0	2.0	2.5	.5	-.5	.5
17	9.5	8.5	9.0	5.0	4.0	4.5	2.0	1.5	1.5	-.5	-.5	-.5
18	8.5	8.0	8.5	4.5	3.5	4.0	1.5	1.0	1.0	-.5	-.5	-.5
19	8.0	7.5	7.5	5.5	4.5	5.0	1.0	.0	.5	.0	-.5	-.5
20	8.0	7.0	7.5	6.0	5.5	6.0	1.0	.0	1.0	.0	-.5	-.5
21	8.0	6.5	7.0	6.5	6.0	6.5	.0	.0	.0	.0	-.5	-.5
22	8.0	7.0	7.5	7.5	6.5	7.0	.0	.0	.0	.0	-.5	.0
23	7.0	6.0	6.5	8.0	6.5	7.5	.0	.0	.0	.0	-.5	.0
24	7.0	6.0	6.5	8.0	6.0	7.0	.0	.0	.0	.0	-.5	-.5
25	7.0	5.5	6.0	6.0	5.0	5.5	.0	.0	.0	-.5	-.5	-.5
26	7.0	6.0	6.0	5.0	4.5	4.5	.0	.0	.0	-.5	-.5	-.5
27	7.0	6.0	6.5	4.5	4.5	4.5	.0	.0	.0	.0	-.5	-.5
28	8.0	6.5	7.0	4.5	4.0	4.5	.0	.0	.0	.0	-.5	-.5
29	8.0	6.5	7.5	4.0	3.0	3.5	.0	.0	.0	.0	-.5	-.5
30	10.0	8.0	9.0	3.5	2.5	3.0	.0	.0	.0	.0	-.5	-.5
31	10.5	9.5	10.0	---	---	---	.0	.0	.0	.0	-.5	-.5
MONTH	12.0	5.5	8.4	10.0	2.5	5.9	6.5	.0	2.1	2.5	-.5	.1

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	-5	-5	5.0	4.5	4.5	7.5	6.5	7.0	14.0	12.0	13.0
2	.0	-5	-5	5.0	4.5	4.5	10.0	7.0	8.5	15.0	11.5	13.5
3	.0	-5	-5	4.5	3.5	4.0	9.5	8.0	8.5	15.5	12.0	14.0
4	.0	-5	-5	5.0	3.5	4.0	8.0	6.0	7.0	17.0	13.5	15.0
5	.0	-5	-5	5.5	4.0	4.5	7.0	5.0	6.0	18.5	15.0	17.0
6	.0	-5	-5	6.5	4.5	5.0	6.5	5.5	6.0	19.5	16.5	18.0
7	.0	-5	-5	8.5	6.0	7.0	5.5	4.0	5.0	20.5	17.5	19.0
8	.0	-5	-5	10.0	7.5	9.0	6.0	3.5	5.0	19.5	18.0	19.0
9	.0	-5	-5	10.0	7.0	9.0	5.5	4.0	4.5	19.0	16.5	17.5
10	.0	-5	-5	7.0	5.5	6.0	6.0	3.5	4.5	16.5	14.5	15.5
11	.0	-5	-5	5.5	4.0	5.0	5.5	4.5	5.0	15.5	13.5	14.0
12	.0	-5	-5	4.0	2.5	3.0	6.5	4.5	5.0	13.5	13.0	13.5
13	.0	-5	-5	3.0	2.0	2.5	5.5	5.0	5.5	13.0	11.5	12.5
14	.0	-5	.0	4.0	2.5	3.0	9.5	5.5	7.0	12.0	10.5	11.5
15	.0	-5	.0	5.0	4.0	4.5	9.5	9.0	9.0	12.5	10.0	11.0
16	.0	-5	.0	5.0	3.5	4.0	9.0	7.0	8.0	12.0	11.0	11.0
17	.0	-5	.0	5.0	3.0	4.0	8.5	6.5	7.5	13.0	10.5	12.0
18	.0	-5	.0	5.0	3.0	4.0	8.5	7.5	8.0	13.0	12.0	12.5
19	.0	-5	.0	4.5	4.0	4.5	8.5	8.0	8.0	14.0	11.5	12.5
20	.0	.0	.0	5.0	4.5	4.5	8.5	7.5	8.0	14.5	11.5	13.0
21	2.0	.0	1.0	6.5	5.0	6.0	8.0	7.0	7.5	14.5	12.0	13.5
22	4.0	2.0	3.0	8.0	6.5	7.0	9.5	6.5	8.0	14.5	13.0	14.0
23	4.5	4.0	4.5	10.0	7.0	8.5	10.0	8.0	9.0	15.0	13.5	14.0
24	4.5	4.0	4.5	10.0	8.5	9.0	11.5	8.0	10.0	15.0	13.5	14.5
25	5.0	4.0	4.5	10.5	9.5	10.0	12.0	9.0	10.5	15.0	13.0	14.0
26	6.5	5.0	5.5	10.5	8.5	9.5	12.5	9.5	11.0	15.5	12.5	14.0
27	6.5	5.0	5.5	10.0	9.0	9.5	13.5	10.0	12.0	15.5	13.5	14.5
28	5.0	4.0	4.5	9.0	8.0	8.5	13.5	10.5	12.0	16.0	13.5	15.0
29	4.5	3.5	4.0	8.0	5.5	6.5	14.0	11.0	12.5	16.5	13.5	15.0
30	---	---	---	7.0	4.5	6.0	14.5	11.0	13.0	15.5	14.5	15.0
31	---	---	---	8.0	5.0	6.5	---	---	---	16.5	14.5	15.5
MONTH	6.5	-5	1.1	10.5	2.0	5.9	14.5	3.5	7.9	20.5	10.0	14.3

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.0	15.0	15.5	19.0	15.5	17.5	20.5	17.5	19.0	20.5	18.0	19.0
2	16.0	15.0	15.5	19.0	17.5	18.5	19.5	18.0	18.5	20.0	18.5	19.5
3	16.0	13.5	15.0	19.0	17.5	18.5	19.5	16.5	18.0	19.5	18.0	19.0
4	15.5	14.0	15.0	20.0	17.0	18.5	19.0	16.0	17.5	19.0	17.5	18.0
5	16.5	14.0	15.0	21.0	17.5	19.0	18.0	16.0	17.0	17.5	15.0	16.0
6	17.0	13.5	15.5	20.0	18.0	18.5	18.5	16.5	17.5	16.0	13.5	15.0
7	17.0	14.5	16.0	19.5	16.5	18.0	20.0	17.0	18.5	16.5	13.5	15.0
8	19.0	15.5	17.5	18.5	16.5	17.0	19.0	18.0	18.5	18.0	15.5	16.5
9	21.0	17.5	19.5	19.5	16.5	17.5	19.0	17.0	18.0	18.0	16.0	17.0
10	22.0	18.5	20.5	20.5	17.5	19.0	19.5	17.0	18.0	18.5	17.5	18.0
11	21.0	19.5	20.0	21.0	18.0	19.5	20.0	17.0	18.5	18.5	17.0	17.5
12	19.5	17.5	18.5	20.0	18.0	19.0	19.5	16.5	18.5	18.0	16.5	17.0
13	17.5	16.5	17.0	21.0	17.5	19.5	19.5	17.5	18.5	16.5	14.5	16.0
14	18.5	15.5	17.0	21.5	18.5	20.0	21.0	18.0	19.5	16.0	15.0	15.5
15	18.5	17.0	17.5	20.5	18.5	19.5	21.0	19.0	20.0	15.0	13.5	14.5
16	18.0	17.0	17.5	21.0	18.5	19.5	20.0	18.0	19.0	14.0	12.5	13.0
17	18.5	16.0	17.5	21.5	18.5	20.0	18.5	16.5	17.0	14.5	12.0	13.5
18	19.0	16.0	17.5	20.0	17.0	18.0	17.0	15.5	16.5	15.0	12.5	14.0
19	19.0	16.0	17.5	18.0	15.5	16.5	16.5	14.0	15.5	15.5	14.0	15.0
20	18.0	16.5	17.0	17.0	14.5	16.0	16.5	13.5	15.0	15.0	13.5	14.5
21	20.0	17.0	18.5	16.0	15.0	15.5	16.5	14.0	15.5	13.5	12.0	13.0
22	19.0	17.5	18.5	15.5	14.5	15.0	16.0	15.0	15.5	12.0	10.5	11.0
23	19.5	17.0	18.5	16.0	13.5	15.0	17.5	15.0	16.0	11.0	10.5	11.0
24	19.0	17.5	18.5	17.5	14.0	16.0	18.0	15.0	16.5	11.5	10.0	10.5
25	21.0	17.5	19.5	18.0	15.0	17.0	17.5	15.5	16.5	10.5	9.0	10.0
26	20.0	18.5	19.0	19.5	16.5	18.0	17.5	16.5	17.0	10.5	8.5	9.5
27	19.5	17.0	18.5	19.0	17.5	18.5	18.5	16.5	17.5	10.5	9.5	10.0
28	18.5	16.0	17.0	18.0	17.0	17.5	18.5	16.0	17.5	10.0	8.0	9.0
29	17.5	15.0	16.5	18.5	16.5	17.5	18.0	16.5	17.0	11.0	8.5	10.0
30	17.5	15.0	16.5	18.0	17.0	17.5	18.0	15.5	16.5	12.0	10.0	11.0
31	---	---	---	19.0	17.0	18.0	19.5	16.5	18.0	---	---	---
MONTH	22.0	13.5	17.4	21.5	13.5	17.9	21.0	13.5	17.5	20.5	8.0	14.3

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	8.8	7.8	8.2	9.7	9.2	9.4	12.3	11.9	12.1	11.7	10.5	11.4			
2	9.5	8.7	9.3	9.5	9.2	9.3	11.9	11.6	11.7	11.4	10.9	11.2			
3	10.0	9.1	9.6	10.1	9.4	9.7	11.6	11.0	11.2	11.3	10.9	11.1			
4	---	---	---	10.6	9.9	10.3	11.1	10.8	10.9	11.9	11.0	11.6			
5	---	---	---	10.7	10.3	10.4	11.1	10.5	10.7	12.3	11.6	12.0			
6	---	---	---	10.8	10.3	10.6	11.4	10.6	11.2	12.2	11.8	12.0			
7	---	---	---	10.9	10.4	10.6	11.3	10.6	10.8	12.1	11.6	11.9			
8	---	---	---	10.6	10.0	10.4	10.7	10.0	10.3	12.2	11.9	12.1			
9	---	---	---	10.4	9.7	10.0	10.1	9.6	9.9	12.0	11.5	11.9			
10	---	---	---	9.7	9.3	9.5	9.9	9.6	9.8	11.6	10.8	11.2			
11	---	---	---	9.9	9.3	9.6	10.3	9.9	10.1	11.4	10.8	11.1			
12	---	---	---	9.8	9.6	9.7	10.3	10.1	10.2	12.1	11.2	11.8			
13	---	---	---	10.1	9.5	9.8	10.5	10.2	10.3	12.7	12.1	12.4			
14	---	---	---	10.2	9.6	9.9	10.9	10.5	10.7	13.1	12.6	12.9			
15	---	---	---	10.3	9.7	10.0	11.1	10.8	11.0	13.2	12.2	12.5			
16	---	---	---	10.5	9.6	10.2	11.7	11.0	11.3	12.5	11.9	12.1			
17	---	---	---	11.2	10.4	10.8	12.4	11.7	12.0	12.5	10.7	11.4			
18	---	---	---	11.3	10.9	11.1	12.8	12.4	12.6	12.6	12.0	12.3			
19	---	---	---	11.1	10.5	10.8	13.3	12.7	13.0	12.1	12.0	12.1			
20	---	---	---	10.7	10.4	10.6	13.1	12.2	12.9	12.1	11.6	11.9			
21	---	---	---	10.5	10.2	10.4	12.5	12.0	12.2	12.1	11.5	11.8			
22	---	---	---	10.2	9.9	10.0	12.4	12.1	12.2	12.4	11.7	12.1			
23	---	---	---	10.2	9.6	10.0	12.5	11.8	12.1	12.5	12.2	12.4			
24	---	---	---	10.0	9.5	9.7	12.1	11.9	12.0	13.0	12.3	12.6			
25	---	---	---	10.5	10.0	10.3	12.0	11.5	11.8	13.3	13.0	13.1			
26	---	---	---	10.9	10.3	10.7	12.2	10.8	11.7	13.4	13.1	13.2			
27	---	---	---	11.5	10.5	10.9	11.2	10.3	10.8	13.5	13.2	13.4			
28	---	---	---	11.7	11.2	11.5	11.0	10.3	10.6	13.6	13.3	13.4			
29	10.8	10.4	10.6	11.8	11.3	11.6	10.6	10.3	10.4	13.7	13.5	13.6			
30	10.4	9.8	10.2	12.1	11.7	11.9	11.2	10.3	10.7	13.8	13.5	13.7			
31	9.8	9.3	9.5	---	---	---	10.9	10.5	10.8	13.7	13.3	13.5			
MONTH	---	---	---	12.1	9.2	10.3	13.3	9.6	11.2	13.8	10.5	12.2			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	13.7	13.4	13.5	---	---	---	10.8	10.5	10.7	10.7	10.1	10.4	
2	14.0	13.6	13.8	---	---	---	10.6	10.1	10.4	10.9	10.1	10.5	
3	14.0	13.7	13.9	---	---	---	10.3	9.9	10.1	10.7	10.0	10.3	
4	14.1	13.9	14.0	---	---	---	10.8	10.0	10.3	10.3	9.7	10.0	
5	14.4	14.1	14.2	---	---	---	11.9	10.7	11.3	10.0	9.2	9.6	
6	14.5	14.3	14.4	---	---	---	11.5	11.1	11.3	9.4	8.8	9.1	
7	14.5	14.2	14.3	---	---	---	12.1	11.4	11.7	9.2	8.5	8.8	
8	14.5	14.2	14.4	---	---	---	12.4	11.9	12.1	8.7	8.2	8.5	
9	14.2	13.8	14.0	10.3	9.7	9.9	12.2	11.9	12.0	9.4	8.1	8.8	
10	13.8	13.6	13.7	11.1	10.3	10.8	12.4	11.8	12.2	10.0	9.0	9.5	
11	13.6	13.4	13.5	11.6	11.1	11.4	12.1	11.7	11.9	9.9	9.4	9.7	
12	13.7	13.4	13.6	12.1	11.6	11.9	12.1	11.5	11.8	10.0	9.6	9.8	
13	13.4	13.2	13.3	12.2	11.9	12.1	11.8	11.3	11.6	10.2	9.7	9.9	
14	---	---	---	12.1	11.6	11.9	11.4	10.5	11.2	10.7	10.2	10.5	
15	---	---	---	11.6	11.3	11.5	10.6	10.1	10.3	10.8	10.2	10.6	
16	---	---	---	11.7	11.3	11.5	10.6	10.1	10.3	10.5	10.1	10.2	
17	---	---	---	11.9	11.5	11.7	11.1	10.5	10.8	10.4	10.0	10.3	
18	---	---	---	11.9	11.6	11.8	11.3	10.7	11.0	10.0	9.8	9.9	
19	---	---	---	11.6	11.4	11.5	11.1	10.5	10.8	10.0	9.7	9.8	
20	---	---	---	11.4	11.1	11.2	10.8	10.4	10.6	10.1	9.7	9.9	
21	---	---	---	11.1	10.8	11.0	11.5	10.8	11.2	10.0	9.5	9.8	
22	---	---	---	10.8	10.5	10.7	11.7	11.0	11.5	9.7	9.4	9.6	
23	---	---	---	10.5	10.1	10.4	11.5	10.9	11.1	9.6	9.2	9.4	
24	---	---	---	10.3	9.9	10.1	11.4	10.8	11.1	9.6	9.1	9.3	
25	---	---	---	10.0	9.7	9.8	11.3	10.7	10.9	9.8	9.2	9.5	
26	---	---	---	10.1	9.7	9.9	11.5	10.6	11.0	10.0	9.4	9.7	
27	---	---	---	10.0	9.6	9.8	11.6	10.8	11.2	9.9	9.4	9.6	
28	---	---	---	10.2	9.7	10.0	11.2	10.6	10.9	9.8	9.2	9.5	
29	---	---	---	10.9	10.1	10.5	11.2	10.5	10.8	9.8	9.2	9.5	
30	---	---	---	11.3	10.9	11.1	11.1	10.5	10.8	9.6	9.1	9.3	
31	---	---	---	11.2	10.7	11.0	---	---	---	9.6	9.1	9.3	
MONTH	---	---	---	---	---	---	12.4	9.9	11.1	10.9	8.1	9.7	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.4	9.0	9.2	9.3	8.7	9.0	8.6	8.0	8.3	8.7	8.0	8.3
2	9.1	8.8	8.9	9.0	8.4	8.6	8.5	7.9	8.2	8.4	7.8	8.1
3	9.4	9.0	9.2	8.6	8.2	8.3	8.8	8.1	8.4	8.4	7.6	8.0
4	9.4	9.1	9.3	9.1	8.2	8.6	9.0	8.2	8.6	8.9	8.0	8.5
5	9.6	9.1	9.4	9.0	8.2	8.6	8.9	8.3	8.6	9.5	8.5	9.0
6	9.8	9.2	9.5	8.9	8.1	8.5	8.7	8.0	8.4	9.7	8.9	9.3
7	9.7	9.1	9.3	9.4	8.5	8.9	8.6	7.9	8.2	9.8	8.9	9.2
8	9.4	8.8	9.1	9.0	8.5	8.7	8.1	7.7	7.9	9.2	8.6	8.9
9	8.9	8.4	8.6	9.2	8.6	8.8	8.5	7.7	8.1	9.2	8.4	8.8
10	8.7	8.2	8.4	9.1	8.2	8.6	8.6	8.0	8.2	8.8	8.3	8.5
11	8.2	7.8	8.0	9.1	8.1	8.5	8.4	7.8	8.1	8.6	8.2	8.4
12	8.6	8.0	8.3	9.1	8.1	8.5	8.5	7.6	8.0	9.0	8.3	8.6
13	8.9	8.4	8.6	9.0	8.1	8.5	8.7	8.1	8.3	9.3	8.7	9.0
14	9.2	8.7	8.9	8.5	7.8	8.1	8.5	7.8	8.2	9.3	8.9	9.1
15	8.9	8.4	8.6	8.5	7.5	8.0	8.6	7.8	8.2	9.8	8.9	9.3
16	8.8	8.3	8.5	8.6	7.5	8.1	9.1	8.1	8.5	10.1	9.5	9.7
17	9.3	8.5	8.8	8.6	7.7	8.1	9.0	8.4	8.7	10.1	9.6	9.8
18	9.2	8.7	8.9	8.6	7.8	8.2	9.5	8.7	9.1	10.1	9.4	9.7
19	9.2	8.6	8.8	9.3	8.1	8.7	9.8	9.0	9.4	9.6	8.9	9.2
20	9.1	8.4	8.8	9.2	8.4	8.8	10.0	9.2	9.6	9.1	8.7	8.9
21	9.0	8.4	8.7	9.3	8.6	8.9	9.9	9.1	9.4	10.2	9.0	9.6
22	8.8	8.2	8.5	9.4	8.7	9.1	9.3	8.9	9.1	10.7	10.0	10.3
23	9.1	8.3	8.6	9.7	9.0	9.3	9.4	8.9	9.1	10.8	10.4	10.6
24	8.7	8.2	8.4	9.5	8.9	9.2	9.5	8.7	9.0	11.1	10.5	10.8
25	8.5	8.1	8.3	9.2	8.7	8.9	9.3	8.5	8.9	11.4	10.7	11.0
26	8.3	7.9	8.1	8.9	8.3	8.6	8.7	8.2	8.4	11.6	11.0	11.3
27	8.8	7.9	8.4	8.5	8.0	8.2	8.8	8.4	8.6	11.6	10.9	11.2
28	9.0	8.3	8.6	8.6	8.0	8.3	8.9	8.4	8.6	11.9	11.2	11.6
29	9.3	8.7	9.0	8.9	8.2	8.5	8.4	8.1	8.3	11.9	11.3	11.6
30	9.4	8.7	9.1	8.6	8.3	8.4	9.1	8.3	8.7	11.3	10.8	11.0
31	---	---	---	8.8	8.2	8.5	8.9	8.2	8.5	---	---	---
MONTH	9.8	7.8	8.8	9.7	7.5	8.6	10.0	7.6	8.6	11.9	7.6	9.6

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04124200 MANISTEE RIVER NEAR MESICK, MI

LOCATION.--Lat 44°21'47", long 85°49'15", in SE1/4 NE1/4 sec.25, T.23 N., R.13 W., Manistee County, Hydrologic Unit 04060103, on right bank 200 ft downstream from Hodenpyl Dam, 6.2 mi southwest of Mesick.

DRAINAGE AREA.--1,018 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1996 to current year.

GAGE.--Water-stage recorder. Datum of gage is 732.22 ft above sea level (Consumers Energy benchmark).

REMARKS.--Water-discharge records good. Flow completely regulated by Hodenpyl Dam 200 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1020	1020	983	1090	1080	1560	1110	958	1080	883	925	869
2	1040	1040	984	1120	1030	1530	1070	959	1380	1010	930	841
3	1040	1030	984	1120	1040	1390	1040	958	1270	1100	930	866
4	983	1010	1020	1180	1070	1310	1040	978	1380	943	907	881
5	918	989	1150	1090	1040	1260	1040	987	1270	900	835	883
6	920	975	1250	1030	1010	1210	1040	988	1080	905	855	860
7	955	973	1190	1060	1010	1180	1040	976	1040	907	859	847
8	930	920	1160	1040	1010	1170	1040	949	1060	949	877	849
9	861	931	1160	1020	1010	1320	1040	973	1050	913	839	851
10	921	983	1130	1020	1030	1370	1040	967	1030	842	868	841
11	995	986	1070	1070	1040	1260	1040	1040	1200	856	920	1040
12	899	988	1020	1110	969	1180	1040	1120	1260	880	868	839
13	1020	942	1040	1100	942	1230	1040	1150	1230	881	827	893
14	1020	927	1060	1050	1000	1140	1040	1180	1140	875	854	1040
15	990	965	1070	1020	1040	1140	1040	1240	1080	870	885	1030
16	1050	923	1070	1020	1040	1210	1040	1410	1060	867	867	922
17	1030	872	1070	810	987	1190	1020	1380	1060	865	835	819
18	984	949	1030	745	937	1180	978	1620	1040	864	862	817
19	974	975	999	772	982	1140	981	1710	1010	812	864	888
20	975	976	1000	1010	1030	1100	1170	1310	990	807	802	811
21	974	924	1000	1070	1030	1100	1180	1270	980	856	805	809
22	997	927	792	864	1010	1110	1060	1290	968	866	843	805
23	1130	1000	825	780	1090	1100	1060	1300	964	866	828	839
24	1100	1140	858	808	1220	1100	1110	1180	964	865	855	816
25	1050	1060	706	937	1380	1110	1070	1120	958	862	845	894
26	1070	1050	788	1030	1520	1100	1020	1120	952	859	961	877
27	1110	1060	996	988	1750	1170	992	1120	1030	859	960	809
28	1110	1040	1140	894	1750	1170	968	1060	1030	965	864	807
29	1080	1040	1060	883	1610	1120	955	1020	938	1040	905	861
30	998	1010	1000	1010	---	1120	956	1020	870	941	955	844
31	991	---	1030	1100	---	1110	---	1020	---	913	907	---
TOTAL	31135	29625	31635	30841	32657	37380	31260	35373	32364	27821	27137	26548
MEAN	1004	988	1020	995	1126	1206	1042	1141	1079	897	875	898
MAX	1130	1140	1250	1180	1750	1560	1180	1710	1380	1100	961	1040
MIN	861	872	706	745	937	1100	955	949	870	807	802	817
CFSM	.99	.97	1.00	.98	1.11	1.18	1.02	1.12	1.06	.88	.86	.88
IN.	1.14	1.08	1.16	1.13	1.19	1.37	1.14	1.29	1.18	1.02	.99	.98

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1997 - 2000, BY WATER YEAR (WY)

	1997	1998	1999	2000	1997	1998	1999	2000	1997	1998	1999	2000
MEAN	1061	1075	1113	1152	1212	1306	1505	1294	1095	1018	951	838
MAX	1094	1126	1266	1359	1328	1435	1954	1761	1154	1155	1042	1006
(WY)	1998	1998	1997	1997	1997	1997	1997	1997	1999	1999	1997	1997
MIN	1004	988	1020	995	1126	1206	1042	1076	1061	897	875	844
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	1998	2000	2000	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1997 - 2000
ANNUAL TOTAL	397418	374176	
ANNUAL MEAN	1089	1022	1094
HIGHEST ANNUAL MEAN			1149
LOWEST ANNUAL MEAN			1022
HIGHEST DAILY MEAN	1660	1750	2880
LOWEST DAILY MEAN	706	706	706
ANNUAL SEVEN-DAY MINIMUM	831	834	831
INSTANTANEOUS PEAK FLOW		1950	2950
INSTANTANEOUS PEAK STAGE		5.28	6.46
INSTANTANEOUS LOW FLOW		521	521
ANNUAL RUNOFF (CFSM)	1.07	1.00	1.07
ANNUAL RUNOFF (INCHES)	14.52	13.67	14.60
10 PERCENT EXCEEDS	1350	1180	1450
50 PERCENT EXCEEDS	1050	1010	1080
90 PERCENT EXCEEDS	882	859	907

(a) Dec. 22, 23, 1999.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: December 1996 to current year.

DISSOLVED OXYGEN: December 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 23.0°C, July 31, 1999, Aug. 1, 2, 1999; minimum, 0.0°C, Feb. 10-13, 1997.

DISSOLVED OXYGEN: Maximum, 15.3 mg/L, Mar. 15, 1999; minimum, 6.4 mg/L, July 9, 10, 1998.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 21.5°C, July 5, 11, 14, 15; minimum, 0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.7 mg/L, Dec. 24; minimum, 7.0 mg/L, Aug. 26.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	15.0	14.5	14.5	8.5	8.0	8.0	5.5	5.0	5.5	1.0	1.0	1.0
2	14.5	14.5	14.5	8.5	8.0	8.5	5.0	5.0	5.0	1.0	1.0	1.0
3	14.5	14.0	14.0	8.5	8.0	8.0	5.0	5.0	5.0	1.0	1.0	1.0
4	14.0	13.5	14.0	8.0	8.0	8.0	5.0	5.0	5.0	1.0	1.0	1.0
5	13.5	13.0	13.5	8.0	7.5	8.0	5.0	5.0	5.0	1.0	.5	1.0
6	13.0	13.0	13.0	8.0	7.5	7.5	5.0	4.5	5.0	1.0	1.0	1.0
7	13.0	12.5	12.5	7.5	7.5	7.5	5.0	4.5	4.5	1.0	.5	.5
8	12.5	12.5	12.5	7.5	7.5	7.5	4.5	4.5	4.5	1.0	.5	1.0
9	12.5	12.0	12.0	7.5	7.5	7.5	4.5	4.5	4.5	1.0	.5	.5
10	12.0	11.5	11.5	8.0	7.5	8.0	4.5	4.0	4.5	1.0	1.0	1.0
11	11.5	11.5	11.5	7.5	7.5	7.5	4.0	3.5	4.0	1.0	.5	1.0
12	11.5	10.5	11.0	7.5	7.5	7.5	4.0	4.0	4.0	1.0	.5	.5
13	11.5	11.0	11.5	7.5	7.5	7.5	4.0	3.5	4.0	1.0	.5	.5
14	11.0	11.0	11.0	7.5	7.5	7.5	3.5	3.5	3.5	1.0	.5	1.0
15	11.0	11.0	11.0	7.5	7.0	7.5	3.5	3.5	3.5	1.0	1.0	1.0
16	11.0	11.0	11.0	7.0	7.0	7.0	3.5	3.0	3.5	1.0	1.0	1.0
17	11.0	11.0	11.0	7.0	7.0	7.0	3.0	3.0	3.0	1.0	1.0	1.0
18	11.0	10.5	11.0	7.0	6.5	7.0	3.0	3.0	3.0	1.0	1.0	1.0
19	10.5	10.5	10.5	6.5	6.5	6.5	3.0	3.0	3.0	1.0	1.0	1.0
20	10.5	10.5	10.5	6.5	6.5	6.5	3.0	2.5	3.0	1.0	1.0	1.0
21	10.5	10.5	10.5	6.5	6.5	6.5	2.5	2.0	2.5	1.0	1.0	1.0
22	10.5	10.0	10.0	6.5	6.5	6.5	2.0	1.5	2.0	1.0	1.0	1.0
23	10.0	9.5	10.0	6.5	6.5	6.5	2.0	1.5	1.5	1.0	1.0	1.0
24	9.5	9.5	9.5	6.5	6.5	6.5	1.5	1.5	1.5	1.0	1.0	1.0
25	9.5	9.0	9.0	6.5	6.5	6.5	1.5	1.5	1.5	1.0	1.0	1.0
26	9.0	9.0	9.0	6.5	6.5	6.5	1.5	1.0	1.5	1.0	1.0	1.0
27	9.0	8.5	8.5	6.5	6.0	6.0	1.0	1.0	1.0	1.0	1.0	1.0
28	9.0	8.5	8.5	6.0	6.0	6.0	1.0	1.0	1.0	1.0	1.0	1.0
29	8.5	8.5	8.5	6.0	5.5	5.5	1.0	1.0	1.0	1.0	1.0	1.0
30	8.5	8.0	8.5	5.5	5.5	5.5	1.0	1.0	1.0	1.0	1.0	1.0
31	8.5	8.0	8.5	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
MONTH	15.0	8.0	11.0	8.5	5.5	7.1	5.5	1.0	3.2	1.0	.5	.9

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH			APRIL			MAY		
1	1.0	1.0	1.0	1.5	1.0	1.5	7.0	6.5	7.0	10.5	10.0	10.0
2	1.0	1.0	1.0	2.0	1.5	2.0	7.5	7.0	7.0	10.5	10.0	10.5
3	1.0	1.0	1.0	2.5	2.0	2.5	7.5	7.0	7.5	10.5	10.5	10.5
4	1.0	.5	1.0	3.0	2.5	3.0	7.5	7.5	7.5	11.0	10.0	10.5
5	.5	.5	.5	3.5	3.0	3.0	7.5	7.0	7.5	11.5	10.5	11.0
6	.5	.5	.5	3.5	3.5	3.5	7.5	7.0	7.5	12.0	11.0	11.5
7	.5	.5	.5	3.5	3.0	3.5	7.5	7.0	7.5	12.5	11.5	12.0
8	.5	.5	.5	4.0	3.5	3.5	7.5	7.0	7.0	13.5	12.5	13.0
9	.5	.5	.5	5.0	3.5	4.5	7.0	7.0	7.0	14.5	13.0	14.0
10	.5	.5	.5	4.5	4.5	4.5	7.0	6.5	7.0	14.5	14.0	14.5
11	.5	.5	.5	5.0	4.5	4.5	7.0	6.5	7.0	14.5	12.5	13.5
12	.5	.5	.5	5.0	4.5	4.5	7.0	6.5	6.5	14.5	14.0	14.5
13	.5	.5	.5	4.5	4.5	4.5	7.0	6.5	6.5	14.5	14.0	14.0
14	.5	.5	.5	4.5	4.5	4.5	7.0	6.5	6.5	14.0	14.0	14.0
15	.5	.5	.5	5.0	4.5	5.0	7.5	7.0	7.0	14.5	14.0	14.0
16	.5	.5	.5	5.0	5.0	5.0	7.5	7.0	7.0	14.5	14.0	14.5
17	.5	.5	.5	5.5	5.0	5.0	7.0	6.5	7.0	15.0	14.5	14.5
18	.5	.5	.5	5.0	5.0	5.0	7.0	6.5	7.0	15.0	15.0	15.0
19	.5	.5	.5	5.0	5.0	5.0	7.0	7.0	7.0	15.0	15.0	15.0
20	.5	.5	.5	5.0	5.0	5.0	7.0	7.0	7.0	15.0	14.5	14.5
21	.5	.5	.5	5.0	5.0	5.0	7.0	7.0	7.0	14.5	14.0	14.0
22	.5	.5	.5	5.5	5.0	5.0	7.5	7.0	7.0	14.0	13.5	14.0
23	.5	.5	.5	5.5	5.0	5.0	7.5	7.0	7.5	14.0	14.0	14.0
24	.5	.5	.5	5.5	5.0	5.5	9.0	7.5	8.0	14.5	14.0	14.0
25	.5	.5	.5	6.0	5.5	5.5	9.0	8.0	8.5	14.0	13.5	14.0
26	.5	.5	.5	6.0	6.0	6.0	9.0	8.5	8.5	15.0	14.0	14.5
27	.5	.5	.5	6.5	6.0	6.0	9.5	8.5	9.0	15.0	14.5	15.0
28	1.0	.5	.5	6.5	6.5	6.5	10.5	9.0	9.5	15.5	15.0	15.0
29	1.0	1.0	1.0	6.5	6.5	6.5	10.5	9.5	10.0	15.5	15.0	15.0
30	---	---	---	7.0	6.5	6.5	10.5	10.0	10.0	15.0	15.0	15.0
31	---	---	---	7.0	6.5	6.5	---	---	---	15.5	15.0	15.0
MONTH	1.0	.5	.6	7.0	1.0	4.6	10.5	6.5	7.5	15.5	10.0	13.6

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	15.5	15.5	15.5	20.0	19.5	19.5	19.5	19.0	19.0	20.5	19.0	19.5
2	16.0	15.5	15.5	20.0	19.5	20.0	19.5	19.0	19.0	20.0	19.5	20.0
3	16.0	15.5	15.5	20.5	20.0	20.5	19.5	19.0	19.5	20.0	19.0	19.5
4	16.5	15.5	16.0	21.0	20.5	20.5	19.5	18.5	19.0	21.0	19.5	20.5
5	17.0	16.0	16.5	21.5	20.5	20.5	19.0	19.0	19.0	20.0	20.0	20.0
6	16.5	16.5	16.5	21.0	20.5	21.0	19.0	19.0	19.0	20.0	19.5	19.5
7	16.5	16.0	16.0	21.0	20.5	20.5	19.5	19.0	19.0	19.5	19.0	19.5
8	16.5	16.0	16.0	20.5	20.0	20.5	20.0	19.5	20.0	19.5	19.5	19.5
9	16.5	16.0	16.5	20.0	20.0	20.0	20.5	20.0	20.0	19.5	19.0	19.5
10	17.0	16.0	16.5	21.0	20.0	20.5	20.5	20.0	20.5	19.5	19.0	19.0
11	18.0	17.0	17.5	21.5	20.5	21.0	21.0	20.0	20.5	19.5	18.5	19.0
12	18.0	17.5	18.0	21.0	20.5	21.0	20.5	20.5	20.5	19.5	19.0	19.0
13	18.0	18.0	18.0	20.5	20.0	20.5	20.5	20.0	20.5	19.0	18.5	19.0
14	18.0	17.5	18.0	21.5	20.5	21.0	20.5	20.0	20.5	19.0	19.0	19.0
15	18.0	17.5	18.0	21.5	20.5	21.0	20.5	19.5	20.0	19.0	18.5	19.0
16	18.0	17.5	18.0	21.0	20.0	20.5	21.0	20.0	20.5	18.5	18.5	18.5
17	18.5	18.0	18.0	20.5	20.0	20.0	20.5	20.0	20.5	18.5	18.5	18.5
18	18.5	18.5	18.5	20.5	20.0	20.0	21.0	20.0	20.5	18.5	18.0	18.5
19	18.5	18.5	18.5	20.0	20.0	20.0	20.5	20.0	20.5	18.5	18.0	18.0
20	18.5	18.5	18.5	20.0	20.0	20.0	20.5	20.0	20.0	18.0	17.5	17.5
21	18.5	18.5	18.5	20.0	20.0	20.0	20.0	20.0	20.0	17.5	17.0	17.0
22	19.0	18.5	19.0	20.0	20.0	20.0	20.0	19.5	19.5	17.0	16.5	16.5
23	19.5	19.0	19.0	20.0	19.5	20.0	20.0	19.5	19.5	16.5	16.5	16.5
24	19.5	19.0	19.5	20.0	19.5	19.5	19.5	19.5	19.5	16.5	16.5	16.5
25	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.0	19.0	16.5	16.0	16.0
26	20.0	19.5	19.5	19.5	19.0	19.0	19.0	19.0	19.0	16.0	16.0	16.0
27	19.5	19.5	19.5	19.0	19.0	19.0	20.0	19.0	19.5	16.0	15.5	15.5
28	19.5	19.5	19.5	19.0	19.0	19.0	19.5	19.5	19.5	15.5	14.5	15.0
29	20.0	19.5	19.5	19.5	19.0	19.0	19.5	19.0	19.0	14.5	14.0	14.5
30	19.5	19.5	19.5	19.5	19.0	19.5	19.5	19.0	19.5	14.0	13.5	14.0
31	---	---	---	19.5	19.5	19.5	19.5	19.0	19.0	---	---	---
MONTH	20.0	15.5	17.8	21.5	19.0	20.1	21.0	18.5	19.7	21.0	13.5	18.0

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	9.4	9.2	9.3	10.4	10.3	10.3	12.1	11.9	12.0	12.5	11.8	12.4
2	9.4	9.2	9.3	10.6	10.3	10.4	12.1	11.7	12.0	12.3	11.7	12.1
3	9.7	9.3	9.5	10.6	10.5	10.5	12.1	11.5	11.8	12.2	11.9	12.1
4	9.8	9.6	9.7	10.6	10.5	10.5	12.1	11.5	11.9	12.0	11.7	11.9
5	10.6	9.7	10.2	10.7	10.6	10.6	12.0	11.8	11.9	12.1	11.8	11.9
6	10.7	10.1	10.4	10.7	10.6	10.7	11.9	11.8	11.9	12.0	11.7	11.8
7	10.6	10.0	10.1	10.9	10.7	10.8	12.0	11.8	11.9	11.8	11.7	11.7
8	10.5	10.0	10.2	11.2	10.5	10.9	12.1	11.7	12.0	11.8	11.7	11.7
9	10.7	10.5	10.7	11.1	10.7	10.8	12.0	11.6	11.9	11.9	11.7	11.8
10	10.7	10.1	10.5	10.9	10.7	10.8	12.2	12.0	12.1	11.8	11.6	11.7
11	10.4	10.2	10.3	10.9	10.8	10.9	12.4	12.0	12.3	11.8	11.7	11.7
12	10.8	10.3	10.6	10.9	10.7	10.9	12.6	11.9	12.3	12.4	11.7	11.8
13	10.7	10.1	10.3	11.2	10.7	11.0	12.4	11.8	12.3	12.0	11.8	11.9
14	10.4	9.6	10.2	11.2	10.2	10.7	12.5	11.9	12.2	12.2	11.9	12.0
15	10.3	10.2	10.3	11.1	10.4	11.0	12.3	11.8	12.2	12.2	12.0	12.1
16	10.3	10.0	10.1	11.6	10.8	11.2	12.4	11.7	12.0	12.3	12.0	12.2
17	10.2	10.1	10.2	11.0	10.5	10.8	12.6	12.4	12.5	13.0	12.2	12.6
18	10.3	10.2	10.2	11.6	10.6	11.1	12.7	12.2	12.6	12.9	12.4	12.7
19	10.3	10.1	10.1	11.2	10.6	11.2	12.7	12.6	12.6	12.9	12.5	12.8
20	10.2	10.0	10.1	11.4	10.7	11.3	12.6	12.1	12.5	12.8	11.5	12.2
21	10.2	10.1	10.2	11.7	11.3	11.6	12.9	12.1	12.7	12.5	11.9	12.1
22	10.1	10.0	10.0	11.7	11.3	11.5	13.5	12.8	13.2	12.6	11.8	12.2
23	10.1	10.0	10.1	11.4	11.3	11.4	13.5	12.8	13.1	13.2	12.2	12.9
24	10.3	10.1	10.2	11.4	11.1	11.3	13.7	12.8	13.3	13.4	13.1	13.2
25	10.3	10.1	10.1	11.5	10.9	11.4	13.5	13.3	13.4	13.1	12.9	13.0
26	10.3	10.1	10.2	11.5	11.4	11.4	13.4	13.3	13.3	13.0	12.1	12.7
27	10.3	10.2	10.2	11.6	11.4	11.5	13.4	12.0	12.8	13.2	12.9	13.1
28	10.2	10.1	10.1	11.7	11.6	11.7	12.5	11.9	12.2	13.2	12.4	12.6
29	10.3	10.2	10.2	11.8	11.6	11.7	12.7	12.0	12.4	13.3	12.4	13.0
30	10.5	10.2	10.3	12.0	11.7	11.9	12.7	12.5	12.6	12.8	12.0	12.5
31	10.5	10.4	10.4	—	—	—	12.7	12.5	12.5	12.7	11.9	12.6
MONTH	10.8	9.2	10.1	12.0	10.2	11.1	13.7	11.5	12.4	13.4	11.5	12.3

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	12.8	11.9	12.5	11.9	11.8	11.9	10.5	10.4	10.4	11.0	10.8	10.9
2	12.9	12.0	12.6	11.9	11.7	11.8	10.4	10.3	10.4	11.0	10.7	10.8
3	12.1	11.8	11.9	11.8	11.7	11.8	10.3	10.2	10.2	10.8	10.7	10.8
4	12.0	11.7	11.9	11.7	10.9	11.4	10.2	10.1	10.2	10.7	10.5	10.6
5	12.1	11.8	11.9	11.7	11.5	11.6	10.2	10.0	10.1	10.5	10.4	10.5
6	12.1	11.8	12.0	11.7	11.1	11.6	10.1	10.0	10.1	10.4	10.2	10.3
7	12.1	11.8	12.0	11.8	11.6	11.7	10.2	10.1	10.2	10.2	9.9	10.1
8	12.6	11.8	12.1	11.7	11.4	11.6	10.4	10.2	10.4	9.9	9.6	9.8
9	12.6	12.5	12.6	11.4	11.0	11.1	10.5	10.3	10.4	9.6	9.3	9.5
10	12.6	12.4	12.5	11.0	10.9	11.0	10.6	10.4	10.6	9.5	9.3	9.4
11	12.6	12.5	12.5	11.1	10.9	11.0	10.8	10.6	10.7	10.6	9.4	9.9
12	12.9	12.4	12.7	11.2	11.0	11.1	10.9	10.7	10.8	9.6	9.5	9.5
13	12.8	12.5	12.7	11.1	10.7	10.8	11.0	10.8	10.9	9.6	9.4	9.5
14	12.7	12.5	12.6	11.1	10.7	10.9	11.0	10.9	11.0	9.5	9.4	9.5
15	12.8	12.7	12.7	11.0	10.7	10.9	11.1	10.9	11.0	9.5	9.3	9.4
16	12.9	12.6	12.7	10.9	10.8	10.8	11.2	11.0	11.1	9.3	9.2	9.3
17	13.1	12.8	12.9	10.9	10.8	10.8	11.3	11.2	11.2	9.3	9.2	9.3
18	13.0	12.9	13.0	10.8	10.7	10.8	11.4	11.2	11.3	9.4	9.2	9.3
19	13.0	12.8	12.9	10.8	10.7	10.8	11.5	11.3	11.4	9.5	9.3	9.4
20	12.9	12.7	12.8	10.9	10.8	10.9	11.4	11.3	11.4	9.6	9.4	9.4
21	12.9	12.6	12.8	10.9	10.9	10.9	11.5	11.3	11.4	9.5	9.4	9.5
22	12.9	12.8	12.8	10.9	10.7	10.8	11.6	11.5	11.5	9.5	9.4	9.5
23	12.8	11.9	12.7	10.8	10.7	10.8	11.6	11.5	11.6	9.6	9.4	9.5
24	12.6	12.4	12.5	10.8	10.7	10.7	11.6	11.4	11.5	9.6	9.5	9.5
25	12.5	12.4	12.5	10.7	10.6	10.7	11.5	11.3	11.4	9.6	9.5	9.6
26	12.5	12.4	12.5	10.7	10.6	10.7	11.5	11.4	11.5	9.6	9.5	9.6
27	12.5	12.3	12.4	10.6	10.5	10.6	11.5	11.2	11.4	9.5	9.4	9.5
28	12.4	12.2	12.3	10.6	10.5	10.5	11.4	11.1	11.2	9.6	9.4	9.5
29	12.2	11.9	12.1	10.6	10.5	10.6	11.2	11.0	11.1	9.6	9.4	9.5
30	—	—	—	10.6	10.5	10.6	11.1	11.0	11.1	9.6	9.4	9.5
31	—	—	—	10.6	10.4	10.6	—	—	—	9.5	9.4	9.5
MONTH	13.1	11.7	12.5	11.9	10.4	11.0	11.6	10.0	10.9	11.0	9.2	9.7



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.5	9.2	9.5	9.3	8.8	9.1	8.4	8.3	8.4	8.0	7.8	7.9
2	9.6	9.1	9.4	9.3	7.8	8.7	8.4	8.3	8.4	7.9	7.7	7.8
3	9.6	9.3	9.5	8.8	8.1	8.5	8.5	8.0	8.4	7.8	7.6	7.7
4	9.5	9.3	9.4	9.3	8.7	9.0	8.8	8.3	8.4	7.7	7.6	7.6
5	9.6	9.4	9.5	9.4	9.2	9.3	8.4	8.1	8.3	7.7	7.5	7.6
6	9.7	9.4	9.6	9.4	9.2	9.3	8.2	8.0	8.1	7.9	7.4	7.6
7	9.8	9.3	9.5	9.4	9.2	9.3	8.1	7.8	7.9	8.0	7.8	7.9
8	9.6	9.4	9.5	9.4	8.8	9.2	8.3	7.8	8.1	8.1	7.9	8.0
9	9.6	9.3	9.4	9.3	8.9	9.2	8.6	8.2	8.3	8.1	7.9	8.0
10	9.5	9.3	9.4	9.3	9.1	9.2	8.7	8.4	8.6	8.0	7.5	7.7
11	9.4	9.1	9.3	9.4	9.3	9.3	8.7	8.2	8.4	7.7	7.1	7.4
12	9.9	9.2	9.3	9.4	9.3	9.3	8.6	8.2	8.4	8.2	7.3	7.8
13	9.3	9.0	9.2	9.3	9.1	9.3	8.6	8.3	8.5	8.3	7.9	8.0
14	9.2	9.0	9.1	9.3	9.0	9.2	8.4	7.7	8.1	8.2	7.8	8.0
15	9.2	9.0	9.1	9.1	8.9	9.0	7.9	7.6	7.7	8.3	8.0	8.2
16	9.2	8.9	9.1	9.0	8.6	8.8	8.1	7.9	8.0	8.6	8.3	8.5
17	9.3	9.1	9.2	8.9	8.7	8.7	8.5	8.0	8.1	8.9	8.4	8.6
18	9.4	9.0	9.3	8.8	8.6	8.7	8.1	7.9	8.0	8.8	7.8	8.5
19	9.3	9.0	9.2	8.8	8.5	8.6	8.0	7.9	8.0	8.4	8.1	8.3
20	9.3	8.9	9.2	8.8	8.3	8.5	8.5	7.9	8.2	8.3	8.2	8.3
21	9.2	8.9	9.1	8.4	8.1	8.3	8.5	7.8	8.1	8.8	8.3	8.6
22	9.3	8.9	9.1	8.4	8.3	8.3	7.9	7.5	7.7	8.9	8.7	8.8
23	9.3	9.0	9.2	8.3	8.2	8.3	7.7	7.5	7.6	9.0	8.7	8.8
24	9.3	9.0	9.2	8.2	8.2	8.2	7.7	7.4	7.5	9.2	8.9	9.1
25	9.3	9.1	9.2	8.4	8.2	8.3	7.6	7.4	7.5	9.2	9.1	9.1
26	9.3	8.8	9.2	8.5	8.3	8.4	7.6	7.0	7.2	9.4	9.1	9.3
27	9.4	9.1	9.3	8.6	8.4	8.5	8.3	7.2	7.7	9.5	9.3	9.4
28	9.4	8.8	9.2	8.6	8.3	8.5	8.3	8.1	8.2	9.6	9.4	9.5
29	9.6	8.8	9.1	8.6	8.4	8.5	8.3	7.9	8.1	9.8	9.5	9.7
30	9.8	8.9	9.2	8.6	8.5	8.5	8.1	7.9	8.0	9.9	9.7	9.8
31	---	---	---	8.5	8.4	8.5	8.0	7.8	7.9	---	---	---
MONTH	9.9	8.8	9.3	9.4	7.8	8.8	8.8	7.0	8.1	9.9	7.1	8.4

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04124500 EAST BRANCH PINE RIVER NEAR TUSTIN, MI

LOCATION.--Lat 44°06'09", long 85°31'02", in NE1/4 NW1/4 sec. 28, T.20 N., R.10 W., Osceola County, Hydrologic Unit 04060103, on left bank 75 ft downstream from bridge on Marion Road, 3.0 mi west of Tustin.

DRAINAGE AREA.--60.0 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1952 to September 1963, October 1963 to September 1991 (operated as a crest-stage partial-record station), October 1991 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,077.65 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	20	19	13	14	91	30	21	38	9.1	27	13
2	25	19	19	17	14	76	29	19	116	8.8	28	13
3	23	22	24	25	15	59	28	16	66	8.8	33	16
4	21	17	47	25	15	49	27	15	51	8.6	36	16
5	19	16	75	23	15	44	25	14	42	8.1	33	13
6	17	15	66	20	14	40	24	13	35	8.1	30	12
7	20	14	51	18	14	39	23	12	31	8.1	27	11
8	18	14	43	18	14	41	27	16	28	8.6	24	11
9	14	14	36	17	14	73	29	38	24	9.1	31	11
10	13	14	33	25	14	64	31	34	21	8.5	28	15
11	13	13	29	37	14	51	32	30	41	7.8	24	30
12	13	13	26	29	14	43	32	108	31	7.4	20	38
13	23	15	25	26	14	39	30	130	27	7.5	17	29
14	22	13	24	24	14	37	28	81	25	7.6	15	25
15	19	12	25	21	14	47	26	66	23	7.4	33	24
16	23	12	25	19	14	49	26	95	21	7.4	30	19
17	25	12	21	16	14	42	25	107	18	7.2	26	16
18	21	12	19	16	14	36	25	223	17	7.1	24	14
19	20	13	17	16	14	35	23	161	15	7.1	19	12
20	26	13	18	17	14	38	43	115	15	7.2	16	16
21	23	13	17	16	15	38	66	89	18	8.3	13	29
22	25	13	15	15	19	37	58	76	14	7.7	13	27
23	31	20	13	15	35	36	47	72	12	7.5	23	48
24	30	61	11	15	67	35	42	61	11	7.3	18	42
25	26	38	11	15	130	38	40	54	11	7.2	15	35
26	23	32	12	14	205	34	34	47	13	7.1	20	28
27	20	28	12	14	211	35	28	40	14	9.3	34	22
28	20	25	12	14	134	38	25	36	11	26	27	19
29	18	23	13	14	98	41	22	32	10	35	21	17
30	18	21	13	14	---	36	24	30	9.4	28	17	15
31	21	---	13	14	---	33	---	30	---	37	15	---
TOTAL	657	567	784	582	1197	1394	949	1881	808.4	339.9	737	636
MEAN	21.2	18.9	25.3	18.8	41.3	45.0	31.6	60.7	26.9	11.0	23.8	21.2
MAX	31	61	75	37	211	91	66	223	116	37	36	48
MIN	13	12	11	13	14	33	22	12	9.4	7.1	13	11
CFSM	.35	.31	.42	.31	.69	.75	.53	1.01	.45	.18	.40	.35
IN.	.41	.35	.49	.36	.74	.86	.59	1.17	.50	.21	.46	.39

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

MEAN	25.6	32.5	25.7	23.2	27.0	54.6	78.8	37.9	24.0	17.7	18.6	15.5
MAX	99.9	90.8	83.8	48.4	54.4	93.6	190	75.4	70.4	45.1	68.5	44.2
(WY)	1992	1993	1992	1997	1994	1992	1959	1960	1993	1994	1956	1993
MIN	9.54	12.3	12.4	10.1	9.39	18.7	31.6	10.7	8.90	7.22	6.29	6.82
(WY)	1956	1954	1956	1956	1963	1956	2000	1958	1959	1959	1957	1955

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR		FOR 2000 WATER YEAR		WATER YEARS 1952 - 2000	
ANNUAL TOTAL	10276.6		10532.3			
ANNUAL MEAN	28.2		28.8		31.7	
HIGHEST ANNUAL MEAN					54.5	
LOWEST ANNUAL MEAN					16.0	
HIGHEST DAILY MEAN	187		223		753	
LOWEST DAILY MEAN	7.5		7.1		5.3	
ANNUAL SEVEN-DAY MINIMUM	7.8		7.3		5.5	
INSTANTANEOUS PEAK FLOW			267		(a)1410	
INSTANTANEOUS PEAK STAGE			4.14		6.23	
INSTANTANEOUS LOW FLOW			6.6		(c)4.1	
ANNUAL RUNOFF (CFSM)	.47		.48		.53	
ANNUAL RUNOFF (INCHES)	6.37		6.53		7.18	
10 PERCENT EXCEEDS	55		49		66	
50 PERCENT EXCEEDS	21		21		19	
90 PERCENT EXCEEDS	11		11		8.5	

(a) From rating curve extended above 450 ft<sup>3</sup>/s.

(b) July 17, 18, 19, 26, 27.

(c) Result of freezeup.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 04125460 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°11'36", long 85°46'11", in NW1/4 NE1/4 sec.28, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 75 ft downstream from High School Bridge on S 5 1/2 Road, 2.5 mi west of Hoxeyville.

DRAINAGE AREA.--245 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1952 to September 1982, October 1996 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map. July 1952 to September 1982 water-stage recorder at site 3.5 mi downstream at different datum (station 04125500).

REMARKS.--Water-discharge records good. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	260	238	225	222	224	416	256	233	294	207	292	207
2	244	232	224	227	221	396	253	235	479	205	252	206
3	242	228	233	246	225	351	250	229	494	205	257	213
4	233	227	283	261	223	319	248	225	379	205	243	220
5	226	223	360	251	221	301	244	223	329	207	238	210
6	222	222	398	240	218	288	242	220	297	208	236	203
7	219	222	329	232	221	281	242	219	276	210	235	200
8	219	222	292	226	217	282	246	223	268	217	230	200
9	217	221	272	227	224	329	258	256	260	219	240	200
10	215	220	263	240	226	382	260	282	251	217	251	218
11	212	218	255	282	223	327	260	267	265	210	230	245
12	211	217	247	285	211	297	260	370	308	206	218	309
13	219	218	242	259	228	280	258	606	277	205	211	283
14	239	219	240	243	224	273	255	571	267	211	207	249
15	234	217	243	243	221	282	251	425	257	208	250	243
16	234	216	250	239	222	303	247	409	248	205	294	236
17	242	215	243	214	218	289	243	532	241	203	253	226
18	239	215	231	226	218	271	240	671	235	201	244	216
19	230	216	226	243	220	264	237	773	229	202	230	210
20	237	219	230	237	220	271	257	586	226	202	217	214
21	245	220	229	227	220	278	337	445	232	207	210	254
22	245	219	216	226	227	275	353	395	232	209	210	271
23	257	226	220	239	264	270	306	e375	222	205	234	293
24	271	285	223	229	361	266	278	358	218	202	236	347
25	256	323	226	231	505	272	264	333	215	200	218	289
26	243	271	225	220	613	277	254	314	218	199	212	260
27	235	253	219	233	692	270	244	295	245	205	242	242
28	230	242	221	231	638	274	237	282	229	270	242	234
29	229	235	220	229	483	280	233	274	218	350	226	226
30	228	229	223	231	---	278	228	266	214	318	219	221
31	233	---	223	225	---	265	---	269	---	316	212	---
TOTAL	7266	6928	7731	7364	8428	9207	7741	11161	8123	6834	7289	7145
MEAN	234	231	249	238	291	297	258	360	271	220	235	238
MAX	271	323	398	285	692	416	353	773	494	350	294	347
MIN	211	215	216	214	211	264	228	219	214	199	207	200
CFSM	.96	.94	1.02	.97	1.19	1.21	1.05	1.47	1.11	.90	.96	.97
IN.	1.10	1.05	1.17	1.12	1.28	1.40	1.18	1.69	1.23	1.04	1.11	1.08

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	262	276	273	256	266	347	432	314	275	247	242	246
MAX	373	339	408	350	361	629	670	436	391	427	393	504	
(WY)	1955	1976	1966	1973	1976	1976	1959	1960	1974	1969	1956	1975	
MIN	219	227	223	205	208	254	258	222	206	196	197	203	
(WY)	1964	1954	1964	1961	1959	1978	2000	1958	1964	1966	1998	1955	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1952 - 2000

ANNUAL TOTAL	92790												
ANNUAL MEAN	254												
HIGHEST ANNUAL MEAN										286			
LOWEST ANNUAL MEAN										356			1976
HIGHEST DAILY MEAN	800						773		May 19	1830			Aug 5 1956
LOWEST DAILY MEAN	196						199		Jul 26	170			Oct 3 1996
ANNUAL SEVEN-DAY MINIMUM	196						203		Jul 20	180			Jan 21 1961
INSTANTANEOUS PEAK FLOW							813		May 19	(a)2440			Aug 6 1956
INSTANTANEOUS PEAK STAGE							6.06		May 19	(b)6.85			Apr 1 1998
INSTANTANEOUS LOW FLOW							188		Feb 12	161			Feb 2 1961
ANNUAL RUNOFF (CFSM)	1.04						1.06			1.17			
ANNUAL RUNOFF (INCHES)	14.09						14.46			15.87			
10 PERCENT EXCEEDS	325						328			386			
50 PERCENT EXCEEDS	233						236			252			
90 PERCENT EXCEEDS	210						211			214			

(a) From rating curve extended above 1,000 ft<sup>3</sup>/s; gage height 6.82 ft, site and datum then in use.

(b) Present site and datum.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: December 1996 to current year.

DISSOLVED OXYGEN: December 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum recorded, 21.0°C, July 25, 1999, but may have been higher during instrument malfunction July 23, 24, 1999; minimum, -0.5°C, on several days during winter periods.

DISSOLVED OXYGEN: Maximum, 15.6 mg/L, Mar. 23, 1999; minimum, 6.9 mg/L, July 6, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 18.5°C, June 10; minimum, 0.0°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum, 13.5 mg/L, Dec. 23; minimum, 6.9 mg/L, July 6.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	10.0	9.0	9.5	9.5	8.0	8.5	4.0	3.0	3.5	3.0	2.5	3.0
2	9.5	8.5	9.0	9.0	7.0	8.0	5.0	4.0	4.5	4.0	3.0	4.0
3	8.5	7.5	8.0	7.0	5.5	6.0	6.5	5.0	6.0	4.0	3.0	3.5
4	8.0	6.5	7.5	5.5	4.5	5.0	7.5	6.5	7.0	3.0	2.0	2.5
5	8.0	7.0	7.5	7.0	5.5	6.0	7.5	5.5	6.5	2.5	2.0	2.0
6	8.0	7.5	7.5	6.5	5.5	6.0	5.5	4.5	5.0	3.0	2.0	2.5
7	7.5	6.5	7.0	5.5	4.5	5.0	4.5	4.5	4.5	2.5	1.5	2.5
8	9.0	7.0	8.0	6.0	4.5	5.5	4.5	4.0	4.5	2.0	1.0	1.5
9	11.0	9.0	10.0	8.0	6.0	7.0	5.0	4.0	4.5	4.0	2.0	3.0
10	11.5	10.0	10.5	9.0	8.0	8.5	5.0	4.5	5.0	4.5	4.0	4.0
11	10.5	9.0	9.5	8.5	6.5	7.0	4.5	3.5	4.0	4.0	3.0	4.0
12	9.5	8.5	9.0	7.0	6.0	6.5	4.5	3.5	4.0	3.0	1.5	2.5
13	9.5	8.5	9.5	8.0	7.0	7.5	4.5	4.0	4.5	1.5	.5	1.0
14	8.5	7.5	8.0	7.5	6.5	7.0	4.0	3.5	4.0	1.5	.5	1.0
15	9.0	7.5	8.0	6.5	5.5	6.0	4.0	3.5	4.0	2.5	1.5	2.0
16	9.5	9.0	9.5	5.5	4.5	5.5	---	---	---	2.5	1.0	2.0
17	9.5	8.0	9.0	4.5	4.0	4.5	---	---	---	1.0	.0	.0
18	8.0	7.5	7.5	5.0	4.0	4.5	---	---	---	.5	.0	.0
19	8.0	7.0	7.5	6.5	5.0	5.5	---	---	---	1.0	.5	1.0
20	7.5	7.0	7.5	7.0	6.5	6.5	---	---	---	1.0	.5	.5
21	8.0	6.0	7.0	7.0	7.0	7.0	---	---	---	.5	.0	.0
22	8.0	7.5	7.5	8.0	7.0	7.5	---	---	---	.5	.0	.0
23	7.5	6.5	7.0	8.5	7.0	7.5	.5	.0	.0	.5	.0	.5
24	7.0	6.0	6.5	8.5	6.5	7.5	.0	.0	.0	1.0	.0	.0
25	7.0	5.5	6.0	6.5	5.0	5.5	1.0	.0	.5	1.0	.5	.5
26	6.5	6.0	6.5	5.0	4.5	5.0	1.0	1.0	1.0	.5	.0	.0
27	6.5	5.5	6.0	5.5	5.0	5.0	1.5	1.0	1.5	.0	.0	.0
28	7.5	6.5	7.0	5.0	4.5	4.5	1.5	.5	1.0	1.0	.0	.5
29	8.5	7.0	8.0	4.5	4.0	4.0	2.5	1.0	1.5	1.0	.0	.0
30	10.0	8.5	9.0	4.0	3.5	3.5	3.0	2.5	2.5	1.5	.5	1.0
31	10.0	9.5	10.0	---	---	---	3.0	2.0	2.5	2.0	1.5	1.5
MONTH	11.5	5.5	8.1	9.5	3.5	6.1	---	---	---	4.5	.0	1.5

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	2.5	2.0	2.0	5.0	4.5	4.5	7.5	6.5	7.0	12.5	11.0	12.0	
2	2.0	1.0	1.5	4.5	3.5	4.0	9.5	7.0	8.5	13.0	10.0	11.5	
3	2.5	1.5	2.0	4.0	2.5	3.5	9.0	7.5	8.5	13.0	10.5	12.0	
4	3.0	2.5	2.5	5.0	3.0	4.0	8.5	6.0	7.0	14.0	12.0	12.0	
5	2.5	1.0	1.5	5.5	4.0	5.0	6.5	4.5	5.5	16.0	13.0	14.5	
6	1.5	.5	1.0	7.0	4.5	5.5	7.0	6.0	6.5	17.0	14.0	15.5	
7	2.5	1.5	2.0	8.5	6.0	7.5	6.5	4.5	5.5	17.5	15.5	16.5	
8	2.0	.0	1.0	10.0	8.0	9.0	6.5	4.0	5.0	16.5	15.0	16.0	
9	3.0	1.5	2.5	10.0	6.5	8.5	5.5	4.5	5.0	16.0	13.5	14.5	
10	3.0	2.5	2.5	6.5	4.5	5.5	6.5	3.5	5.0	14.5	12.0	12.0	
11	2.5	1.5	2.5	4.5	3.5	4.0	6.0	5.0	5.5	13.5	11.5	12.0	
12	1.5	.0	.5	4.0	3.0	3.5	6.5	4.5	5.5	13.0	11.5	12.0	
13	1.5	.5	1.0	4.0	3.5	3.5	6.5	5.5	6.0	13.0	12.0	12.5	
14	2.0	1.0	1.5	6.0	3.5	4.5	10.0	6.0	7.5	12.0	10.5	11.5	
15	3.0	2.0	2.5	6.5	5.5	6.0	10.0	9.0	9.5	11.5	9.0	10.5	
16	3.5	2.5	3.0	6.0	4.5	5.0	9.5	7.0	8.0	11.0	10.0	10.5	
17	2.5	1.0	1.5	5.0	3.5	4.0	8.0	6.5	7.0	12.0	10.0	11.0	
18	2.0	1.5	2.0	5.0	3.0	4.0	8.5	7.5	8.0	12.5	12.0	12.0	
19	2.5	1.0	2.0	5.0	4.5	5.0	8.5	8.0	8.5	13.0	11.5	12.0	
20	3.0	2.0	2.5	6.0	5.0	5.5	8.5	7.5	8.0	13.0	10.5	12.0	
21	3.5	1.5	2.5	7.5	6.0	6.5	8.5	7.0	7.5	13.0	11.0	12.0	
22	5.5	3.5	4.5	8.0	7.0	7.5	9.5	6.5	8.0	13.0	12.0	12.5	
23	5.5	5.0	5.5	9.5	7.0	8.0	10.0	8.0	9.0	---	---	---	
24	5.0	3.5	4.0	10.0	8.0	9.0	11.5	8.0	9.5	13.5	12.5	13.0	
25	3.5	3.0	3.5	10.5	9.0	9.5	11.5	8.5	10.0	13.5	11.5	12.5	
26	4.0	3.0	3.5	9.5	8.0	9.0	12.0	8.5	10.5	13.5	11.5	12.5	
27	4.0	2.5	3.5	9.0	8.0	8.5	12.5	9.0	11.0	13.0	12.0	12.5	
28	3.0	2.0	2.5	8.0	7.0	7.5	13.0	9.5	11.5	13.5	11.5	12.5	
29	4.5	2.5	3.5	7.0	5.5	6.5	13.0	10.0	11.5	14.0	11.5	13.0	
30	---	---	---	7.5	4.5	6.0	13.0	10.0	11.5	13.5	12.0	12.5	
31	---	---	---	8.0	5.0	6.5	---	---	---	13.5	12.5	13.0	
MONTH	5.5	.0	2.4	10.5	2.5	6.0	13.0	3.5	7.9	---	---	---	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	14.0	12.5	13.0	16.0	13.5	14.5	17.0	15.5	16.0	17.0	15.5	16.0
2	14.0	13.0	14.0	16.5	14.5	15.5	16.5	15.0	15.5	16.5	15.5	16.0
3	14.5	12.5	13.5	16.0	15.0	15.5	16.0	13.5	15.0	16.5	15.0	16.0
4	14.0	13.0	13.5	16.5	14.5	15.5	15.5	13.5	14.5	16.0	14.5	15.0
5	14.5	13.0	13.5	17.5	14.5	16.0	14.5	13.0	14.0	14.5	12.5	13.5
6	14.5	11.5	13.0	17.0	15.0	16.0	15.5	14.0	14.5	13.0	11.5	12.5
7	14.5	12.5	13.5	15.5	13.5	14.5	17.0	14.5	15.5	14.0	11.5	12.5
8	16.5	13.0	15.0	15.0	13.5	14.0	16.5	15.0	15.5	15.0	13.5	14.0
9	18.0	15.0	16.5	15.5	13.0	14.0	16.0	14.5	15.5	15.5	13.5	14.5
10	18.5	16.0	17.0	17.0	14.5	15.5	16.5	14.5	15.5	16.0	14.5	15.0
11	18.0	16.0	16.5	18.0	15.0	16.5	16.5	14.5	15.5	15.5	14.5	15.0
12	16.0	14.5	15.0	17.0	15.0	16.0	16.5	14.0	15.5	15.5	14.5	15.0
13	14.5	13.5	14.0	17.0	14.5	15.5	16.0	14.5	15.5	14.5	13.0	14.0
14	16.0	13.5	14.5	18.0	15.0	16.5	16.5	14.5	15.5	14.0	13.0	13.5
15	16.0	15.0	15.5	17.0	15.0	16.0	---	---	---	13.0	11.5	12.0
16	15.5	14.5	15.0	16.5	14.5	15.5	16.5	15.0	16.0	11.5	10.0	11.0
17	15.5	13.5	14.5	17.5	15.0	16.0	15.5	14.0	14.5	12.0	10.0	11.0
18	15.0	13.0	14.0	16.5	14.0	15.0	14.5	13.5	14.0	12.5	11.0	12.0
19	16.5	13.5	15.0	15.5	13.0	14.0	14.0	12.5	13.5	14.0	12.0	13.0
20	15.5	14.0	14.5	14.5	12.0	13.0	14.0	12.0	13.0	13.5	12.0	13.0
21	17.0	14.0	15.5	14.0	12.5	13.0	14.0	12.0	13.0	12.0	11.0	11.5
22	17.0	15.0	16.0	13.5	12.0	12.5	14.0	13.0	13.5	11.0	10.0	10.0
23	16.0	14.5	15.5	13.5	11.5	12.5	15.0	13.5	14.0	10.5	10.0	10.0
24	16.0	15.0	15.5	14.5	12.0	13.0	15.5	13.5	14.5	10.5	9.5	10.0
25	17.5	14.5	16.0	15.0	13.0	14.0	15.0	13.5	14.5	10.0	9.0	9.5
26	16.5	15.5	16.0	16.0	13.5	15.0	14.5	14.0	14.0	10.0	8.5	9.0
27	16.0	14.0	15.0	15.5	14.5	15.0	15.0	13.5	14.0	9.5	9.0	9.5
28	15.5	13.0	14.0	14.5	14.0	14.0	16.0	14.0	15.0	9.0	7.5	8.5
29	15.0	12.5	13.5	16.0	14.0	15.0	15.5	14.5	15.0	10.0	8.0	9.0
30	14.5	12.5	13.5	16.0	15.0	15.5	15.5	13.5	14.5	11.5	9.5	10.5
31	---	---	---	16.5	14.5	15.5	17.0	14.5	15.5	---	---	---
MONTH	18.5	11.5	14.7	18.0	11.5	14.8	---	---	---	17.0	7.5	12.4

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	10.8	9.7	10.2	10.1	8.7	9.2	12.3	11.4	11.9	12.5	11.4	12.0
2	10.5	10.1	10.4	9.7	8.5	9.0	11.5	10.9	11.3	12.0	10.8	11.5
3	11.2	10.4	10.9	10.0	8.8	9.4	10.9	10.5	10.7	12.2	11.6	11.9
4	11.4	10.2	10.9	10.3	9.4	9.7	10.5	10.3	10.4	12.5	11.8	12.2
5	10.2	9.1	9.8	10.2	9.3	9.6	10.9	10.4	10.6	12.9	12.4	12.6
6	10.4	9.1	9.9	10.3	9.2	9.6	11.4	10.9	11.2	12.4	11.8	12.2
7	10.5	9.4	10.1	10.7	9.3	9.9	11.7	11.4	11.5	12.3	11.8	12.0
8	9.6	8.5	9.2	10.5	9.4	9.8	11.8	11.5	11.6	12.2	11.5	12.0
9	9.0	8.1	8.6	9.4	8.2	9.0	11.7	11.5	11.6	11.7	11.0	11.4
10	8.8	7.9	8.3	8.7	7.8	8.2	11.7	11.4	11.5	11.0	10.7	10.8
11	9.1	8.1	8.6	9.5	7.9	8.6	12.2	11.7	12.0	11.3	10.8	11.0
12	9.2	8.4	8.7	9.0	8.5	8.7	12.3	11.8	12.0	11.9	11.3	11.6
13	8.7	8.1	8.4	9.3	8.3	8.6	12.1	11.7	11.9	12.4	11.9	12.1
14	9.7	8.7	9.1	9.7	8.2	8.8	12.1	11.8	11.9	12.5	12.0	12.3
15	9.7	8.6	9.1	9.9	8.6	9.2	11.9	11.7	11.8	12.0	11.5	11.8
16	8.6	8.2	8.4	9.7	8.8	9.2	---	---	---	12.0	11.4	11.7
17	9.5	8.2	9.0	10.7	9.2	10.0	---	---	---	12.4	11.9	12.1
18	9.9	9.1	9.5	10.3	9.3	9.8	---	---	---	12.1	11.9	12.0
19	10.0	8.9	9.6	9.4	8.7	9.1	---	---	---	12.0	11.7	11.9
20	10.1	9.2	9.7	9.1	8.5	8.8	---	---	---	12.1	11.6	11.8
21	10.3	9.5	9.9	9.1	8.6	8.8	---	---	---	12.2	11.8	12.0
22	9.9	9.2	9.6	10.1	8.3	9.0	---	---	---	12.0	10.0	11.2
23	10.4	9.6	10.0	10.5	8.6	9.8	13.5	12.6	13.3	11.9	11.7	11.8
24	10.8	10.0	10.4	10.9	9.4	10.1	13.2	9.2	11.7	12.1	11.8	11.9
25	11.2	10.1	10.6	11.4	10.4	11.0	13.4	12.4	13.1	11.9	11.6	11.8
26	10.8	10.1	10.4	11.9	11.1	11.5	13.0	12.0	12.7	12.1	11.5	11.8
27	11.1	10.4	10.7	11.9	11.1	11.4	12.9	11.6	12.3	12.0	10.9	11.5
28	10.8	10.1	10.4	12.1	11.4	11.7	12.7	11.4	12.3	12.2	11.8	12.0
29	11.0	9.8	10.3	12.5	11.8	12.1	12.6	11.6	12.2	12.1	10.4	11.5
30	10.7	8.9	9.7	12.6	11.7	12.2	12.5	11.3	12.0	11.8	11.3	11.6
31	9.5	8.4	8.9	---	---	---	12.5	11.5	12.1	11.3	11.1	11.2
MONTH	11.4	7.9	9.7	12.6	7.8	9.7	---	---	---	12.9	10.0	11.8

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	11.3	11.1	11.2	10.7	10.4	10.5	10.9	10.3	10.6	10.0	9.2	9.5
2	11.7	11.0	11.4	11.1	10.6	10.9	10.5	9.9	10.2	10.4	9.3	9.8
3	11.1	10.8	10.9	11.4	10.9	11.2	10.5	9.9	10.2	10.4	9.2	9.8
4	11.3	10.9	11.0	11.3	10.8	11.0	11.0	9.9	10.5	10.0	8.9	9.4
5	11.6	11.1	11.3	11.0	10.4	10.8	11.4	10.1	10.9	9.3	8.0	8.7
6	11.8	11.1	11.5	11.0	10.3	10.7	10.4	10.0	10.2	9.1	7.7	8.3
7	11.2	11.0	11.1	10.6	9.9	10.3	10.4	9.7	10.2	8.7	7.5	8.0
8	11.7	10.9	11.4	10.4	8.3	9.9	10.9	10.0	10.5	8.5	7.5	8.0
9	11.1	10.7	10.9	10.6	9.6	9.9	10.8	10.2	10.5	8.9	7.7	8.3
10	10.9	10.6	10.8	11.4	10.6	11.1	11.1	10.3	10.7	9.2	8.3	8.7
11	11.3	10.7	11.0	11.8	11.4	11.6	10.9	10.3	10.6	9.3	8.4	8.9
12	11.7	10.0	11.2	12.0	11.5	11.7	11.0	10.5	10.7	9.1	8.7	8.9
13	11.5	11.1	11.3	11.7	11.4	11.6	10.9	10.4	10.6	9.0	8.7	8.9
14	11.2	10.2	10.9	11.5	10.7	11.3	10.6	9.5	10.2	9.6	9.0	9.4
15	10.9	9.9	10.5	10.9	10.6	10.7	10.0	9.4	9.7	10.2	9.3	9.8
16	10.8	9.8	10.3	11.2	10.6	11.0	10.4	9.5	10.0	9.9	9.3	9.6
17	11.5	10.4	10.9	11.9	11.1	11.6	10.9	10.2	10.5	9.9	9.3	9.7
18	11.3	10.8	11.2	12.0	11.3	11.6	10.8	10.1	10.4	9.5	9.2	9.4
19	11.5	11.1	11.3	11.4	11.1	11.3	10.6	9.9	10.2	9.5	9.1	9.3
20	11.3	11.0	11.2	11.3	11.1	11.2	10.3	10.0	10.1	9.7	9.1	9.4
21	11.6	10.9	11.3	11.2	10.7	11.0	10.8	10.1	10.5	9.6	9.0	9.3
22	11.1	10.6	10.9	11.0	10.6	10.8	10.9	10.2	10.6	9.3	8.9	9.1
23	11.0	10.6	10.8	11.0	10.2	10.7	10.4	9.9	10.2	---	---	---
24	11.5	10.8	11.2	10.6	10.0	10.3	10.5	9.8	10.2	9.1	8.7	8.9
25	11.6	11.5	11.5	10.6	9.9	10.2	10.6	9.8	10.2	9.5	8.9	9.2
26	11.8	11.4	11.6	10.8	9.9	10.3	10.7	9.6	10.2	9.7	8.8	9.2
27	11.6	11.3	11.4	10.4	9.9	10.1	10.4	9.4	9.9	9.4	8.6	9.0
28	11.8	11.4	11.7	10.6	10.1	10.4	10.3	9.3	9.8	9.5	8.8	9.1
29	11.6	10.5	11.1	11.5	10.5	11.0	10.3	9.3	9.7	9.7	8.8	9.2
30	---	---	---	11.7	10.9	11.3	10.4	9.2	9.8	9.3	8.7	9.0
31	---	---	---	11.3	10.5	11.0	---	---	---	9.5	8.7	9.1
MONTH	11.8	9.8	11.1	12.0	8.3	10.9	11.4	9.2	10.3	---	---	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST			SEPTEMBER	
1	9.4	8.8	9.1	9.5	7.9	8.6	9.2	8.2	8.5	9.7	8.1	8.8
2	9.2	8.9	9.1	9.1	7.7	8.3	8.8	8.1	8.6	9.2	8.0	8.4
3	9.4	8.9	9.2	8.8	7.4	8.0	9.5	8.4	8.9	9.7	8.0	8.8
4	9.3	8.8	9.1	9.0	7.5	8.2	9.6	8.4	9.0	9.4	8.3	8.8
5	9.3	8.5	8.9	8.6	7.1	7.8	9.6	8.6	9.1	9.9	8.5	9.2
6	9.3	8.4	8.9	8.3	6.9	7.6	9.2	8.4	8.8	10.1	8.9	9.4
7	9.2	8.3	8.7	8.7	7.3	8.0	9.2	8.2	8.6	11.0	8.9	9.9
8	9.0	7.8	8.6	8.6	7.1	7.8	8.8	7.9	8.3	10.8	9.2	9.9
9	8.7	7.6	8.0	9.1	7.7	8.3	9.0	8.1	8.5	10.7	9.1	9.8
10	8.7	7.6	8.0	9.5	7.5	8.4	8.6	7.8	8.3	9.7	9.0	9.4
11	8.3	7.2	7.9	9.0	7.3	8.0	8.8	7.7	8.2	9.3	8.2	8.9
12	8.5	8.1	8.3	8.9	7.3	8.0	8.8	7.8	8.2	9.6	8.5	9.1
13	8.7	8.0	8.4	9.1	7.5	8.3	8.7	7.4	8.0	10.1	8.9	9.4
14	8.7	7.6	8.2	9.3	7.7	8.4	9.0	7.3	8.0	10.1	9.1	9.6
15	8.4	7.4	7.9	9.1	7.7	8.4	---	---	---	10.4	9.3	9.7
16	8.7	7.7	8.2	9.3	8.0	8.6	9.4	8.7	9.0	10.9	9.6	10.2
17	9.2	8.1	8.6	9.4	8.0	8.6	9.6	8.7	9.3	10.9	9.5	10.2
18	9.2	8.1	8.6	9.6	8.0	8.7	10.2	9.1	9.7	11.5	9.2	9.9
19	9.2	7.8	8.4	9.9	8.5	9.2	10.3	9.4	9.7	10.2	8.7	9.3
20	8.7	7.6	8.2	10.2	8.5	9.3	10.2	9.1	9.8	9.6	8.5	8.9
21	9.2	7.8	8.5	9.9	8.8	9.3	10.5	9.0	9.7	10.5	8.9	9.8
22	9.1	7.5	8.2	10.3	9.0	9.5	9.9	9.1	9.4	10.9	9.7	10.3
23	9.1	7.6	8.2	10.6	9.1	9.7	9.8	8.8	9.3	10.3	9.8	10.0
24	8.8	7.5	8.2	10.2	8.8	9.5	10.1	8.8	9.2	10.7	9.9	10.3
25	9.4	7.7	8.4	10.2	8.7	9.3	10.1	8.9	9.4	11.2	9.9	10.6
26	9.0	7.7	8.3	10.0	8.4	9.1	9.6	8.7	9.1	11.1	10.2	10.7
27	9.6	8.1	8.7	9.3	8.3	8.8	9.3	8.3	8.8	10.9	10.0	10.5
28	9.2	7.8	8.5	9.3	8.7	8.9	9.3	8.2	8.7	11.8	10.5	11.1
29	9.7	8.2	8.7	8.9	8.3	8.7	9.0	8.1	8.6	11.4	10.1	10.8
30	9.5	8.1	8.7	8.6	8.2	8.4	9.6	8.4	9.0	11.0	9.6	10.2
31	---	---	---	9.0	8.3	8.6	9.8	8.3	8.9	---	---	---
MONTH	9.7	7.2	8.5	10.6	6.9	8.6	---	---	---	11.8	8.0	9.7

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI

LOCATION.--Lat 44°15'34", long 85°56'30", in NE1/4 SE1/4 sec.36, T.22 N., R.14 W., Manistee County, Hydrologic Unit 04060103, or right bank 700 ft downstream from Tippy Dam, at public access site, 3.2 mi north of Wellston, and 5.0 mi southeast of Brethren.

DRAINAGE AREA.--1,451 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 640 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good. Flow completely regulated by Tippy Dam 700 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1430	1500	1480	1550	1380	2400	1580	1350	1590	1350	1420	1220
2	1510	1490	1440	1570	1340	2310	1490	1380	2280	1390	1380	1220
3	1460	1490	1420	1550	1490	1980	1480	1380	1990	1550	1400	1270
4	1380	1470	1570	1670	1490	1730	1520	1380	2040	1430	1360	1260
5	1370	1420	1710	1520	1420	1690	1520	1380	1850	1360	1310	1240
6	1290	1390	2070	1430	1370	1650	1520	1360	1560	1270	1330	1240
7	1320	1380	2110	1480	1370	1620	1520	1340	1510	1300	1340	1240
8	1350	1370	2040	1410	1370	1630	1520	e1350	1500	1420	1310	1230
9	1220	1340	1820	1480	1430	1860	1520	e1480	1500	1410	1350	1230
10	1250	1360	1760	1540	1420	2060	1530	1420	1480	1300	1310	1400
11	1360	1360	1560	1560	1460	1830	1550	1460	1580	1260	1320	1610
12	1290	1410	1510	1600	1400	1630	1550	1830	1660	1270	1360	e1430
13	1310	1440	1510	1550	1350	1590	1540	1750	1640	1300	1290	1330
14	1460	1320	1490	1440	1370	1380	1500	2130	1630	1370	1230	1560
15	1440	1350	1540	1500	1400	1280	1510	1820	1540	1330	1460	1530
16	1490	1350	1560	1480	1470	1370	1520	2130	1500	1290	1320	1360
17	1410	1270	1560	1270	1430	1340	1480	2290	1500	1250	1290	1270
18	1360	1340	1530	1150	1330	1360	1390	2780	1480	1220	1250	1270
19	1380	1410	1410	1170	1310	1340	1410	2980	1460	1260	1220	1270
20	1360	1410	1490	1350	1380	1320	1590	2110	1490	1240	1270	1400
21	1350	1360	1670	1430	1430	1360	1640	2070	1470	1250	1210	1380
22	1380	1300	1560	1200	1430	1300	1570	1850	1360	1270	1220	1410
23	1530	1450	1360	1210	1530	1300	1570	1900	1360	1290	1270	1460
24	1530	1620	1400	1210	1670	1510	1590	1750	1360	1290	1280	1430
25	1510	1580	1320	1250	2130	1540	1560	1590	1380	1260	1280	1390
26	1520	1570	1210	1400	2540	1520	1490	1620	1380	1250	e1300	1350
27	1520	1530	1340	1350	2840	1650	1440	1630	1370	1320	e1400	1320
28	1530	1450	1580	1290	2750	1620	1410	1560	1510	1430	e1300	1290
29	1530	1460	1490	1290	2390	1550	1380	1490	1400	1550	1290	1290
30	1450	1480	1380	1440	---	1580	1360	1510	1290	1530	1320	1260
31	1460	---	1430	1580	---	1580	---	1550	---	1550	1260	---
TOTAL	43750	42660	48320	43920	46690	49880	45250	53620	46660	41560	40650	40160
MEAN	1411	1422	1559	1417	1610	1609	1508	1730	1555	1341	1311	1339
MAX	1530	1620	2110	1670	2840	2400	1640	2980	2280	1550	1460	1610
MIN	1220	1270	1210	1150	1150	1280	1360	1340	1290	1220	1210	1220
CFSM	.97	.98	1.07	.98	1.11	1.11	1.04	1.19	1.07	.92	.90	.92
IN.	1.12	1.09	1.24	1.13	1.20	1.28	1.16	1.37	1.20	1.07	1.04	1.03

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1997 - 2000, BY WATER YEAR (WY)

MEAN	1518	1565	1582	1599	1700	1787	2037	1757	1523	1432	1357	1338
MAX	1579	1691	1722	1823	1856	1999	2512	2150	1555	1675	1453	1409
(WY)	1997	1997	1997	1997	1997	1997	1997	1997	2000	1999	1997	1997
MIN	1411	1422	1521	1417	1597	1609	1508	1504	1487	1341	1288	1268
(WY)	2000	2000	1998	2000	1998	2000	2000	1999	1998	2000	1998	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1997 - 2000

ANNUAL TOTAL	564310	543120	
ANNUAL MEAN	1546	1484	1599
HIGHEST ANNUAL MEAN			1758
LOWEST ANNUAL MEAN			1484
HIGHEST DAILY MEAN	2600	2980	4240
LOWEST DAILY MEAN	1090	1150	1090
ANNUAL SEVEN-DAY MINIMUM	1190	1240	1190
INSTANTANEOUS PEAK FLOW		3480	6130
INSTANTANEOUS PEAK STAGE		9.72	10.91
INSTANTANEOUS LOW FLOW		686	83
ANNUAL RUNOFF (CFSM)	1.07	1.02	1.10
ANNUAL RUNOFF (INCHES)	14.47	13.92	14.97
10 PERCENT EXCEEDS	1890	1680	2010
50 PERCENT EXCEEDS	1510	1430	1530
90 PERCENT EXCEEDS	1270	1270	1290

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to current year.

DISSOLVED OXYGEN: October 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 23.5°C, July 30, 1999; minimum, 0.0°C, on several days during winter periods.

DISSOLVED OXYGEN: Maximum, 16.0 mg/L, Mar. 11, 12, 1997; minimum, 6.4 mg/L, June 23, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 21.5°C, July 11, 12, 16, 17; minimum, 0.0°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum, 12.7 mg/L, Dec. 27; minimum, 6.4 mg/L, June 23.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	14.5	14.5	14.5	9.5	9.0	9.0	5.5	5.5	5.5	1.0	1.0	1.0
2	14.5	14.0	14.0	9.0	8.5	9.0	5.5	5.5	5.5	1.0	1.0	1.0
3	14.0	13.5	13.5	8.5	8.0	8.5	5.5	5.0	5.5	1.0	1.0	1.0
4	13.5	13.0	13.5	8.5	8.0	8.0	5.5	5.0	5.0	1.5	1.0	1.0
5	13.0	13.0	13.0	8.5	8.0	8.5	5.5	5.0	5.0	1.5	1.0	1.0
6	13.0	12.5	13.0	8.5	8.0	8.0	5.0	5.0	5.0	1.0	1.0	1.0
7	12.5	12.0	12.5	8.0	8.0	8.0	5.0	4.5	5.0	1.0	1.0	1.0
8	12.0	12.0	12.0	8.0	7.5	7.5	5.0	4.5	4.5	1.0	1.0	1.0
9	12.5	12.0	12.0	7.5	7.5	7.5	4.5	4.5	4.5	1.0	1.0	1.0
10	12.5	12.0	12.0	8.5	7.5	8.0	4.5	4.5	4.5	1.0	1.0	1.0
11	12.5	12.0	12.0	7.5	7.5	7.5	4.5	4.5	4.5	1.0	1.0	1.0
12	12.5	12.0	12.0	7.5	7.5	7.5	4.5	4.0	4.5	1.5	1.0	1.0
13	12.5	11.5	12.0	7.5	7.5	7.5	4.5	4.0	4.0	1.0	1.0	1.0
14	11.5	11.5	11.5	7.5	7.0	7.5	4.0	4.0	4.0	1.0	1.0	1.0
15	12.0	11.5	11.5	7.0	7.0	7.0	4.0	4.0	4.0	1.0	1.0	1.0
16	12.0	11.5	11.5	7.0	7.0	7.0	4.0	3.5	3.5	1.0	.5	1.0
17	11.5	11.0	11.0	7.0	7.0	7.0	3.5	3.5	3.5	1.0	.5	.5
18	11.0	11.0	11.0	7.0	7.0	7.0	3.5	3.0	3.0	.5	.5	.5
19	11.0	10.5	10.5	7.0	7.0	7.0	3.0	2.5	2.5	1.0	.5	.5
20	10.5	10.5	10.5	7.0	7.0	7.0	3.0	2.5	2.5	1.0	.5	.5
21	10.5	10.0	10.5	7.0	6.5	6.5	2.5	2.0	2.0	1.0	.5	.5
22	10.5	10.0	10.0	6.5	6.5	6.5	2.0	2.0	2.0	.5	.5	.5
23	10.0	9.5	9.5	7.0	6.5	6.5	2.0	1.5	1.5	.5	.5	.5
24	9.5	9.5	9.5	6.5	6.5	6.5	1.5	1.5	1.5	.5	.5	.5
25	9.5	9.0	9.5	6.5	6.5	6.5	1.5	1.5	1.5	.5	.5	.5
26	9.5	9.0	9.0	6.5	6.5	6.5	1.5	1.5	1.5	.5	.0	.5
27	9.0	9.0	9.0	6.5	6.5	6.5	1.5	1.0	1.5	.5	.0	.5
28	9.5	9.0	9.0	6.5	6.0	6.5	1.0	1.0	1.0	.5	.0	.5
29	9.0	8.5	9.0	6.0	6.0	6.0	1.0	1.0	1.0	.5	.0	.5
30	9.0	8.5	9.0	6.0	5.5	6.0	1.0	1.0	1.0	.5	.0	.5
31	9.0	9.0	9.0	---	---	---	1.0	1.0	1.0	.5	.5	.5
MONTH	14.5	8.5	11.2	9.5	5.5	7.3	5.5	1.0	3.3	1.5	.0	.8

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	.5	.0	.5	2.5	2.0	2.5	7.0	7.0	7.0	11.5	11.0	11.5	
2	.5	.0	.5	2.5	2.0	2.0	7.5	7.0	7.5	12.0	11.0	11.5	
3	.5	.5	.5	2.5	2.0	2.0	8.0	7.0	7.5	12.5	11.0	12.0	
4	.5	.5	.5	2.5	2.0	2.5	7.0	7.0	7.0	13.5	12.0	12.5	
5	.5	.5	.5	3.0	2.5	2.5	7.5	7.0	7.0	14.0	13.0	13.0	
6	.5	.5	.5	3.0	2.5	3.0	7.5	7.0	7.0	15.0	13.0	14.0	
7	.5	.5	.5	3.5	3.0	3.5	7.0	7.0	7.0	15.0	14.0	14.5	
8	.5	.5	.5	5.0	3.5	4.0	7.5	7.0	7.0	---	---	---	
9	.5	.5	.5	5.0	4.5	5.0	7.0	7.0	7.0	---	---	---	
10	.5	.5	.5	5.0	5.0	5.0	7.0	6.5	7.0	15.5	14.0	14.5	
11	.5	.5	.5	5.5	5.0	5.0	7.0	6.5	6.5	16.0	15.0	15.5	
12	.5	.5	.5	5.0	4.5	4.5	6.5	6.5	6.5	16.0	14.0	14.5	
13	.5	.5	.5	4.5	4.5	4.5	6.5	6.5	6.5	14.5	12.5	13.5	
14	1.0	.5	.5	4.5	4.5	4.5	7.0	6.5	6.5	13.5	13.0	13.0	
15	.5	.5	.5	4.5	4.5	4.5	7.5	7.0	7.0	14.0	13.5	13.5	
16	.5	.5	.5	5.0	4.5	4.5	7.5	7.0	7.0	13.5	13.5	13.5	
17	.5	.5	.5	5.0	4.5	4.5	7.0	7.0	7.0	14.0	13.5	13.5	
18	.5	.5	.5	4.5	4.5	4.5	7.5	7.0	7.0	14.0	13.5	13.5	
19	1.0	.5	.5	4.5	4.5	4.5	7.5	7.5	7.5	14.0	13.5	13.5	
20	1.0	.5	.5	4.5	4.5	4.5	7.5	7.5	7.5	14.0	13.5	14.0	
21	1.0	.5	.5	5.0	4.5	5.0	7.5	7.5	7.5	14.0	13.5	14.0	
22	1.0	.5	.5	5.0	5.0	5.0	7.5	7.5	7.5	14.5	14.0	14.5	
23	1.0	.5	1.0	6.0	5.0	5.5	8.5	7.5	8.0	14.5	13.5	14.0	
24	1.0	1.0	1.0	6.5	5.5	6.0	9.5	8.0	9.0	14.5	13.5	14.0	
25	1.5	1.0	1.5	6.5	6.0	6.0	10.0	8.5	9.0	14.5	14.0	14.0	
26	2.0	1.5	2.0	6.5	6.5	6.5	9.0	8.5	9.0	15.5	14.5	15.0	
27	2.0	2.0	2.0	7.0	6.5	6.5	10.0	8.5	9.5	16.0	15.0	15.5	
28	2.5	2.0	2.0	7.0	7.0	7.0	10.5	9.0	9.5	16.0	15.0	15.5	
29	2.5	2.0	2.5	7.0	6.5	7.0	10.5	9.0	10.0	15.5	15.0	15.0	
30	---	---	---	7.0	6.5	7.0	11.5	10.0	11.0	16.0	15.0	15.5	
31	---	---	---	7.0	7.0	7.0	---	---	---	15.5	15.5	15.5	
MONTH	2.5	.0	.8	7.0	2.0	4.7	11.5	6.5	7.7	---	---	---	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.5	15.5	16.0	20.0	19.5	20.0	20.0	19.0	19.5	20.5	20.0	20.0
2	16.0	14.5	15.0	20.5	19.5	20.0	20.0	19.5	20.0	20.5	20.0	20.5
3	16.0	14.5	15.5	20.5	19.5	20.0	20.0	19.5	19.5	20.5	19.5	20.5
4	16.5	15.0	16.0	20.5	20.0	20.5	20.0	19.5	20.0	20.5	19.5	20.0
5	17.0	16.0	16.5	21.0	20.0	20.5	20.0	19.5	20.0	20.5	19.5	20.0
6	16.5	15.5	16.0	21.0	20.5	21.0	20.0	20.0	20.0	20.0	19.5	19.5
7	16.5	16.0	16.0	21.0	20.5	20.5	20.0	19.0	19.5	19.5	19.5	19.5
8	17.0	16.5	16.5	20.5	20.0	20.5	20.5	19.5	20.0	19.5	19.0	19.5
9	18.0	17.0	17.5	20.5	20.0	20.0	20.0	19.5	20.0	20.0	19.0	19.5
10	19.0	17.5	18.0	21.0	20.0	20.5	20.0	19.5	20.0	20.0	19.5	19.5
11	18.5	17.5	18.0	21.5	20.5	21.0	20.5	20.0	20.0	20.0	19.5	20.0
12	18.5	17.5	18.5	21.5	21.0	21.0	21.0	20.0	20.5	---	---	---
13	18.5	18.0	18.0	21.0	20.5	20.5	20.5	20.5	20.5	19.5	19.0	19.5
14	19.0	18.0	18.5	21.0	20.0	20.5	21.0	20.5	20.5	19.5	18.5	19.0
15	18.5	18.0	18.0	21.0	20.5	21.0	21.0	20.0	20.5	18.5	18.0	18.5
16	18.5	18.0	18.5	21.5	20.5	21.0	21.0	20.0	20.5	18.5	18.0	18.0
17	18.0	18.0	18.0	21.5	20.0	21.0	21.0	20.5	21.0	18.0	17.5	18.0
18	19.0	18.0	18.5	21.0	20.5	21.0	20.5	20.0	20.5	18.5	17.5	18.0
19	18.5	18.5	18.5	21.0	20.5	21.0	20.5	20.0	20.0	18.0	18.0	18.0
20	19.5	18.5	19.0	21.0	20.0	20.5	20.5	20.0	20.0	18.0	17.5	17.5
21	19.0	18.0	18.5	20.5	19.5	20.0	20.5	20.0	20.0	17.5	16.5	16.5
22	19.0	18.0	18.5	20.0	19.5	20.0	20.0	19.5	20.0	16.5	16.5	16.5
23	19.5	19.0	19.5	20.0	19.5	20.0	19.5	19.5	19.5	16.5	16.0	16.0
24	20.0	19.5	19.5	20.0	19.5	19.5	20.0	19.5	19.5	16.0	15.5	15.5
25	20.0	19.5	19.5	20.0	19.5	20.0	20.0	19.5	20.0	15.5	15.0	15.5
26	20.0	19.0	19.5	20.5	20.0	20.0	---	---	---	15.0	15.0	15.0
27	20.0	19.5	19.5	20.5	20.0	20.0	---	---	---	15.0	14.5	14.5
28	20.0	19.5	20.0	20.0	20.0	20.0	---	---	---	14.5	14.0	14.5
29	20.0	19.0	19.5	20.5	20.0	20.0	20.5	19.5	20.0	14.5	14.0	14.0
30	20.0	19.0	19.5	20.0	19.5	20.0	20.5	19.5	20.0	14.5	14.5	14.5
31	---	---	---	20.0	19.5	20.0	20.5	20.0	20.0	---	---	---
MONTH	20.0	14.5	18.0	21.5	19.5	20.4	---	---	---	---	---	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	9.2	8.7	9.0	10.3	10.1	10.2	11.5	11.3	11.4	12.2	12.0	12.1
2	8.9	8.5	8.7	10.5	10.1	10.2	11.4	11.2	11.3	12.1	11.9	12.0
3	9.0	8.4	8.8	10.4	10.0	10.2	11.4	11.2	11.3	12.0	11.7	11.9
4	9.0	8.5	8.7	10.4	10.1	10.2	11.5	11.3	11.4	11.9	11.7	11.8
5	9.1	8.3	8.6	10.4	10.1	10.3	11.5	11.3	11.4	11.8	11.4	11.6
6	8.9	8.2	8.4	10.5	10.1	10.3	11.6	11.4	11.5	11.4	11.3	11.4
7	8.9	8.3	8.6	10.6	10.2	10.4	11.6	11.5	11.5	11.4	11.3	11.3
8	9.1	8.4	8.8	10.7	10.3	10.5	11.6	11.4	11.5	11.4	11.2	11.3
9	9.3	8.5	8.8	10.7	10.3	10.5	11.6	11.4	11.5	11.4	11.1	11.3
10	9.0	8.4	8.6	10.6	10.2	10.4	11.6	11.4	11.5	11.3	11.1	11.2
11	9.1	8.5	8.8	10.7	10.3	10.5	11.6	11.5	11.5	11.2	11.0	11.1
12	9.3	8.9	9.0	10.8	10.2	10.4	11.6	11.4	11.5	11.1	11.0	11.1
13	9.4	8.7	9.0	10.9	10.0	10.4	11.7	11.5	11.6	11.3	11.1	11.2
14	9.4	8.6	9.0	10.8	10.0	10.3	11.6	11.5	11.6	11.3	11.2	11.2
15	9.4	8.6	9.0	10.8	9.9	10.2	11.6	11.4	11.5	11.4	11.2	11.2
16	9.4	8.4	8.9	10.7	9.8	10.3	11.6	11.4	11.5	11.5	11.2	11.4
17	9.0	8.5	8.7	10.7	9.7	10.1	11.6	11.5	11.6	11.5	11.3	11.4
18	9.3	8.6	8.9	10.8	9.8	10.2	11.9	11.6	11.7	11.5	11.2	11.3
19	9.4	8.6	9.1	10.8	10.0	10.3	12.0	11.8	11.9	11.4	11.2	11.3
20	9.1	8.6	8.9	10.8	10.1	10.4	12.2	11.7	11.9	11.4	11.2	11.3
21	9.2	8.7	9.0	10.8	10.2	10.5	12.3	12.1	12.2	11.5	11.3	11.4
22	9.4	8.7	9.1	10.7	10.3	10.5	12.4	12.1	12.3	11.5	11.3	11.4
23	9.9	9.2	9.5	11.0	10.4	10.7	12.3	12.2	12.3	11.4	11.3	11.4
24	9.9	9.4	9.7	11.5	10.7	11.1	12.4	12.2	12.3	11.5	11.3	11.4
25	10.2	9.5	9.8	11.5	11.0	11.3	12.4	12.1	12.3	11.5	11.4	11.5
26	10.1	9.6	9.9	11.3	11.0	11.2	12.2	12.1	12.2	11.6	11.4	11.5
27	10.1	9.5	9.9	11.4	11.0	11.2	12.7	12.1	12.2	11.6	11.5	11.5
28	10.4	9.8	10.0	11.7	11.4	11.5	12.3	12.1	12.2	11.5	11.3	11.4
29	10.2	9.9	10.1	11.7	11.4	11.5	12.2	12.1	12.2	11.5	11.3	11.4
30	10.2	10.0	10.1	11.7	11.5	11.6	12.3	12.1	12.2	11.4	11.2	11.3
31	10.4	10.0	10.2	---	---	---	12.2	12.1	12.1	11.3	11.2	11.2
MONTH	10.4	8.2	9.1	11.7	9.7	10.6	12.7	11.2	11.8	12.2	11.0	11.4

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	11.3	11.1	11.2	11.2	10.9	11.1	11.1	10.9	11.0	10.2	9.8	9.9	
2	11.1	11.0	11.1	11.3	11.2	11.3	11.1	10.9	11.0	9.8	9.3	9.6	
3	11.0	10.9	11.0	11.5	11.3	11.4	11.1	10.8	10.9	9.6	9.1	9.4	
4	11.0	10.8	10.9	11.5	11.3	11.5	11.0	10.5	10.9	9.9	8.9	9.2	
5	10.9	10.8	10.8	11.6	11.4	11.5	10.9	10.6	10.7	9.8	9.0	9.4	
6	10.9	10.6	10.8	11.6	11.5	11.5	10.8	10.4	10.6	9.6	9.0	9.3	
7	10.7	10.6	10.7	11.6	11.5	11.5	10.6	10.2	10.4	9.6	8.9	9.3	
8	10.8	10.5	10.6	11.8	11.4	11.6	10.6	10.3	10.5	---	---	---	
9	10.6	10.5	10.5	11.7	11.4	11.6	10.6	10.4	10.5	---	---	---	
10	10.6	10.5	10.6	11.6	11.4	11.5	10.8	10.4	10.6	9.7	9.3	9.6	
11	10.6	10.4	10.5	11.6	11.4	11.5	10.9	10.5	10.7	9.9	9.4	9.7	
12	10.7	10.4	10.5	11.6	11.4	11.6	11.0	10.6	10.8	9.6	.0	9.3	
13	10.4	10.2	10.3	11.7	11.3	11.6	11.1	10.8	10.9	9.3	9.1	9.2	
14	11.7	9.0	10.3	11.6	11.4	11.6	11.1	10.9	11.0	9.3	9.0	9.2	
15	10.5	10.1	10.2	11.5	11.2	11.4	11.0	10.7	10.9	9.4	9.2	9.3	
16	10.4	10.2	10.2	11.6	11.0	11.4	11.1	10.8	11.0	9.3	9.2	9.2	
17	10.4	10.3	10.4	11.7	11.2	11.6	11.1	10.7	10.9	9.9	9.1	9.2	
18	10.4	10.3	10.3	11.8	11.4	11.6	11.0	10.5	10.9	9.3	9.1	9.2	
19	10.5	10.3	10.4	11.6	11.3	11.5	11.0	10.5	10.8	9.2	9.1	9.2	
20	10.7	10.4	10.5	11.6	11.4	11.5	10.9	10.4	10.7	9.2	8.9	9.0	
21	10.8	10.6	10.7	11.6	11.4	11.5	10.9	10.5	10.7	9.0	8.8	9.0	
22	10.9	10.7	10.8	11.6	11.4	11.5	10.9	10.3	10.6	8.9	8.6	8.8	
23	11.1	10.8	10.9	11.7	11.4	11.5	10.9	10.5	10.6	8.9	8.6	8.7	
24	11.0	10.8	10.9	11.6	11.2	11.4	10.8	10.4	10.6	8.6	8.4	8.5	
25	10.8	10.5	10.7	11.4	11.1	11.3	10.7	10.2	10.5	8.6	8.4	8.5	
26	10.7	10.5	10.6	11.4	11.1	11.3	10.9	10.3	10.6	8.7	8.4	8.6	
27	10.9	10.4	10.6	11.2	11.0	11.1	10.8	10.5	10.7	8.7	8.3	8.6	
28	11.0	10.8	10.9	11.1	11.0	11.0	10.7	10.5	10.7	8.6	8.1	8.4	
29	11.0	11.0	11.0	11.2	10.9	11.1	10.7	10.5	10.6	8.2	7.4	7.8	
30	---	---	---	11.1	11.0	11.1	10.6	10.2	10.4	8.1	7.5	7.8	
31	---	---	---	11.1	11.0	11.0	---	---	---	8.2	7.6	7.9	
MONTH	11.7	9.0	10.7	11.8	10.9	11.4	11.1	10.2	10.7	---	---	---	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.0	7.7	7.8	7.5	7.3	7.4	8.6	8.1	8.3	8.2	7.4	7.7
2	8.0	7.4	7.6	7.4	7.2	7.3	8.6	7.8	8.2	8.0	7.6	7.8
3	7.9	7.4	7.7	7.6	7.2	7.4	8.9	6.8	8.2	8.1	7.6	7.9
4	7.7	7.4	7.5	7.7	7.4	7.6	9.0	7.8	8.2	8.3	7.8	8.0
5	7.9	7.4	7.7	7.8	7.4	7.6	9.2	7.5	8.2	8.5	7.9	8.3
6	7.7	7.2	7.4	7.7	7.4	7.5	8.4	7.5	8.0	8.8	8.1	8.4
7	8.1	7.2	7.7	7.8	7.3	7.5	9.1	7.5	8.0	8.4	7.9	8.2
8	8.3	7.5	7.8	7.6	7.3	7.4	8.1	7.4	7.7	8.2	7.9	8.0
9	8.2	7.3	7.9	7.7	7.2	7.4	8.4	7.6	7.9	8.2	7.6	8.0
10	8.2	7.7	7.9	7.6	7.0	7.3	9.3	7.6	8.0	8.0	7.6	7.8
11	8.2	7.8	8.0	7.8	7.1	7.4	9.3	7.6	8.1	7.9	7.7	7.8
12	8.0	7.6	7.8	8.0	7.0	7.4	9.6	7.8	8.3	—	—	—
13	7.8	7.3	7.6	8.1	7.1	7.5	8.5	7.9	8.1	8.0	7.5	7.8
14	7.9	7.1	7.5	8.3	7.2	7.6	9.3	7.5	8.0	8.0	7.5	7.8
15	7.7	7.1	7.3	8.3	7.3	7.5	8.7	7.6	8.2	8.0	7.5	7.8
16	7.7	7.2	7.3	8.4	7.2	7.7	8.6	8.1	8.4	8.2	7.7	7.9
17	7.7	7.1	7.3	8.3	7.0	7.5	8.5	8.1	8.3	8.2	7.5	7.8
18	8.2	7.1	7.4	7.5	6.8	7.1	8.3	7.5	7.9	8.3	7.3	7.7
19	8.1	7.0	7.4	8.3	6.9	7.3	8.0	7.5	7.7	8.1	7.1	7.5
20	7.5	6.8	7.1	8.2	6.9	7.3	7.9	7.4	7.6	7.8	7.2	7.4
21	8.2	6.6	7.2	8.2	7.1	7.5	7.7	7.2	7.6	8.3	7.5	7.8
22	7.6	6.5	7.0	7.9	7.6	7.8	7.5	7.0	7.3	8.3	7.8	8.1
23	8.4	6.4	7.1	8.2	7.7	8.0	7.4	7.1	7.3	8.2	7.6	7.9
24	7.8	6.5	6.8	8.4	7.9	8.1	7.7	7.1	7.4	8.4	7.6	7.9
25	7.7	6.6	7.0	8.4	7.9	8.2	7.8	7.4	7.6	8.5	7.7	8.0
26	7.4	6.6	6.9	8.4	7.9	8.1	—	—	—	8.8	7.7	8.0
27	7.9	6.7	7.1	8.3	7.7	8.0	—	—	—	8.2	7.8	8.0
28	7.3	6.8	7.0	8.5	8.1	8.2	—	—	—	8.9	7.9	8.1
29	7.4	6.8	7.1	8.6	8.1	8.3	7.6	7.1	7.5	9.0	7.7	8.1
30	7.5	7.1	7.3	8.4	8.0	8.2	8.3	7.4	7.6	8.6	7.9	8.2
31	—	—	—	8.4	8.0	8.2	8.0	7.2	7.7	—	—	—
MONTH	8.4	6.4	7.4	8.6	6.8	7.7	—	—	—	—	—	—

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04126740 PLATTE RIVER AT HONOR, MI

LOCATION.--Lat 44°40'05", long 86°02'05", in SW1/4 NW1/4 sec.8, T.26 N., R.14 W., Benzie County, Hydrologic Unit 04060104, on right bank 20 ft downstream from bridge on U.S. Highway 31, 1.0 mi west of Honor.

DRAINAGE AREA.--118 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1990 to current year.

GAGE.--Water-stage recorder. Datum of gage is 589.73 ft above sea level (Michigan Department of Transportation bench mark).

REMARKS.--Records good except for estimated daily discharge, which is fair. Some diversion for fish hatchery 6 mi upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	97	97	100	102	122	99	94	109	91	103	146
2	106	97	98	102	101	117	98	91	137	95	101	228
3	98	96	100	103	102	115	98	90	109	96	99	145
4	97	96	108	105	101	114	98	90	104	94	98	122
5	97	95	120	102	101	112	98	89	102	91	96	114
6	95	94	106	101	101	111	98	88	99	91	98	112
7	94	94	103	100	101	111	98	94	97	90	96	109
8	94	95	101	100	100	112	97	91	98	95	116	106
9	94	95	103	100	101	117	98	91	101	96	108	105
10	94	96	107	106	102	111	98	90	97	92	102	110
11	92	95	103	112	102	109	97	94	96	90	99	151
12	92	95	102	104	101	109	95	97	96	89	97	131
13	103	95	100	102	102	108	97	97	96	92	96	112
14	95	94	100	101	102	108	96	92	96	91	95	108
15	94	94	104	101	101	108	94	91	94	90	98	110
16	103	94	104	100	101	107	95	101	99	88	95	107
17	99	93	100	104	99	104	96	100	96	87	94	103
18	98	93	99	103	101	104	94	126	93	87	96	101
19	96	94	98	103	100	104	94	105	94	87	93	100
20	95	95	102	103	100	106	104	99	98	87	92	104
21	95	95	99	102	100	105	104	96	98	94	91	105
22	100	95	99	102	105	104	99	99	94	90	91	105
23	109	104	98	103	114	103	96	98	93	88	92	109
24	104	109	98	102	120	104	93	99	93	88	91	104
25	101	100	98	103	125	103	92	98	93	88	89	101
26	98	99	98	102	149	101	92	94	97	88	100	98
27	97	99	98	104	162	114	91	95	95	97	96	96
28	97	97	100	102	128	105	91	98	95	113	93	94
29	96	97	100	e102	121	102	90	93	94	110	94	94
30	96	96	100	102	--	100	89	92	92	102	93	94
31	97	--	99	102	--	99	--	93	--	112	92	--
TOTAL	3024	2888	3142	3178	3145	3349	2879	2965	2955	2889	2994	3424
MEAN	97.5	96.3	101	103	108	108	96.0	95.6	98.5	93.2	96.6	114
MAX	109	109	120	112	162	122	104	126	137	113	116	228
MIN	92	93	97	100	99	99	89	88	92	87	89	94
CFSM	.83	.82	.86	.87	.92	.92	.81	.81	.83	.79	.82	.97
IN.	.95	.91	.99	1.00	.99	1.06	.91	.93	.93	.91	.94	1.08

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 2000, BY WATER YEAR (WY)

	MEAN	124	127	125	127	125	133	142	132	128	123	117	124
MAX	148	150	151	147	144	164	169	155	165	152	152	135	158
(WY)	1992	1993	1992	1992	1992	1992	1992	1997	1993	1993	1991	1999	1999
MIN	97.5	96.3	101	103	108	108	96.0	95.6	98.5	93.2	96.2	96.6	96.6
(WY)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	1998	1999	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1990 - 2000
ANNUAL TOTAL	38310	36832	
ANNUAL MEAN	105	101	127
HIGHEST ANNUAL MEAN			147
LOWEST ANNUAL MEAN			101
HIGHEST DAILY MEAN	203	Jul 6	386
LOWEST DAILY MEAN	92	Jul 27	87
ANNUAL SEVEN-DAY MINIMUM	94	Oct 6	88
INSTANTANEOUS PEAK FLOW			487
INSTANTANEOUS PEAK STAGE			3.40
INSTANTANEOUS LOW FLOW			84
ANNUAL RUNOFF (CFSM)	.89	.85	1.07
ANNUAL RUNOFF (INCHES)	12.08	11.61	14.58
10 PERCENT EXCEEDS	117	110	153
50 PERCENT EXCEEDS	103	98	127
90 PERCENT EXCEEDS	95	92	101

(a) Backwater from ice.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

445331085564501 GLEN LAKE NEAR GLEN ARBOR, MI

LOCATION.--Lat 44°51'31", long 85°59'46", in SW1/4 NW1/4 sec. 3, T.28 N., R.14 W., Leelanau County, Hydrologic Unit 04060104, at bridge on State Highway 22, 2.6 mi south of Glen Arbor.

DRAINAGE AREA.--30.8 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to current year.

GAGE.--Non recording gage. Once daily reading by observer. Datum of gage is 596.00 ft above sea level.

REMARKS.--There is one small inlet on the south side near Burdickville. The outlet is the Crystal River. Lake elevation controlled by dam. Established legal level 596.75 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 1.90 ft, June 23, 1943; minimum observed, 0.38 ft, Sept. 30, Oct. 1-4, 23-25, 29-31, 1976, Jan. 1, 1995, Sept. 20, 1999.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 1.11 ft, Sept. 13; minimum observed, 0.44 ft, Mar. 10, 14.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	.50	---	---	---	.80	.64	.68
2	---	---	---	---	---	---	---	---	.83	.80	.64	1.08
3	.50	.52	---	---	---	---	.54	---	.84	.80	.64	1.08
4	.48	.52	---	---	---	---	---	---	.80	.80	.63	---
5	---	---	---	---	---	---	.50	.64	---	.78	.63	---
6	---	.50	---	.50	---	.46	---	---	.80	.79	.63	1.04
7	---	.48	---	---	---	---	---	---	---	.78	.63	1.01
8	---	---	.58	---	---	---	---	.72	.80	.75	.69	1.00
9	.48	---	.58	---	---	---	---	---	.85	.77	.68	.99
10	---	.48	---	---	---	.44	.52	.70	---	.77	.69	1.03
11	.48	.48	.60	---	---	---	.50	---	.82	.77	.69	1.05
12	---	---	.60	.48	---	.46	.50	.72	.80	.76	.68	1.10
13	---	---	.60	---	---	---	---	---	.79	---	.67	1.11
14	.50	.48	---	---	---	.44	---	---	---	.72	.67	1.08
15	---	.48	.58	---	---	---	---	---	.79	---	.68	1.06
16	---	---	.58	---	---	---	---	---	---	.70	.66	---
17	---	.46	---	---	---	.46	.54	.74	.80	.70	.64	1.03
18	---	.46	.56	---	---	---	---	.74	.81	.68	.65	---
19	---	---	---	---	---	---	---	---	---	.67	.62	.95
20	.54	---	.56	---	---	---	---	.76	---	.65	.60	---
21	---	---	---	---	---	.46	---	.78	.82	.65	.60	---
22	---	.48	---	---	---	.48	.58	---	.81	.64	.60	---
23	---	---	.54	---	---	.48	---	---	.82	.81	.63	---
24	---	.50	---	---	.48	---	---	---	.83	.81	.63	---
25	---	.52	---	---	.48	---	.60	---	.81	---	.60	.82
26	.56	---	---	---	.48	---	.60	---	.84	.60	.71	.81
27	.52	.52	---	---	.48	---	.60	---	.85	.64	.71	---
28	---	.52	---	---	.48	---	.60	.80	.84	.64	.71	.75
29	---	---	.50	---	.48	---	---	---	.84	.64	.70	.74
30	.56	---	---	---	---	.54	.60	.78	.82	.64	.69	.71
31	.56	---	---	---	---	.52	---	.80	---	.65	.69	---

## STREAMS TRIBUTARY TO LAKE MICHIGAN

04126970 BOARDMAN RIVER AT BROWN BRIDGE ROAD NEAR MAYFIELD, MI

LOCATION.--Lat 44°39'24", long 85°26'12", in NE1/4 NE1/4 sec.18, T.26 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105. on right bank 200 ft upstream from Brown Bridge Road, 5.1 mi northeast of Mayfield.

DRAINAGE AREA.--141 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1997 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 830 ft above sea level, from topographic map.

REMARKS.--Records good. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	95	89	82	92	84	151	91	84	96	86	94	81
2	93	88	82	94	84	135	91	86	120	85	85	89
3	91	88	85	97	84	127	89	87	114	85	82	91
4	89	86	93	93	83	118	89	86	108	84	80	90
5	88	85	110	88	81	111	91	85	98	83	79	86
6	87	85	112	90	81	108	92	84	93	87	79	82
7	86	84	105	92	82	108	92	84	92	83	78	80
8	85	84	101	91	83	109	93	84	94	83	79	81
9	85	84	97	88	86	120	92	84	97	84	82	78
10	84	83	97	90	87	116	91	84	99	82	81	84
11	84	82	97	95	89	107	92	87	105	80	79	97
12	84	82	98	92	87	105	92	95	101	79	79	102
13	92	83	93	90	84	102	86	109	98	79	79	96
14	90	82	92	90	82	99	84	105	98	79	78	91
15	90	81	94	90	83	98	88	103	96	79	79	88
16	91	80	94	89	85	99	88	103	94	78	77	84
17	89	80	91	85	84	97	88	102	92	77	77	82
18	88	81	92	88	85	96	87	115	90	76	78	81
19	87	81	90	87	84	96	88	114	91	76	77	79
20	87	81	88	86	84	96	91	110	91	76	76	79
21	86	81	89	82	83	98	96	102	91	80	76	83
22	90	81	93	90	86	98	95	99	90	82	76	83
23	95	84	90	87	91	96	93	99	88	84	79	88
24	100	91	95	86	94	96	90	97	88	83	77	84
25	99	87	94	86	105	96	88	95	87	82	75	82
26	96	86	93	82	134	95	87	94	88	81	88	80
27	92	85	94	88	177	97	88	92	90	84	93	77
28	90	83	95	87	184	96	84	90	90	88	88	77
29	89	83	94	85	171	95	80	90	89	91	85	76
30	88	82	94	84	---	94	85	91	87	101	82	76
31	89	---	92	84	---	93	---	92	---	101	79	---
TOTAL	2779	2512	2916	2748	2807	3252	2681	2932	2855	2568	2496	2527
MEAN	89.6	83.7	94.1	88.6	96.8	105	89.4	94.6	95.2	82.8	80.5	84.2
MAX	100	91	112	97	184	151	96	115	120	101	94	102
MIN	84	80	82	82	81	93	80	84	87	76	75	76
CFSM	.64	.59	.67	.63	.69	.74	.63	.67	.67	.59	.57	.60
IN.	.73	.66	.77	.73	.74	.86	.71	.77	.75	.68	.66	.67

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 2000, BY WATER YEAR (WY)

	MEAN	1998	1999	2000	MEAN	1998	1999	2000	MEAN	1998	1999	2000
MEAN	98.0	100	102	101	108	119	136	109	105	99.0	85.9	84.1
MAX	110	114	107	113	118	130	179	122	110	122	95.4	84.4
(WY)	1998	1998	1998	1998	1999	1998	1998	1998	1999	1999	1999	1999
MIN	89.6	83.7	94.1	88.6	96.8	105	89.4	94.6	95.2	82.8	80.5	83.7
(WY)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	1998

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1998 - 2000

ANNUAL TOTAL	38633			33073								
ANNUAL MEAN	106			90.4						104		
HIGHEST ANNUAL MEAN										113		1998
LOWEST ANNUAL MEAN										90.4		2000
HIGHEST DAILY MEAN	186		Jul 6	184		Feb 28	423				Apr 2	1998
LOWEST DAILY MEAN	80		Sep 8	75		Aug 25	75				Aug 25	2000
ANNUAL SEVEN-DAY MINIMUM	81		Nov 15	77		Aug 19	77				Aug 19	2000
INSTANTANEOUS PEAK FLOW				208		Feb 27	449				Apr 2	1998
INSTANTANEOUS PEAK STAGE				3.95		Feb 27	5.44				Apr 2	1998
INSTANTANEOUS LOW FLOW				66		Feb 8	66				Feb 8	2000
ANNUAL RUNOFF (CFSM)	.75			.64						.74		
ANNUAL RUNOFF (INCHES)	10.19			8.73						10.01		
10 PERCENT EXCEEDS	137			101						128		
50 PERCENT EXCEEDS	103			88						100		
90 PERCENT EXCEEDS	83			80						82		

## STREAMS TRIBUTARY TO LAKE MICHIGAN

443903085312101 ARBUTUS LAKE NEAR MAYFIELD, MI

LOCATION.--Lat 44°39'03", long 85°31'21", in SW1/4 NE1/4 sec. 16, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on south side of lake at Pine Hurst Trail, 1.8 mi north of Mayfield.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--August 1994 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Elevation of gage is 794 ft above sea level, from topographic map.

REMARKS.--No inlets or outlets.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.07 ft, Feb. 13, 1995; minimum observed, 2.62 ft, Sept. 2, 3, 30, 2000.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.40 ft, Jan. 6, but may have been higher during period of missing record;; minimum observed, 2.62 ft, Sept. 2, 3, 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.32	3.31	3.22	---	---	---	3.18	3.03	3.15	2.97	---	2.64
2	3.33	3.30	3.21	---	---	---	3.16	3.03	3.14	2.96	---	2.62
3	3.34	3.28	3.20	---	---	---	3.16	3.02	3.13	2.95	2.70	2.62
4	3.28	3.28	3.20	---	---	---	3.16	3.02	3.12	2.94	---	2.68
5	3.33	3.27	3.18	---	---	---	3.16	3.02	3.10	2.94	---	2.70
6	3.33	3.26	3.18	3.40	---	---	3.15	3.01	3.09	2.79	---	2.72
7	3.34	3.24	3.19	---	---	---	3.15	3.01	3.08	2.92	---	2.72
8	3.33	3.24	3.20	---	---	---	3.14	3.01	3.06	2.92	2.78	2.78
9	3.34	3.23	3.20	---	---	---	3.14	3.00	3.10	2.90	---	2.82
10	3.34	3.22	3.22	---	---	3.28	3.13	3.00	3.10	2.88	---	2.82
11	3.33	3.22	3.22	---	---	3.28	3.13	2.95	3.09	2.88	---	2.80
12	3.32	3.21	3.24	---	---	3.27	3.12	2.99	3.08	2.87	---	2.79
13	3.33	3.21	3.28	---	---	3.27	3.12	2.99	3.07	2.86	---	2.78
14	3.33	3.20	3.30	---	---	3.29	3.12	2.99	3.06	2.85	---	2.78
15	3.34	3.20	3.32	---	---	3.26	3.11	2.98	3.06	2.85	---	2.76
16	3.34	3.20	3.32	---	---	3.25	3.10	2.96	3.05	2.84	---	2.76
17	3.34	3.19	3.34	---	---	3.24	3.10	2.96	3.04	2.84	---	2.75
18	3.33	3.19	3.34	---	---	3.24	3.09	2.98	3.04	2.82	2.82	2.74
19	3.33	3.18	---	---	---	3.23	3.09	3.00	3.03	2.82	2.76	2.74
20	3.36	3.18	3.36	---	---	3.24	3.08	3.02	3.02	2.80	2.76	2.72
21	3.36	3.18	---	---	---	3.24	3.08	3.03	3.01	2.79	2.75	2.72
22	3.36	3.17	---	---	---	3.24	3.08	3.04	3.01	2.78	2.74	2.70
23	3.35	3.17	---	---	---	3.23	3.07	3.06	3.00	2.76	2.74	2.69
24	3.35	3.17	---	---	---	3.22	3.07	3.08	3.00	2.74	2.72	2.68
25	3.34	3.24	---	---	---	3.22	3.06	3.10	2.98	2.74	2.72	2.68
26	3.34	3.24	---	---	---	3.22	3.09	3.16	2.98	2.73	2.71	2.66
27	3.33	3.24	---	---	---	3.21	3.06	3.16	2.97	2.72	2.70	2.66
28	3.32	3.23	---	---	---	3.20	3.05	3.16	2.98	2.72	2.70	2.64
29	3.32	3.22	---	---	---	3.20	3.04	3.16	2.97	---	2.68	2.64
30	3.32	3.22	---	---	---	3.20	3.04	3.16	2.96	---	2.67	2.62
31	3.32	---	---	---	---	3.19	---	3.16	---	---	2.66	---
MEAN	3.33	3.22	---	---	---	---	3.11	3.04	3.05	---	---	2.71
MAX	3.36	3.31	---	---	---	---	3.18	3.16	3.15	---	---	2.82
MIN	3.28	3.17	---	---	---	---	3.04	2.95	2.96	---	---	2.62



## STREAMS TRIBUTARY TO LAKE MICHIGAN

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW1/4 NW1/4 sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 300 ft downstream from Webster Bridge, 4.2 mi south of East Jordan, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--67.9 mi<sup>2</sup>.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

REVISED RECORDS.--WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 596.43 ft above sea level (Antrim County Road Commission bench mark). Nov. 19, 1959 to Sept. 30, 1966, nonrecording gage at site 600 ft upstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by fish hatchery upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	166	164	162	165	161	213	165	173	171	157	173	193
2	166	162	164	173	160	195	165	164	193	157	155	198
3	162	162	168	183	162	183	166	159	171	158	153	193
4	160	161	195	177	161	182	168	157	166	155	149	199
5	160	161	221	169	160	180	165	156	163	154	149	159
6	164	161	184	168	158	178	170	154	161	155	151	157
7	159	160	170	167	160	180	166	172	161	155	154	157
8	158	161	168	166	161	182	165	163	163	154	212	159
9	158	161	169	166	162	245	164	159	276	156	270	166
10	158	160	197	172	160	189	164	155	207	153	174	238
11	157	160	178	206	160	174	163	162	218	150	159	222
12	156	161	169	183	160	171	163	218	182	150	155	199
13	168	161	168	172	163	169	162	298	175	150	158	198
14	162	161	165	168	160	172	163	190	174	153	155	195
15	159	161	169	169	160	178	161	177	169	152	153	196
16	171	161	177	168	162	183	164	175	183	152	152	193
17	169	160	168	153	160	174	168	173	175	150	152	190
18	164	161	165	e160	162	170	163	217	165	148	155	157
19	161	161	162	e160	159	173	162	196	177	151	151	157
20	166	163	169	e160	159	176	171	177	174	150	151	192
21	164	161	165	e160	160	176	174	172	174	158	150	172
22	185	161	164	e160	169	174	164	189	172	153	160	172
23	224	172	e165	e160	206	171	160	206	167	150	159	197
24	203	214	e165	e160	232	170	158	184	163	149	153	197
25	173	172	e165	e160	255	171	157	181	162	149	151	192
26	166	167	166	e160	374	167	157	174	174	148	201	190
27	164	165	165	e160	361	180	157	171	172	157	247	169
28	163	164	165	e160	234	171	157	169	162	167	165	158
29	162	164	166	e160	204	168	157	168	160	154	162	159
30	162	162	169	e160	---	166	156	168	160	153	160	157
31	172	---	165	e160	---	165	---	171	---	166	156	---
TOTAL	5182	4925	5308	5165	5405	5546	4895	5548	5290	4764	5145	5171
MEAN	167	164	171	167	186	179	163	179	176	154	166	170
MAX	224	214	221	206	374	245	174	298	276	167	270	238
MIN	156	160	162	153	158	165	156	154	160	148	149	156
CFSM	2.46	2.42	2.52	2.45	2.74	2.63	2.40	2.64	2.60	2.26	2.44	2.50
IN.	2.84	2.70	2.91	2.83	2.96	3.04	2.68	3.04	2.90	2.61	2.82	2.79

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 2000, BY WATER YEAR (WY)

MEAN	186	190	187	181	181	209	221	193	182	173	172	190
MAX	235	226	217	202	209	281	273	237	230	210	203	223
(WY)	1987	1993	1983	1997	1984	1979	1979	1983	1969	1975	1972	1976
MIN	167	163	163	157	157	174	163	164	160	151	150	150
(WY)	2000	1982	1982	1971	1982	1972	2000	1982	1982	1981	1981	1971

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1967 - 2070
ANNUAL TOTAL	62367	62274	
ANNUAL MEAN	171	170	188
HIGHEST ANNUAL MEAN			204
LOWEST ANNUAL MEAN			170
HIGHEST DAILY MEAN	440	374	840
LOWEST DAILY MEAN	131	148	130
ANNUAL SEVEN-DAY MINIMUM	140	151	136
INSTANTANEOUS PEAK FLOW		478	1360
INSTANTANEOUS PEAK STAGE		4.86	6.51
INSTANTANEOUS LOW FLOW		(a)126	(a)91
ANNUAL RUNOFF (CFSM)	2.52	2.51	2.77
ANNUAL RUNOFF (INCHES)	34.17	34.12	37.58
10 PERCENT EXCEEDS	195	189	221
50 PERCENT EXCEEDS	165	164	179
90 PERCENT EXCEEDS	153	155	160

(a) Result of freezeup.

(b) Jan. 17, Feb. 12.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 451540084560301 WALLOON LAKE AT WALLOON LAKE, MI

LOCATION.--Lat 45°15'40", long 84°56'03", in NW1/4 NW1/4 sec.16, T.33 N., R.5 W., Charlevoix County, Hydrologic Unit 04060105, on left upstream wingwall of dam at outlet of Walloon Lake (Bear River), 0.1 mi south of Walloon Lake.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--July 1942 to September 1950, September 1995 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Elevation of gage is 687 ft above sea level, from topographic map. Prior to September 30, 1950, nonrecording gage at approximately same elevation.

REMARKS.--Lake level maintained by a fix-crest concrete dam. Crest of dam is divided into two parts. The right sill is about 22 ft wide and has its crest at elevation 2.64 ft, gage datum. The left sill, 13 ft wide, is at elevation 1.93 ft, gage datum. There is a steel grate on top of weir to prevent migration of fish into lake. Established legal level is the top of right sill of the dam at lake outlet.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 3.47 ft, Apr. 3, 1998; minimum observed, 2.14 ft, Sept. 10, 1947, Oct. 7, 1948.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.19 ft, Mar. 9; minimum observed, 2.30 ft, July 27.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	2.80	---	2.37	---
2	---	---	2.69	---	---	3.17	3.08	---	---	2.69	---	---
3	2.53	---	---	2.98	3.09	3.18	---	2.90	---	---	2.40	2.55
4	2.53	---	2.74	---	---	---	---	---	---	---	---	---
5	---	---	---	3.08	---	---	---	2.88	---	---	2.34	---
6	---	2.60	---	---	---	---	---	---	2.77	2.66	---	---
7	2.54	---	---	3.07	---	3.15	---	2.88	---	---	---	---
8	---	---	2.77	---	3.07	---	---	---	---	---	2.36	2.45
9	2.54	2.60	---	---	---	3.19	3.03	---	2.75	---	2.60	2.45
10	2.55	2.60	---	---	3.04	---	---	---	---	2.60	---	2.46
11	2.55	---	2.85	---	---	---	3.00	---	---	---	---	---
12	---	---	---	---	---	---	---	2.96	2.73	2.55	2.59	---
13	---	2.59	2.85	3.10	---	---	---	---	---	---	---	2.48
14	2.55	---	---	---	---	---	---	---	2.70	---	2.57	---
15	---	---	2.86	3.07	3.04	---	---	2.83	2.69	---	---	---
16	---	---	---	---	3.04	---	---	---	2.73	2.47	---	2.44
17	---	---	2.93	---	---	---	2.97	---	---	2.40	2.50	---
18	2.53	2.57	2.87	---	---	---	---	---	---	---	---	2.37
19	---	---	---	3.10	3.04	---	---	---	---	---	---	2.43
20	---	---	---	3.06	---	---	---	2.84	2.70	2.37	---	---
21	---	2.59	---	---	---	---	---	---	2.73	2.36	2.50	---
22	---	---	---	---	3.04	---	2.98	2.84	---	---	2.40	2.45
23	---	---	2.96	---	---	---	---	---	---	2.36	---	---
24	---	---	2.98	---	3.06	---	---	---	---	---	2.50	---
25	---	---	---	3.09	---	3.15	---	2.90	2.73	2.33	---	2.40
26	---	---	---	---	---	3.15	2.94	---	---	---	---	2.40
27	---	---	2.97	---	3.07	---	---	---	---	2.30	---	---
28	2.61	---	---	---	---	3.15	2.92	---	2.74	---	2.49	2.36
29	---	---	3.00	3.07	---	---	---	2.80	---	2.40	2.50	---
30	2.61	2.71	---	---	---	---	2.90	---	2.70	---	---	---
31	---	---	---	3.08	---	3.12	---	2.80	---	2.41	---	---

## STREAMS TRIBUTARY TO LAKE HURON

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW1/4 NE1/4 sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft upstream from bridge on Mackinac Trail, 3.2 mi south of Rudyard.

DRAINAGE AREA.--184 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 601.50 ft above sea level. Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	138	154	e80	e78	e700	278	101	66	70	50	43
2	95	131	138	e80	e78	e600	252	107	67	82	53	47
3	90	124	149	e80	e78	e550	237	100	65	115	53	57
4	84	120	166	e80	e78	e600	257	96	62	91	50	85
5	81	116	183	e80	e78	e620	236	96	59	75	47	69
6	79	109	179	e80	e78	e640	244	93	57	67	47	58
7	80	105	157	e80	e78	e700	326	88	56	63	56	53
8	83	101	145	e82	e76	e900	284	83	56	57	61	51
9	113	99	142	e82	e76	e1200	239	82	57	57	63	49
10	121	98	229	e82	e75	e800	217	79	65	56	63	48
11	110	93	236	e82	e74	668	196	74	78	52	61	52
12	101	91	196	e82	e72	525	184	75	78	49	57	65
13	98	92	179	e82	e70	379	178	80	71	69	52	65
14	96	91	165	e82	e70	309	181	87	65	227	50	58
15	94	90	156	e82	e70	247	176	86	73	181	48	54
16	114	87	160	e82	e70	e240	180	79	90	131	47	51
17	173	85	143	e82	e70	e220	175	75	99	101	45	51
18	161	85	e140	e82	e70	e210	166	78	84	80	44	50
19	147	85	e130	e82	e70	201	159	77	74	70	45	48
20	145	95	e130	e82	e70	222	153	72	70	65	44	49
21	147	97	e125	e82	e70	410	179	69	91	69	43	54
22	172	95	e120	e82	e74	503	175	72	95	66	43	54
23	256	95	e110	e82	e80	527	159	102	87	61	44	55
24	315	177	e100	e82	e90	521	147	109	78	58	45	60
25	269	206	e95	e82	e110	539	136	97	74	55	43	58
26	227	178	e90	e82	e250	685	126	86	80	53	43	55
27	199	162	e80	e82	e800	684	119	79	88	52	43	56
28	177	153	e80	e82	e780	586	112	73	76	53	43	57
29	162	146	e80	e80	e750	452	105	69	75	53	42	54
30	146	132	e80	e80	---	365	100	66	73	52	42	53
31	144	---	e80	e78	---	312	---	66	---	51	43	---
TOTAL	4370	3476	4317	2520	4483	16115	5676	2596	2209	2381	1510	1659
MEAN	141	116	139	81.3	155	520	189	83.7	73.6	76.8	48.7	55.3
MAX	315	206	236	82	800	1200	326	109	99	227	63	85
MIN	79	85	80	78	70	201	100	66	56	49	42	43
CFSM	.77	.63	.76	.44	.84	2.83	1.03	.46	.40	.42	.26	.30
IN.	.88	.70	.87	.51	.91	3.26	1.15	.52	.45	.48	.31	.34

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 2000, BY WATER YEAR (WY)

	MEAN	218	277	178	120	112	273	793	257	171	110	103	145
MAX	452	807	328	248	217	544	1589	633	432	261	349	383	
(WY)	1997	1989	1983	1980	1984	1973	1985	1972	1974	1979	1973	1996	
MIN	71.5	72.7	63.0	60.3	65.9	90.7	189	83.7	73.6	60.3	48.7	55.3	
(WY)	1998	1977	1977	1977	1979	1978	2000	2000	2000	1988	2000	2000	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1972 - 2000

ANNUAL TOTAL	63207		51312										
ANNUAL MEAN	173		140										
HIGHEST ANNUAL MEAN										228			
LOWEST ANNUAL MEAN										344		1985	
HIGHEST DAILY MEAN										138		1998	
LOWEST DAILY MEAN	1670									4050		Apr 21 1985	
ANNUAL SEVEN-DAY MINIMUM	60									42		Aug 29 2000	
INSTANTANEOUS PEAK FLOW	61									43		Aug 25 2000	
INSTANTANEOUS PEAK STAGE										4300		Mar 30 1986	
INSTANTANEOUS LOW FLOW										18.44		Mar 30 1986	
ANNUAL RUNOFF (CFSM)										41		Nov 16 1989	
ANNUAL RUNOFF (INCHES)	.94									(c)			
10 PERCENT EXCEEDS	268									10.37		1.24	
50 PERCENT EXCEEDS	120									458		16.82	
90 PERCENT EXCEEDS	73									124		69	

(a) Gage height 8.0 ft. from floodmark.

(b) Backwater from ice.

(c) Part of each day Aug. 25, 27, Aug. 29 to Sept. 1.

(d) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04127937 EAST LAKE NEAR FIBRE, MI

LOCATION.--Lat 46°07'56", long 84°47'31", in SE1/4 SW1/4 sec. 10, T.43 N., R.4 W., Mackinac County, Hydrologic Unit 04070002, 5.9 mi southwest of Fibre.

DRAINAGE AREA.--5.87 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1967 to September 1971, June 1990 to current year.

REVISED RECORDS.--WDR MI-96-1: 1991 (M).

GAGE.--Nonrecording gage. Elevation of gage is 805 ft above sea level, from topographic map. July 12, 1967 to Sept. 1, 1971, nonrecording gage at different datum.

REMARKS.--Staff gage read by observer. The inlet to East Lake is a small unnamed stream draining a marsh at the north end of the lake. The outlet is the East Lake Branch of the Carp River. Surface area of lake is 995 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.62 ft, Dec. 2, 1991; minimum observed, 3.46 ft, datum then in use, Sept. 14-16, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.34 ft, Apr. 12-14, 21; minimum observed, 3.60 ft, Oct. 1-7.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.60	3.74	---	---	---	---	---	---	3.90	3.92	3.68	3.68
2	3.60	3.76	---	---	---	---	---	---	3.90	3.90	3.68	3.68
3	3.60	---	---	---	---	---	---	---	3.88	3.90	3.66	3.70
4	3.60	---	---	---	---	---	---	---	3.86	3.90	3.66	3.70
5	3.60	---	---	---	---	---	---	---	3.86	3.90	3.66	3.70
6	3.60	---	---	---	---	---	---	---	3.84	3.88	3.64	3.70
7	3.60	---	---	---	---	---	---	4.10	3.80	3.88	3.64	3.72
8	3.62	3.72	---	---	---	---	---	4.10	3.80	3.88	3.62	3.72
9	3.62	3.72	---	---	---	---	---	4.10	3.82	3.88	3.62	3.72
10	3.62	---	---	---	---	4.16	---	4.06	3.82	3.84	3.90	3.70
11	3.62	---	---	---	---	---	---	4.04	3.82	3.80	3.90	3.70
12	3.62	---	---	---	---	---	4.34	4.00	3.82	3.80	3.88	3.70
13	3.62	---	---	---	---	---	4.34	4.04	3.84	3.80	3.86	3.72
14	3.62	---	---	---	---	---	4.34	4.04	3.84	3.90	3.86	3.72
15	3.62	---	3.84	---	---	---	4.32	4.04	3.86	3.90	3.84	3.70
16	3.62	---	---	---	---	---	4.32	4.00	3.90	3.90	3.80	3.68
17	3.62	---	---	---	---	---	4.32	4.00	3.90	3.88	3.80	3.68
18	3.62	---	---	---	---	---	4.30	4.00	3.90	3.86	3.80	3.70
19	3.64	---	---	---	---	---	4.30	4.00	3.90	3.82	3.78	---
20	3.70	---	---	---	---	---	4.30	3.98	3.90	3.82	3.76	---
21	3.70	---	---	---	---	---	4.34	3.98	3.92	3.80	3.74	---
22	3.70	---	---	---	---	---	4.30	3.98	3.92	3.80	3.74	3.68
23	3.70	---	---	---	---	---	4.30	3.98	3.88	3.78	3.72	3.68
24	3.76	---	---	---	---	---	4.30	3.98	3.88	3.78	3.72	3.68
25	3.78	---	---	4.00	---	---	4.30	3.98	3.88	3.76	3.70	3.68
26	3.76	---	---	---	---	---	4.28	3.96	3.90	3.74	3.70	3.68
27	3.76	---	---	---	---	---	4.28	3.94	3.90	3.74	3.70	3.68
28	3.76	---	---	---	---	---	4.28	3.92	3.90	3.72	3.70	---
29	3.74	---	---	---	---	---	4.28	3.92	3.92	3.70	3.70	---
30	3.74	---	---	---	---	---	---	3.90	3.92	3.70	3.68	3.68
31	3.74	---	---	---	---	---	---	3.92	---	3.70	3.68	---

## STREAMS TRIBUTARY TO LAKE HURON

452600084472001 CROOKED LAKE NEAR CONWAY, MI

LOCATION.--Lat 45°23'52", long 84°49'22", in NE1/4 SW1/4 sec.29, T.35 N., R.4 W., Emmet County, Hydrologic Unit 04070004, at Minnehaha Creek Inlet on Channel Road, 2.5 mi southeast of Conway.

DRAINAGE AREA.--101 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1942 to July 1945 (summer months only), August 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 593.38 ft above sea level. Prior to June 13, 1960, nonrecording gage at datum 1.00 ft higher. June 13, 1960 to June 29, 1964, nonrecording gage at same datum.

REMARKS.--Crooked Lake is the upstream end of the navigable inland water route. Major inlets are Minnehaha Creek, Round Lake Outlet, and Pickerel Lake Outlet. The outlet is Crooked River. Lake elevation controlled by dam and boat lock at Alanson. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.60 ft, Apr. 12, 1948, present datum; minimum, 0.54 ft, Mar. 30, 1982, possibly affected by ice in well.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 2.44 ft, Oct. 23; minimum, 0.93 ft, Dec. 1.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.28	2.22	.95	1.55	1.76	2.12	1.83	2.00	2.24	2.14	2.02	2.06
2	2.33	2.17	.99	1.57	1.76	2.09	1.86	2.03	2.23	2.13	2.01	2.08
3	2.35	2.07	1.04	1.60	1.77	2.03	1.89	2.05	2.21	2.13	2.00	2.10
4	2.34	1.94	1.12	1.67	1.77	1.97	1.93	2.07	2.21	2.11	1.98	2.10
5	2.33	1.84	1.21	1.69	1.77	1.91	1.93	2.10	2.20	2.11	1.97	2.08
6	2.33	1.76	1.26	1.70	1.79	1.85	1.95	2.11	2.18	2.10	1.97	2.08
7	2.32	1.68	1.30	1.70	1.80	1.80	1.97	2.11	2.18	2.10	1.97	2.06
8	2.31	1.61	1.35	1.71	1.82	1.76	1.97	2.13	2.18	2.08	2.05	2.07
9	2.31	1.54	1.41	1.70	1.84	1.80	1.96	2.14	2.19	2.07	2.19	2.07
10	2.30	1.50	1.50	1.72	1.86	1.79	1.96	2.13	2.18	2.07	2.18	2.07
11	2.30	1.44	1.58	1.76	1.87	1.74	1.95	2.16	2.21	2.06	2.17	2.10
12	2.30	1.38	1.62	1.78	1.84	1.70	1.95	2.21	2.20	2.05	2.15	2.11
13	2.30	1.33	1.66	1.79	1.81	1.65	1.95	2.20	2.20	2.04	2.12	2.10
14	2.28	1.30	1.70	1.79	1.78	1.62	1.94	2.20	2.19	2.06	2.10	2.10
15	2.28	1.24	1.75	1.79	1.75	1.63	1.95	2.21	2.17	2.06	2.09	2.10
16	2.30	1.20	1.80	1.78	1.75	1.65	1.97	2.22	2.19	2.05	2.07	2.08
17	2.31	1.15	1.83	1.77	1.72	1.65	1.98	2.23	2.19	2.03	2.05	2.07
18	2.31	1.12	1.80	1.79	1.70	1.64	1.97	2.25	2.18	2.01	2.06	2.06
19	2.31	1.10	1.75	1.79	1.67	1.65	1.96	2.26	2.19	1.99	2.04	2.06
20	2.34	1.07	1.70	1.79	1.65	1.66	1.96	2.24	2.20	1.99	2.03	2.07
21	2.34	1.05	1.67	1.78	1.62	1.67	1.96	2.24	2.18	2.00	2.01	2.10
22	2.37	1.03	1.64	1.77	1.61	1.67	1.92	2.24	2.19	2.00	2.01	2.11
23	2.42	1.03	1.62	1.79	1.64	1.67	1.88	2.27	2.20	1.99	2.03	2.14
24	2.40	1.02	1.59	1.79	1.71	1.68	1.84	2.27	2.20	1.98	2.01	2.14
25	2.38	1.03	1.57	1.79	1.79	1.66	1.86	2.27	2.19	1.97	2.01	2.13
26	2.38	1.02	1.53	1.78	1.87	1.69	1.88	2.27	2.20	1.97	2.02	2.12
27	2.37	1.00	1.49	1.77	2.01	1.72	1.90	2.27	2.20	1.99	2.03	2.13
28	2.36	.97	1.51	1.77	2.09	1.77	1.92	2.26	2.19	2.03	2.02	2.12
29	2.35	.97	1.53	1.77	2.10	1.80	1.95	2.24	2.18	2.03	2.02	2.10
30	2.33	.95	1.54	1.77	---	1.79	1.96	2.23	2.16	2.02	2.03	2.09
31	2.29	---	1.55	1.77	---	1.81	---	2.23	---	2.02	2.02	---
MEAN	2.33	1.36	1.50	1.74	1.79	1.76	1.93	2.19	2.19	2.04	2.05	2.09
MAX	2.42	2.22	1.83	1.79	2.10	2.12	1.98	2.27	2.24	2.14	2.19	2.14
MIN	2.28	.95	.95	1.55	1.61	1.62	1.83	2.00	2.16	1.97	1.97	2.06

## STREAMS TRIBUTARY TO LAKE HURON

453345084401501 DOUGLAS LAKE NEAR PELLSTON, MI

LOCATION.--Lat 45°33'45", long 84°40'15", in NW1/4 NE1/4 sec. 33, T.37N., R.3W., Cheboygan County, Hydrologic Unit 04070004, in boat well in Laboratory building at University of Michigan Biological Station.

**DRAINAGE AREA.**--26.5 mi<sup>2</sup> at outlet.

**PERIOD OF RECORD.**--June 1942 to December 1959, October 1994 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 710.00 ft above sea level (Doyle Civil Engineers bench mark).  
June 1942 to December 1959 at same site at datum 2.34 ft higher.

REMARKS.--Beavertail Creek flows into the lake from the northeast and Lancaster Creek flows into the lake from the northwest. East Branch Maple River flows from the southwest side of lake into Maple River, then into Burt Lake.

**EXTREMES FOR PERIOD OF RECORD.**—Maximum gage height, 4.68 ft, May 7, 1959, from floodmark, present datum; minimum observed, 0.78 ft, Oct. 15, 1955, present datum.

**EXTREMES FOR CURRENT YEAR.**--Maximum gage height observed, 3.40 ft, Apr. 22; minimum observed, 1.80 ft, Sept. 26.

**GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000**  
**DAILY INSTANTANEOUS VALUES**

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	2.96	---	---	---	---	---	---
2	---	---	2.50	---	---	---	---	---	---	2.74	2.30	---
3	---	---	---	---	---	---	---	3.34	---	---	---	---
4	2.64	2.60	---	---	---	---	---	---	---	---	2.24	---
5	---	---	---	---	---	3.06	---	3.38	---	---	---	---
6	---	---	---	---	---	---	---	---	3.00	2.72	---	2.02
7	2.60	---	2.54	2.76	---	3.10	---	---	---	---	2.18	---
8	---	2.56	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	2.78	---	---	---	---	2.66	---	---
10	---	---	---	2.74	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	3.28	---	2.64	---	1.98
12	---	2.58	---	---	---	---	3.36	---	2.98	---	2.26	---
13	---	---	2.58	---	---	3.26	---	---	---	2.58	---	---
14	---	---	---	2.78	---	---	---	---	---	---	2.22	---
15	2.60	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	3.30	---	3.26	---	2.52	---	1.90
17	---	2.50	---	---	---	---	---	---	2.98	---	---	---
18	---	2.48	---	---	---	---	3.36	---	---	---	---	1.85
19	---	---	---	2.79	---	---	---	---	2.91	---	---	---
20	---	---	---	---	---	3.30	---	---	---	2.38	---	---
21	2.64	---	2.62	---	---	---	---	---	---	---	2.06	---
22	---	---	---	---	2.81	---	3.40	---	---	---	---	1.84
23	---	2.48	---	---	---	---	---	---	---	2.36	---	---
24	---	---	---	2.80	---	---	---	3.22	2.84	---	---	---
25	---	---	---	---	---	---	---	---	---	2.32	---	---
26	---	---	---	---	---	---	3.38	---	---	---	---	1.80
27	2.64	---	---	---	2.88	---	---	---	---	---	---	---
28	2.64	---	---	---	---	---	---	---	---	---	2.10	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	2.50	---	---	---	---	---	3.10	---	---	---	---
31	---	---	---	2.78	---	---	---	---	---	---	---	---

## STREAMS TRIBUTARY TO LAKE HURON

## 04127997 STURGEON RIVER AT WOLVERINE, MI

LOCATION.--Lat 45°16'28", long 84°36'00", in SE1/4 SW1/4 sec.6, T.33 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on right bank at Cedar Street in Wolverine, 0.2 mi downstream from West Branch, and 11.7 mi upstream from mouth.

DRAINAGE AREA.--192 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1942 to current year. Published as "near Wolverine" prior to October 1994.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M). WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 770 ft above sea level, from topographic map. Prior to June 15, 1942, nonrecording gages at site 1.7 mi downstream and June 16, 1942 to Sept. 30, 1958, at site 2.0 mi downstream at different datums. Oct. 1, 1958 to Sept. 30, 1994, water-stage recorder at site 2.7 mi downstream at different datum (Station 04128000).

REMARKS.--Records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	178	169	176	149	288	178	181	161	144	217	149
2	185	177	175	188	e150	261	177	184	173	140	179	200
3	177	173	182	203	150	229	176	169	166	139	152	188
4	175	170	203	196	151	217	178	165	158	137	144	177
5	170	169	267	186	148	214	177	165	155	136	138	159
6	178	164	246	181	e150	209	186	162	153	133	138	152
7	174	164	200	178	e150	216	186	167	153	135	157	148
8	172	166	189	177	e150	231	179	176	153	135	228	188
9	167	168	188	177	e150	291	178	175	160	136	429	148
10	163	163	230	188	149	253	178	163	177	134	228	206
11	162	161	216	237	150	214	174	167	177	131	187	218
12	163	162	196	210	e150	197	173	235	167	130	173	236
13	167	161	189	201	e150	186	172	362	162	129	158	195
14	170	162	183	e190	e150	187	173	254	163	130	156	174
15	161	162	191	187	149	195	172	213	160	130	151	165
16	171	162	199	191	152	205	174	189	163	133	146	161
17	182	161	190	e180	e150	193	177	186	165	131	143	158
18	170	163	182	e180	e150	186	175	224	153	128	146	153
19	168	163	190	e180	e150	186	173	238	157	128	144	150
20	175	167	184	e170	149	195	191	196	161	129	140	152
21	174	165	181	e170	150	203	255	183	163	134	139	163
22	228	164	181	e170	164	201	206	185	159	137	153	166
23	318	171	e180	e160	212	197	186	218	160	132	169	196
24	266	230	e180	e160	267	196	180	202	151	131	150	182
25	214	202	e180	e160	298	200	172	197	146	130	144	168
26	192	184	178	e150	395	195	171	186	152	130	147	162
27	179	180	168	e150	496	199	170	180	158	147	224	158
28	175	176	e170	e150	351	194	166	170	148	193	166	154
29	172	177	171	e150	280	188	165	167	145	149	157	155
30	171	171	173	e150	---	182	166	164	146	141	157	154
31	184	---	178	e150	---	178	---	165	---	160	148	---
TOTAL	5723	5136	5909	5496	5610	6486	5384	5988	4765	4252	5308	5195
MEAN	185	171	191	177	183	209	179	193	159	137	171	173
MAX	318	230	267	237	496	291	255	362	177	193	429	318
MIN	161	161	168	150	148	178	165	162	145	128	138	148
CFSM	.96	.89	.99	.92	1.01	1.09	.93	1.01	.83	.71	.89	1.01
IN.	1.11	1.00	1.14	1.06	1.09	1.26	1.04	1.16	.92	.82	1.03	1.01

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2000, BY WATER YEAR (WY)

	MEAN	213	224	213	201	199	245	309	238	209	185	181	201
MAX	326	301	306	295	275	354	431	353	272	255	301	290	290
(WY)	1984	1993	1972	1973	1984	1976	1971	1983	1969	1994	1972	1972	1976
MIN	153	164	157	133	130	172	179	154	149	130	134	141	141
(WY)	1957	1950	1949	1957	1957	1954	2000	1958	1958	1981	1944	1948	1948

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1942 - 2000
ANNUAL TOTAL	71611	65252	
ANNUAL MEAN	196	178	218
HIGHEST ANNUAL MEAN			268
LOWEST ANNUAL MEAN			167
HIGHEST DAILY MEAN	680	496	1080
LOWEST DAILY MEAN	137	128	113
ANNUAL SEVEN-DAY MINIMUM	139	130	118
INSTANTANEOUS PEAK FLOW		(a)522	(b)1290
INSTANTANEOUS PEAK STAGE		(c)6.17	(d)6.42
INSTANTANEOUS LOW FLOW		(g)123	93
ANNUAL RUNOFF (CFSM)	1.02	.93	1.14
ANNUAL RUNOFF (INCHES)	13.87	12.64	15.44
10 PERCENT EXCEEDS	251	216	292
50 PERCENT EXCEEDS	180	171	202
90 PERCENT EXCEEDS	157	146	159

(a) Gage height 4.56 ft.

(b) Site then in use.

(c) Backwater from ice.

(d) From floodmark, backwater from ice, peak stage at previous site and datum, 4.48 ft, Sept. 14, 1961.

(e) Estimated.

(f) Date unknown, occurred during period of no gage height record Jan. 4-14, 1999.

(g) Result of freezeup.

## STREAMS TRIBUTARY TO LAKE HURON

04128990 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°09'24", long 84°28'00", in NW1/4 NW1/4 sec.20, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on 1-ft bank at Sturgeon Valley Road, 9.7 mi east of Vanderbilt, 1.0 mi downstream from Lansing Club Dam, and 28.5 mi upstream from Mullett Lake.

DRAINAGE AREA.--57.7 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 909.03 ft above sea level (Wade-Trim Inc. bench mark). September 1950 to October 1990, water-stage recorder at site 2.5 mi downstream at different datum (Station 04129000).

REMARKS.--Records good except for estimated daily discharges, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, regulation by Lansing Club Dam 1.0 mi upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	65	64	57	55	116	65	59	57	48	67	53
2	62	67	60	63	58	97	69	70	65	47	97	90
3	60	59	65	69	55	91	67	58	62	46	67	83
4	59	58	100	63	56	69	65	65	49	44	55	74
5	58	56	133	63	56	79	69	55	57	45	53	63
6	68	58	114	62	57	82	69	57	49	44	51	55
7	59	59	78	62	56	70	71	55	52	44	57	58
8	57	55	65	61	41	96	70	66	47	46	70	57
9	58	62	69	61	62	132	61	64	58	45	207	57
10	56	51	78	61	60	87	69	54	72	44	85	107
11	56	58	75	79	60	75	69	58	63	42	68	203
12	54	62	64	66	53	59	57	78	59	44	60	104
13	62	54	64	66	62	82	68	187	60	44	53	73
14	66	60	61	57	61	54	66	98	60	45	56	67
15	58	58	71	64	54	76	64	70	51	44	50	63
16	70	56	67	60	60	79	70	65	56	41	51	57
17	71	61	67	44	48	57	71	66	49	41	50	56
18	59	59	63	65	63	74	69	101	54	42	52	57
19	59	58	49	62	60	57	66	105	53	37	50	54
20	63	59	65	64	56	75	74	68	54	42	49	61
21	62	60	62	45	55	79	149	65	51	43	48	60
22	75	55	60	e60	54	77	90	64	54	45	48	64
23	133	60	59	e60	78	93	74	78	54	46	62	85
24	103	132	61	57	106	67	62	74	53	40	51	78
25	71	80	49	54	124	84	73	66	47	43	51	62
26	70	74	60	49	168	72	59	63	49	43	52	62
27	61	67	61	e60	225	81	59	61	59	46	89	62
28	66	65	58	e60	146	78	60	61	53	84	61	59
29	56	62	54	e60	96	75	62	51	49	63	61	57
30	64	62	60	e60	—	71	58	58	47	50	54	54
31	65	—	62	57	—	63	—	50	—	71	59	—
TOTAL	2054	1892	2118	1871	2185	2447	2095	2190	1643	1449	1984	2135
MEAN	66.3	63.1	68.3	60.4	75.3	78.9	69.8	70.6	54.8	46.7	64.0	71.2
MAX	133	132	133	79	225	132	149	187	72	84	207	203
MIN	54	51	49	44	41	54	57	50	47	37	48	53
CFSM	1.15	1.09	1.18	1.05	1.31	1.37	1.21	1.22	.95	.81	1.11	1.23
IN.	1.32	1.22	1.37	1.21	1.41	1.58	1.35	1.41	1.06	.93	1.28	1.38

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 2000, BY WATER YEAR (WY)

	MEAN	78.2	82.3	76.4	71.1	70.9	88.7	118	86.7	71.0	65.3	64.3	72.8
MAX	112	112	105	94.9	90.1	136	164	142	94.5	106	116	120	
(WY)	1987	1989	1972	1973	1984	1976	1960	1983	1993	1994	1995	1961	
MIN	56.6	63.1	61.1	55.1	55.7	65.0	69.8	54.4	50.7	46.7	42.6	53.2	
(WY)	1964	2000	1959	1959	1957	1958	2000	1958	1958	2000	1958	1966	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1951 - 2000

ANNUAL TOTAL	24818		24063									
ANNUAL MEAN	68.0		65.7									
HIGHEST ANNUAL MEAN										78.8		
LOWEST ANNUAL MEAN										90.7		1985
HIGHEST DAILY MEAN										62.3		1958
LOWEST DAILY MEAN	204	Jun 14	225	Feb 27						829	Aug 18	1995
ANNUAL SEVEN-DAY MINIMUM	37	Sep 1	37	Jul 19						24	Jan 8	1957
INSTANTANEOUS PEAK FLOW	43	Sep 1	41	Jul 15						38	Aug 2	1958
INSTANTANEOUS PEAK STAGE			411	Sep 11	(a)1500						May 15	1957
INSTANTANEOUS LOW FLOW			4.42	Sep 11	(b)6.49						Aug 18	1995
ANNUAL RUNOFF (CFSM)	1.18		9.1	Mar 24	(c)8.4						Feb 17	1993
ANNUAL RUNOFF (INCHES)	16.00		1.14							1.37		
10 PERCENT EXCEEDS	92		15.51							18.56		
50 PERCENT EXCEEDS	61		83							109		
90 PERCENT EXCEEDS	51		61							71		
			49							55		

(a) From rating curve extended above 500 ft<sup>3</sup>/s, result of failure of Lansing Club Dam; gage height 6.80 ft, from floodmark, site and datum then in use.

(b) Present site and datum.

(c) Result of freezeup.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE HURON

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE1/4 NE1/4 sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft downstream from Kleber Dam, 1,000 ft upstream from Milligan Creek, 3.0 mi northwest of Tower, and 10.8 mi upstream from Black Lake.

DRAINAGE AREA.--311 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1942 to current year.

REVISED RECORDS.--WSP 1307: 1942. WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft above sea level (Stanley Engineering Co. bench mark). Prior to Aug. 1, 1949, at site 1 mi upstream at different datum.

REMARKS.--Records good. Flow completely regulated by Kleber Dam 400 ft upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	251	175	189	169	159	543	216	189	200	135	132	173
2	283	176	174	197	159	506	193	189	169	127	191	151
3	292	178	159	196	180	442	195	224	165	130	148	196
4	151	178	213	198	161	335	225	207	160	130	128	219
5	147	178	259	213	154	318	236	183	159	130	142	210
6	216	178	259	170	146	316	213	159	157	127	122	198
7	205	178	324	187	154	289	220	156	148	104	97	149
8	171	172	323	218	154	254	218	186	143	91	179	145
9	165	162	259	181	154	329	213	186	143	102	256	153
10	167	159	259	177	154	388	214	180	143	120	339	154
11	169	159	237	216	154	337	213	181	173	122	361	213
12	163	160	214	218	154	325	204	200	163	110	320	256
13	162	159	235	220	154	261	196	286	157	95	320	297
14	170	160	236	205	154	241	191	376	164	113	199	392
15	171	172	213	157	154	246	182	381	167	119	130	259
16	199	191	200	186	154	246	202	368	164	119	133	192
17	182	179	206	199	154	246	213	279	174	124	134	152
18	185	145	192	146	154	246	214	248	174	103	149	139
19	202	149	163	148	170	246	212	259	149	103	149	193
20	182	165	179	171	188	246	212	276	138	103	128	152
21	173	165	196	171	166	246	240	299	146	103	127	144
22	186	165	141	144	156	246	264	238	168	107	131	150
23	233	172	128	155	184	246	386	236	143	128	161	135
24	213	186	131	184	219	246	312	248	127	116	195	196
25	220	212	131	182	280	277	235	249	126	88	147	201
26	254	229	149	166	433	292	237	234	146	99	137	200
27	211	226	190	158	683	257	186	207	146	113	143	171
28	188	221	198	154	746	281	160	207	146	134	163	158
29	178	194	174	135	646	282	189	165	146	165	206	155
30	185	189	154	142	---	269	200	158	146	170	153	148
31	180	---	154	157	---	236	---	207	---	150	137	---
TOTAL	6054	5332	6239	5520	6658	9238	6591	7161	4650	3680	5457	5611
MEAN	195	178	201	178	230	298	220	231	155	119	176	187
MAX	292	229	324	220	746	543	386	381	200	170	361	372
MIN	147	145	128	135	146	236	160	156	126	88	97	144
CFSM	.63	.57	.65	.57	.74	.96	.71	.74	.50	.38	.57	.60
IN.	.72	.64	.75	.66	.80	1.10	.79	.86	.56	.44	.65	.67

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 2000, BY WATER YEAR (WY)

	MEAN	244	269	248	221	220	338	535	343	248	202	184	217
MAX	459	489	409	433	398	594	882	638	405	408	351	377	
(WY)	1984	1946	1972	1973	1984	1976	1960	1983	1976	1974	1972	1974	1974
MIN	138	130	163	150	138	188	220	177	140	112	86.1	116	
(WY)	1957	1950	1990	1948	1948	1956	2000	1999	1958	1966	1949	1979	1979

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1943 - 2000
ANNUAL TOTAL	81014	72191	
ANNUAL MEAN	222	197	272
HIGHEST ANNUAL MEAN			350
LOWEST ANNUAL MEAN			188
HIGHEST DAILY MEAN	547	746	1860
LOWEST DAILY MEAN	107	88	4.0
ANNUAL SEVEN-DAY MINIMUM	111	106	50
INSTANTANEOUS PEAK FLOW		794	2340
INSTANTANEOUS PEAK STAGE		4.35	7.13
INSTANTANEOUS LOW FLOW		14	.60
ANNUAL RUNOFF (CFSM)	.71	.63	.88
ANNUAL RUNOFF (INCHES)	9.69	8.64	11.90
10 PERCENT EXCEEDS	349	279	463
50 PERCENT EXCEEDS	195	179	228
90 PERCENT EXCEEDS	137	131	145

## STREAMS TRIBUTARY TO LAKE HURON

442409084274001 LAKE ST. HELEN AT ST. HELEN, MI

LOCATION.--Lat 44°22'27", long 84°25'17", in SE1/4 NW1/4 sec.22, T.23 N., R.1 W., Roscommon County, Hydrologic Unit 04070007, at Marina, at end of Monroe Sreet, in St. Helen.

DRAINAGE AREA.--72.2 mi<sup>2</sup> at outlet.

PERIOD OF RECORD.--June 1942 to December 1959, August 1993 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,149.01 ft above sea level. June 18, 1942 to May 21, 1947, nonrecording gage at Artesia Beach at same datum. May 22, 1947 to Dec. 31, 1959, and Aug. 17, 1993 to May 21, 1998, nonrecording gage at outlet at same datum.

REMARKS.--Inlets are Marsh Creek, Russell Creek and Cameron Creek. The outlet is South Branch of the Au Sable River. Lake elevation controlled by dam. Established legal level; 1,155.25 ft, minimum winter level 1,154.75 ft, above sea level. Prior to May 5, 1998, established legal level; 1,154.15 ft, minimum winter level 1,153.65 ft, above sea level. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.26 ft, Apr. 1, 1949, May 24, 2000; minimum observed, 4.64 ft, Jan. 21, 1954.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 7.26 ft, May 24; minimum, 5.73 ft, Feb. 8, 9, 10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.37	6.32	5.97	5.76	5.76	6.20	6.64	6.80	6.89	6.56	6.56	6.55
2	6.39	6.32	5.95	5.78	5.75	6.23	6.64	6.77	6.96	6.54	6.59	6.55
3	6.39	6.33	5.95	5.79	5.75	6.24	6.66	6.75	6.91	6.58	6.60	6.55
4	6.41	6.29	5.98	5.83	5.76	6.25	6.71	6.73	6.87	6.59	6.59	6.50
5	6.42	6.30	6.04	5.83	5.75	6.25	6.68	6.70	6.82	6.57	6.59	6.48
6	6.41	6.27	6.07	5.83	5.75	6.25	6.72	6.68	6.81	6.57	6.58	6.46
7	6.39	6.25	6.07	5.83	5.74	6.25	6.68	6.65	6.79	6.56	6.62	6.46
8	6.41	6.25	6.07	5.82	5.74	6.26	6.72	6.63	6.76	6.56	6.59	6.43
9	6.39	6.28	6.07	5.81	5.73	6.29	6.73	6.63	6.75	6.59	6.59	6.41
10	6.38	6.21	6.10	5.83	5.74	6.29	6.73	6.66	6.76	6.57	6.58	6.41
11	6.35	6.19	6.05	5.85	5.76	6.31	6.72	6.62	6.72	6.57	6.56	6.40
12	6.33	6.21	6.04	5.84	5.75	6.32	6.73	6.71	6.69	6.56	6.55	6.40
13	6.38	6.20	6.03	5.84	5.76	6.30	6.73	6.89	6.67	6.56	6.55	6.38
14	6.39	6.21	6.01	5.84	5.77	6.33	6.74	6.90	6.68	6.56	6.54	6.35
15	6.39	6.17	6.01	5.84	5.77	6.33	6.73	6.92	6.69	6.54	6.55	6.33
16	6.40	6.14	6.01	5.83	5.78	6.33	6.71	6.96	6.65	6.53	6.53	6.31
17	6.39	6.13	5.98	5.82	5.77	6.35	6.71	7.00	6.59	6.54	6.50	6.29
18	6.36	6.11	5.96	5.82	5.77	6.36	6.74	7.09	6.55	6.50	6.51	6.26
19	6.35	6.10	5.95	5.82	5.77	6.36	6.73	7.12	6.54	6.48	6.49	6.24
20	6.37	6.09	5.95	5.83	5.76	6.39	6.71	7.17	6.51	6.48	6.47	6.24
21	6.34	6.07	5.94	5.82	5.76	6.43	6.80	7.18	6.56	6.49	6.46	6.26
22	6.39	6.07	5.92	5.81	5.76	6.46	6.87	7.17	6.55	6.47	6.46	6.19
23	6.38	6.06	5.89	5.81	5.76	6.48	6.88	7.17	6.51	6.46	6.48	6.22
24	6.36	6.16	5.87	5.80	5.79	6.50	6.87	7.17	6.51	6.45	6.47	6.21
25	6.36	6.07	5.85	5.80	5.83	6.62	6.86	7.14	6.51	6.44	6.47	6.19
26	6.33	6.06	5.84	5.79	5.89	6.56	6.86	7.09	6.55	6.43	6.49	6.20
27	6.31	6.08	5.82	5.78	6.02	6.61	6.85	7.03	6.57	6.43	6.51	6.17
28	6.30	6.05	5.81	5.77	6.10	6.59	6.83	6.98	6.56	6.46	6.51	6.14
29	6.29	6.02	5.80	5.77	6.14	6.64	6.81	6.97	6.55	6.46	6.55	6.14
30	6.31	5.99	5.78	5.76	---	6.62	6.81	6.94	6.56	6.47	6.56	6.13
31	6.31	---	5.76	5.76	---	6.63	---	6.92	---	6.54	6.56	---
MEAN	6.37	6.17	5.95	5.81	5.80	6.39	6.75	6.91	6.67	6.52	6.54	6.33
MAX	6.42	6.33	6.10	5.85	6.14	6.64	6.88	7.18	6.96	6.59	6.62	6.55
MIN	6.29	5.99	5.76	5.76	5.73	6.20	6.64	6.62	6.51	6.43	6.46	6.13

## STREAMS TRIBUTARY TO LAKE HURON

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE1/4 SE1/4 sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft upstream from Smith Bridge, 400 ft downstream from bridge on State Highway 72, 4.6 mi upstream from mouth, and 9.1 mi west of Luzerne.

DRAINAGE AREA.--401 mi<sup>2</sup>.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to September 1989, October 1990 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,070 ft above sea level, from topographic map. Apr. 19, 1951 to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by dam upstream from station.  
Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	163	172	160	e147	129	318	157	180	218	126	155	106
2	147	172	163	e150	e129	289	156	179	280	121	181	104
3	139	167	169	155	129	262	155	178	286	119	178	111
4	135	162	186	157	127	239	156	181	288	119	156	110
5	132	158	219	149	127	223	154	184	287	116	135	110
6	132	156	236	147	e120	215	152	182	264	115	128	111
7	133	156	237	146	e125	211	152	177	239	117	126	117
8	133	157	239	147	e115	216	152	176	221	113	120	122
9	133	156	233	144	129	235	153	175	269	117	123	122
10	134	155	224	150	126	252	157	166	259	125	116	127
11	138	153	216	161	125	247	163	165	265	121	109	133
12	144	152	209	161	e110	234	163	176	248	114	104	136
13	187	150	204	e150	e120	216	164	283	233	110	102	133
14	211	155	197	e140	123	203	162	279	224	107	104	129
15	203	159	196	150	127	202	161	282	226	106	111	128
16	201	157	195	148	128	206	164	287	223	106	110	127
17	189	154	177	e110	e115	196	166	286	208	104	103	126
18	174	153	176	e125	e125	173	165	319	196	101	100	125
19	173	154	171	e135	126	164	163	336	187	100	98	125
20	173	154	182	e130	128	168	174	333	179	100	96	126
21	172	154	e160	e110	127	169	215	337	164	102	94	134
22	177	154	e140	e100	131	174	236	324	151	102	94	137
23	182	154	e130	e125	141	176	242	306	145	100	98	139
24	180	160	e145	e130	161	175	241	295	135	99	111	138
25	175	164	e155	e135	193	175	231	281	129	97	105	138
26	174	165	157	e125	241	175	218	264	141	96	105	133
27	170	166	e150	e110	317	180	205	255	165	111	117	129
28	167	165	e145	e120	333	179	195	244	156	159	114	126
29	164	165	e150	e125	326	176	189	234	140	138	108	125
30	162	162	e150	e130	---	170	183	225	132	131	113	124
31	172	---	e145	e130	---	162	---	221	---	154	111	---
TOTAL	5069	4761	5616	4242	4453	6380	5344	7510	6258	3546	3625	3751
MEAN	164	159	181	137	154	206	178	242	209	114	117	125
MAX	211	172	239	161	333	318	242	337	288	159	181	139
MIN	132	150	130	100	110	162	152	165	129	96	94	104
CFSM	.41	.40	.45	.34	.38	.51	.44	.60	.52	.29	.29	.31
IN.	.47	.44	.52	.39	.41	.59	.50	.70	.58	.33	.34	.35

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 2000, BY WATER YEAR (WY)

MEAN	210	236	232	197	186	259	393	282	208	166	149	171
MAX	456	444	373	275	251	508	596	396	307	251	255	379
(WY)	1987	1992	1992	1973	1984	1976	1985	1983	1993	1969	1994	1975
MIN	120	159	148	132	141	159	178	145	124	107	111	111
(WY)	1967	2000	1977	1977	1978	1978	2000	1999	1977	1977	1998	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR		FOR 2000 WATER YEAR		WATER YEARS 1967 - 2000	
ANNUAL TOTAL	61453		60555			
ANNUAL MEAN	168		165		224	
HIGHEST ANNUAL MEAN					280	
LOWEST ANNUAL MEAN					158	
HIGHEST DAILY MEAN	269	Feb 15	337	May 21	1110	Mar 29 1976
LOWEST DAILY MEAN	96	Sep 19	94	Aug 21	94	Aug 21 2000
ANNUAL SEVEN-DAY MINIMUM	101	Sep 16	98	Aug 17	98	Aug 17 2000
INSTANTANEOUS PEAK FLOW			339	May 18	(a)1120	Mar 28 1976
INSTANTANEOUS PEAK STAGE			5.15	May 18	(b)7.75	Jan 28 1986
INSTANTANEOUS LOW FLOW			94	(c)	(d)78	Feb 12 1981
ANNUAL RUNOFF (CFSM)			.41		.56	
ANNUAL RUNOFF (INCHES)	5.70		5.62		7.59	
10 PERCENT EXCEEDS	223		240		351	
50 PERCENT EXCEEDS	164		155		198	
90 PERCENT EXCEEDS	124		110		133	

(a) Gage height 7.30 ft.

(b) Backwater from ice.

(c) Aug. 21, 22.

(d) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

445512084415301 OTSEGO LAKE NEAR GAYLORD, MI

LOCATION.--Lat 44°55'52", long 84°41'33", in SW1/4 SE1/4 sec.5, T.29 N., R.3 W., Otsego County, Hydrologic Unit 04070007, at Otsego Lake State Park, 200 ft northwest of boat ramp, 6.7 mi south of Gaylord.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--August 1942 to current year, except for winter months 1942-43, 1943-44, 1977-78.

GAGE.--Water-stage recorder. Datum of gage is 1,270.03 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Aug. 18, 1958, nonrecording gage at datum 2.00 ft higher.

REMARKS.--Otsego Lake has no natural inlets or outlets. In December 1972 an outlet tube and pump system was installed connecting the lake with the North Branch Au Sable River to lower lake levels. Established legal level; maximum, 1,273.5 ft, minimum, 1,272.0 ft, above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 5.10 ft, May 6, 7, 1972; minimum, 0.96 ft, Aug. 14, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 2.57 ft, Mar. 9; minimum, 1.66 ft, Sept. 7.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.21	2.20	2.14	2.33	2.42	2.51	2.44	2.34	2.27	2.14	1.84	1.72
2	2.20	2.24	2.15	2.34	2.42	2.51	2.44	2.33	2.31	2.13	1.85	1.76
3	2.20	2.22	2.16	2.36	2.42	2.51	2.43	2.31	2.29	2.13	1.83	1.77
4	2.20	2.18	2.20	2.39	2.42	2.50	2.45	2.29	2.28	2.11	1.80	1.78
5	2.19	2.17	2.26	2.39	2.42	2.50	2.41	2.28	2.26	2.09	1.78	1.74
6	2.20	2.17	2.25	2.39	2.41	2.50	2.42	2.26	2.23	2.08	1.77	1.72
7	2.16	2.16	2.22	2.39	2.41	2.50	2.43	2.26	2.21	2.06	1.76	1.70
8	2.15	2.14	2.22	2.39	2.40	2.50	2.45	2.25	2.19	2.03	1.81	1.71
9	2.17	2.14	2.23	2.39	2.40	2.54	2.42	2.26	2.32	2.02	1.89	1.70
10	2.17	2.16	2.26	2.40	2.41	2.54	2.42	2.23	2.33	2.02	1.89	1.78
11	2.17	2.14	2.25	2.42	2.42	2.53	2.40	2.20	2.37	2.00	1.88	1.85
12	2.13	2.13	2.25	2.42	2.42	2.53	2.39	2.25	2.35	1.98	1.86	1.87
13	2.18	2.11	2.25	2.42	2.43	2.52	2.38	2.33	2.33	1.96	1.85	1.84
14	2.16	2.15	2.24	2.42	2.43	2.52	2.36	2.32	2.30	1.98	1.84	1.85
15	2.15	2.13	2.25	2.42	2.43	2.52	2.38	2.31	2.30	1.97	1.83	1.85
16	2.17	2.13	2.27	2.41	2.45	2.53	2.37	2.29	2.28	1.94	1.82	1.81
17	2.18	2.09	2.28	2.41	2.44	2.51	2.38	2.29	2.29	1.92	1.78	1.79
18	2.18	2.09	2.28	2.41	2.44	2.49	2.37	2.36	2.26	1.89	1.78	1.75
19	2.16	2.08	2.27	2.42	2.44	2.50	2.36	2.34	2.26	1.87	1.76	1.75
20	2.17	2.09	2.28	2.42	2.43	2.50	2.41	2.32	2.24	1.84	1.74	1.75
21	2.15	2.08	2.29	2.42	2.43	2.51	2.45	2.31	2.24	1.85	1.72	1.78
22	2.20	2.08	2.29	2.42	2.43	2.50	2.41	2.31	2.25	1.83	1.72	1.78
23	2.26	2.09	2.30	2.42	2.43	2.50	2.40	2.34	2.24	1.81	1.74	1.83
24	2.23	2.16	2.30	2.43	2.44	2.49	2.41	2.34	2.22	1.80	1.73	1.82
25	2.21	2.16	2.30	2.43	2.46	2.50	2.39	2.34	2.22	1.78	1.71	1.80
26	2.22	2.17	2.30	2.43	2.46	2.49	2.38	2.33	2.22	1.77	1.72	1.78
27	2.21	2.17	2.31	2.43	2.49	2.49	2.37	2.31	2.23	1.78	1.75	1.79
28	2.20	2.16	2.32	2.42	2.50	2.51	2.35	2.30	2.20	1.80	1.73	1.76
29	2.20	2.18	2.33	2.42	2.50	2.50	2.35	2.28	2.19	1.79	1.73	1.73
30	2.18	2.17	2.33	2.42	---	2.47	2.32	2.25	2.17	1.79	1.72	1.73
31	2.22	---	2.33	2.42	---	2.46	---	2.26	---	1.81	1.69	---
MEAN	2.19	2.14	2.26	2.41	2.43	2.51	2.40	2.30	2.26	1.93	1.78	1.78
MAX	2.26	2.24	2.33	2.43	2.50	2.54	2.45	2.36	2.37	2.14	1.89	1.87
MIN	2.13	2.08	2.14	2.33	2.40	2.46	2.32	2.20	2.17	1.77	1.69	1.70

## STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI

LOCATION.--Lat 44°40'37", long 84°17'33", in SE1/4 NE1/4 sec.3, T.26 N., R.1 E., Oscoda County, Hydrologic Unit 04070007, at Parmalee Bridge Campground, 4.5 mi northwest of Luzerne, on County Road 489, and 85.0 mi upstream from mouth.

DRAINAGE AREA.--1,108 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1908 to May 1916, December 1930 to June 1931, October 1995 to current year. Prior to October 1914, published as "near Lovells".

REVISED RECORDS.--WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,000 ft above sea level, from topographic map. October 1908 to May 1916, nonrecording gage at site 5 mi upstream, datum of gage 1,004.69 ft above sea level (levels by Fargo Engineering Co.). December 1930 to June 1931, nonrecording gage at present site at different datum.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	699	648	595	e620	e590	994	618	613	674	587	664	513
2	658	637	598	e640	e580	948	615	633	798	576	762	545
3	629	627	616	643	e600	862	614	619	824	574	723	562
4	615	612	700	640	e600	806	614	610	782	566	638	554
5	603	598	810	607	e580	768	606	606	757	556	582	535
6	591	590	856	606	e550	742	607	600	723	553	555	526
7	576	581	795	596	e600	729	607	597	686	557	556	521
8	571	581	757	585	e530	742	619	597	662	550	555	522
9	574	587	729	590	e580	815	620	653	883	552	575	521
10	571	582	715	610	e590	856	617	650	1040	557	602	533
11	568	576	699	649	e580	802	615	622	1050	549	560	594
12	570	575	679	640	e500	762	610	680	955	531	531	612
13	e650	575	664	619	e580	721	605	1100	843	521	517	582
14	711	576	651	e580	e600	704	604	1070	801	519	514	567
15	681	599	655	623	e600	702	602	927	835	520	508	553
16	666	609	662	591	e600	709	615	849	805	515	507	543
17	668	603	633	e490	539	696	620	829	748	513	494	539
18	638	598	619	e520	e570	663	617	979	701	501	498	534
19	622	596	606	e590	589	642	609	1060	678	499	492	530
20	627	581	641	596	559	647	641	966	663	495	488	532
21	628	597	600	e500	542	660	780	897	665	502	486	571
22	650	586	e520	e480	570	666	796	851	636	503	494	578
23	676	584	e480	e560	598	672	759	825	623	500	521	628
24	693	638	e520	e580	650	674	724	815	611	494	516	626
25	677	642	e600	e600	744	691	693	788	596	490	508	596
26	650	633	e660	e560	889	685	665	747	625	487	517	572
27	631	624	e620	e520	1160	694	637	724	707	504	569	554
28	616	613	e600	e560	1140	681	619	700	659	612	563	541
29	612	610	e610	e580	1030	663	613	687	626	577	546	536
30	606	605	e620	e590	---	645	608	677	606	553	534	532
31	649	---	e600	e600	---	628	---	676	---	627	526	---
TOTAL	19576	18063	20110	18165	18840	22669	19169	23647	22262	16640	17101	16652
MEAN	631	602	649	586	650	731	639	763	742	537	552	555
MAX	711	648	856	649	1160	994	796	1100	1050	627	762	628
MIN	568	575	480	480	500	628	602	597	596	487	486	513
CFSM	.57	.54	.59	.53	.59	.66	.58	.69	.67	.48	.50	.50
IN.	.66	.61	.68	.61	.63	.76	.64	.79	.75	.56	.57	.56

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2000, BY WATER YEAR (WY)

	MEAN	785	850	848	769	752	902	1318	1103	896	732	703	716
MAX	1156	1289	1336	1004	900	1349	1747	1592	1380	1093	1129	1223	1223
(WY)	1912	1912	1912	1912	1912	1913	1913	1912	1912	1912	1912	1912	1912
MIN	629	602	649	586	650	722	639	668	693	537	552	531	531
(WY)	1909	2000	2000	2000	2000	1909	2000	1999	1998	2000	2000	2000	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1909 - 2000

ANNUAL TOTAL	251107												
ANNUAL MEAN	688												
HIGHEST ANNUAL MEAN										864			
LOWEST ANNUAL MEAN										1207			1912
HIGHEST DAILY MEAN	1230									3220			2000
LOWEST DAILY MEAN	480									480			Dec 23 1999
ANNUAL SEVEN-DAY MINIMUM	488									488			Sep 4 1999
INSTANTANEOUS PEAK FLOW										(b)3300			Apr 1 1998
INSTANTANEOUS PEAK STAGE										(d)6.85			Jan 26 1996
INSTANTANEOUS LOW FLOW										476			Sep 5 1999
ANNUAL RUNOFF (CFSM)	.62									.78			
ANNUAL RUNOFF (INCHES)	8.43									10.60			
10 PERCENT EXCEEDS	853									1260			
50 PERCENT EXCEEDS	668									771			
90 PERCENT EXCEEDS	534									606			

(a) Gage height 3.69 ft.

(b) Does not include water years 1909 to 1916, 1931.

(c) Backwater from ice.

(d) Backwater from ice; does not include water years 1909 to 1916, 1931.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON  
04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.5°C, July 5, 1999; minimum, -0.5°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum recorded, 15.1 mg/L, Dec. 17, 19, 1999, but may have been higher during instrument malfunction Dec. 19, 1999; minimum recorded, 6.5 mg/L, July 15, 1998, July 17, 1999, but may have been lower during instrument malfunction July 21-23, 1998.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 22.0°C, June 25; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded, 15.1 mg/L, Dec. 17, 19, but may have been higher during instrument malfunction Dec. 19; minimum, 7.0 mg/L, June 11.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	10.5	9.5	10.0	9.5	8.0	8.5	2.0	.5	1.5	-.5	-.5	-.5
2	10.0	8.5	9.5	9.5	7.0	8.5	4.0	2.0	3.0	1.5	-.5	.5
3	8.5	7.5	7.5	7.0	4.0	5.5	6.0	4.0	4.5	1.5	1.0	1.5
4	8.5	7.0	8.0	4.5	3.5	4.0	7.0	6.0	6.5	1.0	.0	.5
5	8.5	7.5	8.0	6.5	4.5	5.5	7.0	5.0	6.5	.5	.0	.0
6	8.5	7.5	8.0	6.0	4.5	5.0	5.0	3.5	4.0	1.0	.5	.5
7	7.5	6.0	6.5	4.5	3.5	4.0	3.5	3.0	3.5	1.0	.5	.5
8	9.5	6.5	7.5	6.0	4.0	5.0	3.5	3.0	3.0	.5	.0	.5
9	11.5	9.5	10.5	9.0	6.0	7.5	3.5	2.5	3.0	2.0	.5	1.0
10	12.5	11.0	12.0	9.0	7.5	8.5	4.0	3.5	3.5	3.0	2.0	2.5
11	11.5	9.5	10.0	7.5	5.0	6.0	3.5	2.5	3.0	3.0	2.0	2.5
12	9.5	8.5	9.0	5.5	5.0	5.0	2.5	2.0	2.5	2.0	.5	1.0
13	---	---	---	7.5	5.5	6.5	2.5	2.0	2.5	.5	-.5	.0
14	8.5	7.0	7.5	7.5	6.0	6.5	2.5	2.0	2.0	-.5	-.5	-.5
15	9.0	7.5	8.0	6.0	4.5	5.0	2.5	2.5	2.5	.0	-.5	.0
16	10.0	9.0	9.5	4.5	3.0	4.0	2.5	1.5	2.0	.0	-.5	.0
17	9.5	8.0	9.0	3.0	2.0	2.5	1.5	.0	.5	-.5	-.5	-.5
18	8.0	7.5	7.5	3.5	3.0	3.0	.5	.0	.5	-.5	-.5	-.5
19	7.5	7.0	7.0	5.5	3.5	4.0	.0	-.5	-.5	-.5	-.5	-.5
20	7.5	7.0	7.5	6.5	5.5	6.0	1.5	.0	.5	-.5	-.5	-.5
21	7.0	6.0	6.5	6.0	5.5	6.0	.0	-.5	-.5	-.5	-.5	-.5
22	7.5	7.0	7.5	7.5	6.0	7.0	-.5	-.5	-.5	-.5	-.5	-.5
23	7.0	6.0	6.5	7.5	7.0	7.0	-.5	-.5	-.5	-.5	-.5	-.5
24	6.0	5.5	6.0	8.0	5.5	7.0	-.5	-.5	-.5	-.5	-.5	-.5
25	6.5	5.0	6.0	5.5	3.5	4.0	-.5	-.5	-.5	-.5	-.5	-.5
26	6.5	6.0	6.0	4.0	3.5	3.5	-.5	-.5	-.5	-.5	-.5	-.5
27	6.5	5.5	6.0	4.0	4.0	4.0	-.5	-.5	-.5	-.5	-.5	-.5
28	7.5	6.0	6.5	4.0	3.5	4.0	-.5	-.5	-.5	-.5	-.5	-.5
29	7.5	6.0	7.0	3.5	2.0	3.0	-.5	-.5	-.5	-.5	-.5	-.5
30	10.0	7.5	8.5	2.5	1.5	2.0	-.5	-.5	-.5	-.5	-.5	-.5
31	11.0	9.5	10.5	---	---	---	-.5	-.5	-.5	-.5	-.5	-.5
MONTH	---	---	---	9.5	1.5	5.3	7.0	-.5	1.6	3.0	-.5	.1

## STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	-5	-5	-5	4.5	4.0	4.5	7.5	7.0	7.5	13.5	12.0	13.0
2	-5	-5	-5	4.0	2.5	3.5	9.5	7.5	8.5	14.5	11.5	13.0
3	-5	-5	-5	3.5	2.0	3.0	9.5	8.5	9.0	15.0	12.5	14.0
4	-5	-5	-5	5.0	3.0	4.0	9.0	5.0	7.0	17.0	14.0	15.5
5	-5	-5	-5	5.5	4.0	4.5	7.0	3.5	5.0	18.5	15.5	17.0
6	-5	-5	-5	6.0	4.0	5.0	7.0	5.5	6.5	19.5	17.0	18.0
7	-5	-5	-5	8.5	5.5	7.0	5.5	4.0	4.5	20.0	18.0	17.0
8	-5	-5	-5	10.0	8.0	9.0	6.0	3.0	4.5	19.5	18.0	17.0
9	-5	-5	-5	10.0	6.0	9.0	6.0	3.5	4.5	19.5	17.0	17.0
10	-5	-5	-5	6.0	3.0	4.0	6.0	3.0	4.5	17.0	14.0	15.5
11	-5	-5	-5	3.0	1.5	2.5	6.0	5.0	5.5	15.5	12.0	17.5
12	-5	-5	-5	3.0	2.0	2.5	6.0	4.0	5.0	13.5	11.5	12.5
13	-5	-5	-5	2.5	1.5	2.0	6.0	5.0	6.0	13.5	12.5	13.5
14	-5	-5	-5	4.5	2.0	3.5	10.5	6.0	8.0	12.5	11.0	11.5
15	.0	-5	.0	4.5	3.5	4.0	11.0	10.0	10.5	12.5	9.5	11.0
16	1.0	.0	.5	4.5	3.5	4.0	10.0	6.5	8.0	12.5	11.0	11.5
17	.0	-5	.0	4.0	2.5	3.5	7.0	5.5	6.0	14.0	11.0	12.0
18	.0	-5	-5	4.0	2.0	3.0	9.0	6.0	7.5	14.0	12.0	13.0
19	.5	-5	.0	4.5	4.0	4.5	10.0	9.0	9.5	13.5	10.5	12.0
20	1.0	.5	.5	5.0	4.0	4.5	9.5	7.0	8.5	14.0	11.0	12.5
21	2.0	.0	1.0	6.5	5.0	5.5	7.0	6.0	6.5	15.0	12.5	13.5
22	3.5	1.0	2.0	7.5	6.5	7.0	10.0	6.0	8.0	15.0	13.0	14.0
23	5.0	3.5	4.5	9.0	6.5	8.0	10.5	9.0	9.5	14.0	13.0	13.5
24	4.5	4.0	4.5	9.5	8.0	9.0	11.5	8.5	10.0	15.0	13.0	14.0
25	4.5	4.0	4.5	11.0	9.5	10.0	11.5	9.0	10.5	14.5	13.0	14.0
26	6.0	4.5	5.0	10.0	8.0	9.0	12.0	9.5	11.0	15.5	12.0	13.5
27	6.0	4.5	5.5	9.0	8.0	8.5	13.0	10.0	11.5	15.5	14.0	15.0
28	4.5	3.0	3.5	8.0	6.5	7.5	13.0	11.0	12.0	15.5	13.5	14.5
29	4.5	2.5	3.5	7.5	5.0	6.5	13.5	11.5	12.5	16.5	14.0	15.0
30	---	---	---	7.0	4.0	5.5	13.5	11.0	12.5	16.5	15.0	15.5
31	---	---	---	8.0	5.5	6.5	---	---	---	17.5	15.0	17.0
MONTH	6.0	-5	.9	11.0	1.5	5.5	13.5	3.0	8.0	20.0	9.5	14.3

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST				SEPTEMBER
1	17.0	15.5	16.5	19.0	16.5	17.5	19.5	18.5	19.0	20.5	19.5	20.0
2	15.5	14.0	15.0	20.0	18.0	19.0	19.0	18.0	18.5	19.5	17.0	17.0
3	16.0	12.5	14.0	20.5	18.5	19.5	19.0	16.5	18.0	18.0	16.0	17.0
4	16.0	15.0	15.5	21.0	18.0	19.5	18.5	16.5	17.5	18.0	16.0	17.0
5	16.5	14.5	15.5	21.0	18.5	20.0	19.0	16.5	17.5	16.0	13.5	14.5
6	16.5	13.5	15.0	20.5	17.0	18.5	18.5	17.5	18.0	14.5	12.5	13.5
7	17.0	15.5	16.5	18.5	15.0	17.0	19.5	17.0	18.0	16.5	13.0	15.0
8	20.0	16.0	17.5	18.0	16.5	17.0	19.0	17.5	18.0	18.5	16.5	17.5
9	20.0	18.5	19.5	18.5	16.0	17.0	19.0	16.5	18.0	17.5	16.0	17.5
10	21.5	18.0	19.5	19.5	17.5	18.5	19.0	17.0	18.0	17.5	16.5	17.0
11	21.5	18.0	20.0	19.5	17.5	18.5	20.0	17.5	18.5	17.5	16.5	17.0
12	18.0	15.5	16.0	18.5	16.5	17.5	19.5	17.5	18.5	17.5	16.0	17.5
13	15.5	14.5	14.5	20.5	17.0	18.5	19.0	18.0	18.5	16.0	14.0	15.0
14	18.5	14.5	16.0	21.0	19.0	20.0	20.5	17.5	19.0	15.0	14.0	14.5
15	19.0	18.0	18.5	20.5	18.5	19.0	20.5	19.0	20.0	14.5	12.0	13.0
16	18.5	17.5	18.0	19.0	17.0	18.0	20.0	18.0	19.0	12.0	10.5	11.5
17	18.0	16.0	17.0	21.0	17.5	19.5	18.5	14.5	16.0	14.0	11.5	12.5
18	17.5	16.0	17.0	20.0	16.0	18.0	16.5	14.0	15.5	15.0	12.5	13.5
19	18.5	16.0	17.0	17.5	14.0	16.0	16.0	14.0	15.0	16.0	14.5	15.0
20	18.0	17.0	17.0	17.0	15.0	16.0	16.0	13.5	15.0	15.5	13.5	15.0
21	19.5	17.0	18.0	15.0	14.5	14.5	16.0	14.0	15.0	13.5	11.5	12.5
22	19.5	17.5	18.0	15.5	13.5	14.5	15.5	14.5	14.5	11.5	10.0	10.5
23	18.5	16.0	17.5	16.5	14.0	15.0	17.5	14.5	16.0	11.0	10.0	10.5
24	20.0	17.5	19.0	18.0	14.5	16.0	18.0	15.5	17.0	11.0	10.0	10.5
25	22.0	19.0	20.5	18.5	16.0	17.0	18.0	15.5	17.0	10.5	9.0	9.5
26	21.0	18.0	19.5	18.5	17.0	18.0	17.5	16.5	17.0	10.5	8.0	9.5
27	18.5	16.0	17.5	18.5	17.0	18.0	17.0	15.5	16.0	11.0	10.0	10.5
28	18.0	15.5	16.5	18.5	16.5	17.5	18.0	15.5	16.5	10.0	8.0	9.0
29	17.0	15.0	16.0	19.0	17.5	18.5	17.5	17.0	17.5	11.0	8.0	9.5
30	17.5	15.0	16.5	19.0	17.5	18.0	17.5	15.0	16.5	13.5	11.0	12.0
31	---	---	---	19.0	17.0	18.0	20.0	16.5	18.5	---	---	---
MONTH	22.0	12.5	17.1	21.0	13.5	17.7	20.5	13.5	17.3	20.5	8.0	13.8

## STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	10.2	8.7	9.5	11.6	10.0	10.8	13.4	12.7	13.0	13.6	13.1	13.2			
2	10.2	9.1	9.6	11.1	9.8	10.5	12.8	12.0	12.3	13.1	12.6	12.8			
3	10.9	9.4	10.2	12.0	10.7	11.3	12.0	11.3	11.6	13.5	12.7	13.1			
4	11.0	9.7	10.5	12.5	11.6	12.0	11.4	11.0	11.2	13.8	13.1	13.4			
5	10.7	9.9	10.3	12.0	11.2	11.6	11.5	10.9	11.1	14.3	13.6	14.0			
6	11.0	9.9	10.4	12.4	11.0	11.7	12.6	11.5	12.1	14.0	13.7	13.9			
7	11.6	10.3	10.9	12.8	11.7	12.2	13.0	12.4	12.6	14.0	13.4	13.7			
8	11.0	10.1	10.6	12.3	11.5	11.9	13.1	12.6	12.8	14.0	13.6	13.9			
9	10.5	9.4	9.9	11.5	10.5	11.1	13.2	12.9	13.0	13.6	13.2	13.4			
10	10.1	8.7	9.4	10.6	9.8	10.3	13.1	12.5	12.8	13.2	12.2	12.6			
11	10.5	9.0	9.7	12.4	10.5	11.5	13.8	13.0	13.4	12.7	12.1	12.4			
12	10.8	9.5	10.0	11.8	11.3	11.5	14.0	13.4	13.7	13.9	12.7	13.3			
13	---	---	---	11.9	11.0	11.4	14.1	13.4	13.7	14.3	13.5	13.9			
14	11.1	9.0	10.3	11.8	10.5	11.1	14.3	13.7	14.0	14.4	14.1	14.2			
15	10.9	10.0	10.4	12.2	11.1	11.6	13.9	13.5	13.7	14.2	13.6	13.8			
16	10.3	9.4	9.8	12.6	11.5	12.1	14.1	13.3	13.7	14.1	13.3	13.7			
17	10.4	8.8	9.7	13.1	12.2	12.6	15.1	14.1	14.6	14.4	13.7	14.1			
18	11.1	10.1	10.6	12.7	12.0	12.3	15.0	14.6	14.8	14.2	13.6	13.8			
19	11.4	10.3	10.8	12.3	11.6	12.0	---	---	---	13.6	13.3	13.5			
20	11.3	10.3	10.8	11.6	10.9	11.3	14.8	13.9	14.1	13.7	13.2	13.4			
21	11.7	10.6	11.1	11.6	11.1	11.3	14.9	14.1	14.6	13.7	13.4	13.6			
22	11.0	10.0	10.6	11.6	10.8	11.2	14.9	14.5	14.7	13.7	13.2	13.4			
23	11.2	10.4	10.6	11.3	10.7	11.0	14.7	14.5	14.6	13.3	12.4	12.8			
24	11.9	10.3	11.3	11.2	10.4	10.8	14.6	14.4	14.5	12.7	12.5	12.6			
25	11.9	10.9	11.3	12.6	11.2	11.9	14.4	13.8	14.1	12.7	12.3	12.5			
26	11.7	10.5	11.1	12.4	11.8	12.1	14.0	13.3	13.6	12.7	12.3	12.5			
27	12.0	11.0	11.4	12.1	11.5	11.8	14.0	13.6	13.7	12.8	12.5	12.7			
28	11.8	10.8	11.2	12.5	11.7	12.1	14.0	13.5	13.8	12.7	12.3	12.5			
29	11.8	10.7	11.2	13.1	12.1	12.6	13.6	13.3	13.4	12.5	12.2	12.3			
30	11.4	10.4	10.8	13.0	12.6	12.8	13.5	12.8	13.1	12.5	12.0	12.2			
31	11.0	9.6	10.3	---	---	---	13.8	13.4	13.6	12.3	11.7	11.9			
MONTH	---	---	---	13.1	9.8	11.6	---	---	---	14.4	11.7	13.2			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.1	11.7	11.9	11.6	11.1	11.3	11.4	10.3	10.8	10.2	8.7	9.3	
2	12.4	11.9	12.1	12.3	11.4	11.9	11.1	10.3	10.7	10.8	8.8	9.7	
3	12.5	11.8	11.9	12.5	11.9	12.1	11.0	9.8	10.4	10.6	8.8	9.6	
4	12.1	11.5	11.7	12.3	11.7	11.9	11.5	10.0	10.7	9.6	8.4	9.0	
5	12.4	12.0	12.2	12.1	11.3	11.7	12.3	11.0	11.7	9.3	8.0	8.6	
6	12.7	12.2	12.4	12.1	11.3	11.6	11.3	10.4	10.9	9.2	7.7	8.4	
7	12.6	12.0	12.2	11.6	10.7	11.2	12.2	11.0	11.6	8.9	7.4	8.1	
8	12.7	12.2	12.4	11.1	10.2	10.6	12.5	11.6	12.0	8.8	7.3	7.9	
9	12.6	12.0	12.2	10.7	9.6	10.0	12.3	11.2	11.8	8.8	7.1	7.9	
10	12.3	11.8	12.0	12.4	10.7	11.7	12.7	11.6	12.2	9.8	7.8	8.7	
11	12.7	12.2	12.4	12.9	12.1	12.5	12.3	11.1	11.7	9.5	8.2	8.8	
12	12.9	12.6	12.7	12.7	12.0	12.4	12.4	11.4	11.9	9.5	8.6	9.0	
13	12.8	12.3	12.6	13.0	12.3	12.6	12.3	11.0	11.6	8.6	8.2	8.4	
14	12.6	12.3	12.5	12.6	11.9	12.3	11.7	10.2	11.2	9.6	8.6	9.1	
15	12.6	12.2	12.4	12.2	11.5	11.8	10.7	9.4	10.0	10.4	9.2	9.7	
16	12.7	12.1	12.4	12.5	11.6	12.0	11.1	9.7	10.4	9.6	8.7	9.2	
17	13.3	12.7	13.0	12.7	11.7	12.2	12.2	10.9	11.5	9.8	8.9	9.4	
18	13.2	12.9	13.0	12.9	11.9	12.4	11.8	10.6	11.2	9.3	8.4	8.8	
19	13.1	12.8	13.0	12.1	11.5	11.8	11.2	9.8	10.5	9.9	9.1	9.4	
20	13.0	12.6	12.8	11.9	11.4	11.6	10.6	9.9	10.3	10.1	8.8	9.4	
21	13.1	12.8	13.0	11.7	11.3	11.5	11.6	10.6	11.1	9.7	8.5	9.0	
22	12.8	12.1	12.4	11.4	10.8	11.1	11.6	10.3	11.1	9.2	8.2	8.7	
23	12.1	11.6	11.8	11.6	10.6	11.0	11.1	9.6	10.3	9.1	8.5	8.8	
24	11.9	11.5	11.6	11.2	10.1	10.6	11.2	9.9	10.5	9.2	8.4	8.8	
25	11.9	11.4	11.6	10.5	9.7	10.1	11.2	9.6	10.4	9.5	8.1	8.8	
26	11.6	11.1	11.4	11.2	9.8	10.4	11.2	9.6	10.3	10.0	8.8	9.3	
27	11.3	10.7	10.9	10.7	9.7	10.2	10.9	9.2	10.0	9.8	8.2	9.0	
28	12.1	11.3	11.8	11.3	10.2	10.7	10.5	8.9	9.7	9.8	8.3	9.0	
29	12.1	11.6	11.9	11.7	10.4	11.1	10.7	8.9	9.7	10.0	8.4	9.1	
30	---	---	---	12.1	11.1	11.6	10.9	8.9	9.8	9.4	7.9	8.7	
31	---	---	---	11.9	10.7	11.2	---	---	---	9.5	8.1	8.8	
MONTH	13.3	10.7	12.2	13.0	9.6	11.5	12.7	8.9	10.9	10.8	7.1	8.9	



## STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.2	7.9	8.6	10.0	8.2	9.1	9.1	7.6	8.3	10.1	7.9	8.8
2	9.2	8.2	8.7	9.7	7.8	8.8	8.7	7.6	8.1	9.7	7.9	8.7
3	10.1	8.8	9.4	9.9	7.8	8.8	9.6	7.9	8.7	10.3	8.6	9.3
4	9.6	8.3	9.0	10.2	7.9	9.0	9.9	7.9	8.9	10.4	8.3	9.3
5	10.0	8.4	9.2	10.0	7.8	8.9	10.0	8.1	9.0	11.1	9.0	10.0
6	10.2	8.5	9.3	9.5	7.7	8.6	9.2	7.5	8.3	11.0	9.4	10.1
7	9.9	8.3	9.1	10.7	8.6	9.6	9.7	7.9	8.7	10.6	8.8	9.6
8	9.7	8.1	8.8	10.2	8.2	9.2	9.2	7.4	8.3	10.0	8.1	9.0
9	8.2	7.5	7.8	9.9	8.5	9.1	9.9	7.9	8.9	10.0	8.1	8.9
10	8.3	7.3	7.8	10.1	8.1	9.1	10.0	7.9	8.8	9.4	8.1	8.7
11	8.0	7.0	7.4	10.3	8.2	9.1	10.1	8.0	9.0	9.2	8.0	8.5
12	9.1	7.9	8.5	10.6	8.2	9.4	10.2	7.8	8.9	9.8	8.1	8.8
13	8.9	8.3	8.7	10.1	8.3	9.2	9.6	7.7	8.6	10.4	8.3	9.3
14	9.2	8.1	8.7	9.7	7.6	8.7	10.2	7.8	8.9	10.0	8.6	9.2
15	8.7	7.5	8.1	9.6	7.5	8.5	9.7	7.5	8.6	10.6	8.8	9.6
16	8.9	7.7	8.3	10.0	7.9	8.9	10.0	7.6	8.7	11.1	9.4	10.2
17	9.8	7.9	8.8	9.9	8.0	8.9	9.8	7.9	8.8	10.7	9.4	9.9
18	9.8	8.1	8.9	10.0	7.5	8.8	10.3	8.7	9.5	10.6	8.9	9.7
19	9.7	8.1	8.9	10.7	8.7	9.6	10.6	8.6	9.6	10.1	8.4	9.1
20	9.4	7.9	8.7	10.4	8.4	9.4	10.6	8.7	9.6	9.3	8.3	8.8
21	9.4	7.9	8.6	10.3	8.7	9.5	10.7	8.6	9.6	10.6	8.8	9.6
22	9.4	7.5	8.4	10.6	9.0	9.8	9.7	8.5	9.1	10.7	9.5	10.1
23	10.1	8.1	9.0	10.6	8.9	9.7	10.3	8.7	9.4	10.4	9.7	10.0
24	9.7	7.8	8.7	10.4	8.6	9.4	10.2	8.2	9.1	11.0	9.6	10.2
25	9.5	7.5	8.4	10.2	8.1	9.2	10.2	8.1	9.1	11.5	9.8	10.6
26	8.8	7.1	8.0	9.6	8.1	8.9	9.0	7.8	8.4	11.3	10.1	10.6
27	9.9	8.0	8.8	9.4	7.9	8.6	10.0	8.3	9.0	10.9	9.5	10.1
28	10.0	8.0	9.0	9.6	8.0	8.7	10.4	8.4	9.3	11.6	9.9	10.7
29	9.9	8.5	9.2	9.4	7.8	8.6	9.2	8.1	8.7	11.3	10.1	10.7
30	10.3	8.4	9.3	9.1	7.7	8.4	10.7	8.4	9.5	10.8	9.4	10.0
31	—	—	—	9.2	7.6	8.4	10.5	8.5	9.3	—	—	—
MONTH	10.3	7.0	8.7	10.7	7.5	9.0	10.7	7.4	8.9	11.6	7.9	9.6

## STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in SE1/4 NE1/4 sec.12, T.26 N., R.2 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft upstream from bridge on State Highway 33 in Mio, 500 ft downstream from Mio hydroelectric plant, 9.5 mi downstream from Big Creek, and 73.0 mi upstream from mouth.

DRAINAGE AREA.--1,361 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1952 to current year.

REVISED RECORDS.--WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft above sea level.

REMARKS.--Water-discharge records good. Flow regulated by Mio Dam 500 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	832	812	749	775	744	1100	773	788	855	723	789	649
2	804	793	758	849	720	1060	769	796	994	714	881	648
3	753	797	779	865	740	992	776	795	988	710	834	681
4	752	761	898	837	744	947	767	782	975	692	763	669
5	758	753	981	784	726	912	752	770	930	682	705	647
6	748	767	1020	742	675	880	777	768	892	675	679	639
7	725	756	937	768	741	877	769	762	863	697	677	635
8	716	745	910	773	654	899	771	776	832	687	685	640
9	716	751	890	773	739	957	777	799	1030	683	703	638
10	728	769	875	812	736	996	762	813	1220	689	717	648
11	721	741	843	817	730	940	763	787	1190	672	672	711
12	707	721	837	797	621	907	762	888	1130	662	643	727
13	863	736	832	802	727	875	758	1220	1030	659	633	708
14	868	746	826	702	741	864	760	1180	990	676	624	689
15	810	743	833	782	735	860	759	1060	995	657	618	665
16	847	760	846	781	743	868	780	992	968	653	610	655
17	812	774	792	600	653	861	769	980	926	650	595	654
18	750	762	769	644	722	826	783	1140	864	624	633	643
19	792	750	747	760	723	806	781	1210	831	630	621	640
20	778	749	817	750	724	815	818	1100	827	623	623	655
21	761	749	758	602	708	822	965	1030	841	625	571	690
22	828	761	638	599	721	834	981	999	798	621	575	690
23	816	767	611	719	788	832	916	989	777	622	636	738
24	816	786	619	729	880	842	878	988	767	617	617	736
25	819	801	740	746	982	845	850	953	741	611	626	728
26	807	805	809	685	1110	839	823	913	787	607	647	695
27	780	804	795	654	1300	862	807	891	876	676	692	677
28	785	781	751	708	1240	840	790	880	799	754	691	660
29	765	770	767	723	1130	807	771	862	795	712	686	655
30	751	755	794	735	---	798	770	846	746	683	651	652
31	841	---	765	736	---	765	---	848	---	772	645	---
TOTAL	24249	22965	24986	23049	23197	27328	23977	28605	27257	20758	20742	20162
MEAN	782	766	806	744	800	882	799	923	909	670	669	672
MAX	868	812	1020	865	1300	1100	981	1220	1220	772	881	738
MIN	707	721	611	599	621	765	752	762	741	607	571	635
CFSM	.57	.56	.59	.55	.59	.65	.59	.68	.67	.49	.49	.49
IN.	.66	.63	.68	.63	.63	.75	.66	.78	.75	.57	.57	.55

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

MEAN	944	997	969	901	888	1093	1461	1158	990	874	825	873
MAX	1779	1430	1303	1321	1152	1813	2241	1636	1422	1520	1195	1575
(WY)	1987	1992	1967	1973	1973	1976	1971	1983	1954	1994	1994	1986
MIN	685	738	711	697	660	733	799	723	683	655	578	661
(WY)	1965	1964	1964	1965	1958	1956	2000	1958	1958	1958	1958	1958

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1952 - 2000

ANNUAL TOTAL	307057	287275	997
ANNUAL MEAN	841	785	1213
HIGHEST ANNUAL MEAN			746
LOWEST ANNUAL MEAN			1958
HIGHEST DAILY MEAN	1400	Jun 14	4230
LOWEST DAILY MEAN	611	Dec 23	21
ANNUAL SEVEN-DAY MINIMUM	620	Sep 3	420
INSTANTANEOUS PEAK FLOW			4380
INSTANTANEOUS PEAK STAGE			(a)
INSTANTANEOUS LOW FLOW			6.37
ANNUAL RUNOFF (CFSM)	.62		7.0
ANNUAL RUNOFF (INCHES)	8.39		.73
10 PERCENT EXCEEDS	1040		9.96
50 PERCENT EXCEEDS	819		1350
90 PERCENT EXCEEDS	674		926
			719

(a) Sept. 30, 1986, Apr. 1, 1998.

## STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.0°C, July 21, 1998, July 28, 1999; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 14.3 mg/L, Feb. 23-25, 1999; minimum, 6.0 mg/L, Aug. 22, 1999.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 22.5°C, July 17; minimum, 0.0°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum, 12.6 mg/L, Jan. 20; minimum, 6.5 mg/L, July 23.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	13.0	12.0	12.5	9.5	8.5	9.0	3.0	2.5	3.0	.5	.5	.5			
2	12.0	11.0	11.5	9.0	9.0	9.0	3.0	2.5	3.0	.5	.0	.5			
3	11.0	10.5	10.5	9.0	8.0	8.5	3.0	2.5	3.0	.5	.0	.0			
4	10.5	10.0	10.5	8.0	7.0	7.5	3.0	3.0	3.0	.5	.0	.0			
5	10.0	9.5	10.0	7.0	6.5	6.5	4.0	3.0	3.5	.5	.0	.5			
6	9.5	9.0	9.0	6.5	6.0	6.0	4.5	4.0	4.5	.5	.5	.5			
7	9.0	8.0	8.5	6.0	5.5	5.5	5.0	4.5	5.0	.5	.5	.5			
8	8.5	8.0	8.5	5.5	5.0	5.5	5.0	4.0	4.5	.5	.5	.5			
9	9.5	8.5	9.0	6.5	5.5	6.0	4.0	3.5	4.0	.5	.5	.5			
10	10.0	9.0	9.5	6.5	6.5	6.5	3.5	3.0	3.5	.5	.5	.5			
11	10.0	9.5	10.0	6.5	6.0	6.0	3.0	3.0	3.0	.5	.5	.5			
12	11.0	10.0	10.5	6.5	6.0	6.0	3.0	2.5	3.0	1.0	.5	.5			
13	10.5	10.5	10.5	7.0	6.5	6.5	3.0	2.5	3.0	2.0	1.0	1.5			
14	10.5	10.0	10.5	6.5	6.5	6.5	3.0	2.5	2.5	2.0	1.5	2.0			
15	10.0	9.5	10.0	6.5	5.5	6.0	2.5	2.5	2.5	1.5	1.0	1.5			
16	10.0	9.5	9.5	5.5	5.0	5.5	2.5	1.5	2.0	1.0	.5	1.0			
17	9.5	9.0	9.0	5.0	4.5	5.0	1.5	1.0	1.0	.5	.5	.5			
18	9.0	8.5	9.0	4.5	4.5	4.5	1.5	1.0	1.5	.5	.5	.5			
19	9.0	8.5	8.5	4.5	4.0	4.0	1.5	1.5	1.5	.5	.5	.5			
20	8.5	8.5	8.5	4.0	4.0	4.0	1.5	1.0	1.5	.5	.5	.5			
21	8.5	8.0	8.0	4.0	4.0	4.0	1.0	1.0	1.0	.5	.0	.5			
22	8.0	7.5	7.5	5.0	4.0	4.5	1.0	1.0	1.0	.5	.0	.0			
23	7.5	7.0	7.0	6.0	5.0	5.0	1.0	1.0	1.0	.0	.0	.0			
24	7.0	6.5	6.5	6.5	6.0	6.0	1.0	1.0	1.0	.5	.0	.0			
25	6.5	6.0	6.5	6.0	6.0	6.0	1.0	1.0	1.0	.0	.0	.0			
26	6.5	6.5	6.5	6.0	6.0	6.0	1.0	1.0	1.0	.0	.0	.0			
27	6.5	6.5	6.5	6.0	5.5	5.5	1.0	.5	.5	.0	.0	.0			
28	6.5	6.5	6.5	5.5	4.5	5.0	.5	.5	.5	.0	.0	.0			
29	6.5	6.5	6.5	4.5	3.5	4.0	.5	.5	.5	.0	.0	.0			
30	8.0	6.5	7.5	3.5	3.0	3.5	.5	.5	.5	.0	.0	.0			
31	8.5	8.0	8.0	--	--	--	.5	.5	.5	.0	.0	.0			
MONTH	13.0	6.0	8.8	9.5	3.0	5.8	5.0	.5	2.2	2.0	.0	.4			

## STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

## WATER-QUALITY RECORDS

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH			APRIL			MAY		
1	.0	.0	.0	4.0	3.5	4.0	7.5	7.5	7.5	14.0	13.5	13.5
2	.0	.0	.0	3.5	3.5	3.5	8.0	7.5	7.5	14.0	13.0	13.5
3	.0	.0	.0	3.5	3.5	3.5	8.5	7.5	8.0	15.5	13.5	14.5
4	.0	.0	.0	4.0	3.5	3.5	8.5	7.5	8.0	16.0	14.5	15.0
5	.0	.0	.0	4.0	3.5	4.0	8.0	7.0	7.5	17.0	15.0	16.0
6	.0	.0	.0	4.5	4.0	4.0	7.5	7.0	7.5	18.5	16.0	17.0
7	.0	.0	.0	5.0	4.5	5.0	7.0	6.5	6.5	19.0	17.5	18.5
8	.0	.0	.0	6.0	5.0	5.5	6.5	5.5	6.0	20.0	18.0	19.0
9	.0	.0	.0	7.0	6.0	6.5	5.5	5.0	5.5	19.5	19.0	19.0
10	.0	.0	.0	6.5	6.5	6.5	5.0	4.5	5.0	19.5	18.5	19.0
11	.0	.0	.0	6.5	6.0	6.5	5.0	4.5	4.5	18.5	17.5	18.0
12	.5	.0	.0	6.0	5.0	6.0	5.0	4.5	5.0	17.5	16.0	17.0
13	.0	.0	.0	5.0	3.5	4.0	5.5	5.0	5.0	17.0	15.0	16.0
14	.0	.0	.0	3.5	3.0	3.5	7.0	5.0	6.0	15.0	13.0	14.0
15	.0	.0	.0	3.5	3.0	3.0	7.5	6.5	7.0	13.5	12.5	13.0
16	.0	.0	.0	3.0	3.0	3.0	7.5	7.0	7.5	13.0	12.0	12.5
17	.5	.0	.0	3.5	2.5	3.0	8.0	7.5	7.5	13.0	12.0	12.0
18	.0	.0	.0	4.0	3.0	3.5	9.5	7.5	8.5	12.5	11.5	12.0
19	.5	.0	.0	4.0	3.5	3.5	9.0	8.5	8.5	12.5	12.0	12.5
20	.0	.0	.0	4.0	4.0	4.0	8.5	8.0	8.0	13.0	12.5	12.5
21	.5	.0	.0	4.5	4.0	4.0	8.0	8.0	8.0	15.0	12.5	13.5
22	.5	.0	.0	5.0	4.5	4.5	8.0	7.5	8.0	14.0	13.0	13.5
23	.5	.0	.5	5.5	5.0	5.5	9.0	7.5	8.5	15.0	13.5	14.0
24	1.0	.5	.5	7.0	5.5	6.0	9.0	8.5	8.5	15.0	14.0	14.5
25	2.0	1.0	1.5	8.5	7.0	8.0	10.0	9.0	9.5	14.5	14.0	14.5
26	3.0	2.0	3.0	9.0	8.5	8.5	11.0	10.0	10.5	15.5	14.0	14.5
27	3.5	3.0	3.5	9.0	9.0	9.0	12.5	10.5	11.5	14.5	14.5	14.5
28	4.0	3.5	3.5	9.0	9.0	9.0	13.5	11.5	12.0	15.0	14.5	15.0
29	4.0	4.0	4.0	9.0	8.0	8.5	12.5	12.0	12.5	16.0	15.0	15.5
30	---	---	---	8.0	7.5	8.0	14.5	12.5	13.5	16.5	15.0	16.0
31	---	---	---	8.0	7.5	7.5	---	---	---	16.5	16.0	16.5
MONTH	4.0	.0	.6	9.0	2.5	5.3	14.5	4.5	8.0	20.0	11.5	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	16.5	16.0	16.5	20.0	18.5	19.5	21.0	19.5	20.0	19.5	18.5	19.0
2	17.5	16.5	17.0	19.5	19.0	19.5	21.5	20.0	20.5	19.5	19.0	19.0
3	17.0	16.0	16.5	19.5	18.5	19.0	20.5	20.0	20.0	20.0	19.0	19.5
4	16.5	15.5	16.0	21.0	19.5	20.0	20.5	19.5	20.0	19.5	19.0	19.0
5	16.5	15.5	16.0	21.0	20.0	20.5	20.0	19.0	19.5	19.0	18.0	19.0
6	17.5	16.0	16.5	21.0	20.0	20.5	19.5	19.0	19.0	18.5	17.5	18.0
7	18.0	16.5	17.5	21.0	20.5	20.5	20.5	19.0	20.0	19.0	17.0	18.0
8	18.5	17.0	17.5	21.0	19.5	20.5	20.0	19.5	19.5	18.5	17.5	18.0
9	18.0	17.5	18.0	20.5	20.0	20.5	20.5	19.5	20.0	18.0	17.0	17.5
10	21.0	18.0	19.5	20.0	19.0	19.5	20.5	19.5	20.0	18.5	17.5	18.0
11	20.0	19.5	20.0	20.0	19.0	19.5	20.0	19.5	19.5	18.0	17.5	18.0
12	19.5	19.5	19.5	20.0	19.5	19.5	20.5	19.5	20.0	19.0	18.0	18.5
13	19.5	18.0	18.5	21.5	19.5	20.5	20.5	19.5	20.0	18.5	17.5	18.0
14	19.0	17.5	18.0	21.0	20.0	20.5	20.5	20.0	20.0	18.0	17.5	17.5
15	18.5	17.5	18.0	21.0	20.0	20.5	21.5	20.0	21.0	17.5	16.5	17.0
16	18.0	17.5	17.5	20.5	20.0	20.5	21.0	20.5	21.0	16.5	15.5	16.0
17	19.5	17.5	18.5	22.5	20.5	21.5	20.5	20.0	20.5	15.5	15.0	15.5
18	19.0	18.0	18.5	21.0	20.5	21.0	20.5	20.0	20.0	15.5	14.5	15.0
19	19.0	18.0	18.5	20.5	19.5	20.0	20.0	19.0	19.5	15.5	15.0	15.0
20	19.0	18.0	18.5	20.5	19.0	19.5	19.0	17.5	18.5	15.0	14.5	15.0
21	20.0	19.0	19.0	20.0	19.0	19.5	18.0	17.5	17.5	14.5	14.0	14.5
22	19.0	18.5	18.5	19.0	18.0	18.5	17.5	17.0	17.5	14.5	14.0	14.0
23	19.5	18.5	19.0	18.5	17.5	18.0	18.0	17.5	17.5	14.0	13.5	14.0
24	20.5	18.5	19.5	18.0	17.0	17.5	18.0	17.5	17.5	13.5	12.5	13.5
25	21.0	19.5	20.0	18.5	16.5	17.5	18.5	17.0	18.0	12.5	11.5	12.0
26	21.5	20.0	21.0	18.5	17.0	17.5	18.5	17.5	18.0	12.5	11.5	12.0
27	21.0	20.5	21.0	19.5	17.5	18.5	18.0	17.0	17.5	12.0	11.5	11.5
28	20.5	20.0	20.5	19.0	18.5	18.5	18.0	18.0	18.0	11.5	11.0	11.0
29	20.0	19.0	20.0	19.5	18.5	19.0	19.0	18.0	18.5	11.5	11.0	11.0
30	20.0	19.0	19.5	19.5	18.5	19.0	18.5	18.0	18.0	11.5	11.0	11.5
31	---	---	---	20.0	19.0	19.5	20.0	18.0	19.0	---	---	---
MONTH	21.5	15.5	18.5	22.5	16.5	19.5	21.5	17.0	19.2	20.0	11.0	15.9

## STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	---	---	---	10.4	9.8	10.1	11.7	11.5	11.6	11.7	11.6	11.7
2	---	---	---	9.9	9.3	9.7	11.7	11.5	11.6	11.7	11.6	11.7
3	---	---	---	9.6	9.3	9.4	11.9	11.6	11.7	11.9	11.7	11.8
4	---	---	---	9.7	9.3	9.6	11.9	11.8	11.9	11.9	11.6	11.8
5	9.3	9.0	9.1	10.0	9.6	9.8	11.9	11.3	11.7	12.0	11.8	11.9
6	9.7	9.2	9.5	10.3	9.7	10.1	11.3	10.8	11.1	12.1	11.9	12.0
7	10.0	9.6	9.8	10.6	10.1	10.4	10.8	10.6	10.7	12.1	12.0	12.1
8	10.2	9.8	10.1	10.8	10.3	10.7	10.8	10.5	10.6	12.3	12.1	12.3
9	10.1	10.0	10.1	10.9	10.6	10.8	11.0	10.7	10.9	12.4	12.2	12.3
10	10.2	10.0	10.1	11.2	10.6	10.8	11.4	11.0	11.2	12.3	12.2	12.3
11	10.2	10.0	10.1	10.8	10.6	10.7	11.6	11.4	11.5	12.3	12.2	12.2
12	10.1	9.7	9.9	10.8	10.4	10.6	11.5	11.5	11.5	12.2	11.9	12.1
13	9.8	9.6	9.7	10.4	10.1	10.3	11.6	11.5	11.5	11.9	11.5	11.6
14	9.6	9.4	9.5	10.4	10.1	10.3	11.6	10.9	11.3	11.7	11.5	11.6
15	9.6	9.4	9.5	10.7	10.4	10.5	11.1	10.9	11.1	12.0	11.6	11.8
16	9.6	9.5	9.6	10.9	10.7	10.8	11.3	11.1	11.2	12.3	12.0	12.2
17	9.8	9.6	9.7	11.0	10.8	10.9	11.4	11.3	11.4	12.5	12.3	12.4
18	10.0	9.8	9.9	11.2	11.0	11.1	11.3	11.1	11.2	12.5	12.2	12.4
19	10.0	9.7	9.8	11.4	11.1	11.3	11.3	11.1	11.2	12.5	12.4	12.5
20	10.0	9.7	9.8	11.7	11.4	11.6	11.6	11.3	11.4	12.6	12.5	12.6
21	10.1	9.8	10.0	11.7	11.5	11.6	11.9	11.6	11.8	12.5	12.3	12.4
22	10.4	10.0	10.3	11.7	11.4	11.6	12.0	11.9	11.9	12.3	12.0	12.1
23	10.6	10.3	10.4	11.5	11.1	11.3	12.1	11.9	12.0	12.0	11.9	12.0
24	10.6	10.4	10.5	11.2	11.0	11.1	12.2	11.9	12.1	11.9	11.8	11.9
25	10.7	10.5	10.6	11.2	11.0	11.1	12.4	12.1	12.3	12.0	11.7	11.8
26	10.7	10.6	10.7	11.1	10.8	11.0	12.5	12.3	12.4	11.7	11.4	11.6
27	10.7	10.6	10.7	11.1	10.9	11.0	12.4	12.2	12.3	11.5	11.3	11.4
28	10.8	10.6	10.7	11.6	11.1	11.4	12.2	12.0	12.1	11.4	11.3	11.3
29	10.8	10.6	10.8	12.0	11.6	11.9	12.0	11.8	11.9	11.3	11.1	11.2
30	10.8	10.4	10.6	12.0	11.5	11.8	11.8	11.7	11.8	11.3	11.2	11.2
31	10.7	10.2	10.4	---	---	---	11.8	11.6	11.7	11.6	11.2	11.4
MONTH	---	---	---	12.0	9.3	10.8	12.5	10.5	11.6	12.6	11.1	11.9

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	11.5	11.4	11.5	11.1	10.6	10.8	11.0	10.7	10.9	10.2	10.0	10.1
2	11.5	11.4	11.4	11.3	11.1	11.2	11.1	10.9	11.0	10.1	9.9	10.0
3	11.4	11.3	11.4	11.3	10.9	11.2	11.2	11.0	11.1	10.1	9.9	10.0
4	11.4	11.3	11.3	11.4	11.2	11.3	11.1	10.8	10.9	10.0	9.6	9.9
5	11.5	11.3	11.5	11.4	11.2	11.3	10.9	10.7	10.8	9.9	9.5	9.7
6	11.5	11.4	11.5	11.3	11.2	11.3	10.8	10.7	10.7	9.7	9.3	9.5
7	11.6	11.2	11.5	11.2	11.0	11.1	10.9	10.8	10.8	9.4	8.9	9.2
8	11.7	11.5	11.6	11.1	10.8	11.0	11.3	10.7	11.0	9.0	8.7	8.9
9	11.9	11.6	11.8	10.9	10.7	10.8	11.6	11.3	11.4	8.8	8.4	8.7
10	12.0	11.9	11.9	10.7	10.4	10.6	11.8	11.5	11.7	8.7	8.2	8.5
11	12.1	12.0	12.0	10.4	10.1	10.2	11.9	11.8	11.9	8.2	7.9	8.1
12	12.2	12.0	12.1	10.6	10.0	10.3	11.9	11.9	11.9	8.1	7.8	8.0
13	12.0	11.9	12.0	11.4	10.6	11.0	12.1	11.9	12.0	8.7	8.0	8.5
14	12.0	11.8	12.0	11.7	11.4	11.6	12.0	11.7	11.9	9.0	8.6	8.8
15	12.2	12.0	12.1	12.0	11.6	11.8	11.7	11.5	11.6	9.0	8.5	8.8
16	12.3	12.1	12.2	12.0	11.8	11.9	11.5	11.3	11.4	9.0	8.6	8.9
17	12.3	12.1	12.2	12.0	11.6	11.9	11.3	10.9	11.1	9.0	8.7	8.9
18	12.2	12.1	12.1	11.8	11.6	11.8	10.9	10.6	10.7	9.1	8.7	8.8
19	12.1	12.0	12.1	11.9	11.7	11.8	10.7	10.6	10.6	9.3	9.0	9.1
20	12.3	12.1	12.2	11.9	11.6	11.8	10.9	10.6	10.8	9.4	9.0	9.2
21	12.5	12.3	12.4	11.8	11.6	11.7	10.8	10.6	10.7	9.4	8.9	9.1
22	12.5	12.4	12.4	11.6	11.4	11.5	10.6	10.4	10.5	9.2	8.8	9.0
23	12.4	12.2	12.3	11.4	11.2	11.4	10.8	10.5	10.6	9.1	8.7	8.9
24	12.3	12.0	12.2	11.2	11.0	11.1	11.0	10.8	10.9	9.0	8.6	8.8
25	12.1	11.4	11.8	11.0	10.6	10.8	10.9	10.7	10.8	8.8	8.6	8.7
26	11.4	10.9	11.1	10.6	10.4	10.5	10.7	10.6	10.7	9.0	8.7	8.9
27	10.9	10.8	10.9	10.4	10.1	10.3	10.6	10.4	10.5	8.9	8.5	8.7
28	10.8	10.6	10.7	10.1	9.9	10.0	10.5	10.4	10.5	9.3	8.9	9.1
29	10.6	10.5	10.5	10.2	10.0	10.1	10.5	10.2	10.4	9.8	9.2	9.5
30	---	---	---	10.5	10.1	10.3	10.5	10.2	10.4	9.9	9.1	9.4
31	---	---	---	10.8	10.4	10.6	---	---	---	9.4	9.0	9.2
MONTH	12.5	10.5	11.7	12.0	9.9	11.1	12.1	10.2	11.0	10.2	7.8	9.1

## STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.1	8.5	8.8	8.3	7.8	8.1	7.4	7.0	7.2	8.2	7.7	7.9
2	9.2	8.2	8.7	8.2	7.8	8.0	7.8	7.0	7.5	8.1	7.8	8.0
3	8.3	8.1	8.2	8.6	7.8	8.2	7.6	7.3	7.4	8.6	7.8	8.2
4	8.1	7.7	7.9	8.6	8.1	8.4	7.5	7.0	7.3	8.1	7.6	7.9
5	8.6	7.9	8.2	8.3	7.8	8.1	7.6	7.0	7.4	8.2	7.7	7.9
6	9.2	8.4	8.8	8.1	7.5	7.8	7.8	7.2	7.4	8.2	7.4	7.8
7	9.5	8.9	9.1	8.0	7.4	7.7	8.0	7.4	7.7	8.3	7.3	7.8
8	8.9	8.6	8.8	8.2	6.7	7.5	7.5	7.0	7.3	8.2	7.7	7.9
9	8.6	8.3	8.4	7.8	7.4	7.6	7.5	7.0	7.2	8.3	7.9	8.1
10	8.8	8.1	8.6	7.7	7.5	7.6	7.7	7.0	7.3	8.3	8.0	8.2
11	8.1	7.5	7.7	7.9	7.6	7.7	7.4	6.9	7.2	8.0	7.8	8.0
12	7.5	6.7	7.1	8.1	7.7	7.9	7.5	7.2	7.3	8.1	7.6	7.8
13	6.9	6.7	6.9	8.1	7.7	7.9	7.9	7.2	7.5	8.0	7.5	7.7
14	7.7	6.9	7.3	7.9	7.5	7.8	7.7	7.2	7.5	7.7	7.5	7.6
15	8.2	7.4	7.9	7.8	7.6	7.7	7.8	7.2	7.6	7.7	7.5	7.6
16	8.4	8.0	8.2	7.7	7.5	7.6	7.8	7.1	7.4	8.1	7.5	7.8
17	8.5	8.1	8.3	8.3	7.5	7.8	7.7	7.0	7.4	8.4	7.9	8.2
18	8.5	8.0	8.2	7.8	7.2	7.6	7.5	6.9	7.2	8.6	8.3	8.4
19	8.5	7.8	8.2	7.3	7.0	7.1	7.4	6.9	7.2	8.7	8.4	8.6
20	8.4	7.9	8.1	8.1	7.1	7.7	7.5	7.0	7.2	8.8	8.6	8.7
21	8.9	8.3	8.6	7.7	7.1	7.4	7.7	7.3	7.5	8.9	8.7	8.8
22	8.5	8.2	8.3	7.5	6.9	7.3	7.8	7.3	7.5	8.7	8.5	8.6
23	8.3	8.0	8.1	7.7	6.5	7.3	7.8	7.3	7.5	8.6	8.3	8.5
24	8.7	7.8	8.2	8.0	7.6	7.8	8.0	7.5	7.7	8.7	8.3	8.5
25	8.3	7.7	8.0	8.1	7.7	7.9	7.9	7.5	7.8	9.2	8.7	8.9
26	8.9	8.1	8.5	8.2	7.7	8.0	8.1	7.7	7.8	9.5	9.1	9.3
27	9.0	8.3	8.7	8.3	7.9	8.0	7.9	7.5	7.7	9.6	9.4	9.5
28	8.5	8.1	8.3	8.1	7.4	7.8	7.9	7.4	7.6	9.7	9.5	9.6
29	8.1	7.7	7.8	7.7	7.1	7.3	7.8	7.1	7.6	10.0	9.7	9.9
30	8.3	7.8	8.1	7.4	6.6	7.0	7.8	7.3	7.6	10.1	9.9	10.1
31	---	---	---	7.2	6.8	7.1	8.1	7.6	7.8	---	---	---
MONTH	9.5	6.7	8.2	8.6	6.5	7.7	8.1	6.9	7.5	10.1	7.3	8.4

## STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI

LOCATION.--Lat 44°36'46", long 83°50'16", in SE1/4 SW1/4 sec.28, T.26 N., R.5 E., Alcona County, Hydrologic Unit 04070007, on right bank, upstream side of U.S. Forest Service 4001 bridge on Au Sable River Road, 5.5 mi southeast of McKinley.

DRAINAGE AREA.--1,513 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 830 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1020	1010	891	e920	e880	1310	966	943	988	892	990	803
2	976	963	892	983	e860	1250	960	949	1110	869	1040	822
3	928	962	912	996	e880	1180	964	948	1110	858	1050	840
4	889	947	1000	989	e880	1140	961	944	1100	854	976	834
5	902	900	1120	954	e860	1100	934	925	1050	844	911	822
6	894	923	1170	880	e800	1070	969	925	1040	833	887	826
7	870	910	1120	875	e860	1050	931	912	1000	849	894	824
8	857	897	1040	910	e780	1070	961	905	980	859	882	809
9	856	895	1030	884	e860	1110	952	933	1030	840	947	797
10	863	905	1000	913	e860	1180	951	968	1400	847	935	805
11	865	926	987	952	e860	1140	948	931	1330	843	911	841
12	852	862	956	921	e740	1090	944	988	1310	825	856	877
13	1020	892	965	956	e840	1060	940	1360	1190	821	833	871
14	1090	891	953	882	e880	1050	942	1400	1140	833	826	851
15	998	897	959	868	e880	1040	931	1240	1140	835	820	838
16	986	899	976	e860	e880	1050	942	1140	1130	813	802	819
17	1010	923	951	e720	e780	1050	953	1120	1080	825	787	814
18	917	919	896	e780	e800	1020	947	1260	1030	792	810	809
19	911	898	916	e900	e860	999	953	1400	995	786	808	802
20	956	897	915	e900	e860	1000	978	1290	966	790	796	812
21	917	897	e900	e780	e840	1020	1130	1180	985	795	794	845
22	974	905	e780	e700	e880	1020	1210	1130	967	799	778	842
23	990	921	e720	e840	933	1020	1110	1130	930	799	805	877
24	977	941	e740	e860	1100	1030	1060	1110	923	794	800	892
25	990	954	e860	e880	1280	1060	1030	1090	901	793	784	883
26	980	962	e960	e820	1360	1020	998	1040	918	794	805	861
27	946	961	e920	e780	1050	1020	984	1020	1010	805	841	844
28	930	943	e880	e820	1490	1040	950	1010	983	991	855	817
29	937	917	e900	e840	1350	1020	937	999	947	928	858	815
30	915	909	e920	e860	---	995	931	982	938	882	824	813
31	990	---	e900	e860	---	964	---	988	---	944	811	---
TOTAL	29206	27626	29129	27083	27753	33198	29367	33160	31621	26032	26716	25705
MEAN	942	921	940	874	957	1071	979	1070	1054	840	862	834
MAX	1090	1010	1170	996	1560	1310	1210	1400	1400	991	1050	892
MIN	852	862	720	700	740	964	931	905	901	786	778	797
CFSM	.62	.61	.62	.58	.63	.71	.65	.71	.70	.56	.57	.55
IN.	.72	.68	.72	.67	.68	.82	.72	.82	.78	.64	.66	.61

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1997 - 2000, BY WATER YEAR (WY)

MEAN	1015	1040	1057	1035	1077	1197	1576	1240	1085	957	897	876
MAX	1074	1098	1229	1179	1162	1380	2300	1662	1117	1020	1020	1022
(WY)	1997	1997	1997	1997	1997	1998	1997	1997	1997	1999	1997	1997
MIN	942	921	940	874	957	1071	979	967	1054	840	839	799
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	2000	2000	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1997 - 2000

ANNUAL TOTAL	363391		345896									
ANNUAL MEAN	996		945							1087		
HIGHEST ANNUAL MEAN										1260		1997
LOWEST ANNUAL MEAN										945		2000
HIGHEST DAILY MEAN	1720						1560		Feb 27	4790		Apr 1 1998
LOWEST DAILY MEAN	720				Jun 15		700		Jan 22	700		Jan 22 2000
ANNUAL SEVEN-DAY MINIMUM	745				Dec 23		794		Jul 18	745		Sep 4 1999
INSTANTANEOUS PEAK FLOW					Sep 4		(a)1600		Feb 27	(b)4990		Apr 1 1998
INSTANTANEOUS PEAK STAGE							(c)			(d)14.40		Jan 1 1999
INSTANTANEOUS LOW FLOW							(f)700		Jan 22	(f)700		Jan 22 2000
ANNUAL RUNOFF (CFSM)	.66		.62							.72		
ANNUAL RUNOFF (INCHES)	8.93		8.50							9.76		
10 PERCENT EXCEEDS	1200		1110							1310		
50 PERCENT EXCEEDS	970		923							1020		
90 PERCENT EXCEEDS	802		809							838		

(a) Gage height 8.23 ft.

(b) Gage height 10.73 ft.

(c) Not determined.

(d) Backwater from ice.

(e) Estimated.

(f) Result of freezeup.

## STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to current year.

DISSOLVED OXYGEN: October 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.0°C, July 5, 1999; minimum, -0.5°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum recorded, 13.9 mg/L, Jan. 18, 1998, but may have been higher during instrument malfunction

Dec. 24, 1997 to Jan. 8, 1998; minimum, 5.2 mg/L, Aug. 28, 1998, July 28, 31, 1999.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 22.5°C, June 25, July 17, Aug. 14; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.6 mg/L, Jan. 14; minimum, 6.4 mg/L, May 9.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			MEAN
1	12.5	11.0	12.0	10.0	6.5	8.5	3.5	1.5	2.5	1.5	.0	.5
2	12.0	10.5	11.0	10.0	7.0	8.5	3.5	3.0	3.5	1.5	1.0	1.0
3	10.5	8.5	9.5	7.0	6.0	6.5	4.5	3.5	4.0	1.5	.0	.5
4	10.5	9.0	10.0	7.5	5.5	6.5	5.0	4.5	4.5	.5	.0	.0
5	10.0	8.5	9.0	8.0	6.5	7.0	4.5	3.0	4.0	.5	-.5	.0
6	9.5	8.5	9.0	7.0	5.0	5.5	4.0	3.0	3.5	1.0	.0	.5
7	8.5	6.5	8.0	6.0	4.0	5.0	4.5	3.5	4.0	1.0	.0	.5
8	10.0	7.5	9.0	6.5	4.5	5.5	4.5	3.5	4.0	1.0	-.5	.5
9	11.0	9.0	10.0	8.5	6.5	7.5	4.5	3.0	3.5	1.5	.0	1.0
10	12.0	9.5	10.5	8.5	6.0	7.5	4.5	3.0	4.0	2.0	1.5	1.5
11	10.5	8.0	9.5	6.0	5.0	5.5	3.0	2.5	2.5	1.5	.5	1.5
12	10.5	8.5	9.5	6.0	5.0	5.5	3.0	2.0	2.5	.5	.0	.0
13	10.5	9.0	10.0	7.5	6.0	6.5	2.5	2.0	2.5	.5	-.5	.0
14	10.0	8.0	9.0	7.5	5.5	6.5	3.0	2.0	2.5	1.0	.0	.5
15	10.5	9.0	10.0	5.5	5.0	5.5	3.0	2.5	3.0	1.0	.5	1.0
16	10.5	9.5	10.0	5.0	4.0	4.5	3.0	1.0	2.0	1.0	.0	.0
17	10.0	8.5	9.0	4.5	3.0	4.0	1.0	.0	.5	.0	-.5	.0
18	8.5	7.5	8.0	5.0	4.0	4.5	1.0	.5	.5	.0	.0	.0
19	8.5	7.0	8.0	5.5	4.0	4.5	1.5	.0	.5	.0	.0	.0
20	8.5	7.5	8.0	5.5	4.5	5.0	2.0	.0	1.5	.0	-.5	.0
21	8.5	6.5	7.5	5.0	4.0	4.5	.0	.0	.0	.0	-.5	.0
22	8.5	7.0	8.0	6.5	5.0	5.5	.0	.0	.0	.0	-.5	.0
23	7.0	6.0	6.5	7.0	5.0	5.5	.5	.0	.0	.0	-.5	.0
24	7.0	5.5	6.5	7.0	5.0	6.0	.0	.0	.0	.0	-.5	.0
25	7.5	5.5	6.5	5.0	3.5	4.5	.0	.0	.0	.0	-.5	.0
26	7.5	5.5	6.0	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0
27	7.5	5.5	6.5	5.5	5.0	5.5	.0	.0	.0	.0	-.5	.0
28	7.5	5.5	7.0	5.0	4.5	5.0	.0	.0	.0	.0	-.5	.0
29	8.0	5.5	7.0	4.5	3.0	3.5	.0	.0	.0	.0	-.5	.0
30	10.0	7.0	8.0	3.0	2.5	3.0	.5	-.5	.0	.0	-.5	.0
31	10.0	8.5	9.0	---	---	---	.5	.0	.0	.0	-.5	.0
MONTH	12.5	5.5	8.6	10.0	2.5	5.6	5.0	-.5	1.8	2.0	-.5	.3



## STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	.0	-5	.0	5.0	3.5	4.5	9.0	6.5	8.0	14.5	11.5	13.0
2	.0	-5	.0	4.0	2.5	3.5	9.5	7.0	8.5	15.5	11.5	13.5
3	.0	.0	.0	4.5	2.0	3.5	9.5	7.0	8.5	16.0	11.5	14.0
4	.0	-5	.0	5.5	2.5	4.0	9.0	5.5	6.5	17.5	13.5	15.5
5	.0	-5	.0	5.5	3.0	4.5	9.0	5.0	7.0	18.5	15.0	17.0
6	.0	.0	.0	6.0	2.5	4.5	8.5	6.5	7.0	19.5	15.5	18.0
7	.0	-5	.0	8.0	4.0	6.0	6.5	5.0	6.0	20.5	17.0	19.0
8	.0	-5	.0	8.0	5.0	7.0	8.0	4.0	6.0	20.0	17.5	19.0
9	.0	.0	.0	8.0	4.5	6.5	7.0	4.0	5.0	19.5	18.0	18.5
10	.0	.0	.0	5.5	4.0	4.5	7.0	3.0	5.5	18.5	15.5	17.0
11	.0	.0	.0	6.5	3.5	5.0	6.5	4.0	5.0	17.5	15.0	15.5
12	.0	-5	.0	6.0	4.0	5.0	6.5	3.5	5.5	17.5	15.0	16.5
13	.0	.0	.0	5.0	3.0	4.0	6.5	4.0	5.5	17.0	14.5	16.0
14	.0	-5	.0	5.5	3.5	4.5	10.0	5.0	7.5	14.5	13.0	14.0
15	.0	.0	.0	5.0	3.0	4.0	9.5	7.5	8.5	15.0	11.0	12.0
16	.0	.0	.0	4.0	2.5	3.5	8.0	6.0	6.5	13.5	11.5	12.0
17	.0	.0	.0	4.0	1.5	3.0	8.5	5.5	7.0	14.0	11.5	13.0
18	.0	.0	.0	5.0	1.5	3.0	10.0	6.0	8.5	13.5	11.5	12.0
19	.0	.0	.0	5.0	3.0	4.0	10.0	8.5	9.5	14.0	10.5	12.5
20	.0	.0	.0	4.5	3.5	4.0	9.5	7.0	8.0	15.0	10.0	12.0
21	1.5	.0	.0	6.0	4.0	5.0	7.5	6.5	7.0	15.5	10.5	12.5
22	3.0	.5	2.0	6.0	4.5	5.5	11.0	6.5	8.5	14.5	13.0	12.5
23	3.0	1.5	2.0	7.5	4.5	6.0	10.0	7.0	8.5	14.5	13.0	14.0
24	2.0	1.0	1.5	8.5	5.0	7.0	11.0	6.5	9.0	16.5	13.0	15.0
25	3.0	1.5	2.0	10.0	7.0	8.5	11.5	7.0	9.5	15.0	13.0	14.0
26	5.0	2.5	3.5	9.5	6.5	8.5	12.5	7.5	10.5	17.0	11.5	14.5
27	5.0	3.5	4.0	9.5	8.0	8.5	13.5	8.5	11.0	16.0	13.0	15.0
28	4.5	2.5	3.5	9.0	7.0	8.0	14.0	9.5	12.0	16.0	12.5	14.5
29	5.0	3.0	4.0	8.5	7.0	7.5	14.5	10.5	13.0	17.5	13.0	15.5
30	---	---	---	9.5	6.0	7.5	15.0	9.5	12.5	17.0	14.0	15.5
31	---	---	---	9.5	5.5	8.0	---	---	---	18.0	15.5	16.5
MONTH	5.0	-5	.8	10.0	1.5	5.4	15.0	3.0	8.0	20.5	10.0	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	17.5	15.0	16.0	21.0	17.5	19.5	21.5	19.0	20.5	20.5	19.0	19.5
2	16.0	15.0	15.5	21.0	18.5	20.0	21.5	19.0	20.5	19.0	17.0	17.5
3	19.0	14.0	16.5	21.5	18.5	20.0	21.5	18.0	19.5	19.5	17.0	18.0
4	18.0	15.0	16.5	21.5	17.0	19.5	20.5	17.0	19.0	19.0	17.0	18.0
5	16.5	13.5	15.5	22.0	18.0	20.5	21.0	17.5	19.5	17.5	15.0	16.5
6	18.5	13.0	16.0	21.0	18.0	19.0	21.0	18.0	19.0	17.5	14.0	16.5
7	18.5	15.0	17.0	21.5	16.5	19.0	21.5	18.0	19.5	18.5	15.0	17.0
8	20.5	16.0	18.5	20.5	18.0	19.0	20.5	18.0	19.0	20.0	17.5	18.5
9	20.0	16.5	18.5	21.5	18.5	20.0	20.5	18.0	19.5	19.0	16.5	18.0
10	22.0	16.5	19.5	21.0	19.0	20.0	20.5	18.0	19.0	18.5	17.5	18.0
11	21.0	17.5	19.0	20.5	17.5	19.5	21.0	18.0	19.5	18.0	17.5	18.0
12	18.5	17.0	17.5	20.0	16.5	18.5	21.0	17.0	19.5	19.0	17.0	18.0
13	18.0	17.0	17.5	22.0	18.0	20.0	20.5	18.0	19.0	17.5	14.5	16.5
14	20.5	17.0	19.0	21.5	19.0	20.5	22.5	19.0	20.5	17.5	16.0	16.5
15	20.0	17.5	18.5	20.5	18.5	19.5	22.0	19.5	21.0	16.5	14.5	16.0
16	19.0	16.5	18.0	20.5	18.5	19.5	21.0	18.5	20.0	15.5	13.0	14.5
17	19.5	16.0	17.5	22.5	19.0	20.5	19.5	17.0	18.0	16.5	14.0	15.5
18	19.0	16.0	18.0	21.0	18.0	19.5	20.0	17.5	18.5	16.5	13.0	15.0
19	20.0	16.5	18.5	21.0	16.5	19.0	19.5	16.5	18.0	17.0	15.0	16.0
20	19.0	17.0	18.0	20.0	17.0	18.5	18.5	15.5	17.5	16.5	14.0	16.0
21	21.0	17.5	19.0	18.5	17.0	17.5	18.5	15.5	17.0	14.0	12.5	13.5
22	19.5	17.5	18.5	18.5	16.5	17.5	17.5	15.0	16.0	13.5	11.5	12.5
23	20.5	16.5	18.5	18.5	16.0	17.5	19.5	16.0	17.5	13.5	12.5	13.0
24	21.5	18.5	20.0	19.5	16.0	18.0	19.5	15.5	17.5	13.5	12.0	13.0
25	22.5	19.0	21.0	20.0	16.5	18.5	19.0	16.0	18.0	13.0	10.5	11.5
26	21.5	19.0	20.0	20.0	17.0	18.5	19.0	17.0	18.0	12.5	9.5	11.5
27	21.0	18.0	19.5	20.0	17.5	19.0	18.0	16.5	17.5	12.5	11.0	11.5
28	20.0	17.5	18.5	19.5	17.5	19.0	19.5	15.5	17.5	11.0	8.5	10.0
29	19.5	17.5	19.0	21.0	17.5	19.5	19.0	17.5	18.0	12.5	9.0	11.0
30	20.5	16.5	18.5	20.0	17.5	18.5	19.5	16.5	18.0	12.5	11.0	12.0
31	---	---	---	21.0	18.0	19.5	21.0	17.0	19.0	---	---	---
MONTH	22.5	13.0	18.1	22.5	16.0	19.2	22.5	15.0	18.7	20.5	8.5	15.2

## STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	10.1	8.9	9.5	11.2	9.3	10.4	12.5	11.6	12.0	13.1	12.2	12.6
2	10.1	9.2	9.7	10.4	9.0	9.7	12.1	11.4	11.7	12.6	12.4	12.5
3	10.9	9.6	10.2	10.8	9.7	10.2	11.7	11.2	11.4	12.9	12.4	12.6
4	10.6	9.4	10.1	10.9	9.9	10.3	11.9	11.1	11.4	12.8	12.0	12.4
5	10.1	9.1	9.6	10.8	9.7	10.2	11.7	11.3	11.5	12.8	12.0	12.3
6	10.6	9.2	9.9	11.3	10.2	10.7	12.1	11.5	11.8	13.3	12.0	12.6
7	10.9	9.6	10.2	11.6	10.5	11.0	12.1	11.4	11.6	13.2	12.0	12.6
8	10.8	9.4	10.0	11.5	10.4	10.9	12.0	11.4	11.6	13.3	12.0	12.6
9	10.6	9.2	9.8	11.0	9.9	10.4	12.1	11.4	11.7	13.3	12.2	12.7
10	10.4	9.1	9.7	10.5	9.8	10.1	12.1	11.4	11.7	12.7	12.2	12.4
11	10.7	9.3	10.0	11.7	10.5	11.0	12.7	11.9	12.2	13.0	12.2	12.6
12	10.6	9.3	9.9	11.1	10.6	10.8	12.5	12.1	12.2	13.1	12.0	12.6
13	9.5	8.9	9.3	11.4	10.3	10.7	12.8	12.1	12.4	13.0	12.0	12.4
14	10.5	9.4	9.8	11.4	10.0	10.7	12.7	12.2	12.4	13.6	12.1	12.8
15	10.4	9.2	9.7	11.6	10.6	11.0	12.4	12.1	12.2	13.5	12.7	13.0
16	10.0	9.1	9.4	11.8	10.9	11.3	12.7	12.0	12.3	13.1	12.2	12.7
17	10.4	9.0	9.7	12.1	11.2	11.5	13.3	12.1	12.7	13.1	12.5	12.7
18	10.9	9.6	10.1	12.0	11.1	11.5	13.2	12.5	12.8	12.6	12.2	12.4
19	10.9	9.8	10.3	11.9	11.0	11.4	13.2	12.0	12.5	12.6	12.1	12.3
20	10.7	9.5	10.1	11.8	10.8	11.2	12.7	12.2	12.4	12.9	12.1	12.4
21	10.9	9.8	10.3	12.0	11.3	11.6	12.5	12.0	12.2	12.8	12.3	12.5
22	10.7	9.4	10.1	11.8	11.0	11.3	12.5	12.1	12.3	12.5	12.2	12.3
23	10.9	9.9	10.4	11.7	10.8	11.2	12.6	12.1	12.3	12.4	11.8	12.0
24	11.3	10.3	10.7	11.7	10.5	11.0	12.5	12.0	12.2	12.2	11.9	12.0
25	11.2	10.3	10.7	12.1	11.2	11.6	12.3	11.9	12.1	12.1	11.7	11.9
26	11.3	10.2	10.7	11.9	10.9	11.3	12.2	11.6	11.9	12.1	11.9	12.0
27	11.4	10.5	10.9	11.6	10.8	11.2	12.3	11.9	12.1	12.1	11.9	11.9
28	11.4	10.5	10.9	12.2	11.2	11.6	12.1	11.9	12.0	12.0	11.8	11.9
29	11.6	10.4	10.9	12.5	11.5	12.1	12.1	11.7	11.9	12.2	11.7	11.9
30	11.4	10.0	10.6	12.7	11.9	12.3	12.8	11.8	12.4	12.1	11.7	11.8
31	11.0	9.7	10.4	---	---	---	12.5	12.0	12.2	12.0	11.6	11.8
MONTH	11.6	8.9	10.1	12.7	9.0	11.0	13.3	11.1	12.1	13.6	11.6	12.4

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	12.3	11.8	12.0	11.8	11.2	11.5	11.4	9.9	10.6	9.7	8.3	8.9
2	12.4	12.0	12.2	12.5	11.6	12.0	11.1	10.0	10.5	9.9	8.3	9.1
3	12.2	11.8	11.9	12.5	11.6	12.1	11.2	10.0	10.5	9.8	7.9	8.9
4	12.2	11.7	11.9	12.5	11.4	12.0	11.3	9.9	10.7	9.5	7.7	8.6
5	12.2	11.9	12.0	12.3	11.3	11.8	11.5	10.1	10.9	9.1	7.5	8.3
6	12.4	12.0	12.2	12.4	11.0	11.7	11.2	10.0	10.6	9.0	7.3	8.2
7	12.3	11.8	12.1	11.7	10.1	11.1	11.7	10.6	11.1	8.9	7.0	7.9
8	12.4	11.0	12.0	11.5	9.8	10.7	11.9	10.7	11.4	8.7	6.9	7.8
9	12.0	11.7	11.8	10.5	9.6	10.0	12.1	10.7	11.5	9.0	6.4	7.9
10	12.2	11.9	12.0	11.9	10.4	11.1	12.1	10.4	11.5	9.2	7.4	8.3
11	12.3	11.9	12.1	12.1	10.7	11.4	11.7	10.4	11.2	9.2	7.6	8.4
12	12.3	12.1	12.2	11.8	10.7	11.2	11.7	10.6	11.2	9.4	7.7	8.4
13	12.1	11.8	11.9	12.1	11.0	11.5	11.7	10.4	11.1	9.1	7.6	8.4
14	12.1	11.8	11.9	12.0	11.0	11.4	11.3	9.6	10.6	9.9	8.3	9.1
15	12.2	11.7	11.9	12.2	10.9	11.5	10.8	9.5	10.1	10.4	9.0	9.6
16	12.1	11.6	11.9	12.2	10.9	11.5	10.8	9.7	10.3	9.6	8.9	9.3
17	12.4	12.0	12.2	12.3	11.2	11.7	11.0	9.8	10.5	10.1	8.9	9.5
18	12.2	11.9	12.0	12.3	10.9	11.7	10.7	9.0	10.0	10.0	8.8	9.4
19	12.1	11.6	11.9	11.9	10.9	11.3	10.3	8.9	9.5	10.5	9.2	9.8
20	12.2	11.5	11.9	11.7	10.9	11.2	9.8	9.0	9.5	10.5	9.0	9.8
21	13.0	11.9	12.3	11.8	10.8	11.2	10.4	9.5	9.9	10.4	8.8	9.6
22	12.9	12.2	12.6	11.8	10.8	11.2	10.5	9.1	9.9	10.1	8.5	9.2
23	13.0	12.1	12.6	11.8	10.4	11.1	10.9	9.1	10.0	9.8	8.6	9.1
24	12.8	12.4	12.7	11.7	10.1	10.9	10.7	9.4	10.1	10.1	8.5	9.2
25	12.9	12.2	12.6	11.0	9.7	10.3	10.7	9.2	10.0	10.2	8.5	9.3
26	12.2	11.5	12.0	11.1	9.6	10.3	10.5	8.8	9.8	10.5	8.8	9.6
27	11.9	11.4	11.6	10.6	9.5	10.0	10.3	8.5	9.5	10.6	8.6	9.6
28	12.2	11.7	11.9	10.9	9.6	10.2	10.1	8.3	9.2	10.6	8.7	9.6
29	12.2	11.3	11.9	11.1	9.8	10.4	10.1	8.3	9.2	10.4	8.6	9.5
30	---	---	---	11.3	10.1	10.6	10.4	8.4	9.5	10.2	8.4	9.3
31	---	---	---	11.4	9.9	10.7	---	---	---	9.8	8.1	8.9
MONTH	13.0	11.0	12.1	12.5	9.5	11.1	12.1	8.3	10.3	10.6	6.4	9.0

## STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI--Continued

## OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	9.8	8.1	8.8	10.2	7.9	9.1	9.4	7.3	8.3	9.8	7.4	8.4
2	9.7	8.0	8.9	9.9	7.7	8.8	9.0	7.2	8.1	9.4	7.5	8.4
3	9.9	8.4	9.2	9.9	7.7	8.8	9.5	7.4	8.3	9.7	7.8	8.6
4	9.8	8.0	9.0	10.3	7.9	9.1	9.7	7.4	8.6	9.8	7.7	8.6
5	10.1	8.3	9.2	10.0	7.7	8.9	9.8	7.5	8.6	10.4	8.2	9.1
6	10.1	8.6	9.3	9.5	7.6	8.6	9.3	7.3	8.2	10.1	8.1	9.0
7	9.9	8.2	9.1	10.0	8.1	9.0	9.5	7.6	8.5	9.7	7.6	8.6
8	9.6	7.9	8.7	9.3	7.3	8.3	9.3	7.3	8.4	9.2	7.1	8.1
9	9.4	7.6	8.5	9.2	7.3	8.2	9.1	7.5	8.3	9.3	6.9	7.9
10	9.4	7.8	8.6	9.7	7.6	8.7	9.3	7.4	8.3	9.0	7.3	8.0
11	8.7	7.4	8.1	9.5	7.8	8.7	9.5	7.2	8.3	9.0	7.3	8.0
12	9.2	7.9	8.5	9.7	7.6	8.7	9.5	7.2	8.4	9.0	7.1	7.8
13	9.1	8.0	8.5	9.4	7.5	8.5	9.3	7.1	8.2	9.2	7.4	8.2
14	9.5	7.8	8.6	9.1	7.0	8.0	9.4	7.1	8.3	8.7	7.0	7.8
15	9.7	7.4	8.5	8.8	7.0	7.9	9.2	6.8	8.0	9.3	7.4	8.3
16	9.8	7.9	8.9	8.6	6.8	7.8	9.6	7.1	8.3	9.4	7.9	8.6
17	10.2	8.1	9.1	8.9	6.9	7.9	9.5	7.3	8.4	9.5	7.7	8.5
18	10.0	8.0	9.0	8.9	6.5	7.8	9.8	7.4	8.6	9.9	7.9	8.8
19	10.0	8.0	8.9	8.9	7.0	7.9	10.0	7.8	8.9	9.7	7.7	8.6
20	9.7	7.9	8.8	8.6	6.7	7.7	9.9	7.8	8.8	8.6	7.5	8.1
21	9.5	7.6	8.5	8.8	6.7	7.9	10.2	7.9	9.0	10.0	8.3	9.1
22	9.6	7.5	8.5	9.7	7.9	8.8	9.4	7.9	8.5	10.1	8.9	9.4
23	9.7	7.6	8.7	9.5	7.7	8.6	9.8	7.9	8.8	9.7	8.5	9.0
24	9.6	7.3	8.4	9.6	7.7	8.6	10.0	7.9	9.0	10.3	8.5	9.3
25	9.6	7.2	8.4	9.9	7.6	8.8	10.8	7.7	9.2	10.5	8.8	9.5
26	9.1	7.1	8.2	9.8	7.7	8.7	9.8	7.9	8.8	10.1	8.8	9.4
27	9.4	7.4	8.5	9.6	7.6	8.5	10.3	8.2	9.1	10.6	8.4	9.3
28	9.6	7.6	8.7	9.4	7.5	8.4	10.7	8.5	9.5	10.3	8.9	9.6
29	9.5	7.7	8.6	9.6	7.6	8.6	9.7	7.9	8.7	10.4	9.0	9.5
30	10.2	8.0	9.1	9.3	7.5	8.3	10.5	8.1	9.2	10.0	8.6	9.2
31	---	---	---	9.5	7.6	8.4	10.3	7.9	9.0	---	---	---
MONTH	10.2	7.1	8.7	10.3	6.5	8.5	10.8	6.8	8.6	10.6	6.9	8.7

## STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI

LOCATION.--Lat 44°33'39", long 83°48'10", in SW1/4 NW1/4 sec.14, T.25 N., R.5 E., Alcona County, Hydrologic Unit 04070007, on left bank 200 ft upstream from Bamfield Road, 3.2 mi east of Curtisville.

DRAINAGE AREA.--1,598 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 800 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good. Flow completely regulated by Alcona Dam 300 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1040	1050	941	987	972	1390	971	984	1040	928	1030	816
2	1050	1010	946	988	924	1350	992	966	1190	885	1040	838
3	1010	1010	949	1020	984	1250	990	976	1190	882	1060	836
4	951	955	1080	1040	988	1190	993	979	1160	887	963	842
5	938	923	1250	975	931	1150	978	958	1100	865	887	812
6	941	930	1270	957	880	1150	1000	963	1090	855	858	796
7	930	950	1150	995	947	1080	986	952	1040	859	863	777
8	930	956	1090	994	877	1120	1000	945	1030	864	848	808
9	934	955	1100	983	928	1160	999	980	1080	887	914	785
10	919	967	1070	1030	973	1230	972	1010	1520	883	907	831
11	882	932	1030	1040	944	1210	980	970	1420	860	908	853
12	874	924	1010	981	835	1120	980	1140	1450	834	834	874
13	1040	942	1020	987	926	1090	977	1440	1390	833	820	871
14	1080	929	993	995	981	1100	981	1540	1300	863	802	867
15	1020	930	1020	963	967	1080	976	1310	1080	854	814	849
16	1050	944	1070	972	974	1080	982	1210	1100	832	777	805
17	1030	965	1000	809	865	1060	989	1190	1060	832	768	812
18	944	950	928	866	918	1040	984	1340	1020	798	789	786
19	953	935	916	928	944	1020	978	1490	989	792	808	810
20	957	936	984	923	954	1030	1040	1370	1000	811	776	818
21	931	936	897	797	946	1030	1250	1280	1010	794	786	855
22	987	953	796	776	962	1050	1300	1210	999	799	783	836
23	1040	962	751	813	984	1050	1200	1200	958	789	804	914
24	1000	962	776	870	1200	1050	1100	1190	948	815	807	900
25	967	994	936	933	1340	1090	1060	1160	933	774	785	897
26	983	1010	1030	980	1440	1030	1020	1100	969	786	812	875
27	996	1010	1030	816	1710	1090	1020	1060	1060	792	855	861
28	963	970	1010	868	1590	1070	980	1060	1020	989	861	830
29	930	948	990	950	1420	1060	963	1040	997	908	870	830
30	937	945	987	966	---	1000	957	1020	973	878	838	833
31	1050	---	984	964	---	1000	---	1030	---	929	804	---
TOTAL	30257	28783	31004	29166	30304	34420	30598	35063	33116	26357	26471	25117
MEAN	976	959	1000	941	1045	1110	1020	1131	1104	850	854	837
MAX	1080	1050	1270	1040	1710	1390	1300	1540	1520	989	1060	914
MIN	874	923	751	776	835	1000	957	945	933	774	768	777
CFSM	.61	.60	.63	.59	.65	.69	.64	.71	.69	.53	.53	.52
IN.	.70	.67	.72	.68	.71	.80	.71	.82	.77	.61	.62	.58

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1997 - 2000, BY WATER YEAR (WY)

	1997	1998	1999	2000
MEAN	1062	1081	1108	1113
MAX	1118	1153	1227	1236
(WY)	1999	1998	1997	1997
MIN	976	959	1000	941
(WY)	2000	2000	2000	2000

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1997 - 2000
ANNUAL TOTAL	381846	360656	
ANNUAL MEAN	1046	985	1143
HIGHEST ANNUAL MEAN			1320
LOWEST ANNUAL MEAN			985
HIGHEST DAILY MEAN	1840	1710	5410
LOWEST DAILY MEAN	751	751	751
ANNUAL SEVEN-DAY MINIMUM	803	784	784
INSTANTANEOUS PEAK FLOW		1810	5520
INSTANTANEOUS PEAK STAGE		9.58	13.56
INSTANTANEOUS LOW FLOW		525	525
ANNUAL RUNOFF (CFSM)	.65	.62	.72
ANNUAL RUNOFF (INCHES)	8.89	8.40	9.72
10 PERCENT EXCEEDS	1270	1170	1390
50 PERCENT EXCEEDS	1010	970	1070
90 PERCENT EXCEEDS	845	812	870

## STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1997 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to current year.

DISSOLVED OXYGEN: October 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.0°C, July 7, 1999; minimum, -0.5°C, Feb. 18, 21, 2000.

DISSOLVED OXYGEN: Maximum, 13.4 mg/L, Jan. 26, 2000; minimum, 5.4 mg/L, Aug. 16, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 23.0°C, July 17; minimum, -0.5°C, Feb. 18, 21.

DISSOLVED OXYGEN: Maximum, 13.4 mg/L, Jan. 26; minimum, 5.4 mg/L, Aug. 16.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	13.5	13.5	13.5	8.5	8.0	8.0	4.0	3.5	3.5	.5	.5	.5
2	13.5	12.5	13.0	---	---	---	3.5	3.0	3.5	.5	.5	.5
3	12.5	12.0	12.5	---	---	---	3.5	3.0	3.5	.5	.5	.5
4	12.5	11.5	12.0	---	---	---	3.5	3.5	3.5	.5	.5	.5
5	11.5	11.0	11.5	6.5	6.0	6.5	3.5	3.0	3.5	.5	.5	.5
6	11.5	10.5	11.0	6.5	6.0	6.5	3.0	3.0	3.0	.5	.5	.5
7	10.5	10.0	10.5	6.0	6.0	6.0	3.5	3.0	3.5	.5	.0	.0
8	10.5	10.0	10.0	6.0	6.0	6.0	3.5	3.0	3.0	.5	.0	.0
9	10.5	10.0	10.0	6.5	6.0	6.0	3.5	3.0	3.5	.0	.0	.0
10	11.5	10.0	11.0	7.0	6.5	6.5	3.5	3.0	3.0	.5	.0	.0
11	11.5	10.5	11.0	6.5	6.0	6.0	3.0	2.5	3.0	.5	.0	.5
12	10.5	10.0	10.5	6.0	6.0	6.0	3.0	3.0	3.0	.5	.5	.5
13	11.0	10.5	10.5	6.0	6.0	6.0	3.0	2.5	2.5	1.0	.5	.5
14	10.5	10.0	10.0	6.0	5.5	6.0	3.0	2.5	2.5	1.0	1.0	1.0
15	10.0	10.0	10.0	5.5	5.0	5.5	3.0	2.5	3.0	1.0	.5	1.0
16	10.5	10.0	10.0	5.0	4.5	5.0	2.5	2.0	2.5	1.0	.5	.5
17	10.5	10.0	10.0	4.5	4.5	4.5	2.0	1.5	1.5	1.0	.5	.5
18	10.0	9.5	9.5	4.5	4.0	4.5	1.5	1.0	1.0	1.0	.5	.5
19	9.5	9.5	9.5	4.5	4.0	4.5	1.5	1.5	1.5	1.0	.5	1.0
20	9.5	9.0	9.5	4.5	4.5	4.5	1.5	1.5	1.5	1.0	.5	.5
21	9.0	9.0	9.0	4.5	4.0	4.5	1.5	1.5	1.5	.5	.0	.5
22	9.0	8.5	9.0	4.5	4.5	4.5	1.5	1.5	1.5	.5	.0	.0
23	8.5	7.5	8.0	5.0	4.5	4.5	1.5	1.5	1.5	.5	.0	.5
24	7.5	7.0	7.5	5.0	5.0	5.0	1.5	1.5	1.5	.5	.0	.5
25	7.5	7.0	7.5	5.0	5.0	5.0	1.5	1.5	1.5	.5	.0	.5
26	7.5	7.0	7.0	5.0	5.0	5.0	1.5	1.5	1.5	1.0	.0	.5
27	7.0	7.0	7.0	5.0	4.5	5.0	1.5	1.0	1.5	.0	.0	.0
28	7.5	7.0	7.0	4.5	4.5	4.5	1.0	1.0	1.0	1.0	.0	.0
29	7.5	7.0	7.0	4.5	4.0	4.0	1.0	1.0	1.0	1.0	.0	.5
30	7.5	7.0	7.0	4.0	3.5	3.5	1.0	1.0	1.0	1.0	.0	.5
31	8.5	7.5	8.0	---	---	---	1.0	.5	.5	.5	.0	.5
MONTH	13.5	7.0	9.7	---	---	---	4.0	.5	2.2	1.0	.0	.4

## STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	.5	.0	.5	3.5	3.0	3.5	8.0	7.5	8.0	14.0	11.5	12.5	
2	1.5	.0	.0	3.5	3.5	3.5	8.0	7.5	8.0	13.0	11.5	12.5	
3	1.0	.0	.5	4.0	3.5	3.5	9.0	8.0	8.5	14.0	12.0	12.5	
4	.5	.0	.5	3.5	3.5	3.5	9.0	7.5	8.5	15.0	13.0	13.5	
5	1.0	.0	.0	3.5	3.5	3.5	8.0	7.0	7.5	16.0	14.0	15.0	
6	1.5	.0	.0	4.5	3.5	4.0	7.5	7.5	7.5	17.0	15.0	15.5	
7	.5	.0	.0	4.5	4.0	4.0	7.5	6.5	7.0	17.5	15.5	16.5	
8	.5	.0	.0	4.5	4.5	4.5	7.0	6.5	6.5	18.0	16.0	17.0	
9	.5	.0	.0	4.5	4.5	4.5	6.5	6.0	6.5	18.5	17.5	18.0	
10	.5	.0	.0	5.0	4.5	4.5	6.0	5.0	5.5	19.0	18.0	18.5	
11	.5	.0	.0	5.0	4.5	5.0	6.0	5.5	6.0	18.0	17.0	17.5	
12	.0	.0	.0	5.0	4.5	4.5	6.0	5.5	6.0	17.5	17.0	17.0	
13	.0	.0	.0	4.5	4.5	4.5	5.5	5.5	5.5	17.5	16.5	17.0	
14	1.0	.0	.5	4.5	4.0	4.5	6.5	5.5	6.0	16.5	15.5	16.0	
15	.5	.0	.5	4.0	4.0	4.0	8.0	6.5	7.0	16.0	15.5	15.5	
16	.5	.0	.0	4.0	3.5	4.0	7.5	6.5	7.0	15.5	14.5	15.0	
17	.5	.0	.0	4.0	3.5	4.0	7.5	6.5	7.0	14.5	14.0	14.0	
18	1.0	-.5	.0	4.0	4.0	4.0	8.0	7.0	7.0	14.5	13.5	14.0	
19	.5	.0	.0	4.0	4.0	4.0	8.0	7.5	8.0	13.5	13.5	13.5	
20	.5	.0	.0	4.0	3.5	3.5	8.0	7.5	8.0	14.0	13.0	13.5	
21	.5	-.5	.0	4.0	3.5	3.5	8.0	7.5	7.5	14.0	13.0	13.0	
22	.5	.0	.0	4.0	3.5	4.0	9.0	7.5	8.0	14.0	12.5	13.5	
23	1.0	.0	.5	5.0	4.0	4.5	9.0	8.0	8.5	14.0	14.0	14.0	
24	1.5	.5	1.0	5.0	4.5	4.5	10.0	8.0	9.0	15.5	14.0	14.5	
25	2.0	.5	1.5	6.5	5.0	6.0	10.0	8.5	9.0	15.0	14.5	14.5	
26	1.5	1.0	1.5	7.0	6.0	6.5	10.5	9.0	9.5	15.5	14.0	14.5	
27	1.5	1.0	1.5	7.5	7.0	7.0	10.0	9.5	9.5	15.0	14.5	14.5	
28	2.5	1.5	2.0	8.0	7.0	7.5	12.0	10.0	10.5	15.5	15.0	15.0	
29	3.0	2.5	3.0	7.5	7.0	7.5	12.5	11.0	12.0	15.5	15.0	15.0	
30	---	---	---	8.0	7.0	7.5	12.5	11.0	11.5	16.0	14.5	15.0	
31	---	---	---	8.5	7.0	7.5	---	---	---	16.0	15.5	16.0	
MONTH	3.0	-.5	.5	8.5	3.0	4.7	12.5	5.0	7.9	19.0	11.5	15.0	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.5	16.0	16.0	20.5	20.0	20.0	21.0	20.5	20.5	20.5	19.5	20.0
2	17.0	16.0	16.5	21.0	20.0	20.5	22.5	20.5	21.0	20.0	19.5	20.0
3	16.5	16.0	16.5	21.0	20.5	20.5	22.5	21.0	21.5	20.5	19.5	20.0
4	16.5	16.5	16.5	22.0	20.5	21.0	21.0	21.0	21.0	20.0	19.0	20.0
5	17.0	16.5	17.0	21.0	20.5	21.0	21.0	20.5	20.5	19.5	19.0	19.0
6	18.0	16.5	17.0	21.0	21.0	21.0	20.5	20.0	20.5	19.0	18.5	18.5
7	17.5	16.5	17.0	21.0	20.5	21.0	22.0	20.5	21.0	19.0	18.0	18.5
8	19.0	17.0	18.0	21.0	20.0	20.5	21.5	21.0	21.0	19.0	18.5	19.0
9	18.0	17.5	18.0	21.0	20.0	20.5	21.5	20.5	21.0	19.0	18.5	18.5
10	20.5	18.0	18.5	21.0	20.5	20.5	21.5	21.0	21.0	19.0	18.5	18.5
11	20.0	19.5	19.5	21.5	20.5	21.0	21.5	20.5	21.0	19.5	18.5	19.0
12	19.5	19.0	19.0	21.0	20.5	20.5	21.0	20.5	21.0	20.5	19.0	19.5
13	19.0	18.5	18.5	21.0	20.5	20.5	21.0	20.5	20.5	19.5	18.5	19.0
14	19.0	18.0	18.5	22.0	20.5	21.5	21.5	20.5	21.0	19.5	19.0	19.0
15	19.5	18.5	19.0	22.0	21.0	21.5	22.0	20.5	21.5	19.0	17.5	18.0
16	19.5	18.5	19.0	22.0	21.0	21.5	22.5	21.0	21.5	17.5	17.0	17.5
17	20.0	19.0	19.5	23.0	21.0	21.5	21.5	21.0	21.0	17.5	17.0	17.0
18	19.0	18.5	19.0	22.5	21.0	21.5	21.5	21.0	21.0	17.0	16.0	16.5
19	20.0	18.5	19.0	21.0	20.5	21.0	21.0	20.0	20.5	17.0	16.0	16.5
20	19.0	18.0	19.0	21.0	20.5	20.5	20.0	19.5	20.0	17.0	16.5	16.5
21	20.0	19.0	19.5	21.0	20.0	20.5	19.5	19.0	19.5	16.5	16.0	16.5
22	20.5	19.5	20.0	20.5	19.5	20.0	19.5	18.5	19.0	16.0	15.5	15.5
23	20.0	19.5	19.5	20.0	19.5	19.5	19.5	18.5	19.0	15.5	15.0	15.5
24	20.5	19.0	19.5	19.5	19.0	19.0	19.5	18.5	19.0	15.0	14.5	15.0
25	21.5	20.0	20.5	19.5	19.0	19.0	19.0	18.5	19.0	14.5	14.0	14.0
26	22.0	20.0	21.0	20.0	19.0	19.5	19.5	18.5	19.0	14.0	13.5	13.5
27	22.0	20.5	21.0	20.5	19.5	20.0	19.5	18.5	19.0	14.0	13.5	14.0
28	21.0	20.5	21.0	20.0	19.5	20.0	19.0	19.0	19.0	13.5	12.5	13.0
29	21.0	20.0	20.5	20.5	20.0	20.0	19.5	18.5	19.0	12.5	12.5	12.5
30	20.5	20.0	20.0	20.5	20.0	20.5	19.5	19.0	19.0	13.0	12.5	12.5
31	--	---	---	20.5	20.0	20.5	20.0	19.0	19.0	---	---	---
MONTH	22.0	16.0	18.8	23.0	19.0	20.5	22.5	18.5	20.2	20.5	12.5	17.1

## STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	9.2	8.8	9.0	10.7	10.5	10.7	12.0	11.8	11.9	12.5	12.3	12.4			
2	9.2	8.9	9.0	---	---	---	12.1	11.9	12.0	12.3	12.2	12.3			
3	9.1	9.0	9.1	---	---	---	12.1	11.9	12.0	12.3	12.2	12.2			
4	9.2	8.8	9.1	---	---	---	12.2	12.0	12.1	12.3	12.1	12.2			
5	9.0	8.7	8.8	10.3	10.1	10.2	12.3	12.1	12.2	12.2	12.1	12.2			
6	9.6	9.0	9.2	10.6	10.2	10.3	12.3	12.1	12.2	12.3	12.2	12.2			
7	9.5	9.2	9.3	10.4	10.3	10.4	12.2	11.9	12.0	12.4	12.1	12.2			
8	9.6	9.4	9.5	10.4	10.2	10.3	12.1	12.0	12.0	12.5	12.3	12.3			
9	9.8	9.6	9.7	10.3	10.1	10.2	12.0	11.8	11.9	12.5	12.3	12.4			
10	10.0	9.7	9.8	10.3	10.2	10.3	12.2	11.8	12.0	12.6	12.4	12.5			
11	10.1	9.9	10.0	10.5	10.3	10.4	12.2	12.1	12.1	12.7	12.5	12.6			
12	10.0	9.4	9.7	10.5	10.4	10.5	12.2	12.1	12.1	12.7	12.5	12.6			
13	10.0	9.7	9.8	10.6	10.4	10.5	12.2	12.0	12.1	12.7	12.5	12.6			
14	9.8	9.4	9.7	10.8	10.5	10.7	12.2	12.0	12.1	13.0	12.6	12.8			
15	9.6	9.4	9.4	11.1	10.7	10.9	12.1	11.8	12.0	13.0	12.8	12.9			
16	9.6	9.4	9.6	11.2	10.9	11.1	12.1	11.8	12.0	13.3	12.7	13.0			
17	9.8	9.6	9.6	11.2	11.1	11.2	12.2	12.1	12.2	13.2	12.7	13.0			
18	9.8	9.7	9.7	11.3	11.1	11.3	12.3	12.0	12.1	13.2	12.7	13.0			
19	9.8	9.5	9.6	11.4	11.3	11.4	12.4	12.2	12.3	13.2	12.9	13.0			
20	9.7	9.4	9.6	11.5	11.3	11.4	12.6	12.4	12.5	13.2	12.9	13.0			
21	9.7	9.6	9.7	11.5	11.4	11.4	12.8	12.5	12.7	12.9	12.6	12.8			
22	10.0	9.6	9.8	11.6	11.4	11.5	12.9	12.7	12.8	12.8	12.4	12.6			
23	10.4	10.0	10.2	11.6	11.4	11.6	13.0	12.7	12.9	12.5	12.3	12.4			
24	10.5	10.4	10.4	11.7	11.4	11.6	13.3	12.9	13.1	12.7	12.5	12.6			
25	10.5	10.4	10.4	11.6	11.6	11.6	13.3	13.1	13.2	12.5	12.4	12.4			
26	10.6	10.4	10.5	11.7	11.6	11.7	13.2	13.0	13.1	13.4	12.1	12.4			
27	10.6	10.5	10.5	11.8	11.6	11.7	13.2	13.0	13.1	12.3	11.7	12.0			
28	10.6	10.5	10.5	12.0	11.8	11.9	13.1	12.9	13.0	12.7	11.8	12.0			
29	10.7	10.5	10.6	12.3	11.9	12.1	12.9	12.6	12.7	12.7	11.7	12.0			
30	10.7	10.5	10.6	12.3	11.9	12.2	12.8	12.6	12.7	12.6	11.6	11.9			
31	10.8	10.6	10.7	---	---	---	12.6	12.5	12.5	12.3	11.0	11.6			
MONTH	10.8	8.7	9.8	---	---	---	13.3	11.8	12.4	13.4	11.0	12.5			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	11.3	10.9	11.1	11.6	11.5	11.5	11.5	11.3	11.4	10.1	9.6	9.8	
2	11.8	10.6	10.9	11.6	11.4	11.5	11.3	11.0	11.2	9.8	9.6	9.7	
3	11.8	10.7	11.1	11.5	11.4	11.5	11.4	11.1	11.3	9.7	9.4	9.6	
4	11.4	10.8	11.0	11.4	11.1	11.3	11.4	11.0	11.2	9.5	9.0	9.3	
5	11.7	10.6	10.9	11.3	10.7	11.0	11.2	11.0	11.1	10.0	8.9	9.4	
6	12.0	10.7	11.0	11.6	10.2	11.2	11.3	11.0	11.2	9.9	9.6	9.8	
7	11.6	10.7	11.1	11.3	10.9	11.2	11.4	11.2	11.3	9.6	9.1	9.4	
8	11.6	10.7	11.0	11.2	10.5	10.9	11.6	11.2	11.4	9.1	8.9	9.1	
9	11.6	10.9	11.1	11.2	10.7	10.9	11.6	11.4	11.5	8.9	8.7	8.8	
10	11.7	11.1	11.4	11.2	11.1	11.2	11.9	11.3	11.6	9.0	8.7	8.8	
11	11.4	11.2	11.3	11.2	10.9	11.1	11.4	11.2	11.3	8.7	8.2	8.5	
12	11.4	11.1	11.2	11.1	10.9	11.0	11.5	11.1	11.3	8.4	7.9	8.1	
13	11.4	11.1	11.2	11.4	11.1	11.2	11.5	11.3	11.4	8.6	7.9	8.3	
14	12.5	11.3	11.7	11.5	11.2	11.4	11.5	11.3	11.4	8.8	8.4	8.6	
15	12.0	11.3	11.7	11.6	11.4	11.5	11.5	11.3	11.4	9.2	8.6	8.8	
16	12.0	11.4	11.8	11.9	11.6	11.7	11.3	11.1	11.2	8.8	8.3	8.4	
17	11.9	11.3	11.5	12.1	11.6	11.8	11.3	11.1	11.2	8.9	8.3	8.6	
18	12.6	11.4	11.7	12.1	11.7	11.9	11.2	11.0	11.1	9.0	8.8	8.9	
19	12.4	11.5	11.8	12.1	11.9	12.0	11.0	10.8	10.9	9.3	8.9	9.2	
20	12.0	11.7	11.8	12.2	12.0	12.1	10.9	10.7	10.8	9.3	9.0	9.2	
21	12.7	11.7	12.1	12.4	12.2	12.3	10.7	10.5	10.6	9.6	9.0	9.2	
22	12.6	11.9	12.3	12.4	12.3	12.4	10.7	10.5	10.6	9.6	9.0	9.3	
23	13.3	11.9	12.4	12.3	12.2	12.3	10.7	10.5	10.6	9.4	9.1	9.2	
24	12.9	12.3	12.6	12.2	12.0	12.2	10.8	10.5	10.6	9.6	9.1	9.2	
25	12.7	12.3	12.5	12.2	11.7	12.0	10.7	10.5	10.6	9.6	9.0	9.3	
26	12.5	12.0	12.3	11.8	11.5	11.6	10.5	10.4	10.5	9.4	9.2	9.3	
27	12.2	11.9	12.1	11.5	11.2	11.4	10.6	10.4	10.5	9.4	9.1	9.2	
28	12.1	11.9	12.0	11.4	11.2	11.3	10.6	10.4	10.5	9.4	9.1	9.2	
29	11.9	11.5	11.7	11.5	11.2	11.3	10.4	10.0	10.2	9.3	9.0	9.2	
30	---	---	---	11.5	11.1	11.3	10.3	10.0	10.2	9.2	8.5	9.0	
31	---	---	---	11.4	11.2	11.3	---	---	---	9.0	8.7	8.9	
MONTH	13.3	10.6	11.6	12.4	10.2	11.5	11.9	10.0	11.0	10.1	7.9	9.1	

## STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

## OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.9	8.4	8.7	7.8	7.2	7.5	8.7	7.3	8.0	7.8	6.8	7.2
2	9.3	8.5	9.0	7.8	7.2	7.6	8.4	6.8	7.8	8.2	6.9	7.5
3	8.9	8.5	8.7	7.8	7.5	7.7	8.2	6.7	7.4	8.3	6.8	7.3
4	8.9	8.4	8.6	8.2	7.7	7.9	7.6	6.4	7.1	7.8	6.8	7.3
5	9.1	8.6	8.8	8.0	7.6	7.8	7.2	6.0	6.6	8.0	6.8	7.5
6	9.3	8.5	8.9	7.9	7.6	7.7	7.1	6.5	6.8	8.3	7.0	7.6
7	9.0	8.7	8.8	7.8	7.4	7.6	7.2	6.2	6.7	7.7	6.5	7.2
8	9.2	8.4	8.8	7.6	6.6	7.2	7.4	6.3	6.9	7.7	7.1	7.4
9	8.6	8.3	8.5	7.5	6.8	7.2	8.2	6.6	7.3	8.3	7.5	7.9
10	8.8	8.4	8.6	7.6	7.0	7.3	7.7	6.9	7.4	8.1	7.7	7.9
11	8.5	8.0	8.1	7.9	7.5	7.7	7.9	7.1	7.6	8.0	7.5	7.8
12	8.1	7.6	7.9	8.0	7.7	7.8	7.7	7.2	7.5	7.9	7.5	7.6
13	7.6	7.0	7.1	7.7	7.6	7.6	8.1	6.3	7.5	7.6	7.1	7.5
14	7.7	7.0	7.3	8.4	7.2	7.7	7.6	6.3	7.2	7.6	7.2	7.4
15	8.0	7.3	7.6	8.2	7.2	7.6	7.4	6.3	7.0	7.7	7.3	7.6
16	8.1	7.2	7.8	8.3	6.7	7.7	7.5	5.4	6.5	7.7	7.5	7.6
17	8.4	7.7	8.0	8.8	7.0	7.7	7.0	5.7	6.4	7.8	7.3	7.5
18	8.0	7.4	7.7	8.6	7.1	7.8	7.4	5.5	6.6	7.6	6.8	7.3
19	8.3	7.4	7.8	8.0	6.7	7.2	7.6	6.2	6.9	7.9	7.4	7.6
20	8.0	7.2	7.7	8.3	6.4	7.1	7.6	5.9	7.0	7.9	7.6	7.8
21	8.3	7.5	7.9	8.0	6.8	7.4	7.6	6.6	7.2	8.1	7.7	7.9
22	8.5	7.8	8.2	8.2	6.8	7.5	7.6	5.7	6.4	8.1	7.9	8.0
23	8.3	7.8	8.0	7.8	6.7	7.1	7.1	6.1	6.5	8.0	7.6	7.8
24	8.1	7.2	7.7	8.0	6.9	7.3	7.0	6.5	6.7	8.1	7.8	8.0
25	8.0	7.6	7.8	9.0	7.1	8.0	7.4	6.5	6.8	8.2	7.9	8.0
26	8.5	7.6	8.0	9.1	7.8	8.6	8.4	6.4	7.5	8.3	7.9	8.0
27	8.3	7.6	7.9	9.1	7.9	8.5	8.2	7.5	7.8	9.0	8.3	8.6
28	7.8	7.4	7.6	9.3	7.9	8.7	8.3	7.5	7.9	8.8	8.6	8.7
29	7.5	6.9	7.2	9.1	7.7	8.4	7.9	7.1	7.5	8.8	8.6	8.7
30	7.7	7.0	7.3	8.7	7.4	8.2	8.0	6.9	7.4	8.9	8.8	8.9
31	---	---	---	8.6	7.2	7.9	8.0	6.7	7.4	---	---	---
MONTH	9.3	6.9	8.1	9.3	6.4	7.7	8.7	5.4	7.1	9.0	6.5	7.8



## STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI

LOCATION.--Lat 44°27'48", long 83°43'17", in SW1/4 NW1/4 sec.21, T.24 N., R.6 E., Iosco County, Hydrologic Unit 04070007, on right bank 75 ft downstream from Loud Dam, 8.4 mi east of South Branch.

DRAINAGE AREA.--1,689 mi<sup>2</sup>.

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.5°C, July 24, July 30 to Aug. 1, 1999; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 14.1 mg/L, Dec. 27, 1998, Jan. 4, 1999; minimum, 4.0 mg/L, July 22, 1999.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 23.5°C, Aug. 15; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.0 mg/L, Dec. 24-27; minimum, 4.6 mg/L, Sept. 14.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	14.5	14.0	14.0	9.5	8.5	9.0	3.5	3.0	3.5	.5	.0	.5
2	14.0	13.0	13.5	9.5	8.5	9.0	3.0	3.0	3.0	.5	.0	.5
3	13.0	12.5	12.5	8.5	7.5	8.0	3.5	3.0	3.0	.5	.0	.5
4	12.5	12.0	12.0	7.5	6.5	7.0	4.0	3.5	3.5	.5	.5	.5
5	12.0	11.5	11.5	7.0	6.5	6.5	4.5	4.0	4.0	.5	.5	.5
6	11.5	11.0	11.0	6.5	6.5	6.5	4.0	3.5	4.0	.5	.0	.5
7	11.0	10.5	11.0	6.5	6.0	6.5	3.5	3.0	3.5	.5	.0	.0
8	11.0	10.5	10.5	6.5	6.0	6.5	3.0	3.0	3.0	.5	.0	.0
9	11.5	10.5	11.0	7.0	6.0	6.5	3.0	3.0	3.0	.5	.0	.0
10	12.0	11.0	11.5	7.5	7.0	7.0	3.0	2.5	3.0	.5	.0	.0
11	12.0	11.5	11.5	7.0	7.0	7.0	3.0	2.5	2.5	.5	.0	.0
12	11.5	11.5	11.5	7.0	6.5	7.0	3.0	2.5	2.5	.5	.0	.5
13	11.5	11.0	11.5	6.5	6.5	6.5	2.5	2.0	2.5	.5	.5	.5
14	11.0	10.5	10.5	6.5	6.0	6.5	2.5	2.0	2.5	.5	.0	.5
15	10.5	10.5	10.5	6.0	6.0	6.0	2.5	2.0	2.0	.5	.0	.0
16	10.5	10.5	10.5	6.0	5.0	5.5	2.0	1.5	2.0	.0	.0	.0
17	10.5	10.5	10.5	5.0	4.5	5.0	1.5	1.0	1.5	.0	.0	.0
18	10.5	10.0	10.0	4.5	4.0	4.5	1.5	1.0	1.5	.5	.0	.5
19	10.0	9.5	10.0	4.5	4.0	4.0	1.5	1.0	1.0	.0	.0	.0
20	9.5	9.0	9.5	4.5	4.5	4.5	1.0	.5	1.0	.0	.0	.0
21	9.0	9.0	9.0	5.0	4.5	5.0	1.0	.5	.5	.0	.0	.0
22	9.0	8.5	9.0	5.5	5.0	5.0	1.0	.5	1.0	.0	.0	.0
23	8.5	8.0	8.5	5.5	5.5	5.5	1.0	.5	1.0	.0	.0	.0
24	8.0	7.5	8.0	5.5	5.5	5.5	1.0	.5	.5	.0	.0	.0
25	7.5	7.5	7.5	5.5	5.5	5.5	.5	.5	.5	.0	.0	.0
26	7.5	7.0	7.0	5.5	5.0	5.0	.5	.5	.5	.0	.0	.0
27	7.5	7.0	7.0	5.0	4.5	4.5	.5	.5	.5	.0	.0	.0
28	7.5	7.0	7.5	4.5	4.0	4.5	.5	.5	.5	.0	.0	.0
29	7.5	7.0	7.5	4.0	4.0	4.0	.5	.5	.5	.0	.0	.0
30	8.5	7.5	8.0	4.0	3.5	3.5	.5	.5	.5	.0	.0	.0
31	9.0	8.5	8.5	---	---	---	.5	.5	.5	.0	.0	.0
MONTH	14.5	7.0	10.1	9.5	3.5	5.9	4.5	.5	1.9	.5	.0	.2

## STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			MEAN
1	.0	.0	.0	2.5	1.5	2.0	8.0	7.5	8.0	13.5	13.0	13.0
2	.0	.0	.0	2.5	2.5	2.5	8.5	8.0	8.0	13.5	12.5	13.0
3	.0	.0	.0	3.0	2.5	2.5	9.0	8.5	8.5	14.5	13.0	14.0
4	.0	.0	.0	3.5	3.0	3.0	9.0	8.0	8.5	15.5	14.0	15.0
5	.0	.0	.0	3.5	3.5	3.5	8.5	7.5	8.0	16.5	15.0	16.0
6	.0	.0	.0	4.0	3.5	4.0	7.5	7.0	7.5	18.0	16.0	17.0
7	.0	.0	.0	4.5	4.0	4.0	7.0	7.0	7.0	19.0	17.5	18.0
8	.0	.0	.0	5.5	4.0	4.5	7.0	6.5	6.5	19.5	18.5	18.5
9	.0	.0	.0	5.5	5.0	5.0	6.5	5.5	6.5	19.5	18.5	19.0
10	.0	.0	.0	5.0	4.5	4.5	6.5	5.5	6.0	19.0	18.5	18.5
11	.0	.0	.0	4.5	3.5	4.0	6.0	5.5	5.5	18.5	17.5	17.5
12	.0	.0	.0	3.5	3.5	3.5	6.0	5.5	6.0	17.5	17.0	17.0
13	.0	.0	.0	3.5	3.5	3.5	6.0	5.5	6.0	17.5	16.5	17.0
14	.0	.0	.0	4.0	3.5	3.5	7.0	6.0	6.5	16.5	15.5	16.0
15	.0	.0	.0	4.0	3.5	4.0	8.0	7.0	7.5	16.0	15.0	15.5
16	.0	.0	.0	4.0	3.5	4.0	8.0	7.5	7.5	15.5	14.5	15.0
17	.0	.0	.0	4.0	3.5	4.0	8.0	7.5	7.5	15.0	14.5	15.0
18	.0	.0	.0	4.0	3.5	3.5	8.0	7.5	7.5	15.0	14.5	15.0
19	.0	.0	.0	4.0	3.5	3.5	8.5	8.0	8.5	14.5	14.0	14.5
20	.0	.0	.0	4.0	3.5	4.0	8.5	8.0	8.5	14.5	13.5	14.0
21	.0	.0	.0	4.0	4.0	4.0	8.0	7.5	8.0	15.5	14.0	14.5
22	.0	.0	.0	4.5	4.0	4.5	8.0	7.0	7.5	15.5	15.0	15.0
23	.0	.0	.0	5.0	4.5	5.0	9.5	7.5	8.5	15.0	14.5	15.0
24	.0	.0	.0	6.0	5.0	5.5	10.0	9.0	9.5	15.0	14.5	14.5
25	.0	.0	.0	7.0	6.0	6.5	10.5	9.5	10.0	15.0	14.5	14.5
26	.5	.0	.0	7.5	6.5	7.0	11.0	10.0	10.5	15.5	14.5	15.0
27	.5	.5	.5	7.5	7.0	7.0	11.5	10.5	11.0	16.0	15.0	15.0
28	1.0	.5	1.0	7.5	7.0	7.0	12.5	11.5	11.5	16.0	15.0	15.5
29	1.5	1.0	1.5	7.0	7.0	7.0	12.5	12.0	12.0	16.0	15.5	15.5
30	---	---	---	7.5	7.0	7.0	13.0	12.0	12.5	17.0	16.0	16.5
31	---	---	---	8.5	7.0	7.5	---	---	---	17.0	16.5	16.5
MONTH	1.5	.0	.1	8.5	1.5	4.5	13.0	5.5	8.2	19.5	12.5	15.7

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	17.0	16.5	16.5	21.5	20.0	20.5	22.0	21.5	21.5	22.0	20.5	21.0
2	17.0	16.5	17.0	22.0	20.5	21.0	23.0	21.5	22.0	21.0	20.5	21.0
3	17.5	16.0	16.5	22.0	21.0	21.5	22.0	21.5	21.5	21.0	20.0	20.5
4	17.5	17.0	17.0	23.0	21.5	22.0	22.0	21.0	21.5	20.5	20.0	20.0
5	17.5	17.0	17.5	22.5	22.0	22.0	22.0	21.5	21.5	20.0	19.5	19.5
6	17.5	17.0	17.0	22.5	22.0	22.0	22.0	21.5	21.5	19.5	19.0	19.5
7	18.5	17.0	17.5	22.0	21.5	22.0	22.5	21.5	22.0	19.5	19.0	19.5
8	19.5	17.5	18.5	21.5	21.0	21.5	22.0	21.5	21.5	20.0	19.0	19.5
9	19.5	18.5	19.0	22.0	21.5	21.5	22.0	21.5	22.0	20.5	19.5	20.0
10	21.5	19.5	20.0	21.5	21.0	21.5	22.0	21.5	22.0	20.5	20.0	20.5
11	20.5	20.0	20.5	22.0	21.5	21.5	22.0	21.5	22.0	20.5	20.0	20.5
12	20.0	19.0	19.5	22.0	21.5	21.5	22.5	21.5	22.0	20.5	20.0	20.5
13	19.0	18.5	18.5	22.5	21.5	22.0	22.5	21.5	22.0	20.0	19.5	20.0
14	19.5	18.0	18.5	22.5	22.0	22.5	22.5	22.0	22.0	19.5	19.0	19.5
15	20.0	19.0	19.5	22.0	22.0	22.0	23.5	22.0	22.5	19.0	18.0	18.5
16	20.0	19.5	20.0	22.0	21.5	22.0	23.0	22.0	22.5	18.0	17.5	18.0
17	20.5	19.5	20.0	23.0	21.5	22.5	22.5	22.0	22.0	17.5	17.0	17.0
18	20.5	19.5	20.0	22.5	22.0	22.0	22.0	21.5	21.5	17.0	16.5	17.0
19	20.5	20.0	20.0	22.0	21.5	22.0	21.5	20.5	21.0	17.5	17.0	17.0
20	20.0	20.0	20.0	22.0	21.5	21.5	20.5	20.0	20.5	17.5	17.5	17.5
21	21.0	20.0	20.5	21.5	21.0	21.5	20.5	20.0	20.0	17.5	16.5	17.0
22	20.5	20.0	20.0	21.0	20.5	21.0	20.5	20.0	20.0	16.5	15.5	16.0
23	21.0	20.0	20.5	20.5	20.0	20.5	20.5	19.5	20.0	15.5	15.0	15.5
24	22.0	20.5	21.0	20.5	20.0	20.5	20.5	19.5	20.0	15.0	14.5	15.0
25	23.0	21.0	22.0	21.0	20.5	20.5	21.0	19.5	20.5	15.0	14.5	14.5
26	23.0	21.0	22.0	21.5	20.5	21.0	21.5	20.0	20.5	15.0	14.0	14.5
27	22.5	21.5	22.0	21.5	21.0	21.5	20.5	20.0	20.0	14.5	14.0	14.0
28	22.0	21.5	21.5	22.0	21.0	21.5	20.0	20.0	20.0	14.0	13.5	13.5
29	21.5	20.5	21.0	22.0	21.5	21.5	20.5	19.5	20.5	14.0	13.0	13.5
30	21.0	20.5	20.5	21.5	21.5	21.5	20.5	20.0	20.0	13.5	13.0	13.0
31	---	---	---	21.5	21.5	21.5	21.5	20.0	20.5	---	---	---
MONTH	23.0	16.0	19.5	23.0	20.0	21.5	23.5	19.5	21.2	22.0	13.0	17.8

## STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	9.1	5.6	7.8	11.2	8.0	10.2	11.8	8.2	10.8	12.6	11.8	12.5			
2	9.2	6.1	8.0	11.1	8.8	10.4	11.9	9.5	11.1	12.6	12.3	12.5			
3	9.4	6.3	8.2	11.0	10.7	10.9	11.7	9.6	10.9	12.6	12.3	12.5			
4	9.5	6.6	8.3	11.1	10.9	11.0	11.6	9.9	10.9	12.5	12.3	12.4			
5	9.5	6.7	8.8	11.3	11.0	11.1	11.5	9.8	10.9	12.6	12.4	12.5			
6	9.8	9.1	9.6	11.4	11.1	11.3	11.5	8.9	10.9	12.7	12.5	12.6			
7	9.8	9.6	9.7	11.5	10.8	11.3	11.7	9.3	11.0	12.9	12.2	12.6			
8	10.0	9.7	9.9	11.4	11.1	11.3	11.9	9.3	11.1	12.9	12.6	12.8			
9	10.3	10.0	10.1	11.4	11.2	11.4	12.0	8.9	11.1	12.9	12.8	12.9			
10	10.4	10.2	10.3	11.4	11.1	11.2	12.0	8.9	11.0	12.9	11.7	12.6			
11	10.3	9.9	10.2	11.1	10.9	11.1	12.2	9.6	11.2	12.1	11.5	12.0			
12	10.1	10.0	10.0	11.1	10.8	11.0	12.3	10.1	11.5	12.0	11.7	11.8			
13	10.0	7.7	9.1	11.2	10.9	11.0	12.4	9.3	11.4	12.0	11.6	11.8			
14	9.3	8.1	8.8	11.4	11.1	11.3	12.5	9.6	11.6	12.2	11.7	11.9			
15	9.1	8.1	8.6	11.4	11.2	11.3	12.6	10.7	11.8	12.1	11.8	11.9			
16	9.1	8.0	8.6	11.6	11.2	11.4	12.2	11.5	12.1	12.0	11.8	11.9			
17	9.3	8.0	8.6	11.7	8.8	11.1	12.5	11.5	12.0	12.1	11.8	11.9			
18	9.2	8.0	8.7	11.9	9.3	11.3	12.4	11.6	12.0	12.1	11.9	12.0			
19	9.2	8.0	8.7	12.0	10.7	11.5	12.4	11.7	12.0	12.2	12.1	12.1			
20	9.3	8.2	9.0	12.0	10.7	11.4	12.5	11.9	12.2	12.3	12.1	12.2			
21	9.5	8.8	9.2	11.9	10.5	11.3	12.6	12.1	12.4	12.2	12.1	12.1			
22	10.5	8.6	9.6	11.7	9.2	11.1	12.5	12.1	12.4	12.2	12.1	12.1			
23	10.6	8.1	9.6	11.6	9.2	11.0	12.8	12.1	12.4	12.3	12.2	12.3			
24	10.7	8.0	9.8	11.6	11.5	11.6	13.0	12.8	12.9	12.4	12.2	12.3			
25	10.9	8.5	9.9	11.7	11.5	11.6	13.0	12.9	12.9	12.4	12.2	12.3			
26	10.4	8.9	9.9	11.6	11.5	11.6	13.0	12.9	13.0	12.4	12.3	12.3			
27	10.3	9.6	9.9	11.8	11.6	11.7	13.0	12.7	12.9	12.4	12.2	12.3			
28	10.3	9.7	10.0	11.9	11.7	11.8	12.8	12.6	12.7	12.6	12.4	12.5			
29	11.2	8.4	10.4	12.0	9.0	11.6	12.8	12.7	12.8	12.7	12.5	12.6			
30	11.3	8.4	10.2	12.0	8.1	11.0	12.7	12.5	12.7	12.7	12.5	12.6			
31	11.3	9.3	10.4	---	---	---	12.6	12.4	12.5	12.6	12.6	12.6			
MONTH	11.3	5.6	9.4	12.0	8.0	11.2	13.0	8.2	11.8	12.9	11.5	12.3			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.6	11.9	12.3	11.7	11.4	11.5	11.6	11.4	11.5	10.1	9.4	9.7	
2	11.9	11.8	11.8	11.4	11.2	11.3	11.6	11.3	11.4	9.9	9.1	9.4	
3	11.9	11.7	11.8	11.3	11.2	11.3	11.4	11.2	11.3	9.7	9.0	9.2	
4	12.0	11.9	11.9	11.5	11.2	11.3	11.3	10.9	11.1	9.6	9.0	9.4	
5	11.9	11.8	11.8	11.5	11.3	11.3	11.2	10.9	11.0	9.4	9.1	9.3	
6	12.0	11.8	11.9	11.3	11.0	11.2	11.2	11.0	11.1	9.3	9.1	9.2	
7	12.3	11.8	12.0	11.4	11.1	11.4	11.1	11.0	11.1	9.1	8.7	8.9	
8	12.2	12.0	12.2	11.4	10.8	11.3	11.2	11.0	11.1	8.7	8.5	8.6	
9	12.3	11.2	12.0	11.3	10.8	11.2	11.5	11.2	11.3	8.6	7.7	8.3	
10	12.2	11.2	11.7	11.3	11.2	11.3	11.6	11.3	11.5	8.2	7.7	7.9	
11	12.1	11.3	11.9	11.5	11.3	11.4	11.4	11.2	11.3	8.1	7.5	7.7	
12	12.2	12.0	12.0	12.0	11.5	11.7	11.6	11.3	11.5	8.0	7.4	7.7	
13	12.1	11.5	12.0	11.9	11.8	11.8	11.6	11.0	11.5	8.1	7.6	7.9	
14	12.2	11.6	12.0	12.0	11.8	11.9	11.6	11.1	11.5	8.2	7.8	7.9	
15	12.4	11.7	12.1	12.0	11.9	12.0	11.5	11.4	11.5	8.5	7.6	8.0	
16	12.4	11.8	12.2	12.0	11.6	11.8	11.5	11.2	11.3	8.3	7.8	8.1	
17	12.2	11.7	12.1	11.8	11.6	11.7	11.2	10.9	11.0	8.3	7.9	8.1	
18	12.2	11.9	12.1	12.1	11.8	11.9	11.0	10.9	11.0	8.4	7.9	8.1	
19	12.4	11.8	12.2	12.2	12.0	12.2	11.2	10.9	11.1	8.7	8.1	8.4	
20	12.6	12.0	12.3	12.2	11.7	12.0	11.2	10.8	11.0	9.2	8.5	8.9	
21	12.5	12.0	12.3	12.1	11.6	11.9	10.8	10.6	10.7	9.9	9.0	9.6	
22	12.6	12.1	12.3	12.0	11.5	11.9	10.7	10.4	10.6	9.9	9.2	9.7	
23	12.6	12.1	12.4	12.0	11.8	11.9	10.8	10.5	10.7	9.4	8.9	9.2	
24	12.6	12.2	12.4	12.1	11.8	12.0	10.8	10.4	10.6	9.4	8.7	9.0	
25	12.3	12.0	12.2	12.0	11.7	11.9	10.7	10.3	10.5	9.2	8.7	9.0	
26	12.2	12.0	12.1	11.7	11.5	11.6	10.6	10.3	10.4	9.2	9.0	9.1	
27	12.1	11.8	12.0	11.6	11.3	11.5	10.6	10.2	10.4	9.6	9.1	9.3	
28	11.8	11.6	11.7	11.4	11.1	11.3	10.6	9.9	10.2	9.6	9.1	9.4	
29	11.7	11.6	11.6	11.2	11.0	11.1	10.1	9.9	10.0	9.6	9.2	9.4	
30	--	--	--	11.4	11.1	11.2	10.0	9.8	9.9	9.6	9.3	9.5	
31	--	--	--	11.6	11.3	11.4	--	--	--	9.5	8.7	9.2	
MONTH	12.6	11.2	12.0	12.2	10.8	11.6	11.6	9.8	11.0	10.1	7.4	8.8	

## STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.3	8.6	8.9	8.5	7.4	8.0	8.0	7.1	7.6	8.9	7.7	8.4
2	9.1	8.3	8.8	8.7	8.1	8.3	8.1	7.1	7.7	8.5	7.7	8.2
3	8.7	8.3	8.5	8.6	7.8	8.2	7.7	6.6	7.3	8.2	6.9	7.8
4	8.9	8.6	8.7	8.6	7.9	8.2	7.5	6.6	7.0	7.8	6.8	7.4
5	9.4	8.7	9.0	8.8	7.7	8.2	7.9	7.0	7.5	8.0	7.4	7.7
6	9.3	8.6	9.0	8.7	7.7	8.1	8.1	7.2	7.5	8.4	7.8	8.1
7	9.6	8.9	9.3	8.4	7.2	7.8	8.1	7.1	7.6	8.4	7.9	8.2
8	9.6	8.5	9.2	8.3	7.0	7.8	7.6	6.7	7.2	8.7	8.0	8.4
9	9.3	8.8	9.1	8.4	7.7	8.0	7.8	6.8	7.3	8.7	7.8	8.4
10	9.3	8.6	9.1	8.3	7.4	7.8	8.0	6.7	7.4	8.8	8.1	8.5
11	8.8	8.3	8.5	8.3	7.3	7.8	7.6	6.7	7.2	8.5	7.8	8.2
12	8.4	7.9	8.1	8.5	7.7	8.0	8.3	6.8	7.9	8.4	7.8	8.2
13	8.2	7.7	7.9	8.5	7.6	7.9	8.7	7.7	8.3	8.1	7.7	7.9
14	8.1	7.9	8.0	8.6	7.4	8.0	8.7	7.2	8.0	8.0	4.6	7.4
15	8.4	7.9	8.2	8.5	7.1	8.0	8.3	7.2	7.8	8.3	7.7	8.0
16	8.3	8.0	8.1	8.0	6.7	7.5	8.4	7.1	7.7	8.3	8.1	8.2
17	8.4	8.0	8.1	8.1	7.1	7.7	7.9	6.9	7.4	8.7	8.1	8.4
18	8.7	8.2	8.4	8.1	7.5	7.9	7.9	7.3	7.6	9.4	8.4	8.6
19	8.9	8.3	8.6	8.0	7.5	7.8	8.1	7.4	7.8	9.4	8.6	8.9
20	8.7	8.1	8.4	7.9	7.4	7.7	8.2	7.4	7.8	9.0	8.4	8.7
21	8.7	8.1	8.4	7.9	7.6	7.8	8.2	7.7	8.0	8.5	7.5	8.3
22	8.4	8.1	8.2	7.8	7.3	7.6	8.2	7.8	8.0	8.3	7.0	7.9
23	8.2	7.4	8.0	7.7	7.3	7.5	8.7	7.7	8.2	8.7	8.1	8.4
24	8.6	7.7	8.1	8.1	7.6	7.9	8.7	7.5	8.2	8.9	8.4	8.7
25	8.9	7.5	8.2	8.5	7.9	8.1	8.9	7.7	8.4	8.9	8.7	8.8
26	9.0	7.4	8.2	8.5	7.3	7.9	9.1	7.9	8.6	9.3	8.7	9.0
27	8.7	7.0	7.9	8.0	7.3	7.6	8.9	7.5	8.3	9.6	8.5	9.2
28	8.4	6.8	7.7	8.1	7.5	7.8	8.2	7.7	7.9	9.7	9.2	9.5
29	8.3	7.3	7.8	8.2	7.8	8.0	8.5	7.4	8.0	9.8	9.6	9.7
30	8.3	7.4	7.8	8.1	7.5	7.8	8.4	7.7	8.2	9.9	8.9	9.7
31	---	---	---	8.1	7.3	7.7	8.8	7.8	8.4	---	---	---
MONTH	9.6	6.8	8.4	8.8	6.7	7.9	9.1	6.6	7.8	9.9	4.6	8.4

## STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI

LOCATION.--Lat 44°27'15", long 83°40'28", in SW1/4 SE1/4 sec.23, T.24 N., R.6 E., Iosco County, Hydrologic Unit 04070007, center of bridge on State Highway 65, 400 ft downstream from Five-Channels Dam, 7.6 mi southeast of Glennie.

DRAINAGE AREA.--1,696 mi<sup>2</sup>.

PERIOD OF RECORD.--Water years 1996 to current year.

## PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

## EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.5°C, July 31, Aug. 1, 1999; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 13.6 mg/L, Jan. 7, 8, 1998, Jan. 1, 2000; minimum, 3.0 mg/L, June 16, 17, 1998.

## EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 23.0°C, July 17, Aug. 15; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.6 mg/L, Jan. 1; minimum, 6.5 mg/L, Aug. 3.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	15.0	14.5	14.5	9.0	8.0	8.5	3.5	3.5	3.5	.0	.0	.0
2	14.5	13.5	14.0	9.0	8.5	8.5	3.5	3.0	3.5	.0	.0	.0
3	13.5	13.0	13.5	8.5	7.5	8.0	3.5	3.5	3.5	.0	.0	.0
4	13.0	12.5	12.5	8.0	7.5	7.5	3.5	3.5	3.5	.0	.0	.0
5	12.5	12.0	12.0	7.5	7.0	7.5	4.0	3.5	3.5	.5	.0	.5
6	12.0	11.5	12.0	7.0	6.5	7.0	4.0	3.5	4.0	.5	.0	.5
7	11.5	11.0	11.0	6.5	6.5	6.5	4.0	3.5	4.0	.5	.0	.0
8	11.0	11.0	11.0	6.5	6.0	6.5	---	---	---	.5	.0	.0
9	11.5	11.0	11.0	7.0	6.5	6.5	---	---	---	.0	.0	.0
10	12.0	11.0	11.5	7.0	6.5	7.0	3.0	2.5	3.0	.0	.0	.0
11	11.5	11.5	11.5	7.0	6.5	6.5	2.5	2.5	2.5	.5	.0	.0
12	11.5	11.5	11.5	6.5	6.5	6.5	2.5	2.5	2.5	.0	.0	.0
13	11.5	11.5	11.5	7.0	6.5	7.0	2.5	2.5	2.5	.0	.0	.0
14	11.5	11.0	11.0	7.0	6.5	6.5	2.5	2.0	2.5	.0	.0	.0
15	11.0	11.0	11.0	6.5	6.0	6.0	2.0	2.0	2.0	.5	.0	.0
16	11.0	11.0	11.0	6.0	5.5	5.5	2.0	1.5	2.0	.0	.0	.0
17	11.0	10.5	10.5	5.5	5.0	5.0	1.5	1.5	1.5	.0	.0	.0
18	10.5	10.0	10.5	5.0	5.0	5.0	1.5	1.0	1.5	.0	.0	.0
19	10.0	10.0	10.0	5.0	4.5	5.0	1.5	1.0	1.5	.0	.0	.0
20	10.0	10.0	10.0	4.5	4.5	4.5	1.5	.5	1.0	.0	.0	.0
21	10.0	9.5	9.5	4.5	4.5	4.5	1.0	.5	1.0	.0	.0	.0
22	9.5	9.0	9.0	5.0	4.5	5.0	.5	.5	.5	.0	.0	.0
23	9.0	8.5	8.5	5.5	5.0	5.0	.5	.5	.5	.0	.0	.0
24	8.5	8.0	8.0	5.5	5.5	5.5	1.0	.5	.5	.0	.0	.0
25	8.0	8.0	8.0	5.5	5.0	5.5	.5	.5	.5	.0	.0	.0
26	8.0	7.5	7.5	5.0	5.0	5.0	.5	.5	.5	.0	.0	.0
27	7.5	7.0	7.5	5.0	5.0	5.0	.5	.5	.5	.0	.0	.0
28	7.5	7.0	7.5	5.0	4.5	5.0	.5	.5	.5	.0	.0	.0
29	7.5	7.5	7.5	4.5	4.0	4.0	.5	.5	.5	.0	.0	.0
30	8.0	7.5	8.0	4.0	3.5	3.5	.5	.5	.5	.0	.0	.0
31	8.5	8.0	8.0	---	---	---	.5	.0	.5	.0	.0	.0
MONTH	15.0	7.0	10.3	9.0	3.5	6.0	---	---	---	.5	.0	.0

## STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	.0	.0	.0	1.5	1.0	1.0	7.5	7.5	7.5	13.0	12.0	12.5	
2	.0	.0	.0	2.0	1.5	1.5	8.0	7.5	8.0	13.0	12.5	12.5	
3	.0	.0	.0	2.5	2.0	2.0	8.5	8.0	8.0	14.0	12.5	13.0	
4	.0	.0	.0	3.0	2.5	2.5	8.5	8.0	8.5	15.0	13.5	14.0	
5	.0	.0	.0	3.5	3.0	3.0	8.5	8.0	8.0	16.0	14.5	15.5	
6	.0	.0	.0	3.5	3.5	3.5	8.0	8.0	8.0	17.0	15.5	16.5	
7	.0	.0	.0	4.5	3.5	4.0	8.0	7.0	7.5	18.0	16.5	17.5	
8	.0	.0	.0	5.0	4.0	4.5	7.0	6.5	7.0	19.0	17.5	18.0	
9	.0	.0	.0	5.0	4.5	5.0	6.5	6.5	6.5	19.5	18.5	19.0	
10	.0	.0	.0	5.0	4.5	4.5	6.5	6.0	6.0	19.0	18.5	19.0	
11	.0	.0	.0	4.5	4.0	4.5	6.0	6.0	6.0	18.5	18.0	18.0	
12	.0	.0	.0	4.5	4.0	4.0	6.0	5.5	6.0	18.0	17.5	17.5	
13	.0	.0	.0	4.0	3.5	3.5	6.0	5.5	6.0	17.5	17.0	17.5	
14	.0	.0	.0	3.5	3.0	3.5	7.0	6.0	6.0	17.0	15.5	16.5	
15	.0	.0	.0	4.0	3.5	3.5	7.5	6.5	7.0	16.0	15.5	15.5	
16	.0	.0	.0	4.0	3.5	3.5	7.5	7.0	7.0	15.5	15.0	15.0	
17	.0	.0	.0	4.0	3.5	3.5	7.5	7.0	7.5	15.0	14.5	15.0	
18	.0	.0	.0	4.0	3.5	4.0	8.0	7.5	7.5	15.0	14.5	15.0	
19	.0	.0	.0	4.0	4.0	4.0	8.5	8.0	8.0	14.5	14.5	14.5	
20	.0	.0	.0	4.0	3.5	3.5	8.0	8.0	8.0	14.5	14.0	14.0	
21	.0	.0	.0	4.0	3.5	4.0	8.0	7.5	7.5	14.5	14.0	14.0	
22	.0	.0	.0	4.5	4.0	4.0	8.0	7.5	7.5	15.0	14.5	15.0	
23	.0	.0	.0	4.5	4.5	4.5	8.0	8.0	8.0	15.0	15.0	15.0	
24	.0	.0	.0	5.5	4.5	5.0	9.0	8.0	8.5	15.5	15.0	15.0	
25	.0	.0	.0	6.5	5.5	6.0	9.5	9.0	9.0	15.0	14.5	15.0	
26	.0	.0	.0	7.0	6.0	6.5	10.0	9.5	9.5	15.0	14.5	14.5	
27	.5	.0	.0	7.0	7.0	7.0	10.5	10.0	10.0	15.5	14.5	15.0	
28	.5	.5	.5	7.0	7.0	7.0	11.0	10.5	11.0	15.5	15.0	15.5	
29	1.0	.5	1.0	7.0	7.0	7.0	12.0	11.0	11.5	16.0	15.5	15.5	
30	---	---	---	7.5	7.0	7.0	12.5	12.0	12.0	16.0	16.0	16.0	
31	---	---	---	8.0	7.0	7.5	---	---	---	16.5	16.0	16.5	
MONTH	1.0	.0	.1	8.0	1.0	4.3	12.5	5.5	7.9	19.5	12.0	15.6	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
JUNE				JULY				AUGUST			SEPTEMBER		
1	16.5	16.5	16.5	21.5	20.5	21.0	22.0	21.5	21.5	21.0	20.0	20.5	
2	17.0	16.5	16.5	21.5	21.0	21.0	22.5	21.5	22.0	21.0	21.0	21.0	
3	17.0	16.5	16.5	21.5	21.0	21.5	22.0	21.5	22.0	21.0	20.5	20.5	
4	17.0	16.5	17.0	22.0	21.0	21.5	22.0	21.5	21.5	20.5	20.5	20.5	
5	17.5	17.0	17.0	22.0	21.5	22.0	21.5	21.5	21.5	20.5	19.5	20.0	
6	17.5	17.0	17.0	22.5	22.0	22.0	22.0	21.5	21.5	19.5	19.5	19.5	
7	18.0	17.0	17.5	22.0	21.5	22.0	22.5	21.5	22.0	20.0	19.0	19.5	
8	18.5	17.5	18.0	22.0	21.5	22.0	22.0	22.0	22.0	20.0	19.5	19.5	
9	18.5	18.0	18.5	22.0	21.5	21.5	22.0	21.5	22.0	20.0	19.5	20.0	
10	20.5	18.5	19.5	21.5	21.5	21.5	22.0	21.5	22.0	20.0	20.0	20.0	
11	20.0	20.0	20.0	22.0	21.5	21.5	22.0	21.5	22.0	20.5	20.0	20.0	
12	20.0	19.5	19.5	22.0	21.5	21.5	22.0	21.5	22.0	20.5	20.0	20.5	
13	19.5	18.5	19.0	22.5	21.5	22.0	22.0	21.5	22.0	20.5	20.0	20.0	
14	19.0	18.5	18.5	22.5	22.0	22.0	22.5	21.5	22.0	20.0	19.5	20.0	
15	20.0	19.0	19.5	22.5	22.0	22.0	23.0	22.0	22.5	19.5	18.5	19.0	
16	20.0	19.5	19.5	22.0	22.0	22.0	22.5	22.5	22.5	18.5	18.0	18.5	
17	20.0	19.5	20.0	23.0	22.0	22.5	22.5	22.0	22.0	18.0	18.0	18.0	
18	20.0	19.5	19.5	22.5	22.0	22.0	22.0	21.5	22.0	18.0	17.5	17.5	
19	20.0	20.0	20.0	22.0	21.5	22.0	21.5	21.0	21.5	17.5	17.0	17.5	
20	20.0	20.0	20.0	22.0	21.5	22.0	21.0	20.5	21.0	17.5	17.0	17.5	
21	21.0	20.0	20.5	22.0	21.5	21.5	20.5	20.0	20.5	17.5	17.0	17.0	
22	20.5	20.5	20.5	21.5	21.0	21.0	20.5	20.0	20.0	17.0	16.5	16.5	
23	20.5	20.0	20.5	21.0	20.5	21.0	20.0	20.0	20.0	16.5	16.0	16.0	
24	21.0	20.0	20.5	21.0	20.5	20.5	20.5	20.0	20.0	16.0	15.5	15.5	
25	22.5	21.0	21.5	21.0	20.5	20.5	20.5	20.0	20.0	15.5	14.5	15.0	
26	22.5	21.5	22.0	21.0	20.5	21.0	20.5	20.0	20.5	15.0	14.5	14.5	
27	22.5	22.0	22.0	21.5	21.0	21.0	20.5	20.0	20.5	14.5	14.0	14.5	
28	22.0	22.0	22.0	21.5	21.5	21.5	20.5	20.0	20.0	14.0	13.5	14.0	
29	22.0	21.0	21.5	21.5	21.5	21.5	20.5	20.0	20.0	14.0	13.5	13.5	
30	21.5	21.0	21.0	22.0	21.5	21.5	20.5	20.0	20.0	14.0	13.5	13.5	
31	---	---	---	21.5	21.5	21.5	21.0	20.0	20.5	---	---	---	
MONTH	22.5	16.5	19.4	23.0	20.5	21.5	23.0	20.0	21.3	21.0	13.5	18.0	

## STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	9.0	8.0	8.7	11.2	10.3	10.7	12.6	11.5	12.3	13.6	11.7	13.6			
2	9.0	8.2	8.7	10.8	10.1	10.6	12.6	11.7	12.2	13.0	12.2	13.7			
3	9.1	8.2	8.8	11.0	10.2	10.7	12.6	11.6	12.3	12.8	11.6	12.6			
4	9.4	8.4	9.1	11.1	10.0	10.8	12.6	11.7	12.4	12.8	11.7	12.5			
5	9.4	8.7	9.1	11.1	10.0	10.7	12.6	11.5	12.3	13.0	11.8	12.5			
6	9.4	8.7	9.1	11.1	10.1	10.8	12.4	11.6	12.2	12.9	12.0	12.7			
7	9.5	9.2	9.4	11.3	10.1	11.0	12.3	11.3	12.0	13.0	11.9	12.7			
8	9.7	9.4	9.5	11.5	10.3	11.2	---	---	---	13.0	12.3	12.8			
9	9.9	9.6	9.7	12.3	10.4	11.2	---	---	---	13.2	12.9	13.0			
10	10.0	9.7	9.8	11.5	10.4	11.2	12.6	11.5	12.3	13.1	12.0	12.9			
11	10.3	9.4	9.9	11.5	10.3	11.3	12.5	11.7	12.3	13.1	12.0	12.7			
12	10.0	9.5	9.8	11.4	10.3	11.1	12.6	11.5	12.3	13.2	12.1	12.9			
13	10.0	9.2	9.8	11.3	10.0	11.0	12.5	11.7	12.2	13.1	11.7	12.8			
14	10.0	9.7	9.8	11.2	10.0	10.9	12.6	11.4	12.2	13.0	11.8	12.6			
15	9.8	9.6	9.7	11.3	10.2	11.0	12.6	11.4	12.2	13.0	12.0	12.7			
16	10.2	9.7	9.8	11.7	10.4	11.2	12.4	11.4	12.1	13.0	12.0	12.8			
17	9.8	9.6	9.7	11.6	10.4	11.3	12.5	11.7	12.2	13.2	12.6	13.0			
18	9.9	9.7	9.8	11.7	10.4	11.4	12.6	11.7	12.3	13.1	12.9	13.0			
19	9.9	9.7	9.8	11.8	10.8	11.4	12.5	11.5	12.3	13.2	12.8	13.0			
20	9.9	9.7	9.8	12.3	10.8	11.6	12.7	11.6	12.2	13.4	12.8	13.0			
21	9.9	9.6	9.7	12.0	11.0	11.7	12.7	12.1	12.5	13.1	12.9	13.0			
22	10.3	9.6	10.0	12.0	10.9	11.7	12.9	12.6	12.8	13.1	12.9	13.0			
23	10.3	9.5	9.9	11.9	10.9	11.6	13.0	12.8	12.8	13.1	12.8	12.9			
24	10.6	9.7	10.2	11.8	11.6	11.7	13.5	12.8	13.0	12.9	12.8	12.8			
25	10.6	9.5	10.2	11.7	11.6	11.6	13.2	12.9	13.0	13.1	12.8	12.9			
26	10.6	9.9	10.3	11.9	11.5	11.7	13.3	13.1	13.2	13.5	12.8	12.9			
27	10.7	10.5	10.6	11.7	11.6	11.7	13.3	13.1	13.2	12.9	12.7	12.8			
28	10.7	10.6	10.7	11.9	11.6	11.7	13.4	13.1	13.2	13.5	12.5	12.7			
29	11.4	10.2	10.8	12.1	11.1	11.9	13.5	12.9	13.0	12.7	12.6	12.6			
30	11.1	9.8	10.6	12.5	11.1	11.9	13.0	12.9	12.9	12.8	12.6	12.7			
31	11.2	10.2	10.8	---	---	---	13.0	12.1	12.8	13.0	12.5	12.7			
MONTH	11.4	8.0	9.8	12.5	10.0	11.3	---	---	---	13.6	11.6	12.8			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	13.0	12.4	12.6	12.1	11.9	12.0	11.9	11.6	11.7	10.7	9.9	10.5	
2	12.6	12.3	12.4	12.2	11.9	12.0	11.9	11.7	11.8	10.5	9.8	10.2	
3	12.4	12.2	12.3	12.1	11.7	11.8	11.8	11.5	11.6	10.5	9.7	10.2	
4	12.6	12.2	12.3	11.8	11.6	11.7	11.7	11.4	11.5	10.2	9.7	9.9	
5	12.5	12.2	12.3	11.8	11.5	11.6	11.5	11.3	11.4	9.9	9.7	9.8	
6	12.6	12.3	12.4	11.9	11.1	11.7	11.4	11.1	11.2	9.7	9.5	9.6	
7	12.7	11.6	12.3	11.7	11.1	11.5	11.2	10.9	11.1	9.5	9.2	9.4	
8	12.4	11.7	12.2	11.6	10.7	11.4	11.4	11.0	11.1	9.2	8.8	9.0	
9	12.4	11.6	12.2	11.5	10.7	11.3	11.5	11.1	11.3	8.8	8.0	8.6	
10	12.4	11.5	12.1	11.6	11.3	11.5	11.5	11.2	11.3	8.4	6.9	7.9	
11	12.3	11.6	12.1	11.8	11.4	11.5	11.5	11.3	11.4	8.0	7.3	7.7	
12	12.4	12.2	12.3	11.7	11.5	11.6	11.7	11.5	11.6	7.7	7.2	7.4	
13	13.0	12.3	12.4	11.9	11.6	11.7	11.8	11.3	11.7	7.6	7.1	7.4	
14	12.4	12.3	12.4	12.4	11.8	12.0	11.9	11.4	11.7	7.8	7.4	7.6	
15	12.9	12.3	12.4	12.1	11.9	12.0	12.0	11.8	11.9	7.8	7.4	7.6	
16	13.2	12.3	12.4	12.1	11.8	12.0	11.9	11.7	11.8	7.8	7.3	7.5	
17	12.5	12.3	12.4	12.1	11.8	11.9	11.7	11.6	11.6	8.2	7.6	7.8	
18	12.5	12.3	12.4	12.3	11.9	12.1	11.7	11.5	11.6	8.3	7.9	8.1	
19	12.5	12.3	12.4	12.2	12.1	12.2	11.5	10.7	11.4	8.8	8.2	8.6	
20	12.6	12.3	12.5	12.4	11.8	12.3	11.4	10.7	11.2	9.0	8.7	8.8	
21	12.7	12.5	12.6	12.5	11.7	12.2	11.4	11.2	11.3	9.3	8.9	9.1	
22	12.7	12.5	12.6	12.5	11.9	12.3	11.2	11.1	11.2	9.6	9.2	9.4	
23	12.9	12.5	12.6	12.4	12.3	12.4	11.1	11.1	11.1	9.6	9.0	9.3	
24	12.7	12.5	12.6	12.4	12.2	12.3	11.3	10.8	11.2	9.4	8.8	9.1	
25	12.6	12.3	12.5	12.4	12.1	12.2	11.2	10.7	11.0	9.3	8.8	9.1	
26	12.5	12.3	12.4	12.4	12.0	12.1	11.1	10.4	10.8	9.2	8.9	9.1	
27	12.5	12.4	12.4	12.2	11.9	12.0	11.0	10.3	10.7	9.2	8.8	9.0	
28	12.5	12.1	12.3	12.1	11.7	11.9	11.0	10.3	10.7	9.2	9.0	9.1	
29	12.2	12.0	12.1	12.1	11.5	11.7	10.8	10.2	10.6	9.2	9.0	9.1	
30	---	---	---	11.7	11.4	11.5	10.8	10.5	10.6	9.2	8.4	9.0	
31	---	---	---	11.8	11.5	11.6	---	---	---	9.0	8.2	8.7	
MONTH	13.2	11.5	12.4	12.5	10.7	11.9	12.0	10.2	11.3	10.7	6.9	8.8	

## STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.4	7.9	8.6	7.9	7.2	7.5	7.5	6.9	7.2	8.0	7.3	7.7
2	8.7	7.9	8.5	8.0	7.3	7.7	7.5	6.8	7.3	7.9	7.3	7.7
3	8.6	8.3	8.4	7.8	7.2	7.6	7.5	6.5	7.2	7.8	7.4	7.6
4	8.4	8.1	8.2	8.1	7.4	7.8	7.4	6.7	7.2	7.8	7.4	7.6
5	8.3	7.6	8.1	8.1	7.4	7.8	7.3	6.7	7.0	7.7	7.3	7.5
6	8.3	7.3	8.0	8.0	7.2	7.7	7.4	6.6	7.1	7.7	7.3	7.5
7	8.4	7.3	7.9	7.7	7.2	7.5	7.7	6.6	7.2	8.0	7.3	7.6
8	8.4	7.3	8.0	7.8	7.2	7.6	7.6	6.8	7.3	8.0	7.3	7.6
9	8.4	7.4	8.1	7.6	6.8	7.3	7.5	7.0	7.3	8.1	7.6	7.9
10	8.3	8.0	8.2	7.7	7.1	7.4	7.6	6.9	7.3	8.4	7.8	8.1
11	8.4	6.8	8.1	7.7	7.1	7.4	7.6	7.0	7.3	8.4	7.8	8.2
12	8.1	7.8	8.0	7.8	7.1	7.5	7.5	6.9	7.3	8.5	7.8	8.2
13	9.0	7.5	8.2	7.8	7.0	7.5	7.5	6.7	7.2	8.4	7.7	8.1
14	8.7	7.9	8.2	7.7	7.2	7.4	7.5	6.7	7.2	8.1	7.5	7.9
15	8.0	7.7	7.9	7.8	7.2	7.5	7.6	6.7	7.3	8.2	7.6	7.9
16	8.1	7.5	7.8	7.7	7.2	7.5	7.6	7.0	7.3	8.5	7.7	8.1
17	8.0	7.4	7.8	8.0	7.0	7.5	7.5	7.0	7.3	8.6	8.1	8.3
18	8.1	7.8	7.9	7.7	6.9	7.4	7.4	7.0	7.2	8.6	8.3	8.4
19	8.1	7.5	8.0	7.6	7.0	7.3	7.4	6.8	7.2	8.5	8.0	8.4
20	8.0	7.4	7.8	7.7	7.0	7.4	7.3	6.8	7.1	8.7	8.5	8.6
21	8.1	7.3	7.8	7.5	7.0	7.3	7.4	6.9	7.2	8.7	8.3	8.5
22	8.0	7.4	7.7	7.4	6.9	7.2	7.5	7.0	7.2	8.6	8.4	8.5
23	7.9	7.2	7.6	7.6	7.0	7.3	7.5	7.0	7.3	8.6	8.3	8.4
24	7.9	7.1	7.6	7.6	6.9	7.2	7.7	7.0	7.4	8.6	8.3	8.4
25	8.2	7.3	7.7	7.8	7.0	7.4	7.9	7.1	7.5	8.8	8.4	8.6
26	8.1	6.9	7.8	7.8	7.1	7.5	7.9	7.3	7.7	9.0	8.7	8.8
27	8.1	7.5	7.8	7.8	7.2	7.5	7.9	7.3	7.7	9.1	8.8	9.0
28	8.1	7.4	7.8	7.7	7.3	7.6	7.9	7.2	7.7	9.3	8.8	9.0
29	7.6	7.1	7.4	7.8	7.6	7.7	7.8	7.1	7.6	9.5	8.8	9.1
30	7.6	7.1	7.4	7.7	7.3	7.6	7.6	7.1	7.3	9.1	8.9	9.0
31	--	--	--	7.5	6.9	7.3	7.9	7.2	7.5	--	--	--
MONTH	9.4	6.8	7.9	8.1	6.8	7.5	7.9	6.5	7.3	9.5	7.3	8.2



## STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI

LOCATION.--Lat 44°28'22", long 83°34'16", in NW1/4 SE1/4 sec.15, T.24 N., R.7 E., Iosco County, Hydrologic Unit 04070007, on right bank 100 ft downstream from Cooke Dam, 2 mi northeast of Sidtown.

DRAINAGE AREA.--1,718 mi<sup>2</sup>.

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 26.5°C, July 24, 31, 1999; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 14.8 mg/L, Mar. 31, Apr. 1, 1999; minimum, 3.7 mg/L, June 27, 2000.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 24.0°C, July 17, Aug. 15; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 12.8 mg/L, Jan. 3; minimum, 3.7 mg/L, June 27.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER				DECEMBER			JANUARY	
1	16.5	16.5	16.5	9.5	9.0	9.0	4.5	4.5	4.5	1.0	1.0	1.0
2	16.5	16.0	16.0	9.5	9.0	9.0	4.5	4.5	4.5	1.0	1.0	1.0
3	16.0	15.5	15.5	9.0	8.0	8.5	4.5	4.5	4.5	1.0	.5	1.0
4	15.5	15.0	15.0	8.0	8.0	8.0	4.5	4.5	4.5	1.0	.5	.5
5	15.0	14.5	14.5	8.0	8.0	8.0	4.5	4.0	4.5	1.0	.5	.5
6	14.5	14.0	14.5	8.0	8.0	8.0	4.0	4.0	4.0	1.0	.5	.5
7	14.0	13.5	14.0	8.0	7.5	8.0	4.0	3.5	4.0	.5	.5	.5
8	13.5	13.5	13.5	8.0	7.5	7.5	3.5	3.5	3.5	.5	.5	.5
9	13.5	13.5	13.5	8.0	7.5	8.0	3.5	3.5	3.5	.5	.5	.5
10	14.5	13.0	13.5	8.0	7.5	8.0	3.5	3.5	3.5	.5	.5	.5
11	13.5	13.0	13.5	7.5	7.5	7.5	3.5	3.0	3.5	.5	.5	.5
12	13.0	12.5	13.0	7.5	7.0	7.5	3.5	3.0	3.5	.5	.5	.5
13	13.0	12.5	13.0	7.5	7.0	7.0	3.0	3.0	3.0	.5	.5	.5
14	12.5	12.5	12.5	7.5	7.0	7.0	3.0	3.0	3.0	.5	.5	.5
15	12.5	12.0	12.5	7.0	6.5	7.0	3.0	3.0	3.0	.5	.5	.5
16	12.5	12.0	12.5	6.5	6.5	6.5	3.0	2.5	2.5	.5	.5	.5
17	12.5	12.0	12.0	6.5	6.0	6.0	2.5	2.0	2.0	.5	.5	.5
18	12.0	11.5	12.0	6.0	6.0	6.0	2.0	1.5	2.0	.5	.5	.5
19	11.5	11.5	11.5	6.0	6.0	6.0	2.0	1.5	2.0	.5	.5	.5
20	11.5	11.0	11.5	6.0	6.0	6.0	2.0	1.5	2.0	.5	.5	.5
21	11.0	11.0	11.0	6.0	6.0	6.0	1.5	1.0	1.0	.5	.5	.5
22	11.0	10.5	11.0	6.0	6.0	6.0	1.0	1.0	1.0	.5	.5	.5
23	10.5	10.0	10.5	6.0	5.5	6.0	1.0	.5	1.0	.5	.5	.5
24	10.0	10.0	10.0	6.0	5.5	6.0	1.0	1.0	1.0	.5	.5	.5
25	10.0	9.5	10.0	5.5	5.5	5.5	1.0	1.0	1.0	.5	.5	.5
26	10.0	9.5	9.5	5.5	5.5	5.5	1.0	1.0	1.0	.5	.0	.5
27	9.5	9.0	9.0	5.5	5.5	5.5	1.0	1.0	1.0	.5	.0	.0
28	9.0	9.0	9.0	5.5	5.0	5.0	1.0	1.0	1.0	.5	.0	.0
29	9.0	8.5	8.5	5.0	5.0	5.0	1.0	1.0	1.0	.5	.0	.0
30	9.5	8.5	9.0	5.0	4.5	4.5	1.0	1.0	1.0	.0	.0	.0
31	9.5	9.0	9.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
MONTH	16.5	8.5	12.2	9.5	4.5	6.8	4.5	.5	2.5	1.0	.0	.5

## STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	.0	.0	.0	1.0	.5	.5	7.5	7.0	7.0	12.5	11.5	12.0
2	.0	.0	.0	1.0	1.0	1.0	8.0	7.5	7.5	12.0	11.5	11.5
3	.0	.0	.0	1.0	1.0	1.0	8.0	7.5	8.0	13.5	12.0	12.5
4	.0	.0	.0	1.5	1.0	1.0	8.0	7.5	8.0	15.0	12.5	13.5
5	.0	.0	.0	1.5	1.5	1.5	8.0	7.5	7.5	15.5	14.0	14.5
6	.0	.0	.0	2.0	1.5	2.0	8.0	7.5	7.5	16.5	14.5	15.5
7	.0	.0	.0	2.5	2.0	2.0	7.5	7.5	7.5	17.5	15.5	16.5
8	.0	.0	.0	3.0	2.0	2.5	7.5	7.0	7.5	18.0	16.5	17.0
9	.0	.0	.0	3.0	2.5	3.0	7.5	7.0	7.0	18.0	16.5	17.0
10	.0	.0	.0	3.0	3.0	3.0	7.5	7.0	7.0	18.0	17.0	17.5
11	.0	.0	.0	3.0	3.0	3.0	7.0	7.0	7.0	17.5	16.5	17.0
12	.0	.0	.0	3.5	3.0	3.0	7.0	6.5	7.0	17.5	16.5	17.0
13	.0	.0	.0	3.5	3.0	3.5	7.0	6.5	7.0	18.0	17.0	17.5
14	.0	.0	.0	4.0	3.5	3.5	7.5	7.0	7.0	17.0	16.5	17.0
15	.0	.0	.0	3.5	3.5	3.5	8.0	7.5	7.5	17.0	16.0	16.5
16	.0	.0	.0	3.5	3.5	3.5	7.5	7.0	7.0	16.5	16.0	16.0
17	.0	.0	.0	3.5	3.5	3.5	7.5	7.0	7.0	16.0	16.0	16.0
18	.0	.0	.0	3.5	3.5	3.5	7.5	7.0	7.5	16.0	15.5	16.0
19	.0	.0	.0	3.5	3.5	3.5	8.0	7.5	7.5	15.5	15.0	15.5
20	.0	.0	.0	3.5	3.5	3.5	8.0	7.5	7.5	15.5	15.0	15.0
21	.0	.0	.0	4.0	3.5	3.5	7.5	7.5	7.5	15.5	15.0	15.0
22	.0	.0	.0	4.0	3.5	4.0	8.0	7.5	7.5	16.0	15.5	15.5
23	.0	.0	.0	4.5	4.0	4.0	8.5	8.0	8.0	16.0	15.5	15.5
24	.0	.0	.0	4.5	4.0	4.5	9.0	8.5	8.5	16.5	15.5	16.0
25	.0	.0	.0	5.5	4.5	5.0	9.0	8.5	8.5	16.0	15.5	16.0
26	.5	.0	.0	6.0	5.0	5.5	9.0	8.5	9.0	16.0	15.5	15.5
27	.5	.5	.5	6.0	5.5	6.0	9.5	9.0	9.5	15.5	15.5	15.5
28	.5	.5	.5	6.5	6.0	6.0	10.5	9.5	10.0	16.0	15.5	15.5
29	.5	.5	.5	6.5	6.0	6.0	11.0	10.5	10.5	16.0	15.5	16.0
30	---	---	---	7.0	6.0	6.5	12.0	10.5	11.5	16.5	16.0	16.5
31	---	---	---	7.5	6.5	7.0	---	---	---	16.5	16.5	16.5
MONTH	.5	.0	.1	7.5	.5	3.5	12.0	6.5	7.9	18.0	11.5	15.6

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	16.5	16.5	16.5	22.0	21.5	22.0	23.0	22.5	22.5	22.5	21.5	22.0
2	17.5	16.5	17.0	22.5	21.5	22.0	23.5	23.0	23.0	22.0	21.5	22.0
3	17.0	16.5	17.0	22.0	21.5	22.0	23.5	22.5	23.0	22.0	21.5	21.5
4	17.0	17.0	17.0	22.5	21.5	22.0	23.5	22.5	23.0	21.5	21.5	21.5
5	17.5	16.5	17.0	22.0	21.5	22.0	23.0	22.5	22.5	21.5	21.0	21.0
6	17.5	17.0	17.0	22.5	22.0	22.0	23.0	22.5	22.5	21.0	20.5	21.0
7	18.5	17.0	18.0	22.0	22.0	22.0	23.5	22.5	23.0	21.0	20.5	21.0
8	19.0	17.5	18.0	22.5	22.0	22.0	23.0	22.5	22.5	21.5	21.0	21.0
9	18.0	18.0	18.0	23.0	22.0	22.5	23.0	22.5	22.5	21.5	21.0	21.0
10	20.0	18.0	19.0	22.5	22.0	22.5	22.5	22.5	22.5	21.5	21.0	21.5
11	19.5	19.0	19.0	22.5	22.0	22.5	23.0	22.5	22.5	21.5	21.0	21.5
12	19.0	18.5	19.0	22.5	22.0	22.5	23.0	22.5	22.5	21.5	21.0	21.5
13	19.0	18.5	19.0	23.5	22.5	23.0	23.0	22.5	22.5	21.0	21.0	21.0
14	20.0	19.0	19.0	23.0	22.5	23.0	23.5	22.5	23.0	21.0	20.5	21.0
15	20.5	19.5	20.0	23.0	22.5	23.0	24.0	22.5	23.0	20.5	20.0	20.0
16	20.5	19.5	20.0	23.0	22.5	22.5	23.5	23.0	23.0	20.0	19.5	19.5
17	20.5	19.5	20.0	24.0	22.5	23.0	23.0	22.5	23.0	20.0	19.5	19.5
18	20.0	19.5	20.0	23.0	22.5	23.0	23.0	22.5	22.5	19.5	19.5	19.5
19	20.5	20.0	20.0	22.5	22.0	22.5	22.5	22.0	22.5	19.5	19.5	19.5
20	20.5	19.5	20.0	22.5	22.0	22.5	22.5	22.0	22.0	19.5	19.0	19.5
21	21.5	20.0	20.5	22.5	22.0	22.0	22.0	21.5	22.0	19.0	18.5	19.0
22	21.0	20.5	20.5	22.0	22.0	22.0	22.0	21.5	22.0	18.5	18.0	18.5
23	21.0	20.5	20.5	22.0	21.5	22.0	22.0	21.5	22.0	18.0	17.5	18.0
24	21.5	20.5	21.0	22.0	21.5	22.0	22.0	21.5	21.5	17.5	17.5	17.5
25	22.0	21.0	21.5	22.5	22.0	22.0	22.5	21.5	22.0	17.5	17.0	17.0
26	23.0	21.0	21.5	22.0	22.0	22.0	22.0	21.5	22.0	17.0	16.5	17.0
27	22.5	21.5	22.0	22.5	22.0	22.0	21.5	21.5	21.5	17.0	16.0	16.5
28	22.0	21.5	21.5	22.5	22.0	22.5	21.5	21.5	21.5	16.0	15.5	16.0
29	22.0	21.5	21.5	22.5	22.0	22.5	22.0	21.5	21.5	16.0	15.5	15.5
30	22.0	21.0	21.5	22.5	22.0	22.5	22.0	21.5	21.5	16.0	15.5	15.5
31	---	---	---	22.5	22.0	22.5	22.5	21.5	22.0	---	---	---
MONTH	23.0	16.5	19.4	24.0	21.5	22.3	24.0	21.5	22.4	22.5	15.5	19.5

## STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI--Continued

## OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	8.9	6.2	8.0	10.8	7.5	9.4	12.3	11.6	12.0	12.7	12.4	12.6
2	8.9	6.1	7.8	10.7	7.4	9.5	12.1	11.6	11.8	12.7	12.5	12.6
3	8.8	6.2	7.7	10.7	9.8	10.3	12.0	11.6	11.8	12.8	12.5	12.6
4	9.2	6.2	8.2	10.7	9.9	10.4	12.0	11.5	11.8	12.7	12.4	12.5
5	8.7	6.6	8.0	10.8	9.7	10.4	12.2	11.5	11.9	12.6	12.1	12.5
6	8.8	6.6	8.3	10.8	10.0	10.5	12.2	11.8	12.0	12.6	12.3	12.4
7	8.9	8.1	8.6	10.9	10.3	10.6	12.2	11.8	12.0	12.5	12.2	12.4
8	8.9	8.1	8.6	10.9	10.2	10.6	12.3	11.8	12.1	12.5	12.2	12.3
9	8.9	8.3	8.7	10.9	9.9	10.6	12.3	11.9	12.1	12.4	12.2	12.3
10	9.2	8.4	8.8	10.9	9.9	10.6	12.4	11.9	12.2	12.3	8.8	11.7
11	9.5	7.5	8.8	11.0	10.4	10.8	12.4	12.1	12.2	11.8	9.4	11.8
12	9.3	7.3	8.6	11.1	10.3	10.8	12.4	12.0	12.2	11.7	8.6	11.7
13	11.1	7.4	8.9	11.1	10.3	10.8	12.5	12.1	12.3	11.7	9.0	11.7
14	9.3	8.9	9.1	11.3	10.3	11.0	12.5	12.1	12.3	11.7	8.8	10.7
15	9.4	8.8	9.2	11.4	10.7	11.1	12.4	11.8	12.1	11.8	9.2	10.8
16	9.5	9.1	9.4	11.4	10.8	11.2	12.2	11.8	12.0	11.7	9.7	11.1
17	9.6	9.1	9.4	11.6	10.9	11.2	12.3	11.9	12.1	11.5	10.6	11.1
18	9.5	8.7	9.3	11.6	10.8	11.2	12.3	12.0	12.1	11.6	10.3	11.2
19	9.5	8.8	9.1	11.6	10.5	11.3	12.3	11.9	12.1	11.7	10.6	11.3
20	9.6	8.9	9.2	11.6	10.7	11.3	12.3	11.9	12.1	11.6	10.9	11.3
21	9.5	8.5	9.1	11.6	10.6	11.3	12.4	12.0	12.2	11.7	11.0	11.4
22	9.7	6.8	9.1	11.7	10.8	11.3	12.5	12.3	12.4	11.6	10.8	11.3
23	9.9	6.4	8.3	11.8	10.8	11.6	12.5	12.4	12.5	11.7	10.8	11.4
24	10.0	6.4	8.6	11.9	11.7	11.8	12.5	12.4	12.5	11.8	11.1	11.6
25	10.0	6.5	8.5	11.9	11.7	11.8	12.6	12.4	12.5	11.7	11.2	11.5
26	10.0	6.9	9.2	11.9	11.8	11.8	12.7	12.5	12.6	11.9	11.0	11.6
27	10.1	9.6	9.9	12.0	11.8	11.9	12.7	12.6	12.7	11.9	11.2	11.6
28	10.1	8.8	9.7	12.0	11.7	11.9	12.7	12.5	12.6	12.0	11.2	11.7
29	10.4	7.4	9.7	12.1	11.8	12.0	12.7	12.5	12.6	12.0	11.3	11.7
30	10.6	6.9	8.9	12.2	11.7	12.0	12.7	12.6	12.6	12.1	11.4	11.9
31	10.8	7.4	9.6	---	---	---	12.7	12.4	12.6	12.2	11.5	11.9
MONTH	11.1	6.1	8.8	12.2	7.4	11.0	12.7	11.5	12.2	12.8	8.6	11.7

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	12.3	11.8	12.0	12.5	12.0	12.2	12.2	11.6	12.0	11.1	10.1	10.7
2	12.3	11.3	12.0	12.2	11.5	12.0	12.0	11.8	11.9	11.1	10.0	10.6
3	12.2	11.5	12.0	12.2	11.2	12.0	11.9	10.8	11.7	10.9	9.5	10.4
4	12.3	11.4	11.9	12.1	11.9	12.0	11.8	11.3	11.6	11.0	9.4	10.4
5	12.3	11.5	12.0	12.1	11.9	12.0	11.7	11.0	11.6	10.5	9.9	10.3
6	12.3	11.4	12.0	12.0	11.3	11.8	11.6	11.3	11.5	10.3	9.7	10.0
7	12.7	10.6	12.3	12.0	11.6	11.8	11.5	11.2	11.4	10.0	9.2	9.8
8	12.4	9.2	11.7	12.0	11.5	11.8	11.4	11.1	11.3	9.8	9.0	9.5
9	12.6	10.4	12.1	11.9	11.2	11.7	11.4	11.0	11.3	9.5	7.1	9.2
10	12.5	9.9	11.6	11.9	11.3	11.6	11.4	11.1	11.3	9.4	7.1	8.6
11	12.5	9.6	11.8	12.0	11.4	11.6	11.3	10.3	10.9	9.3	5.4	8.2
12	12.4	11.4	12.0	12.0	11.6	11.8	11.2	10.2	10.9	9.1	6.6	8.4
13	12.2	11.2	11.8	12.0	11.7	11.9	11.2	8.9	10.8	9.0	6.1	8.4
14	12.1	11.2	11.8	12.1	11.7	11.9	11.1	8.3	10.3	8.7	7.8	8.4
15	12.1	11.3	11.8	12.1	11.8	12.0	11.2	9.7	11.0	8.8	7.8	8.3
16	12.2	11.2	11.9	12.2	11.6	11.9	11.3	9.7	11.0	8.5	7.8	8.2
17	12.1	11.1	11.8	12.2	11.5	11.9	11.2	10.3	11.0	8.4	7.5	7.9
18	12.2	11.2	11.8	12.2	11.7	12.0	11.3	10.9	11.1	8.3	7.4	7.8
19	12.1	11.4	11.9	12.2	11.8	12.0	11.4	8.5	11.0	8.5	7.6	8.0
20	12.1	11.4	11.9	12.3	11.6	12.2	11.1	8.9	10.4	8.8	7.6	8.2
21	12.2	11.5	11.9	12.4	11.6	12.0	11.2	10.0	10.6	8.8	7.9	8.4
22	12.3	11.6	12.1	12.6	11.8	12.3	11.2	10.0	10.9	9.3	8.3	9.0
23	12.3	11.7	12.1	12.6	12.2	12.5	11.2	10.8	11.0	9.4	6.4	8.5
24	12.3	11.7	12.1	12.7	12.2	12.6	11.1	10.5	10.9	10.0	6.8	8.9
25	12.3	11.8	12.2	12.7	12.3	12.5	11.2	10.2	10.9	9.3	5.9	8.4
26	12.3	12.0	12.2	12.6	12.2	12.5	11.0	8.9	10.6	9.1	6.4	8.5
27	12.4	12.1	12.3	12.6	12.2	12.4	11.1	10.1	10.8	8.9	7.6	8.4
28	12.3	12.0	12.2	12.4	12.0	12.2	11.2	10.2	10.8	8.7	8.3	8.5
29	12.3	11.8	12.2	12.3	12.1	12.2	10.9	10.1	10.6	8.7	8.5	8.6
30	---	---	---	12.3	11.9	12.1	10.8	10.6	10.7	9.1	7.7	8.8
31	---	---	---	12.2	11.9	12.1	---	---	---	8.9	7.4	8.4
MONTH	12.7	9.2	12.0	12.7	11.2	12.0	12.2	8.3	11.1	11.1	5.4	8.9

## STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.8	5.3	7.9	7.8	4.5	6.7	7.8	6.3	7.3	8.6	5.6	7.9
2	8.9	5.1	7.7	7.6	5.7	7.0	7.9	6.7	7.4	8.5	7.7	8.3
3	8.7	8.3	8.5	7.3	4.6	6.4	7.9	6.6	7.5	8.6	7.8	8.3
4	8.6	8.1	8.4	7.4	4.0	6.1	8.0	7.0	7.6	8.6	7.9	8.3
5	8.4	5.7	7.8	7.3	4.4	6.1	7.8	6.8	7.4	8.2	6.2	7.7
6	8.3	5.7	7.7	7.5	4.1	5.9	7.7	6.8	7.3	8.7	6.0	7.4
7	8.6	5.5	7.7	7.4	4.4	6.0	7.8	6.8	7.4	7.8	6.5	7.1
8	8.7	6.0	7.8	8.0	4.7	6.3	7.5	6.7	7.2	7.7	6.9	7.3
9	8.2	4.3	7.6	7.6	4.6	6.5	9.0	6.4	7.2	7.8	6.7	7.3
10	8.8	7.8	8.2	7.4	4.4	6.1	7.6	6.7	7.2	7.6	6.6	7.2
11	8.3	7.6	7.8	7.5	4.6	6.2	7.7	6.8	7.4	7.6	6.6	7.3
12	8.1	7.6	7.8	7.7	4.6	6.5	7.7	6.9	7.5	7.8	7.1	7.5
13	7.9	7.0	7.6	7.8	4.9	6.5	7.9	7.1	7.5	7.7	7.0	7.4
14	7.6	6.0	7.0	7.6	6.1	6.8	7.8	6.9	7.5	7.6	7.1	7.4
15	7.5	6.3	7.0	7.6	6.4	7.1	8.0	7.0	7.5	7.6	7.0	7.4
16	7.6	6.9	7.3	7.3	6.3	7.0	8.1	7.2	7.7	7.7	7.2	7.5
17	7.5	7.0	7.3	7.9	6.3	7.1	7.8	7.1	7.5	7.8	7.3	7.5
18	7.4	7.0	7.2	7.7	6.2	7.0	8.0	7.4	7.7	7.6	7.5	7.6
19	7.6	4.1	7.1	7.3	6.1	6.8	7.9	7.3	7.7	7.7	7.3	7.6
20	7.4	3.9	6.1	7.8	6.6	7.2	7.9	7.4	7.7	7.8	7.6	7.7
21	7.7	4.1	6.5	7.5	6.8	7.2	7.9	7.3	7.7	7.9	7.7	7.8
22	7.6	6.1	7.0	7.5	6.4	7.0	8.0	7.3	7.7	7.9	7.8	7.8
23	7.5	5.7	6.7	7.4	6.3	7.0	8.0	7.4	7.7	7.9	7.8	7.9
24	7.4	3.8	6.6	7.4	6.3	6.9	8.2	7.5	7.8	8.1	7.9	8.0
25	7.3	4.0	6.1	7.5	5.9	6.8	8.3	7.2	7.9	8.1	7.9	8.0
26	7.5	3.8	6.0	7.4	6.2	6.9	8.3	7.3	7.9	8.2	8.0	8.1
27	7.4	3.7	6.1	7.4	6.2	6.9	8.2	7.5	8.0	8.3	8.1	8.2
28	7.5	4.3	6.4	7.6	6.5	7.2	8.2	7.7	8.0	8.3	8.1	8.2
29	7.2	4.3	6.1	7.6	7.3	7.4	8.5	7.8	8.2	8.5	8.3	8.3
30	7.6	4.5	6.5	7.7	7.3	7.5	8.4	7.7	8.1	8.5	8.3	8.4
31	---	---	---	7.7	6.7	7.4	8.5	5.7	7.8	---	---	---
MONTH	8.9	3.7	7.2	8.0	4.0	6.8	9.0	5.7	7.6	8.7	5.6	7.7

## STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI

LOCATION.--Lat 44°26'09", long 83°26'28", in NE1/4 NW1/4 sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, at bridge on Rea Road, 5.5 mi northwest of Au Sable, and 10.4 mi upstream from mouth.

DRAINAGE AREA.--1,739 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1987 to current year. Records for July 1939 to September 1940, published in WSP 874, 894, and 1307, have been found to be unreliable and should not be used.

REVISED RECORDS.--WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.93 ft above sea level.

REMARKS.--Water-discharge records good. Flow regulated by Foote Dam 0.6 mi upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1330	1100	1020	1010	1040	1800	1120	1100	1100	1110	1200	988
2	1110	1100	1020	1030	972	1710	1110	1090	1320	1040	1250	1030
3	1010	1140	1030	1070	958	1420	1110	1100	1520	1000	1480	1080
4	1010	1150	1130	1020	1020	1470	1140	1110	1520	983	1500	1090
5	1010	1130	1510	1030	1070	1450	1120	1110	1420	957	1200	1060
6	1110	1110	1620	1040	979	1420	1080	1130	1250	964	1080	954
7	1230	1050	1460	1050	930	1280	1110	1140	1080	933	1060	914
8	1170	1020	1400	1080	1020	1150	1150	1130	1020	882	1070	918
9	1070	1020	1380	1110	1080	1190	1150	1150	1300	948	1260	917
10	990	1060	1380	1090	1040	1200	1130	1160	1730	1040	1520	1050
11	911	1090	1290	1070	1030	1330	1140	1150	1910	1110	1440	1230
12	819	1020	1210	1080	1000	1490	1140	1050	1890	1130	1300	1180
13	1180	993	1180	1050	932	1400	1010	1760	1870	1100	1180	1080
14	1500	990	1090	1030	1000	1190	1020	2100	1510	956	1060	1050
15	1350	1000	1130	1020	1070	1380	1100	1900	1420	864	992	1050
16	1220	1020	1200	1080	1070	1400	1120	1460	1170	906	968	1040
17	1240	1140	1130	933	931	1260	1120	1270	1170	978	972	1070
18	1170	1210	1060	942	902	1160	1120	1470	1170	1020	915	1080
19	1140	987	1000	1010	1080	1160	1040	1590	1020	1020	988	982
20	1220	854	1050	952	1110	1160	1060	1680	970	1020	1030	973
21	1100	923	1060	884	1100	1120	1830	1550	1100	992	937	1010
22	1160	1030	1030	791	1160	1150	2000	1360	1170	935	905	1040
23	1070	1090	919	800	1210	1190	1920	1350	1100	892	942	1130
24	957	1160	813	843	1350	1180	1300	1480	1020	881	1010	1150
25	1020	1190	975	965	1640	1420	998	1450	1040	897	980	1070
26	1160	1180	1150	987	1690	1440	1050	1310	1050	936	986	1010
27	1210	1170	1130	978	2160	1290	1090	1140	1150	995	1080	1010
28	1200	1150	1070	827	2030	1150	1100	1080	1200	1200	1140	1000
29	1150	1080	1040	815	1620	1130	1110	1090	1200	1240	1200	1000
30	1100	1040	1060	1000	---	1130	1110	1160	1160	1170	1210	919
31	1090	---	1070	1100	---	1100	---	1110	---	1140	1130	---
TOTAL	35007	32197	35607	30687	34194	40320	35598	40730	38550	31239	34985	31075
MEAN	1129	1073	1149	990	1179	1301	1187	1314	1285	1008	1129	1036
MAX	1500	1210	1620	1110	2160	1800	2000	2100	1910	1240	1520	1230
MIN	819	854	813	791	902	1100	998	1050	970	864	905	914
CFSM	.65	.62	.66	.57	.68	.75	.68	.76	.74	.58	.65	.60
IN.	.75	.69	.76	.66	.73	.86	.76	.87	.82	.67	.75	.66

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 2000, BY WATER YEAR (WY)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
MEAN	1393	1526	1444	1375	1346	1667	2049	1605	1409	1308	1284	1240	1240	1240
MAX	1770	1944	1870	1596	1618	2097	2749	2084	1952	2205	1834	1605	1605	1605
(WY)	1992	1992	1992	1997	1997	1990	1997	1997	1993	1994	1994	1994	1994	1994
MIN	1129	1073	1132	990	1179	1301	1187	1111	1104	1008	988	988	988	988
(WY)	2000	2000	1990	2000	2000	2000	2000	1999	1988	2000	1999	1999	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1987 - 2000

ANNUAL TOTAL	437084	420189	1468
ANNUAL MEAN	1197	1148	1640
HIGHEST ANNUAL MEAN			1148
LOWEST ANNUAL MEAN			1994
HIGHEST DAILY MEAN	2380	2160	5740
LOWEST DAILY MEAN	813	791	455
ANNUAL SEVEN-DAY MINIMUM	861	884	656
INSTANTANEOUS PEAK FLOW		2490	5850
INSTANTANEOUS PEAK STAGE		11.23	16.27
INSTANTANEOUS LOW FLOW		317	135
ANNUAL RUNOFF (CFSM)	.69	.66	.84
ANNUAL RUNOFF (INCHES)	9.35	8.99	11.47
10 PERCENT EXCEEDS	1530	1450	2000
50 PERCENT EXCEEDS	1150	1100	1370
90 PERCENT EXCEEDS	919	951	1020

## STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1978-94, 1996 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to September 1981.

WATER TEMPERATURE: April 1978 to September 1981, July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter from July 11, 1996, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1978-79): Maximum daily, 346 microsiemens, Nov. 21, 1978; minimum daily, 229 microsiemens, Apr. 19, 21, 1979.

WATER TEMPERATURE (water years 1979-80, 1996-2000): Maximum measured, 28.0°C, Aug. 8, 1979; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 13.6 mg/L, on several days during December and January, water year 1998; minimum, 5.8 mg/L, Aug. 13, 1999.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance of 354 microsiemens was measured Feb. 3, 1988.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 24.0°C, Aug. 16; minimum, 0.0°C on several days during winter period.

DISSOLVED OXYGEN: Maximum, 13.2 mg/L, Dec. 30; minimum, 6.3 mg/L, July 30, 31, Aug. 6.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	17.0	16.5	17.0	10.5	10.0	10.0	5.0	4.5	5.0	1.5	1.0	1.0			
2	16.5	16.0	16.5	10.5	9.5	10.0	5.0	4.5	5.0	1.0	1.0	1.0			
3	16.0	15.5	16.0	9.5	9.0	9.0	5.0	5.0	5.0	1.0	1.0	1.0			
4	15.5	15.5	15.5	9.0	8.5	9.0	5.0	5.0	5.0	1.0	1.0	1.0			
5	15.5	15.0	15.0	9.0	8.5	9.0	5.0	5.0	5.0	1.0	1.0	1.0			
6	15.0	14.5	15.0	9.0	8.5	8.5	5.0	4.5	4.5	1.0	1.0	1.0			
7	14.5	14.0	14.5	8.5	8.0	8.5	4.5	4.5	4.5	1.0	1.0	1.0			
8	14.5	14.0	14.0	8.5	8.0	8.5	4.5	4.0	4.5	1.0	1.0	1.0			
9	14.5	14.0	14.5	9.0	8.0	8.5	4.0	4.0	4.0	1.0	1.0	1.0			
10	15.0	14.0	14.5	8.5	8.5	8.5	4.0	4.0	4.0	1.0	1.0	1.0			
11	14.5	14.0	14.5	8.5	8.0	8.0	4.0	4.0	4.0	1.5	1.0	1.0			
12	14.0	14.0	14.0	8.0	8.0	8.0	4.0	3.5	4.0	1.0	1.0	1.0			
13	14.0	13.5	14.0	8.0	8.0	8.0	3.5	3.5	3.5	1.0	1.0	1.0			
14	13.5	13.0	13.5	8.0	7.5	8.0	3.5	3.5	3.5	1.0	1.0	1.0			
15	13.5	13.0	13.0	7.5	7.0	7.5	3.5	3.5	3.5	1.0	1.0	1.0			
16	13.5	13.0	13.0	7.0	6.5	7.0	3.5	3.0	3.0	1.0	1.0	1.0			
17	13.0	13.0	13.0	6.5	6.5	6.5	3.0	2.5	2.5	1.0	1.0	1.0			
18	13.0	12.5	12.5	6.5	6.5	6.5	2.5	2.0	2.0	1.0	1.0	1.0			
19	12.5	12.5	12.5	6.5	6.5	6.5	2.5	2.0	2.0	1.0	1.0	1.0			
20	12.5	12.0	12.0	6.5	6.5	6.5	2.5	1.5	2.0	1.0	1.0	1.0			
21	12.0	11.5	12.0	6.5	6.5	6.5	1.5	1.0	1.5	1.0	.5	1.0			
22	11.5	11.0	11.5	7.0	6.5	6.5	1.5	1.0	1.0	1.0	.5	.5			
23	11.0	10.5	11.0	6.5	6.5	6.5	1.0	.5	1.0	1.0	.5	.5			
24	10.5	10.5	10.5	7.0	6.5	6.5	1.0	.5	.5	1.0	.5	.5			
25	10.5	10.0	10.0	6.5	6.5	6.5	1.0	.5	1.0	.5	.5	.5			
26	10.0	10.0	10.0	6.5	6.0	6.0	1.0	.5	1.0	.5	.5	.5			
27	10.0	9.5	9.5	6.0	6.0	6.0	1.0	1.0	1.0	.5	.5	.5			
28	10.0	9.5	9.5	6.0	5.5	6.0	1.0	1.0	1.0	.5	.5	.5			
29	10.0	9.5	9.5	5.5	5.5	5.5	1.0	1.0	1.0	.5	.5	.5			
30	10.0	9.5	10.0	5.5	5.0	5.0	1.0	1.0	1.0	.5	.5	.5			
31	10.5	10.0	10.0	---	---	---	1.5	1.0	1.0	.5	.5	.5			
MONTH	17.0	9.5	12.8	10.5	5.0	7.4	5.0	.5	2.8	1.5	.5	.8			

## STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	.5	.5	.5	1.0	1.0	1.0	6.5	6.0	6.0	11.0	10.0	10.5	
2	.5	.5	.5	1.0	1.0	1.0	7.0	6.5	6.5	11.0	10.5	11.0	
3	.5	.5	.5	1.5	1.0	1.0	7.0	6.5	7.0	12.0	11.0	11.5	
4	.5	.5	.5	1.5	1.5	1.5	7.0	6.5	7.0	13.5	11.0	12.5	
5	.5	.5	.5	2.0	1.5	1.5	7.0	6.5	6.5	14.5	12.5	13.5	
6	.5	.5	.5	2.0	1.5	2.0	7.0	6.5	6.5	15.5	14.0	14.5	
7	.5	.0	.5	2.5	2.0	2.0	6.5	6.5	6.5	16.5	15.0	16.0	
8	.5	.0	.5	2.5	2.0	2.5	6.5	6.0	6.5	16.5	15.0	15.5	
9	.5	.5	.5	2.5	2.5	2.5	6.5	6.0	6.5	16.5	15.5	16.0	
10	.5	.0	.5	2.5	2.0	2.5	6.5	6.0	6.0	17.5	15.5	16.5	
11	.5	.0	.5	2.5	2.0	2.5	6.5	6.0	6.0	17.0	15.0	16.0	
12	.5	.0	.5	2.5	2.5	2.5	6.5	6.0	6.0	16.0	14.5	15.5	
13	.5	.0	.0	2.5	2.5	2.5	6.5	6.0	6.5	17.0	15.5	16.5	
14	.5	.0	.5	3.0	2.5	3.0	7.5	6.5	7.0	16.0	15.5	16.0	
15	.5	.0	.5	3.0	3.0	3.0	7.5	6.5	7.0	16.0	15.0	15.5	
16	.5	.0	.5	3.0	3.0	3.0	7.0	7.0	7.0	15.5	15.0	15.0	
17	.5	.0	.0	3.5	3.0	3.0	7.5	7.0	7.0	15.5	15.0	15.0	
18	.0	.0	.0	3.5	3.0	3.0	7.5	7.0	7.0	15.0	15.0	15.0	
19	.5	.0	.0	3.5	3.0	3.0	8.0	7.0	7.5	15.0	14.5	14.5	
20	.5	.0	.0	3.5	3.0	3.0	7.5	7.0	7.5	15.0	14.5	14.5	
21	.5	.0	.0	3.5	3.0	3.5	7.5	7.0	7.5	15.5	15.0	15.0	
22	.5	.0	.0	3.5	3.5	3.5	8.0	7.0	7.5	15.5	15.0	15.5	
23	.5	.0	.5	4.0	3.5	3.5	8.5	8.0	8.0	16.0	15.5	15.5	
24	.5	.0	.5	4.0	3.5	4.0	8.5	8.0	8.0	17.0	15.5	16.0	
25	.5	.5	.5	4.5	3.5	4.0	8.5	8.5	8.5	16.0	15.5	16.0	
26	.5	.5	.5	5.0	4.0	4.5	9.0	8.5	8.5	16.0	15.5	15.5	
27	.5	.5	.5	5.0	4.5	5.0	9.5	9.0	9.0	16.0	15.5	16.0	
28	1.0	.5	.5	5.0	5.0	5.0	10.5	9.0	9.5	16.0	15.5	16.0	
29	1.0	.5	1.0	5.5	5.0	5.5	10.0	9.0	10.0	16.5	16.0	16.0	
30	---	---	---	6.0	5.0	5.5	11.0	10.0	10.0	16.5	16.0	16.0	
31	---	---	---	6.5	5.5	6.0	---	---	---	17.0	16.5	16.5	
MONTH	1.0	.0	.4	6.5	1.0	3.1	11.0	6.0	7.3	17.5	10.0	15.0	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	17.0	16.5	16.5	22.0	21.5	21.5	23.0	22.5	23.0	23.0	22.0	22.5
2	17.5	16.5	17.0	22.5	21.5	22.0	23.5	23.0	23.0	22.5	22.0	22.0
3	17.0	16.5	17.0	22.0	21.5	22.0	23.5	23.0	23.0	22.5	22.0	22.0
4	17.5	17.0	17.0	22.5	21.5	22.0	23.5	22.5	23.0	22.0	21.5	21.5
5	17.0	17.0	17.0	22.5	21.5	22.0	23.0	22.5	23.0	21.5	21.0	21.5
6	17.5	16.5	17.0	22.0	21.5	22.0	23.0	22.5	22.5	21.5	21.0	21.0
7	18.0	17.0	17.5	22.5	21.5	22.0	23.5	22.5	23.0	21.5	20.5	21.0
8	19.0	17.5	18.5	22.0	21.5	22.0	23.0	23.0	23.0	21.5	21.0	21.0
9	---	---	---	23.0	22.0	22.0	23.5	22.5	23.0	22.0	21.0	21.5
10	---	---	---	23.0	22.0	22.5	23.0	22.5	23.0	---	---	---
11	---	---	---	22.5	22.0	22.5	23.0	22.5	23.0	---	---	---
12	---	---	---	22.5	22.0	22.5	23.0	22.5	23.0	---	---	---
13	---	---	---	23.0	22.0	22.5	23.0	22.5	23.0	21.5	21.0	21.5
14	---	---	---	23.5	22.5	23.0	23.5	22.5	23.0	21.0	20.5	21.0
15	20.0	19.0	19.5	23.5	23.0	23.0	23.5	23.0	23.5	20.5	20.0	20.0
16	20.0	19.5	20.0	23.0	22.5	23.0	24.0	23.0	23.5	20.0	19.5	19.5
17	20.0	19.5	20.0	23.5	22.5	23.0	23.0	23.0	23.0	20.0	19.0	19.5
18	20.0	19.5	19.5	23.0	22.5	22.5	23.0	22.5	22.5	20.0	19.0	19.5
19	20.5	19.5	20.0	23.0	22.0	22.5	22.5	22.0	22.0	19.5	19.0	19.5
20	20.5	20.0	20.0	22.5	22.0	22.5	22.0	21.5	22.0	19.5	19.0	19.0
21	21.5	20.0	20.5	22.0	21.5	22.0	22.0	21.5	21.5	19.0	18.5	18.5
22	21.0	20.5	20.5	22.0	21.5	21.5	22.0	21.5	21.5	18.5	18.0	18.5
23	21.0	20.5	20.5	22.0	21.5	21.5	22.0	21.5	21.5	18.5	18.0	18.0
24	21.0	20.5	21.0	22.0	21.5	21.5	22.0	21.5	21.5	18.0	17.5	17.5
25	22.0	21.0	21.5	22.0	21.5	21.5	22.5	21.5	22.0	17.5	17.0	17.5
26	22.0	21.0	21.5	22.5	21.5	22.0	22.0	22.0	22.0	17.5	17.0	17.0
27	22.0	21.5	22.0	22.5	21.5	22.0	22.0	21.5	22.0	17.0	16.5	17.0
28	22.0	21.5	21.5	22.5	22.0	22.0	22.0	21.5	21.5	16.5	16.0	16.5
29	21.5	21.0	21.5	22.5	22.0	22.5	22.0	21.5	21.5	16.5	16.0	16.5
30	22.0	21.0	21.5	22.5	22.0	22.5	22.0	21.5	22.0	16.5	16.0	16.0
31	---	---	---	22.5	22.0	22.5	22.5	22.0	22.0	---	---	---
MONTH	---	---	---	23.5	21.5	22.2	24.0	21.5	22.5	---	---	---

## STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	8.2	7.7	7.9	10.1	9.5	9.8	12.6	12.3	12.4	12.9	12.6	12.8
2	8.2	7.8	8.0	10.1	9.7	9.9	12.5	12.3	12.4	12.9	12.5	12.7
3	8.3	8.0	8.1	10.0	9.7	9.9	12.8	12.2	12.3	12.9	12.6	12.8
4	8.3	7.8	8.1	10.1	9.9	10.0	12.3	12.0	12.2	13.0	12.5	12.8
5	8.6	8.0	8.3	10.3	10.0	10.1	12.2	11.9	12.0	12.9	12.6	12.7
6	8.8	8.0	8.4	10.4	9.3	10.2	12.2	11.9	12.1	12.9	12.5	12.7
7	8.7	8.2	8.5	10.5	10.2	10.3	12.1	12.0	12.1	12.9	12.4	12.7
8	8.8	8.1	8.4	10.5	10.2	10.4	12.2	12.0	12.1	12.8	12.4	12.7
9	8.7	8.3	8.5	10.5	10.3	10.4	12.2	12.1	12.1	12.8	12.5	12.7
10	9.0	8.4	8.7	10.5	10.3	10.4	12.4	12.0	12.2	12.9	12.5	12.7
11	9.2	8.5	8.9	10.7	10.4	10.6	12.5	12.2	12.3	12.9	12.5	12.7
12	8.9	8.6	8.8	10.7	10.6	10.6	12.2	12.0	12.1	12.5	12.3	12.4
13	9.0	8.1	8.7	10.8	10.5	10.6	12.2	11.9	12.1	12.5	12.3	12.4
14	9.4	8.7	8.9	10.8	10.5	10.7	12.1	12.0	12.1	12.6	12.4	12.5
15	9.4	8.2	8.8	10.9	10.5	10.7	12.2	11.8	12.0	12.4	12.2	12.3
16	8.7	8.2	8.5	11.1	10.7	10.9	12.0	11.8	11.9	12.4	11.9	12.3
17	8.9	8.2	8.6	11.2	10.9	11.0	12.2	11.2	11.7	12.4	12.2	12.3
18	9.0	8.5	8.7	11.2	10.4	11.0	12.8	11.4	12.2	12.3	12.1	12.2
19	9.0	8.5	8.8	11.3	11.0	11.1	12.4	11.6	12.0	12.4	12.1	12.3
20	9.0	8.4	8.7	11.4	10.9	11.2	12.2	11.7	12.0	12.4	12.2	12.3
21	9.0	8.5	8.8	11.3	11.0	11.2	12.0	11.3	11.7	12.4	12.2	12.3
22	9.3	8.6	8.9	11.3	11.1	11.2	13.1	11.0	12.3	12.4	12.2	12.2
23	9.5	8.8	9.2	11.4	11.1	11.3	12.9	12.5	12.7	12.3	12.1	12.2
24	9.6	9.2	9.4	11.6	11.3	11.5	13.0	12.7	12.9	12.3	12.1	12.2
25	9.7	9.2	9.4	--	--	--	12.9	12.4	12.7	12.3	12.1	12.2
26	9.9	9.4	9.7	--	--	--	12.9	12.2	12.6	12.4	12.1	12.2
27	9.9	9.2	9.5	--	--	--	13.1	12.3	12.7	12.3	12.1	12.2
28	10.0	9.3	9.7	12.1	11.8	11.9	13.0	12.4	12.7	12.4	12.1	12.3
29	10.1	9.7	9.9	12.3	12.0	12.1	12.9	12.4	12.6	12.4	12.2	12.3
30	10.2	9.6	9.9	12.4	12.1	12.2	13.2	12.6	12.8	12.3	12.1	12.2
31	10.1	9.7	9.9	--	--	--	13.0	12.6	12.8	12.2	11.7	12.0
MONTH	10.2	7.7	8.9	--	--	--	13.2	11.0	12.3	13.0	11.7	12.4

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH			APRIL			MAY		
1	11.9	11.7	11.8	11.9	11.4	11.7	12.0	11.8	11.9	10.4	10.1	10.2
2	11.8	11.7	11.7	11.9	11.6	11.8	11.9	11.6	11.8	10.4	9.8	10.2
3	11.8	11.6	11.7	11.9	11.7	11.8	11.7	11.5	11.7	10.3	9.9	10.1
4	11.8	11.6	11.7	11.9	11.6	11.7	11.6	11.4	11.5	10.1	9.7	9.9
5	11.8	11.7	11.8	12.0	11.5	11.8	11.5	11.3	11.4	9.9	9.5	9.8
6	11.9	11.6	11.7	12.1	11.7	11.9	11.6	11.3	11.4	9.9	9.6	9.8
7	11.9	11.7	11.8	12.1	11.7	11.9	11.5	11.3	11.4	9.7	9.4	9.5
8	11.9	11.7	11.8	12.1	11.7	11.9	11.5	11.2	11.4	9.8	9.3	9.5
9	11.9	11.7	11.8	12.1	11.8	12.0	11.4	11.2	11.3	9.5	9.1	9.3
10	12.0	11.6	11.8	12.3	11.8	12.1	11.5	10.9	11.2	9.3	8.8	9.0
11	12.0	11.8	11.9	12.3	12.0	12.2	11.1	10.8	11.0	9.3	8.9	9.0
12	12.1	11.8	12.0	12.3	12.0	12.2	11.1	10.8	10.9	9.3	8.5	8.9
13	12.1	11.9	12.0	12.4	12.0	12.2	11.0	10.7	10.9	9.1	8.4	8.9
14	12.1	11.9	12.0	12.4	12.1	12.2	11.0	10.6	10.8	9.1	8.3	8.9
15	12.2	12.0	12.0	12.5	11.9	12.1	11.6	10.4	10.7	9.1	8.5	8.9
16	12.2	12.0	12.1	12.8	11.8	12.4	11.0	10.5	10.8	9.1	8.6	8.9
17	12.3	11.9	12.1	12.8	12.5	12.7	11.0	10.5	10.8	9.1	8.3	8.8
18	12.2	12.1	12.1	12.9	12.5	12.7	10.9	10.7	10.8	9.1	8.4	8.8
19	12.3	12.1	12.2	12.8	12.5	12.6	10.9	10.5	10.7	9.3	8.8	9.0
20	12.3	12.0	12.1	12.9	12.5	12.6	10.6	10.4	10.5	9.9	8.8	9.2
21	12.5	12.0	12.2	13.0	12.5	12.7	10.7	10.1	10.5	9.5	8.8	9.2
22	12.3	12.1	12.2	12.7	12.5	12.6	11.0	10.5	10.7	9.4	8.5	9.2
23	12.3	12.1	12.2	12.7	12.5	12.6	11.1	9.8	10.5	9.6	8.6	9.2
24	12.2	11.9	12.0	12.7	12.5	12.6	10.5	10.2	10.4	9.6	8.5	9.2
25	12.0	11.7	11.8	12.5	12.2	12.4	10.5	10.2	10.4	9.7	9.0	9.5
26	11.9	11.7	11.8	12.4	12.1	12.3	10.4	10.1	10.3	9.7	9.4	9.5
27	11.8	11.5	11.7	12.3	12.0	12.2	10.4	10.0	10.2	9.6	9.2	9.4
28	11.8	11.5	11.7	12.4	12.0	12.2	10.3	9.6	10.0	9.6	9.3	9.4
29	11.9	11.7	11.8	12.2	11.9	12.1	10.3	9.9	10.2	9.8	9.2	9.5
30	--	--	--	12.0	11.8	12.0	10.4	10.0	10.3	9.6	9.1	9.3
31	--	--	--	12.0	11.8	11.9	--	--	--	10.2	9.2	9.4
MONTH	12.5	11.5	11.9	13.0	11.4	12.2	12.0	9.6	10.9	10.4	8.3	9.3



## STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	9.7	9.1	9.4	7.8	7.3	7.5	7.5	6.7	7.0	8.1	7.5	7.7
2	9.8	9.1	9.4	7.7	7.1	7.4	7.8	6.7	7.3	7.9	7.4	7.6
3	9.5	8.9	9.3	7.5	7.0	7.3	7.7	6.7	7.3	7.9	7.4	7.7
4	9.4	9.0	9.3	7.6	7.0	7.2	7.5	6.6	7.1	7.9	6.7	7.5
5	9.2	8.6	9.0	7.4	7.0	7.2	7.5	6.5	7.0	8.2	7.3	7.7
6	9.6	9.0	9.2	7.6	6.8	7.2	7.4	6.3	6.9	8.2	7.2	7.7
7	9.6	9.0	9.3	7.7	7.0	7.4	7.9	6.8	7.3	8.8	7.2	7.9
8	9.6	9.0	9.3	7.8	7.2	7.5	7.7	6.9	7.3	8.7	7.4	8.0
9	---	---	---	7.9	7.4	7.6	7.8	7.1	7.3	8.9	7.5	8.0
10	---	---	---	7.7	6.9	7.5	7.4	6.9	7.2	---	---	---
11	---	---	---	7.6	6.9	7.3	7.4	6.9	7.1	---	---	---
12	---	---	---	7.7	7.0	7.4	7.5	6.7	7.1	---	---	---
13	---	---	---	7.6	7.0	7.3	7.5	6.6	7.0	8.5	7.6	8.0
14	---	---	---	7.5	7.0	7.3	7.5	6.6	7.0	8.0	7.6	7.7
15	7.6	7.2	7.4	7.7	7.1	7.4	7.5	6.6	7.0	8.0	7.6	7.7
16	7.8	7.4	7.5	7.6	6.8	7.2	7.6	6.8	7.2	8.2	7.6	7.9
17	7.9	7.5	7.6	7.5	6.9	7.1	7.8	7.3	7.5	8.3	7.7	7.9
18	7.8	7.3	7.5	7.9	6.9	7.4	7.6	7.0	7.3	8.5	7.8	8.0
19	7.8	7.4	7.6	7.8	6.9	7.3	7.7	6.7	7.2	8.4	7.7	8.0
20	7.7	7.3	7.5	7.7	6.8	7.3	7.5	6.8	7.1	8.1	7.7	7.8
21	8.0	7.2	7.6	7.6	6.8	7.2	7.8	6.8	7.2	8.5	7.7	8.1
22	8.0	7.6	7.7	7.4	6.5	7.1	7.6	6.6	7.0	8.5	7.8	8.0
23	7.9	7.4	7.7	7.9	6.8	7.3	7.5	6.7	7.1	8.3	7.8	8.1
24	7.6	7.2	7.4	8.0	7.0	7.4	7.9	6.9	7.4	8.6	8.1	8.3
25	7.7	7.2	7.5	8.0	7.0	7.4	8.1	7.1	7.5	8.7	8.2	8.3
26	7.7	7.3	7.5	7.8	6.8	7.3	7.7	7.0	7.5	9.0	8.2	8.5
27	7.8	7.3	7.6	7.7	6.7	7.1	7.7	7.3	7.5	8.9	8.4	8.6
28	7.6	7.2	7.4	7.5	6.4	7.1	7.9	7.2	7.5	9.1	8.5	8.8
29	7.5	7.2	7.4	7.6	7.0	7.3	7.8	7.0	7.4	9.3	8.7	8.9
30	7.7	7.2	7.4	7.2	6.3	6.9	8.0	7.5	7.7	9.2	8.6	8.9
31	---	---	---	7.1	6.3	6.8	8.0	7.2	7.7	---	---	---
MONTH	---	---	---	8.0	6.3	7.3	8.1	6.3	7.2	---	---	---

## STREAMS TRIBUTARY TO LAKE HURON

## 04142000 RIFLE RIVER NEAR STERLING, MI

LOCATION.--Lat 44°04'21", long 84°01'12", in NE1/4 SW1/4 sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft downstream from bridge on Melita Road, 2.8 mi north of Sterling, and 20 mi upstream from mouth.

DRAINAGE AREA.--320 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year.

Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft above sea level. November 1905 to December 1908, nonrecording gage at site 400 ft downstream at different datum. Jan. 13, 1937 to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by dams upstream from station. Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	189	170	e200	e160	565	229	249	276	283	309	167
2	196	239	168	e220	e160	554	236	273	396	212	289	189
3	202	244	177	e250	e160	433	242	253	496	236	303	213
4	196	204	218	e280	e160	378	237	240	347	292	229	185
5	196	190	333	e210	e160	353	227	233	282	212	194	170
6	180	187	413	e180	e160	335	222	227	259	189	184	161
7	172	180	299	e170	e160	321	222	217	216	186	190	157
8	167	178	248	e160	e160	339	241	214	207	177	207	156
9	166	176	225	e190	e160	390	258	366	215	181	267	e150
10	165	e178	214	e250	e160	405	252	414	433	202	282	e150
11	163	e200	205	e350	e160	326	251	364	429	183	213	e190
12	160	e224	198	e280	e160	294	255	447	385	168	189	179
13	174	207	194	e230	e160	276	251	1240	311	161	175	169
14	221	192	191	e190	e160	263	246	1020	317	166	172	167
15	196	180	203	e170	e160	280	243	634	346	190	170	183
16	178	200	247	e165	e160	316	247	508	290	200	164	176
17	174	215	e220	e160	e160	309	255	621	251	183	158	164
18	170	212	e200	e160	e160	264	239	1300	224	164	162	160
19	167	209	e190	e160	e160	260	231	1610	220	156	159	154
20	166	191	e185	e160	e160	291	284	1030	215	157	152	159
21	166	180	e180	e160	e170	359	697	670	256	159	150	188
22	171	175	e180	e160	e180	352	935	502	220	158	154	185
23	183	176	e180	e160	e250	328	663	515	196	155	187	229
24	177	199	e180	e160	e400	313	488	508	185	152	176	258
25	172	210	e180	e160	e700	307	419	427	179	151	159	200
26	169	187	e180	e160	e1000	296	377	362	186	147	175	181
27	165	183	e180	e160	e1300	283	312	329	263	151	237	173
28	165	181	e180	e160	1050	284	273	297	213	179	217	167
29	165	176	e180	e160	639	263	258	276	196	196	187	165
30	165	172	e180	e160	---	248	256	259	286	224	197	162
31	168	---	e190	e160	---	235	---	278	---	307	178	---
TOTAL	5495	5834	6488	5895	8889	10220	9546	15883	8295	5877	6185	5307
MEAN	177	194	209	190	307	330	318	512	276	190	200	177
MAX	221	244	413	350	1300	565	935	1610	496	307	309	258
MIN	160	172	168	160	160	235	222	214	179	147	150	150
CFSM	.55	.61	.65	.59	.96	1.03	.99	1.60	.86	.59	.62	.55
IN.	.64	.68	.75	.69	1.03	1.19	1.11	1.85	.96	.68	.72	.62

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 2000, BY WATER YEAR (WY)

	MEAN	240	292	286	253	289	557	634	393	288	195	181	205
MAX	741	826	579	538	741	1035	1160	859	842	335	339	712	
(WY)	1987	1993	1992	1973	1938	1991	1959	1983	1945	1969	1995	1986	
MIN	142	160	156	152	150	206	262	175	124	126	122	124	
(WY)	1964	1964	1964	1956	1956	1964	1945	1977	1964	1966	1964	1948	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1937 - 2000

ANNUAL TOTAL	90267	93914	
ANNUAL MEAN	247	257	(a)318
HIGHEST ANNUAL MEAN			501
LOWEST ANNUAL MEAN			166
HIGHEST DAILY MEAN	1400	1610	4500
LOWEST DAILY MEAN	127	147	98
ANNUAL SEVEN-DAY MINIMUM	129	153	105
INSTANTANEOUS PEAK FLOW		(b)1840	(c)5340
INSTANTANEOUS PEAK STAGE		(d)8.39	13.74
INSTANTANEOUS LOW FLOW		146	(f)75
ANNUAL RUNOFF (CFSM)	.77	.80	.99
ANNUAL RUNOFF (INCHES)	10.49	10.92	13.51
10 PERCENT EXCEEDS	393	386	560
50 PERCENT EXCEEDS	200	198	230
90 PERCENT EXCEEDS	154	160	150

(a) Does not include water year 1937.

(b) Gage height 6.52 ft.

(c) From rating curve extended above 3,800 ft<sup>3</sup>/s.

(d) Backwater from ice.

(e) Estimated.

(f) July 25, 26, 27.

(g) Result of freezeup.

## STREAMS TRIBUTARY TO LAKE HURON

## 04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW1/4 sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi north of Owosso.

DRAINAGE AREA.--538 mi<sup>2</sup>.

PERIOD OF RECORD.--March 1931 to current year. Gage-height records for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft above sea level. Prior to Oct. 15, 1933, at site 1.5 mi upstream at datum 5.46 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow regulated below approximately 800 ft<sup>3</sup>/s by powerplant at Shiawassee town prior to February 1953; occasional regulation at low stages since. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	46	124	e120	e110	464	132	401	543	194	468	140
2	66	67	146	e125	e110	431	130	363	478	187	533	153
3	101	56	143	e140	e110	404	127	348	e441	190	511	163
4	120	74	141	145	e110	381	126	293	e391	177	501	141
5	130	109	194	145	e110	327	126	218	e342	205	556	127
6	127	128	181	147	e110	282	123	198	e292	239	613	100
7	117	132	191	149	e110	225	128	181	290	240	617	88
8	116	125	211	151	e110	240	149	164	291	230	595	99
9	117	125	207	117	e110	260	139	204	237	227	599	92
10	106	125	196	148	e110	215	148	313	190	209	582	131
11	87	120	191	160	e110	199	162	410	195	195	509	159
12	76	108	182	e165	e110	191	161	473	190	161	402	277
13	79	102	171	e170	e115	184	187	553	203	149	337	366
14	78	96	181	e175	e120	177	206	582	244	140	284	479
15	78	90	191	153	e130	173	224	553	388	127	203	494
16	86	87	202	e145	e130	177	217	514	460	118	166	505
17	95	87	235	e140	e110	170	194	399	475	117	206	519
18	98	81	246	138	e120	190	157	1330	443	110	197	457
19	105	98	214	e135	e120	196	144	2500	376	101	200	332
20	107	100	224	e130	e120	185	433	2270	318	97	224	300
21	108	101	200	e130	e140	173	1100	1820	284	92	212	280
22	107	114	167	e125	e110	173	1020	1640	236	83	198	295
23	104	131	e160	e120	223	166	1140	1640	181	79	202	1880
24	100	129	e150	e120	376	149	1180	1510	164	78	192	2290
25	96	131	e140	e115	434	150	1180	1280	164	83	211	1890
26	87	146	e135	e110	490	153	944	1000	154	77	215	1740
27	80	163	e130	e110	500	154	673	754	187	75	186	1680
28	74	192	e125	e110	499	157	545	688	225	204	152	1590
29	69	173	e120	e110	501	147	477	643	214	426	143	1440
30	66	143	e120	e110	---	143	428	598	200	444	125	1160
31	49	---	e115	e115	---	139	---	586	---	723	133	---
TOTAL	2866	3379	5333	4173	5625	6775	12100	24426	8796	5777	10272	19367
MEAN	92.5	113	172	135	194	219	403	788	293	186	331	646
MAX	130	192	246	175	501	464	1180	2500	543	723	617	2290
MIN	37	46	115	110	110	139	123	164	154	75	125	88
CFSM	.17	.21	.32	.25	.36	.41	.75	1.46	.54	.35	.62	1.20
IN.	.20	.23	.37	.29	.39	.47	.84	1.69	.61	.40	.71	1.34

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	193	261	316	353	453	758	720	459	275	167	124	150
MAX	1442	985	922	1066	1728	1682	2060	1950	1051	868	578	522	
(WY)	1982	1993	1976	1993	1938	1948	1947	1956	1989	1994	1992	1975	
MIN	32.6	52.1	56.6	66.9	65.5	119	162	119	34.0	24.0	13.2	25.0	
(WY)	1964	1964	1964	1940	1940	1964	1931	1958	1934	1934	1931	1931	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1931 - 2000
ANNUAL TOTAL	85772	108889	
ANNUAL MEAN	235	298	354
HIGHEST ANNUAL MEAN			629
LOWEST ANNUAL MEAN			97.7
HIGHEST DAILY MEAN	2260	2500	5920
LOWEST DAILY MEAN	28	37	2.0
ANNUAL SEVEN-DAY MINIMUM	31	61	7.7
INSTANTANEOUS PEAK FLOW		2760	6240
INSTANTANEOUS PEAK STAGE		7.07	10.35
INSTANTANEOUS LOW FLOW		34	.20
ANNUAL RUNOFF (CFSM)	.44	.55	.66
ANNUAL RUNOFF (INCHES)	5.93	7.53	8.94
10 PERCENT EXCEEDS	431	564	800
50 PERCENT EXCEEDS	139	170	200
90 PERCENT EXCEEDS	59	98	65

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank on grounds of Oakdale Regional Center for Developmental Disabilities, 2.0 mi west of Lapeer.

DRAINAGE AREA.--55.3 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Concrete control since Oct. 12, 1938. Datum of gage is 805.79 ft above sea level. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Prior to 1941, occasional regulation caused by dam upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	14	11	e9.0	e8.0	58	12	9.6	19	9.2	139	7.1
2	5.7	12	11	e9.5	e8.0	53	11	8.9	19	9.0	151	6.6
3	6.6	11	11	12	e8.2	47	11	7.1	19	12	132	6.3
4	8.2	11	13	14	e8.4	41	11	6.0	18	12	116	5.8
5	8.2	10	16	14	e8.5	35	13	5.1	17	13	98	5.1
6	7.4	9.4	21	14	e8.6	30	13	4.3	16	13	83	4.4
7	6.3	8.6	22	14	e8.6	27	14	4.4	15	11	68	3.9
8	5.7	8.2	28	12	e8.6	24	16	5.5	13	9.1	56	3.8
9	4.8	7.8	29	e12	e8.8	23	17	12	11	8.2	45	4.0
10	4.7	7.5	30	e13	e8.8	22	17	26	9.6	8.0	42	6.0
11	4.5	7.8	24	e14	e9.0	21	18	34	8.8	7.1	47	11
12	5.0	8.6	23	e14	e9.0	19	19	43	12	6.3	44	14
13	5.4	8.9	22	15	e9.0	18	19	47	17	5.7	36	14
14	5.2	8.9	23	e15	e9.0	17	18	44	21	8.7	29	15
15	5.3	9.0	27	e15	e9.0	16	15	36	22	18	24	18
16	7.1	9.0	27	e15	e8.8	17	14	29	21	20	21	18
17	13	9.0	26	14	e8.8	17	15	28	18	20	20	17
18	20	9.4	23	e13	e8.8	17	15	68	14	17	21	15
19	22	9.7	22	e13	e8.8	17	13	110	12	14	20	13
20	32	11	23	e12	e8.8	18	42	191	9.9	11	18	11
21	35	11	20	e11	e8.8	18	71	306	8.7	8.6	16	11
22	32	12	e15	e10	e9.0	18	75	286	7.6	7.2	14	11
23	38	12	e14	e9.5	e12	17	73	217	6.4	6.4	16	45
24	41	13	e13	e9.0	e16	16	72	136	5.5	5.5	16	73
25	37	13	e12	e8.6	e26	15	67	93	6.8	4.6	15	219
26	34	14	e11	e8.4	41	15	56	69	8.6	4.1	13	279
27	31	13	e10	e8.2	54	14	45	53	10	4.1	12	229
28	26	13	e10	e8.0	59	14	30	41	10	32	10	156
29	23	12	e10	e8.0	59	14	21	33	9.6	63	9.3	96
30	19	12	e9.5	e8.0	---	14	11	26	9.1	97	8.5	67
31	16	---	e9.2	e8.0	---	13	---	21	---	121	7.7	---
TOTAL	514.0	315.8	565.7	360.2	458.3	705	844	1999.9	394.6	585.8	1347.5	1385.0
MEAN	16.6	10.5	18.2	11.6	15.8	22.7	28.1	64.5	13.2	18.9	43.5	46.2
MAX	41	14	30	15	59	58	75	306	22	121	151	279
MIN	4.5	7.5	9.2	8.0	8.0	13	11	4.3	5.5	4.1	7.7	3.8
CFSM	.30	.19	.33	.21	.29	.41	.51	1.17	.24	.34	.79	.83
IN.	.35	.21	.38	.24	.31	.47	.57	1.35	.27	.39	.91	.93

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1933 - 2000, BY WATER YEAR (WY)

	MEAN	19.0	25.4	29.0	32.3	42.4	73.2	69.0	39.4	22.7	11.1	9.60	15.7
MAX	134	101	93.3	132	174	154	226	188	127	48.8	49.8	226	
(WY)	1987	1986	1951	1973	1938	1948	1947	1956	1943	1994	1937	1985	
MIN	2.36	3.84	3.99	3.58	5.62	14.2	19.2	7.49	2.12	1.60	1.48	.89	
(WY)	1939	1939	1964	1940	1940	1964	1946	1988	1988	1941	1944	1941	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1933 - 2000

ANNUAL TOTAL	6370.52	9475.8	
ANNUAL MEAN	17.5	25.9	(a)32.3
HIGHEST ANNUAL MEAN			71.7
LOWEST ANNUAL MEAN			9.05
HIGHEST DAILY MEAN	149	306	1300
LOWEST DAILY MEAN	.95	3.8	.26
ANNUAL SEVEN-DAY MINIMUM	1.1	4.7	.50
INSTANTANEOUS PEAK FLOW		317	1380
INSTANTANEOUS PEAK STAGE		17.72	(b)20.95
INSTANTANEOUS LOW FLOW		2.9	.14
ANNUAL RUNOFF (CFSM)	.32	.47	.58
ANNUAL RUNOFF (INCHES)	4.29	6.37	7.94
10 PERCENT EXCEEDS	33	55	74
50 PERCENT EXCEEDS	12	14	17
90 PERCENT EXCEEDS	2.7	7.0	3.8

(a) Does not include water year 1933.

(b) From floodmark.

(c) Jan. 8, Sept. 9.

(d) Sept. 16, 18, 1970.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE1/4 NE1/4 sec.36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 mi east of Columbiaville, and 3.2 mi upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi<sup>2</sup>.

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 765 ft above sea level, from topographic map. Jan. 9, 1996 to Jan. 15, 1997, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Gage-height telemeter at station.

REVISIONS.--The minimum discharge for water year 1999 has been revised to 14 ft<sup>3</sup>/s, Sept. 2, 4, 5, 6, 1999.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	50	52	e66	e54	211	65	97	107	54	516	43
2	56	48	50	e68	e54	182	63	105	103	55	419	43
3	57	52	51	e72	e54	157	65	100	98	71	381	37
4	60	57	54	100	e55	143	63	93	89	79	318	37
5	51	59	62	105	e54	134	63	78	83	79	244	36
6	52	54	94	95	e55	119	64	76	80	66	207	33
7	50	49	106	89	e55	111	66	71	73	61	179	29
8	44	49	105	66	e54	104	71	71	68	54	151	25
9	40	49	108	97	e55	101	82	90	64	51	131	27
10	36	47	100	77	e55	98	89	168	60	53	124	32
11	36	46	95	87	e56	93	96	217	55	49	132	70
12	37	46	84	95	e55	86	101	242	63	48	128	98
13	37	47	80	92	e55	82	98	264	87	45	113	98
14	49	46	81	e74	e55	81	92	236	108	44	96	98
15	50	45	125	e68	e55	81	84	169	107	61	91	104
16	51	45	152	e66	e56	87	78	131	105	68	83	95
17	51	45	148	e66	e56	90	74	136	84	65	76	87
18	57	44	129	e66	e56	89	74	286	69	59	81	77
19	64	45	e110	e68	e56	84	70	620	64	52	79	66
20	64	53	106	e64	e58	86	110	790	60	47	77	57
21	73	55	92	e60	e62	88	441	775	55	44	71	55
22	72	58	e72	e58	e80	90	578	762	51	41	64	53
23	67	58	e69	e56	e170	88	479	711	48	39	73	201
24	74	58	e67	e54	e270	84	385	553	45	36	67	368
25	75	56	e65	e52	e310	80	301	365	54	35	63	430
26	73	56	e65	e51	259	76	220	263	67	34	60	586
27	71	57	e64	e50	272	76	173	205	76	31	55	655
28	67	57	e64	e51	283	73	156	166	68	145	52	547
29	61	55	e65	e55	243	71	133	142	59	367	50	359
30	58	54	e65	e55	---	70	110	128	52	469	46	228
31	53	---	e65	e54	---	68	---	119	---	567	41	---
TOTAL	1754	1540	2645	2177	3052	3083	4544	8229	2202	2969	4268	4774
MEAN	56.6	51.3	85.3	70.2	105	99.5	151	265	73.4	95.8	138	156
MAX	75	59	152	105	310	211	578	790	108	567	516	655
MIN	36	44	50	50	54	68	63	71	45	31	41	25
CFSM	.26	.23	.39	.32	.48	.45	.69	1.20	.33	.43	.62	.70
IN.	.30	.26	.45	.37	.51	.52	.76	1.39	.37	.50	.72	.79

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1980 - 2000, BY WATER YEAR (WY)

MEAN	146	177	176	177	218	333	312	172	125	79.3	70.0	128
MAX	583	474	349	354	485	712	630	327	325	206	166	635
(WY)	1987	1986	1988	1993	1985	1985	1985	1996	1996	1994	1992	1985
MIN	44.2	50.8	65.5	70.2	89.4	99.5	151	82.4	31.2	39.1	26.8	25.2
(WY)	1999	1999	1999	2000	1982	2000	2000	1999	1988	1988	1999	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1980 - 2000
ANNUAL TOTAL	31390	41137	
ANNUAL MEAN	86.0	112	175
HIGHEST ANNUAL MEAN			295
LOWEST ANNUAL MEAN			83.2
HIGHEST DAILY MEAN	574	Apr 25	2950
LOWEST DAILY MEAN	14	Sep 5	14
ANNUAL SEVEN-DAY MINIMUM	18	Aug 31	31
INSTANTANEOUS PEAK FLOW			816
INSTANTANEOUS PEAK STAGE			4.57
INSTANTANEOUS LOW FLOW			24
ANNUAL RUNOFF (CFSM)	.39	.51	.79
ANNUAL RUNOFF (INCHES)	5.28	6.92	10.75
10 PERCENT EXCEEDS	147	238	359
50 PERCENT EXCEEDS	63	70	116
90 PERCENT EXCEEDS	25	47	46

(a) Gage height 9.60 ft.  
(b) Backwater from ice.  
(c) Jan. 8, Sept. 8.  
(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

## 04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE1/4 sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 27 ft downstream from bridge on State Highway 15, 1.5 mi downstream from Holloway Reservoir, 3.5 mi upstream from Powers-Culler Drain, and 3.8 mi south of Otisville.

DRAINAGE AREA.--530 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1952 to September 1989, October 1990 to current year.

REVISED RECORDS.--WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft above sea level.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi upstream from station. From 1954 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Holloway Reservoir. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	561	94	100	96	767	87	258	274	88	982	100
2	77	922	93	104	94	601	94	254	220	89	969	98
3	77	508	92	114	93	416	102	226	210	111	708	92
4	77	329	93	122	93	361	105	200	196	110	654	95
5	74	354	108	129	93	368	112	182	186	113	602	84
6	72	305	124	134	93	340	110	173	163	106	468	77
7	73	196	136	134	93	303	255	163	149	102	396	72
8	74	147	150	125	93	278	271	153	140	90	339	71
9	74	119	159	123	93	206	239	195	136	90	300	73
10	74	119	156	132	94	180	317	256	125	99	277	73
11	74	111	166	137	94	187	316	332	122	94	299	84
12	74	91	162	143	95	177	273	391	125	84	324	101
13	75	90	153	149	95	177	109	400	134	78	329	112
14	75	88	166	131	95	172	49	404	146	86	300	134
15	75	87	165	128	95	172	48	370	156	104	260	152
16	76	89	185	133	95	189	49	325	161	103	222	149
17	77	86	219	127	95	183	49	297	163	98	204	145
18	76	85	229	120	95	183	49	819	150	95	178	145
19	78	86	199	116	96	185	37	1500	129	89	159	134
20	82	92	200	116	95	195	39	1450	122	78	149	124
21	82	95	189	110	95	184	41	1570	108	73	134	114
22	82	96	161	105	96	187	33	1620	99	71	127	121
23	82	103	146	101	107	193	32	1550	97	69	148	613
24	82	97	139	97	165	192	125	1400	93	64	143	977
25	82	105	131	94	293	167	550	1020	99	67	130	820
26	82	103	124	92	438	171	647	327	94	80	122	591
27	82	99	116	89	575	266	494	430	99	77	128	625
28	82	99	111	87	750	388	444	441	102	97	116	698
29	82	98	106	85	902	237	351	383	98	554	111	678
30	83	97	102	85	---	86	265	336	95	836	112	462
31	82	---	100	90	---	87	---	299	---	960	104	---
TOTAL	2412	5457	4474	3552	5306	7798	5692	17724	4191	4845	9494	7814
MEAN	77.8	182	144	115	183	252	190	572	140	156	306	260
MAX	83	922	229	149	902	767	647	1620	274	950	982	977
MIN	72	85	92	85	93	86	32	153	93	64	104	71

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2000, BY WATER YEAR (WY)

	MEAN	214	277	305	301	387	790	643	381	256	167	135	215
MAX	1688	911	900	1153	1123	1984	1549	1789	1668	839	369	1507	
(WY)	1987	1993	1988	1973	1968	1976	1960	1956	1996	1994	1994	1986	
MIN	59.4	19.1	14.0	49.7	66.4	76.5	175	43.6	20.3	47.4	36.3	42.3	
(WY)	1966	1972	1972	1961	1964	1964	1964	1977	1977	1977	1977	1954	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1953 - 2000
ANNUAL TOTAL	59150	78759	
ANNUAL MEAN	162	215	
HIGHEST ANNUAL MEAN			339
LOWEST ANNUAL MEAN			638
HIGHEST DAILY MEAN			82.7
LOWEST DAILY MEAN	1360	1620	7240
ANNUAL SEVEN-DAY MINIMUM	25	32	2.1
INSTANTANEOUS PEAK FLOW	27	40	3.6
INSTANTANEOUS PEAK STAGE		1630	7470
INSTANTANEOUS LOW FLOW		9.50	15.73
10 PERCENT EXCEEDS	337	25	2.1
50 PERCENT EXCEEDS	94	449	783
90 PERCENT EXCEEDS	55	122	178
		77	65

(a) Oct. 11, 12, 1971.

## STREAMS TRIBUTARY TO LAKE HURON

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE1/4 sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft upstream from bridge on Davison Road, 1.4 mi downstream from Black Creek, and 3.3 mi west of Davison.

DRAINAGE AREA.--99.4 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78-1: Drainage area. WDR MI-85-1: 1968(M), 1973(M), 1975, 1982(P).

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are poor. Some diurnal fluctuation caused by small dams, and occasional diversion for irrigation upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.1	11	16	e25	e13	99	17	55	58	21	206	13
2	22	12	15	e27	e13	74	13	53	56	23	222	11
3	30	15	15	e28	e13	60	16	52	47	36	194	10
4	29	19	14	e30	e13	53	19	54	42	21	122	10
5	19	23	26	e22	e13	48	20	50	40	19	85	9.6
6	19	23	30	e18	e13	45	23	43	42	17	85	9.3
7	19	22	31	e15	e13	41	30	37	37	14	69	8.0
8	18	21	39	e14	e14	34	34	33	33	13	60	8.3
9	15	20	42	e13	e14	37	25	49	28	15	64	8.5
10	12	20	41	e16	e14	40	24	84	24	14	63	26
11	9.9	20	38	e20	e14	42	38	86	22	12	50	30
12	9.9	20	32	e27	e13	40	43	116	29	12	40	35
13	14	21	26	e22	e13	34	39	127	39	11	36	41
14	16	20	29	e20	e13	31	36	95	43	24	31	50
15	14	18	37	e19	e13	31	33	70	52	29	30	49
16	22	15	36	e18	e13	35	33	57	57	35	28	40
17	27	13	43	e17	e13	35	30	54	47	31	33	40
18	25	11	44	e16	e13	41	27	274	38	25	34	36
19	25	13	e42	e15	e13	45	26	461	30	19	35	30
20	22	18	e41	e15	e13	45	119	410	24	14	31	27
21	18	16	e38	e14	e14	40	260	378	20	10	25	27
22	15	23	e36	e14	e14	37	218	371	17	8.5	21	27
23	13	24	e33	e14	e16	36	230	318	18	7.5	45	335
24	14	29	e30	e13	e26	34	229	213	23	7.1	35	352
25	12	25	e27	e13	e50	34	176	163	39	6.8	30	354
26	12	23	e24	e13	e70	32	113	130	29	6.3	31	399
27	12	24	e22	e13	e98	32	82	88	25	6.2	29	349
28	12	25	e21	e13	122	30	72	77	28	33	22	233
29	12	22	e21	e13	110	29	62	69	25	166	20	150
30	12	19	e22	e13	---	36	56	66	22	219	18	106
31	12	---	e24	e13	---	28	---	63	---	266	15	---
TOTAL	516.9	585	935	543	784	1278	2143	4196	1034	1141.4	1809	2823.7
MEAN	16.7	19.5	30.2	17.5	27.0	41.2	71.4	135	34.5	36.8	58.4	94.1
MAX	30	29	44	30	122	99	260	461	58	266	222	399
MIN	5.1	11	14	13	13	28	13	33	17	6.2	15	8.0
CFSM	.17	.20	.30	.18	.27	.41	.72	1.36	.35	.37	.59	.95
IN.	.19	.22	.35	.20	.29	.48	.80	1.57	.39	.43	.68	1.06

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2000, BY WATER YEAR (WY)

	MEAN	42.0	60.5	73.6	71.4	93.3	164	155	79.4	48.5	28.2	22.3	44.6
MAX	236	181	213	192	294	317	350	200	159	93.2	107	314	
(WY)	1982	1986	1976	1973	1976	1973	1975	1974	1996	1994	1975	1985	
MIN	8.01	13.8	16.7	15.6	24.3	41.2	71.4	24.7	7.39	5.48	5.83	6.34	
(WY)	1999	1999	1999	1970	1970	2000	2000	1977	1988	1966	1966	1999	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1966 - 2000

ANNUAL TOTAL	12689.4						17789.0						
ANNUAL MEAN	34.8						48.6				73.3		
HIGHEST ANNUAL MEAN											122		1985
LOWEST ANNUAL MEAN											32.4		1999
HIGHEST DAILY MEAN	350						461		May 19	1370		Sep 9	1985
LOWEST DAILY MEAN	2.6						5.1		Oct 1	2.1		Jul 7	1988
ANNUAL SEVEN-DAY MINIMUM	3.9						7.5		Jul 21	2.3		Jul 5	1988
INSTANTANEOUS PEAK FLOW							493		May 19	1500		Sep 9	1985
INSTANTANEOUS PEAK STAGE							8.46		May 19	(a)11.85		Sep 9	1985
INSTANTANEOUS LOW FLOW							3.6		Oct 2	1.6		Jul 9	1988
ANNUAL RUNOFF (CFSM)	.35						.49			.74			
ANNUAL RUNOFF (INCHES)	4.75						6.66			10.02			
10 PERCENT EXCEEDS	62						98			169			
50 PERCENT EXCEEDS	24						27			40			
90 PERCENT EXCEEDS	9.1						13			11			

(a) From floodmark.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'18", in SW1/4 sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi upstream from Pirnie Creek, and 5.0 mi downstream from Swartz Creek.

DRAINAGE AREA.--956 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1903 to March 1904 (gauge heights only), August 1932 to current year. Gauge-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78-1: Drainage area.

**GAGE.--**Water-stage recorder. Datum of gage is 678.80 ft above sea level (levels by the National Weather Service and City of Flint).

REMARKS.—Records good. Some regulation by small reservoirs upstream from station and by Holloway Reservoir. From 1954 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Holloway Reservoir. Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft<sup>3</sup>/s as sewage effluent which originates outside the basin. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	157	155	144	174	177	1130	180	541	503	139	2060	175
2	144	1100	145	179	167	972	183	464	481	136	2160	157
3	149	661	149	200	168	636	196	404	351	288	1640	145
4	214	458	146	225	169	478	211	368	339	213	1080	157
5	215	320	348	218	167	527	196	326	351	219	972	132
6	320	360	334	214	163	554	187	284	341	173	952	121
7	238	300	229	217	160	456	249	263	270	174	684	117
8	144	234	223	212	161	402	533	278	232	143	554	120
9	132	257	231	233	168	384	383	639	238	165	573	121
10	127	209	230	332	175	348	493	826	243	203	512	365
11	127	204	230	264	172	293	468	607	217	162	473	381
12	127	162	234	247	167	280	444	722	252	137	460	302
13	206	141	245	259	166	280	369	692	304	126	455	230
14	199	143	408	272	176	303	263	657	295	195	439	476
15	141	134	549	252	202	310	160	650	276	304	501	477
16	128	136	384	222	205	398	156	554	244	230	374	335
17	153	132	316	213	195	293	153	533	234	201	440	289
18	138	136	312	209	178	282	160	2770	227	197	353	283
19	127	219	300	213	187	334	161	4540	205	162	292	261
20	126	445	348	218	182	404	1320	3800	233	136	263	255
21	128	311	461	196	191	345	1830	3090	212	133	244	268
22	133	182	286	186	235	316	996	2880	178	123	311	355
23	137	158	244	183	314	295	798	2670	143	117	834	4630
24	135	198	228	176	458	308	678	2130	128	116	361	3850
25	126	170	216	176	629	295	927	1920	213	112	284	2250
26	131	161	257	173	735	292	998	883	171	111	253	1680
27	135	155	206	170	974	291	817	612	225	143	256	1610
28	131	156	191	168	1020	506	747	903	168	1180	239	1530
29	129	157	193	165	1260	403	578	796	176	3040	225	1110
30	217	149	184	164	---	244	459	617	150	2720	218	1050
31	284	---	180	166	---	184	---	521	---	2630	182	---
TOTAL	4998	7703	8151	6496	9321	12543	15293	36940	7600	14128	18644	23232
MEAN	161	257	263	210	321	405	510	1192	253	456	601	774
MAX	320	1100	549	332	1260	1130	1830	4540	503	3040	2160	4630
MIN	126	132	144	164	160	184	153	263	128	111	182	117

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 2000, BY WATER YEAR (WY)

MEAN	345	468	547	595	783	1496	1306	765	482	277	239	350
MAX	2764	1734	1739	2008	2867	3514	4209	3575	2512	1294	868	2635
(WY)	1987	1993	1976	1973	1938	1985	1947	1956	1996	1994	1975	1986
MIN	60.6	69.9	70.8	84.8	87.6	187	335	110	81.3	56.1	31.3	45.9
(WY)	1936	1965	1964	1940	1940	1964	1946	1958	1934	1936	1936	1941

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1932 - 2000
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ANNUAL TOTAL	124105		165049			
ANNUAL MEAN	340		451		636	
HIGHEST ANNUAL MEAN					1258	1985
LOWEST ANNUAL MEAN					153	1964
HIGHEST DAILY MEAN	3220	Apr 23	4630	Sep 23	14500	Apr 6 1947
LOWEST DAILY MEAN	92	Sep 6	111	Jul 26	14	Aug 7 1934
ANNUAL SEVEN-DAY MINIMUM	98	Sep 2	121	Jul 20	23	Aug 14 1936
INSTANTANEOUS PEAK FLOW			5830	Sep 23	14900	Apr 6 1947
INSTANTANEOUS PEAK STAGE			11.62	Sep 23	16.95	Sep 6 1985
INSTANTANEOUS LOW FLOW					9.0	Aug 7 1934
10 PERCENT EXCEEDS	643		934		1480	
50 PERCENT EXCEEDS	222		244		337	
90 PERCENT EXCEEDS	115		138		102	



## STREAMS TRIBUTARY TO LAKE HURON

## 04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW1/4 SE1/4 sec. 27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft downstream from dam in Frankenmuth, 3,600 ft upstream from highway bridge on Dehmel Road, 3.4 mi upstream from Dea<sup>1</sup> Creek, and 17 mi upstream from mouth.

DRAINAGE AREA.--841 mi<sup>2</sup>.

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft above sea level (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft upstream at datum 1.81 ft lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935 to Sept. 30, 1936, and June 20, 1939 to Sept. 30, 1949, water-stage recorder, at site 3,600 ft downstream at datum 0.04 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by dams upstream from station. Prior to 1950, regulation at low and medium flows by mill upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	110	68	69	85	e82	1240	202	313	254	225	1360	138
2	201	80	67	94	e84	984	196	326	245	186	1110	144
3	163	81	69	119	e86	794	198	312	230	156	831	130
4	135	78	75	135	e86	645	199	288	209	137	621	119
5	122	72	99	138	e86	552	195	266	193	119	479	178
6	105	70	165	138	e86	481	190	247	177	109	384	171
7	101	70	177	133	e88	425	188	226	164	105	323	98
8	94	70	178	114	e90	390	202	209	152	99	293	97
9	89	67	175	123	e90	368	230	249	141	94	303	94
10	83	67	163	124	e90	353	252	595	130	89	368	99
11	76	67	151	136	e90	328	272	814	123	91	300	119
12	70	66	138	134	e90	301	287	769	144	91	286	378
13	72	63	130	106	e90	280	285	630	224	83	249	186
14	75	65	127	e90	e90	285	272	498	547	80	210	185
15	79	65	155	e86	e90	292	260	402	943	94	189	382
16	76	65	210	e84	e90	306	247	361	1370	91	170	273
17	76	62	266	e82	e90	316	230	432	1250	81	157	224
18	78	63	253	e81	e90	302	214	1450	1060	71	149	198
19	76	70	190	e81	e90	288	202	3950	741	68	140	196
20	71	76	204	e80	e90	327	392	4240	465	64	127	190
21	70	85	e180	e80	e90	370	1600	2660	317	61	114	196
22	69	86	e100	e80	e95	377	2430	1620	240	58	117	188
23	68	87	e90	e80	e80	358	1660	1160	195	57	153	579
24	68	85	e85	e80	e719	334	1150	901	169	55	143	824
25	66	86	e82	e80	1730	313	853	716	162	52	131	702
26	67	83	e81	e80	3440	292	650	567	167	49	134	606
27	67	79	e80	e80	2970	274	521	463	257	43	459	482
28	82	77	80	e80	2480	262	442	389	289	224	363	365
29	85	75	82	e80	1780	248	382	336	299	892	310	274
30	75	73	85	e80	---	233	336	295	262	926	247	236
31	69	---	85	e80	---	216	---	269	---	1300	206	---
TOTAL	2738	2201	4091	3043	15332	12534	14737	25953	11119	5880	10426	7860
MEAN	88.3	73.4	132	98.2	529	404	491	837	371	189	336	262
MAX	201	87	266	138	3440	1240	2430	4240	1370	1300	1360	824
MIN	66	62	67	80	82	216	188	209	123	43	114	94
CFSM	.11	.09	.16	.12	.63	.48	.58	1.00	.44	.22	.40	.31
IN.	.12	.10	.18	.13	.68	.55	.65	1.15	.49	.26	.46	.35

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 2000, BY WATER YEAR (WY)

	MEAN	225	331	423	455	651	1639	1160	658	378	191	108	221
MAX	2637	1374	1335	2185	2657	4943	3122	2715	3217	1884	523	500	500
(WY)	1987	1993	1985	1973	1997	1976	1947	1996	1996	1994	1953	1962	1962
MIN	31.7	43.1	50.7	45.1	55.6	179	202	104	60.4	20.4	20.1	23.5	23.5
(WY)	1947	1965	1940	1959	1959	1964	1946	1941	1964	1936	1944	1941	1941

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1908 - 2000
ANNUAL TOTAL	74822	115894	
ANNUAL MEAN	205	317	533
HIGHEST ANNUAL MEAN			1063
LOWEST ANNUAL MEAN			96.6
HIGHEST DAILY MEAN	3240	4240	21700
LOWEST DAILY MEAN	24	43	(a)1.5
ANNUAL SEVEN-DAY MINIMUM	27	54	4.4
INSTANTANEOUS PEAK FLOW		4830	22200
INSTANTANEOUS PEAK STAGE		15.61	27.52
INSTANTANEOUS LOW FLOW		22	
ANNUAL RUNOFF (CFSM)	.24	.38	.63
ANNUAL RUNOFF (INCHES)	3.31	5.13	8.62
10 PERCENT EXCEEDS	378	706	1250
50 PERCENT EXCEEDS	110	162	187
90 PERCENT EXCEEDS	45	71	49

(a) Approximately.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04152238 SOUTH BRANCH TOBACCO RIVER NEAR BEAVERTON, MI

LOCATION.--Lat 43°52'01", long 84°32'43", in SE1/4 NE1/4 sec.16, T.17 N., R.2 W., Gladwin County, Hydrologic Unit 04080201, on left bank 40 ft upstream from bridge on Grout Road, 3.0 mi upstream from Ross Lake, and 3.2 mi southwest of Beaverton.

DRAINAGE AREA.--160 mi<sup>2</sup>.

PERIOD OF RECORD.--January 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 709.92 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	144	60	62	e76	e60	303	95	99	104	61	90	58
2	102	65	62	e80	e60	274	100	109	165	57	79	65
3	97	75	62	e86	e60	224	104	101	184	55	98	74
4	95	68	65	e94	e60	193	99	93	136	56	72	67
5	96	62	92	e75	e59	174	94	88	115	54	61	65
6	86	60	191	e67	e59	161	91	83	105	52	58	58
7	79	59	159	e66	e59	151	90	80	92	56	59	56
8	74	58	e120	e65	e59	147	99	78	85	54	57	55
9	72	57	e100	e75	e59	147	117	377	81	55	68	56
10	70	58	e90	e100	e59	147	122	653	76	55	105	57
11	68	57	85	e150	e60	132	125	562	110	53	82	59
12	68	58	80	e110	e60	121	129	330	120	51	66	65
13	70	60	78	e90	e60	114	122	325	115	50	61	69
14	69	63	76	e70	e60	112	116	277	114	46	58	66
15	66	64	79	e65	e60	e120	110	194	116	44	59	77
16	62	62	95	e62	e60	e128	101	169	108	44	62	74
17	64	58	e100	e61	e60	118	98	289	89	45	60	66
18	62	56	e90	e61	e60	109	95	481	80	45	67	62
19	61	57	e80	e61	e60	106	93	743	75	45	65	59
20	62	59	e75	e60	e65	122	115	597	72	45	58	59
21	61	59	e74	e60	e80	147	359	304	80	44	56	74
22	59	59	e72	e60	e120	141	606	217	80	47	58	82
23	62	59	e72	e60	e180	129	479	190	71	47	87	97
24	62	73	e72	e60	334	120	260	174	66	46	105	118
25	62	85	e72	e60	724	114	179	153	64	44	77	98
26	62	73	e72	e60	1300	108	154	133	64	42	e68	84
27	58	68	e72	e60	e1100	103	136	119	67	47	e70	80
28	57	66	e72	e60	e700	106	118	113	68	82	e73	72
29	58	63	e72	e60	e450	116	108	108	66	71	70	65
30	57	61	e72	e60	---	109	101	102	66	61	67	59
31	57	---	e74	e60	---	100	---	100	---	82	62	---
TOTAL	2222	1882	2637	2234	6187	4396	4615	7441	2834	1636	2178	2096
MEAN	71.7	62.7	85.1	72.1	213	142	154	240	94.5	52.8	70.3	69.9
MAX	144	85	191	150	1300	303	606	743	184	82	105	118
MIN	57	56	62	60	59	100	90	78	64	42	56	55
CFSM	.45	.39	.53	.45	1.33	.89	.96	1.50	.59	.33	.44	.44
IN.	.52	.44	.61	.52	1.44	1.02	1.07	1.73	.66	.38	.51	.49

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 2000, BY WATER YEAR (WY)

	MEAN	105	148	125	110	134	212	223	142	120	71.5	73.7	73.4
MAX	202	364	253	176	213	296	478	240	282	92.3	86.6	127	
(WY)	1991	1993	1992	1993	2000	1991	1991	2000	1996	1992	1996	1992	
MIN	67.6	62.7	61.2	67.6	74.4	115	115	77.6	57.2	49.5	52.2	49.7	
(WY)	1995	2000	1990	1994	1993	1999	1987	1999	1988	1988	1999	1999	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1987 - 2000

ANNUAL TOTAL	34455	40358	130
ANNUAL MEAN	94.4	110	184
HIGHEST ANNUAL MEAN			1991
LOWEST ANNUAL MEAN			1999
HIGHEST DAILY MEAN	511	Feb 13	1340
LOWEST DAILY MEAN	36	Sep 8	36
ANNUAL SEVEN-DAY MINIMUM	36	Sep 7	36
INSTANTANEOUS PEAK FLOW			1380
INSTANTANEOUS PEAK STAGE			10.61
INSTANTANEOUS LOW FLOW			42
ANNUAL RUNOFF (CFSM)	.59	.69	.81
ANNUAL RUNOFF (INCHES)	8.01	9.38	11.01
10 PERCENT EXCEEDS	157	162	229
50 PERCENT EXCEEDS	73	72	92
90 PERCENT EXCEEDS	49	57	59

(a) Gage height 10.74 ft.

(b) Backwater from ice.

(c) July 26, 27.

(d) Aug. 3, 1998, Sept. 8-12, 1999.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW1/4 NW1/4 sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft downstream from bridge on South Leaton Road, 3.8 mi northeast of Mount Pleasant, and 36 mi upstream from mouth.

DRAINAGE AREA.--416 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation below 750 ft<sup>3</sup>/s caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structure on lake outlets. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	343	174	173	e250	e190	933	275	333	373	191	225	159
2	297	195	171	269	e190	792	272	328	399	185	227	157
3	269	187	170	265	e195	662	269	317	419	178	275	162
4	266	187	177	262	e195	578	268	305	408	172	235	159
5	258	180	265	222	e200	522	259	292	387	169	202	151
6	246	178	373	198	e200	474	254	282	360	158	190	144
7	233	173	372	194	e200	440	252	274	328	159	180	139
8	229	171	341	e190	e200	420	273	263	306	153	169	140
9	236	170	305	186	e200	411	288	310	283	156	e200	140
10	232	175	282	201	e200	399	298	520	e260	159	e300	161
11	223	172	263	290	e200	383	312	636	e310	153	e200	167
12	211	168	247	e250	e200	362	322	734	e360	148	e170	178
13	206	169	236	e220	e200	345	323	810	430	143	e150	177
14	201	173	229	e200	e205	336	317	759	412	145	e140	221
15	195	168	239	e190	e205	329	310	675	428	146	147	226
16	193	167	265	e185	e205	326	297	617	381	148	149	203
17	191	167	268	e180	e205	319	285	613	353	144	160	189
18	185	165	247	e180	e210	306	271	816	311	134	164	179
19	181	163	e220	e180	e210	302	266	1150	281	127	161	171
20	181	166	e200	e180	e210	314	332	1080	252	121	154	171
21	181	167	e195	e180	e210	331	546	951	251	118	147	195
22	183	167	e190	e180	e220	336	800	838	244	115	e145	205
23	187	167	e190	e180	e250	333	774	738	230	112	e270	298
24	185	193	e190	e180	413	326	707	639	223	108	234	210
25	183	203	e190	e180	880	320	605	562	219	105	223	275
26	185	196	e190	e180	1120	311	510	505	213	103	208	255
27	179	192	e190	e180	1200	306	448	463	208	104	193	239
28	174	188	e190	e180	1190	302	403	438	200	173	186	222
29	174	181	e190	e180	1060	295	367	421	205	178	180	204
30	176	176	e200	e185	---	291	338	398	198	175	173	194
31	177	---	e210	e185	---	284	---	379	---	220	165	---
TOTAL	6560	5298	7168	6282	10563	12388	11241	17451	9232	4598	5922	5791
MEAN	212	177	231	203	364	400	375	563	308	148	191	193
MAX	343	203	373	290	1200	933	800	1150	430	220	300	310
MIN	174	163	170	180	190	284	252	268	198	103	140	139
CFSM	.51	.42	.56	.49	.88	.96	.90	1.35	.74	.36	.46	.46
IN.	.59	.47	.64	.56	.94	1.11	1.01	1.56	.83	.41	.53	.52

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	251	303	302	280	334	569	584	387	284	194	174	225
MAX	1058	836	627	655	1401	1709	1204	934	711	694	585	1682	
(WY)	1987	1986	1992	1973	1938	1976	1967	1974	1943	1969	1972	1986	
MIN	117	151	144	112	124	204	231	175	117	77.3	70.6	97.7	
(WY)	1947	1939	1931	1945	1940	1937	1945	1977	1941	1936	1931	1931	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1931 - 2000
ANNUAL TOTAL	96218	102494	
ANNUAL MEAN	264	280	324
HIGHEST ANNUAL MEAN			585
LOWEST ANNUAL MEAN			163
HIGHEST DAILY MEAN	652	1200	6210
LOWEST DAILY MEAN	108	103	19
ANNUAL SEVEN-DAY MINIMUM	113	109	49
INSTANTANEOUS PEAK FLOW		1240	6660
INSTANTANEOUS PEAK STAGE		6.73	(a)15.58
INSTANTANEOUS LOW FLOW		99	12
ANNUAL RUNOFF (CFSM)	.63	.67	.78
ANNUAL RUNOFF (INCHES)	8.60	9.17	10.57
10 PERCENT EXCEEDS	423	442	588
50 PERCENT EXCEEDS	245	209	244
90 PERCENT EXCEEDS	158	159	133

(a) From floodmark.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

## 04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW1/4 SE1/4 sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft downstream from Superior Street Bridge in Alma, 0.6 mi downstream from municipal reservoir, and 38 mi upstream from mouth.

DRAINAGE AREA.--288 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft above sea level. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930 to June 15, 1938, nonrecording gage at site 70 ft downstream from bridge, and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by dam 0.6 mi upstream from station, and by variable backwater from powerplant at St. Louis, 5.2 mi downstream. Approximately 1.0 ft<sup>3</sup>/s diverted upstream from station for municipal use; sewage effluent is returned downstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	266	101	111	e220	e90	792	185	224	226	169	185	100
2	262	110	109	e210	e95	634	186	220	243	112	331	108
3	182	116	109	e190	e110	503	189	221	256	73	366	113
4	112	126	114	e170	e120	407	193	213	237	77	345	110
5	97	127	171	e150	e130	330	190	190	208	79	286	102
6	122	116	196	167	e135	298	185	172	190	100	204	104
7	89	106	269	160	e135	283	175	167	177	100	167	106
8	90	103	302	132	e130	256	189	166	168	98	163	106
9	93	106	273	110	e125	232	205	239	154	103	149	106
10	81	101	196	142	e120	241	224	414	150	108	115	116
11	74	101	143	173	e115	205	232	467	136	113	125	118
12	83	102	126	e150	e115	178	230	497	256	115	121	90
13	98	103	154	e130	e110	176	205	485	893	108	108	107
14	98	103	147	e110	e105	183	196	402	843	105	114	153
15	98	103	146	e95	e105	194	189	377	1030	105	122	129
16	113	102	162	e105	e110	207	176	306	741	120	116	167
17	113	102	e180	e115	e110	211	181	288	527	132	117	182
18	108	100	e160	e110	e110	191	186	764	363	134	110	155
19	105	102	e140	e105	e110	173	184	1100	265	127	121	117
20	104	108	e135	e110	e110	172	263	1040	253	116	126	99
21	103	113	e130	e115	e110	200	626	938	200	104	121	107
22	109	118	e125	e110	124	236	705	849	191	89	120	133
23	113	120	e120	e100	181	228	680	722	188	87	126	224
24	117	118	e115	e95	426	212	684	553	191	116	141	226
25	120	109	e115	e95	737	205	589	442	195	106	159	299
26	104	129	e115	e90	769	182	458	353	200	105	139	284
27	96	146	e115	e90	1050	185	323	287	156	111	118	196
28	100	125	e115	e90	977	179	289	265	127	104	110	157
29	104	117	e160	e90	909	205	247	264	122	133	108	148
30	105	114	e220	e90	---	174	231	265	121	133	105	134
31	101	---	e230	e90	---	181	---	249	---	128	102	---
TOTAL	3560	3347	4903	3909	7573	8053	8795	13139	9007	3410	4840	4296
MEAN	115	112	158	126	261	260	293	424	300	110	156	143
MAX	266	146	302	220	1050	792	705	1100	1030	169	366	299
MIN	74	100	109	90	90	172	175	166	121	73	102	90
CFSM	.40	.39	.55	.44	.91	.90	1.02	1.47	1.04	.38	.54	.50
IN.	.46	.43	.63	.50	.98	1.04	1.14	1.70	1.16	.44	.63	.55

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	162	209	214	197	243	469	434	282	190	111	97.2	139
MAX	894	574	488	680	997	1214	1054	677	575	420	276	1364	
(WY)	1987	1993	1983	1973	1938	1976	1967	1956	1989	1994	1994	1986	
MIN	66.4	82.6	78.4	66.6	72.6	161	159	109	50.8	35.6	34.7	47.5	
(WY)	1939	1931	1940	1945	1940	1937	1945	1949	1934	1934	1936	1932	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1931 - 2000
ANNUAL TOTAL	58440	74832	
ANNUAL MEAN	160	204	229
HIGHEST ANNUAL MEAN			398
LOWEST ANNUAL MEAN			97.8
HIGHEST DAILY MEAN	860	1100	4960
LOWEST DAILY MEAN	51	73	40
ANNUAL SEVEN-DAY MINIMUM	56	87	10
INSTANTANEOUS PEAK FLOW		1130	5160
INSTANTANEOUS PEAK STAGE		5.89	(a)12.82
INSTANTANEOUS LOW FLOW		72	(b)
ANNUAL RUNOFF (CFSM)	.56	.71	.79
ANNUAL RUNOFF (INCHES)	7.55	9.67	10.79
10 PERCENT EXCEEDS	288	364	472
50 PERCENT EXCEEDS	120	135	152
90 PERCENT EXCEEDS	60	101	69

(a) From floodmark.

(b) Oct. 11, July 3.

(c) Caused by closing dam during construction of waterworks.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

## 04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW1/4 NE1/4 sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft downstream from dam at Dow Chemical Co. in Midland, 0.7 mi upstream from Bullock Creek, 1.4 mi downstream from Chippewa River, and 23 mi upstream from mouth.

DRAINAGE AREA.--2,400 mi<sup>2</sup>, approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.08 ft above sea level (levels by Wade-Trim Assoc.). Prior to Sept. 30, 1955, at datum 10.20 ft higher, Oct. 1, 1955 to Sept. 30, 1993, at datum 0.20 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Approximately 5.0 ft<sup>3</sup>/s diverted upstream from station for industrial use, flow partially returned to river 0.25 mi downstream from station, remainder returned 1 mi downstream. Prior to 1992 water year, diversion was used in computing annual mean discharge and runoff figures, extremes and daily discharge were not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft<sup>3</sup>/s regulated by dam 2,000 ft upstream from station; fixed crest dam since. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1250	617	587	e300	e1100	5010	766	1480	1720	470	1130	550
2	1180	713	720	e310	e970	4450	745	1880	1690	392	1050	654
3	640	863	910	e830	e900	3810	1130	1460	1100	976	1560	354
4	870	734	464	1350	e860	3190	1460	1110	1110	468	972	286
5	1020	668	1150	1240	e460	2980	1100	1270	1930	743	771	480
6	789	406	1490	1210	e350	2130	964	1030	1840	802	610	702
7	752	346	1180	956	e700	1820	1010	673	1310	634	827	615
8	793	640	1260	513	e1100	1650	1190	1070	1120	388	820	571
9	414	700	1430	438	e980	1870	877	2290	1020	325	1060	320
10	370	703	1530	1140	e600	2040	1300	5810	663	591	1110	327
11	854	712	813	1070	e800	2040	1350	5860	587	645	993	633
12	741	701	567	1080	e440	1320	1450	4680	1470	633	437	739
13	697	392	785	e1050	e350	1550	1370	4990	3290	624	357	678
14	531	315	829	e1050	e850	1840	1650	4880	3930	520	461	526
15	682	738	926	e600	e1250	1790	1570	3440	4420	361	510	955
16	396	716	1130	e340	e950	1600	909	3140	3980	308	649	543
17	300	549	1230	e900	e900	1360	1240	3260	2100	556	724	423
18	798	678	e480	e1050	e900	1060	1410	7290	1350	337	756	702
19	724	772	e380	e1100	e480	980	1120	13700	1740	387	452	601
20	699	429	e1200	e820	e350	1180	1650	12300	1490	443	334	749
21	545	344	e1300	e1100	e420	1230	3360	7930	1340	459	455	895
22	774	797	e1250	e500	1340	1540	7020	5170	1150	458	690	617
23	391	745	e820	e320	1600	1240	6280	4320	1030	450	1010	936
24	312	902	e320	e1000	1720	1480	4380	3950	638	437	961	918
25	631	480	e300	e1400	4670	1170	3850	2530	570	390	909	1080
26	695	951	e300	e1250	8450	906	2470	2350	924	582	587	1040
27	881	523	e1100	e1000	11900	1240	2170	2200	1060	436	465	868
28	564	386	e1450	e770	10600	1800	1750	1310	1110	600	648	1080
29	662	715	e1500	e440	6240	1300	1550	986	975	662	757	813
30	359	749	e1050	e320	---	1120	970	1720	905	485	1070	452
31	308	---	e330	e660	---	1040	---	1980	---	1060	831	---
TOTAL	20622	18984	28781	26107	62230	57736	58061	116059	47562	16622	23966	20107
MEAN	665	633	928	842	2146	1862	1935	3744	1585	536	773	670
MAX	1250	951	1530	1400	11900	5010	7020	13700	4420	1060	1560	1080
MIN	300	315	300	300	350	906	745	673	570	308	334	286
CFSM	.28	.26	.39	.35	.89	.78	.81	1.56	.66	.22	.32	.28
IN.	.32	.29	.45	.40	.96	.89	.90	1.80	.74	.26	.37	.31

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1936 - 2000, BY WATER YEAR (WY)

	MEAN	1061	1461	1524	1418	1781	3880	3667	2154	1400	734	600	905
MAX	6318	6097	3907	5564	6455	10660	8096	5573	5270	4492	2236	10300	
(WY)	1987	1986	1992	1973	1938	1976	1967	1956	1945	1957	1972	1986	
MIN	344	493	462	388	466	1027	969	567	355	234	217	250	
(WY)	1949	1950	1964	1945	1963	1964	1945	1977	1964	1941	1936	1948	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1936 - 2000
ANNUAL TOTAL	417782	496837	
ANNUAL MEAN	1145	1357	1720
HIGHEST ANNUAL MEAN			3318
LOWEST ANNUAL MEAN			699
HIGHEST DAILY MEAN	5840	13700	36200
LOWEST DAILY MEAN	159	286	111
ANNUAL SEVEN-DAY MINIMUM	303	407	126
INSTANTANEOUS PEAK FLOW		14400	38700
INSTANTANEOUS PEAK STAGE		22.27	(a)33.89
INSTANTANEOUS LOW FLOW		209	39
ANNUAL RUNOFF (CFSM)	.48	.57	.72
ANNUAL RUNOFF (INCHES)	6.48	7.70	9.74
10 PERCENT EXCEEDS	2240	2390	3930
50 PERCENT EXCEEDS	895	906	952
90 PERCENT EXCEEDS	371	392	376

(a) From floodmark.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

## 04157000 SAGINAW RIVER AT SAGINAW, MI

LOCATION.--Lat 43°24'46", long 83°57'47", in NW1/4 SE1/4 sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft downstream from bridge on Rust Avenue in Saginaw, 1.9 mi downstream from Tittabawassee River, and 20.3 mi upstream from mouth.

DRAINAGE AREA.--6,060 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to September 1991 and October 1994 to September 1996, daily discharges greater than 10,000 ft<sup>3</sup>/s only; no daily discharges greater than 10,000 ft<sup>3</sup>/s water years 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Continuous-record station October 1991 to July 1994, and October 1996 to current year. Gage-height records for flood seasons 1910-20 are contained in reports of National Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 565.05 ft, International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi downstream at same datum. Auxiliary water-stage recorder, Saginaw River at Essexville (04157065).

REMARKS.--Water-discharge records fair. Minimum flows affected by wind direction and seiche on Saginaw Bay, 20.3 mi downstream. Considerable diversion through metropolitan area of Saginaw. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1100	588	e1200	e950	e2100	10500	766	2930	e3200	1010	5150	1040
2	2460	1490	e1500	e1000	e1900	8440	1340	3940	2720	738	4150	2410
3	2200	2680	e2100	e1700	e1800	7030	615	3300	3580	3450	4660	1410
4	2510	765	e1000	e2600	e1700	5610	1690	1560	e3800	1990	3860	3180
5	1070	e900	2190	e2500	e1100	4910	1250	1700	e4100	2830	2700	2560
6	2000	1190	2780	e2200	e1000	4250	e500	1470	e3500	2460	2230	1260
7	2040	1190	2160	e2000	e1400	2830	2270	727	e2800	2920	685	e500
8	209	537	2010	e1500	e2000	2160	4900	825	e2500	694	2010	498
9	786	e1000	2590	e1300	e1800	2280	2160	2420	e2200	e1300	2590	1080
10	314	e2000	2440	e2400	e1400	4320	1330	7630	e1800	2390	2590	285
11	1510	3910	2410	e2300	e1600	3400	3510	9450	1590	2600	3030	169
12	1360	489	1600	e2200	e1200	3180	2090	8850	3710	2270	2330	908
13	448	744	1680	e2300	e1000	2030	1600	8440	4750	822	632	1180
14	2340	524	3520	e2000	e1500	1280	527	7820	5620	565	895	1790
15	887	1410	e2300	e1500	e2400	1950	e1600	6730	5400	1650	635	2400
16	e1000	2080	e2600	e1000	e2300	3660	e3600	5890	6140	1480	1710	2740
17	1210	1260	e2800	e1500	e2000	3430	e2500	e5500	5370	e1700	1750	e450
18	1870	825	e1800	e2000	e1800	2100	e2100	e9500	4500	2120	1160	1280
19	1700	e620	e1600	e2100	e1300	5890	e2500	e19000	2880	1340	1870	2530
20	e1300	495	e2300	e1900	e1100	9230	e2700	e24500	3640	e1250	2100	567
21	e900	1220	e3000	e2100	e1000	8360	939	e25500	1540	1170	e1250	4040
22	e1000	335	e2500	e1200	e1000	6640	11800	e22500	2150	1070	601	2260
23	730	1610	e1800	e1000	e1500	4900	13100	e18500	2440	1150	1330	1510
24	1720	e1400	e1200	e1800	e2500	5060	13300	13200	2120	666	2440	e3000
25	e1100	1190	e1000	e2500	e5000	3740	e11000	10300	e1900	e500	1720	8680
26	684	1540	e1200	e2300	e9500	2660	e8000	7460	e2500	e650	856	7390
27	2270	406	e2000	e2000	12700	1530	e5000	6480	e3000	e800	2760	4160
28	650	e600	e2500	e1500	14000	2880	e3000	e5800	2370	987	2340	5050
29	1910	1290	e2600	e1200	13100	e2600	1470	e4800	2550	284	608	3510
30	1040	2010	e1500	e900	---	2580	1770	e4200	2230	3840	3490	2640
31	e800	---	e1200	e1400	---	1610	---	e3700	---	1760	4990	---
TOTAL	41118	36298	63080	54850	92700	131040	108927	254622	96600	48456	69122	70477
MEAN	1326	1210	2035	1769	3197	4227	3631	8214	3220	1563	2230	2349
MAX	2510	3910	3520	2600	14000	10500	13300	25500	6140	3840	5150	8680
MIN	209	335	1000	900	53	1280	500	727	1540	284	601	169
CFSM	.22	.20	.34	.29	.53	.70	.60	1.36	.53	.26	.37	.39
IN.	.25	.22	.39	.34	.57	.80	.67	1.56	.59	.30	.42	.43

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 2000, BY WATER YEAR (WY)

MEAN	2961	4356	4218	5476	6360	9167	8953	5353	3374	3089	2341	2651
MAX	4471	11430	7638	10950	12550	14310	16440	8214	5792	7758	4133	5202
(WY)	1994	1993	1992	1993	1997	1997	1993	2000	1993	1994	1992	1992
MIN	1326	1210	2035	1769	3197	3715	3631	2595	1998	1563	1231	1031
(WY)	2000	2000	2000	2000	2000	1999	2000	1999	1999	2000	1999	1999

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1992 - 2000
ANNUAL TOTAL	1008406	1067290	
ANNUAL MEAN	2763	2916	(a)4839
HIGHEST ANNUAL MEAN			6769
LOWEST ANNUAL MEAN			2916
HIGHEST DAILY MEAN	16700	25500	May 21
LOWEST DAILY MEAN	108	169	Sep 11
ANNUAL SEVEN-DAY MINIMUM	574	660	Sep 7
INSTANTANEOUS PEAK FLOW			(b)67800
INSTANTANEOUS PEAK STAGE			574
ANNUAL RUNOFF (CFSM)	.46	(c)	(b)24.90
ANNUAL RUNOFF (INCHES)	6.19	.48	.80
10 PERCENT EXCEEDS	5210	6.55	10.85
50 PERCENT EXCEEDS	2040	5830	11800
90 PERCENT EXCEEDS	600	2010	3640
		736	1200

(a) Does not include water years 1995, 1996.

(b) Includes water years 1904-1991.

(c) Not determined.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1975-86, 1989 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to September 1981.

WATER TEMPERATURE: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor from Nov. 6, 1976 to Sept. 30, 1981.

REMARKS.--Cross-sectional samples were collected at Rust Avenue bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975, 1977, 1979): Maximum recorded (more than 20 percent missing record), 1,230 microsiemens, Jan. 5, 1977; minimum recorded (more than 20 percent missing record), 224 microsiemens, Mar. 13, 1977.

WATER TEMPERATURE (water years 1975-77, 1979): Maximum, 30.0°C, July 10, 14, 20, 1977; minimum, 0.0°C, on many days during winter periods.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	OXYGEN, DIS- SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	HARD- NESS TOTAL (MG/L AS CaCO3) (00900)	HARD- NESS NONCARB DISSOLV FLD. AS CaCO3 (MG/L) (00904)	CALCIUM DIS- SOLVED (MG/L AS Ca) (00915)
OCT 14...	1000	1470	80	8.6	8.1	673	12.0	230	79	61.9
MAR 28...	0900	1760	90	9.9	8.3	710	10.0	280	110	77.7
JUN 26...	1130	2670	112	9.1	8.5	764	25.5	290	100	79.6
AUG 01...	1115	6400	74	6.3	8.1	540	23.0	210	67	56.2
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SODIUM, DIS- SOLVED (MG/L AS Na) (00930)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CaCO3 (39086)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CAR- BONATE WATER DI IT FIELD MG/L AS CO3 (00452)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/ AS SiO2) (00955)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 14...	17.8	3.3	52.9	149	182	--	97.2	.3	5.2	42.8
MAR 28...	21.9	3.5	42.5	171	213	--	88.0	.2	2.3	63.6
JUN 26...	22.9	3.6	47.3	192	227	4	94.4	.3	4.5	51.0
AUG 01...	16.8	4.3	29.4	143	174	--	62.3	.2	5.5	40.0
DATE	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
OCT 14...	.64	.064	.652	.015	E.030	<.010	--	.55	1620	408
MAR 28...	.90	.100	2.10	.023	<.050	.010	.057	.59	2050	431
JUN 26...	1.2	<.020	3.44	.035	<.050	<.010	.103	.66	3500	486
AUG 01...	1.0	.082	1.77	.036	E.037	.030	.209	.48	6130	355

## STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--Continued

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TUR- BID- ITY (NTU) (00076)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)	STREP- TOCOCOI FECAL KF AGAR (COLS. PER 100 ML) (31673)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
OCT 14...	9.4	-	230	<15	37	<13	10	7.0	10
MAR 28...	.8	K12	K8	17	46	<13	50	4.3	14
JUN 26...	25	K28	K44	<15	55	<13	<10	5.4	<2
AUG 01...	61	350	270	E12	45	<13	E10	E3.6	4

DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	SEDI- MENT, SUS- PENDEED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDEED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 14...	<34	1	<2.4	<1	311	<10	34	135	97
MAR 28...	<34	1	<2.4	<1	319	<10	31	147	91
JUN 26...	<34	E1	<2.4	<1	285	<10	37	267	95
AUG 01...	<34	E1	<2.4	<1	223	<10	120	2070	97



## STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI

LOCATION.--Lat 43°09'09", long 82°37'27", in SE1/4 SE1/4 sec.6, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on right bank 650 ft upstream from bridge on Jeddo Road, 0.4 mi downstream from Silver Creek, and 2.2 mi west of Jeddo.

DRAINAGE AREA.--464 mi<sup>2</sup>.

PERIOD OF RECORD.--February 1944 to current year. Published as "near Fargo" prior to October 1991.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 655 ft above sea level, from topographic map. Prior to July 9, 1954, nonrecording gage and July 10, 1954 to September 1991 water-stage recorder, at site 7.6 mi downstream, at different datum (station 04159500).

REMARKS.--Records good except for estimated daily discharges, which are poor. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	79	20	21	e32	e23	532	56	108	93	111	966	36
2	63	24	21	35	e24	434	55	108	92	84	554	36
3	47	37	22	39	e24	316	54	104	88	75	433	35
4	41	47	23	51	e24	238	56	94	80	106	350	34
5	36	42	27	66	e24	201	57	87	73	130	230	32
6	38	35	44	58	e24	170	56	82	69	87	158	31
7	34	30	86	48	e23	144	54	76	64	69	118	31
8	31	26	87	47	e22	130	60	72	60	59	104	32
9	30	25	66	40	e24	122	66	82	58	53	143	32
10	29	24	54	44	e24	113	79	344	56	50	223	36
11	25	23	47	64	e24	102	96	539	56	48	262	44
12	23	23	41	70	e24	89	110	354	55	47	183	46
13	23	24	38	e60	e24	82	110	238	124	47	116	45
14	27	23	68	e50	e24	80	107	178	380	46	85	42
15	39	22	339	e44	e24	79	106	142	316	49	69	52
16	41	21	404	e37	e24	80	95	116	195	47	59	139
17	39	21	265	e33	e25	81	80	112	141	51	53	193
18	32	21	133	e28	e25	77	72	1480	108	45	50	196
19	29	21	92	e25	e25	71	69	3790	86	41	47	73
20	26	23	e76	e25	e25	74	304	2310	74	40	44	58
21	25	23	e65	e23	e26	83	2000	1020	68	37	41	52
22	24	24	e56	e23	e30	87	1550	602	61	38	40	49
23	24	24	e50	e23	101	84	739	433	57	36	43	324
24	23	24	e44	e23	835	80	455	428	55	38	43	748
25	22	24	e38	e23	2080	77	313	310	469	47	42	456
26	21	25	e36	e22	2090	74	224	224	272	46	41	259
27	21	25	e34	e23	1870	71	178	170	395	44	40	158
28	21	23	e30	e23	1630	70	152	139	260	129	38	114
29	20	22	e29	e23	808	70	133	120	191	864	42	90
30	20	22	e29	e23	---	65	117	106	179	971	41	76
31	20	---	e30	e23	---	58	---	99	---	921	38	---
TOTAL	973	768	2395	1148	9950	4034	7603	14067	4275	4456	4696	3459
MEAN	31.4	25.6	77.3	37.0	343	130	253	454	142	144	151	115
MAX	79	47	404	70	2090	532	2000	3790	469	971	966	748
MIN	20	20	21	22	22	58	54	72	55	36	38	31
CFSM	.07	.06	.17	.08	.74	.28	.55	.98	.31	.31	.33	.25
IN.	.08	.06	.19	.09	.80	.32	.61	1.13	.34	.36	.38	.28

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2000, BY WATER YEAR (WY)

	MEAN	112	171	252	266	435	991	642	305	183	80.9	60.6	115
MAX	1316	972	1031	1315	1855	3218	2102	1511	1625	517	559	2277	
(WY)	1987	1993	1951	1952	1954	1985	1947	1956	1996	1994	1953	1976	
MIN	7.62	10.5	10.3	8.37	15.8	48.9	54.2	40.4	22.4	13.1	8.34	5.53	
(WY)	1964	1945	1959	1945	1959	1964	1946	1958	1949	1966	1948	1918	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1944 - 2070
ANNUAL TOTAL	33989	57824	
ANNUAL MEAN	93.1	158	302
HIGHEST ANNUAL MEAN			705
LOWEST ANNUAL MEAN			28.6
HIGHEST DAILY MEAN	1330	3790	10100
LOWEST DAILY MEAN	12	20	2.0
ANNUAL SEVEN-DAY MINIMUM	12	20	2.7
INSTANTANEOUS PEAK FLOW		4060	(a)14400
INSTANTANEOUS PEAK STAGE		11.09	(b)16.72
INSTANTANEOUS LOW FLOW		18	(c)1.8
ANNUAL RUNOFF (CFSM)	.20	.34	.65
ANNUAL RUNOFF (INCHES)	2.72	4.64	8.83
10 PERCENT EXCEEDS	176	328	668
50 PERCENT EXCEEDS	44	56	65
90 PERCENT EXCEEDS	21	23	16

(a) From rating curve extended above 9,500 ft<sup>3</sup>/s.

(b) Present site and datum; peak stage observed at previous site and datum, 18.05 ft, Feb. 20, 1951, backwater from ice.

(c) Observed; site then in use.

(d) Sept. 18, 19, 1946.

(e) Estimated.

## STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159900 MILL CREEK NEAR AVOCA, MI

LOCATION.--Lat 43°03'16", long 82°44'05", in NW1/4 sec.8, T.7 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank at downstream side of bridge on Bricker Road, 0.2 mi upstream from Gleason Drain, and 2.3 mi west of Avoca.

DRAINAGE AREA.--169 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1963 to September 1975, October 1975 to September 1979 (operated as a crest-stage partial-record station), October 1987 to current year. Also operated as a low-flow partial-record station in water year 1979.

GAGE.--Water-stage recorder. Datum of gage is 711.31 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are poor. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	17	8.5	e11	e10	138	30	47	39	29	354	7.2
2	7.5	23	8.6	e12	e11	104	29	45	41	24	242	6.9
3	12	30	8.6	e15	e11	81	18	46	38	22	158	6.7
4	11	14	12	e21	e12	65	20	43	37	21	103	6.4
5	9.0	9.4	18	e20	e12	55	20	40	33	18	65	6.3
6	11	8.2	12	e19	e12	48	25	37	30	16	44	6.6
7	10	11	9.5	e15	e12	42	25	36	29	17	33	6.3
8	6.5	7.6	14	e12	e13	37	28	34	29	16	28	6.0
9	5.1	6.1	12	e14	e12	35	27	36	27	14	58	5.5
10	5.1	5.0	10	e16	e12	32	20	115	24	24	159	10
11	4.8	4.7	9.5	e17	e12	28	19	221	24	34	108	18
12	4.3	5.2	9.3	e20	e11	26	20	180	24	40	58	18
13	6.4	6.7	9.0	e22	e11	24	21	129	103	59	33	15
14	17	7.1	14	e21	e11	24	22	93	90	80	24	14
15	18	7.3	31	e19	e11	23	22	67	102	73	20	17
16	16	6.7	45	e17	e11	24	19	50	81	e54	17	22
17	13	6.5	49	e16	e11	23	18	47	57	e41	14	20
18	16	6.4	37	e16	e11	22	17	350	42	e31	13	15
19	16	7.2	e31	e14	e11	22	16	962	34	23	13	11
20	17	8.9	e25	e13	e11	24	86	947	28	16	12	9.7
21	17	8.6	e22	e12	e12	26	521	682	26	13	12	9.9
22	18	8.3	e20	e12	e12	28	563	479	22	11	12	10
23	17	8.7	e17	e11	e13	28	399	373	21	10	15	163
24	17	10	e14	e11	e60	29	284	370	20	9.4	15	278
25	15	7.9	e11	e10	e190	32	197	276	231	8.4	17	215
26	14	8.5	e11	e10	e260	30	133	178	73	7.7	17	137
27	15	8.9	e10	e10	e300	31	92	116	90	7.0	13	95
28	16	9.0	e9.0	e10	279	31	71	79	72	7.6	8.0	70
29	18	9.6	e9.0	e10	198	30	59	59	56	164	7.9	53
30	20	9.9	e9.0	e10	---	24	50	48	40	255	7.7	42
31	17	---	e10	e10	---	25	---	43	---	338	7.4	---
TOTAL	396.1	287.4	515.0	446	1552	1191	2871	6228	1563	1483.1	1688.0	1300.5
MEAN	12.8	9.58	16.6	14.4	53.5	38.4	95.7	201	52.1	47.8	54.5	43.3
MAX	20	30	49	22	300	138	563	962	231	338	354	278
MIN	4.3	4.7	8.5	10	10	22	16	34	20	7.0	7.4	5.5
CFSM	.08	.06	.10	.09	.32	.23	.57	1.19	.31	.28	.32	.26
IN.	.09	.06	.11	.10	.34	.26	.63	1.37	.34	.33	.37	.29

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 2000, BY WATER YEAR (WY)

	MEAN	19.5	55.2	84.9	110	144	271	227	101	75.0	23.3	15.7	16.2
MAX	67.4	261	266	404	423	664	715	328	659	78.1	57.3	95.9	95.9
(WY)	1991	1993	1988	1974	1997	1973	1975	1974	1996	1996	1973	1992	1992
MIN	2.76	5.25	3.72	6.03	6.21	11.2	26.1	16.2	5.91	2.36	3.17	2.39	2.39
(WY)	1964	1965	1964	1964	1964	1964	1964	1964	1964	1963	1964	1963	1963

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1963 - 2000

ANNUAL TOTAL	10300.5	19521.1	
ANNUAL MEAN	28.2	53.3	
HIGHEST ANNUAL MEAN			96.2
LOWEST ANNUAL MEAN			174
HIGHEST DAILY MEAN	545	962	7.84
LOWEST DAILY MEAN	2.1	4.3	3940
ANNUAL SEVEN-DAY MINIMUM	2.5	6.0	.90
INSTANTANEOUS PEAK FLOW		1040	1.2
INSTANTANEOUS PEAK STAGE		6.09	4570
INSTANTANEOUS LOW FLOW			8.87
ANNUAL RUNOFF (CFSM)	.17	.32	.80
ANNUAL RUNOFF (INCHES)	2.27	4.30	.57
10 PERCENT EXCEEDS	53	120	7.74
50 PERCENT EXCEEDS	16	19	231
90 PERCENT EXCEEDS	5.1	8.0	26
			5.3

(a) Aug. 9, 10, 11, 1964.

(e) Estimated.

## STREAMS TRIBUTARY TO ST. CLAIR RIVER

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW1/4 NW1/4 sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft upstream from bridge on State Highway 21, 0.6 mi northeast of Imlay City.

DRAINAGE AREA.--18.0 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder. Concrete control Aug. 20, 1965 to Nov. 2, 1981. Datum of gage is 789.69 ft above sea level (levels by Boldt, McLeod, and Johnson, Inc.). Prior to Feb. 24, 1985, at datum 2.00 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Some diversion by pumping for sprinkler irrigation. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	2.5	3.7	e3.6	e2.7	11	3.5	2.5	32	9.8	77	3.7
2	3.5	3.6	3.2	e3.7	e2.8	9.1	3.6	2.6	41	6.6	56	2.2
3	3.4	4.5	3.2	4.4	e2.8	7.6	3.5	2.3	35	11	45	1.6
4	4.8	3.6	3.4	5.8	e2.9	6.7	3.3	2.1	33	7.3	33	2.0
5	3.8	3.3	5.5	6.3	e2.8	6.3	3.3	2.0	31	3.0	24	2.1
6	3.3	3.1	8.9	4.8	e2.8	6.0	3.3	1.9	31	2.3	22	1.4
7	3.1	3.0	7.2	4.6	e2.8	5.8	3.0	2.0	25	1.9	19	1.9
8	2.9	2.8	6.3	5.8	e2.8	6.0	4.0	2.2	20	1.5	12	1.3
9	2.7	2.9	5.6	4.2	e2.9	5.8	4.2	9.8	18	5.6	11	1.3
10	2.6	3.3	5.3	5.2	e2.8	5.3	4.4	57	13	2.7	13	1.8
11	2.5	3.3	4.5	5.7	e2.8	4.9	4.0	31	26	1.7	8.9	1.9
12	2.2	2.7	4.1	e5.0	e2.7	4.6	3.6	18	50	1.7	7.9	7.6
13	3.0	2.6	4.0	e4.5	e2.7	4.5	3.3	9.9	84	1.5	6.2	4.7
14	4.1	2.7	6.4	e4.2	e2.7	4.5	3.1	6.3	74	24	8.8	7.6
15	3.4	2.7	13	e3.8	e2.7	4.8	2.8	5.7	64	42	5.5	14
16	3.4	2.7	13	e3.7	e2.7	5.8	5.6	6.1	53	24	3.8	7.8
17	3.4	2.8	9.6	e3.7	e2.7	5.1	3.2	8.9	43	12	4.2	4.9
18	3.1	3.2	7.9	e3.7	e2.7	4.6	2.3	125	37	7.2	7.0	3.0
19	3.0	3.1	6.9	e3.8	e2.8	4.6	2.1	199	34	2.6	3.7	2.4
20	3.0	4.0	5.6	e3.4	e2.8	5.2	39	120	26	1.9	3.0	2.2
21	2.8	3.6	e5.0	e3.0	e3.2	5.5	63	76	22	1.5	3.5	2.0
22	2.7	3.8	e4.6	e2.8	e4.5	4.9	30	57	16	1.5	4.8	5.3
23	2.7	3.4	e4.3	e2.8	14	4.4	14	68	10	1.5	3.7	130
24	2.7	3.9	e4.0	e2.7	21	4.1	14	74	7.5	1.4	2.7	89
25	2.7	3.5	e4.0	e2.6	26	3.9	9.2	58	73	1.4	4.7	38
26	2.7	8.6	e3.9	e2.5	20	3.8	5.3	48	48	1.2	2.0	24
27	2.9	4.6	e3.7	e2.5	24	4.1	3.7	40	37	1.2	1.8	15
28	2.8	3.3	e3.6	e2.5	18	4.0	2.8	36	34	39	2.5	9.7
29	2.5	3.2	e3.6	e2.5	13	3.8	2.7	34	27	79	4.0	6.7
30	2.4	3.0	e3.6	e2.6	---	3.8	2.3	36	20	109	1.8	6.1
31	2.7	---	e3.6	e2.6	---	3.7	---	35	---	160	1.7	---
TOTAL	95.3	103.3	171.2	119.0	199.1	164.2	252.1	1176.3	1064.5	567.0	404.2	434.5
MEAN	3.07	3.44	5.52	3.84	6.87	5.30	8.40	37.9	35.5	18.3	13.0	14.5
MAX	4.8	8.6	13	6.3	26	11	63	199	84	160	77	130
MIN	2.2	2.5	3.2	2.5	2.7	3.7	2.1	1.9	7.5	1.2	1.7	1.3
CFSM	.17	.19	.31	.21	.38	.29	.47	2.11	1.97	1.02	.72	.80
IN.	.20	.21	.35	.25	.41	.34	.52	2.43	2.20	1.17	.84	.90

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

	MEAN	7.36	10.2	11.7	11.3	16.5	28.7	23.1	12.6	11.3	5.29	3.84	6.29
MAX	36.8	31.0	28.2	32.9	46.6	60.5	59.6	37.9	59.4	18.3	13.0	37.4	
(WY)	1987	1986	1988	1973	1976	1973	1975	2000	1996	2000	2000	1986	
MIN	.82	2.49	2.71	2.64	3.24	5.30	8.40	2.76	1.21	.41	.57	.64	
(WY)	1967	1966	1977	1977	1980	2000	2000	1977	1988	1966	1966	1965	

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1965 - 2000

	ANNUAL TOTAL	2041.29	4750.7	
ANNUAL MEAN		5.59	13.0	12.3
HIGHEST ANNUAL MEAN				20.6
LOWEST ANNUAL MEAN				5.13
HIGHEST DAILY MEAN	93	Apr 23	199	307
LOWEST DAILY MEAN	.51	Jun 23	1.2	.01
ANNUAL SEVEN-DAY MINIMUM	.68	Jun 20	1.4	.14
INSTANTANEOUS PEAK FLOW			239	(a)354
INSTANTANEOUS PEAK STAGE			6.08	(b)7.33
INSTANTANEOUS LOW FLOW				.00
ANNUAL RUNOFF (CFSM)	.31		.72	.68
ANNUAL RUNOFF (INCHES)	4.22		9.82	9.30
10 PERCENT EXCEEDS	9.8		36	28
50 PERCENT EXCEEDS	3.4		4.0	6.2
90 PERCENT EXCEEDS	1.0		2.3	1.8

(a) From rating curve extended above 100 ft<sup>3</sup>/s.

(b) Present datum.

(c) Part of each day June 27, 28, 1977, June 26-28, 1979, June 30, 1988, caused by irrigation pumpage.

(e) Estimated.

## STREAMS TRIBUTARY TO ST. CLAIR RIVER

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW1/4 SE1/4 sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 705.41 ft above sea level (Michigan Department of Transportation bench mark).

REMARKS.--Records good except for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947 reached a stage of about 9 ft, from information by local resident<sup>a</sup>

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	11	14	e19	e15	131	23	49	44	54	547	17
2	23	13	14	e20	e15	104	23	51	40	42	325	16
3	18	16	18	e21	e16	82	23	49	40	48	297	17
4	16	20	18	e25	e17	67	23	42	38	122	172	16
5	16	17	20	e30	e19	58	23	37	34	98	114	14
6	18	15	26	e26	e19	51	22	34	33	68	88	14
7	19	14	42	e23	e19	46	23	31	29	54	80	15
8	17	13	39	e20	e19	43	24	29	28	43	70	15
9	14	12	35	e19	e18	42	29	31	26	28	56	15
10	13	11	31	e22	e17	39	33	160	24	22	49	20
11	12	12	28	e24	e16	36	35	380	23	24	55	51
12	11	12	26	e30	e15	33	36	273	24	26	50	110
13	13	13	24	e28	e15	31	35	189	50	23	41	80
14	13	12	26	e26	e15	31	33	123	282	23	36	56
15	19	11	52	e24	e15	31	32	76	281	73	33	72
16	17	11	97	e22	e15	33	30	54	173	118	31	91
17	16	9.8	91	e20	e15	35	30	57	94	82	29	66
18	15	9.6	61	e21	e15	33	31	249	61	49	27	46
19	15	10	e49	e21	e15	32	32	1080	47	35	29	35
20	15	11	e37	e18	e15	33	184	1160	39	28	28	29
21	14	15	34	e17	e17	35	682	687	35	24	25	26
22	13	15	e29	e16	21	38	708	349	29	21	22	27
23	13	14	e26	e15	51	36	361	231	26	19	22	912
24	13	15	e24	e14	186	34	201	224	23	18	23	1280
25	12	15	e23	e14	335	32	140	177	307	17	22	953
26	11	16	e22	e14	379	31	106	120	433	16	20	459
27	11	15	e21	e14	308	29	84	92	230	15	19	244
28	12	21	e20	e14	308	29	68	74	109	16	18	161
29	12	18	e20	e14	199	29	58	62	71	93	18	115
30	12	16	e19	e14	---	27	52	51	68	247	18	90
31	11	---	e19	e14	---	25	---	46	---	359	18	---
TOTAL	468	413.4	1005	619	2129	1336	3184	6267	2741	1905	2382	5062
MEAN	15.1	13.8	32.4	20.0	73.4	43.1	106	202	91.4	61.5	76.8	169
MAX	34	21	97	30	379	131	708	1160	433	359	547	1280
MIN	11	9.6	14	14	15	25	22	29	23	15	18	14
CFSM	.10	.09	.21	.13	.49	.29	.70	1.34	.61	.41	.51	1.12
IN.	.12	.10	.25	.15	.52	.33	.78	1.54	.68	.47	.59	1.25

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 2000, BY WATER YEAR (WY)

	MEAN	40.3	66.5	90.7	87.6	139	254	201	92.7	58.6	27.9	20.7	34.7
MAX	330	375	247	315	528	595	617	270	300	82.3	91.3	256	
(WY)	1982	1986	1988	1973	1976	1973	1975	1974	1996	1967	1992	1985	
MIN	5.00	7.62	5.50	8.92	8.00	15.8	25.9	20.9	6.44	5.21	5.08	5.54	
(WY)	1964	1965	1964	1964	1963	1964	1964	1977	1964	1965	1963	1979	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1963 - 2000

ANNUAL TOTAL	14925.3		27511.4										
ANNUAL MEAN	40.9		75.2										
HIGHEST ANNUAL MEAN										92.5			
LOWEST ANNUAL MEAN										168			1985
HIGHEST DAILY MEAN										11.3			1964
LOWEST DAILY MEAN	1040									3320			Apr 1 <sup>a</sup> 1975
ANNUAL SEVEN-DAY MINIMUM	5.9		Apr 24							2.4			Sep 6 1978
INSTANTANEOUS PEAK FLOW	6.9		Sep 5							2.6			Sep 5 1978
INSTANTANEOUS PEAK STAGE			Aug 31							4520			Apr 1 <sup>a</sup> 1975
INSTANTANEOUS LOW FLOW										8.96			Apr 1 <sup>a</sup> 1975
ANNUAL RUNOFF (CFSM)	.27									2.3			(a)
ANNUAL RUNOFF (INCHES)	3.68									.61			
10 PERCENT EXCEEDS	71									8.32			
50 PERCENT EXCEEDS	19									220			
90 PERCENT EXCEEDS	9.6									31			
										9.3			

(a) Sept. 6, 10, 1978.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE1/4 sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of culverts on Maybee Road, 1.1 mi upstream from mouth, and 2.5 mi northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961 to Mar. 6, 1968. Elevation of gage is 970 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	2.8	4.0	e4.0	e4.8	20	7.0	12	16	19	36	5.5
2	5.0	3.6	4.1	4.7	e4.7	18	7.0	14	15	18	29	5.3
3	5.0	5.1	3.8	6.4	e4.6	16	7.0	13	14	33	28	5.2
4	7.1	3.9	3.8	9.3	e4.5	15	7.0	12	12	29	23	4.9
5	6.6	3.5	7.9	8.0	e4.5	15	6.8	11	11	23	21	4.3
6	5.7	3.3	15	e6.5	e4.5	14	6.5	9.7	11	19	26	4.1
7	4.7	3.0	14	e6.0	e4.5	13	6.3	8.9	9.7	17	26	3.9
8	4.5	2.9	13	e7.0	e4.5	13	8.4	8.6	8.5	15	24	3.8
9	4.5	2.9	11	7.6	e4.5	13	9.2	14	7.5	14	21	4.0
10	4.5	2.9	10	13	e4.5	13	9.2	36	6.6	14	20	26
11	5.0	2.9	8.2	14	e4.4	12	9.1	26	5.7	19	18	64
12	3.3	2.7	7.2	12	e4.3	11	9.0	23	6.0	17	16	82
13	4.4	2.8	6.6	e11	e4.3	e10	8.4	21	19	15	14	62
14	8.0	2.9	8.5	e10	e4.2	e10	7.8	17	19	14	13	53
15	6.6	2.7	13	10	e4.3	11	7.6	14	16	13	13	54
16	6.8	2.7	14	9.2	e4.0	14	7.0	14	14	12	12	44
17	6.5	2.4	13	e9.0	e4.1	13	6.7	16	12	11	12	38
18	5.8	2.4	e11	8.0	e4.2	12	6.1	27	11	9.8	13	33
19	4.7	3.0	e10	7.3	e4.3	12	6.0	60	9.5	8.7	11	30
20	4.1	5.4	e11	e7.0	e4.3	13	19	56	8.3	7.7	9.9	28
21	4.1	4.7	e9.0	e6.5	e4.5	13	37	47	8.5	7.2	8.5	29
22	4.2	4.1	e8.0	e6.5	e5.0	12	31	38	7.4	6.7	8.0	27
23	4.0	4.1	e7.0	e6.5	10	12	25	39	6.6	6.1	14	79
24	3.7	5.1	e6.0	e6.0	19	11	20	35	6.4	5.6	13	79
25	3.5	4.9	e5.5	e6.0	27	10	16	29	32	5.0	11	69
26	3.5	4.8	e5.0	e6.0	26	9.5	14	25	31	4.7	9.3	56
27	2.7	4.8	e4.5	e5.0	30	9.0	13	22	30	4.5	8.4	47
28	2.5	4.3	e4.5	e5.0	26	9.0	12	21	24	8.8	7.7	41
29	2.4	4.0	e4.0	e5.0	22	8.2	11	20	22	12	7.0	35
30	2.4	3.8	e4.5	e5.0	---	7.7	9.9	18	21	31	6.4	31
31	2.8	---	e4.0	e4.8	---	7.2	---	16	---	45	6.0	---
TOTAL	145.1	108.4	251.1	232.3	257.5	376.6	350.0	723.2	420.7	464.8	485.2	1048.0
MEAN	4.68	3.61	8.10	7.49	8.88	12.1	11.7	23.3	14.0	15.0	15.7	34.9
MAX	8.0	5.4	15	14	30	20	37	60	32	45	36	82
MIN	2.4	2.4	3.8	4.0	4.0	7.2	6.0	8.6	5.7	4.5	6.0	3.8
CFSM	.22	.17	.39	.36	.42	.58	.56	1.12	.67	.72	.75	1.67
IN.	.26	.19	.45	.41	.46	.67	.62	1.29	.75	.83	.86	1.87

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2000, BY WATER YEAR (WY)

	6.65	10.4	12.7	12.7	14.7	26.0	28.3	18.3	11.3	6.15	4.72	6.25
MEAN	6.65	10.4	12.7	12.7	14.7	26.0	28.3	18.3	11.3	6.15	4.72	6.25
MAX	38.4	38.2	28.2	36.5	39.1	61.2	45.5	41.6	28.5	15.0	19.5	34.9
(WY)	1982	1986	1988	1993	1976	1976	1975	1974	1996	2000	1975	2000
MIN	37	1.02	.95	1.46	2.15	6.28	11.7	8.03	1.58	.74	.30	.41
(WY)	1964	1965	1964	1961	1964	1964	2000	1988	1988	1965	1984	1963

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1960 - 2000

	2935.4	4862.9	13.2	1375
ANNUAL TOTAL	2935.4	4862.9	13.2	1375
ANNUAL MEAN	8.04	13.3	21.5	1964
HIGHEST ANNUAL MEAN			4.12	1964
LOWEST ANNUAL MEAN			146	Oct 1 1981
HIGHEST DAILY MEAN	55	Apr 23	82	Sep 12
LOWEST DAILY MEAN	1.5	Sep 17	2.4	Oct 29
ANNUAL SEVEN-DAY MINIMUM	1.5	Sep 16	2.7	Nov 12
INSTANTANEOUS PEAK FLOW			104	Sep 23
INSTANTANEOUS PEAK STAGE			3.95	Sep 23
INSTANTANEOUS LOW FLOW			2.4	(a)
ANNUAL RUNOFF (CFSM)	.38	.64	.63	(b)
ANNUAL RUNOFF (INCHES)	5.22	8.66	8.56	
10 PERCENT EXCEEDS	15	29	30	
50 PERCENT EXCEEDS	5.9	9.0	9.3	
90 PERCENT EXCEEDS	2.3	4.0	1.8	

(a) Part or all of each day Oct. 27-30, Nov. 17-19.

(b) July 9, 16, 1988.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE1/4 sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on State Highway 59, 2.0 mi south of Drayton Plains.

DRAINAGE AREA.--79.2 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 940 ft above sea level, from topographic map. Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake-level control at many lakes upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	18	32	37	33	61	4.9	44	74	76	92	20
2	32	54	31	36	33	68	4.9	42	67	40	104	20
3	33	97	31	33	32	66	4.9	41	63	69	115	19
4	33	88	30	35	32	65	4.9	41	63	89	120	19
5	32	80	38	38	31	65	4.9	42	63	91	119	17
6	32	73	44	37	31	63	4.8	42	49	89	125	16
7	20	67	41	37	30	57	5.4	42	34	86	123	13
8	5.0	62	41	37	30	53	6.7	42	30	83	123	13
9	5.1	57	41	40	30	50	7.2	46	27	86	115	12
10	5.9	54	41	44	30	49	8.2	72	25	85	93	54
11	6.9	51	42	46	29	48	10	91	26	80	90	119
12	8.1	47	43	47	29	46	11	92	27	76	85	150
13	15	45	44	49	30	42	11	91	47	54	80	165
14	34	42	48	49	30	43	11	71	62	16	77	177
15	34	40	51	49	29	33	12	48	57	17	76	178
16	35	38	54	46	29	16	14	49	54	19	73	172
17	28	36	57	44	29	31	14	50	51	21	72	163
18	19	35	59	41	29	30	14	60	50	22	45	153
19	19	35	61	40	30	30	15	93	47	23	15	139
20	15	37	62	39	30	31	27	118	46	33	15	123
21	13	35	61	38	30	31	50	129	53	42	15	109
22	12	34	59	40	31	31	101	136	41	41	18	103
23	12	34	57	37	33	31	95	143	21	40	50	111
24	12	34	55	37	35	33	87	144	21	25	73	111
25	12	33	52	37	37	32	65	142	80	13	72	118
26	12	34	50	37	39	32	44	141	106	12	50	125
27	12	34	49	38	45	35	45	138	108	12	20	132
28	12	33	46	36	51	37	45	133	107	16	20	137
29	13	33	43	35	57	35	45	129	107	28	20	141
30	15	32	40	34	---	26	46	113	103	68	21	138
31	16	---	38	34	---	8.1	---	80	---	89	21	---
TOTAL	588.0	1392	1441	1227	964	1278.1	818.8	2645	1709	1541	2137	2967
MEAN	19.0	46.4	46.5	39.6	33.2	41.2	27.3	85.3	57.0	49.7	68.9	98.9
MAX	35	97	62	49	57	68	101	144	108	91	125	178
MIN	5.0	18	30	33	29	8.1	4.8	41	21	12	15	12
CFSM	.24	.59	.59	.50	.42	.52	.34	1.08	.72	.63	.87	1.25
IN.	.28	.65	.68	.58	.45	.60	.38	1.24	.80	.72	1.00	1.39

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2000, BY WATER YEAR (WY)

	MEAN	36.7	51.3	60.3	57.0	58.4	82.7	90.6	62.2	44.9	30.1	25.9	30.9
MAX	114	107	109	114	115	188	168	137	115	82.0	68.9	129	
(WY)	1982	1986	1986	1973	1974	1976	1974	1974	1996	1968	2000	1975	
MIN	4.08	7.90	15.6	15.5	16.6	28.8	27.3	22.9	6.47	5.79	6.39	4.80	
(WY)	1999	1965	1964	1964	1964	1964	2000	1988	1988	1988	1963	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1960 - 2000

ANNUAL TOTAL	13330.6	18707.9	
ANNUAL MEAN	36.5	51.1	52.5
HIGHEST ANNUAL MEAN			87.9
LOWEST ANNUAL MEAN			20.0
HIGHEST DAILY MEAN	135	178	274
LOWEST DAILY MEAN	4.8	4.8	3.1
ANNUAL SEVEN-DAY MINIMUM	5.7	5.0	3.5
INSTANTANEOUS PEAK FLOW		184	276
INSTANTANEOUS PEAK STAGE		4.34	4.95
INSTANTANEOUS LOW FLOW		4.5	2.4
ANNUAL RUNOFF (CFSM)	.46	.65	.66
ANNUAL RUNOFF (INCHES)	6.26	8.79	9.01
10 PERCENT EXCEEDS	72	110	103
50 PERCENT EXCEEDS	31	41	46
90 PERCENT EXCEEDS	6.4	14	11

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW1/4 SE1/4 sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, 1.5 mi upstream from mouth.

DRAINAGE AREA.--70.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by Lake Orion. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	24	25	e24	e24	62	29	55	49	54	e55	e15
2	24	44	22	26	e24	58	29	49	47	46	e150	e15
3	26	46	22	29	e23	49	30	41	43	112	e100	e14
4	39	38	22	40	e23	45	30	40	40	73	e40	e13
5	29	36	49	32	e23	42	30	39	39	54	e35	e12
6	25	34	78	e28	e22	40	30	37	38	44	e110	e12
7	23	33	42	e27	e22	38	30	36	36	38	e80	e11
8	23	32	34	e28	e22	36	37	35	34	35	e65	e11
9	24	33	31	41	e22	36	36	69	31	34	54	e20
10	23	30	30	66	e22	36	34	213	29	54	45	e160
11	22	27	30	58	e22	35	34	127	30	47	39	e300
12	21	28	29	44	e22	34	34	107	32	35	33	e340
13	26	28	28	e38	e22	e33	32	100	130	31	31	e90
14	37	27	45	e35	e22	e32	31	81	106	30	29	e100
15	37	26	67	e34	e22	e35	31	70	82	31	30	139
16	33	25	55	34	e23	48	30	71	67	30	30	92
17	32	24	43	49	e23	41	30	84	58	29	36	70
18	29	23	39	e40	e23	38	29	154	51	25	36	53
19	27	25	36	e38	e23	39	29	317	45	25	29	44
20	28	34	40	e36	e24	45	135	234	43	24	26	40
21	27	28	e35	e34	25	48	161	174	49	24	24	44
22	26	26	e30	e33	29	44	115	156	39	24	e24	40
23	25	25	e28	e31	61	41	104	172	36	23	e140	231
24	26	30	e25	e30	80	38	96	148	40	23	e40	189
25	26	28	e25	e29	83	30	80	128	449	21	e24	150
26	25	28	e26	e29	64	29	69	110	177	24	e22	142
27	25	29	e26	e28	88	32	61	97	146	22	e21	128
28	25	28	e26	e27	75	31	56	90	103	e70	e19	110
29	25	27	e29	e26	65	30	51	75	84	e80	e18	95
30	24	26	e30	e26	---	29	48	62	69	e250	e17	83
31	24	---	e25	e25	---	29	---	53	---	e90	e16	---
TOTAL	834	892	1072	1065	1023	1203	1571	3224	2222	1502	1418	2543
MEAN	26.9	29.7	34.6	34.4	35.3	38.8	52.4	104	74.1	48.5	45.7	85.4
MAX	39	46	78	66	88	62	161	317	449	250	150	240
MIN	21	23	22	24	22	29	29	35	29	21	16	11
CFSM	.38	.42	.49	.48	.50	.55	.74	1.47	1.04	.68	.65	1.20
IN.	.44	.47	.56	.56	.54	.63	.82	1.69	1.17	.79	.74	1.34

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2000, BY WATER YEAR (WY)

	MEAN	38.1	45.1	51.0	51.3	60.0	94.8	97.2	63.9	47.3	29.9	26.1	35.1
MAX	123	120	103	127	160	204	194	146	125	58.0	66.7	104	
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1996	1992	1975	1975	
MIN	8.50	11.0	14.5	14.9	15.4	25.9	37.2	28.5	13.5	11.7	12.0	12.2	
(WY)	1964	1964	1965	1964	1963	1964	1964	1977	1988	1963	1965	1963	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1960 - 2000
ANNUAL TOTAL	13514.8	18589	
ANNUAL MEAN	37.0	50.8	53.2
HIGHEST ANNUAL MEAN			86.7
LOWEST ANNUAL MEAN			20.4
HIGHEST DAILY MEAN	285	449	660
LOWEST DAILY MEAN	9.3	11	6.8
ANNUAL SEVEN-DAY MINIMUM	10	13	7.9
INSTANTANEOUS PEAK FLOW		679	(a)918
INSTANTANEOUS PEAK STAGE		4.28	(b)5.95
INSTANTANEOUS LOW FLOW			(c)1.2
ANNUAL RUNOFF (CFSM)	.52	.72	.75
ANNUAL RUNOFF (INCHES)	7.09	9.75	10.20
10 PERCENT EXCEEDS	58	103	104
50 PERCENT EXCEEDS	30	34	40
90 PERCENT EXCEEDS	13	23	16

(a) Gage height 5.22 ft.

(b) Backwater from ice.

(c) Result of regulation due to bridge construction.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW1/4 sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of culvert on Romeo Road, 4.0 mi west of Romeo.

DRAINAGE AREA.--25.6 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	6.4	5.3	e3.4	e2.7	17	4.7	9.8	9.7	24	26	5.1
2	2.7	12	5.1	e3.2	e2.7	16	4.7	12	9.9	10	22	4.6
3	2.8	9.7	5.3	e3.0	e2.8	14	4.7	10	8.6	15	26	4.2
4	4.8	9.3	5.3	e3.0	e2.8	13	5.0	8.9	7.1	18	19	4.2
5	3.3	8.6	11	e2.9	e2.8	12	4.8	8.5	6.6	13	16	4.0
6	2.9	11	18	e2.8	e2.9	10	5.6	9.1	6.3	12	16	3.6
7	2.7	8.5	11	2.8	e3.0	9.7	5.1	8.2	5.4	11	16	3.4
8	2.6	6.9	9.9	2.9	e3.0	9.9	6.6	7.3	4.7	11	16	3.4
9	2.8	6.4	13	4.7	e3.0	9.1	7.0	13	4.3	9.6	17	3.7
10	2.7	6.8	12	8.9	e3.0	6.5	7.5	42	3.8	9.6	18	18
11	2.9	7.4	11	7.4	e3.0	5.4	6.6	35	4.1	12	12	40
12	2.8	6.3	9.6	4.9	e3.0	5.2	5.9	26	5.4	8.7	9.4	49
13	4.1	9.2	9.1	e5.0	e3.0	5.1	5.5	21	37	5.4	7.9	43
14	5.9	7.9	13	e5.5	e3.0	5.5	4.7	16	31	5.2	7.7	47
15	3.8	5.7	19	e3.0	e3.0	6.0	4.3	13	24	5.9	9.6	51
16	3.7	5.8	17	e5.2	e3.0	11	4.0	11	18	6.0	9.3	43
17	4.2	5.0	12	8.3	e3.0	7.6	3.9	14	14	5.1	9.4	34
18	4.0	5.7	9.2	8.5	e3.0	6.1	3.8	33	11	4.3	10	27
19	3.8	6.0	9.1	8.1	e3.0	6.1	3.5	70	9.0	4.0	8.7	13
20	3.6	11	10	9.0	e3.0	8.5	23	87	7.5	3.8	6.8	9.5
21	3.4	8.2	8.9	8.8	4.1	9.6	41	76	7.7	3.5	6.2	10
22	3.3	6.9	e7.5	e8.5	11	8.2	28	58	6.4	3.5	6.6	9.7
23	3.4	6.0	e6.8	e7.8	18	7.5	19	59	5.5	3.3	8.4	108
24	3.5	8.9	e6.0	e7.0	24	7.1	16	54	5.3	3.3	7.9	132
25	3.1	14	e5.5	e6.0	30	6.8	13	42	55	3.2	7.1	108
26	2.8	13	e5.0	e5.5	25	6.2	12	29	57	3.1	6.8	86
27	2.8	12	e4.7	e4.8	29	7.0	11	17	43	3.2	6.8	70
28	2.9	11	e4.4	e4.0	23	6.8	10	15	31	4.5	6.2	54
29	2.9	9.4	e4.1	e3.5	18	6.3	8.8	14	32	7.8	5.9	44
30	3.7	6.0	e3.7	e3.0	---	5.8	7.5	11	30	23	5.7	37
31	5.3	---	e3.5	e2.7	---	5.4	---	10	---	35	5.3	---
TOTAL	106.2	251.0	275.0	172.1	240.8	260.4	287.2	839.8	500.3	287.0	355.7	1069.4
MEAN	3.43	8.37	8.87	5.55	8.30	8.40	9.57	27.1	16.7	9.26	11.5	35.6
MAX	5.9	14	19	9.0	30	17	41	87	57	35	26	132
MIN	2.6	5.0	3.5	2.7	2.7	5.1	3.5	7.3	3.8	3.1	5.3	3.4
CFSM	.13	.33	.35	.22	.32	.33	.37	1.06	.65	.36	.45	1.39
IN.	.15	.36	.40	.25	.35	.38	.42	1.22	.73	.42	.52	1.55

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

MEAN	10.2	15.4	17.4	16.5	20.6	34.5	33.9	18.8	13.9	8.23	6.93	9.21
MAX	25.1	46.2	41.3	47.7	62.9	79.7	75.1	57.1	49.5	20.0	48.5	41.2
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1996	1969	1975	1975
MIN	1.79	2.06	3.56	5.26	7.22	8.40	9.57	5.82	2.67	1.47	1.63	1.52
(WY)	1967	1965	1965	1965	1979	2000	2000	1977	1988	1965	1965	1966

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1965 - 2000

ANNUAL TOTAL	3230.4	4644.9	
ANNUAL MEAN	8.85	12.7	17.1
HIGHEST ANNUAL MEAN			31.5
LOWEST ANNUAL MEAN			9.06
HIGHEST DAILY MEAN	66	132	245
LOWEST DAILY MEAN	1.7	2.6	.92
ANNUAL SEVEN-DAY MINIMUM	1.7	2.8	1.2
INSTANTANEOUS PEAK FLOW		158	290
INSTANTANEOUS PEAK STAGE		3.90	5.19
INSTANTANEOUS LOW FLOW			(a).88
ANNUAL RUNOFF (CFSM)	.35	.50	.67
ANNUAL RUNOFF (INCHES)	4.69	6.75	9.08
10 PERCENT EXCEEDS	16	29	37
50 PERCENT EXCEEDS	6.9	7.5	11
90 PERCENT EXCEEDS	2.0	3.0	3.3

(a) Result of regulation from unknown source.

(e) Estimated.





## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Mt. Vernon Road, 500 ft downstream from Stony Lake Dam, and 2.9 mi west of Washington.

DRAINAGE AREA.--68.2 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft above sea level (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills upstream from station prior to February 1963; occasional regulation by Stony Lake since (see preceding page). From 1963 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Stony Lake. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	29	20	4.1	3.2	42	14	26	33	63	101	9.1
2	20	31	16	4.3	3.2	46	14	30	30	56	91	9.2
3	20	31	16	4.4	3.3	46	14	29	25	61	83	7.2
4	20	21	15	3.5	3.3	43	13	27	23	51	69	13
5	17	14	14	2.7	3.3	40	10	25	23	44	58	6.3
6	14	14	24	2.7	3.2	33	12	23	21	36	61	3.1
7	14	14	34	2.7	3.1	29	16	21	15	30	63	2.6
8	14	13	41	2.7	3.3	27	22	20	13	24	53	3.0
9	43	13	40	2.8	3.2	25	13	29	13	23	47	3.8
10	59	13	37	2.8	3.3	23	17	60	11	29	41	21
11	59	13	37	2.8	3.3	22	16	79	13	31	37	60
12	59	13	37	2.8	3.2	13	10	90	14	24	32	94
13	59	13	27	2.8	3.2	12	10	81	24	20	26	111
14	59	12	22	2.8	3.2	15	12	64	53	17	22	108
15	65	9.7	30	2.8	3.2	17	13	52	72	16	20	112
16	69	30	40	2.9	3.3	20	9.0	46	63	16	18	102
17	69	45	40	3.0	3.3	12	7.7	45	53	15	18	96
18	68	44	40	2.9	3.3	7.9	6.9	62	44	13	20	87
19	67	25	40	3.0	3.3	12	7.6	116	36	11	19	78
20	67	16	39	3.1	3.2	18	12	149	30	9.0	16	62
21	66	17	38	3.0	3.3	14	44	150	32	8.6	14	47
22	66	17	28	3.0	3.4	5.2	73	137	25	7.5	13	38
23	65	22	7.6	2.9	4.3	7.5	74	e130	21	7.1	23	72
24	65	26	4.1	3.1	16	13	68	e120	19	6.6	22	137
25	64	25	4.0	3.0	44	17	56	101	93	5.7	19	190
26	64	25	4.1	2.9	60	18	46	87	106	6.1	16	182
27	63	25	4.1	2.8	71	13	39	74	115	7.4	14	161
28	63	25	4.2	2.8	72	12	32	63	100	13	12	134
29	43	25	4.2	2.7	52	14	30	52	85	28	12	112
30	31	24	4.2	2.9	---	14	24	43	72	76	11	96
31	30	---	4.0	3.2	---	14	---	37	---	119	9.7	---
TOTAL	1503	644.7	715.5	93.9	390.9	644.6	735.2	2068	1277	874.0	1060.7	2157.3
MEAN	48.5	21.5	23.1	3.03	13.5	20.8	24.5	66.7	42.6	28.2	34.2	71.9
MAX	69	45	41	4.4	72	46	74	150	115	119	101	190
MIN	14	9.7	4.0	2.7	3.1	5.2	6.9	20	11	5.7	9.7	2.6

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2000, BY WATER YEAR (WY)

	MEAN	31.1	42.3	44.6	41.1	48.3	75.8	76.0	50.3	36.3	21.7	19.2	25.3
MAX	85.8	105	94.0	115	144	199	142	132	120	50.7	76.0	97.7	
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1989	1969	1975	1975	
MIN	10.3	10.2	5.02	3.03	9.79	5.14	10.0	17.2	6.93	4.41	4.00	4.72	
(WY)	1963	1964	1999	2000	1963	1964	1963	1963	1964	1988	1964	1964	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1958 - 2000

ANNUAL TOTAL	9653.3	12164.8	
ANNUAL MEAN	26.4	33.2	42.7
HIGHEST ANNUAL MEAN			79.1
LOWEST ANNUAL MEAN			12.0
HIGHEST DAILY MEAN	141	190	407
LOWEST DAILY MEAN	4.0	2.6	1.3
ANNUAL SEVEN-DAY MINIMUM	4.1	2.7	2.2
INSTANTANEOUS PEAK FLOW		200	(a)552
INSTANTANEOUS PEAK STAGE		4.30	(b)6.71
INSTANTANEOUS LOW FLOW		2.5	(c).90
10 PERCENT EXCEEDS	53	75	86
50 PERCENT EXCEEDS	21	22	31
90 PERCENT EXCEEDS	6.3	3.2	9.4

(a) From rating curve extended above 380 ft<sup>3</sup>/s; result of momentary release of water from Stony Lake; gage height 6.44 ft.

(b) Backwater from ice.

(c) Jan. 4, 5, 8, 9, Sept. 6, 7.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE1/4 NE1/4 sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Ryan Road, 1.0 mi southwest of Utica.

DRAINAGE AREA.--16.5 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1965 to July 1998, October 1999 to September 2000.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft above sea level (levels by Johnson and Anderson, Inc.).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	2.2	2.0	e4.2	e3.0	9.2	4.3	16	4.7	11	67	5.3
2	6.0	23	2.0	e4.5	3.0	8.0	4.1	19	5.6	9.1	170	5.0
3	7.2	25	2.0	e6.0	3.3	6.4	4.9	8.7	3.9	111	147	4.8
4	28	5.7	2.1	e11	3.9	6.0	5.2	7.0	3.5	36	48	4.5
5	8.3	3.7	27	e6.0	3.8	5.9	4.9	5.5	3.9	17	28	3.6
6	5.2	2.8	54	e5.0	3.3	5.2	4.5	5.3	5.0	13	95	3.8
7	3.7	2.4	12	e4.5	3.2	5.1	4.6	5.2	3.4	11	49	3.8
8	4.0	2.7	6.1	e4.3	2.8	5.0	12	4.8	3.0	9.6	27	3.6
9	5.2	3.1	4.5	e7.0	2.7	4.9	9.2	15	2.6	27	22	3.6
10	4.4	2.6	4.1	e12	3.4	4.4	7.2	104	2.4	91	17	109
11	3.5	2.2	3.4	e10	3.4	4.3	7.9	33	6.5	58	14	136
12	2.9	2.0	3.0	e6.0	2.8	4.1	7.8	19	6.5	20	12	176
13	6.6	2.0	2.8	e5.6	2.7	3.9	6.1	14	29	16	11	44
14	9.8	2.2	29	e6.0	3.2	4.0	5.4	8.2	22	15	10	48
15	4.7	1.8	44	e5.2	3.3	5.5	4.9	5.8	22	15	12	58
16	3.6	1.8	21	e4.9	3.6	17	4.6	7.6	7.5	13	10	22
17	3.0	2.3	7.5	e4.6	3.2	9.8	4.7	14	5.4	13	17	16
18	2.4	2.4	5.1	e4.3	3.3	7.0	4.3	42	7.3	11	15	12
19	2.4	3.1	4.1	e4.2	3.5	7.0	4.1	167	5.6	10	10	9.9
20	2.4	8.6	7.5	e4.3	3.5	14	173	54	5.0	10	8.4	10
21	3.0	4.7	e6.8	4.1	3.6	15	174	24	29	10	7.8	11
22	3.1	3.1	e5.0	3.8	11	9.9	64	15	11	10	8.3	8.7
23	2.4	2.5	e4.9	3.8	55	8.1	30	19	6.6	10	65	42
24	2.2	4.1	e4.6	3.7	54	7.2	19	13	8.1	9.5	19	18
25	2.0	3.5	e4.5	3.5	62	6.8	13	9.1	262	9.8	10	11
26	2.0	3.4	e4.4	3.4	24	6.4	9.6	6.8	50	65	8.5	9.0
27	1.8	3.5	e4.2	e3.3	41	8.1	8.6	5.6	25	129	8.2	7.8
28	1.8	2.8	e3.9	e3.2	23	8.4	7.0	14	14	87	7.8	7.0
29	1.9	2.4	e4.5	e3.1	11	7.5	6.8	14	22	242	6.9	6.4
30	2.0	2.2	e4.3	e3.0	---	5.6	5.5	6.7	21	360	6.3	5.6
31	2.3	---	e4.3	e3.0	---	4.8	---	5.7	---	214	5.8	---
TOTAL	147.8	133.8	294.6	157.5	349.5	224.5	621.2	688.0	603.5	1663.0	943.0	865.4
MEAN	4.77	4.46	9.50	5.08	12.1	7.24	20.7	22.2	20.1	53.6	30.4	26.8
MAX	28	25	54	12	62	17	174	167	262	360	170	176
MIN	1.8	1.8	2.0	3.0	2.7	3.9	4.1	4.8	2.4	9.1	5.8	3.6
CFSM	.29	.27	.58	.31	.73	.44	1.25	1.35	1.22	3.25	1.84	1.63
IN.	.33	.30	.66	.36	.79	.51	1.40	1.55	1.36	3.75	2.13	1.82

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2000, BY WATER YEAR (WY)

	MEAN	7.39	11.8	15.1	12.7	18.9	30.5	24.8	15.5	11.4	8.39	6.25	6.59
MAX	33.7	39.8	37.7	40.7	60.3	83.6	47.4	39.9	51.9	53.6	30.4	27.8	
(WY)	1982	1986	1973	1993	1976	1982	1979	1968	1996	2000	2000	2000	
MIN	.82	1.45	1.99	1.23	2.62	7.24	8.30	3.46	1.51	.29	.43	.44	
(WY)	1967	1966	1977	1977	1980	2000	1971	1971	1988	1965	1965	1969	

## SUMMARY STATISTICS

## FOR 2000 WATER YEAR

## WATER YEARS 1965 - 2000

ANNUAL TOTAL	6631.8												
ANNUAL MEAN	18.1												
HIGHEST ANNUAL MEAN										14.1			
LOWEST ANNUAL MEAN										20.5			1968
HIGHEST DAILY MEAN										6.67			1970
LOWEST DAILY MEAN	360									707			Jun 26 1968
ANNUAL SEVEN-DAY MINIMUM	1.8									.04			Jul 19 1966
INSTANTANEOUS PEAK FLOW	2.0									.09			Aug 22 1969
INSTANTANEOUS PEAK STAGE	500									(a)1290			Jun 18 1996
INSTANTANEOUS LOW FLOW	7.65									10.62			Jun 18 1996
ANNUAL RUNOFF (CFSM)										.00			(b)
ANNUAL RUNOFF (INCHES)	1.10									.85			
10 PERCENT EXCEEDS	14.95									11.58			
50 PERCENT EXCEEDS	42									30			
90 PERCENT EXCEEDS	6.4									6.0			
	2.8									1.3			

(a) From rating curve extended above 800 ft<sup>3</sup>/s.

(b) Part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969.

(c) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'38", long 82°57'05", in SE1/4 NE1/4 sec.19, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 50 ft downstream from bridge on Garfield Road, 2.8 mi north of Fraser, and 4.0 mi upstream from North Branch.

DRAINAGE AREA.--444 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft above sea level (Macomb County bench mark). Prior to Nov. 17, 1949, and from May 29 to July 31, 1990, nonrecording gage at same site and datum. Nov. 17, 1949 to Apr. 5, 1990, water-stage recorder at site 800 ft downstream at same datum.

REMARKS.--Records good. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft, from floodmark, and discharge of approximately 9,000 ft<sup>3</sup>/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	270	166	165	193	154	357	125	429	387	502	1510	178
2	209	452	154	197	154	330	123	502	364	441	1520	155
3	205	476	150	300	162	303	124	310	324	1280	1900	140
4	543	239	135	445	185	288	146	274	274	905	1060	136
5	294	226	522	238	178	268	127	270	274	489	675	138
6	226	236	984	166	166	255	120	256	261	356	1380	128
7	195	195	473	166	164	241	129	243	178	323	951	118
8	204	185	324	162	158	238	304	237	153	279	648	114
9	237	201	278	320	165	237	216	368	142	549	561	160
10	219	194	261	519	192	236	170	1410	139	1250	499	1070
11	215	200	237	437	174	227	208	933	228	757	436	2180
12	218	242	227	281	142	213	189	776	218	396	385	2450
13	445	242	221	242	129	197	144	700	425	323	343	1690
14	407	234	625	205	136	195	136	510	678	328	280	1190
15	253	228	803	213	135	251	130	426	608	312	374	1260
16	232	212	618	200	144	423	125	448	401	255	327	965
17	218	181	393	167	145	234	123	507	329	251	448	740
18	205	174	311	175	143	188	125	761	370	235	405	649
19	192	237	276	187	155	193	117	2110	303	192	258	601
20	184	409	384	193	152	390	1700	1480	226	176	205	587
21	184	237	326	165	156	373	2340	937	654	161	190	680
22	184	210	246	180	259	246	1100	745	265	151	189	479
23	177	189	192	201	479	214	714	738	187	149	1480	999
24	172	254	146	197	596	204	539	691	204	154	598	970
25	171	207	150	161	725	193	498	608	2310	148	355	794
26	169	227	165	154	493	163	432	567	1990	140	272	737
27	165	206	161	142	623	226	391	517	1160	412	311	633
28	173	179	143	138	558	187	355	621	716	385	268	585
29	184	179	188	143	425	159	291	557	646	1580	257	528
30	171	177	213	152	---	136	266	384	779	2780	235	445
31	167	---	197	155	---	131	---	372	---	2860	200	---
TOTAL	7088	6994	9668	6794	7447	7496	11507	19687	15193	18519	18520	21499
MEAN	229	233	312	219	257	242	384	635	506	597	597	717
MAX	543	476	984	519	725	423	2340	2110	2310	2860	1900	2450
MIN	165	166	135	138	129	131	117	237	139	140	189	114
CFSM	.51	.53	.70	.49	.58	.54	.86	1.43	1.14	1.35	1.35	1.61
IN.	.59	.59	.81	.57	.62	.63	.96	1.65	1.27	1.55	1.55	1.80

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 2000, BY WATER YEAR (WY)

	MEAN	266	331	386	386	457	661	649	463	361	272	232	248
MAX	1021	834	837	975	1119	1313	1237	1382	942	664	597	758	
(WY)	1982	1986	1968	1950	1976	1976	1950	1956	1996	1957	2000	1975	
MIN	72.3	78.2	93.1	91.8	112	217	259	127	120	87.1	69.5	73.3	
(WY)	1954	1954	1959	1961	1963	1964	1958	1958	1949	1955	1954	1954	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1947 - 2000

ANNUAL TOTAL	121654						150412						
ANNUAL MEAN	333						411						
HIGHEST ANNUAL MEAN										392			
LOWEST ANNUAL MEAN										595			1976
HIGHEST DAILY MEAN										189			1964
LOWEST DAILY MEAN										6930			May 11 1948
ANNUAL SEVEN-DAY MINIMUM	3000				Apr 23		2860		Jul 31				
INSTANTANEOUS PEAK FLOW	87				Sep 19		114		Sep 8				Sep 6 1955
ANNUAL SEVEN-DAY MINIMUM	97				Sep 14		128		Apr 1				Sep 3 1954
INSTANTANEOUS PEAK FLOW							4140		Apr 20				Oct 1 1981
INSTANTANEOUS LOW FLOW							16.29		Apr 20				Oct 1 1981
ANNUAL RUNOFF (CFSM)							107		(a)				Sep 6 1955
ANNUAL RUNOFF (INCHES)							.93				.88		
10 PERCENT EXCEEDS	614						12.60				11.98		
50 PERCENT EXCEEDS	228						784				750		
90 PERCENT EXCEEDS	126						242				280		
							146				117		

(a) Sept. 8, 10.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE1/4 SE1/4 sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Van Dyke Road, 1.4 mi north of Romeo.

DRAINAGE AREA.--21.8 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 780 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by lakes upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SUM
1	6.5	4.8	6.5	8.3	e7.0	20	7.1	13	11	12	23	5.8
2	5.9	6.6	6.2	8.6	e7.0	18	6.8	13	11	10	29	5.6
3	6.0	8.1	6.1	9.0	e6.8	16	7.3	12	9.1	18	26	5.6
4	7.8	7.5	5.9	11	e6.8	14	8.3	11	8.3	18	19	5.4
5	7.0	6.7	8.1	10	e6.8	14	8.3	9.7	8.1	14	15	5.1
6	6.1	6.2	13	9.4	e6.7	12	8.1	9.0	8.4	12	17	4.9
7	5.5	5.9	10	9.0	e6.7	12	7.2	8.2	8.7	12	16	4.8
8	5.3	5.6	9.0	e9.5	e6.6	12	10	7.7	6.9	11	14	5.0
9	5.2	5.7	8.1	11	e6.6	11	10	13	5.9	10	16	4.8
10	5.2	5.4	7.8	15	e6.6	10	10	42	6.8	9.6	21	12
11	5.1	5.3	7.2	14	e6.6	9.3	9.5	26	6.0	8.8	18	33
12	5.0	5.1	7.1	12	e6.7	8.3	9.3	20	6.1	7.8	16	45
13	5.5	5.1	7.1	e11	e6.7	8.2	9.0	18	24	7.1	14	29
14	7.0	4.9	9.9	e10	e6.8	8.4	8.5	17	31	7.0	13	27
15	6.3	4.8	15	e9.5	e6.8	8.4	8.1	17	22	7.7	13	35
16	5.9	4.6	14	e9.2	e7.0	11	7.3	18	14	10	12	25
17	5.9	4.6	e11	e9.0	e7.0	10	7.3	19	11	9.1	13	19
18	5.7	4.6	e12	e8.5	e7.0	9.2	7.2	31	10	7.3	13	17
19	5.6	5.0	15	e8.4	e7.2	8.9	7.0	73	9.4	6.4	12	15
20	5.3	6.8	e12	e8.1	e7.5	11	22	63	8.4	6.0	11	14
21	5.2	6.2	e11	e7.8	e8.0	11	38	52	9.6	5.5	9.6	14
22	5.1	5.9	e11	e7.8	8.6	9.8	26	48	8.5	5.2	8.8	13
23	5.0	5.6	e10	e7.6	14	9.3	24	51	7.2	4.9	10	128
24	5.0	6.7	e10	e7.4	21	9.1	22	43	6.7	4.5	9.1	125
25	4.9	5.9	e9.5	e7.2	25	9.7	20	32	49	4.2	8.3	84
26	4.8	5.9	e8.5	e7.2	23	9.3	18	25	32	4.0	7.7	68
27	4.6	6.3	e8.5	e7.2	27	9.9	16	20	19	3.9	7.4	59
28	4.9	6.9	e8.3	e7.0	24	9.3	14	18	15	5.0	7.1	51
29	4.9	7.1	e8.2	e7.0	21	8.7	13	16	14	8.5	6.8	45
30	4.9	6.7	e8.0	e7.0	---	7.9	12	14	13	30	6.3	39
31	4.9	---	e8.0	e7.0	---	7.4	---	12	---	48	6.0	---
TOTAL	172.0	176.5	292.0	280.7	308.5	333.1	383.3	771.6	400.1	327.5	418.1	944.0
MEAN	5.55	5.88	9.42	9.05	10.6	10.7	12.8	24.9	13.3	10.6	13.5	31.5
MAX	7.8	8.1	15	15	27	20	38	73	49	48	29	128
MIN	4.6	4.6	5.9	7.0	6.6	7.4	6.8	7.7	5.9	3.9	6.0	4.8
CFSM	.25	.27	.43	.42	.49	.49	.59	1.14	.61	.48	.62	1.44
IN.	.29	.30	.50	.48	.53	.57	.65	1.32	.68	.56	.71	1.61

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2000, BY WATER YEAR (WY)

	MEAN	10.0	13.7	15.0	14.9	18.8	31.7	30.8	19.3	13.9	9.08	7.21	9.14
MAX	35.1	45.0	35.7	42.6	54.0	67.9	71.4	52.2	52.9	22.9	35.0	57.3	
(WY)	1987	1986	1988	1973	1968	1976	1975	1974	1989	1969	1975	1985	
MIN	1.92	2.32	1.64	2.89	2.93	7.81	12.8	7.77	2.76	2.07	1.30	2.02	
(WY)	1964	1964	1964	1959	1964	1964	2000	1977	1963	1964	1965	1966	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1958 - 2000
ANNUAL TOTAL	3958.9	4807.4	
ANNUAL MEAN	10.8	13.1	16.1
HIGHEST ANNUAL MEAN			29.0
LOWEST ANNUAL MEAN			4.99
HIGHEST DAILY MEAN	110	128	302
LOWEST DAILY MEAN	2.6	3.9	.90
ANNUAL SEVEN-DAY MINIMUM	2.8	4.5	.99
INSTANTANEOUS PEAK FLOW		183	(a)358
INSTANTANEOUS PEAK STAGE		3.77	(b)4.56
INSTANTANEOUS LOW FLOW		3.5	(c)
ANNUAL RUNOFF (CFSM)	.50	.60	.74
ANNUAL RUNOFF (INCHES)	6.76	8.20	10.04
10 PERCENT EXCEEDS	20	24	32
50 PERCENT EXCEEDS	7.0	8.8	11
90 PERCENT EXCEEDS	3.4	5.3	3.4

(a) Gage height 4.48 ft.

(b) Backwater from ice.

(c) July 27, 28.

(d) July 30, 31, 1964, Aug. 6, 7, 1965.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE1/4 sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank at downstream side of bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1958 to current year.

REVISED RECORDS.--WDR MI-83-1: 1982.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 735 ft above sea level, from topographic map.

REMARKS.--Records good except for daily discharges below 1.0 ft<sup>3</sup>/s, which are poor. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.39	.22	.27	e.40	e.70	8.4	.89	3.2	1.2	2.0	18	.54
2	.49	1.2	.27	.53	e.75	6.3	.88	3.4	1.4	1.8	36	.50
3	.72	.61	.28	.72	e.80	4.6	.95	2.4	1.1	5.0	148	.49
4	.66	.65	.31	1.0	e.80	3.8	1.0	2.0	.91	5.4	31	.59
5	.31	.42	.98	.86	e.82	3.4	.93	1.9	.91	3.5	18	.50
6	.33	.39	.89	.71	e.85	2.9	.88	1.6	.88	2.0	11	.50
7	.35	.31	.89	.65	e.85	2.5	1.1	1.4	.73	1.6	8.5	.50
8	.33	.20	.88	.55	e.85	2.1	1.7	1.3	.61	1.2	5.3	.70
9	.42	.16	.85	1.2	e.82	2.0	1.9	3.1	.50	1.5	29	.82
10	.48	.20	.82	2.0	e.80	1.8	1.9	1.7	.43	1.6	33	4.4
11	.47	.28	.73	3.3	e.80	1.5	2.0	21	.65	1.1	9.0	5.2
12	.48	.28	.64	2.5	e.80	1.4	2.0	16	.68	.83	4.6	17
13	.85	.28	.55	1.8	e.75	1.3	1.9	13	6.6	.67	2.9	19
14	.30	.31	1.4	1.3	e.75	1.2	1.6	6.9	18	1.2	2.2	15
15	.09	.29	2.7	1.1	e.75	1.3	1.6	4.0	23	1.1	1.7	24
16	.10	.29	6.0	e.90	e.75	1.7	1.6	3.2	6.0	.99	1.4	17
17	.13	.29	4.5	e.80	e.75	1.5	1.5	3.1	3.3	.78	1.6	8.1
18	.12	.32	2.5	e.70	e.80	1.3	1.3	50	2.5	.68	1.5	4.9
19	.35	.45	1.7	e.65	e.80	1.4	1.1	221	1.8	.65	1.2	4.0
20	.36	.33	1.6	e.63	e.85	1.7	23	93	1.5	.56	.95	3.3
21	.28	.22	1.3	e.60	e.90	1.9	86	40	1.7	.53	.78	2.6
22	.33	.22	.99	e.60	e.15	1.6	38	23	1.3	.50	.84	2.4
23	.34	.26	e.70	e.58	6.8	1.6	20	15	.92	.39	1.1	320
24	.28	.49	e.55	e.58	21	1.5	12	11	.87	.35	.78	140
25	.28	.36	e.50	e.58	30	1.4	8.3	6.4	119	.33	.64	63
26	.28	.42	e.45	e.58	28	1.4	6.1	4.3	35	.32	.60	39
27	.22	.35	e.40	e.58	28	1.4	4.6	3.0	12	.35	.60	25
28	.24	.31	e.38	e.60	24	1.4	3.7	2.4	5.7	3.9	.58	12
29	.29	.28	e.35	e.60	13	1.2	3.1	2.0	3.8	20	.58	7.5
30	.28	.28	e.35	e.63	---	1.1	2.6	1.6	2.7	31	.60	5.8
31	.29	---	e.37	e.65	---	.95	---	1.3	---	32	.57	---
TOTAL	10.84	10.67	35.10	28.88	169.04	67.55	234.13	578.5	255.69	123.83	372.52	744.34
MEAN	.35	.36	1.13	.93	5.83	2.18	7.80	18.7	8.52	3.99	12.0	24.8
MAX	.85	1.2	6.0	3.3	30	8.4	86	221	119	32	148	320
MIN	.09	.16	.27	.40	.70	.95	.88	1.3	.43	.32	.57	.49
CFSM	.03	.03	.09	.07	.45	.17	.60	1.44	.66	.31	.92	1.91
IN.	.03	.03	.10	.08	.48	.19	.67	1.66	.73	.35	1.07	2.13

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2000, BY WATER YEAR (WY)

MEAN	2.15	5.03	7.98	6.68	11.2	23.9	15.5	5.88	4.47	1.88	1.45	2.47
MAX	24.1	43.3	35.7	37.6	60.3	75.2	47.1	23.5	21.9	19.7	12.3	33.9
(WY)	1982	1986	1973	1974	1976	1982	1967	1974	1989	1967	1975	1985
MIN	.047	.088	.074	.078	.087	.23	.83	.61	.059	.047	.055	.056
(WY)	1964	1964	1964	1961	1964	1964	1964	1977	1964	1964	1963	1964

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1959 - 2000

ANNUAL TOTAL	1532.64	2631.09	
ANNUAL MEAN	4.20	7.19	
HIGHEST ANNUAL MEAN			7.36
LOWEST ANNUAL MEAN			14.9
HIGHEST DAILY MEAN			.36
LOWEST DAILY MEAN	172	320	497
ANNUAL SEVEN-DAY MINIMUM	.09	.09	.00
INSTANTANEOUS PEAK FLOW	.10	.20	.00
INSTANTANEOUS PEAK STAGE		544	910
ANNUAL RUNOFF (CFSM)	.32	5.77	6.69
ANNUAL RUNOFF (INCHES)	4.39	.55	.57
10 PERCENT EXCEEDS	6.5	7.53	7.69
50 PERCENT EXCEEDS	.72	17	15
90 PERCENT EXCEEDS	.15	1.1	1.0
		.31	.11

(a) Jan. 25 to Feb. 9, 1961, result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW1/4 sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on State Highway 59, 2 mi north of Mount Clemens, and 3.6 mi upstream from mouth.

DRAINAGE AREA.--199 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949 and Oct. 3, 1997 to Apr. 22, 1998, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at times by mill upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft, from floodmark.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	e11	20	e22	e20	208	38	68	58	78	872	25
2	23	e13	19	24	e20	157	35	77	54	62	740	23
3	17	e16	21	27	e20	122	35	91	48	126	e500	24
4	18	e21	21	33	e20	91	34	78	44	166	e400	24
5	20	e20	23	40	e21	82	37	67	38	168	e300	22
6	18	e19	35	40	e21	75	37	59	37	93	e230	19
7	17	e19	60	36	e22	68	35	53	37	65	e170	16
8	13	e18	58	30	e22	65	36	47	34	54	e120	16
9	14	e17	45	31	e20	63	47	45	28	47	e90	18
10	14	e17	38	49	e21	57	58	98	24	46	e130	32
11	13	e17	33	72	e21	51	57	326	23	51	e320	143
12	12	e17	31	75	e21	46	56	367	23	40	202	289
13	13	17	28	e60	e21	43	56	244	28	33	102	286
14	12	16	33	e50	e21	43	54	200	107	28	76	232
15	17	15	53	e40	e20	43	50	121	194	30	65	254
16	16	16	91	47	e20	44	45	88	201	39	59	305
17	16	15	e85	37	e20	56	41	85	111	43	53	218
18	16	15	e55	28	e20	55	38	103	68	40	58	124
19	14	15	47	30	e20	47	36	526	56	31	61	85
20	15	15	59	e28	e20	48	100	1530	48	26	52	69
21	14	19	39	e25	e21	63	349	1490	44	23	43	62
22	12	24	e35	e23	24	73	813	691	45	21	38	59
23	11	23	e30	e22	48	68	667	353	38	19	49	148
24	12	21	e28	e21	154	60	378	284	33	17	62	e2500
25	12	20	e25	e20	280	57	224	231	177	16	47	e1500
26	11	22	e24	e20	389	54	160	157	533	14	38	e200
27	10	21	e22	e19	391	51	120	109	682	e13	33	591
28	e11	21	e20	e19	347	49	98	90	335	61	32	371
29	e12	21	e18	e18	294	49	85	82	141	389	31	278
30	e12	21	e19	e18	---	45	74	73	96	589	30	242
31	e11	---	e20	e19	---	41	---	65	---	828	26	---
TOTAL	452	542	1135	1023	2359	2074	3893	7898	3385	3256	5029	8275
MEAN	14.6	18.1	36.6	33.0	81.3	66.9	130	255	113	105	162	296
MAX	26	24	91	75	391	208	813	1530	682	828	872	2500
MIN	10	11	18	18	20	41	34	45	23	13	26	16
CFSM	.07	.09	.18	.17	.41	.34	.65	1.28	.57	.53	.82	1.49
IN.	.08	.10	.21	.19	.44	.39	.73	1.48	.63	.61	.94	1.66

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 2000, BY WATER YEAR (WY)

MEAN	49.0	88.6	132	131	201	352	266	140	80.5	35.4	27.1	47.9
MAX	479	595	460	507	766	928	560	790	448	127	247	484
(WY)	1982	1986	1968	1974	1976	1982	1975	1956	1996	1992	1975	1985
MIN	3.71	7.12	5.63	5.55	8.77	29.6	72.6	25.9	7.08	3.44	2.14	3.12
(WY)	1964	1964	1959	1961	1963	1964	1963	1958	1988	1955	1955	1963

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1947 - 2000
ANNUAL TOTAL	25857.1	39921	
ANNUAL MEAN	70.8	109	128
HIGHEST ANNUAL MEAN			230
LOWEST ANNUAL MEAN			25.4
HIGHEST DAILY MEAN	1870	2500	5040
LOWEST DAILY MEAN	1.3	10	.09
ANNUAL SEVEN-DAY MINIMUM	2.6	11	.10
INSTANTANEOUS PEAK FLOW		(e)2700	6700
INSTANTANEOUS PEAK STAGE			18.62
INSTANTANEOUS LOW FLOW		9.3	.08
ANNUAL RUNOFF (CFSM)	.36	.55	.64
ANNUAL RUNOFF (INCHES)	4.83	7.46	8.74
10 PERCENT EXCEEDS	154	281	307
50 PERCENT EXCEEDS	24	40	41
90 PERCENT EXCEEDS	8.1	16	7.5

(a) Part of each day July 4-10, 14, 15, 1988.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Moravian Drive, 0.2 mi downstream from North Branch, and 0.5 mi west of Mount Clemens.

DRAINAGE AREA.--734 mi<sup>2</sup>.

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder and acoustic doppler current meter. Datum of gage is 570.43 ft above sea level. May 10, 1934 to Jan. 11, 1939, nonrecording gage at same site and datum. Mar. 15, 1938 to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi downstream from base gage at same datum. Jan. 4, 1952 to June 27, 2000, auxiliary water-stage recorder on right bank 2.0 mi downstream from base gage at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	411	187	175	218	e180	686	e170	505	539	638	e3400	219
2	269	389	167	219	e180	548	e160	719	510	e520	e2500	195
3	273	624	149	316	e190	486	e170	504	474	1730	e2400	169
4	711	330	e150	614	e200	429	e180	420	415	1310	e2000	176
5	411	288	511	348	e200	383	e180	384	396	761	e1300	166
6	292	281	1280	235	e190	356	e170	356	421	546	e1700	147
7	256	236	567	176	e190	321	e200	334	304	451	e1500	140
8	247	237	391	186	e180	308	352	321	270	398	1200	135
9	289	232	314	359	e190	297	308	427	247	536	754	202
10	231	227	273	734	e220	279	240	1680	232	1510	706	882
11	215	221	255	655	e200	262	289	1220	274	1070	820	2830
12	243	256	249	427	e180	226	286	1170	364	518	687	e3200
13	438	263	235	324	e160	230	222	925	530	403	521	e2500
14	597	231	696	259	e160	219	191	732	832	366	424	e1800
15	336	224	1050	e270	e160	289	169	646	e850	409	463	2000
16	267	211	900	e230	e170	540	151	618	702	364	449	1610
17	209	200	623	e230	e170	324	166	681	550	337	532	1130
18	208	200	469	e220	e170	265	162	921	530	323	580	844
19	210	241	384	e220	e180	241	145	3120	453	244	392	721
20	180	450	513	e230	e180	508	1620	3380	367	219	318	690
21	193	272	448	e210	e200	588	4220	2510	779	193	274	913
22	169	230	314	e210	217	374	2440	1660	432	167	257	580
23	151	213	253	e220	671	308	1620	1230	311	170	1590	1410
24	176	246	176	e220	848	280	1030	1060	321	168	844	2080
25	215	220	186	e200	1190	243	767	864	3590	174	481	3210
26	195	231	169	e180	973	196	675	716	4090	147	371	2210
27	192	231	165	e170	1100	274	636	667	2280	468	393	1410
28	214	171	203	e160	1010	253	565	706	1260	e1000	362	1010
29	211	152	248	e160	829	e220	460	679	852	e2500	341	828
30	201	165	260	e170	---	e200	397	558	996	e3500	302	678
31	183	---	231	e180	---	e180	---	535	---	e3700	251	---
TOTAL	8393	7659	12004	8550	10688	10313	18341	30248	24171	24840	28112	34085
MEAN	271	255	387	276	369	333	611	976	806	801	907	1136
MAX	711	624	1280	734	1190	686	4220	3380	4090	3700	3400	3210
MIN	151	152	149	160	160	180	145	321	232	147	251	135
CFSM	.37	.35	.53	.38	.50	.45	.83	1.33	1.10	1.09	1.24	1.55
IN.	.43	.39	.61	.43	.54	.52	.93	1.53	1.23	1.26	1.42	1.73

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1934 - 2000, BY WATER YEAR (WY)

	MEAN	311	416	533	557	752	1133	1051	691	485	307	259	282
MAX	1550	1492	1615	1739	2407	2255	3090	2747	1543	865	907	1144	
(WY)	1982	1986	1968	1993	1938	1982	1947	1943	1989	1969	2000	1975	
MIN	64.1	79.0	84.3	93.9	118	263	249	164	52.9	50.9	51.7	52.5	
(WY)	1935	1945	1945	1945	1940	1964	1946	1958	1934	1934	1934	1941	

## SUMMARY STATISTICS FOR 1999 CALENDAR YEAR FOR 2000 WATER YEAR WATER YEARS 1934 - 2000

	ANNUAL TOTAL	189084	217404	566
ANNUAL MEAN	518	594	929	1974
HIGHEST ANNUAL MEAN			230	1964
LOWEST ANNUAL MEAN			19200	Apr 6 1947
HIGHEST DAILY MEAN	6070	Apr 24	4220	Apr 21
LOWEST DAILY MEAN	130	Sep 20	135	Sep 8
ANNUAL SEVEN-DAY MINIMUM	143	Sep 14	161	Sep 2
INSTANTANEOUS PEAK FLOW			5170	Apr 21
INSTANTANEOUS PEAK STAGE			11.95	Apr 21
ANNUAL RUNOFF (CFSM)	.71		.81	(a)23.55
ANNUAL RUNOFF (INCHES)	9.58		11.02	.77
10 PERCENT EXCEEDS	992		1300	10.47
50 PERCENT EXCEEDS	301		321	330
90 PERCENT EXCEEDS	171		170	120

(a) From floodmark.

(e) Estimated.



## STREAMS TRIBUTARY TO DETROIT RIVER

## 04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW1/4 sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 75 ft downstream from mouth of Quarton Lake outlet, and 100 ft upstream from bridge on Maple Road in Birmingham.

DRAINAGE AREA.--33.3 mi<sup>2</sup>. Prior to water year 1971, drainage area was 36.9 mi<sup>2</sup>. An area of 3.6 mi<sup>2</sup> noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft above sea level.

REMARKS.--Records good. Occasional regulation by Quarton Lake upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	5.8	7.6	9.6	9.8	28	12	24	17	25	52	14
2	10	20	8.0	11	9.5	24	12	28	18	21	155	14
3	13	25	8.2	15	10	21	12	18	15	172	118	13
4	29	12	8.2	28	11	20	13	15	14	50	44	12
5	14	9.2	42	17	11	20	12	14	16	31	31	9.9
6	9.9	8.0	64	13	10	19	11	14	20	26	125	9.2
7	8.4	7.1	25	12	10	18	12	13	16	23	57	8.4
8	9.1	7.6	16	11	9.7	17	20	12	15	21	36	8.0
9	10	8.4	15	18	10	17	17	25	14	49	30	8.0
10	9.1	8.5	13	31	12	15	14	161	13	59	25	164
11	7.7	7.7	11	25	11	15	15	45	23	34	22	208
12	7.0	7.8	10	16	11	14	15	33	24	25	19	261
13	10	7.2	10	14	11	14	13	26	56	22	18	65
14	15	7.6	31	16	10	14	12	19	35	25	18	75
15	10	7.4	49	14	10	17	11	17	29	29	20	77
16	8.0	7.0	35	13	11	31	11	20	19	19	19	44
17	7.7	6.0	20	11	10	18	10	26	17	17	27	36
18	7.3	6.8	15	11	11	14	10	57	19	15	26	32
19	7.0	8.4	13	12	12	14	9.8	216	17	14	19	30
20	7.2	19	19	12	11	24	185	63	16	14	17	29
21	7.0	12	17	11	11	26	162	36	37	13	15	30
22	6.8	8.8	13	9.7	16	19	57	29	16	10	17	27
23	6.3	8.4	13	9.9	45	15	34	34	12	9.4	148	70
24	5.8	12	12	10	55	15	26	27	14	8.9	38	35
25	5.6	11	12	9.8	65	14	23	21	405	8.5	24	29
26	5.7	9.6	11	9.8	35	14	19	19	86	7.9	21	25
27	5.8	9.9	11	9.8	53	18	17	18	52	9.0	21	22
28	5.8	8.8	9.4	9.8	40	17	16	32	35	64	19	20
29	5.8	8.4	9.8	9.8	30	14	14	28	33	77	17	19
30	6.4	7.6	9.9	9.8	---	13	14	21	36	270	15	19
31	5.9	---	9.8	9.8	---	12	---	20	---	127	14	---
TOTAL	279.3	293.0	547.9	418.8	561.0	551	808.8	1131	1139	1295.7	1227	1413.5
MEAN	9.01	9.77	17.7	13.5	19.3	17.8	27.0	36.5	38.0	41.8	39.6	47.1
MAX	29	25	64	31	65	31	185	216	405	270	155	261
MIN	5.6	5.8	7.6	9.6	9.5	12	9.8	12	12	7.9	14	8.0
CFSM	.27	.29	.53	.41	.58	.53	.81	1.10	1.14	1.26	1.19	1.41
IN.	.31	.33	.61	.47	.63	.62	.90	1.26	1.27	1.45	1.37	1.58

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 2000, BY WATER YEAR (WY)

	MEAN	12.1	16.5	20.1	20.0	24.9	39.1	36.2	26.6	20.3	13.7	11.3	11.7
MAX	50.7	47.7	51.5	56.0	71.5	82.5	63.6	98.1	84.0	48.2	39.6	47.1	47.1
(WY)	1982	1993	1988	1993	1976	1982	1974	1956	1989	1968	2000	2070	2070
MIN	1.48	2.11	1.88	2.18	2.21	7.59	10.4	5.82	4.33	1.42	1.58	1.42	1.42
(WY)	1965	1965	1964	1963	1963	1964	1963	1958	1966	1966	1954	1973	1973

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1950 - 2070

ANNUAL TOTAL	7845.0	9666.0	
ANNUAL MEAN	21.5	26.4	(a)21.1
HIGHEST ANNUAL MEAN			35.7
LOWEST ANNUAL MEAN			4.55
HIGHEST DAILY MEAN	373	405	902
LOWEST DAILY MEAN	4.4	5.6	20
ANNUAL SEVEN-DAY MINIMUM	4.8	5.8	34
INSTANTANEOUS PEAK FLOW		708	1390
INSTANTANEOUS PEAK STAGE		5.78	8.70
INSTANTANEOUS LOW FLOW		5.1	10
ANNUAL RUNOFF (CFSM)	.65	.79	.63
ANNUAL RUNOFF (INCHES)	8.76	10.80	8.59
10 PERCENT EXCEEDS	35	49	43
50 PERCENT EXCEEDS	14	15	13
90 PERCENT EXCEEDS	6.9	8.1	3.2

(a) Annual mean, water years 1951-70, 15.3 ft<sup>3</sup>/s, 5.63 in/yr; water years 1971-00, 24.9 ft<sup>3</sup>/s, 10.15 in/yr.

(b) Aug. 8, 9, 1963.

(c) Estimated.

## STREAMS TRIBUTARY TO DETROIT RIVER

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW1/4 sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road in Southfield.

DRAINAGE AREA.--87.9 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft above sea level (City of Southfield bench mark). Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	21	21	e27	e25	71	31	77	52	73	130	34
2	29	50	21	32	e26	64	30	92	51	62	188	32
3	31	78	22	48	e27	54	31	64	44	797	321	31
4	90	39	23	96	e28	51	33	53	39	191	113	30
5	45	26	111	58	e29	47	31	46	47	106	85	27
6	29	23	216	39	e27	44	29	43	61	86	334	25
7	24	22	91	34	e26	42	29	39	42	74	162	23
8	32	22	57	e31	e26	41	64	36	36	63	99	23
9	41	22	45	54	e27	40	52	68	33	58	82	24
10	27	22	40	90	e31	37	41	561	30	117	69	488
11	24	23	34	81	e30	35	45	152	54	81	60	777
12	21	21	30	54	e29	33	45	111	71	60	52	760
13	33	21	29	e40	e28	32	37	91	122	52	46	206
14	48	21	92	e43	e27	33	34	66	99	47	44	201
15	32	20	139	e37	e26	44	31	54	87	63	55	249
16	26	20	109	e34	e29	84	30	59	53	47	50	119
17	23	20	69	e30	e27	55	29	81	42	82	95	95
18	23	19	47	e30	e29	40	27	147	50	35	77	e84
19	22	22	45	e32	e31	38	27	694	41	32	50	e78
20	21	61	59	e32	e30	73	464	287	36	31	42	e72
21	22	37	55	e30	e29	86	724	119	187	29	37	74
22	22	27	48	e29	e50	58	205	95	60	26	35	61
23	21	24	36	e28	131	47	119	98	39	23	282	158
24	21	38	30	e27	177	42	93	86	42	22	103	95
25	20	29	30	e27	169	41	79	71	1120	21	66	71
26	20	31	30	e26	101	38	68	58	400	20	54	62
27	20	31	29	e26	139	51	58	53	170	20	76	53
28	21	25	25	e25	107	47	53	99	108	53	49	49
29	21	23	e30	e25	79	39	48	89	92	164	43	45
30	22	22	e29	e25	---	35	44	62	92	544	40	43
31	22	---	e28	e25	---	32	---	56	---	479	36	---
TOTAL	899	860	1670	1215	1540	1474	2631	3707	3400	3516	2962	4089
MEAN	29.0	28.7	53.9	39.2	53.1	47.5	87.7	120	113	113	95.5	136
MAX	90	78	216	96	177	86	724	694	1120	797	334	777
MIN	20	19	21	25	25	32	27	36	30	20	35	23
CFSM	.33	.33	.61	.45	.60	.54	1.00	1.36	1.29	1.29	1.09	1.55
IN.	.38	.36	.71	.51	.65	.62	1.11	1.57	1.44	1.49	1.25	1.73

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2000, BY WATER YEAR (WY)

	MEAN	42.4	57.5	67.5	65.4	81.6	131	118	80.2	67.6	42.5	39.1	40.7
MAX	207	164	178	203	254	327	225	191	241	118	142	147	147
(WY)	1982	1993	1988	1993	1976	1982	1977	1983	1989	1968	1995	1986	1986
MIN	4.08	7.24	6.92	8.95	9.14	38.9	38.5	19.6	13.7	5.52	3.77	3.37	3.37
(WY)	1964	1964	1964	1961	1963	1964	1963	1958	1971	1964	1963	1963	1963

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1958 - 2000

ANNUAL TOTAL	24986	27963	69.8	1993
ANNUAL MEAN	68.5	76.4	105	1964
HIGHEST ANNUAL MEAN			20.4	1964
LOWEST ANNUAL MEAN			3210	Jun 26 1968
HIGHEST DAILY MEAN	1060	Apr 23	19	Nov 18
LOWEST DAILY MEAN	14	Sep 20	20	Nov 12
ANNUAL SEVEN-DAY MINIMUM	17	Sep 14	1520	Jun 25
INSTANTANEOUS PEAK FLOW			12.46	Jun 25
INSTANTANEOUS PEAK STAGE			19	(a)
INSTANTANEOUS LOW FLOW			.87	.79
ANNUAL RUNOFF (CFSM)	.78		11.83	10.78
ANNUAL RUNOFF (INCHES)	10.57		124	135
10 PERCENT EXCEEDS	123		42	39
50 PERCENT EXCEEDS	41		23	12
90 PERCENT EXCEEDS	21			

(a) Oct. 26, Nov. 17, 18, July 27.

(e) Estimated.



## STREAMS TRIBUTARY TO DETROIT RIVER

04166100 RIVER ROUGE AT SOUTHFIELD, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	14.5	12.5	13.0
2	---	---	---	---	---	---	---	---	---	15.0	11.0	13.0
3	---	---	---	---	---	---	---	---	---	16.5	13.0	14.5
4	---	---	---	---	---	---	---	---	---	18.0	14.0	16.0
5	---	---	---	---	---	---	---	---	---	20.0	16.5	18.0
6	---	---	---	---	---	---	---	---	---	21.0	18.0	19.5
7	---	---	---	---	---	---	---	---	---	21.5	19.0	20.0
8	---	---	---	---	---	---	---	---	---	22.0	19.5	20.5
9	---	---	---	---	---	---	---	---	---	21.0	18.5	20.5
10	---	---	---	---	---	---	---	---	---	19.0	17.0	17.5
11	---	---	---	---	---	---	---	---	---	17.0	15.5	16.0
12	---	---	---	---	---	---	---	---	---	18.0	15.5	16.5
13	---	---	---	---	---	---	---	---	---	19.0	17.0	18.0
14	---	---	---	---	---	---	13.0	7.5	10.0	17.0	13.5	15.0
15	---	---	---	---	---	---	16.5	11.0	13.5	14.5	12.0	13.0
16	---	---	---	---	---	---	15.0	12.5	13.5	13.5	12.0	12.5
17	---	---	---	---	---	---	12.5	10.5	11.5	15.5	12.0	13.5
18	---	---	---	---	---	---	12.5	9.5	10.5	15.5	13.5	15.0
19	---	---	---	---	---	---	11.5	10.5	11.0	13.5	11.5	12.5
20	---	---	---	---	---	---	11.0	9.5	10.0	14.0	11.5	12.5
21	---	---	---	---	---	---	10.5	9.5	10.0	15.0	13.0	14.0
22	---	---	---	---	---	---	11.0	9.0	10.0	16.0	14.5	15.0
23	---	---	---	---	---	---	12.5	9.0	10.5	16.5	15.5	16.0
24	---	---	---	---	---	---	14.5	11.0	12.5	17.0	16.0	16.5
25	---	---	---	---	---	---	14.0	11.0	12.5	17.0	15.5	16.5
26	---	---	---	---	---	---	14.0	10.0	12.0	16.5	14.5	15.5
27	---	---	---	---	---	---	14.5	10.5	12.5	16.5	15.5	15.5
28	---	---	---	---	---	---	14.5	11.0	13.0	15.5	14.0	14.5
29	---	---	---	---	---	---	15.5	11.5	13.5	16.0	14.0	15.0
30	---	---	---	---	---	---	16.0	12.5	14.0	17.0	15.0	16.0
31	---	---	---	---	---	---	---	---	---	18.0	16.5	17.5
MONTH	---	---	---	---	---	---	---	---	---	22.0	11.0	15.8

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.0	17.5	18.5	20.5	19.0	20.0	21.5	20.5	21.0	23.0	21.0	22.0
2	20.0	18.5	19.5	21.5	19.5	20.5	21.5	20.5	21.0	23.0	22.0	22.5
3	18.5	16.0	16.5	22.0	20.5	21.5	21.5	20.0	21.0	22.5	21.5	22.0
4	16.0	14.5	15.5	22.0	20.5	21.5	20.0	19.0	19.5	22.0	18.5	20.5
5	15.5	14.0	14.5	22.0	21.0	21.5	20.5	19.0	20.0	18.5	16.0	17.0
6	15.5	13.0	14.5	21.5	19.5	20.5	21.0	19.5	20.0	17.0	15.0	16.0
7	17.5	14.0	16.0	20.0	18.5	19.0	22.0	20.5	21.0	17.5	15.0	16.0
8	19.5	17.0	18.0	19.5	18.0	18.5	22.5	21.0	22.0	20.0	17.0	18.0
9	21.5	19.0	20.0	19.5	18.0	19.0	23.0	22.0	22.5	21.0	19.0	20.0
10	22.5	20.0	21.0	21.0	19.5	21.0	23.0	21.5	22.0	21.5	20.0	21.0
11	23.5	21.5	22.0	21.0	20.0	20.5	22.0	20.5	21.0	21.0	20.5	21.0
12	22.5	19.0	20.5	20.5	19.0	19.5	21.0	19.0	20.0	21.0	20.0	20.5
13	20.0	18.0	19.0	20.5	18.0	19.5	20.0	19.0	19.5	20.0	18.5	19.0
14	22.0	20.0	21.0	21.5	20.0	21.0	21.0	19.0	20.0	18.5	17.0	17.5
15	21.5	21.0	21.5	21.0	20.0	20.5	22.0	20.5	21.0	17.0	16.0	16.5
16	21.5	19.5	20.5	21.0	19.5	20.5	22.0	20.5	21.0	16.0	14.5	15.0
17	21.5	20.0	20.5	22.0	19.5	20.5	20.5	18.5	19.0	15.5	14.0	15.0
18	20.5	18.0	19.0	21.5	19.5	20.5	19.0	18.0	18.5	---	---	---
19	20.0	17.0	18.5	19.5	18.5	19.0	19.0	17.5	18.5	---	---	---
20	20.5	18.0	19.5	19.5	17.5	18.5	18.0	16.5	17.5	---	---	---
21	21.5	20.0	21.0	19.5	18.5	19.0	17.5	16.0	17.0	17.5	15.0	16.5
22	21.0	19.5	20.0	18.5	17.5	18.0	19.0	16.5	17.5	15.0	14.0	14.5
23	20.5	18.5	19.5	19.0	17.0	18.0	21.0	18.5	20.0	16.5	14.5	15.5
24	21.0	19.5	20.0	19.5	17.0	18.0	21.0	20.5	21.0	16.5	14.5	15.5
25	22.0	20.5	21.0	19.0	17.0	18.0	20.5	19.5	20.0	14.5	13.0	13.5
26	22.5	21.5	22.0	20.5	18.0	19.0	21.0	19.5	20.5	13.5	12.0	13.0
27	22.5	21.0	21.5	21.5	19.0	20.5	21.0	20.0	20.5	14.0	12.5	13.5
28	21.0	19.5	20.0	21.5	20.0	21.0	21.0	20.0	20.5	14.0	12.0	13.0
29	20.0	19.0	19.5	21.0	20.5	20.5	21.5	20.0	21.0	12.5	11.0	11.5
30	20.0	18.5	19.0	21.0	20.5	21.0	22.5	21.0	21.5	13.0	11.0	12.0
31	---	---	---	21.0	21.0	21.0	22.5	21.0	22.0	---	---	---
MONTH	23.5	13.0	19.3	22.0	17.0	19.9	23.0	16.0	20.2	---	---	---



## STREAMS TRIBUTARY TO DETROIT RIVER

## 04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE1/4 sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 70 ft upstream from bridge on Nine Mile Road in Southfield, 1.6 mi upstream from mouth.

DRAINAGE AREA.--9.49 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1958 to current year.

REVISED RECORDS.--WSP 1912: 1963.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft above sea level (City of Southfield bench mark).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	e2.5	1.1	1.5	e1.8	4.0	1.7	30	3.0	2.7	7.1	2.0
2	3.2	32	.90	2.3	e1.6	3.2	1.8	4.8	2.9	8.6	82	2.0
3	6.8	5.1	.95	12	e1.7	2.9	1.9	3.5	2.0	218	16	2.0
4	18	1.9	1.1	8.5	e1.9	2.8	2.5	3.1	1.8	12	4.3	2.0
5	2.0	1.6	59	2.5	e1.9	2.6	1.7	3.0	10	6.7	3.3	1.9
6	1.9	1.6	20	1.9	e1.8	2.5	1.6	2.7	3.4	5.2	99	1.9
7	1.8	1.5	4.0	1.8	e1.7	2.4	6.8	2.7	2.0	4.1	14	1.9
8	8.3	1.4	2.5	1.6	e1.7	2.6	7.1	2.7	1.8	3.5	4.7	4.3
9	4.1	1.3	1.9	15	e1.8	3.1	2.8	45	1.8	3.4	3.8	3.8
10	1.9	1.5	2.6	13	e2.0	2.3	2.0	82	1.8	4.6	3.2	239
11	1.8	2.5	1.6	4.4	e1.9	2.1	5.2	7.2	38	3.9	2.6	38
12	e1.8	1.2	1.5	2.7	e1.9	1.9	2.5	17	3.9	2.4	2.5	47
13	e8.0	1.3	1.4	e2.3	e1.8	2.0	2.0	7.3	21	2.1	2.4	6.5
14	3.0	1.3	41	e2.0	e1.7	1.8	1.9	4.1	13	2.8	2.4	54
15	1.7	1.3	15	e1.8	e1.7	6.2	1.8	3.5	4.4	2.2	6.1	11
16	e1.7	1.3	6.6	e1.7	e1.8	13	1.7	10	2.6	1.7	2.1	5.3
17	e1.7	1.3	3.2	e1.6	e1.8	2.4	1.7	6.6	2.3	1.8	25	4.2
18	e1.6	1.2	2.3	e1.7	e1.9	2.0	1.9	81	7.5	1.7	3.0	3.6
19	e1.6	7.3	2.0	e1.8	e2.0	4.5	2.3	118	2.4	1.7	2.1	3.4
20	e1.6	7.1	9.5	e1.8	e1.9	16	273	12	13	1.6	1.7	7.8
21	e1.6	1.3	2.6	e1.5	e3.0	5.4	53	6.7	76	1.5	1.8	5.8
22	e1.6	1.2	1.9	1.4	9.7	3.3	17	5.3	3.1	1.4	3.1	3.2
23	e1.6	1.3	1.7	e1.5	20	2.8	8.8	5.3	2.5	1.3	104	40
24	e1.6	5.8	1.5	e1.5	24	2.6	6.6	4.0	9.2	1.4	4.0	4.7
25	e1.5	1.2	1.4	e1.4	12	2.8	5.5	3.3	208	1.3	2.9	3.3
26	e1.5	3.3	1.5	e1.4	6.4	2.2	4.5	3.0	20	1.2	6.6	3.0
27	e1.5	1.6	1.4	e1.3	22	7.0	4.1	2.8	7.9	1.4	11	2.6
28	e1.5	1.1	1.3	e1.3	5.8	2.6	3.8	34	4.0	2.2	2.8	2.5
29	e1.5	1.1	1.5	e1.4	4.0	2.3	3.4	4.2	6.6	10	2.4	2.4
30	e1.5	1.0	1.7	e1.7	---	1.9	3.2	3.0	4.2	190	2.2	2.3
31	e1.5	---	1.8	e2.3	---	1.7	---	4.1	---	7.4	2.0	---
TOTAL	91.5	95.1	196.45	98.6	143.2	114.9	433.8	521.9	480.1	529.6	430.1	511.4
MEAN	2.95	3.17	6.34	3.18	4.94	3.71	14.5	16.8	16.0	17.1	13.9	17.0
MAX	18	32	59	15	24	16	273	118	208	218	104	239
MIN	1.5	1.0	.90	1.3	1.6	1.7	1.6	2.7	1.8	1.2	1.7	1.9
CFSM	.31	.33	.67	.34	.52	.39	1.52	1.77	1.69	1.80	1.46	1.80
IN.	.36	.37	.77	.39	.56	.45	1.70	2.05	1.88	2.08	1.69	2.00

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2000, BY WATER YEAR (WY)

	MEAN	5.88	7.61	8.69	7.50	9.73	14.0	13.6	9.51	9.88	7.40	7.22	6.63
MAX	23.3	19.8	25.4	26.7	32.1	32.6	27.4	27.1	30.5	23.7	22.4	20.0	
(WY)	1982	1993	1968	1974	1971	1974	1977	1968	1968	1992	1995	1986	
MIN	44	1.13	.71	.49	.79	3.71	3.27	2.35	1.68	.73	1.35	.58	
(WY)	1964	1964	1964	1963	1963	2000	1971	1962	1959	1962	1960	1965	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1958 - 2000

ANNUAL TOTAL	3367.85	3646.65	
ANNUAL MEAN	9.23	9.96	8.97
HIGHEST ANNUAL MEAN			16.9
LOWEST ANNUAL MEAN			3.12
HIGHEST DAILY MEAN	209	273	442
LOWEST DAILY MEAN	.90	.90	.00
ANNUAL SEVEN-DAY MINIMUM	1.0	1.0	.27
INSTANTANEOUS PEAK FLOW		761	(b)1200
INSTANTANEOUS PEAK STAGE		11.72	(c)15.03
ANNUAL RUNOFF (CFSM)	.97	1.05	.94
ANNUAL RUNOFF (INCHES)	13.20	14.29	12.84
10 PERCENT EXCEEDS	18	16	18
50 PERCENT EXCEEDS	2.9	2.5	3.4
90 PERCENT EXCEEDS	1.3	1.5	1.2

(a) June 13-15, 1986, result of regulation from unknown source.

(b) From rating curve extended above 410 ft<sup>3</sup>/s.

(c) From floodmark.

(e) Estimated.

## STREAMS TRIBUTARY TO DETROIT RIVER

## 04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW1/4 sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft downstream from bridge on Shiawassee Road in Farmington.

DRAINAGE AREA.--17.5 mi<sup>2</sup>.

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	TEMP
1	13	4.5	4.7	5.6	e5.6	15	6.9	18	11	12	34	5.3
2	8.7	9.1	4.8	6.6	e6.0	12	7.0	18	10	12	39	4.7
3	8.4	11	4.8	11	e6.5	10	6.8	12	8.7	161	47	4.6
4	20	6.8	5.2	21	e7.0	9.5	7.0	10	7.3	46	21	4.2
5	10	5.8	35	12	e6.7	9.3	6.6	9.2	9.8	22	13	3.7
6	7.7	5.4	58	8.7	e6.4	8.4	6.1	8.4	11	14	71	3.5
7	6.3	5.0	28	7.6	e6.2	8.2	6.6	7.5	7.4	10	43	3.6
8	7.5	4.8	16	6.4	e6.2	8.3	15	7.2	6.6	8.7	21	3.7
9	8.6	4.5	11	12	e6.5	8.1	12	36	6.1	8.4	14	4.0
10	6.4	4.5	9.9	22	e7.0	7.3	9.9	122	5.7	9.2	11	219
11	5.7	5.7	7.9	20	e7.4	6.8	11	43	9.5	9.2	9.5	258
12	5.2	4.9	7.2	12	e7.1	6.8	11	26	11	7.7	10	258
13	7.2	4.9	6.7	9.0	e6.8	6.9	9.1	19	42	6.8	8.6	86
14	8.5	4.9	25	10	e6.7	6.9	8.0	12	40	6.3	7.4	75
15	6.5	4.6	40	8.1	e6.6	9.8	7.6	9.9	22	6.8	18	74
16	5.9	4.5	31	7.1	e6.5	20	7.3	12	13	6.1	13	38
17	5.5	4.5	18	e7.0	e6.4	12	7.0	14	9.2	6.0	26	25
18	5.1	4.5	e10	e7.2	e6.3	9.5	6.5	44	9.9	5.4	22	19
19	4.9	6.3	e9.2	e7.4	e6.3	9.6	6.5	161	8.0	5.3	14	16
20	4.8	13	14	e7.6	e6.5	17	150	79	10	4.6	10	13
21	4.8	7.3	e10	e7.4	e7.0	20	137	38	38	4.5	8.2	13
22	4.8	5.9	e8.0	e6.4	e10	14	63	23	17	4.5	7.8	11
23	4.8	5.7	e7.0	e6.0	e35	11	37	24	13	4.1	56	38
24	4.8	7.8	e7.5	e5.8	53	11	22	19	17	3.7	25	23
25	4.5	6.2	e7.3	e5.7	54	12	16	14	381	3.7	14	16
26	4.6	6.9	e6.7	e5.6	30	11	13	11	138	3.6	10	12
27	4.4	6.7	e6.0	e5.5	43	12	11	9.0	56	3.7	11	11
28	4.6	5.6	e6.5	e5.4	27	9.7	9.8	23	30	21	8.1	9.4
29	4.7	5.2	e6.2	e5.4	18	8.8	9.0	20	20	49	7.1	8.9
30	4.6	4.9	5.9	e5.4	---	7.4	8.2	13	16	144	6.5	8.5
31	4.5	---	5.8	e5.4	---	7.1	---	11	---	86	5.9	---
TOTAL	207.0	181.4	423.3	272.3	407.7	325.4	633.9	873.2	984.2	695.3	612.1	1269.1
MEAN	6.68	6.05	13.7	8.78	14.1	10.5	21.1	28.2	32.8	22.4	19.7	42.3
MAX	20	13	58	22	54	20	150	161	381	161	71	258
MIN	4.4	4.5	4.7	5.4	5.6	6.8	6.1	7.2	5.7	3.6	5.9	3.5
CFSM	.38	.35	.78	.50	.80	.60	1.21	1.61	1.87	1.28	1.13	2.42
IN.	.44	.39	.90	.58	.87	.69	1.35	1.86	2.09	1.48	1.30	2.70

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2000, BY WATER YEAR (WY)

	MEAN	8.02	11.1	12.6	13.2	17.1	26.9	24.0	16.5	13.8	8.29	7.78	8.25
MAX	42.2	31.3	29.0	39.8	51.6	63.6	42.3	38.7	63.9	24.8	32.2	42.3	
(WY)	1982	1993	1991	1974	1976	1982	1977	1983	1989	1992	1998	2000	
MIN	1.10	1.69	1.70	2.06	2.20	6.81	9.10	3.46	2.13	1.00	.97	1.00	
(WY)	1965	1965	1964	1961	1963	1964	1971	1971	1971	1964	1963	1964	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR			FOR 2000 WATER YEAR			WATER YEARS 1958 - 2000		
ANNUAL TOTAL	6114.9			6884.9					
ANNUAL MEAN	16.8			18.8			14.0		
HIGHEST ANNUAL MEAN							22.6		
LOWEST ANNUAL MEAN							4.54		
HIGHEST DAILY MEAN	258			381			653		
LOWEST DAILY MEAN	3.0			3.5			.32		
ANNUAL SEVEN-DAY MINIMUM	3.1			3.9			.61		
INSTANTANEOUS PEAK FLOW				627			1500		
INSTANTANEOUS PEAK STAGE				6.34			8.70		
INSTANTANEOUS LOW FLOW							(a).07		
ANNUAL RUNOFF (CFSM)	.96			1.07			.80		
ANNUAL RUNOFF (INCHES)	13.00			14.64			10.89		
10 PERCENT EXCEEDS	31			38			29		
50 PERCENT EXCEEDS	9.9			8.7			7.6		
90 PERCENT EXCEEDS	4.6			4.8			2.3		

(a) Result of regulation.  
(e) Estimated.

## STREAMS TRIBUTARY TO DETROIT RIVER

04166470 UPPER RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°23'38", long 83°16'35", in SW1/4 NE1/4 sec.20, T.1 S., R.8 E., Wayne County, Hydrologic Unit 04090004, on left bank 1,000 ft upstream from bridge on Telegraph Road in Detroit.

DRAINAGE AREA.--67.3 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1997 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 605 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	14	13	e14	e13	40	17	68	47	36	116	17
2	28	44	12	e16	e14	34	17	70	28	35	288	16
3	34	53	12	36	e15	29	17	37	23	807	177	16
4	90	21	13	76	e16	27	20	29	20	262	66	15
5	33	15	121	39	e16	25	17	26	41	70	45	15
6	23	13	258	26	e15	23	15	23	63	51	303	12
7	19	11	78	21	e15	22	21	21	27	38	143	12
8	22	10	45	18	e15	24	57	19	21	31	67	12
9	37	10	34	39	e15	22	37	100	18	28	48	22
10	24	11	29	66	e16	19	25	554	15	38	37	405
11	19	30	25	57	e17	18	33	181	38	34	31	859
12	16	18	21	37	e16	17	32	117	53	24	26	596
13	39	13	20	28	e16	17	23	74	82	20	23	262
14	41	12	102	e25	e16	17	21	44	74	18	22	150
15	21	11	126	e20	e15	33	19	33	70	19	51	218
16	18	9.9	97	e18	e15	70	17	39	35	17	37	83
17	16	9.6	54	e17	e15	34	16	52	24	15	85	56
18	14	10	34	e16	e15	23	14	113	44	13	66	41
19	14	16	26	e17	e15	25	14	455	27	12	37	34
20	13	53	48	e17	e16	65	344	284	24	12	26	36
21	13	25	e32	e17	e18	71	657	85	193	11	21	33
22	14	18	e25	e16	e28	39	211	58	57	11	19	22
23	14	15	e22	e15	91	31	89	59	31	9.9	220	107
24	15	29	e20	e14	130	27	62	50	45	9.3	71	57
25	14	21	e19	e14	145	26	48	36	815	10	38	31
26	13	21	18	e13	71	26	38	29	501	9.4	36	23
27	12	26	e17	e13	115	36	34	27	145	8.7	109	20
28	14	17	e16	e13	75	30	30	84	68	78	39	15
29	13	14	e15	e13	47	26	28	62	61	154	26	13
30	15	13	e15	e13	---	21	25	38	57	388	22	11
31	13	---	e14	e13	---	18	---	38	---	384	19	---
TOTAL	709	583.5	1381	757	1026	935	1998	2905	2747	2653.3	2314	3209
MEAN	22.9	19.5	44.5	24.4	35.4	30.2	66.6	93.7	91.6	85.6	74.6	107
MAX	90	53	258	76	145	71	657	554	815	807	303	859
MIN	12	9.6	12	13	13	17	14	19	15	8.7	19	11
CFSM	.34	.29	.66	.36	.53	.45	.99	1.39	1.36	1.27	1.11	1.59
IN.	.39	.32	.76	.42	.57	.52	1.10	1.61	1.52	1.47	1.28	1.77

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 2000, BY WATER YEAR (WY)

	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
MEAN	28.5	24.1	36.6	59.9	69.6	70.2	90.5	63.5	66.9	55.0	72.8	49.4
MAX	33.9	32.7	44.5	83.8	122	132	113	93.7	91.6	85.6	118	107
(WY)	1999	1998	2000	1999	1998	1998	1999	2000	2000	2000	1998	2000
MIN	22.9	19.5	25.7	24.4	35.4	30.2	66.6	45.8	30.3	20.9	25.4	15.8
(WY)	2000	2000	1999	2000	2000	2000	2000	1998	1998	1998	1999	1998

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1998 - 2000

ANNUAL TOTAL	18941.3	21217.8	
ANNUAL MEAN	51.9	58.0	
HIGHEST ANNUAL MEAN			57.2
LOWEST ANNUAL MEAN			62.2
HIGHEST DAILY MEAN			51.3
LOWEST DAILY MEAN	757	859	1180
ANNUAL SEVEN-DAY MINIMUM	9.5	8.7	6.2
INSTANTANEOUS PEAK FLOW	11	9.9	7.1
INSTANTANEOUS PEAK STAGE		1100	1490
ANNUAL RUNOFF (CFSM)	.77	.86	.85
ANNUAL RUNOFF (INCHES)	10.47	11.73	11.54
10 PERCENT EXCEEDS	99	110	116
50 PERCENT EXCEEDS	25	25	26
90 PERCENT EXCEEDS	13	13	13

(e) Estimated.



[illegible]

## STREAMS TRIBUTARY TO DETROIT RIVER

04166470 UPPER RIVER ROUGE AT DETROIT, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	14.0	12.5	13.0
2	---	---	---	---	---	---	---	---	---	15.0	12.0	13.0
3	---	---	---	---	---	---	---	---	---	16.5	12.0	14.5
4	---	---	---	---	---	---	---	---	---	18.0	14.0	15.5
5	---	---	---	---	---	---	---	---	---	19.5	16.0	17.5
6	---	---	---	---	---	---	---	---	---	21.0	17.5	19.0
7	---	---	---	---	---	---	---	---	---	21.5	18.5	20.0
8	---	---	---	---	---	---	---	---	---	22.0	19.5	20.5
9	---	---	---	---	---	---	---	---	---	21.1	17.1	19.6
10	---	---	---	---	---	---	---	---	---	18.0	16.3	17.1
11	---	---	---	---	---	---	---	---	---	16.3	15.3	15.8
12	---	---	---	---	---	---	---	---	---	17.5	15.0	16.0
13	---	---	---	---	---	---	---	---	---	18.5	16.5	17.5
14	---	---	---	---	---	---	13.0	7.0	10.0	16.5	13.5	15.0
15	---	---	---	---	---	---	16.5	10.5	13.5	15.0	12.0	13.5
16	---	---	---	---	---	---	15.0	12.5	13.5	13.5	12.0	12.5
17	---	---	---	---	---	---	13.0	10.5	11.5	15.0	12.0	13.5
18	---	---	---	---	---	---	12.5	9.5	11.0	15.0	13.5	14.5
19	---	---	---	---	---	---	12.0	10.0	11.0	13.5	11.5	12.5
20	---	---	---	---	---	---	11.0	10.0	10.5	13.0	11.0	12.0
21	---	---	---	---	---	---	---	---	---	15.0	12.5	13.5
22	---	---	---	---	---	---	---	---	---	15.5	14.0	14.5
23	---	---	---	---	---	---	---	---	---	16.0	14.5	15.5
24	---	---	---	---	---	---	---	---	---	17.0	15.0	16.0
25	---	---	---	---	---	---	---	---	---	17.5	15.0	16.0
26	---	---	---	---	---	---	14.0	10.5	12.0	17.0	14.5	16.0
27	---	---	---	---	---	---	14.5	10.5	12.5	16.0	15.0	15.5
28	---	---	---	---	---	---	14.5	10.5	12.5	15.0	14.0	14.0
29	---	---	---	---	---	---	16.0	11.0	13.5	16.0	13.5	14.5
30	---	---	---	---	---	---	16.0	12.0	14.0	17.0	14.5	15.5
31	---	---	---	---	---	---	---	---	---	19.5	16.0	17.0
MONTH	---	---	---	---	---	---	---	---	---	22.0	11.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	20.5	17.5	19.0	20.5	18.0	19.5	21.5	21.0	21.5	24.0	21.5	22.5
2	20.5	18.5	19.5	22.0	18.5	20.0	21.5	21.0	21.0	23.5	22.0	22.5
3	18.5	16.0	17.0	22.0	21.0	21.5	21.5	20.0	21.0	23.0	21.5	22.0
4	16.5	15.0	15.5	21.5	20.5	21.0	20.0	18.5	19.5	22.0	18.5	20.5
5	16.0	13.5	14.5	22.0	20.5	21.0	20.5	18.5	19.5	18.5	16.5	17.5
6	16.0	13.0	14.5	21.0	19.5	20.0	20.0	19.0	19.5	18.0	15.5	16.5
7	17.5	13.5	15.5	20.5	18.0	19.0	21.5	20.0	21.0	19.0	15.5	17.0
8	20.5	16.0	18.0	19.0	17.5	18.5	22.5	20.5	21.5	20.0	17.5	18.5
9	22.0	18.5	20.0	20.0	18.0	18.5	23.0	20.0	22.0	21.5	19.0	20.0
10	23.5	19.5	21.5	20.5	19.0	19.5	22.5	21.0	22.0	22.0	20.5	21.0
11	23.0	21.0	22.0	21.5	19.0	20.0	22.0	20.0	21.0	21.0	20.5	21.0
12	22.0	19.5	20.5	20.5	18.5	19.5	21.5	19.0	20.0	21.0	20.0	20.5
13	19.5	18.5	19.0	21.5	18.0	19.5	20.0	19.0	19.5	20.0	18.0	19.0
14	21.5	19.0	20.5	22.0	19.5	20.5	22.0	19.0	20.5	18.0	17.0	17.5
15	21.5	20.5	21.0	21.0	19.5	20.5	21.5	20.0	21.0	17.0	15.5	16.0
16	22.5	20.0	21.0	21.0	19.5	20.0	22.0	20.0	21.0	15.5	14.5	15.0
17	22.0	20.0	20.5	22.5	19.5	21.0	20.5	18.5	19.0	15.5	13.5	14.5
18	20.0	17.5	18.5	21.5	19.5	20.5	19.0	18.0	18.5	17.0	14.5	15.5
19	20.5	17.0	18.5	20.5	19.0	19.5	19.0	17.5	18.0	18.0	16.0	17.0
20	21.0	18.0	19.5	20.5	17.5	19.0	18.5	16.5	17.5	18.5	17.0	17.5
21	21.0	19.5	20.5	20.0	18.5	19.5	18.5	16.0	17.0	18.0	15.0	16.5
22	21.0	20.0	20.5	19.5	17.0	18.5	19.0	16.0	17.5	15.5	14.0	15.0
23	21.0	19.0	20.0	19.5	17.5	18.5	20.5	18.5	20.0	16.5	15.0	16.0
24	21.5	19.5	20.5	20.0	17.0	18.5	21.5	20.0	20.5	16.0	15.0	16.0
25	22.0	21.0	21.5	20.0	17.5	19.0	21.0	19.0	20.0	15.0	13.0	14.0
26	22.0	21.5	21.5	21.5	18.5	20.0	21.0	19.5	20.5	14.0	12.0	13.0
27	21.5	20.5	21.0	23.0	20.0	21.0	21.0	20.5	20.5	14.5	12.5	13.5
28	20.5	19.0	19.5	22.5	20.0	21.5	21.5	20.0	20.5	13.5	12.0	13.0
29	20.5	18.5	19.0	20.5	20.0	20.0	22.5	20.0	21.0	13.5	11.0	12.0
30	20.0	17.5	19.0	21.0	20.0	20.5	23.0	21.0	22.0	13.5	11.0	12.5
31	---	---	---	21.5	21.0	21.0	23.5	21.0	22.0	---	---	---
MONTH	23.5	13.0	19.3	23.0	17.0	19.9	23.5	16.0	20.2	24.0	11.0	17.1



## STREAMS TRIBUTARY TO DETROIT RIVER

04166470 UPPER RIVER ROUGE AT DETROIT, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	6.1	5.1	5.6	6.6	5.9	6.4	6.5	6.0	6.3	7.6	5.0	6.1
2	5.9	5.0	5.5	6.6	1.4	6.0	7.1	6.0	6.4	5.2	4.4	5.0
3	6.4	5.5	6.0	6.6	.4	5.8	7.1	6.2	6.8	5.3	4.7	5.1
4	6.8	6.1	6.5	6.9	5.9	6.4	---	---	---	6.0	5.0	5.4
5	7.6	6.4	6.9	7.4	6.4	6.9	---	---	---	6.7	5.1	6.3
6	7.7	7.0	7.4	7.1	6.2	6.7	---	---	---	6.8	6.3	6.6
7	7.5	6.2	7.1	7.0	5.7	6.5	---	---	---	6.8	6.0	6.4
8	6.6	5.3	6.2	6.7	.8	5.6	---	---	---	6.2	5.8	6.0
9	5.8	4.5	5.4	6.3	.4	5.0	---	---	---	6.0	4.5	5.7
10	5.2	3.9	4.7	6.1	3.2	5.1	5.9	5.4	5.7	6.5	4.1	5.4
11	5.2	3.5	4.3	---	---	---	6.2	5.7	6.0	6.1	5.6	5.9
12	---	---	---	---	---	---	7.0	6.0	6.3	6.5	5.7	6.2
13	---	---	---	---	---	---	6.5	6.2	6.4	7.2	6.3	6.9
14	---	---	---	---	---	---	6.7	6.2	6.5	7.6	6.8	7.3
15	6.1	5.2	5.7	---	---	---	6.7	5.2	6.0	8.1	7.2	7.7
16	5.7	5.1	5.5	---	---	---	6.1	5.2	5.8	7.9	7.7	7.8
17	5.5	4.9	5.2	---	---	---	6.8	5.6	6.2	7.9	7.5	7.8
18	6.6	4.9	5.8	---	---	---	7.0	6.4	6.7	7.6	7.2	7.4
19	6.3	5.4	6.0	---	---	---	7.0	6.5	6.8	7.2	6.7	7.0
20	6.4	5.2	5.7	---	---	---	7.0	6.4	6.7	6.7	4.9	6.4
21	6.7	4.9	6.1	5.5	4.9	5.2	7.1	4.8	6.8	6.5	4.6	6.0
22	6.6	6.0	6.3	5.7	5.0	5.3	7.4	5.2	7.0	7.1	6.4	6.8
23	6.3	5.7	6.0	5.4	5.0	5.2	7.1	6.4	6.7	7.2	5.9	7.0
24	6.4	5.4	5.8	5.5	4.8	5.2	6.9	6.5	6.8	7.2	6.8	7.0
25	6.6	5.1	5.8	5.4	4.8	5.1	7.0	6.5	6.7	7.9	7.1	7.5
26	6.3	5.7	5.9	5.5	4.6	5.0	6.9	6.3	6.7	8.0	7.6	7.8
27	6.7	5.7	6.0	5.5	4.6	4.9	7.1	6.4	6.8	7.8	7.5	7.7
28	7.4	6.2	6.7	6.0	3.3	4.9	7.5	7.1	7.3	7.8	7.3	7.6
29	6.6	5.9	6.3	5.9	4.6	5.5	7.6	7.1	7.4	8.2	7.3	7.8
30	6.8	6.0	6.5	6.0	5.6	5.8	7.5	7.1	7.2	8.5	7.8	8.3
31	---	---	---	6.3	5.6	6.0	7.6	6.8	7.2	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	8.5	4.1	6.7

## STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW1/4 sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft upstream from bridge on Plymouth Road in Detroit, 4 mi upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft above sea level. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi downstream at datum 4.6 ft lower.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	122	35	37	e45	e42	116	52	132	104	116	363	57
2	65	90	34	53	e44	103	50	220	76	92	616	53
3	68	206	34	85	e46	88	52	107	70	1600	595	51
4	226	85	36	203	e48	81	59	83	60	878	240	50
5	99	53	179	128	e49	77	55	73	77	237	142	48
6	60	43	643	77	e47	73	48	68	157	156	658	42
7	45	37	267	63	e45	69	48	62	74	123	443	39
8	46	37	122	52	e45	70	121	58	58	100	207	40
9	95	36	86	83	e47	69	100	148	51	91	137	64
10	60	37	75	192	e50	64	76	1100	46	153	108	667
11	45	63	68	181	e50	59	74	592	68	135	90	2160
12	39	50	55	106	e49	56	86	293	173	91	81	1420
13	87	38	52	79	e48	53	67	220	186	79	73	812
14	129	37	181	61	e47	58	60	122	228	72	69	345
15	66	34	384	e66	e46	74	56	90	187	79	96	620
16	49	32	296	e56	e48	186	53	87	92	74	95	265
17	42	32	158	e52	e47	109	48	150	68	64	156	178
18	38	31	91	e50	e48	71	47	217	90	58	191	139
19	38	37	e76	e54	e49	67	45	967	76	50	92	119
20	35	128	e97	e54	e50	140	578	824	57	48	72	111
21	35	77	121	e52	e52	212	1640	277	441	45	64	136
22	34	56	66	e49	76	110	643	175	158	41	59	90
23	34	43	e68	e47	204	83	276	161	74	38	543	282
24	36	68	e54	e45	380	75	187	149	77	35	255	214
25	36	63	e52	e44	431	72	135	106	1500	34	110	116
26	33	54	50	e43	242	69	106	87	1430	33	84	92
27	31	68	47	e42	295	84	92	79	453	34	230	85
28	32	48	43	e41	265	90	83	180	218	95	99	75
29	34	40	45	e41	149	72	77	206	169	413	75	69
30	36	36	50	e42	---	62	71	102	165	719	68	66
31	34	---	e46	e42	---	55	---	92	---	1030	62	---
TOTAL	1829	1694	3613	2228	3039	2667	5085	7227	6683	6813	6173	8305
MEAN	59.0	56.5	117	71.9	105	86.0	170	233	223	220	199	284
MAX	226	206	643	203	431	212	1640	1100	1500	1600	658	2160
MIN	31	31	34	41	42	53	45	58	46	33	59	39
CFSM	.32	.30	.62	.38	.56	.46	.91	1.25	1.19	1.18	1.06	1.52
IN.	.36	.34	.72	.44	.60	.53	1.01	1.44	1.33	1.36	1.23	1.69

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	67.7	90.9	114	122	168	235	232	169	116	73.2	63.7	62.7
MAX	450	322	321	456	519	488	965	683	478	385	280	284	284
(WY)	1982	1993	1968	1950	1938	1950	1947	1943	1968	1957	1998	2000	2000
MIN	8.35	16.3	16.6	13.6	18.2	59.5	49.3	23.9	7.92	6.46	5.58	7.03	7.03
(WY)	1964	1954	1940	1961	1963	1931	1931	1934	1934	1934	1931	1931	1931

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1931 - 2000

ANNUAL TOTAL	50738		55556		126	
ANNUAL MEAN	139		152		222	1968
HIGHEST ANNUAL MEAN					25.7	1931
LOWEST ANNUAL MEAN					7380	Apr 6 1947
HIGHEST DAILY MEAN	1640	Apr 24	2160	Sep 11	1.8	Aug 1 1964
LOWEST DAILY MEAN	25	Sep 20	31	Oct 27	2.7	Aug 2 1963
ANNUAL SEVEN-DAY MINIMUM	28	Sep 14	34	Oct 26	13000	Apr 5 1947
INSTANTANEOUS PEAK FLOW			2560	Sep 11	21.40	Jun 26 1968
INSTANTANEOUS PEAK STAGE			15.87	Sep 11	1.8	(a)
INSTANTANEOUS LOW FLOW					.67	
ANNUAL RUNOFF (CFSM)	.74		.81		9.14	
ANNUAL RUNOFF (INCHES)	10.09		11.05		268	
10 PERCENT EXCEEDS	294		278		63	
50 PERCENT EXCEEDS	78		74		17	
90 PERCENT EXCEEDS	35		39			

(a) Aug. 1, 2, 1964.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1999 to current year.

PERIOD OF DAILY RECORD.--

**WATER TEMPERATURE:** April 1999 to current year.

**DISSOLVED OXYGEN:** April 1999 to current year.

**INSTRUMENTATION.**--Water-quality monitor telemeter, not operated during winter months.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

**WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000**

[illegible]

## STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	15.0	13.0	13.5
2	---	---	---	---	---	---	---	---	---	14.5	12.0	13.0
3	---	---	---	---	---	---	---	---	---	16.0	12.5	14.0
4	---	---	---	---	---	---	---	---	---	17.5	14.0	15.5
5	---	---	---	---	---	---	---	---	---	19.0	16.0	17.5
6	---	---	---	---	---	---	---	---	---	20.5	17.0	19.0
7	---	---	---	---	---	---	---	---	---	21.0	19.5	20.5
8	---	---	---	---	---	---	---	---	---	21.5	18.5	21.0
9	---	---	---	---	---	---	---	---	---	21.5	17.0	20.5
10	---	---	---	---	---	---	---	---	---	18.0	17.0	17.5
11	---	---	---	---	---	---	---	---	---	17.0	15.5	16.5
12	---	---	---	---	---	---	---	---	---	17.5	15.5	16.0
13	---	---	---	---	---	---	---	---	---	18.5	17.0	17.5
14	---	---	---	---	---	---	12.0	7.0	9.0	17.5	14.5	16.0
15	---	---	---	---	---	---	15.0	11.0	13.0	14.5	13.0	14.0
16	---	---	---	---	---	---	15.0	13.0	14.0	14.0	12.5	13.0
17	---	---	---	---	---	---	13.5	11.5	12.0	14.5	12.5	13.5
18	---	---	---	---	---	---	11.5	10.0	11.0	15.0	14.0	14.5
19	---	---	---	---	---	---	11.5	10.5	11.0	14.5	12.0	13.0
20	---	---	---	---	---	---	11.5	10.5	10.5	13.0	11.5	12.0
21	---	---	---	---	---	---	10.5	10.0	10.5	14.5	13.0	13.5
22	---	---	---	---	---	---	10.0	9.5	10.0	15.5	14.0	15.0
23	---	---	---	---	---	---	12.0	9.5	10.5	16.5	14.5	15.5
24	---	---	---	---	---	---	14.0	11.0	12.0	17.0	15.5	16.5
25	---	---	---	---	---	---	14.0	11.5	12.5	17.0	15.5	16.5
26	---	---	---	---	---	---	13.5	11.0	12.5	17.0	15.0	16.0
27	---	---	---	---	---	---	14.0	11.0	12.5	16.0	15.5	16.0
28	---	---	---	---	---	---	14.0	11.5	13.0	15.5	13.5	14.5
29	---	---	---	---	---	---	15.0	12.0	13.5	15.5	14.0	14.5
30	---	---	---	---	---	---	15.5	12.5	14.0	17.0	14.5	15.5
31	---	---	---	---	---	---	---	---	---	18.0	15.5	17.0
MONTH	---	---	---	---	---	---	---	---	---	21.5	11.5	15.8

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.0	17.5	18.5	20.5	18.5	19.5	21.5	21.0	21.0	23.0	21.5	22.5
2	20.0	19.0	19.5	21.5	19.5	20.5	21.5	21.0	21.0	23.0	22.0	23.0
3	19.0	17.0	17.5	22.0	20.5	21.5	21.5	20.5	21.0	23.0	21.5	22.5
4	17.0	15.5	16.0	21.5	21.0	21.5	20.5	19.5	20.0	22.5	19.5	21.0
5	16.0	14.0	15.0	22.0	20.5	21.5	20.5	19.0	19.5	19.5	17.5	18.0
6	15.5	13.5	14.5	21.5	20.0	20.5	20.0	19.5	19.5	17.5	16.5	17.0
7	17.0	14.0	15.5	20.0	19.0	19.5	21.5	20.0	21.0	17.5	16.0	17.0
8	19.5	16.5	17.5	19.5	18.5	18.5	22.5	21.0	21.5	19.0	17.5	18.0
9	21.0	19.0	20.0	19.5	17.5	19.0	23.0	21.0	22.5	21.0	17.5	19.5
10	22.5	20.0	21.5	20.5	19.0	20.0	22.5	21.0	22.0	22.0	20.5	21.0
11	22.5	20.0	22.0	21.0	19.5	20.5	22.0	21.0	21.5	21.5	21.0	21.0
12	22.0	20.5	21.5	20.5	19.5	20.0	21.0	19.0	20.5	21.0	20.5	20.5
13	20.5	19.0	19.5	20.5	18.0	19.5	21.0	19.0	20.0	20.5	18.5	19.5
14	21.5	19.0	20.0	21.5	20.0	20.5	21.0	19.5	20.0	18.5	17.5	18.0
15	21.5	20.5	21.0	21.0	20.0	20.5	21.5	20.0	21.0	17.5	16.0	16.5
16	22.0	20.5	21.0	21.0	20.0	20.5	21.5	20.5	21.0	16.0	15.0	15.0
17	21.5	20.5	21.0	21.5	19.5	21.0	21.0	18.5	19.5	15.5	14.0	15.0
18	21.0	18.0	19.5	21.5	20.0	20.5	19.0	18.5	18.5	16.5	15.0	15.5
19	19.5	17.5	18.5	20.5	19.0	19.5	18.5	18.0	18.5	17.5	16.0	16.5
20	20.5	19.0	19.5	19.5	18.5	19.0	18.5	17.0	18.0	18.5	17.0	17.5
21	21.0	18.5	20.5	19.5	18.0	19.5	18.0	17.0	17.5	18.0	16.0	17.0
22	21.0	20.5	20.5	19.0	18.0	18.5	18.5	17.0	17.5	16.0	15.0	15.0
23	21.0	19.5	20.0	18.5	17.5	18.5	20.5	18.5	20.0	16.0	15.0	15.5
24	21.5	19.0	20.5	19.0	18.0	18.5	21.5	20.5	21.0	16.0	15.5	16.0
25	22.0	20.0	21.5	19.0	18.5	19.0	21.0	20.0	20.5	15.5	13.5	14.5
26	22.0	21.5	21.5	20.5	18.5	19.5	21.0	20.0	20.5	13.5	12.5	13.0
27	22.0	21.0	21.5	21.5	17.5	20.0	21.0	20.0	20.5	15.0	12.5	13.5
28	21.0	20.0	20.5	22.0	20.5	21.5	21.0	20.0	20.5	14.0	12.5	13.0
29	20.0	19.0	19.5	21.0	20.0	20.5	22.0	20.0	21.0	13.0	11.5	12.5
30	19.5	18.5	19.0	21.0	20.5	20.5	22.5	20.5	21.5	13.5	11.5	12.5
31	---	---	---	21.0	21.0	21.0	22.5	21.0	22.0	---	---	---
MONTH	22.5	13.5	19.5	22.0	17.5	20.0	23.0	17.0	20.3	23.0	11.5	17.2

### STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

[illegible][illegible]



## STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	6.5	5.6	6.0	6.3	5.9	6.1	6.9	6.3	6.5	6.2	4.6	5.2
2	6.0	5.4	5.7	6.1	5.7	5.9	7.2	2.9	6.0	6.2	4.3	5.0
3	6.6	5.8	6.1	6.6	4.0	5.4	6.6	5.6	6.3	6.4	4.5	5.1
4	7.4	6.0	6.6	5.9	5.5	5.7	7.2	6.5	6.7	7.1	4.7	5.5
5	7.6	6.5	6.9	6.7	5.8	6.0	6.8	6.6	6.7	6.9	5.1	6.0
6	7.9	6.6	7.1	6.2	5.9	6.1	7.3	5.3	6.6	7.4	5.2	6.4
7	8.2	6.6	7.3	7.2	6.1	6.4	7.1	6.4	6.7	7.4	5.6	6.6
8	7.7	6.5	7.0	6.6	6.2	6.4	7.0	6.2	6.4	7.0	5.9	6.5
9	6.8	5.7	6.3	7.1	6.0	6.3	--	--	--	6.9	4.0	5.5
10	5.9	5.2	5.6	6.7	5.6	6.0	--	--	--	6.4	3.9	5.2
11	6.3	4.4	5.2	6.3	5.2	5.7	--	--	--	5.7	5.2	5.5
12	5.2	4.1	4.7	6.1	5.6	5.9	--	--	--	6.2	5.7	5.9
13	6.8	5.1	5.8	6.5	5.8	6.0	--	--	--	6.8	6.0	6.3
14	6.9	5.5	6.3	6.2	5.5	5.8	--	--	--	7.4	6.7	7.0
15	5.9	5.2	5.4	6.1	5.3	5.7	--	--	--	7.6	7.4	7.5
16	5.8	5.1	5.3	6.1	5.7	5.9	--	--	--	7.9	7.5	7.7
17	5.7	5.1	5.4	6.3	5.7	6.0	4.8	3.7	4.0	8.1	7.7	7.9
18	6.5	5.2	5.7	6.5	5.8	6.2	5.0	4.3	4.7	7.9	7.4	7.7
19	6.4	5.5	6.0	6.8	5.9	6.3	5.5	4.8	5.2	7.6	7.1	7.3
20	6.0	5.4	5.8	7.5	6.2	6.6	6.0	5.2	5.6	7.1	5.7	6.9
21	6.3	5.1	5.8	7.1	6.3	6.6	6.3	5.5	5.9	6.5	4.9	5.9
22	5.9	5.8	5.8	7.2	6.4	6.8	6.4	5.9	6.2	7.4	6.3	7.0
23	6.5	5.8	6.0	7.3	6.6	7.0	6.3	3.7	5.6	7.6	6.9	7.3
24	6.6	5.4	5.9	7.8	6.7	7.0	6.4	6.0	6.1	7.6	7.1	7.3
25	6.5	2.9	5.5	7.4	6.4	6.9	6.6	4.7	6.0	8.1	7.3	7.8
26	5.9	5.2	5.6	7.3	6.4	6.8	5.2	4.1	4.9	8.4	7.7	8.1
27	6.3	5.8	6.0	7.5	6.2	6.7	5.5	3.9	4.8	8.0	7.2	7.7
28	6.7	5.7	6.2	7.2	2.8	6.0	4.6	3.7	4.2	8.1	7.5	7.8
29	6.3	5.5	5.9	6.1	1.7	4.7	5.3	4.0	4.6	8.4	7.8	8.1
30	6.4	5.5	6.0	6.8	5.9	6.3	5.5	4.2	4.9	8.4	8.0	8.2
31	--	--	--	6.6	6.2	6.3	6.0	4.4	5.0	--	--	--
MONTH	8.2	2.9	6.0	7.8	1.7	6.2	--	--	--	8.4	3.9	6.7

## STREAMS TRIBUTARY TO DETROIT RIVER

04167000 MIDDLE RIVER ROUGE NEAR GARDEN CITY, MI

LOCATION.--Lat 42°20'55", long 83°18'45", in SW1/4 NW1/4 sec.6, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 200 ft downstream from bridge on Inkster Road, 1.8 mi northeast of Garden City, and 6.0 mi upstream from mouth.

DRAINAGE AREA.--99.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1930 to September 1933 (published as "at Detroit"), June 1947 to September 1977, October 1977 to September 1983 (operated as a crest-stage partial-record station), October 1983 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 600.95 ft above sea level. Nov. 21, 1930 to Sept. 30, 1933, nonrecording gage at site 4.8 mi downstream at datum 17.48 ft lower. June 6, 1947 to Oct. 18, 1948, nonrecording gage at site 200 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Regulation by storm water retention structures; and occasional regulation by reservoirs upstream from station since 1956. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	19	e21	32	e26	74	34	116	80	106	301	42
2	49	74	e20	34	e27	64	34	112	60	94	390	39
3	60	64	e20	66	e28	57	34	72	48	e700	295	36
4	147	44	e21	106	e29	52	39	57	43	e450	158	35
5	61	31	158	70	e30	50	36	51	90	e165	110	e33
6	41	26	275	52	e29	47	34	48	121	103	469	e30
7	31	23	143	45	e28	47	40	45	60	79	284	e30
8	38	23	79	37	e28	45	82	42	45	65	158	e32
9	49	22	57	52	e29	45	57	127	38	58	105	e36
10	39	22	53	78	e31	42	46	628	35	74	79	550
11	31	e38	44	77	e31	39	54	288	84	76	65	1200
12	27	e25	39	64	e30	37	50	174	148	55	55	928
13	108	e22	36	53	e29	35	42	167	100	45	50	662
14	72	e25	130	44	e28	35	38	83	141	40	47	441
15	38	e23	160	39	e28	47	37	63	124	39	54	423
16	30	e22	165	e35	e29	99	35	68	65	35	50	275
17	27	e21	106	e33	e29	59	32	77	48	32	108	180
18	24	e20	63	e31	e30	47	32	170	80	30	77	129
19	25	e19	49	e31	e30	49	32	605	54	28	58	101
20	24	e55	74	e31	e31	94	376	365	47	26	47	97
21	26	e33	65	e30	e33	94	678	196	229	25	42	87
22	27	e27	50	e30	e33	49	74	399	130	124	25	62
23	26	e26	e38	e29	e29	55	203	170	64	24	280	145
24	25	e35	e33	e27	173	48	135	109	89	23	102	117
25	24	e31	e31	e26	203	47	104	86	1020	23	63	65
26	23	e30	e29	e26	138	42	86	69	984	23	65	49
27	22	e35	e28	e25	170	54	74	65	482	23	328	41
28	20	e26	e26	e25	135	49	65	160	247	90	98	35
29	21	e23	25	e25	95	46	58	107	165	203	65	31
30	20	e22	26	e26	---	38	53	71	133	495	53	29
31	20	---	29	e26	---	36	---	78	---	575	46	---
TOTAL	1248	906	2093	1305	1673	1647	3020	4599	5048	3829	4144	5960
MEAN	40.3	30.2	67.5	42.1	57.7	53.1	101	148	168	124	134	199
MAX	147	74	275	106	203	99	678	628	1020	700	469	1200
MIN	20	19	20	25	26	35	32	42	35	23	42	29
CFSM	.40	.30	.68	.42	.58	.53	1.01	1.49	1.68	1.24	1.34	1.99
IN.	.46	.34	.78	.49	.62	.61	1.12	1.71	1.88	1.43	1.54	2.22

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2000, BY WATER YEAR (WY)

	MEAN	40.8	57.6	74.2	82.2	107	147	134	94.7	68.9	46.7	40.4	45.3
MAX	124	178	177	269	324	313	313	310	225	179	179	144	199
(WY)	1955	1993	1988	1952	1976	1976	1950	1956	1968	1957	1998	2000	
MIN	7.83	9.46	10.4	9.65	14.2	42.3	32.6	21.9	17.8	8.85	5.64	4.97	
(WY)	1932	1965	1964	1961	1963	1931	1931	1958	1959	1931	1931	1931	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1931 - 2000

ANNUAL TOTAL	29421	35472	
ANNUAL MEAN	80.6	96.9	
HIGHEST ANNUAL MEAN			77.9
LOWEST ANNUAL MEAN			133
HIGHEST DAILY MEAN	723	1200	2060
LOWEST DAILY MEAN	15	19	1.4
ANNUAL SEVEN-DAY MINIMUM	17	21	3.0
INSTANTANEOUS PEAK FLOW		1570	(a)2330
INSTANTANEOUS PEAK STAGE		9.65	(b)10.50
INSTANTANEOUS LOW FLOW			.90
ANNUAL RUNOFF (CFSM)	.81	.97	.78
ANNUAL RUNOFF (INCHES)	10.96	13.21	10.60
10 PERCENT EXCEEDS	159	176	165
50 PERCENT EXCEEDS	49	48	44
90 PERCENT EXCEEDS	22	25	14

(a) Gage height 9.96 ft.  
(b) From floodmark.  
(c) Estimated.

## STREAMS TRIBUTARY TO DETROIT RIVER

04167150 MIDDLE RIVER ROUGE AT DEARBORN HEIGHTS, MI

LOCATION.--Lat 42°19'50", long 83°14'53", in SW1/4 sec.10, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Hines Drive in Dearborn Heights.

DRAINAGE AREA.--110 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1997 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 585 ft above sea level, from topographic map.

REMARKS.--Water-discharge records fair. Regulation by storm water retention structures and occasional regulation by reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S <sup>W</sup> P
1	93	22	22	33	e28	76	38	86	84	99	380	43
2	50	55	21	33	e29	67	37	137	62	85	422	40
3	51	98	21	52	e30	57	38	81	50	788	484	38
4	149	50	22	104	e31	51	42	62	43	718	174	37
5	79	33	92	76	e32	48	40	53	57	173	109	35
6	44	26	331	50	e31	45	36	47	115	103	536	32
7	33	23	168	41	e30	44	37	43	63	81	385	32
8	34	22	90	34	e30	43	82	40	46	67	163	33
9	64	21	65	43	e31	42	71	69	40	59	107	38
10	44	20	55	85	e34	40	54	596	37	75	88	411
11	34	40	47	89	e33	38	55	419	54	83	75	1560
12	28	28	40	67	e32	37	61	162	140	57	65	1150
13	79	23	37	51	e32	37	46	151	95	45	55	857
14	100	26	96	e45	e31	39	41	86	137	39	50	426
15	47	24	186	e39	e31	47	39	66	120	39	64	557
16	34	23	162	e35	e31	104	37	62	75	36	65	277
17	30	22	107	e34	e31	75	35	88	55	32	93	169
18	27	21	64	e34	e31	53	34	131	72	29	116	125
19	26	20	45	e33	e31	48	32	626	66	27	71	106
20	26	59	64	e33	e31	89	310	561	50	25	55	99
21	26	38	72	e33	32	115	894	208	227	25	48	106
22	26	29	52	e33	45	80	564	131	148	24	46	80
23	26	27	e45	e32	92	57	203	137	82	23	376	161
24	25	36	e38	e31	170	48	134	108	87	22	164	145
25	25	33	e34	e30	215	46	102	86	774	22	81	87
26	24	32	e32	e29	139	47	86	74	1240	22	61	70
27	23	36	e30	e28	149	57	76	65	616	22	254	59
28	22	28	e30	e28	144	62	67	121	232	38	99	47
29	22	25	e30	e28	95	52	59	129	144	229	69	38
30	22	23	29	e28	---	44	53	78	122	476	56	33
31	22	---	31	e28	---	40	---	71	---	804	48	---
TOTAL	1335	963	2158	1339	1701	1728	3403	4774	5133	4367	4859	6591
MEAN	43.1	32.1	69.6	43.2	58.7	55.7	113	154	171	141	157	220
MAX	149	98	331	104	215	115	894	626	1240	804	536	1260
MIN	22	20	21	28	28	37	32	40	37	22	46	32
CFSM	.39	.29	.63	.39	.53	.51	1.03	1.40	1.56	1.28	1.42	2.00
IN.	.45	.33	.73	.45	.58	.58	1.15	1.61	1.74	1.48	1.64	2.23

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 2000, BY WATER YEAR (WY)

	MEAN	46.4	45.6	70.8	106	126	132	152	108	120	97.4	120	93.0
MAX	50.2	60.7	91.5	141	229	242	173	154	171	141	160	220	220
(WY)	1998	1998	1998	1998	1998	1998	1999	2000	2000	2000	1998	1998	2000
MIN	43.1	32.1	51.3	43.2	58.7	55.7	113	84.3	65.3	47.0	43.7	35.1	35.1
(WY)	2000	2000	1999	2000	2000	2000	2000	1999	1998	1998	1999	1999	1998

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1998 - 2000
ANNUAL TOTAL	31590	38351	
ANNUAL MEAN	86.5	105	102
HIGHEST ANNUAL MEAN			114
LOWEST ANNUAL MEAN			86.2
HIGHEST DAILY MEAN	855	1260	1390
LOWEST DAILY MEAN	16	20	14
ANNUAL SEVEN-DAY MINIMUM	18	22	16
INSTANTANEOUS PEAK FLOW		1470	1670
INSTANTANEOUS PEAK STAGE		10.98	12.24
INSTANTANEOUS LOW FLOW		18	
ANNUAL RUNOFF (CFSM)	.79	.95	.92
ANNUAL RUNOFF (INCHES)	10.68	12.97	12.56
10 PERCENT EXCEEDS	164	178	200
50 PERCENT EXCEEDS	51	50	56
90 PERCENT EXCEEDS	22	26	25

(e) Estimated.

## STREAMS TRIBUTARY TO DETROIT RIVER

04167150 MIDDLE RIVER ROUGE AT DEARBORN HEIGHTS, MI--Continued

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1999 to current year.

PERIOD OF DAILY RECORD.--

**WATER TEMPERATURE:** April 1999 to current year.

**DISSOLVED OXYGEN:** April 1999 to current year.

**INSTRUMENTATION.**--Water-quality monitor telemeter, not operated during winter months.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

[illegible]

## STREAMS TRIBUTARY TO DETROIT RIVER

04167150 MIDDLE RIVER ROUGE AT DEARBORN HEIGHTS, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	---	---	---	---	---	---	---	---	---	14.5	13.5	14.0	
2	---	---	---	---	---	---	---	---	---	15.0	13.0	14.0	
3	---	---	---	---	---	---	---	---	---	17.0	14.0	15.5	
4	---	---	---	---	---	---	---	---	---	18.5	14.5	17.5	
5	---	---	---	---	---	---	---	---	---	20.5	16.5	18.5	
6	---	---	---	---	---	---	---	---	---	22.0	18.5	20.0	
7	---	---	---	---	---	---	---	---	---	22.5	20.0	21.0	
8	---	---	---	---	---	---	---	---	---	23.0	20.5	21.5	
9	---	---	---	---	---	---	---	---	---	22.0	18.0	21.0	
10	---	---	---	---	---	---	---	---	---	19.0	17.0	18.0	
11	---	---	---	---	---	---	---	---	---	18.0	17.0	17.5	
12	---	---	---	---	---	---	---	---	---	18.5	17.0	17.5	
13	---	---	---	---	---	---	---	---	---	20.0	18.0	19.0	
14	---	---	---	---	---	---	13.0	7.5	10.0	18.0	15.0	17.0	
15	---	---	---	---	---	---	16.0	11.0	13.5	16.5	14.0	15.0	
16	---	---	---	---	---	---	15.0	12.5	14.0	15.0	13.5	14.5	
17	---	---	---	---	---	---	13.5	11.0	12.0	16.0	13.5	15.0	
18	---	---	---	---	---	---	12.5	10.0	11.0	17.5	14.0	16.0	
19	---	---	---	---	---	---	11.5	10.5	11.0	14.0	12.5	13.0	
20	---	---	---	---	---	---	11.5	10.5	11.0	15.0	13.5	14.0	
21	---	---	---	---	---	---	11.0	10.5	11.0	15.0	14.0	14.5	
22	---	---	---	---	---	---	11.0	10.0	10.5	15.5	14.5	15.0	
23	---	---	---	---	---	---	12.0	10.0	11.0	16.5	15.0	16.0	
24	---	---	---	---	---	---	12.5	11.5	12.0	17.5	16.0	17.0	
25	---	---	---	---	---	---	12.0	11.0	11.5	18.0	16.5	17.0	
26	---	---	---	---	---	---	13.0	11.0	12.0	18.0	16.0	17.0	
27	---	---	---	---	---	---	14.5	11.5	13.0	17.5	16.5	17.0	
28	---	---	---	---	---	---	15.0	11.5	13.5	16.5	14.5	15.0	
29	---	---	---	---	---	---	16.5	12.0	14.0	16.5	14.0	15.5	
30	---	---	---	---	---	---	17.0	12.5	14.5	18.5	16.0	17.0	
31	---	---	---	---	---	---	---	---	---	20.0	17.0	18.5	
MONTH	---	---	---	---	---	---	---	---	---	23.0	12.5	18.7	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		JUNE				JULY		AUGUST				SEPTEMBER	
1	21.5	18.5	20.0	22.5	21.0	21.5	22.0	21.5	22.0	24.5	22.5	23.5	
2	22.5	20.0	21.0	23.0	21.0	22.5	22.0	21.5	22.0	24.5	23.0	24.0	
3	20.0	17.5	18.5	23.0	22.0	22.5	22.0	21.5	21.5	24.0	23.0	23.5	
4	18.0	16.0	17.0	23.0	22.0	22.5	21.5	20.5	21.0	23.5	19.5	22.0	
5	17.5	14.5	16.0	23.0	22.5	23.0	22.0	21.0	21.5	19.5	17.5	18.5	
6	15.5	14.0	15.0	22.5	20.5	21.5	21.0	20.0	20.5	17.5	16.5	17.0	
7	19.0	15.0	17.0	21.5	20.0	20.5	22.5	21.0	22.0	18.5	16.5	17.5	
8	21.5	17.5	19.5	21.0	19.5	20.5	23.0	22.5	22.5	20.5	18.5	19.5	
9	23.0	19.5	21.5	21.5	19.5	20.5	24.0	22.5	23.5	22.0	20.5	21.0	
10	24.0	21.0	22.5	22.5	21.0	22.0	23.5	22.5	23.0	22.5	21.5	22.0	
11	24.0	22.5	23.0	22.5	21.0	22.0	23.5	22.0	22.5	22.0	21.0	21.5	
12	23.0	20.5	22.0	22.0	21.0	22.0	23.0	21.0	22.0	21.5	21.0	21.0	
13	21.5	20.0	20.5	22.5	19.0	21.0	22.0	20.0	21.5	21.0	19.5	20.0	
14	23.5	20.5	22.0	23.5	20.5	22.0	23.0	20.5	21.5	20.0	18.5	19.0	
15	23.0	22.0	22.5	23.0	21.5	22.0	24.0	21.0	22.5	18.5	17.5	17.5	
16	23.5	21.5	22.5	22.5	21.0	21.5	23.5	22.0	22.5	17.5	16.0	16.5	
17	23.5	21.5	22.0	23.5	21.0	22.0	22.0	19.5	20.5	16.5	16.0	16.0	
18	21.5	19.0	20.0	23.0	21.0	21.5	20.0	19.5	19.5	17.0	16.5	17.0	
19	21.5	18.5	20.0	21.5	20.0	20.5	20.5	19.0	20.0	18.0	17.0	17.5	
20	22.5	19.5	21.0	21.5	19.5	20.5	20.0	18.0	19.0	20.0	17.5	18.5	
21	22.5	21.0	21.5	21.0	20.0	20.5	20.0	17.5	18.5	18.5	16.0	17.5	
22	22.5	21.5	22.0	20.0	19.0	19.5	20.0	17.5	19.0	16.0	15.5	16.0	
23	22.5	21.0	21.5	20.0	19.0	19.5	21.5	20.0	21.0	19.5	15.5	17.0	
24	23.5	21.0	22.0	21.0	18.5	19.5	22.5	21.5	22.0	18.5	15.5	17.0	
25	23.5	22.0	22.5	20.5	19.0	20.0	22.0	21.0	21.5	15.5	14.0	15.0	
26	23.0	22.0	22.5	22.5	20.0	21.0	23.0	20.5	22.0	14.5	13.5	14.0	
27	22.5	21.5	22.0	23.5	21.5	22.5	22.5	21.0	21.5	16.0	13.5	15.0	
28	22.0	21.0	21.5	23.5	22.5	23.0	22.0	21.0	21.5	15.0	13.5	14.5	
29	21.5	20.5	21.0	22.5	20.5	21.5	23.0	21.0	22.0	14.5	12.0	13.5	
30	21.0	20.5	21.0	22.0	21.0	21.5	24.0	22.0	23.0	15.0	12.5	13.5	
31	---	---	---	22.0	21.5	21.5	24.5	22.0	23.0	---	---	---	
MONTH	24.0	14.0	20.7	23.5	18.5	21.3	24.5	17.5	21.5	24.5	12.0	18.2	

## STREAMS TRIBUTARY TO DETROIT RIVER

04167150 MIDDLE RIVER ROUGE AT DEARBORN HEIGHTS, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	7.8	7.4	7.6	9.6	7.3	8.2	---	---	---	---	---	---
2	7.9	7.7	7.8	7.4	5.4	6.4	---	---	---	---	---	---
3	9.0	7.2	8.1	6.1	4.5	5.5	---	---	---	---	---	---
4	9.2	8.3	8.8	8.2	5.8	7.5	---	---	---	---	---	---
5	9.0	8.9	8.9	8.8	7.7	8.4	---	---	---	---	---	---
6	9.0	8.7	8.9	9.1	7.6	8.3	---	---	---	---	---	---
7	9.6	8.8	9.2	9.7	8.3	8.9	---	---	---	---	---	---
8	9.6	8.3	9.1	10.3	9.0	9.5	---	---	---	---	---	---
9	8.4	6.9	7.7	10.2	8.4	9.3	---	---	---	---	---	---
10	7.8	7.2	7.5	9.4	7.9	8.5	---	---	---	---	---	---
11	8.1	7.4	7.8	7.9	5.5	6.7	---	---	---	---	---	---
12	8.8	7.7	8.3	8.9	5.9	7.8	---	---	---	---	---	---
13	8.3	6.7	7.6	10.0	7.9	8.8	---	---	---	---	---	---
14	7.2	6.5	6.9	10.4	8.7	9.3	---	---	---	---	---	---
15	8.5	7.2	8.0	11.4	9.0	10.1	---	---	---	---	---	---
16	8.5	7.3	8.1	12.1	9.8	10.9	---	---	---	---	---	---
17	7.7	7.1	7.4	13.1	10.8	11.9	---	---	---	---	---	---
18	8.4	7.6	8.1	---	---	---	---	---	---	---	---	---
19	9.0	8.3	8.7	---	---	---	---	---	---	---	---	---
20	9.4	8.7	9.1	---	---	---	---	---	---	---	---	---
21	9.8	8.9	9.4	---	---	---	---	---	---	---	---	---
22	9.0	8.3	8.7	---	---	---	---	---	---	---	---	---
23	9.5	8.3	8.9	---	---	---	---	---	---	---	---	---
24	10.4	9.0	9.7	---	---	---	---	---	---	---	---	---
25	10.6	9.7	10.1	---	---	---	---	---	---	---	---	---
26	10.5	9.7	10.1	---	---	---	---	---	---	---	---	---
27	10.5	9.0	9.8	---	---	---	---	---	---	---	---	---
28	11.2	9.6	10.3	---	---	---	---	---	---	---	---	---
29	10.8	9.2	9.8	---	---	---	---	---	---	---	---	---
30	10.3	8.3	9.2	---	---	---	---	---	---	---	---	---
31	9.4	7.3	8.2	---	---	---	---	---	---	---	---	---
MONTH	11.2	6.5	8.6	---	---	---	---	---	---	---	---	---

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	9.2	7.3	8.3
2	---	---	---	---	---	---	---	---	---	8.6	6.9	7.7
3	---	---	---	---	---	---	---	---	---	10.6	7.6	8.9
4	---	---	---	---	---	---	---	---	---	10.6	7.6	8.8
5	---	---	---	---	---	---	---	---	---	9.5	6.8	8.0
6	---	---	---	---	---	---	---	---	---	8.5	6.1	7.1
7	---	---	---	---	---	---	---	---	---	7.4	5.9	6.4
8	---	---	---	---	---	---	---	---	---	7.1	5.4	6.1
9	---	---	---	---	---	---	---	---	---	6.5	4.0	5.2
10	---	---	---	---	---	---	---	---	---	6.4	3.9	5.2
11	---	---	---	---	---	---	---	---	---	6.8	1.1	5.4
12	---	---	---	---	---	---	---	---	---	7.0	6.6	6.7
13	---	---	---	---	---	---	---	---	---	6.7	5.9	6.2
14	---	---	---	---	---	---	16.7	10.3	12.8	7.5	6.4	7.0
15	---	---	---	---	---	---	15.7	9.0	11.5	8.2	7.3	7.7
16	---	---	---	---	---	---	14.7	7.9	10.6	7.8	6.9	7.4
17	---	---	---	---	---	---	12.6	8.3	10.2	7.5	6.3	6.8
18	---	---	---	---	---	---	15.2	9.1	11.6	7.4	5.9	6.4
19	---	---	---	---	---	---	13.8	9.5	11.1	7.8	7.2	7.6
20	---	---	---	---	---	---	9.9	8.1	8.9	7.7	7.4	7.6
21	---	---	---	---	---	---	8.8	7.9	8.3	8.2	7.4	7.9
22	---	---	---	---	---	---	9.2	8.7	8.9	8.1	7.6	7.8
23	---	---	---	---	---	---	9.7	9.1	9.4	7.7	6.7	7.0
24	---	---	---	---	---	---	9.8	8.9	9.4	7.8	6.5	7.2
25	---	---	---	---	---	---	10.5	9.0	9.7	8.0	6.9	7.3
26	---	---	---	---	---	---	11.1	8.8	9.9	8.2	6.6	7.3
27	---	---	---	---	---	---	12.3	8.7	10.2	7.4	6.5	7.0
28	---	---	---	---	---	---	13.0	8.7	10.5	7.3	6.3	6.8
29	---	---	---	---	---	---	13.3	8.6	10.5	7.8	6.6	7.5
30	---	---	---	---	---	---	13.3	8.6	10.4	7.8	7.2	7.5
31	---	---	---	---	---	---	---	---	---	7.5	5.9	7.1
MONTH	---	---	---	---	---	---	---	---	---	10.6	1.1	7.1

## STREAMS TRIBUTARY TO DETROIT RIVER

04167150 MIDDLE RIVER ROUGE AT DEARBORN HEIGHTS, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	6.4	5.3	5.9	7.7	6.6	7.0	7.1	6.2	6.7	6.8	5.7	6.3
2	7.0	5.7	6.3	8.0	6.6	7.2	7.6	6.1	7.0	6.6	5.7	6.1
3	7.7	6.1	7.0	7.3	5.6	6.2	7.3	5.7	6.6	6.7	5.8	6.1
4	8.4	7.2	7.7	6.6	5.4	6.3	7.7	6.3	6.7	7.0	5.9	6.4
5	7.7	6.5	7.3	6.8	6.2	6.6	6.6	6.3	6.4	7.6	6.6	7.1
6	7.7	6.8	7.3	7.1	6.3	6.7	7.1	6.0	6.5	8.0	7.2	7.6
7	7.9	6.9	7.3	7.3	6.6	6.9	6.5	6.1	6.3	8.0	7.3	7.6
8	7.7	6.4	7.1	7.1	6.6	6.8	6.5	6.2	6.4	7.3	6.2	7.0
9	8.7	5.3	6.8	6.9	6.4	6.8	7.2	6.4	6.6	7.0	5.9	6.4
10	8.9	5.1	6.6	6.5	5.2	6.2	7.0	6.4	6.7	6.7	5.2	6.0
11	7.9	4.7	6.0	6.3	4.7	5.6	6.9	6.4	6.7	6.2	5.1	5.4
12	5.6	4.2	4.8	6.6	5.9	6.3	7.1	6.7	6.9	6.1	4.9	5.4
13	6.5	5.6	6.1	6.9	6.3	6.7	7.0	6.8	6.9	6.7	6.0	6.2
14	6.2	5.7	5.9	6.7	6.1	6.4	7.1	6.5	6.9	7.3	6.5	7.0
15	5.8	5.2	5.5	7.2	6.0	6.6	6.9	5.1	6.0	8.6	6.9	7.9
16	6.5	5.6	6.0	7.8	6.1	6.9	7.0	5.1	6.2	8.1	7.8	8.0
17	7.0	5.8	6.3	7.6	5.6	6.9	8.1	6.6	7.4	8.2	7.9	8.1
18	6.3	5.6	6.0	8.2	6.3	7.1	8.4	6.9	7.9	8.0	7.8	7.9
19	6.1	3.7	5.5	9.6	6.6	7.7	9.1	8.4	8.9	8.1	7.6	7.8
20	6.5	2.8	5.4	9.3	6.7	7.7	9.6	9.1	9.5	7.8	6.3	7.3
21	6.0	4.7	5.4	8.1	6.5	7.3	10.1	9.5	9.8	7.2	5.9	6.6
22	6.2	5.7	6.1	8.6	6.8	7.6	10.2	8.7	9.8	8.1	7.2	7.7
23	6.3	5.9	6.2	9.4	7.0	7.9	9.7	7.4	8.1	7.7	6.5	7.2
24	6.6	5.6	6.0	8.9	7.0	7.7	7.8	7.2	7.5	7.8	6.6	7.3
25	6.4	5.0	5.7	9.2	6.9	7.8	7.2	6.2	6.6	8.5	7.8	8.1
26	5.8	4.9	5.4	8.5	6.5	7.3	6.4	5.7	6.1	8.6	8.2	8.3
27	6.4	5.5	6.1	8.1	6.1	7.0	5.9	5.1	5.6	8.3	8.0	8.2
28	6.7	6.2	6.5	8.2	4.1	6.8	6.4	5.9	6.2	8.4	8.0	8.2
29	7.0	6.4	6.6	6.5	4.3	5.5	6.6	6.3	6.4	8.9	8.3	8.6
30	7.1	6.6	6.8	7.0	6.2	6.6	6.6	6.2	6.4	8.9	8.3	8.6
31	---	---	---	7.1	6.6	6.8	6.7	6.2	6.4	---	---	---
MONTH	8.9	2.8	6.3	9.6	4.1	6.9	10.2	5.1	7.0	8.9	4.9	7.2

## STREAMS TRIBUTARY TO DETROIT RIVER

## 04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW1/4 SE1/4 sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft downstream from bridge on John Daly Road, 0.6 mi northeast of Inkster, and 4.8 mi upstream from mouth.

DRAINAGE AREA.--83.2 mi<sup>2</sup>.

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft above sea level. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records fair. Since 1995, flow contains effluent from sewage-treatment plant which originates outside the basin. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	62	42	35	41	36	76	52	102	95	67	139	45
2	49	72	35	44	40	67	50	107	75	61	130	44
3	55	55	33	70	37	58	52	77	62	105	206	43
4	139	42	36	101	43	60	57	68	59	68	120	39
5	66	42	103	68	48	54	53	64	90	55	79	38
6	49	39	159	53	41	52	53	58	105	55	503	37
7	42	39	82	50	40	52	56	54	72	49	300	37
8	42	43	55	46	34	51	84	51	60	46	128	41
9	47	37	48	55	41	49	71	81	53	45	86	39
10	20	35	45	74	48	49	63	466	51	68	69	353
11	46	49	42	78	44	50	70	253	75	245	60	725
12	37	40	39	61	45	47	66	154	111	95	54	1210
13	102	37	40	55	44	46	60	142	77	64	48	610
14	83	37	94	50	46	46	59	90	84	54	46	254
15	54	37	112	48	41	50	58	68	74	51	50	248
16	45	35	109	48	43	81	59	74	55	43	51	125
17	41	38	83	45	44	60	61	80	42	40	76	90
18	43	36	58	43	48	53	58	152	64	40	67	76
19	40	41	48	42	50	56	61	702	49	39	50	68
20	40	54	70	46	44	93	414	504	44	37	43	70
21	39	41	66	43	46	102	803	200	119	36	41	64
22	37	34	52	51	65	78	376	130	79	27	41	54
23	38	42	49	36	147	67	180	144	52	37	164	111
24	37	50	43	38	195	62	122	103	69	37	71	92
25	40	41	40	43	192	63	100	83	723	38	54	61
26	36	48	36	38	133	60	84	71	844	38	57	54
27	40	44	37	50	150	67	74	73	190	39	237	50
28	35	39	38	52	132	61	70	139	111	48	85	39
29	37	36	35	36	90	58	63	116	89	79	66	44
30	29	35	36	40	---	54	61	78	75	375	52	43
31	37	---	38	36	---	52	---	96	---	278	49	---
TOTAL	1507	1260	1796	1581	2007	1874	3490	4570	3748	2359	3222	4804
MEAN	48.6	42.0	57.9	51.0	69.2	60.5	116	147	125	76.1	104	160
MAX	139	72	159	101	195	102	803	702	844	375	503	1210
MIN	20	34	33	36	34	46	50	51	42	27	41	37

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 2000, BY WATER YEAR (WY)

	MEAN	22.8	38.7	61.5	61.4	91.7	134	115	62.4	40.9	24.0	19.4	24.7
MAX	110	176	179	294	307	301	280	183	221	95.8	104	160	160
(WY)	1982	1986	1968	1952	1976	1982	1950	1983	1968	1969	1998	2000	2000
MIN	2.11	3.23	2.32	1.86	4.18	19.4	22.2	4.47	2.75	2.26	.83	1.86	1.86
(WY)	1949	1964	1964	1961	1964	1964	1958	1958	1949	1948	1950	1952	1952

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1947 - 2000

ANNUAL TOTAL	33001	32218	
ANNUAL MEAN	90.4	88.0	(a)57.9
HIGHEST ANNUAL MEAN			107
LOWEST ANNUAL MEAN			15.9
HIGHEST DAILY MEAN	990	1210	2520
LOWEST DAILY MEAN	20	20	.30
ANNUAL SEVEN-DAY MINIMUM	32	36	.53
INSTANTANEOUS PEAK FLOW		1510	3600
INSTANTANEOUS PEAK STAGE		10.96	13.62
INSTANTANEOUS LOW FLOW			.20
10 PERCENT EXCEEDS	176	139	128
50 PERCENT EXCEEDS	52	54	20
90 PERCENT EXCEEDS	37	37	2.8

(a) Annual mean, water years 1948-95, 54.1 ft<sup>3</sup>/s, 8.83 in/yr; water years 1996-00, 94.4 ft<sup>3</sup>/s.

(b) Sept. 13, 1955, Jan. 23, 1961.



## STREAMS TRIBUTARY TO DETROIT RIVER

## 04168400 LOWER RIVER ROUGE AT DEARBORN, MI

LOCATION.--Lat 42°18'31", long 83°15'10", in NE1/4 sec.22, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 100 ft upstream from bridge on Military Road in Dearborn.

DRAINAGE AREA.--91 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1997 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 585 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good. Flow contains effluent from sewage-treatment plant, which originates outside the basin. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S <sup>OP</sup>
1	63	42	34	39	38	77	61	114	96	65	176	48
2	48	81	34	42	40	67	59	112	73	58	161	46
3	62	57	34	72	37	58	61	77	60	140	226	46
4	149	41	35	103	43	60	66	66	56	73	148	42
5	67	40	125	68	49	54	60	64	91	56	90	40
6	50	38	186	50	42	53	61	58	102	55	469	38
7	43	38	92	48	40	51	61	56	70	49	343	37
8	41	41	61	43	35	51	91	52	56	45	163	41
9	47	37	52	53	39	48	76	89	49	44	101	42
10	23	35	49	73	45	48	66	409	48	62	78	377
11	44	50	45	77	41	50	72	280	76	247	66	697
12	37	39	43	60	41	47	69	179	119	113	59	1770
13	127	37	43	55	41	45	61	164	83	69	53	777
14	83	36	120	49	43	45	58	98	91	58	50	294
15	53	36	128	47	39	50	60	70	80	55	58	268
16	45	34	117	46	40	83	59	75	62	47	55	156
17	41	37	88	44	42	61	58	84	50	43	91	108
18	42	34	62	42	44	53	53	170	71	43	77	85
19	39	38	50	40	47	55	54	661	56	41	56	76
20	39	51	71	44	42	97	472	537	53	41	47	79
21	39	40	68	43	43	108	859	203	129	39	45	72
22	37	34	51	47	62	81	425	131	89	30	49	59
23	38	39	48	37	147	68	207	152	60	40	219	130
24	37	47	41	36	206	63	136	101	99	38	84	103
25	39	39	38	42	205	65	105	80	679	40	61	64
26	35	46	35	39	149	64	84	67	954	40	59	57
27	38	42	34	55	162	74	73	66	243	40	254	53
28	36	38	36	42	147	65	69	140	133	51	104	42
29	37	36	35	38	94	65	62	120	98	101	75	46
30	31	34	35	41	---	61	58	79	78	370	58	45
31	35	---	36	38	---	59	---	96	---	309	52	---
TOTAL	1545	1237	1926	1553	2043	1926	3756	4650	4004	2502	3627	5238
MEAN	49.8	41.2	62.1	50.1	70.4	62.1	125	150	133	80.7	117	175
MAX	149	81	186	103	206	108	859	661	954	370	469	1270
MIN	23	34	34	36	35	45	53	52	48	30	45	37

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 2000, BY WATER YEAR (WY)

	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
MEAN	49.8	44.4	60.1	115	140	148	176	97.5	110	78.9	88.5	89.0
MAX	52.9	51.0	75.1	163	256	285	201	150	133	88.2	117	175
(WY)	1999	1998	1998	1999	1998	1998	1999	2000	2000	1999	2000	2000
MIN	46.7	40.9	43.2	50.1	70.4	62.1	125	66.7	63.4	67.8	45.9	43.0
(WY)	1998	1999	1999	2000	2000	2000	2000	1999	1998	1998	1999	1998

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1998 - 2000

ANNUAL TOTAL	33183		34007		99.3	
ANNUAL MEAN	90.9		92.9		116	1978
HIGHEST ANNUAL MEAN					89.5	1979
LOWEST ANNUAL MEAN						
HIGHEST DAILY MEAN	1040	Apr 24	1270	Sep 12	1620	Feb 18 1978
LOWEST DAILY MEAN	23	Jan 1	23	Oct 10	23	(a)
ANNUAL SEVEN-DAY MINIMUM	32	Sep 13	35	Nov 28	27	Dec 26 1978
INSTANTANEOUS PEAK FLOW			1390	Sep 12	1970	Feb 18 1978
INSTANTANEOUS PEAK STAGE			8.79	Sep 12	10.28	Feb 18 1978
10 PERCENT EXCEEDS	188		158		200	
50 PERCENT EXCEEDS	51		56		55	
90 PERCENT EXCEEDS	35		38		35	

(a) Jan. 1, Oct. 10, 1999.

[illegible]

## STREAMS TRIBUTARY TO DETROIT RIVER

04168400 LOWER RIVER ROUGE AT DEARBORN, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	15.5	13.5	14.0
2	---	---	---	---	---	---	---	---	---	15.0	12.5	14.0
3	---	---	---	---	---	---	---	---	---	17.0	13.0	15.0
4	---	---	---	---	---	---	---	---	---	18.0	14.5	15.5
5	---	---	---	---	---	---	---	---	---	20.0	16.5	18.0
6	---	---	---	---	---	---	---	---	---	21.0	17.5	13.5
7	---	---	---	---	---	---	---	---	---	21.0	19.0	21.0
8	---	---	---	---	---	---	---	---	---	21.5	19.5	21.5
9	---	---	---	---	---	---	---	---	---	21.5	18.0	21.0
10	---	---	---	---	---	---	---	---	---	18.5	16.0	17.5
11	---	---	---	---	---	---	---	---	---	16.5	15.5	15.0
12	---	---	---	---	---	---	---	---	---	17.5	15.5	15.5
13	---	---	---	---	---	---	---	---	---	19.5	17.5	18.0
14	---	---	---	---	---	---	14.0	9.5	11.5	17.5	15.0	15.5
15	---	---	---	---	---	---	17.5	13.0	15.0	15.5	13.5	14.5
16	---	---	---	---	---	---	17.0	14.5	15.5	15.0	13.5	14.0
17	---	---	---	---	---	---	15.0	12.5	13.0	16.5	13.5	14.5
18	---	---	---	---	---	---	13.0	11.0	12.0	16.5	13.5	15.5
19	---	---	---	---	---	---	13.0	12.0	12.5	13.5	12.0	15.5
20	---	---	---	---	---	---	13.0	11.0	12.0	13.5	12.0	12.5
21	---	---	---	---	---	---	11.5	10.5	11.0	15.5	13.5	14.5
22	---	---	---	---	---	---	10.5	10.0	10.5	16.5	15.0	15.5
23	---	---	---	---	---	---	13.0	10.0	11.5	17.0	15.5	15.0
24	---	---	---	---	---	---	15.0	12.0	13.0	17.5	16.0	15.5
25	---	---	---	---	---	---	14.5	12.0	13.0	---	---	---
26	---	---	---	---	---	---	14.5	11.5	13.0	---	---	---
27	---	---	---	---	---	---	15.0	11.5	13.0	17.0	16.0	15.5
28	---	---	---	---	---	---	15.0	11.5	13.5	16.0	14.5	15.0
29	---	---	---	---	---	---	16.0	12.0	14.0	16.5	14.0	15.5
30	---	---	---	---	---	---	16.5	13.0	15.0	17.5	15.0	15.5
31	---	---	---	---	---	---	---	---	---	20.0	17.0	15.0
MONTH	---	---	---	---	---	---	---	---	---	---	---	---

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	20.5	19.0	20.0	21.5	19.0	20.0	22.5	22.0	22.0	24.0	22.0	23.0
2	21.0	19.5	20.0	22.5	19.5	21.0	22.5	21.5	21.5	24.0	22.5	23.5
3	19.5	17.0	17.5	22.5	21.0	21.5	22.0	20.5	21.5	24.0	22.5	23.0
4	17.0	15.5	16.5	22.5	21.0	21.5	21.0	20.0	20.5	23.0	20.0	21.5
5	17.0	15.0	15.5	22.5	21.0	22.0	21.5	19.5	20.5	20.0	17.5	18.5
6	16.5	14.0	15.5	22.0	20.0	21.0	21.0	20.0	20.0	18.0	16.5	17.5
7	18.0	15.0	16.5	20.5	18.5	20.0	22.0	20.0	21.5	19.5	17.0	18.0
8	20.5	17.0	18.5	20.5	18.5	19.0	23.0	21.5	22.0	21.5	19.5	20.0
9	22.0	19.0	20.5	21.0	19.0	19.5	23.5	22.0	22.5	22.0	21.0	21.5
10	23.0	20.0	21.5	21.5	20.0	20.5	23.0	21.5	22.0	22.0	21.5	21.5
11	22.5	21.5	22.0	22.0	21.0	21.5	22.0	20.5	21.5	22.0	21.0	21.5
12	22.0	20.0	21.0	21.0	20.0	20.5	21.5	19.5	20.5	21.5	20.5	21.0
13	21.0	19.0	20.0	21.5	19.0	20.5	21.0	19.5	20.0	20.5	19.5	19.5
14	22.5	20.0	21.0	22.0	20.5	21.5	22.0	20.0	20.5	19.5	18.0	19.0
15	21.5	21.0	21.5	21.5	20.5	21.0	22.5	21.0	21.5	18.0	16.5	17.5
16	22.0	20.0	21.0	21.5	20.0	21.0	22.5	21.0	21.5	16.5	15.5	16.0
17	21.5	20.0	21.0	22.5	20.5	21.5	21.5	19.0	20.0	17.0	15.5	16.0
18	21.0	18.5	19.5	22.5	20.0	21.0	19.5	19.0	19.0	18.5	16.5	17.5
19	21.0	18.0	19.0	21.0	19.5	20.0	19.5	18.5	19.0	19.5	17.5	18.5
20	21.5	19.0	20.5	20.5	18.5	19.5	19.0	17.5	18.5	20.0	18.5	19.0
21	22.0	20.0	21.0	20.5	19.5	20.0	19.0	17.5	18.0	19.5	17.0	18.0
22	21.0	20.5	20.5	19.5	18.5	19.0	20.5	17.5	18.5	17.0	15.5	16.0
23	21.5	19.5	20.5	19.5	18.0	19.0	22.0	20.5	21.0	20.0	16.5	17.0
24	22.0	20.0	21.0	20.0	18.0	19.0	22.5	21.0	21.5	18.5	17.0	18.0
25	22.0	21.5	21.5	20.5	18.5	19.5	22.0	20.0	21.0	17.0	15.0	15.5
26	22.5	21.5	22.0	22.0	20.0	20.5	22.0	20.5	21.5	15.5	14.0	15.0
27	22.0	21.0	21.5	22.5	21.0	21.5	22.0	21.0	21.5	16.5	14.5	15.5
28	21.0	20.0	20.5	22.5	21.5	22.0	21.5	20.5	21.0	16.0	14.0	15.0
29	20.5	19.5	20.0	21.5	20.5	21.0	22.5	21.0	21.5	15.0	13.0	14.0
30	20.5	18.5	19.5	21.5	20.5	21.0	23.0	21.5	22.5	16.0	14.0	15.0
31	---	---	---	22.0	21.0	21.5	23.5	22.0	22.5	---	---	---
MONTH	23.0	14.0	19.9	22.5	18.0	20.6	23.5	17.5	20.9	24.0	13.0	19.5



## STREAMS TRIBUTARY TO DETROIT RIVER

04168400 LOWER RIVER ROUGE AT DEARBORN, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	6.2	5.0	5.6	7.5	7.0	7.2	6.7	6.2	6.5	6.0	4.3	5.4
2	5.9	5.6	5.8	7.5	6.9	7.2	6.8	5.3	6.3	5.3	4.8	5.0
3	6.7	5.9	6.4	8.5	6.0	7.2	7.5	6.3	7.0	5.0	4.8	4.9
4	7.2	6.2	6.8	7.7	6.4	7.1	7.6	7.1	7.4	6.1	4.9	5.5
5	7.6	6.5	7.0	7.1	5.6	6.3	7.6	6.9	7.2	6.8	5.9	6.5
6	8.0	7.2	7.6	6.2	5.7	6.0	7.2	5.9	7.0	7.0	6.5	6.8
7	7.9	6.6	7.3	6.5	5.9	6.2	7.4	6.8	7.1	7.1	6.7	6.9
8	6.7	5.7	6.5	6.6	5.9	6.4	7.3	6.6	7.0	6.7	4.0	6.1
9	6.0	5.3	5.7	6.4	5.8	6.2	6.8	6.3	6.5	5.4	4.1	5.0
10	5.7	4.6	5.3	6.3	5.4	5.9	6.8	6.2	6.5	6.7	4.3	5.6
11	5.2	2.3	4.6	6.9	5.4	6.3	7.1	6.4	6.9	6.8	5.7	6.1
12	5.5	3.5	4.9	6.9	6.6	6.7	7.2	6.7	7.1	5.8	5.2	5.5
13	5.9	5.3	5.6	6.8	6.3	6.7	7.2	6.6	7.0	6.8	5.8	6.4
14	5.8	4.8	5.3	6.5	6.2	6.4	7.0	6.6	6.8	7.3	6.8	7.0
15	5.2	4.9	5.1	6.6	6.1	6.4	6.7	4.5	6.1	7.6	7.1	7.3
16	5.5	5.1	5.3	6.8	6.1	6.5	6.4	5.8	6.2	7.7	7.3	7.5
17	5.6	5.1	5.4	6.8	6.2	6.5	6.5	5.5	6.3	7.8	7.4	7.7
18	6.0	4.9	5.7	7.0	6.1	6.6	6.6	6.2	6.5	7.7	7.3	7.5
19	6.5	5.8	6.2	7.3	6.2	6.8	6.9	6.4	6.7	7.4	6.9	7.2
20	6.4	3.5	6.1	7.3	6.3	6.8	6.9	6.6	6.8	7.1	5.0	6.7
21	6.1	3.8	5.5	7.2	5.5	6.8	7.0	6.5	6.8	6.8	4.1	5.9
22	6.4	6.0	6.2	7.8	6.8	6.9	6.8	5.8	6.7	7.6	6.8	7.3
23	6.9	6.3	6.6	7.9	6.9	7.5	6.7	4.5	6.0	7.2	5.3	6.5
24	7.2	5.9	6.5	8.0	7.2	7.6	6.5	6.2	6.4	7.0	5.8	6.7
25	7.6	7.0	7.4	8.1	7.1	7.6	6.6	5.4	6.5	7.8	6.9	7.6
26	8.0	6.3	7.1	8.1	6.9	7.5	6.5	4.0	6.2	7.9	7.1	7.6
27	8.0	5.3	7.0	7.7	6.6	7.0	6.7	5.2	6.2	7.7	6.7	7.4
28	7.4	4.9	6.8	7.4	5.7	6.5	6.8	6.6	6.7	7.7	6.6	7.2
29	7.3	6.9	7.1	6.4	4.0	5.3	6.8	6.4	6.7	8.1	7.5	7.8
30	7.7	7.0	7.4	6.8	5.0	6.3	6.5	5.9	6.3	7.9	7.3	7.7
31	--	--	--	7.0	6.4	6.8	6.3	5.6	6.1	--	--	--
MONTH	8.0	2.3	6.2	8.5	4.0	6.7	7.6	4.0	6.6	8.1	4.0	6.6

## STREAMS TRIBUTARY TO LAKE ERIE

## 04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE1/4 sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft downstream from bridge on General Motors Road, 0.5 mi downstream from Sherwood Creek, and 0.5 mi west of Milford.

DRAINAGE AREA.--132 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft above sea level. Prior to Apr. 1, 1970, at site 240 ft upstream at same datum.

REMARKS.--Water-discharge records good. Flow below about 300 ft<sup>3</sup>/s regulated by powerplant 1.5 mi upstream from station prior to May 20, 1957; occasional regulation for lake level control since. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	76	60	75	86	63	114	35	60	89	158	e205	75
2	63	66	72	84	63	114	38	69	69	149	e210	75
3	62	70	72	88	64	112	42	58	61	171	e215	72
4	74	67	72	98	66	108	42	51	69	174	207	69
5	67	60	93	93	64	103	45	48	76	168	193	64
6	59	67	137	85	63	100	43	44	83	146	216	60
7	54	68	134	80	61	95	51	37	97	127	232	58
8	47	65	116	78	61	93	63	34	98	115	233	59
9	47	62	107	85	61	88	65	57	79	112	210	63
10	45	65	116	101	61	82	57	147	58	113	189	111
11	42	69	118	104	60	74	56	163	57	104	176	214
12	39	66	106	96	59	66	55	160	75	83	164	304
13	39	65	101	91	58	63	53	144	96	67	149	398
14	44	68	110	88	58	59	49	138	111	67	134	417
15	43	68	134	86	58	64	46	131	119	65	121	388
16	38	67	144	82	57	84	45	127	106	61	108	354
17	39	65	132	80	58	75	42	129	95	58	104	317
18	38	64	118	78	59	65	40	136	90	55	106	285
19	39	67	115	77	62	61	34	186	86	50	95	251
20	39	83	121	78	61	66	78	222	81	46	84	231
21	42	77	122	75	61	74	141	218	85	45	80	216
22	41	71	118	71	66	69	148	188	79	45	77	204
23	43	70	115	71	89	65	135	173	66	45	110	236
24	46	72	113	69	108	66	113	165	58	42	113	242
25	50	72	113	68	122	60	96	152	165	33	101	227
26	54	71	109	67	122	59	86	142	243	28	87	204
27	54	73	105	65	134	60	82	131	315	25	83	192
28	56	80	104	64	133	58	76	133	280	e43	82	183
29	57	81	102	64	120	47	70	132	224	e72	83	178
30	58	79	96	63	---	39	63	116	176	e105	81	171
31	59	---	90	63	---	35	---	102	---	e165	79	---
TOTAL	1554	2078	3380	2478	2172	2318	1989	3793	3386	2737	4327	5918
MEAN	50.1	69.3	109	79.9	74.9	74.8	66.3	122	113	88.3	140	197
MAX	76	83	144	104	134	114	148	222	315	174	233	417
MIN	38	60	72	63	57	35	34	34	57	25	77	58
CFSM	.38	.52	.83	.61	.57	.57	.50	.93	.86	.67	1.06	1.49
IN.	.44	.59	.95	.70	.61	.65	.56	1.07	.95	.77	1.22	1.67

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 2000, BY WATER YEAR (WY)

	MEAN	79.9	96.7	109	106	113	155	160	116	88.5	67.5	56.0	67.2
MAX	283	179	218	211	226	337	389	340	197	233	142	247	
(WY)	1982	1993	1961	1993	1961	1976	1950	1956	1996	1968	1968	1975	
MIN	32.6	34.0	35.8	42.5	42.0	66.9	66.3	51.8	28.8	19.3	26.5	27.2	
(WY)	1965	1964	1964	1964	1963	1964	2000	1988	1988	1988	1971	1964	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1948 - 2000

ANNUAL TOTAL	27893		36130		101	
ANNUAL MEAN	76.4		98.7		157	1974
HIGHEST ANNUAL MEAN					44.6	1964
LOWEST ANNUAL MEAN					632	Oct 3 1981
HIGHEST DAILY MEAN	228	Apr 24	417	Sep 14	5.2	Oct 21 1971
LOWEST DAILY MEAN	22	Sep 6	25	Jul 27	11	Jul 9 1988
ANNUAL SEVEN-DAY MINIMUM	28	Sep 22	37	Jul 22	(a)648	Oct 3 1981
INSTANTANEOUS PEAK FLOW			439	Sep 14	8.26	Jun 28 1968
INSTANTANEOUS PEAK STAGE			7.14	Sep 14	.77	
ANNUAL RUNOFF (CFSM)	.58		.75		10.42	
ANNUAL RUNOFF (INCHES)	7.86		10.18		185	
10 PERCENT EXCEEDS	121		180		86	
50 PERCENT EXCEEDS	68		78		38	
90 PERCENT EXCEEDS	38		45			

(a) Gage height 7.87 ft.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	---	---	---	728	701	716	---	---	---	791	756	774
2	---	---	---	728	694	723	---	---	---	801	755	779
3	---	---	---	716	692	704	---	---	---	812	767	789
4	---	---	---	701	674	689	---	---	---	797	778	786
5	---	---	---	678	664	672	---	---	---	783	770	776
6	---	---	---	695	678	685	---	---	---	780	765	774
7	796	786	791	717	694	705	---	---	---	793	760	777
8	786	778	782	736	711	725	---	---	---	811	775	789
9	787	775	780	743	715	732	---	---	---	836	789	809
10	813	777	794	737	721	729	---	---	---	838	732	802
11	809	728	798	746	721	736	---	---	---	759	602	698
12	810	734	790	765	745	756	---	---	---	602	551	571
13	808	763	791	774	753	761	---	---	---	557	549	553
14	779	735	763	783	766	774	---	---	---	---	---	---
15	741	720	732	792	781	785	---	---	---	546	540	543
16	755	736	748	800	772	784	733	689	708	551	539	544
17	759	742	752	820	782	801	734	701	717	554	546	550
18	761	747	754	805	775	793	729	707	716	560	553	556
19	777	748	762	808	783	796	732	704	716	562	555	559
20	786	755	772	814	795	804	716	701	708	562	554	559
21	786	770	778	815	793	804	720	707	712	568	556	561
22	798	765	785	828	809	816	721	654	712	573	557	565
23	791	777	785	830	807	820	707	684	696	565	554	558
24	799	717	785	846	822	831	713	690	692	558	548	554
25	781	669	729	850	830	842	693	672	682	568	541	552
26	669	563	606	850	831	841	726	689	703	583	552	567
27	585	555	568	848	830	840	728	706	715	602	567	585
28	619	570	595	---	---	---	753	721	734	623	596	605
29	657	619	636	---	---	---	757	723	741	629	603	615
30	703	657	679	---	---	---	776	739	752	640	615	628
31	---	---	---	---	---	---	781	743	760	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	---	---

PH, WATER, WHOLE, FIELD, STANDARD UNITS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	---	---	---	---	---	---	7.8	7.6	7.7	8.4	8.3	8.4
2	---	---	---	---	---	---	7.8	7.6	7.7	8.4	8.2	8.3
3	---	---	---	---	---	---	7.6	7.4	7.6	8.3	8.2	8.3
4	---	---	---	---	---	---	7.7	7.4	7.6	8.3	8.2	8.2
5	---	---	---	---	---	---	7.7	7.6	7.6	8.3	8.2	8.2
6	---	---	---	---	---	---	7.8	7.6	7.7	8.3	8.2	8.2
7	---	---	---	---	---	---	7.8	7.6	7.7	8.3	8.1	8.2
8	---	---	---	---	---	---	7.9	7.7	7.8	8.2	8.0	8.1
9	---	---	---	---	---	---	7.9	7.8	7.8	---	---	---
10	---	---	---	---	---	---	7.9	7.8	7.9	---	---	---
11	---	---	---	---	---	---	7.9	7.8	7.9	---	---	---
12	---	---	---	---	---	---	7.9	7.8	7.9	---	---	---
13	---	---	---	---	---	---	7.9	7.8	7.9	---	---	---
14	---	---	---	---	---	---	7.9	7.8	7.9	---	---	---
15	---	---	---	---	---	---	8.0	7.8	7.9	---	---	---
16	---	---	---	---	---	---	8.1	7.9	8.0	---	---	---
17	---	---	---	---	---	---	8.1	7.9	8.0	---	---	---
18	---	---	---	---	---	---	8.0	7.9	8.0	---	---	---
19	---	---	---	---	---	---	8.4	7.9	8.1	---	---	---
20	---	---	---	---	---	---	8.3	8.1	8.2	---	---	---
21	---	---	---	---	---	---	8.1	7.9	8.0	---	---	---
22	---	---	---	---	---	---	7.9	7.7	7.8	---	---	---
23	---	---	---	---	---	---	7.8	7.7	7.8	---	---	---
24	---	---	---	---	---	---	7.8	7.7	7.8	---	---	---
25	---	---	---	---	---	---	8.0	7.8	7.9	---	---	---
26	---	---	---	---	---	---	8.2	7.9	8.1	---	---	---
27	---	---	---	---	---	---	8.2	8.0	8.1	---	---	---
28	---	---	---	---	---	---	8.3	8.2	8.3	---	---	---
29	---	---	---	---	---	---	8.5	8.2	8.3	---	---	---
30	---	---	---	7.9	7.6	7.8	8.4	8.3	8.3	---	---	---
31	---	---	---	7.8	7.6	7.7	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	8.5	7.4	7.9	---	---	---



## STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI--Continued

PH, WATER, WHOLE, FIELD, STANDARD UNITS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		JUNE				JULY		AUGUST				SEPTEMBER	
1	--	--	--	7.9	7.8	7.8	--	--	--	8.2	7.9	8.0	
2	--	--	--	8.0	7.8	7.9	--	--	--	8.2	7.9	8.0	
3	--	--	--	8.1	7.8	7.9	--	--	--	8.1	7.8	8.0	
4	--	--	--	8.0	7.9	7.9	--	--	--	8.1	7.8	7.9	
5	--	--	--	8.0	7.9	7.9	--	--	--	8.1	7.8	7.9	
6	--	--	--	8.0	7.9	7.9	--	--	--	8.1	7.8	7.9	
7	7.9	7.8	7.9	8.0	7.9	8.0	--	--	--	8.2	7.8	8.0	
8	8.0	7.9	7.9	8.0	8.0	8.0	--	--	--	8.2	7.8	8.0	
9	8.1	7.9	8.0	8.0	7.9	8.0	--	--	--	8.2	7.9	8.0	
10	7.9	7.7	7.8	8.1	7.9	8.0	--	--	--	8.0	7.8	7.9	
11	7.8	7.7	7.7	8.3	7.9	8.2	--	--	--	7.8	7.6	7.7	
12	7.7	7.6	7.7	8.4	8.2	8.2	--	--	--	7.7	7.6	7.6	
13	7.6	7.6	7.6	8.2	8.1	8.2	--	--	--	7.7	7.5	7.6	
14	7.7	7.6	7.6	8.3	8.1	8.2	--	--	--	--	--	--	
15	7.7	7.6	7.6	8.3	8.1	8.2	--	--	--	7.7	7.6	7.6	
16	7.7	7.7	7.7	8.2	8.1	8.2	8.0	7.9	8.0	7.8	7.7	7.8	
17	7.8	7.7	7.8	8.1	8.0	8.1	8.0	7.9	7.9	7.9	7.8	7.8	
18	7.8	7.7	7.7	8.4	8.1	8.2	7.9	7.8	7.9	7.9	7.8	7.9	
19	7.9	7.8	7.8	8.4	8.1	8.2	8.0	7.9	7.9	7.9	7.8	7.9	
20	8.0	7.8	7.9	8.2	7.9	8.1	8.1	7.9	8.0	7.9	7.9	7.9	
21	7.9	7.8	7.8	8.2	8.0	8.1	8.1	7.9	8.0	8.0	7.9	7.9	
22	7.9	7.8	7.8	8.2	8.0	8.1	8.1	7.9	8.0	8.1	7.9	8.0	
23	8.1	7.8	7.9	8.2	8.0	8.1	8.1	7.9	8.0	8.1	8.0	8.0	
24	8.1	7.9	8.0	8.2	7.9	8.0	8.0	7.8	7.9	8.0	8.0	8.0	
25	8.0	7.8	7.8	8.1	7.9	8.0	7.9	7.8	7.8	8.1	8.0	8.1	
26	7.8	7.6	7.6	8.2	7.9	8.0	7.9	7.8	7.8	8.2	8.1	8.2	
27	7.6	7.5	7.6	8.2	7.9	8.0	8.0	7.8	7.9	8.2	8.2	8.2	
28	7.6	7.5	7.5	--	--	--	8.1	7.9	8.0	8.3	8.2	8.2	
29	7.7	7.6	7.6	--	--	--	8.1	7.9	8.0	8.3	8.2	8.2	
30	7.8	7.7	7.8	--	--	--	8.2	7.9	8.0	8.3	8.2	8.2	
31	--	--	--	--	--	--	8.2	7.9	8.0	--	--	--	
MONTH	--	--	--	--	--	--	--	--	--	--	--	--	

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL			MAY	
1	---	---	---	---	---	---	12.0	9.5	10.5	16.0	15.0	16.0
2	---	---	---	---	---	---	12.0	11.0	11.5	18.0	14.5	16.0
3	---	---	---	---	---	---	12.5	11.0	11.5	18.5	15.0	17.0
4	---	---	---	---	---	---	11.0	9.0	10.5	19.0	16.5	17.5
5	---	---	---	---	---	---	12.0	8.5	9.5	20.5	17.5	18.0
6	---	---	---	---	---	---	12.0	9.0	9.5	22.5	19.0	20.5
7	---	---	---	---	---	---	10.5	8.5	9.0	23.5	20.5	21.5
8	---	---	---	---	---	---	9.5	7.5	8.0	24.0	21.5	22.0
9	---	---	---	---	---	---	8.5	6.5	7.5	---	---	---
10	---	---	---	---	---	---	9.0	6.0	7.5	---	---	---
11	---	---	---	---	---	---	7.5	6.5	7.0	---	---	---
12	---	---	---	---	---	---	9.0	6.0	7.5	---	---	---
13	---	---	---	---	---	---	10.0	6.5	8.0	---	---	---
14	---	---	---	---	---	---	12.0	8.0	9.5	---	---	---
15	---	---	---	---	---	---	14.0	10.0	12.0	---	---	---
16	---	---	---	---	---	---	15.5	13.0	14.0	---	---	---
17	---	---	---	---	---	---	14.0	12.0	13.0	---	---	---
18	---	---	---	---	---	---	15.5	11.5	13.0	---	---	---
19	---	---	---	---	---	---	14.0	12.5	13.0	---	---	---
20	---	---	---	---	---	---	13.0	12.0	12.5	---	---	---
21	---	---	---	---	---	---	12.0	10.5	11.5	---	---	---
22	---	---	---	---	---	---	11.5	10.0	10.5	---	---	---
23	---	---	---	---	---	---	12.5	10.5	11.5	---	---	---
24	---	---	---	---	---	---	15.0	11.0	13.0	---	---	---
25	---	---	---	---	---	---	15.5	12.0	13.5	---	---	---
26	---	---	---	---	---	---	16.0	12.5	14.0	---	---	---
27	---	---	---	---	---	---	16.5	13.0	14.5	---	---	---
28	---	---	---	---	---	---	17.5	13.5	15.0	---	---	---
29	---	---	---	---	---	---	18.0	14.5	16.0	---	---	---
30	---	---	---	12.5	9.0	10.5	18.0	15.0	16.0	---	---	---
31	---	---	---	13.0	8.5	10.5	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	18.0	6.0	11.3	---	---	---

## STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	23.0	22.0	22.5	---	---	---	26.5	23.5	25.0	
2	---	---	---	24.0	23.0	23.5	---	---	---	26.5	24.5	25.5	
3	---	---	---	24.5	23.5	24.0	---	---	---	26.0	24.0	24.5	
4	---	---	---	24.5	23.5	24.0	---	---	---	24.0	21.5	23.0	
5	---	---	---	25.5	24.0	24.5	---	---	---	23.0	20.0	21.5	
6	---	---	---	25.0	23.0	24.0	---	---	---	22.5	19.0	20.5	
7	19.5	17.0	18.5	24.5	22.5	23.5	---	---	---	22.0	19.0	20.0	
8	21.5	18.5	20.0	23.0	22.0	22.5	---	---	---	22.0	20.0	21.0	
9	23.5	20.5	22.0	22.5	22.0	22.5	---	---	---	23.5	21.0	22.0	
10	25.0	21.5	23.0	23.0	22.0	22.5	---	---	---	22.5	21.5	22.0	
11	24.5	23.0	23.5	24.5	22.0	23.0	---	---	---	21.5	21.5	21.5	
12	23.5	22.0	23.0	24.0	22.0	22.5	---	---	---	21.5	21.0	21.5	
13	22.5	21.0	22.0	25.0	21.5	23.0	---	---	---	21.0	20.0	20.5	
14	23.5	22.0	22.5	25.0	22.5	23.5	---	---	---	---	---	---	
15	23.5	22.5	22.5	24.0	22.5	23.0	---	---	---	19.0	17.5	18.0	
16	23.5	22.5	23.0	24.0	22.0	23.0	24.5	23.0	23.5	17.5	16.5	17.0	
17	24.0	22.0	23.0	24.5	22.0	23.0	23.0	21.5	22.5	17.5	16.5	17.0	
18	23.5	21.5	22.5	24.5	22.0	23.0	22.0	21.0	21.5	18.5	17.0	17.5	
19	23.5	21.0	22.0	23.5	21.5	22.5	22.5	20.5	21.0	19.0	18.0	18.5	
20	24.0	22.0	23.0	24.5	21.0	22.0	22.5	20.0	21.0	19.5	19.0	19.0	
21	24.0	22.5	23.0	23.5	21.0	22.0	22.0	19.5	20.5	19.0	17.0	18.0	
22	23.0	21.5	22.0	23.0	20.5	21.5	22.0	20.0	20.5	17.0	16.0	16.5	
23	24.0	21.0	22.5	23.0	20.5	21.5	22.5	20.5	21.5	17.5	16.0	16.5	
24	24.0	22.5	23.0	24.0	20.0	21.5	24.0	21.5	22.5	17.5	16.0	16.5	
25	24.0	22.5	23.0	24.0	19.5	21.5	23.5	21.5	22.5	16.0	14.5	15.5	
26	23.5	23.0	23.0	24.5	20.5	22.0	23.5	22.0	22.5	15.0	14.0	14.5	
27	23.5	22.5	23.0	25.5	21.0	22.5	23.5	22.5	22.5	16.0	15.0	15.5	
28	23.5	22.5	23.0	---	---	---	23.5	22.0	22.5	16.0	15.0	15.5	
29	22.5	22.0	22.0	---	---	---	24.0	22.0	23.0	15.5	14.5	15.0	
30	22.5	21.5	22.0	---	---	---	25.5	23.0	24.0	15.5	15.0	15.5	
31	---	---	---	---	---	---	25.5	23.5	24.5	---	---	---	
MONTH	---	---	---	---	---	---	---	---	---	---	---	---	

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	12.0	9.0	10.0	7.5	6.5	7.0	
2	---	---	---	---	---	---	11.5	9.0	10.0	7.5	6.5	7.0	
3	---	---	---	---	---	---	12.0	9.0	10.0	8.0	6.5	7.0	
4	---	---	---	---	---	---	11.5	9.5	10.5	8.0	7.0	7.5	
5	---	---	---	---	---	---	12.5	10.0	11.0	8.0	7.0	7.5	
6	---	---	---	---	---	---	12.5	10.0	11.0	8.5	7.0	7.5	
7	---	---	---	---	---	---	12.5	10.0	11.0	8.5	7.0	7.5	
8	---	---	---	---	---	---	13.0	10.5	11.5	8.5	7.0	7.5	
9	---	---	---	---	---	---	13.0	11.0	12.0	---	---	---	
10	---	---	---	---	---	---	13.5	11.0	12.5	---	---	---	
11	---	---	---	---	---	---	13.0	11.0	12.0	---	---	---	
12	---	---	---	---	---	---	13.5	11.0	12.5	---	---	---	
13	---	---	---	---	---	---	13.5	10.5	12.0	---	---	---	
14	---	---	---	---	---	---	13.0	9.5	11.5	---	---	---	
15	---	---	---	---	---	---	12.0	8.0	10.0	---	---	---	
16	---	---	---	---	---	---	11.0	7.5	9.0	---	---	---	
17	---	---	---	---	---	---	11.5	7.5	9.0	---	---	---	
18	---	---	---	---	---	---	11.0	7.5	9.0	---	---	---	
19	---	---	---	---	---	---	10.5	7.5	8.5	---	---	---	
20	---	---	---	---	---	---	9.0	7.5	8.5	---	---	---	
21	---	---	---	---	---	---	9.5	9.0	9.0	---	---	---	
22	---	---	---	---	---	---	10.0	9.0	9.5	---	---	---	
23	---	---	---	---	---	---	10.0	9.0	9.5	---	---	---	
24	---	---	---	---	---	---	10.0	9.0	9.5	---	---	---	
25	---	---	---	---	---	---	9.5	8.5	9.0	---	---	---	
26	---	---	---	---	---	---	9.5	8.0	9.0	---	---	---	
27	---	---	---	---	---	---	9.0	7.5	8.5	---	---	---	
28	---	---	---	---	---	---	9.0	7.5	8.0	---	---	---	
29	---	---	---	---	---	---	8.5	7.0	8.0	---	---	---	
30	---	---	---	11.0	8.0	9.5	8.5	7.0	7.5	---	---	---	
31	---	---	---	11.5	8.5	10.0	---	---	---	---	---	---	
MONTH	---	---	---	---	---	---	13.5	7.0	10.0	---	---	---	



## STREAMS TRIBUTARY TO LAKE ERIE

## 04170490 KENT LAKE NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'34", in sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, at Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi<sup>2</sup>.

PERIOD OF RECORD.--April 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft above sea level (Huron-Clinton Metropolitan Authority bench mark).

REMARKS.--Records good. The inlet and outlet is the Huron River which enters the northeast end of the lake and leaves the southwest end of the lake. Streamflow records are currently collected on the Huron River at sites about 1 mi upstream (04170000) and 150 ft downstream (04170500) from Kent Lake. Maximum depth, 38 ft, surface area, 1,200 acres. A concrete dam with steel drum spillway is used to control the lake level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 16.68 ft, Apr. 6, 1950; minimum observed, 9.46 ft, Jan. 9, 1996, due to construction, but may have been lower during period of no gage-height record Dec. 30, 1995 to Jan. 20, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 16.09 ft, Sept. 14, 15; minimum recorded, 12.00 ft, Nov. 23, 24, but may have been lower during period of no gage-height record Nov. 24 to Dec. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.42	14.61	---	12.58	12.50	12.71	14.48	15.39	15.55	15.77	15.71	15.44
2	15.42	14.53	---	12.57	12.49	12.69	14.49	15.41	15.52	15.73	15.79	15.43
3	15.42	14.35	---	12.58	12.51	12.80	14.51	15.39	15.46	15.78	15.81	15.42
4	15.44	14.37	---	12.60	12.53	12.90	14.52	15.37	15.42	15.76	15.80	15.41
5	15.42	14.42	---	12.60	12.51	12.97	14.53	15.37	15.43	15.75	15.77	15.38
6	15.41	14.42	---	12.58	12.49	13.01	14.52	15.35	15.43	15.71	15.82	15.36
7	15.39	14.42	---	12.57	12.49	13.09	14.56	15.34	15.43	15.66	15.82	15.35
8	15.38	14.33	---	12.55	12.49	13.17	14.60	15.32	15.45	15.62	15.83	15.36
9	15.39	14.02	---	12.57	12.49	13.26	14.64	15.35	15.45	15.59	15.82	15.37
10	15.38	13.69	12.66	12.60	12.49	13.34	14.69	15.54	15.41	15.60	15.79	15.46
11	15.37	13.38	12.66	12.62	12.48	13.40	14.74	15.61	15.41	15.58	15.76	15.67
12	15.35	13.21	12.65	12.62	12.48	13.42	14.77	15.66	15.43	15.53	15.73	15.86
13	15.36	13.13	12.64	12.61	12.48	13.45	14.80	15.65	15.48	15.48	15.70	15.97
14	15.38	13.12	12.66	12.59	12.48	13.56	14.82	15.63	15.50	15.45	15.67	16.05
15	15.37	13.06	12.67	12.58	12.47	13.65	14.85	15.62	15.53	15.45	15.64	16.07
16	15.37	12.86	12.72	12.57	12.47	13.79	14.88	15.62	15.54	15.42	15.61	16.03
17	15.38	12.67	12.74	12.55	12.47	13.86	14.87	15.62	15.53	15.39	15.59	15.99
18	15.37	12.44	12.71	12.55	12.48	13.91	14.88	15.66	15.52	15.38	15.57	15.96
19	15.36	12.33	12.68	12.54	12.50	13.95	14.91	15.75	15.50	15.36	15.54	15.91
20	15.37	12.22	12.68	12.55	12.49	14.01	15.03	15.78	15.49	15.34	15.51	15.87
21	15.36	12.13	12.68	12.54	12.49	14.08	15.23	15.80	15.50	15.32	15.47	15.85
22	15.37	12.07	12.68	12.54	12.49	14.14	15.41	15.79	15.48	15.31	15.45	15.82
23	15.37	12.03	12.67	12.53	12.53	14.20	15.49	15.77	15.46	15.31	15.56	15.86
24	15.37	---	12.66	12.53	12.60	14.25	15.51	15.74	15.44	15.31	15.56	15.86
25	15.37	---	12.65	12.52	12.65	14.28	15.49	15.70	15.67	15.30	15.54	15.84
26	15.39	---	12.64	12.52	12.69	14.33	15.45	15.68	15.74	15.28	15.52	15.81
27	15.40	---	12.63	12.52	12.72	14.37	15.43	15.65	15.85	15.27	15.50	15.79
28	15.20	---	12.63	12.51	12.74	14.43	15.42	15.65	15.90	15.34	15.48	15.77
29	14.88	---	12.62	12.51	12.72	14.45	15.41	15.63	15.89	15.43	15.46	15.74
30	14.69	---	12.61	12.50	---	14.47	15.38	15.60	15.83	15.54	15.46	15.73
31	14.63	---	12.59	12.50	---	14.48	---	15.57	---	15.64	15.44	---
MEAN	15.32	---	---	12.56	12.53	13.69	14.94	15.58	15.54	15.50	15.64	15.71
MAX	15.44	---	---	12.62	12.74	14.48	15.51	15.80	15.90	15.78	15.83	16.07
MIN	14.63	---	---	12.50	12.47	12.69	14.48	15.32	15.41	15.27	15.44	15.35

## STREAMS TRIBUTARY TO LAKE ERIE

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE1/4 sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft downstream from Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft above sea level (Huron-Clinton Metropolitan Authority bench mark).

REMARKS.--Records good. Occasional regulation by Kent Lake (see preceding page). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S <sup>W</sup> P
1	76	77	74	93	66	135	35	85	131	217	199	90
2	73	75	72	92	65	86	35	90	122	196	235	88
3	72	75	70	94	67	50	35	84	102	220	252	83
4	76	147	72	99	69	75	35	76	93	217	244	82
5	71	79	89	99	68	92	35	73	95	208	227	71
6	69	65	125	94	66	70	35	69	95	187	251	64
7	61	65	131	90	65	58	36	64	94	167	252	60
8	56	162	130	85	65	52	38	60	98	145	250	63
9	57	219	122	89	64	52	38	68	99	135	246	69
10	54	245	120	99	65	52	39	124	88	140	233	100
11	51	193	120	106	63	52	39	143	86	137	211	171
12	46	128	118	105	62	54	39	157	91	117	193	260
13	49	97	114	102	62	50	39	157	104	103	178	315
14	52	74	120	98	63	49	39	151	113	95	164	357
15	50	133	124	94	63	39	41	148	118	95	153	382
16	49	148	137	89	62	35	44	147	121	88	143	360
17	51	175	142	e85	61	35	30	150	118	79	135	335
18	49	148	135	e84	63	36	22	160	111	77	132	317
19	46	154	127	e84	69	39	27	197	102	72	123	294
20	46	147	127	e78	67	38	58	211	102	66	113	273
21	45	122	128	80	67	36	62	221	108	62	103	255
22	46	103	125	73	68	37	88	214	100	61	95	243
23	48	91	122	73	80	35	116	205	93	61	126	263
24	47	82	118	71	99	35	125	192	85	60	129	264
25	46	83	115	70	116	35	116	176	168	57	123	253
26	51	81	113	69	127	36	105	166	204	51	113	236
27	54	76	110	68	138	36	98	156	250	47	108	223
28	80	75	109	67	144	37	92	158	272	67	100	208
29	77	78	106	66	140	36	89	155	270	93	95	196
30	77	77	101	65	---	36	83	143	248	130	94	190
31	77	---	97	65	---	35	---	138	---	167	91	---
TOTAL	1802	3474	3513	2626	2274	1543	1713	4338	3881	3617	5111	6165
MEAN	58.1	116	113	84.7	78.4	49.8	57.1	140	129	117	165	206
MAX	80	245	142	106	144	135	125	221	272	220	252	382
MIN	45	65	70	65	61	35	22	60	85	47	91	60

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 2000, BY WATER YEAR (WY)

	MEAN	95.2	152	134	123	130	163	141	124	103	76.0	65.6	77.3
MAX	262	234	248	236	252	315	357	379	228	219	165	231	231
(WY)	1982	1995	1951	1951	1951	1974	1950	1956	1996	1957	2000	1975	1975
MIN	35.1	70.1	63.2	53.8	53.7	49.8	42.9	34.5	33.6	21.6	27.9	31.5	31.5
(WY)	1964	1964	1961	1964	1964	2000	1966	1988	1988	1988	1963	1963	1966

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1948 - 2000
ANNUAL TOTAL	30353	40057	115
ANNUAL MEAN	83.2	109	181
HIGHEST ANNUAL MEAN			52.3
LOWEST ANNUAL MEAN			1874
HIGHEST DAILY MEAN	245	382	582
LOWEST DAILY MEAN	15	22	6.4
ANNUAL SEVEN-DAY MINIMUM	31	35	12
INSTANTANEOUS PEAK FLOW		386	(a)1080
INSTANTANEOUS PEAK STAGE		2.87	5.05
INSTANTANEOUS LOW FLOW		11	2.6
10 PERCENT EXCEEDS	140	212	203
50 PERCENT EXCEEDS	72	92	102
90 PERCENT EXCEEDS	42	45	43

(a) From rating curve extended above 600 ft<sup>3</sup>/s.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

## 04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi north of Hamburg, and 3 mi upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by Kent Lake (station 04170490) 11 mi upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	87	111	139	163	e125	243	112	188	271	502	330	197
2	88	116	137	158	e125	234	111	194	262	461	378	189
3	87	117	136	160	e125	197	109	193	242	449	423	179
4	91	117	136	167	e130	172	108	188	217	434	451	169
5	92	148	146	171	e130	170	104	181	199	429	461	156
6	90	142	181	170	e125	173	102	176	195	422	475	144
7	85	123	205	167	e125	e159	101	171	186	401	477	134
8	81	116	217	161	e120	e153	110	168	177	368	478	127
9	80	157	218	161	e120	146	110	173	172	331	482	125
10	79	209	212	172	e120	144	110	210	165	303	476	143
11	76	245	202	184	e120	138	112	254	155	288	462	212
12	73	261	196	189	e120	134	113	291	152	267	433	290
13	72	224	192	189	e115	132	110	306	172	243	403	349
14	75	182	193	e180	e115	130	109	302	201	217	373	417
15	77	154	206	e170	e115	131	110	286	220	198	349	491
16	78	171	220	e165	e115	136	110	267	227	185	327	550
17	78	192	229	e160	e115	132	108	255	225	172	310	573
18	77	204	229	e155	e115	127	98	256	216	158	300	564
19	76	209	220	e150	e120	125	93	301	202	144	287	535
20	75	214	214	e150	e125	126	119	330	187	134	271	501
21	74	215	211	e145	e120	128	200	348	191	123	251	469
22	74	198	e205	e140	126	127	240	357	189	113	234	436
23	75	180	e205	e140	135	125	261	360	180	106	e243	421
24	75	168	e200	e135	157	122	280	356	172	100	e270	411
25	76	158	e200	e135	184	120	284	343	245	95	e276	406
26	76	154	e195	e130	206	116	269	323	309	90	268	398
27	78	151	e190	e130	230	115	246	302	375	91	255	383
28	82	146	e185	e125	244	115	225	293	451	108	241	362
29	102	144	e180	e125	246	114	208	292	507	169	228	342
30	108	142	e175	e125	---	113	194	284	524	228	216	322
31	110	---	e170	e125	---	114	---	274	---	285	206	---
TOTAL	2547	5068	5944	4797	4068	4411	4566	8222	7186	7614	10634	9995
MEAN	82.2	169	192	155	140	142	152	265	240	246	343	333
MAX	110	261	229	189	246	243	284	360	524	502	482	573
MIN	72	111	136	125	115	113	93	168	152	90	206	125
CFSM	.27	.55	.62	.50	.46	.46	.49	.86	.78	.80	1.11	1.08
IN.	.31	.61	.72	.58	.49	.53	.55	.99	.87	.92	1.28	1.21

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

MEAN	160	239	229	226	239	346	329	266	204	154	131	136
MAX	490	425	355	499	457	705	626	895	406	534	343	424
(WY)	1952	1993	1976	1993	1968	1974	1974	1956	1989	1968	2000	1975
MIN	52.0	100	102	84.5	89.5	122	144	92.3	82.0	41.9	49.6	53.8
(WY)	1965	1964	1961	1961	1964	1964	1964	1958	1965	1965	1965	1964

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1952 - 2000

ANNUAL TOTAL	60091	75052	221
ANNUAL MEAN	165	205	337
HIGHEST ANNUAL MEAN			1974
LOWEST ANNUAL MEAN			97.2
HIGHEST DAILY MEAN	510	573	1560
LOWEST DAILY MEAN	48	72	27
ANNUAL SEVEN-DAY MINIMUM	51	75	28
INSTANTANEOUS PEAK FLOW		(a)577	(b)1560
INSTANTANEOUS PEAK STAGE		6.73	8.46
INSTANTANEOUS LOW FLOW			26
ANNUAL RUNOFF (CFSM)	.53	.67	.72
ANNUAL RUNOFF (INCHES)	7.26	9.06	9.77
10 PERCENT EXCEEDS	258	376	392
50 PERCENT EXCEEDS	151	174	192
90 PERCENT EXCEEDS	77	102	85

(a) Gage height 6.57 ft.

(b) Gage height 8.35 ft.

(c) July 15, 16, 1988.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW1/4 sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft downstream from bridge on Parker Road, 2.5 mi south of Dexter, and 4 mi upstream from mouth.

DRAINAGE AREA.--128 mi<sup>2</sup>.

PERIOD OF RECORD.--February 1952 to December 1982, October 1994 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map. Prior to May 23, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	24	23	e29	e28	103	41	78	94	120	102	55
2	20	25	24	e33	e28	93	40	115	75	100	101	50
3	21	26	24	41	e29	82	41	96	64	100	145	47
4	28	25	24	54	e31	75	40	80	58	100	112	45
5	26	25	32	49	e32	69	38	68	68	81	84	42
6	23	24	74	43	e31	65	37	60	147	71	287	40
7	22	24	60	e38	e30	61	37	54	106	63	299	38
8	22	24	50	e38	e29	62	58	50	76	57	219	37
9	24	24	46	40	e30	61	66	55	60	55	147	37
10	23	25	45	47	e31	57	58	146	50	91	108	51
11	22	24	42	56	e32	53	56	122	48	108	88	91
12	22	24	39	50	e31	50	58	108	86	79	74	113
13	23	23	38	44	e30	47	54	89	143	64	64	e115
14	31	23	42	e47	e29	47	51	68	237	56	60	e92
15	28	23	60	e41	e29	49	48	57	196	61	56	130
16	26	23	71	e37	e30	63	45	52	147	57	53	106
17	26	22	63	e34	e31	61	43	58	104	51	55	84
18	26	23	51	e33	e31	53	42	63	97	46	67	69
19	25	23	e47	e34	e32	52	41	354	90	43	57	60
20	25	32	e43	e34	e32	59	179	337	73	41	49	55
21	24	28	e40	e32	e32	72	515	231	270	39	45	54
22	24	26	e38	e30	e31	67	437	156	258	37	43	51
23	25	25	e36	e29	79	62	317	126	189	36	60	58
24	25	27	e34	e29	144	58	221	106	131	35	56	59
25	25	26	e32	e29	165	55	161	85	532	33	46	55
26	25	25	e30	e29	148	50	127	70	612	31	43	51
27	25	26	e28	e29	159	50	108	63	441	30	117	48
28	25	25	e26	e29	150	50	95	128	328	49	115	45
29	25	24	e25	e28	118	47	85	227	225	86	86	43
30	25	23	e26	e28	---	44	74	145	152	134	71	42
31	25	---	e28	e28	---	42	---	106	---	136	62	---
TOTAL	759	741	1241	1142	1638	1859	3213	3553	5157	2090	2971	1863
MEAN	24.5	24.7	40.0	36.8	56.5	60.0	107	115	172	67.4	95.8	62.1
MAX	31	32	74	56	165	103	515	354	612	136	299	130
MIN	20	22	23	28	28	42	37	50	48	30	43	37
CFSM	.19	.19	.31	.29	.44	.47	.84	.90	1.34	.53	.75	.49
IN.	.22	.22	.36	.33	.48	.54	.93	1.03	1.50	.61	.86	.54

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2000, BY WATER YEAR (WY)

	MEAN	40.4	59.2	80.9	76.5	104	179	157	100	67.7	41.6	36.5	34.6
MAX	193	122	192	251	337	423	271	265	256	165	146	180	
(WY)	1955	1996	1958	1974	1976	1982	1969	1956	1968	1968	1995	1975	
MIN	11.0	14.6	13.8	18.8	18.4	47.7	73.8	29.7	20.9	16.0	12.9	11.0	
(WY)	1964	1964	1964	1964	1964	1964	1963	1958	1958	1965	1963	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1952 - 2000

ANNUAL TOTAL	23965		26227										
ANNUAL MEAN	65.7		71.7										
HIGHEST ANNUAL MEAN										81.0			
LOWEST ANNUAL MEAN										142			1974
HIGHEST DAILY MEAN										29.9			1964
LOWEST DAILY MEAN	698									1380			Jun 27 1968
ANNUAL SEVEN-DAY MINIMUM	14									9.5			Oct 7 1963
INSTANTANEOUS PEAK FLOW	15									9.9			Oct 5 1963
INSTANTANEOUS PEAK STAGE										1500			Jun 26 1968
INSTANTANEOUS LOW FLOW										12.95			Jun 26 1968
ANNUAL RUNOFF (CFSM)	.51									7.3			Dec 13 1963
ANNUAL RUNOFF (INCHES)	6.96									.63			
10 PERCENT EXCEEDS	135									8.60			
50 PERCENT EXCEEDS	35									172			
90 PERCENT EXCEEDS	18									48			

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

## 04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW1/4 sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft upstream from bridge on Wall Street in Ann Arbor, 0.7 mi downstream from Argo Dam, and 4.2 mi upstream from Geddes Dam.

DRAINAGE AREA.--729 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for February 1904 to September 1914 and October 1947 to July 1948, published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft above sea level (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi downstream, and January 1914 to September 1947 at Barton Dam, 2.6 mi upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Water-discharge records good. Prior to 1955, diversion upstream from station for Ann Arbor municipal supply had negligible effect on natural flow; annual mean discharge and runoff figures adjusted for diversion from 1955 to 1991. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations upstream from station. Since 1975 extensive regulation of flow exists due to automation of gates at dams upstream from station. Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	143	170	155	221	583	e155	422	584	886	660	391
2	104	188	176	162	213	679	e165	480	539	881	788	334
3	140	178	175	155	218	626	e170	460	491	921	968	320
4	146	150	167	199	215	585	e180	426	387	1030	873	291
5	142	162	239	212	215	464	180	394	469	813	877	285
6	134	170	226	203	193	408	177	303	542	765	1390	241
7	131	194	191	215	109	399	160	294	504	714	1310	222
8	137	182	172	217	97	388	137	275	365	645	1130	237
9	141	178	196	297	104	370	114	e350	282	589	1000	241
10	143	199	340	330	101	357	98	e430	264	e580	900	413
11	134	217	343	333	107	346	109	484	310	e580	856	588
12	129	223	325	321	96	286	133	453	360	e600	814	804
13	163	282	265	317	109	187	150	473	525	619	736	609
14	144	377	312	281	150	165	164	486	705	515	611	576
15	144	362	321	315	179	196	202	484	662	486	632	844
16	140	337	336	324	223	203	204	471	610	485	618	852
17	136	342	364	265	223	196	195	463	541	472	638	867
18	133	326	397	304	238	218	187	521	528	424	624	865
19	133	358	404	298	227	238	173	905	451	361	527	900
20	131	328	410	286	225	265	522	995	440	320	317	859
21	129	275	387	258	217	439	831	896	622	e300	350	803
22	128	231	369	247	244	439	992	839	709	279	362	754
23	130	226	377	277	304	416	914	802	623	271	490	e700
24	121	242	356	263	405	403	772	e780	667	252	594	759
25	112	226	354	257	418	262	731	e740	1530	203	456	611
26	112	237	343	255	403	94	681	707	1370	199	344	598
27	117	228	320	252	461	78	650	677	1250	195	556	644
28	117	192	296	258	504	92	628	658	1020	368	582	570
29	120	181	315	239	577	111	564	775	946	536	497	487
30	122	172	294	232	---	e130	453	705	901	668	441	493
31	129	---	160	227	---	e145	---	667	---	740	412	---
TOTAL	4048	7106	9100	7954	6996	9768	10791	17815	19197	16697	21353	17158
MEAN	131	237	294	257	241	315	360	575	640	539	689	572
MAX	163	377	410	333	577	679	992	995	1530	1030	1390	900
MIN	104	143	160	155	96	78	98	275	264	195	317	222

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1915 - 2000, BY WATER YEAR (WY)

	MEAN	267	386	424	451	545	859	860	604	402	246	189	218
	MAX	904	1018	1080	1257	1431	2308	2647	2085	1341	1130	689	919
	(WY)	1982	1993	1951	1950	1976	1918	1947	1943	1943	1968	2000	1975
	MIN	71.6	109	123	131	145	189	274	187	72.0	31.5	21.1	55.8
	(WY)	1935	1935	1935	1925	1934	1934	1931	1925	1934	1934	1934	1934

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1915 - 2000

ANNUAL TOTAL	117425	147983	
ANNUAL MEAN	322	404	(a)453
HIGHEST ANNUAL MEAN			824
LOWEST ANNUAL MEAN			171
HIGHEST DAILY MEAN	1670	1530	5840
LOWEST DAILY MEAN	54	78	(b)4.0
ANNUAL SEVEN-DAY MINIMUM	60	103	13
INSTANTANEOUS PEAK FLOW		3950	
INSTANTANEOUS PEAK STAGE		16.52	(d)17.50
10 PERCENT EXCEEDS	604	802	929
50 PERCENT EXCEEDS	231	329	331
90 PERCENT EXCEEDS	122	135	120

(a) Does not include water year 1948.

(b) Plant leakage, but doubtful due to possible change in leakage.

(c) Aug. 2, Sept. 11, 1931.

(d) Present site and datum.

(e) Estimated.





## STREAMS TRIBUTARY TO LAKE ERIE

04174500 HURON RIVER AT ANN ARBOR, MI--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

[illegible]

PH, WATER, WHOLE, FIELD, STANDARD UNITS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

[illegible]



## STREAMS TRIBUTARY TO LAKE ERIE

04174500 HURON RIVER AT ANN ARBOR, MI--Continued

## WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

[illegible]

**OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000**

[illegible]



## STREAMS TRIBUTARY TO LAKE ERIE

## 04174518 MALLETTS CREEK AT ANN ARBOR, MI

LOCATION.--Lat 42°15'53", long 83°41'18", in SE1/4 sec.35, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on right bank 250 ft upstream from bridge on Chalmers Drive in Ann Arbor.

DRAINAGE AREA.--10.9 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1973 to August 1975 (operated as a crest-stage partial-record station), April 1999 to current year. Prior to August 1975, published as Pittsfield-Ann Arbor Drain at Ann Arbor.

GAGE.--Water-stage recorder. Elevation of gage is 760 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

## DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

## DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	2.7	2.2	e2.3	e1.5	4.3	1.8	26	9.3	5.7	18	2.7
2	3.9	9.2	2.2	e3.5	e1.5	3.7	2.2	11	2.9	4.9	60	2.6
3	13	5.1	2.0	16	e1.7	3.3	2.3	3.6	1.9	22	56	2.6
4	24	2.9	2.1	15	e1.9	2.7	2.3	2.6	1.6	6.9	10	2.5
5	7.5	2.8	45	5.3	e2.0	2.3	2.0	2.2	40	5.0	8.1	2.5
6	3.4	2.1	47	3.5	e1.8	2.5	1.9	2.0	20	4.8	121	2.5
7	2.8	1.9	11	3.0	e1.6	2.5	8.8	2.6	5.6	4.3	25	2.3
8	5.3	1.8	6.6	2.7	e1.6	2.4	15	3.3	3.9	4.1	8.5	2.4
9	4.6	1.9	5.5	6.6	e2.0	2.3	4.9	53	3.1	5.1	5.8	2.6
10	2.7	2.0	6.3	9.5	e2.5	2.1	3.1	60	2.6	98	4.4	56
11	2.5	2.2	4.6	5.9	e3.0	1.9	5.8	18	19	28	3.7	73
12	2.2	2.2	4.0	3.5	e2.2	1.7	4.2	12	24	7.3	3.3	62
13	22	2.0	3.6	3.1	e2.0	1.8	3.0	10	31	4.9	3.4	11
14	9.2	1.6	28	2.6	e2.2	1.9	2.8	4.1	18	35	3.1	27
15	3.5	1.6	26	2.3	e2.4	4.6	2.2	2.9	13	19	6.0	15
16	2.6	2.1	20	2.1	e2.5	14	2.1	8.1	5.4	5.9	4.0	6.4
17	2.4	2.4	8.9	1.9	e2.4	4.3	2.5	7.0	4.0	4.2	24	4.6
18	2.4	2.9	5.2	e1.8	e2.5	2.3	2.3	58	17	3.5	8.3	3.8
19	e2.4	11	4.3	e1.8	e2.7	3.7	2.5	91	5.7	3.2	4.2	3.6
20	e2.3	10	16	e1.7	e2.5	15	130	16	17	3.0	3.3	3.6
21	e2.3	3.3	7.5	e1.7	e3.5	8.5	48	7.5	35	2.9	3.0	4.2
22	e2.3	2.5	e4.1	e1.6	e9.0	4.7	21	5.9	7.7	3.0	2.9	3.2
23	e2.2	2.9	e3.2	e1.6	27	3.6	11	6.8	5.1	3.0	33	8.1
24	e2.2	7.3	e2.9	e1.6	23	3.1	8.0	4.0	42	2.8	5.5	5.3
25	e2.2	3.1	e2.6	e1.5	15	2.9	5.3	2.8	410	2.8	3.5	3.7
26	e2.2	7.5	e2.4	e1.5	7.6	2.0	4.1	2.2	29	2.7	19	3.1
27	e2.2	4.9	e2.3	e1.4	26	5.5	3.8	2.1	12	2.6	22	2.9
28	e2.2	2.7	e2.2	e1.5	8.0	3.2	3.2	35	7.5	14	4.9	2.9
29	e2.1	2.4	e2.3	e1.5	5.2	2.3	3.0	6.8	24	15	3.6	2.8
30	e2.1	2.2	e2.5	e1.5	--	1.9	2.4	3.4	11	66	3.0	2.7
31	e2.2	--	e2.4	e1.5	--	1.9	--	23	--	15	2.7	--
TOTAL	147.0	109.2	284.9	111.0	166.8	118.9	311.5	492.9	828.3	404.6	483.2	327.6
MEAN	4.74	3.64	9.19	3.58	5.75	3.84	10.4	15.9	27.6	13.1	15.6	10.9
MAX	24	11	47	16	27	15	130	91	410	98	121	73
MIN	2.1	1.6	2.0	1.4	1.5	1.7	1.8	2.0	1.6	2.6	2.7	2.3
CFSM	.44	.33	.84	.33	.53	.35	.95	1.46	2.53	1.20	1.43	1.00
IN.	.50	.37	.97	.38	.57	.41	1.06	1.68	2.83	1.38	1.65	1.12

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1999 - 2000, BY WATER YEAR (WY)

	MEAN	4.74	3.64	9.19	3.58	5.75	3.84	14.3	12.1	18.6	11.1	10.4	8.17
MAX	4.74	3.64	9.19	3.58	5.75	3.84	18.3	15.9	27.6	13.1	15.6	10.9	
(WY)	2000	2000	2000	2000	2000	2000	1999	2000	2000	2000	2000	2000	2000
MIN	4.74	3.64	9.19	3.58	5.75	3.84	10.4	8.25	9.61	9.12	5.21	5.42	
(WY)	2000	2000	2000	2000	2000	2000	2000	1999	1999	1999	1999	1999	1999

## SUMMARY STATISTICS

## FOR 2000 WATER YEAR

## WATER YEARS 1999 - 2000

ANNUAL TOTAL	3785.9												
ANNUAL MEAN	10.3									10.3			
HIGHEST ANNUAL MEAN										10.3			2000
LOWEST ANNUAL MEAN										10.3			2000
HIGHEST DAILY MEAN	410									410			Jun 25 2000
LOWEST DAILY MEAN	1.4									1.3			Sep 27 1999
ANNUAL SEVEN-DAY MINIMUM	1.5									1.5			Jan 25 2000
INSTANTANEOUS PEAK FLOW	1560									1560			Jun 25 2000
INSTANTANEOUS PEAK STAGE	9.32									9.32			Jun 25 2000
INSTANTANEOUS LOW FLOW										1.1			(a)
ANNUAL RUNOFF (CFSM)	.95									.95			
ANNUAL RUNOFF (INCHES)	12.92									12.89			
10 PERCENT EXCEEDS	24									24			
50 PERCENT EXCEEDS	3.5									3.5			
90 PERCENT EXCEEDS	1.9									1.8			

(a) Sept. 26, 27, 1999.

(e) Estimated.



## STREAMS TRIBUTARY TO LAKE ERIE

04174518 MALLETTS CREEK AT ANN ARBOR, MI--Continued

## SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	---	---	---	1290	1250	1270
2	---	---	---	---	---	---	---	---	---	1310	1280	1290
3	---	---	---	---	---	---	---	---	---	1310	1300	1310
4	---	---	---	---	---	---	---	---	---	1340	1310	1320
5	---	---	---	---	---	---	---	---	---	1400	1330	1370
6	1110	960	1040	---	---	---	---	---	---	1380	1360	1380
7	1240	1110	1180	---	---	---	---	---	---	1380	1360	1370
8	1320	1240	1290	---	---	---	---	---	---	1380	1360	1370
9	1380	1320	1360	---	---	---	---	---	---	1380	1360	1370
10	1410	1380	1400	---	---	---	---	---	---	1400	367	865
11	1430	495	1200	---	---	---	1230	1180	1210	871	201	669
12	1080	702	995	---	---	---	1260	1230	1250	671	371	544
13	1140	657	947	---	---	---	1270	1250	1260	871	671	785
14	1040	853	969	---	---	---	1270	1260	1260	955	416	771
15	1020	825	936	---	---	---	1290	962	1220	859	620	750
16	1100	1020	1060	---	---	---	1130	961	1070	1030	859	941
17	1180	1100	1140	---	---	---	1180	477	911	1100	1030	1060
18	1180	686	973	---	---	---	979	825	915	1200	1090	1140
19	1190	1060	1130	---	---	---	1070	979	1030	1260	1190	1230
20	1240	379	1140	---	---	---	1140	1070	1120	1370	1260	1290
21	954	444	765	---	---	---	1200	1140	1180	1300	1220	1260
22	1090	954	1030	---	---	---	1240	1200	1220	1290	1260	1270
23	1170	1080	1130	---	---	---	1240	365	758	1280	821	1160
24	---	---	---	---	---	---	994	848	928	1150	967	1080
25	---	---	---	---	---	---	1070	994	1050	1200	1140	1170
26	---	---	---	---	---	---	1130	286	970	1270	1200	1250
27	---	---	---	---	---	---	798	338	652	1310	1260	1290
28	---	---	---	---	---	---	956	798	878	1340	1310	1320
29	---	---	---	---	---	---	1060	956	1010	1350	1330	1340
30	---	---	---	---	---	---	1110	1050	1080	1360	1340	1350
31	---	---	---	---	---	---	1250	1110	1190	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	1400	201	1150

## PH, WATER, WHOLE, FIELD, STANDARD UNITS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	8.4	7.9	8.1	8.1	7.8	8.0
2	---	---	---	---	---	---	8.2	7.8	8.0	8.2	7.8	8.0
3	---	---	---	---	---	---	8.1	7.8	7.9	8.3	7.8	8.0
4	---	---	---	---	---	---	8.1	7.8	7.9	8.4	7.9	8.1
5	---	---	---	---	---	---	8.1	7.9	8.0	8.3	8.0	8.1
6	---	---	---	---	---	---	8.1	7.8	7.9	8.2	8.0	8.1
7	---	---	---	---	---	---	8.1	7.8	7.9	8.3	7.9	8.1
8	---	---	---	---	---	---	8.0	7.7	7.8	8.2	7.9	8.0
9	---	---	---	---	---	---	8.2	7.7	7.9	---	---	---
10	---	---	---	---	---	---	8.3	7.8	8.0	---	---	---
11	---	---	---	---	---	---	8.0	7.8	7.9	---	---	---
12	---	---	---	---	---	---	8.4	7.9	8.1	---	---	---
13	---	---	---	---	---	---	8.4	7.9	8.1	---	---	---
14	---	---	---	---	---	---	8.3	7.9	8.1	---	---	---
15	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
16	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
17	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
18	---	---	---	---	---	---	8.2	7.9	8.0	---	---	---
19	---	---	---	---	---	---	8.1	7.8	8.0	---	---	---
20	---	---	---	---	---	---	7.8	7.5	7.7	---	---	---
21	---	---	---	---	---	---	7.7	7.6	7.6	---	---	---
22	---	---	---	---	---	---	7.9	7.6	7.8	---	---	---
23	---	---	---	---	---	---	8.1	7.8	7.9	---	---	---
24	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
25	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
26	---	---	---	---	---	---	8.2	7.8	8.0	---	---	---
27	---	---	---	---	---	---	8.3	7.9	8.1	---	---	---
28	---	---	---	---	---	---	8.2	8.0	8.1	---	---	---
29	---	---	---	---	---	---	8.2	7.9	8.1	---	---	---
30	---	---	---	---	---	---	8.2	7.9	8.1	---	---	---
31	---	---	---	8.4	8.0	8.2	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	8.4	7.5	8.0	---	---	---



## STREAMS TRIBUTARY TO LAKE ERIE

04174518 MALLETTS CREEK AT ANN ARBOR, MI--Continued

PH, WATER, WHOLE, FIELD, STANDARD UNITS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	---	---	---	8.1	8.1	8.1
2	---	---	---	---	---	---	---	---	---	8.1	8.0	8.1
3	---	---	---	---	---	---	---	---	---	8.1	8.0	8.1
4	---	---	---	---	---	---	---	---	---	8.2	8.1	8.1
5	---	---	---	---	---	---	---	---	---	8.2	8.1	8.2
6	---	---	---	---	---	---	---	---	---	8.2	8.1	8.2
7	8.1	7.9	8.0	---	---	---	---	---	---	8.3	8.1	8.2
8	8.0	7.8	7.9	---	---	---	---	---	---	8.3	8.2	8.2
9	7.9	7.8	7.9	---	---	---	---	---	---	8.2	8.2	8.2
10	8.0	7.8	7.9	---	---	---	---	---	---	8.2	7.8	8.0
11	7.9	7.5	7.8	---	---	---	8.2	8.1	8.2	8.4	7.8	8.0
12	7.7	7.6	7.6	---	---	---	8.2	8.1	8.2	8.0	7.9	7.9
13	7.7	7.5	7.6	---	---	---	8.3	8.2	8.2	8.1	8.0	8.1
14	7.8	7.5	7.6	---	---	---	8.2	8.2	8.2	8.1	7.9	8.0
15	7.7	7.6	7.6	---	---	---	8.2	7.8	8.1	8.1	8.0	8.1
16	7.7	7.6	7.7	---	---	---	8.0	7.8	7.9	8.2	8.1	8.2
17	7.8	7.7	7.7	---	---	---	8.0	7.7	7.9	8.2	8.2	8.2
18	7.8	7.6	7.7	---	---	---	8.0	7.9	7.9	8.2	8.2	8.2
19	7.8	7.6	7.7	---	---	---	8.1	7.9	8.0	8.3	8.2	8.3
20	7.8	7.5	7.7	---	---	---	8.2	8.1	8.1	8.3	8.3	8.3
21	7.8	7.5	7.6	---	---	---	8.2	8.1	8.2	8.4	8.2	8.3
22	7.8	7.7	7.7	---	---	---	8.2	8.1	8.1	8.3	8.3	8.3
23	7.8	7.7	7.8	---	---	---	8.1	7.9	8.0	8.3	8.1	8.2
24	---	---	---	---	---	---	8.1	8.0	8.0	8.3	8.2	8.2
25	---	---	---	---	---	---	8.1	8.0	8.0	8.3	8.1	8.2
26	---	---	---	---	---	---	8.1	7.7	8.0	8.2	8.1	8.2
27	---	---	---	---	---	---	7.9	7.7	7.9	8.2	8.2	8.2
28	---	---	---	---	---	---	8.0	7.9	8.0	8.2	8.2	8.2
29	---	---	---	---	---	---	8.1	7.9	8.0	8.2	8.1	8.2
30	---	---	---	---	---	---	8.1	8.0	8.0	8.3	8.1	8.2
31	---	---	---	---	---	---	8.1	8.0	8.1	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	8.4	7.8	8.2

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	12.0	7.0	9.5	14.5	12.5	13.5
2	---	---	---	---	---	---	11.5	10.0	10.5	17.0	12.0	14.5
3	---	---	---	---	---	---	12.0	10.0	11.0	19.0	13.0	15.0
4	---	---	---	---	---	---	11.0	6.0	9.0	20.0	14.0	17.0
5	---	---	---	---	---	---	10.0	4.0	7.0	21.5	16.5	19.0
6	---	---	---	---	---	---	12.0	7.5	9.5	23.0	17.5	20.0
7	---	---	---	---	---	---	9.5	6.5	8.0	22.5	19.0	20.5
8	---	---	---	---	---	---	8.0	6.0	7.0	23.0	19.5	21.0
9	---	---	---	---	---	---	8.0	4.5	6.0	21.5	19.5	20.5
10	---	---	---	---	---	---	9.0	4.0	6.5	19.5	17.5	18.5
11	---	---	---	---	---	---	7.5	5.0	6.0	17.5	16.0	16.5
12	---	---	---	---	---	---	9.0	3.5	6.0	20.0	16.0	17.5
13	---	---	---	---	---	---	11.0	4.5	8.0	20.0	16.0	18.5
14	---	---	---	---	---	---	15.5	7.0	11.0	16.0	13.0	15.0
15	---	---	---	---	---	---	18.5	11.0	15.0	15.5	11.5	13.5
16	---	---	---	---	---	---	16.0	12.5	14.0	14.0	12.0	13.0
17	---	---	---	---	---	---	13.0	10.5	11.5	16.5	12.5	14.5
18	---	---	---	---	---	---	14.0	9.5	11.5	17.5	13.0	15.0
19	---	---	---	---	---	---	13.0	11.0	12.0	13.5	12.0	12.5
20	---	---	---	---	---	---	12.0	10.5	11.0	15.5	11.5	13.5
21	---	---	---	---	---	---	11.0	9.5	10.5	16.0	14.0	15.0
22	---	---	---	---	---	---	12.5	9.0	10.5	17.0	15.0	16.0
23	---	---	---	---	---	---	15.0	9.5	12.0	17.5	16.0	16.5
24	---	---	---	---	---	---	17.5	11.5	14.0	18.5	15.5	17.0
25	---	---	---	---	---	---	17.0	10.0	13.0	18.0	15.0	16.5
26	---	---	---	---	---	---	16.5	9.0	12.5	17.5	13.5	15.5
27	---	---	---	---	---	---	16.5	10.0	13.0	16.5	15.5	16.0
28	---	---	---	---	---	---	16.5	10.0	13.0	15.5	14.0	15.0
29	---	---	---	---	---	---	18.0	10.5	14.0	16.5	13.5	15.0
30	---	---	---	---	---	---	18.0	11.5	14.5	18.0	15.5	17.0
31	---	---	---	12.5	6.0	9.0	---	---	---	23.0	17.0	19.0
MONTH	---	---	---	---	---	---	18.5	3.5	10.6	23.0	11.5	16.4

04174518 MALLETTS CREEK AT ANN ARBOR, MI--Continued

[illegible]

**OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000**

[illegible]

## STREAMS TRIBUTARY TO LAKE ERIE

04174518 MALLETTS CREEK AT ANN ARBOR, MI--Continued

## OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	7.4	6.6	7.0	--	--	--	--	--	--	6.2	5.2	5.6
2	7.4	6.5	6.9	--	--	--	--	--	--	6.3	5.1	5.6
3	8.7	7.3	8.2	--	--	--	--	--	--	6.5	5.2	5.7
4	9.1	8.3	8.7	--	--	--	--	--	--	6.9	5.5	6.1
5	9.3	6.4	8.7	--	--	--	--	--	--	7.7	6.2	7.0
6	9.5	6.9	8.3	--	--	--	--	--	--	7.8	6.7	7.3
7	8.9	6.9	7.3	--	--	--	--	--	--	8.1	6.5	7.2
8	10.9	8.2	9.8	--	--	--	--	--	--	7.5	6.1	6.7
9	10.0	8.8	9.5	--	--	--	--	--	--	7.1	6.1	6.5
10	9.5	8.0	9.0	--	--	--	--	--	--	6.6	6.2	6.4
11	8.9	7.6	8.3	--	--	--	8.1	7.2	7.7	6.9	6.5	6.7
12	8.7	8.0	8.4	--	--	--	8.3	7.3	7.8	7.2	6.8	7.0
13	8.7	7.4	8.2	--	--	--	8.1	7.1	7.7	7.9	6.8	7.3
14	7.8	6.3	7.1	--	--	--	8.1	6.8	7.5	7.3	6.8	7.1
15	8.0	6.8	7.3	--	--	--	7.2	5.6	6.7	7.8	7.3	7.6
16	7.8	6.8	7.2	--	--	--	7.0	5.6	6.4	8.2	7.5	7.9
17	8.1	7.0	7.4	--	--	--	7.4	6.5	7.1	8.1	7.2	7.8
18	8.4	7.1	7.8	--	--	--	7.5	7.0	7.2	7.8	6.9	7.4
19	8.5	7.3	7.9	--	--	--	7.8	7.0	7.4	7.6	6.6	7.1
20	8.6	6.8	7.7	--	--	--	8.1	7.2	7.7	7.4	6.5	6.9
21	7.9	7.2	7.6	--	--	--	8.4	7.4	7.9	8.0	6.4	7.2
22	7.9	7.2	7.5	--	--	--	8.3	6.8	7.7	8.5	7.4	7.8
23	8.2	7.1	7.6	--	--	--	7.2	6.5	6.9	7.6	6.2	7.0
24	--	--	--	--	--	--	7.2	6.4	6.7	7.8	6.6	7.2
25	--	--	--	--	--	--	7.2	6.3	6.8	8.5	7.5	7.9
26	--	--	--	--	--	--	7.2	6.3	6.7	8.6	7.6	8.0
27	--	--	--	--	--	--	6.7	6.2	6.4	8.5	7.4	7.9
28	--	--	--	--	--	--	6.8	6.0	6.4	8.8	7.4	8.1
29	--	--	--	--	--	--	6.6	5.8	6.2	9.1	7.7	8.4
30	--	--	--	--	--	--	6.6	5.5	6.0	8.9	7.4	8.1
31	--	--	--	--	--	--	6.2	5.2	5.8	--	--	--
MONTH	--	--	--	--	--	--	--	--	--	9.1	5.1	7.2

## STREAMS TRIBUTARY TO LAKE ERIE

## 04175600 RIVER RAISIN NEAR MANCHESTER, MI

LOCATION.--Lat 42°10'05", long 84°04'34", in NE1/4 SE1/4 sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank at downstream side of bridge on Sharon Valley Road, 2.5 mi northwest of Manchester.

DRAINAGE AREA.--132 mi<sup>2</sup>.

PERIOD OF RECORD.--January 1970 to September 1981, January 1985 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 900 ft above sea level, from topographic map. Prior to July 30, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation caused by many dams upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	20	38	e43	e44	124	61	160	162	137	90	42
2	24	23	37	44	e46	115	60	190	149	129	87	40
3	22	25	40	58	e47	103	60	176	136	130	82	39
4	34	23	41	77	e47	100	61	163	128	135	76	37
5	37	21	47	72	e46	95	56	148	126	131	73	33
6	31	23	97	64	e46	90	57	131	157	130	123	28
7	25	21	99	60	e46	89	52	120	147	135	133	25
8	25	20	e56	e56	e45	89	75	110	136	128	117	24
9	27	21	79	60	e45	89	87	114	122	123	105	25
10	27	24	75	70	e45	82	79	158	110	129	90	33
11	25	25	68	78	e44	76	74	148	102	119	80	64
12	23	32	62	69	e44	71	76	138	103	117	72	114
13	25	33	66	66	e43	68	71	127	121	101	65	99
14	34	33	63	e63	e42	69	68	113	134	91	60	88
15	33	30	86	e60	e42	70	66	104	131	97	57	110
16	31	29	97	e57	e41	82	62	98	119	86	53	104
17	40	28	87	e54	e41	82	58	101	109	79	52	91
18	39	26	e72	e52	e40	76	59	109	115	72	60	81
19	30	29	e70	e51	e40	72	e59	242	120	65	55	73
20	12	45	e68	e50	e40	81	e81	268	113	59	48	68
21	35	41	e70	e49	e41	99	e265	234	146	53	43	68
22	33	37	e65	e48	e50	96	e382	204	159	48	40	62
23	9.2	37	e60	e47	84	90	e317	185	140	43	49	60
24	21	47	e55	e46	123	85	e262	174	122	40	50	61
25	21	44	e50	e45	140	86	e230	161	227	37	45	60
26	23	42	e46	e44	134	79	e207	149	227	35	44	58
27	21	48	e43	e43	149	78	189	144	202	21	48	54
28	19	52	e37	e42	146	76	178	181	183	22	50	49
29	21	46	e45	e41	131	73	170	224	162	35	49	45
30	21	41	e43	e41	—	66	158	201	146	64	46	44
31	22	—	e43	e42	—	63	—	182	—	91	44	—
TOTAL	822.2	966	1930	1692	1872	2614	3680	4957	4254	2682	2086	1779
MEAN	26.5	32.2	62.3	54.6	64.6	84.3	123	160	142	86.5	67.3	59.3
MAX	40	52	99	78	149	124	382	268	227	137	133	114
MIN	9.2	20	37	41	40	63	52	98	102	21	40	24
CFSM	.20	.24	.47	.41	.49	.64	.93	1.21	1.07	.66	.51	.45
IN.	.23	.27	.54	.48	.53	.74	1.04	1.40	1.20	.76	.59	.50

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2000, BY WATER YEAR (WY)

	MEAN	63.2	91.1	108	113	125	198	188	124	92.6	55.5	48.7	54.0
MAX	169	212	160	280	241	356	275	191	249	114	116	142	142
(WY)	1987	1993	1991	1993	1976	1976	1978	1974	1989	1981	1981	1981	1981
MIN	24.8	25.1	30.7	27.6	45.0	84.3	116	52.7	13.9	10.4	12.4	12.6	12.6
(WY)	1980	1972	1977	1977	1972	2000	1987	1971	1988	1988	1971	1999	1999

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1970 - 2000

ANNUAL TOTAL	29421.5	29334.2	
ANNUAL MEAN	80.6	80.1	105
HIGHEST ANNUAL MEAN			155
LOWEST ANNUAL MEAN			61.8
HIGHEST DAILY MEAN	376	382	690
LOWEST DAILY MEAN	8.3	9.2	5.7
ANNUAL SEVEN-DAY MINIMUM	8.8	19	6.1
INSTANTANEOUS PEAK FLOW		403	869
INSTANTANEOUS PEAK STAGE		(b)5.37	7.21
INSTANTANEOUS LOW FLOW		4.0	(d)4.0
ANNUAL RUNOFF (CFSM)	.61	.61	.80
ANNUAL RUNOFF (INCHES)	8.29	8.27	10.84
10 PERCENT EXCEEDS	174	149	211
50 PERCENT EXCEEDS	60	64	85
90 PERCENT EXCEEDS	16	28	26

(a) July 9, 15, 1988.

(b) From floodmark.

(c) Oct. 20, 23, 1999.

(d) Observed; but may have been less during periods of no gage-height record July 3-11, 14-16, 1988.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

## 04176000 RIVER RAISIN NEAR ADRIAN, MI

LOCATION.--Lat 41°54'15", long 83°58'50", in NW1/4 sec.5, T.7 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank at downstream side of bridge on Academy Road, 1.7 mi east of Adrian, and 2.6 mi downstream from South Branch.

DRAINAGE AREA.--463 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1953 to September 1978, October 1978 to September 1984 (operated as a crest-stage partial-record station), October 1984 to current year. Records for October 1930 to August 1931 and October 1932 to April 1938, published as "Raisin River" in WSP 714, 744, 759, 784, 804, 824, and 854, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 693.2 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplant at Tecumseh, 11 mi upstream from station, prior to June 27, 1968. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	117	105	166	e140	e120	396	191	406	743	573	202	151
2	115	109	165	149	e125	345	185	473	575	491	214	144
3	107	115	166	169	e130	313	181	505	501	453	264	139
4	165	107	166	195	e135	287	164	460	450	451	219	141
5	125	110	189	196	e140	260	167	407	426	421	200	133
6	121	110	235	198	e140	243	154	371	450	413	262	127
7	117	106	235	187	e140	230	166	329	503	411	320	122
8	109	104	255	168	e140	221	214	266	457	381	312	118
9	106	101	247	170	e135	211	208	303	407	360	282	113
10	103	100	251	181	e135	167	231	452	367	363	235	140
11	102	131	222	188	e135	198	233	616	340	393	226	235
12	100	130	208	196	e130	192	224	682	379	355	206	378
13	106	119	199	197	e130	183	216	776	600	323	194	347
14	136	119	214	166	e125	177	209	678	752	303	188	332
15	126	117	222	e165	e125	178	202	479	757	319	170	345
16	127	115	229	e160	e125	188	195	381	565	299	141	325
17	129	110	238	e150	e120	193	189	364	446	279	151	279
18	122	111	234	e160	e120	196	181	452	433	253	167	242
19	121	113	210	e155	e120	195	181	1760	430	222	162	212
20	127	142	e200	e150	e120	235	366	3020	405	215	157	185
21	187	134	e195	e150	123	294	1040	2510	461	201	150	165
22	114	141	e190	e145	139	348	1680	1610	453	185	142	153
23	110	138	e180	e140	203	320	1610	1150	424	173	146	147
24	118	147	e170	e135	368	288	1160	878	388	165	152	159
25	102	146	e160	e130	568	273	871	722	1240	158	147	151
26	97	157	e150	e125	592	251	707	588	2730	153	146	142
27	103	166	e145	e120	559	245	583	523	2480	124	264	137
28	103	159	e140	e120	560	232	491	747	1430	e124	233	132
29	105	158	e140	e120	492	224	422	1160	969	e125	194	126
30	102	159	e140	e115	---	211	401	1400	743	e190	173	121
31	102	---	e140	e115	---	201	---	1040	---	e210	160	---
TOTAL	3624	3779	6001	4855	6194	7495	13022	25508	21304	9086	6179	5641
MEAN	117	126	194	157	214	242	434	823	710	293	199	188
MAX	187	166	255	198	592	396	1680	3020	2730	573	320	378
MIN	97	100	140	115	120	167	154	266	340	124	141	113
CFSM	.25	.27	.42	.34	.46	.52	.94	1.78	1.53	.63	.43	.41
IN.	.29	.30	.48	.39	.50	.60	1.05	2.05	1.71	.73	.50	.45

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 2000, BY WATER YEAR (WY)

	MEAN	181	279	359	392	481	713	620	393	292	178	142	136
MAX	576	941	871	1271	1176	1517	1115	939	1025	609	520	420	
(WY)	1991	1993	1988	1993	1976	1986	1978	1956	1989	1968	1995	1992	
MIN	52.1	57.9	66.6	65.6	74.1	179	239	144	69.7	46.1	47.5	49.0	
(WY)	1964	1965	1964	1963	1964	1964	1963	1964	1988	1988	1963	1955	

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR	FOR 2000 WATER YEAR	WATER YEARS 1954 - 2000
ANNUAL TOTAL	117278	112688	
ANNUAL MEAN	321	308	346
HIGHEST ANNUAL MEAN			605
LOWEST ANNUAL MEAN			99.8
HIGHEST DAILY MEAN	3930	3020	5350
LOWEST DAILY MEAN	48	97	25
ANNUAL SEVEN-DAY MINIMUM	50	102	27
INSTANTANEOUS PEAK FLOW		3400	6660
INSTANTANEOUS PEAK STAGE		13.25	15.77
INSTANTANEOUS LOW FLOW		(a)93	18
ANNUAL RUNOFF (CFSM)	.69	.66	.75
ANNUAL RUNOFF (INCHES)	9.42	9.05	10.16
10 PERCENT EXCEEDS	744	570	738
50 PERCENT EXCEEDS	178	190	223
90 PERCENT EXCEEDS	73	117	78

(a) Result of freezeup.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

## 04176500 RIVER RAISIN NEAR MONROE, MI

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi downstream from bridge on Ida Maybee Road, 5.0 mi downstream from Saline River, and 7.5 mi west of Monroe.

DRAINAGE AREA.--1,042 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft above sea level. Prior to Oct. 1, 1953, at site 9 mi downstream at datum 4f.26 ft lower.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplants upstream from station prior to June 27, 1968. At times, flow is affected by irrigation pumpage. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	115	182	e195	e155	918	304	671	2370	2560	537	222
2	138	128	180	198	e160	758	287	732	2070	1560	498	201
3	146	125	186	210	e170	620	277	851	1460	1070	465	183
4	152	125	186	219	e180	526	273	885	1010	903	475	169
5	148	132	198	e230	e185	462	269	821	828	874	450	156
6	165	135	212	e300	e190	418	249	719	753	923	661	154
7	174	133	254	e280	e190	384	243	624	758	780	950	153
8	156	133	272	e260	e190	361	252	550	808	666	838	144
9	146	137	218	255	e190	343	258	479	795	596	714	138
10	140	137	275	247	e185	325	300	484	690	558	555	147
11	125	150	280	240	e185	308	311	724	598	586	440	302
12	121	144	280	e250	e180	277	321	950	591	554	352	917
13	131	141	260	e260	e180	285	314	1150	1030	532	307	995
14	122	158	283	e250	e175	282	302	1060	1500	469	279	1010
15	126	161	293	e245	e175	275	289	1030	2040	447	258	1000
16	135	155	274	e240	e170	274	280	910	2050	441	235	816
17	142	151	280	e235	e170	280	275	719	1880	410	233	695
18	146	150	303	e230	e170	284	271	728	1610	370	216	556
19	150	154	298	e220	e170	289	263	3980	1140	334	201	435
20	200	158	297	e215	e170	310	680	4870	942	270	204	367
21	133	153	264	e210	e180	386	3500	4630	921	259	199	319
22	97	163	e220	e205	211	606	3500	5440	876	240	190	281
23	151	169	e270	e200	254	766	3430	5060	897	217	193	273
24	172	171	e260	e190	425	696	3430	3940	837	206	203	296
25	146	170	e250	e185	739	568	3080	2940	2600	196	195	321
26	125	175	e230	e180	1130	489	2450	2060	3850	187	185	444
27	123	180	e205	e175	1310	448	1690	1380	3840	173	220	456
28	120	178	e200	e170	1160	419	1170	1470	4200	172	273	339
29	110	190	e195	e165	1030	395	922	2420	4350	181	335	269
30	111	188	e195	e160	---	361	757	2360	3620	385	299	234
31	117	---	e190	e160	---	332	---	2430	---	458	252	---
TOTAL	4270	4559	7490	6779	9979	13445	29947	57067	50914	17604	11412	11992
MEAN	138	152	242	219	344	434	998	1841	1697	568	368	400
MAX	200	190	303	300	1310	918	3500	5440	4350	2560	950	1010
MIN	97	115	180	160	155	274	243	479	591	172	185	138
CFSM	.13	.15	.23	.21	.33	.42	.96	1.77	1.63	.54	.35	.38
IN.	.15	.16	.27	.24	.36	.48	1.07	2.04	1.82	.63	.41	.43

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 2000, BY WATER YEAR (WY)

	MEAN	294	487	728	821	1088	1673	1470	937	651	352	234	244
MAX	1678	2267	2618	3058	3296	4440	4055	4678	2770	1453	1161	2666	
(WY)	1982	1993	1968	1952	1976	1982	1947	1943	1989	1951	1980	1981	
MIN	57.2	74.6	87.5	106	107	343	313	248	99.2	60.3	40.3	45.2	
(WY)	1964	1965	1964	1964	1963	1964	1946	1941	1988	1988	1941	1963	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1937 - 2000

ANNUAL TOTAL	261737							225458					
ANNUAL MEAN	717							616					
HIGHEST ANNUAL MEAN										746			
LOWEST ANNUAL MEAN										1374			1943
HIGHEST DAILY MEAN										178			1964
LOWEST DAILY MEAN	7590				Jan 26			5440	May 22	14600		Mar 16	1982
ANNUAL SEVEN-DAY MINIMUM	56				Sep 20			97	Oct 22	9.0		Sep 30	1941
INSTANTANEOUS PEAK FLOW	58				Sep 18			117	Oct 26	18		Sep 26	1941
INSTANTANEOUS PEAK STAGE								5570	May 22	(a)15300		Mar 16	1982
INSTANTANEOUS LOW FLOW								7.49	May 22	(b)11.16		Mar 15	1982
ANNUAL RUNOFF (CFSM)	.69							93	Oct 22	(c)2.0		(d)	
ANNUAL RUNOFF (INCHES)	9.34							.59		9.73			
10 PERCENT EXCEEDS	2020							1330		1850			
50 PERCENT EXCEEDS	262							275		360			
90 PERCENT EXCEEDS	98							147		108			

(a) Gage height 10.4 ft.

(b) Backwater from ice.

(c) Approximately, site then in use.

(d) Sept. 4, 1938, Sept. 19, 20, 1941.

(e) Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE

04176605 OTTER CREEK AT LA SALLE, MI

LOCATION.--Lat 41°52'01", long 83°27'13", in NW1/4 NW1/4 sec.23 (private claim 47), T.7 S., R.8 E., Monroe County, Hydrologic Unit 04100001, on right bank 150 ft upstream from bridge on State Highway 125 in La Salle, 2.3 mi downstream from South Branch, and 4.6 mi southwest of Monroe.

DRAINAGE AREA.--51.0 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 571.07 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.45	.91	.92	.70	.90	18	10	22	50	23	5.4	3.7
2	.81	1.1	.88	1.2	.90	14	9.4	66	39	18	4.6	3.1
3	.73	1.6	.95	3.2	.94	11	9.0	52	30	18	22	2.7
4	.69	1.7	1.1	4.6	.99	10	8.9	40	25	20	17	2.5
5	1.1	1.4	1.2	3.6	.99	9.2	7.7	32	25	16	9.1	2.2
6	1.0	1.2	1.5	3.0	.99	8.1	7.0	27	33	13	35	1.8
7	.73	1.0	1.7	2.5	e1.0	7.3	6.7	23	32	11	36	1.5
8	.65	.99	1.4	2.1	e1.0	7.0	13	21	25	9.2	21	1.3
9	.60	.99	1.3	2.2	e.99	6.7	17	20	20	8.1	13	1.2
10	.53	.96	1.2	3.1	e.98	6.2	15	63	16	9.0	8.9	2.3
11	.49	.99	1.2	4.3	e.97	5.6	13	61	13	10	6.5	6.1
12	.50	1.3	1.2	2.9	e.96	5.8	12	87	49	8.8	5.2	8.4
13	.66	1.2	1.2	e2.4	e.95	6.9	10	86	144	6.8	4.3	8.0
14	1.3	1.0	1.8	e2.0	e.94	7.3	9.8	43	84	5.8	3.7	6.4
15	2.1	.89	4.1	e1.6	e.93	7.9	9.7	29	51	5.2	3.0	9.9
16	1.4	3.5	3.7	e1.5	e.92	8.8	9.3	25	36	5.2	2.5	9.1
17	1.3	4.5	2.6	e1.3	e.91	9.9	8.5	23	25	5.2	2.6	6.4
18	1.1	4.1	2.3	e1.2	e.90	8.5	8.3	136	21	4.1	3.4	4.6
19	1.0	6.0	1.7	e1.2	e.90	8.3	8.1	1560	21	3.3	3.2	3.6
20	.99	6.6	e1.5	e1.2	e.90	20	233	833	18	3.0	2.4	2.9
21	.99	3.6	e1.4	e1.2	e1.2	44	788	358	19	2.6	1.9	2.8
22	.97	2.5	e1.3	e1.1	e2.7	28	296	190	19	2.4	1.6	2.7
23	.90	1.8	1.1	e1.1	29	22	146	120	15	2.2	1.6	3.5
24	.90	1.2	.84	e1.0	57	18	90	86	12	2.0	1.6	20
25	.88	1.0	.67	e1.0	59	17	61	59	288	1.8	1.4	17
26	.83	1.1	.62	e.97	41	14	44	43	282	1.6	1.5	11
27	.89	1.3	.62	e.94	39	14	35	36	119	1.6	32	7.8
28	.90	1.4	.58	e.90	36	14	28	110	64	2.7	20	6.2
29	.90	1.2	.56	.86	23	16	23	197	42	5.0	10	5.0
30	.91	1.0	.58	.85	---	14	20	106	31	8.1	6.4	4.4
31	.95	---	.62	.90	---	12	---	69	---	8.4	4.7	---
TOTAL	28.15	58.03	42.34	56.62	306.86	399.5	1956.4	4623	1648	241.1	291.5	158.1
MEAN	.91	1.93	1.37	1.83	10.6	12.9	65.2	149	54.9	7.78	9.40	5.60
MAX	2.1	6.6	4.1	4.6	59	44	788	1560	288	23	36	20
MIN	.45	.89	.56	.70	.90	5.6	6.7	20	12	1.6	1.4	1.2
CFSM	.02	.04	.03	.04	.21	.25	1.28	2.92	1.08	.15	.18	.11
IN.	.02	.04	.03	.04	.22	.29	1.43	3.37	1.20	.18	.21	.12

## STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 2000, BY WATER YEAR (WY)

	MEAN	12.8	31.7	45.7	63.5	73.2	91.2	95.8	59.6	56.1	10.8	7.74	7.33
MAX	53.3	144	168	181	217	199	152	149	234	55.1	26.1	46.2	
(WY)	1993	1993	1991	1993	1998	1993	1993	2000	1997	1989	1998	1992	
MIN	.33	1.93	1.37	1.83	10.6	12.9	35.4	9.47	.58	.17	.15	.14	
(WY)	1995	2000	2000	2000	2000	2000	1997	1988	1988	1988	1988	1991	

## SUMMARY STATISTICS

## FOR 1999 CALENDAR YEAR

## FOR 2000 WATER YEAR

## WATER YEARS 1988 - 2000

ANNUAL TOTAL	13585.64	9819.60	
ANNUAL MEAN	37.2	26.8	46.1
HIGHEST ANNUAL MEAN			74.9
LOWEST ANNUAL MEAN			26.8
HIGHEST DAILY MEAN	991	1560	2330
LOWEST DAILY MEAN	.10	.45	.00
ANNUAL SEVEN-DAY MINIMUM	.12	.59	.00
INSTANTANEOUS PEAK FLOW		1890	(b)3010
INSTANTANEOUS PEAK STAGE		10.47	11.60
INSTANTANEOUS LOW FLOW		.41	
ANNUAL RUNOFF (CFSM)	.73	.53	.90
ANNUAL RUNOFF (INCHES)	9.91	7.16	12.28
10 PERCENT EXCEEDS	86	44	106
50 PERCENT EXCEEDS	1.8	4.6	16
90 PERCENT EXCEEDS	.27	.90	.79

(a) On several days in water years 1988, 1991, 1992, 1994, 1996.

(b) From rating curve extended above 1,000 ft<sup>3</sup>/s.

(c) Estimated.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or floodflow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at crest-stage partial-record stations are presented in the following table. Discharge measurements made at miscellaneous sites and for special studies are given in separate tables.

## Crest-stage partial-record stations

The following table contains annual maximum discharges for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

## Maximum discharge at crest-stage partial-record stations

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE SUPERIOR								
Two Hearted River near Paradise, MI (04044813)	Lat 46°41'15", long 85°26'26", in SE1/4 NW1/4 sec.33, T.50 N., R.9 W., Luce County, Hydrologic Unit 04020201, on right bank 300 ft down- stream from end of two-track road, 3.2 mi upstream from mouth, and 20 mi northwest of Paradise. Drainage area is 200 mi <sup>2</sup> .	1973-00	03-09-00	9.27	903	04-25-85	a8.42	3,210
West Branch Waiska River near Brimley, MI (04045538) (locally known as Waishkey River)	Lat 46°21'18", long 84°35'35", in SW1/4 NW1/4 sec.29, T.46 N., R.2 W., Chippewa County, Hydrologic Unit 04020203, at Tilson Road, 3.2 mi upstream from mouth, and 3.5 mi south of Brimley. Drainage area is 40.7 mi <sup>2</sup> .	1973-00	03-09-00	6.96	391	04-18-74	b9.19	1,200
STREAMS TRIBUTARY TO LAKE MICHIGAN								
Tenmile Creek at Perronville, MI (04059400)	Lat 45°48'38", long 87°22'00", in NW1/4 NW1/4 sec.2, T.39 N., R.25 W., Menominee County, Hydrologic Unit 04030109, at county road, 1.0 mi northwest of Perron- ville, and 11.5 mi upstream from Ford River. Drainage area is 38.4 mi <sup>2</sup> .	1971-77, 1978-00	03-09-00	c	e250	04-24-75	d5.42	810

See footnotes at end of table.



## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN—Continued								
Portage River near Vicksburg, MI (04097170)	Lat 42°06'53", long 85°29'08", in SW1/4 sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, at W Avenue, 2.4 mi east of Vicksburg. Datum of gage is 839.94 ft above sea level. Drainage area is 68.2 mi <sup>2</sup> .	1946-51‡, 1965-80‡, 1980-00	04-22-00	4.51	152	06-02-89	f5.81	416
Rabbit River at Hamilton, MI (04108645)	Lat 42°40'31", long 86°00'13", in NE1/4 sec.6, T.3 N., R.14 W., Allegan County, Hydro- logic Unit 04050003, at State Highway 40 in Hamilton. Drainage area is 274 mi <sup>2</sup> .	1979-00	05-19-00	16.17	2,900	06-21-97	g21.60	12,000
SycamoreCreek near Mason, MI (04112700)	Lat 42°36'40", long 84°27'58", in NE1/4 NE1/4 sec.31, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, at Harper Road, 0.7 mi downstream from Aurelius and Vevay Drain, and 2.6 mi northwest of Mason. Drain- age area is 39.5 mi <sup>2</sup> .	1975-00	05-19-00	10.04	303	04-19-75	12.53	1,080
Flat River at Smyrna, MI (04116500)	Lat 43°03'10", long 85°15'53", in NW1/4 sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of bridge on Ingalls Road, 0.5 mi south of Smyrna. Datum of gage is 729.53 ft above sea level. Drainage area is 528 mi <sup>2</sup> .	1951-86‡, 1993-00	05-18-00	h6.28	2,020	09-13-86	9.05	4,700
Thornapple River near Caledonia, MI (04118000)	Lat 42°48'40", long 85°29'00", in NW1/4 sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft downstream from LaBarge powerplant, 200 ft upstream from 84th Street, 2.3 mi northeast of Caledonia, and 3.3 mi down- stream from Coldwater Riv- er. Datum of gage is 676.31 ft above sea level. Drainage area is 773 mi <sup>2</sup> .	1931-38‡, 1952-82‡, 1984-94‡, 1995-00	05-19-00	9.79	5,010	02-27-85	11.43	6,700

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued								
Grand River at Ada, MI (04118105)	Lat 42°57'19", long 85°28'35", in NE1/4 sec.34, T.7 N., R.10 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of bridge on State Highway 21 in Ada, 0.15 mi downstream from Thornapple River, and at mile 62. Datum of gage is 603.95 ft above sea level. Drainage area is 4,473 mi <sup>2</sup> .	1999-00	05-21-00	18.84	20,300	05-21-00	18.84	20,300
Plaster Creek at Grand Rapids, MI (04119055)	Lat 42°54'46", long 85°39'02", in SE1/4 sec.7, T.6 N., R.11 W., Kent County, Hydrologic Unit 04050006, at 28th Street in Grand Rapids. Drainage area is 46.6 mi <sup>2</sup> .	1974-00	05-19-00	12.72	2,010	02-22-97	13.43	2,300
Buck Creek at Grandville, MI (04119160)	Lat 42°54'09", long 85°45'46", in SE1/4 sec.18, T.6 N., R.12 W., Kent County, Hydrologic Unit 04050006, at Wilson Avenue in Grandville. Drainage area is 50.5 mi <sup>2</sup> .	1974-00	05-19-00	9.61	1,220	05-12-81	10.30	1,580
North Branch Pentwater River near Pentwater, MI (04122230)	Lat 43°47'42", long 86°21'30", in NE1/4 SE1/4 sec.8, T.16 N., R.17 W., Oceana County, Hydrologic Unit 04060101, at Oceana Drive, 3.5 mi northeast of Pentwater. Drainage area is 42.3 mi <sup>2</sup> .	1975-00	05-19-00	2.84	204	09-11-86	6.33	2,860
Betsie River near Benzonia, MI (04126600)	Lat 44°36'02", long 86°05'57", in NW1/4 NW1/4 sec.2, T.25 N., R.15 W., Benzie County, Hydrologic Unit 04060104, at U.S. Highway 31, 1.2 mi south of Benzonia. Datum of gage is 602.15 ft above sea level. Drainage area is approximately 170 mi <sup>2</sup> .	1975-00	02-27-00	3.06	507	03-28-89	5.46	993
STREAMS TRIBUTARY TO LAKE HURON								
Rifle River at Selkirk, MI (04140500)	Lat 44°18'48", long 84°04'10", in SE1/4 NE1/4 sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, at State Road in Selkirk. Datum of gage is 828.47 ft above sea level. Drainage area is 117 mi <sup>2</sup> .	1950-82†, 1983-00	05-19-00	12.89	673	05-20-59	6.76	2,760

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

## Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE HURON--Continued								
North Branch Flint River near Columbiaville, MI (04146450)	Lat 43°11'18", long 83°22'03", in NW1/4 sec. 24, T.9 N., R.9 E., Lapeer County, Hydro- logic Unit 04080204, at Barnes Lake Road, 2.9 mi northeast of Columbiaville. Drainage area is 223 mi <sup>2</sup> .	1987-00	05-19-00	12.92	855	06-21-96	20.25	4,800
Swartz Creek at Flint, MI (04148300)	Lat 42°59'16", long 83°43'57", in NW1/4 sec. 26, T.7 N., R.6 E., Genesee County, Hydro- logic Unit 04080204, at South Ballenger Highway in Flint, 3.6 mi upstream from mouth. Datum of gage is 727.05 ft above sea level. Drainage area is 115 mi <sup>2</sup> .	1970-84†, 1991-00	09-23-00	8.16	1,940	04-19-75	9.02	3,160
Thread Creek near Flint, MI (04148440)	Lat 42°58'30", long 83°38'09", in SE1/4 SE1/4 sec. 28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, at Bristol Road, 4.0 mi southeast of Flint, and 6.0 mi upstream from mouth. Datum of gage is 764.36 ft above sea level. Drainage area is 54.4 mi <sup>2</sup> .	1970-84†, 1991-00	09-23-00	6.85	714	04-19-75	g7.65	1,260
STREAMS TRIBUTARY TO ST. CLAIR RIVER								
Pine River near Rattle Run, MI (04160350)	Lat 42°52'49", long 82°34'04", in NE1/4 sec.9, T.5 N., R.16 E., St. Clair County, Hydro- logic Unit 04090001, at Gratiot Road, 1.9 mi north- east of Rattle Run. Drainage area is 135 mi <sup>2</sup> .	1974-00	05-19-00	16.24	1,590	06-22-96	24.24	5,730
STREAMS TRIBUTARY TO LAKE ST. CLAIR								
West Branch Stony Creek near Washington, MI (04161760)	Lat 42°43'53", long 83°06'02", in SE1/4 sec.25, T.4 N., R.11 E., Oakland County, Hydro- logic Unit 04090003, at Huron-Clinton Metropoli- tan Park Road, 3.4 mi west of Washington. Drainage area is 22.5 mi <sup>2</sup> .	1965-00	06-25-00	2.51	72	04-19-75	j4.42	470

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE ST. CLAIR--Continued								
North Branch Clinton River at Almont, MI (04164010)	Lat 42°54'59", long 83°02'42", in NE1/4 sec.28, T.6 N., R.12 E., Lapeer County, Hydro- logic Unit 04090003, at State Highway 53 in Almont. Drainage area is 9.56 mi <sup>2</sup> .	1959-62, 1963-68‡, 1969-00	09-23-00	5.03	306	09-06-85	k8.60	818
North Branch Clinton River near Romeo, MI (04164050)	Lat 42°49'11", long 82°58'35", in NW1/4 sec.31, T.5 N., R.13 E., Macomb County, Hydro- logic Unit 04090003, at 33 Mile Road, 2.2 mi north- east of Romeo. Drainage area is 49.7 mi <sup>2</sup> .	1959-64, 1965-69‡, 1970-00	09-23-00	4.69	1,250	04-19-75	m5.44	3,500
North Branch Clinton River near Meade, MI (04164150)	Lat 42°43'50", long 82°54'23", in NE1/4 sec.34, T.4 N., R.13 E., Macomb County, Hydro- logic Unit 04090003, at 27 Mile Road, 1.9 mi northwest of Meade. Drainage area is 89.6 mi <sup>2</sup> .	1959-67, 1968-72‡, 1973-00	09-24-00	7.73	1,890	04-19-75	n7.76	4,500
Coon Creek near Armada, MI (04164200)	Lat 42°47'41", long 82°52'58", in SW1/4 sec.1, T.4 N., R.13 E., Macomb County, Hydro- logic Unit 04090003, at North Road, 3.4 mi south of Armada. Drainage area is 10.0 mi <sup>2</sup> .	1959-65, 1966-70‡, 1971-00	09-23-00	4.30	149	04-19-75	o6.25	480
Highbank Creek near Armada, MI (04164350)	Lat 42°48'24", long 82°51'08", in NW1/4 sec.6, T.4 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 32 Mile Road, 3.0 mi southeast of Armada. Drainage area is 14.9 mi <sup>2</sup> .	1959-65, 1965-70‡, 1971-00	09-23-00	16.69	1,660	09-06-85	16.77	2,240
East Branch Coon Creek near New Haven, MI (04164360)	Lat 42°45'46", long 82°50'57", in SW1/4 sec.18, T.4 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 29 Mile Road, 3.4 mi northwest of New Haven. Drainage area is 36.1 mi <sup>2</sup> .	1959-67, 1968-72‡, 1973-00	09-23-00	8.97	1,470	04-19-75	p8.95	2,700
Deer Creek near Meade, MI (04164400)	Lat 42°42'39", long 82°51'32", in NW1/4 sec.6, T.3 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 25 1/2 Mile Road, 0.9 mi southeast of Meade. Drain- age area is 12.7 mi <sup>2</sup> .	1959-60, 1960-65‡, 1966-00	09-23-00	6.00	283	09-06-85	8.90	691

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

## Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 2000 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)	Date	Gage height (ft)	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE ST. CLAIR--Continued								
McBride Drain near Macomb, MI (04164450)	Lat 42°41'14", long 82°55'14", in NE1/4 NE1/4 sec.16, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 24 Mile Road, 2.2 mi southeast of Macomb. Drainage area is 5.79 mi <sup>2</sup> .	1960-64‡, 1965-00	08-03-00	7.52	110	02-10-65	q8.82	220
Middle Branch Clinton River near Macomb, MI (04164600)	Lat 42°42'03", long 82°59'44", in SE1/4 sec.2, T.3 N., R.12 E., Macomb County, Hydro- logic Unit 04090003, at Schoenherr Road, 2.0 mi west of Macomb. Drainage area is 22.2 mi <sup>2</sup> .	1959-64, 1965-69‡, 1971-00	08-03-00	11.32	663	06-26-68	r12.17	1,400
STREAMS TRIBUTARY TO DETROIT RIVER								
Frank and Poet Drain at Trenton, MI (04168660)	Lat 42°09'19", long 83°12'22", in NW1/4 sec.13, T.4 S., R.10 E., Wayne County, Hydro- logic Unit 04090004, at King Road in Trenton. Drainage area is 19.3 mi <sup>2</sup> .	1972-00	09-11-00	9.04	502	09-07-90	9.55	655
STREAMS TRIBUTARY TO LAKE ERIE								
Saline River near Saline, MI (04176400)	Lat 42°07'50", long 83°46'35", in SW1/4 sec.18, T.4 S., R.6 E., Washtenaw County, Hydrologic Unit 04100002, 50 ft upstream from Maple Road, 2.8 mi south of Saline. Drainage area is 94.6 mi <sup>2</sup> .	1966-77‡, 1978-00	06-26-00	12.07	520	06-26-68	13.37	3,990

‡ Operated as a continuous-record gaging station.

a Maximum gage height, 12.36 ft, Apr. 9, 1991, present site and datum.

b Maximum gage height, 9.84 ft, Apr. 6, 1988.

c Maximum gage height, 4.49 ft, Mar. 2, backwater from ice.

d Maximum gage height, 8.94 ft, Mar. 30, 1977, backwater from ice.

e Estimated.

f Maximum gage height, 5.86 ft, Dec. 31, 1988, backwater from ice.

g From floodmark.

h Maximum gage height, 6.37 ft, backwater from ice, date not determined.

i Maximum gage height, 2.98 ft, Feb. 26, backwater from ice.

j Maximum gage height, 5.93 ft, Jan. 27, 1974, backwater from ice.

k Maximum gage height, 8.62 ft, Apr. 19, 1975.

m Maximum gage height, 7.1 ft, Mar. 12 or 13, 1962, backwater from ice, site and datum then in use.

n Maximum gage height, 7.85 ft, Mar. 12, 1962, backwater from ice.

o Maximum gage height, 6.95 ft, Sept. 6, 1985.

p Maximum gage height, 9.48 ft, Sept. 6, 1985.

q Maximum gage height, 9.55 ft, June 26, 1968.

r Maximum gage height, 15.89 ft, Mar. 14, 1972, backwater from ice.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

## Special study and miscellaneous sites

Discharge measurements in the following table were made at special study and miscellaneous sites throughout the State.

Discharge measurements made at special study and miscellaneous sites during water year 2000

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE SUPERIOR							
04034100	Bond Falls Lower By-Pass	Middle Branch Ontonagon River	Lat 46°24'27", long 89°07'44", in SE1/4 SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Road, 2.2 mi west of Calderwood.	--	1942,1945, 1963-64, 1967,1969, 1971-72, 1974, 1979-81, 1983-84, 1987-99	08-10-00	a41.6
04044400	Carp River	Lake Superior	Lat 46°31'29", long 87°34'25", in SE1/4 sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, at U.S. Highway 41, 2.0 mi northeast of Negaunee.	51.4	1961-86‡, 1987-92‡, 1993-99	06-02-00 06-20-00 07-17-00 09-21-00	a28.1 a37.8 a22.2 a15.9
STREAMS TRIBUTARY TO LAKE MICHIGAN							
04052000	Driggs River	Manistique River	Lat 46°20'44", long 86°07'36", in NE1/4 NW1/4 sec.36, T.46 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at State Highway 28, 8.6 mi west of Seney.	b70	1938-42‡, 1943-45, 1947-48, 1950	03-02-00 03-09-00 03-27-00 05-17-00	77.6 129 173 *65.6
04052010	Driggs River	Manistique River	Lat 46°18'58", long 86°06'32", in NE1/4 NW1/4 sec.7, T.45 N., R.14 W., Schoolcraft County, Hydrologic Unit 04060106, 150 ft downstream from Diversion Ditch at Seney National Wildlife Refuge, 8.0 mi west of Seney.	--	--	03-02-00 03-09-00 03-28-00 05-17-00	98.0 174 209 *72.8
04052040	Driggs River	Manistique River	Lat 46°13'56", long 86°02'12", in SE1/4 SE1/4 sec.3, T.44 N., R.14 W., Schoolcraft County, Hydrologic Unit 04060106, 0.8 mi southwest of M Pool at Seney National Wildlife Refuge, 5.5 mi west of Germfask.	--	--	03-08-00 03-28-00 05-17-00	153 215 *85.8
04052500	Walsh Creek	Walsh Ditch	Lat 46°20'44", long 86°10'37", in NW1/4 NW1/4 sec.34, T.46 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at State Highway 28, 11.1 mi west of Seney.	b12	1938-42‡, 1943-45, 1947-48, 1950, 1998-99	03-02-00 03-10-00 03-27-00 05-18-00	80.4 116 123 *6.74

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04052700	Sweeney Creek	Driggs River	Lat 46°18'02", long 86°07'18", in NW1/4 NE1/4 sec.13, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at outlet of C3 Pool, at Seney National Wildlife Refuge, 9.0 mi south- west of Seney.	--	1998-99	03-02-00	a119
						03-08-00	a186
						03-28-00	a182
						05-18-00	a6.50
04052704	Sweeney Creek	Driggs River	Lat 46°17'47", long 86°06'50", in SW1/4 NW1/4 sec.18, T.45 N., R.14 W., Schoolcraft County, Hydrologic Unit 04060106, 0.6 mi down- stream from C3 Pool at Seney National Wildlife Refuge, 8.7 mi southwest of Seney.	--	--	05-18-00	a8.23
04053500	Marsh Creek	Manistique River	Lat 46°20'45", long 86°14'09", in NW1/4 NW1/4 sec.31, T.46 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at State Highway 28, 14.0 mi west of Seney.	b20	1938-42†, 1943-45, 1947-48, 1950, 1998-99	03-02-00	12.4
						03-08-00	11.2
						03-27-00	11.9
04053520	Ducey Creek	Marsh Creek	Lat 46°20'44", long 86°13'31", in NW1/4 NE1/4 sec.31, T.46 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at railroad bridge 150 ft downstream from State Highway 28, 13.5 mi west of Seney.	--	1998-99	03-02-00	57.9
						03-08-00	59.7
						03-27-00	75.8
04053600	Marsh Creek	Manistique River	Lat 46°17'22", long 86°08'38", in SW1/4 SE1/4 sec.14, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at outlet of C3 Pool at Seney National Wildlife Refuge, 10.3 mi southwest of Seney.	--	1999	03-02-00	a34.2
						03-08-00	a30.5
						03-28-00	a31.0
						05-17-00	a5.44
04054415	Walsh Ditch	Duck Creek	Lat 46°19'38", long 86°09'26", in SE1/4 NE1/4 sec.3, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, 2.5 mi upstream from C3 Pool at Seney National Wildlife Refuge, 10.2 mi west of Seney.	--	--	09-19-00	4.84
04054420	Walsh Ditch	Duck Creek	Lat 46°17'36", long 86°09'30", in NE1/4 SE1/4 sec.15, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, 0.2 mi upstream from C3 Pool at Seney National Wildlife Refuge, 10.7 mi southwest of Seney.	--	1998-99	03-02-00	176
						03-08-00	204
						03-27-00	208
						05-17-00	*20.4

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04054425	Walsh Ditch	Duck Creek	Lat 46°17'20", long 86°09'10", in SW1/4 SW1/4 sec.14, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, at outlet of C3 Pool at Seney National Wildlife Refuge, 10.6 mi southwest of Seney.	--	1998-99	03-02-00 03-08-00 03-28-00 05-17-00	a37.5 a51.3 a43.4 a<0.01
04054429	Walsh Ditch (East Channel)	Duck Creek	Lat 46°15'55", long 86°09'20", in NW1/4 SW1/4 sec.26, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, 1.8 mi downstream from C3 Pool at Seney National Wildlife Refuge, 11.1 mi west of Germfask.	--	--	09-19-00	a1.27
04054430	Walsh Ditch (West Channel)	Duck Creek	Lat 46°15'53", long 86°09'31", in NE1/4 SE1/4 sec.27, T.45 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, 1.9 mi downstream from C3 Pool at Seney National Wildlife Refuge, 11.2 mi west of Germfask.	--	--	09-19-00	a0.19
04058120	Green Creek	Middle Branch Escanaba River	Lat 46°22'22", long 87°36'21", in NW1/4 sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at County Highway 565, 4.5 mi south of Palmer.	8.42	1961-65, 1970-92†, 1993-99	06-02-00 06-20-00 07-17-00 09-21-00	a2.07 a4.60 a3.82 a2.71
04059034	Escanaba River	Lake Michigan	Lat 45°48'22", long 87°05'51", in SW1/4 NW1/4 sec.1, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030110, 600 ft downstream from Bichler Creek, 2.5 mi upstream from mouth, and 2.0 mi northwest of Wells.	b920	1981-92†, 1993-99	06-07-00 07-14-00 08-04-00 08-25-00	a308 a381 a283 a204
04061500	Paint River	Brule River	Lat 46°06'21", long 88°20'05", in SE1/4 sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, downstream from City of Crystal Falls powerplant, 0.9 mi upstream from State Highway 69 in Crvstal Falls.	597	1944-96‡, 1997-98c 1999	04-25-00 06-05-00 07-17-00 08-28-00	a570 a262 a394 a221

See footnotes at end of table.



## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04062400	Michigamme River	Menominee River	Lat 46°14'48", long 88°00'45", in NW1/4 NW1/4 sec.1, T.44 N., R.30 W., Dickinson County, Hydrologic Unit 04030107, on left bank 20 ft upstream from bridge on unnamed county road, 800 ft downstream from State Highway 95, and 2.0 mi south of Witch Lake.	316	1964-80†, 1997-98c 1999	03-14-00 06-05-00 07-17-00 08-28-00	a783 a94.9 a202 a55.6
04062850	Michigamme River	Menominee River	Lat 45°57'16", long 86°11'44", in NW1/4 NW1/4 sec.16, T.41 N., R.31 W., Iron County, Hydrologic Unit 04030107, 800 ft downstream from Michigamme Falls powerplant, 3.2 mi northeast of Florence, WI	720	--	09-06-00 09-06-00 09-06-00 09-06-00 09-07-00 09-07-00 09-07-00 09-07-00	a53.4 a389 a679 a959 a1,260 a1,370 a2,580 a2,290 a181
04096289	Herricksville Drain	St. Joseph River	Lat 42°02'01", long 84°45'25", in NW1/4 SE1/4 sec.15, T.5 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, adjacent to Anderson Road, in Litchfield.	--	--	07-19-00 08-23-00	*d0.08 *d0.00
04096463	Unnamed Tributary	South Lake	Lat 41°55'38", long 85°01'02", in SW1/4 SW1/4 sec.21, T.6 S., R.6 W., Branch County, Hydrologic Unit 04050001, at Garfield Road, about 0.5 mi south of Coldwater.	--	--	07-19-00 08-23-00	*d0.08 *d0.08
04096464	Unnamed Tributary	South Lake	Lat 41°55'57", long 85°01'26", in NE1/4 SE1/4 sec.20, T.6 S., R.6 W., Branch County, Hydrologic Unit 04050001, at Butlers Avenue, about 1.0 mi west of Coldwater.	--	--	07-19-00 08-23-00	*d0.18 *d0.52
04096501	East Branch Sauk River	Coldwater River	Lat 41°56'30", long 85°01'30", in NE1/4 NE1/4 sec.20, T.6 S., R.6 W., Branch County, Hydrologic Unit 04050001, at trail with footbridge adjacent to Butternut Street, 0.5 mi west of Coldwater.	--	--	09-07-00	*d38.1
04096502	Coldwater River	St. Joseph River	Lat 41°56'41", long 85°01'52", in SE1/4 SW1/4 sec.17, T.6 S., R.6 W., Branch County, Hydrologic Unit 04050001, at Chicago Drive, 1.0 mi west of Coldwater.	--	--	09-07-00	*d72.4

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04096517	South Branch Hog Creek Tributary	South Branch Hog Creek	Lat 41°57'33", long 84°49'33", in SW1/4 SW1/4 sec.7, T.6 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, at Squires Road, 0.3 mi upstream from mouth, and 3.0 mi west of Allen.	2.61	1969-99	12-02-99	*0.96
						04-06-00	*1.20
						06-29-00	*2.07
						08-07-00	*1.20
04096754	Drain No. 30	Swan Creek	Lat 41°52'52", long 85°11'29", in NW1/4 NW1/4 sec.12, T.7 S., R.8 W., Branch County, Hydrologic Unit 04050001, at Matterson Road, in Bronson.	--	--	07-19-00 08-23-00	*d0.07 *d<0.01
04096890	Pine Creek	Prairie River	Lat 42°08'02", long 85°13'50", in NE1/4 SW1/4 sec.10, T.4 S., R.8 W., Calhoun County, Hydrologic Unit 04050001, at O Drive South, 3.0 mi north of Athens.	--	--	05-03-00	32.5
04096895	Unnamed Tributary	Pine Creek	Lat 42°06'03", long 85°16'08", in SE1/4 SW1/4 sec.20, T.4 S., R.8 W., Calhoun County, Hydrologic Unit 04050001, at T Drive South, about 2.0 mi northwest of Athens.	--	--	05-03-00	1.65
04097512	Unnamed Tributary	Prairie River	Lat 41°48'20", long 85°02'21", in SW1/4 NW1/4 sec.5, T.8 S., R.6 W., Branch County, Hydrologic Unit 04050001, at Grass Lake Road, about 2.0 mi northwest of Kinderhook.	--	--	07-19-00 08-23-00	d0.43 *d0.11
04098200	Unnamed Tributary	Lee Lake	Lat 41°46'56", long 85°22'40", in SW1/4 SE1/4 sec.8, T.8 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, at Fawn River Road, about 2.0 mi southeast of Sturgis.	--	--	07-19-00 08-23-00	d1.84 *d0.80
04104700	Battle Creek	Kalamazoo River	Lat 42°21'51", long 85°07'21", in SE1/4 sec.21, T.1 S., R.7 W., Calhoun County, Hydro- logic Unit 04050003, at 9 Mile Road, 1.0 mi southwest of Pennfield.	--	1986, 1989-90 1999	10-27-99 10-27-99	*35.8 *36.9
04104950	Wanadoga Creek	Battle Creek	Lat 42°22'12", long 85°07'44", in NW1/4 SE1/4 sec.21, T.1 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, at Q Drive North, 1.3 mi west of Pennfield.	--	1965, 1983, 1989-90 1999	10-27-99 10-27-99	*13.5 *14.6

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04108715	Macatawa River	Lake Macatawa	Lat 42°50'30", long 85°51'24", in SW1/4 SW1/4 sec.2, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, at 64th Avenue, 3.5 mi south- west of Hudsonville.	--	--	04-25-00	*d30.3
04108730	Macatawa River	Lake Macatawa	Lat 42°47'00", long 86°00'01", in SE1/4 SE1/4 sec.30, T.5 N., R.14 W., Ottawa County, Hydroloigc Unit 04050002, at Adams Street, 2.0 mi south- east of Zeeland.	--	--	04-25-00	*d54.7
04108820	Unnamed Tributary	Macatawa River	Lat 42°50'28", long 86°06'30", NE1/4 NW1/4 sec.8, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at Quincy Street, about 2.0 mi southwest of New Holland.	--	--	07-24-00	*d0.00
						08-07-00	d0.27
						08-16-00	*d0.02
						08-30-00	*d0.00
04108832	Unnamed Tributary	Macatawa River	Lat 42°45'43", long 86°04'45", in NE1/4 SE1/4 sec.4, T.4 N., R.15 W., Allegan County, Hydrologic Unit 04050002, at 147th Avenue, about 1.0 mi east of Holland.	--	--	07-24-00	*d<0.01
						08-07-00	d0.05
						08-16-00	*d0.01
04108833	Unnamed Tributary	Macatawa River	Lat 42°46'13", long 86°05'01", in SW1/4 SE1/4 sec.33, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at U.S. Highway 31, 0.7 mi east of Holland.	--	--	07-24-00	*d0.17
						08-07-00	d0.09
						08-16-00	*d0.15
						08-30-00	*d0.16
04108852	Unnamed Tributary	Lake Macatawa	Lat 42°47'49", long 86°11'06", in SW1/4 SE1/4 sec.22, T.5 N., R.16 W., Ottawa County, Hydrologic Unit 04050002, at Perry Street, 1.5 mi north of Holland.	--	--	07-24-00	*d1.54
						08-07-00	d2.05
						08-16-00	*d1.33
						08-30-00	*d1.50
04108870	Pigeon River	Lake Michigan	Lat 42°55'31", long 86°06'07", in NE1/4 NE1/4 sec.8, T.6 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at 128th Avenue, 1.4 mi north- west of Olive Center.	--	1998-99	05-19-00	d1,180
04119229	Unnamed Tributary	Grand River	Lat 42°55'08", long 85°51'09", in NW1/4 SE1/4 sec.9, T.6 N., R.13 W., Ottawa County, Hydrologic Unit 04050006, at 28th Avenue, in Georgetown.	--	--	04-20-00	d10.7
						04-21-00	d26.2
						05-18-00	d20.3
						06-01-00	d7.13

See footnotes at end of table.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04119280	Deer Creek	Grand River	Lat 43°03'35", long 85°55'41", in SE1/4 SE1/4 sec.23, T.8 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at Arthur Street in Coopersville.	--	1999	10-06-99 10-14-99 10-28-99 11-07-99 05-20-00	*d2.01 *d1.35 *d1.51 *d8.52 d895
04119290	Deer Creek	Grand River	Lat 43°01'44", long 85°55'17", in NW1/4 NW1/4 sec.1, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at Mill Road, 2.3 mi south of Coopersville.	--	1999	10-06-99 10-14-99	*d3.90 *d1.84
04120030	Crockery Creek	Grand River	Lat 43°09'44", long 85°57'47", in SW1/4 SW1/4 sec.15, T.9 N., R.14 W., Muskegon County, Hydrologic Unit 04050006, at Ellis Road, 2.0 mi southwest of Ravenna.	--	1971, 1999	10-06-99	*d28.7
04120040	Crockery Creek	Grand River	Lat 43°08'38", long 85°57'58", in NW1/4 NW1/4 sec.27, T.9 N., R.14 W., Muskegon County, Hydrologic Unit 04050006, at Patterson Road, 3.0 mi southwest of Ravenna.	--	1999	10-06-99	*d35.6
04121239	Clam River	Muskegon River	Lat 44°15'49", long 85°24'04", in NE1/4 NE1/4 sec.33, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, 1.0 mi downstream from dam at outlet of Lake Cadillac, at Smith Street in Cadillac.	b48	1983-84†, 1986-92†, 1993-99	11-30-99 01-05-00 06-14-00 09-05-00	*19.5 35.4 69.3 *4.91
04122076	Ryerson Creek	Muskegon Lake	Lat 43°14'13", long 86°11'30", in SW1/4 SE1/4 sec.22, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, at West Street, in East Muskegon.	--	--	08-16-00 08-17-00 08-17-00	*d0.24 d0.25 d0.28
04122077	Ryerson Creek	Muskegon Lake	Lat 43°14'13", long 86°11'35", in SW1/4 SE1/4 sec.22, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, at Carlton Street, in East Muskegon.	--	--	06-21-00 08-17-00	d0.55 *d0.29
04122078	Ryerson Creek	Muskegon Lake	Lat 43°14'08", long 86°12'24", in SE1/4 SE1/4 sec.21, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, at Home Street, in East Muskegon.	--	--	03-30-00 04-20-00 04-21-00 05-18-00 06-21-00 08-16-00 08-17-00	*d1.25 d14.6 d7.27 d7.69 d2.49 *d1.55 d5.85

See footnotes at end of table.

### DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04122080	Ryerson Creek	Muskegon Lake	Lat 43°14'27", long 86°14'02", in NE1/4 SW1/4 sec.20, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, at Wood Street, at Muskegon.	7.59	1973	03-30-00 04-17-00 04-20-00 05-18-00	*d3.45 d5.83 d38.0 d23.5
0412220997	Hunter Creek	Silver Lake	Lat 43°40'26", long 86°28'24", in NE1/4 NW1/4 sec.28, T.15 N., R.18 W., Oceana County, Hydrologic Unit 04060101, on Strong Road, 2.5 mi west of Mears.	--	--	07-13-00 08-09-00 08-30-00	*d2.81 *d2.87 *d2.90
04122326	Sanborn Creek	Baldwin River	Lat 43°54'03", long 85°48'49", in SE1/4 SW1/4 sec.36, T.18 N., R.13 W., Lake County, Hydrologic Unit 04060101, at U.S. Highway 10, about 2.0 mi east of Baldwin.	--	--	07-13-00 08-09-00	*d9.64 *d11.5
04122495	Unnamed Tributary	Pere Marquette River	Lat 43°57'15", long 86°16'24", in NE1/4 SW1/4 sec.18, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, at unnamed drive off U.S. High- way 10, in Scottville.	--	--	07-13-00 08-09-00 08-30-00	*d0.37 *d0.30 *d0.25
04126181	Stronach Creek	Little Manistee River	Lat 44°08'49", long 85°55'18", in NW1/4 NW1/4 sec.7, T.20 N., R.13 W., Lake County, Hydrologic Unit 04060103, at Brooks Road, 0.5 mi north- west of Irons.	--	--	04-29-00	*d0.00
04126643	Long Lake Outlet	Lake Dubonnet	Lat 44°41'14", long 85°45'20", in NW1/4 NW1/4 sec.3, T.26 N., R.12 W., Grand Traverse County, Hydrologic Unit 04060104, at West Long Lake Road, and 2.5 mi north of Interlochen.	--	--	06-19-00	*d0.00
04126696	Platte River	Platte Lake	Lat 44°39'42", long 85°56'25", in SE1/4 SE1/4 sec.12, T.26 N., R.14 W., Benzie County, Hydrologic Unit 04060104, 30 ft upstream from outfall 001, State Fish Hatchery, 4.0 mi east of Honor.	--	--	03-20-00 04-26-00 05-02-00 07-05-00	51.8 51.5 *50.4 *57.3
04126699	Platte River	Platte Lake	Lat 44°39'41", long 85°56'27", in SE1/4 SE1/4 sec.12, T.26 N., R.14 W., Benzie County, Hydrologic Unit 04060104, 100 ft downstream from out- fall 001, State Fish Hatchery, 4.0 mi east of Honor.	--	--	03-20-00 04-26-00 05-02-00 07-05-00	62.9 63.7 *60.8 *57.6

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN—Continued							
04126751	North Branch Platte River	Platte River	Lat 44°41'01", long 86°03'30", in SE1/4 NE1/4 sec.1, T.26 N., R.15 W., Benzie County, Hydrologic Unit 04060104, downstream from bridge on Deadstream Road, 2.5 mi northwest of Honor.	31.1	1958, 1980-81	04-12-00	a17.3
						05-11-00	a6.82
						07-06-00	a5.12
						08-08-00	a8.76
04126755	Platte River	Loon Lake	Lat 44°42'39", long 86°07'08", in NE1/4 SE1/4 sec.28, T.27 N., R.15 W., Benzie County, Hydrologic Unit 04060104, downstream from bridge on State Highway M-22, 6.2 mi northwest of Honor.	166	1946-48†, 1957, 1979-82†	04-12-00	*119
						05-11-00	*117
						06-02-00	136
						08-15-00	*110
						09-12-00	169
04127558	Cedar River	Blair Lake	Lat 44°56'31", long 85°07'20", in NW1/4 NE1/4 sec.2, T.29 N., R.7 W., Antrim County, Hydrologic Unit 04060105, at Stover Pond Road, 2.0 mi west of Mancelona.	--	1979	08-03-00	*d52.6
04127562	Cedar River	Blair Lake	Lat 44°58'10", long 85°08'20", in SW1/4 NE1/4 sec.27, T.30 N., R.7 W., Antrim County, Hydrologic Unit 04060105, at Beeman Road (Graham Road), 3.0 mi east of Bellaire.	--	1979	08-03-00	*d58.9
STREAMS TRIBUTARY TO LAKE HURON							
04149683	Donald Drain	Duff Creek	Lat 43°19'42", long 83°02'58", in NW1/4 NE1/4 sec.3, T.11 N., R.12 E., Sanilac County, Hydrologic Unit 04080205, at Marlette Road, 1.0 mi east of Marlette.	--	--	09-07-00	*d0.27
04149685	Duff Creek	Cass River	Lat 43°20'35", long 83°03'30", in SE1/4 SW1/4 sec.28, T.11 N., R.12 E., Sanilac County, Hydrologic Unit 04080205, at Mayville Road, 1.5 mi north- east of Marlette.	--	1981	09-07-00	*d0.64
04153770	Coldwater River	Chippewa River	Lat 43°45'19", long 84°56'38", in SW1/4 SW1/4 sec.20, T.16 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Coleman Road, 2.8 mi west of Woods.	--	1999	10-07-99	*d12.0
04153777	Walker Creek	Coldwater River	Lat 43°43'34", long 84°58'01", in SW1/4 SW1/4 sec.31, T.16 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Vernon Road, 2.5 mi north of Weidman.	--	1999	10-07-99	*d2.76

### DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO LAKE HURON--Continued							
04153778	Coldwater River	Chippewa River	Lat 43°42'42", long 84°58'01", in SW1/4 SW1/4 sec.6, T.15 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Denver Road, 1.5 mi north of Weidman.	--	1999	10-07-99	*d17.7
04153788	Coldwater River	Chippewa River	Lat 43°41'01", long 84°57'57", in SW1/4 SW1/4 sec.18, T.15 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Weidman Road, 0.3 mi south of Weidman.	--	1999	10-07-99	*d36.2
04153793	Coldwater River	Chippewa River	Lat 43°39'14", long 84°57'37", in SE1/4 SW1/4 sec.30, T.15 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Jordan Road, 2.3 mi south of Weidman.	--	1999	10-07-99	*d41.1
04153794	Coldwater River	Chippewa River	Lat 43°38'21", long 84°57'20", in SW1/4 SE1/4 sec.31, T.15 N., R.5 W., Isabella County, Hydrologic Unit 04080202, at Baseline Road, 3.3 mi south of Weidman.	--	1999	10-07-99	*d43.7
STREAMS TRIBUTARY TO DETROIT RIVER							
04166281	Seeley Drain	Upper River Rouge	Lat 42°31'36", long 83°27'00", in SE1/4 SW1/4 sec.36, T.2 N., R.8 E., Oakland County, Hydrologic Unit 04090004, at 14 Mile Road, 2.0 mi south-east of Walled Lake.	--	--	06-22-00 08-21-00 09-26-00	*d1.24 *d1.25 *d1.36
04166510	Ashcroft-Sherwood Drain	River Rouge	Lat 42°21'56", long 83°16'19", in SW1/4 NW1/4 sec.33, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, 100 ft downstream from West Chicago Street, in Detroit.	--	--	06-22-00 09-26-00	*d0.65 *d0.59
04166592	Walled Lake Branch	Middle River Rouge	Lat 42°29'42", long 83°29'43", in SW1/4 SW1/4 sec.10, T.1 N., R.8 E., Oakland County, Hydrologic Unit 04090004, at 12 Mile Road, at Novi.	--	--	06-22-00 08-21-00 09-26-00	*d9.06 *d4.85 *d7.47
04166636	Unnamed Tributary	Johnson Drain	Lat 42°24'23", long 83°34'21", in NE1/4 NE1/4 sec.14, T.1 S., R.7 E., Washtenaw County, Hydrologic Unit 04090004, at 6 Mile Road, in Salem.	--	--	06-22-00 08-21-00 09-26-00	*d0.34 *d0.10 *d0.67

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 2000--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft <sup>3</sup> /s)
STREAMS TRIBUTARY TO DETROIT RIVER--Continued							
04167658	McClaghrey Drain	Lower River Rouge	Lat 42°16'50", long 83°24'07", in SE1/4 SW1/4 sec.29, T.2 S., R.9 E., Wayne County, Hydro- logic Unit 04090004, at Michi- gan Avenue, in Wayne.	--	--	06-22-00	*d2.97
						08-21-00	*d6.90
						09-26-00	*d2.19
STREAMS TRIBUTARY TO LAKE ERIE							
04176623	Unnamed Tributary	Whitewood Creek	Lat 41°48'41", long 83°29'14", in SE1/4 SW1/4 sec.4, T.8 S., R.8 E., Monroe County, Hydrologic Unit 04100001, at U.S. Highway 25, about 2.5 mi west of Luna Pier.	--	--	08-01-00	*d0.02
						08-21-00	*d<0.01
						09-26-00	*d0.04

\* Base flow.

† Operated as a low-flow partial-record station.

‡ Operated as a continuous-record gaging station.

a Affected by regulation and/or diversion.

b Approximately.

c Operated as a crest-stage partial-record station.

d Discharge measurement made by employees of Michigan Department of Environmental Quality.

e Estimated.





Figure 9. Location of ground-water wells published in this report.

## GROUND-WATER LEVELS

## BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.

LOCATION.--Lat 41°56'02", long 84°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets in Coldwater. Owner: City of Coldwater.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 113 ft, screened 108 ft to 113 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 970 ft above sea level, from topographic map. Measuring point: Plywood shelter base, 2.5 ft above land-surface datum.

REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--January 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 8.77 ft below land-surface datum, June 4, 1989; lowest recorded, 25.9 ft below land-surface datum, May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.90	24.26	24.34	23.80	23.86	14.12	13.81	12.62	11.71	21.97	22.13	22.95
10	23.92	25.16	24.33	23.84	23.89	14.07	13.77	12.61	21.78	21.92	22.31	23.00
15	25.05	24.27	24.33	23.97	23.92	14.03	13.83	12.45	21.57	12.01	23.47	22.71
20	24.10	24.31	24.09	24.86	14.59	13.89	15.84	12.03	21.64	21.71	22.63	---
25	24.16	24.28	23.87	24.03	14.42	13.76	15.15	11.94	21.31	22.90	23.71	15.27
EOM	24.09	24.36	23.86	23.87	14.23	15.83	12.52	11.66	21.29	22.01	22.89	13.41

WTR YR 2000

HIGHEST

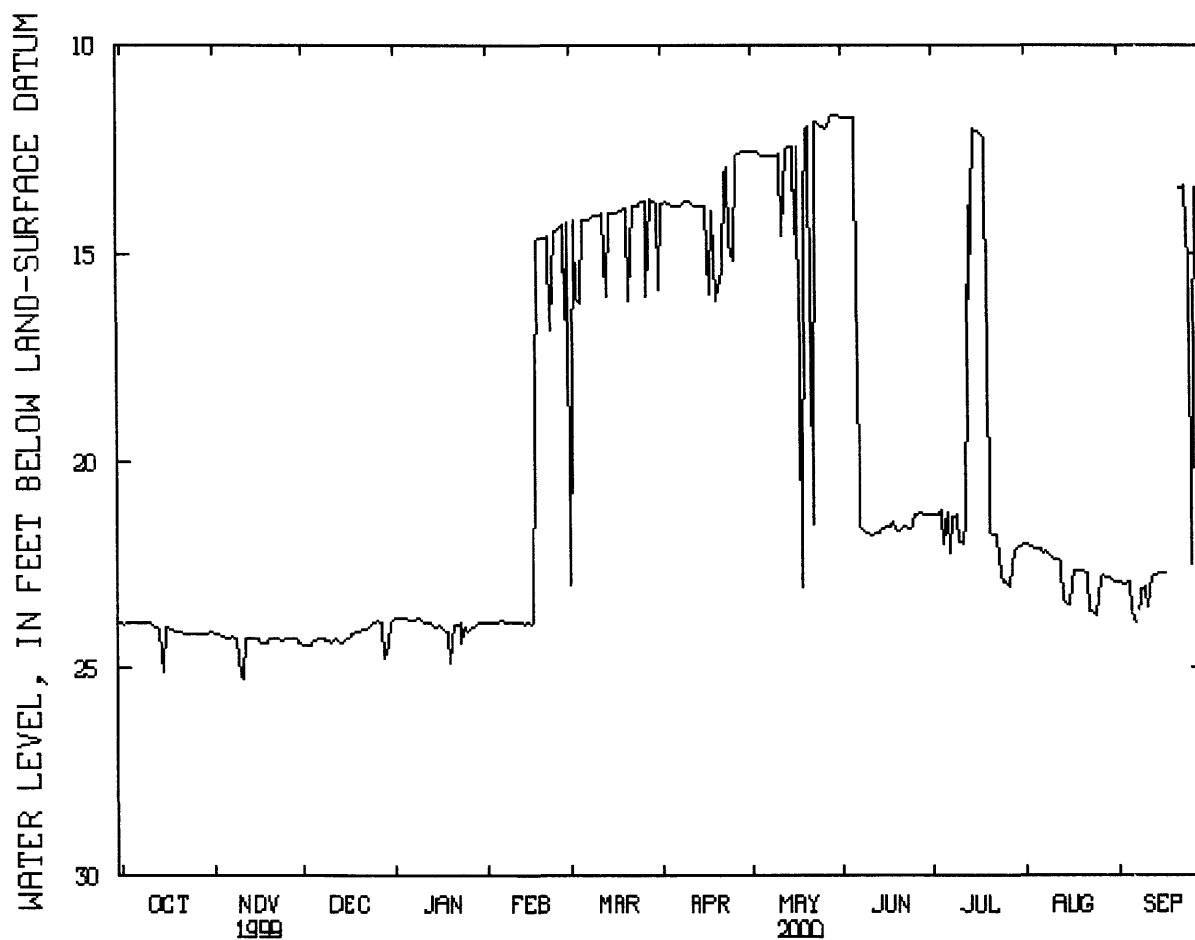
10.98

JUL 4

LOWEST

25.21

NOV 11



## GROUND-WATER LEVELS

## CALHOUN COUNTY

422032085091801. Local number, 1S 7W 32BDCC1.

LOCATION.--Lat 42°20'31", long 85°09'19", Hydrologic Unit 04050003, at Hopkins Street and State Highway 66 in Battle Creek. Owner: Pennfield Tcwnship.

AQUIFER.--Marshall Formation.

WELL CHARACTERISTICS.--Drilled well, diameter 6 in, depth 95 ft, cased to about 40 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 845 ft above sea level, from topographic map. Measuring point: Top of shelter base, 1.0 ft above land-surface datum.

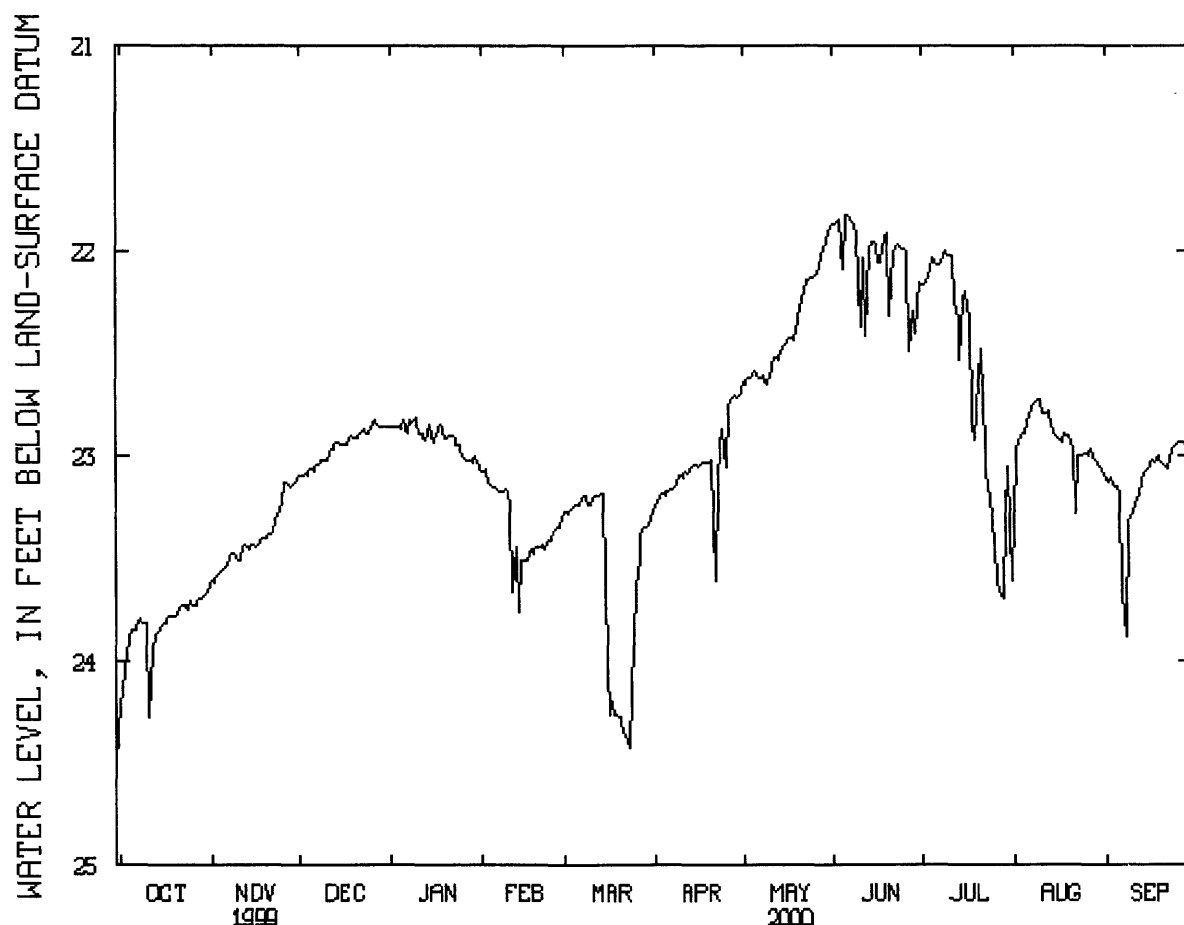
REMARKS--Water levels affected by nearby pumping.

PERIOD OF RECORD.--February 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 15.6 ft below land-surface datum, April 1974; lowest recorded, 27.0 ft below land-surface datum, August 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.84	23.55	23.06	22.87	23.15	23.23	23.17	22.59	21.82	22.03	22.89	23.15
10	23.81	23.50	23.02	22.81	23.17	23.23	23.11	22.62	22.37	22.02	22.73	23.28
15	23.82	23.43	22.94	22.84	23.50	24.01	23.04	22.45	21.97	22.25	22.90	23.07
20	23.77	23.40	22.91	22.91	23.44	24.27	23.01	22.33	22.31	22.64	22.90	23.03
25	23.70	23.23	22.88	22.94	23.41	23.63	23.05	22.13	21.99	23.30	22.98	22.94
EOM	23.66	23.13	22.86	23.02	23.31	23.28	22.69	21.89	22.15	23.60	23.06	22.90
WTR YR 2000	HIGHEST		21.74	JUN 4	LOWEST		24.42	MAR 23				



## GROUND-WATER LEVELS

## CALHOUN COUNTY

422033085082601. Local number, 1S 7W 33BCBC.

LOCATION.--Lat 42°20'33", long 85°08'26", Hydrologic Unit 04050003, at Verona Well Field in Battle Creek. Owner: City of Battle Creek.

AQUIFER.--Marshall Formation.

WELL CHARACTERISTICS --Drilled well, diameter 6 in, depth 120 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 835.7 ft above sea level. Measuring point: Top of casing, 3.1 ft above land-surface datum.

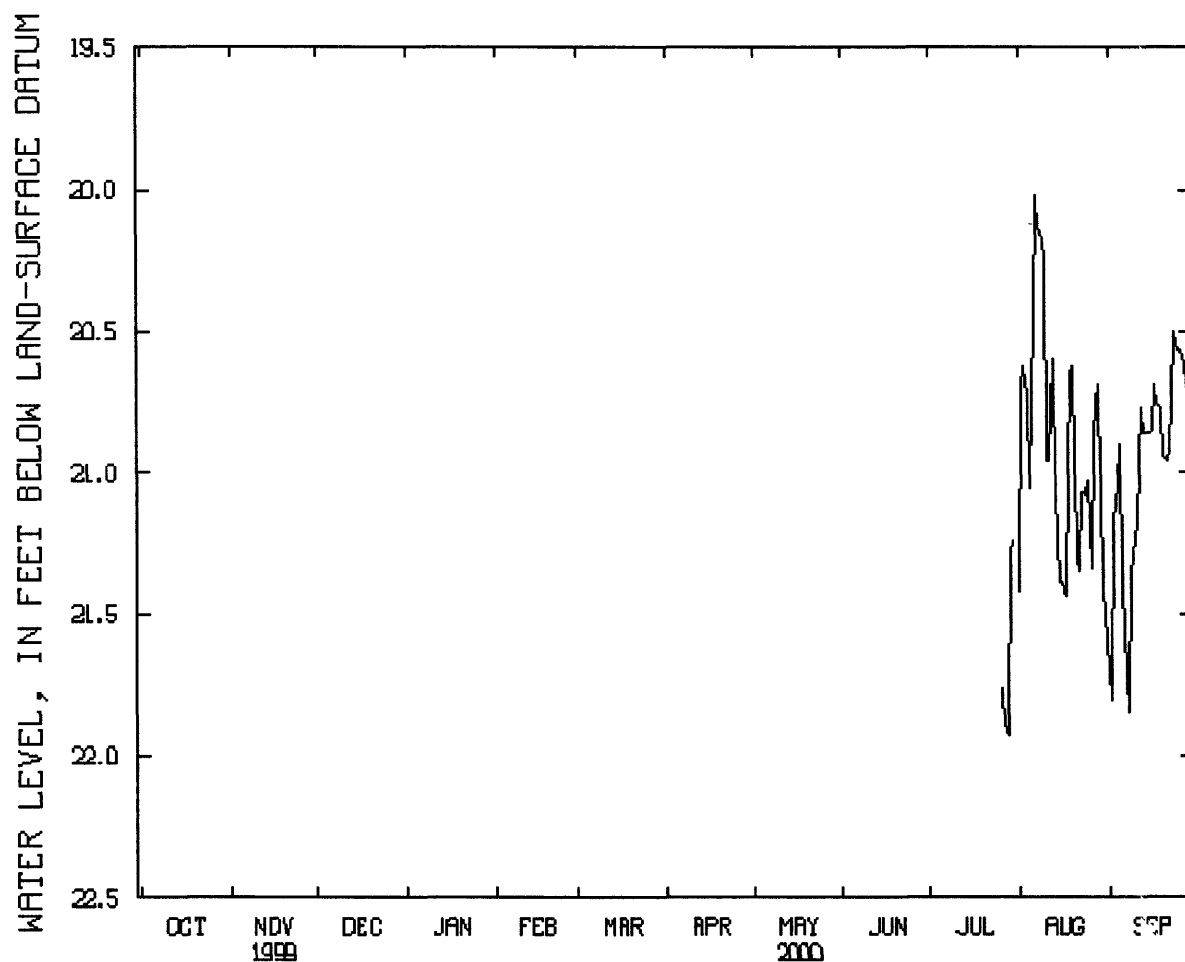
REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--July to September 2000.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 19.40 ft below land-surface datum, Aug. 7, 2000; lowest recorded, 21.92 ft below land-surface datum, July 28, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	---	---	---	---	---	---	---	---	---	21.05	20.90
10	---	---	---	---	---	---	---	---	---	---	20.24	21.24
15	---	---	---	---	---	---	---	---	---	---	21.39	20.86
20	---	---	---	---	---	---	---	---	---	---	20.62	20.94
25	---	---	---	---	---	---	---	---	---	---	21.03	20.57
EOM	---	---	---	---	---	---	---	---	---	---	21.50	20.55



## GROUND-WATER LEVELS

## CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBB1

LOCATION.--Lat 45°44'27", long 84°42'40", Hydrologic Unit 04070003, at Stimpson Road, 3 mi southeast of Mackinaw City. Owner: U.S. Geological Survey.

AQUIFER.--Dundee Formation of Devonian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 121 ft, cased to 104 ft, open bottom.

INSTRUMENTATION.--Monthly measurement.

DATUM.--Elevation of land-surface datum is 705 ft above sea level, from topographic map. Measuring point: Top of casing, 1.9 ft above land-surface datum.

PERIOD OF RECORD.--January 1979 to May 1992, December 1997 to current year. Records for the 1992 water year are unpublished and available in files of the U.S. Geological Survey.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.66 ft below land-surface datum, Apr. 21, 2000; lowest measured, 11.68 ft below land-surface datum, Feb. 11, 1981.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	7.85	DEC 16	7.71	JAN 20	7.28	MAR 2	5.75	APR 21	4.66	MAY 22	5.97
JUN 12	6.04	AUG 2	7.98	SEP 21	9.04						

454427084424002. Local number, 39N 3W 29CBB2.

LOCATION.--Lat 45°44'27", long 84°42'40", Hydrologic Unit 04070003, at Stimpson Road, 3 mi southeast of Mackinaw City. Owner: U.S. Geological Survey.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in, depth 55 ft, screened 40 to 55 ft.

INSTRUMENTATION.--Monthly measurement.

DATUM.--Elevation of land-surface datum is 705 ft above sea level, from topographic map. Measuring point: Top of casing, 2.5 ft above land-surface datum.

PERIOD OF RECORD.--February 1979 to May 1992, December 1997 to current year. Records for the 1992 water year are unpublished and available in files of the U.S. Geological Survey.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.80 ft below land-surface datum, Apr. 8, 1986; lowest measured, 6.47 ft below land-surface datum, Feb. 11, 1981.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	5.16	DEC 16	5.15	JAN 20	4.89	MAR 2	3.58	APR 21	3.11	MAY 22	3.70
JUN 12	3.58	AUG 2	5.36	SEP 21	6.20						

## GROUND-WATER LEVELS

## EATON COUNTY

424058084380301. Local number, 3N 3W 2BA.

LOCATION.--Lat 42°40'58", long 84°38'03", Hydrologic Unit 04050004, on Stiefel Farm grounds, 1.6 mi north of Dimondale. Owner: City of Lansing.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 1.25 in, depth 66 ft, screened 63 ft to 66 ft.

INSTRUMENTATION.--Periodic measurements.

DATUM.--Elevation of land-surface datum is 839 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--April 1964 to September 1998 (water-level recorder), October 1998 to current year (periodic measurements).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 2.98 ft below land-surface datum, June 11, 1986; lowest recorded, 18.0 ft below land-surface datum, November 1968.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	13.30	JAN 28	12.28	MAR 7	12.00	MAR 31	11.59	JUN 13	10.55	AUG 16	8.23
DEC 2	11.49	FEB 24	12.73	MAR 23	11.67	MAY 30	10.36	JUL 7	9.91	SEP 5	7.94

## GROUND-WATER LEVELS

## EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.

LOCATION.--Lat 42°44'35", long 84°36'50", Hydrologic Unit 04050004, at Robins Road in Delta Township, 0.5 mi west of Lansing. Owner: F. Wheeler.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 381 ft, cased to 140 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 861.91 ft above sea level. Measuring point: Plywood instrument shelf, 1.0 ft above land-surface datum.

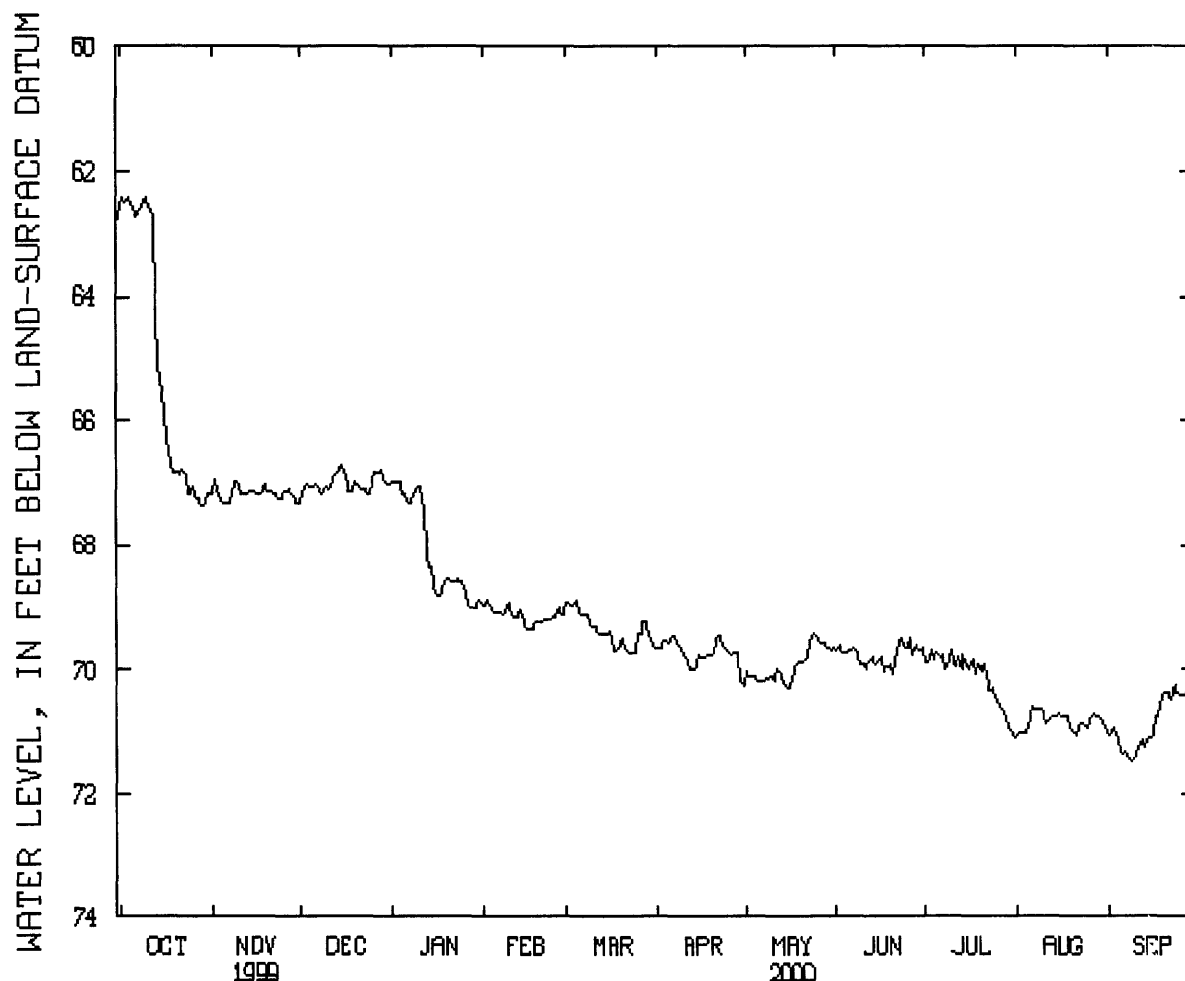
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--October 1953 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 55.19 ft below land-surface datum, June 24, 25, 26, 1996; lowest recorded, 103.6 ft below land-surface datum, Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	62.48	67.33	67.05	67.17	69.07	69.01	69.58	70.20	69.67	69.72	70.95	71.33
10	62.44	67.02	67.08	67.04	68.93	69.29	69.80	70.08	69.93	69.67	70.68	71.42
15	65.49	67.12	66.72	68.35	69.10	69.38	69.76	70.31	69.84	69.90	70.72	71.08
20	66.83	67.14	66.98	68.53	69.24	69.48	69.72	69.88	70.07	70.03	70.99	70.37
25	67.16	67.26	67.17	68.58	69.15	69.44	69.72	69.45	69.64	70.42	70.94	70.40
EOM	67.19	67.31	67.01	68.90	69.10	69.66	70.26	69.64	69.66	71.08	70.91	70.32
WTR YR 2000	HIGHEST		62.16	OCT 4		LOWEST		71.47	SEP 9			



## GROUND-WATER LEVELS

## HURON COUNTY

434103083130301. Local number, 15N 11E 32BBCB.

LOCATION.--Lat 43°41'03", long 83°13'03", Hydrologic Unit 04080103, 2 mi northeast of Gagetown at Gagetown State Game Area. Owner: Huron County.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 91 ft, screened 87 ft to 91 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 746 ft above sea level, from topographic map. Measuring point: Top of casing, 1.6 ft above land-surface datum.

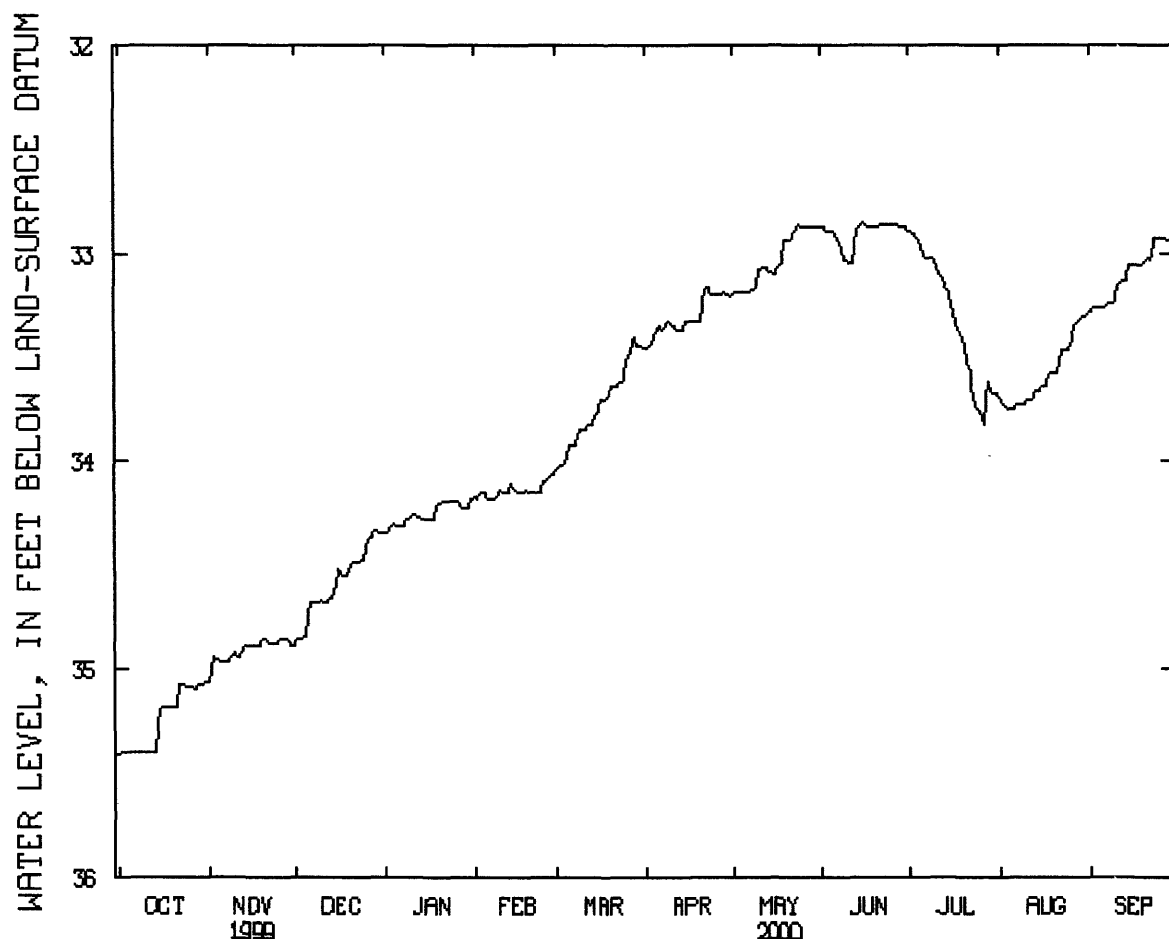
PERIOD OF RECORD.--February 1991 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 30.38 ft below land-surface datum, May 6, 1991; lowest recorded, 35.42 ft below land-surface datum, Sept. 27-29, 1999.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lowest water level measured, 35.60 ft below land-surface datum, June 2, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.40	34.96	34.84	34.31	34.15	33.92	33.38	33.18	32.88	32.94	33.74	33.26
10	35.40	34.92	34.67	34.27	34.14	33.84	33.35	33.07	33.04	33.03	33.73	33.22
15	35.19	34.89	34.60	34.28	34.12	33.76	33.32	33.09	32.84	33.18	33.66	33.05
20	35.18	34.86	34.53	34.21	34.15	33.64	33.32	32.93	32.87	33.43	33.57	33.04
25	35.08	34.87	34.48	34.19	34.10	33.50	33.19	32.87	32.86	33.75	33.46	32.92
EOM	35.06	34.88	34.34	34.18	34.06	33.45	33.20	32.87	32.87	33.67	33.30	32.93
WTR YR 2000	HIGHEST		32.84	JUN 14-16		LOWEST		35.41	OCT 1			





## GROUND-WATER LEVELS

## HURON COUNTY

434323082561901. Local number, 15N 13E 22BBCC.

LOCATION.--Lat. 43°43'23", long 82°56'19", Hydrologic Unit 04080205, on State Highway 19, 1 mi north of Uby. Owner: Huron County.

AQUIFER.--Napoleon Sandstone Member of Marshall Formation.

WELL CHARACTERISTICS.--Rotary drilled observation well, diameter 4 in, depth 70 ft, cased to top of Napoleon Sandstone.

INSTRUMENTATION.--Water-level recorder.

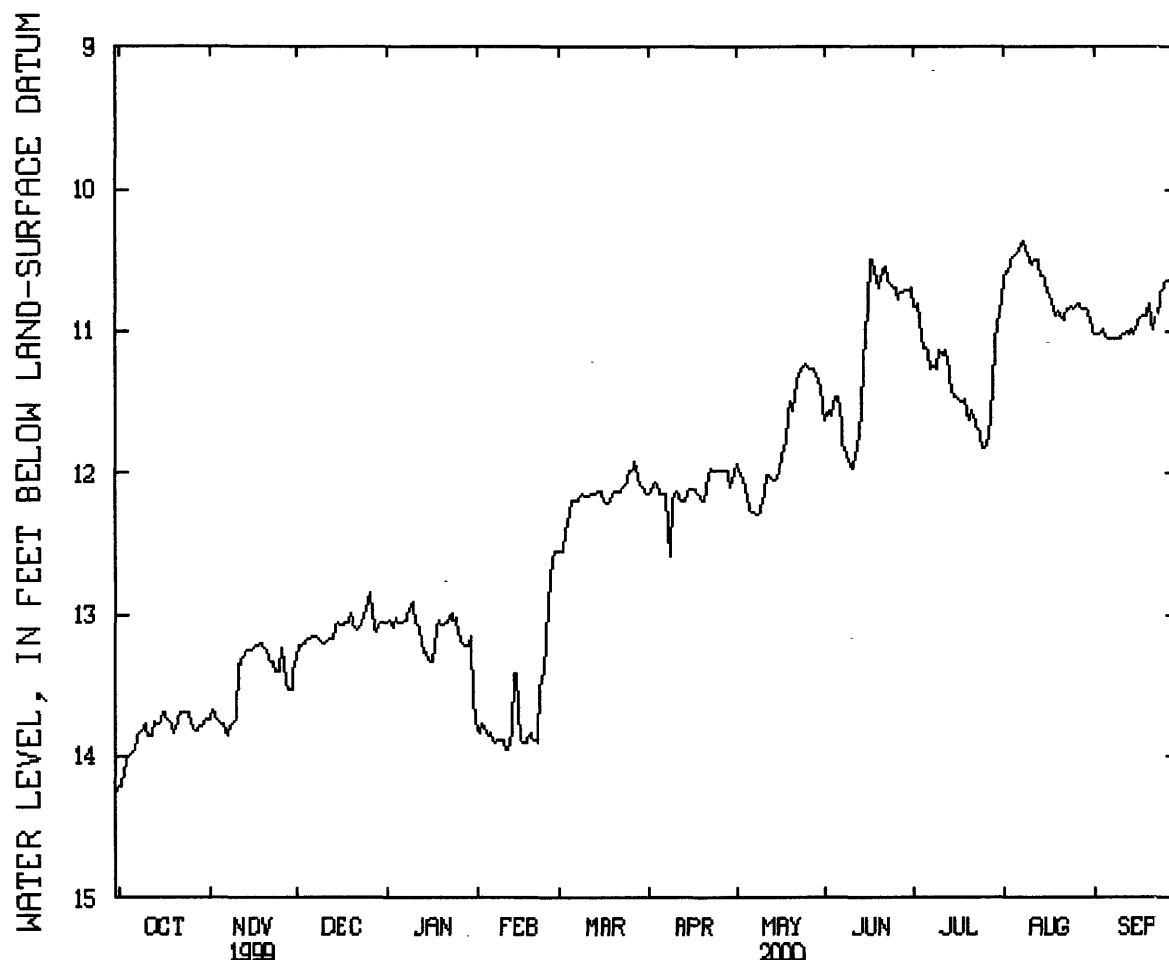
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: Top of casing, 2.81 ft above land-surface datum.

PERIOD OF RECORD.--December 1988 to September 1989, December 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 8.92 ft below land-surface datum, June 23, 1996; lowest recorded, 16.38 ft below land-surface datum, July 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	13.99	13.78	13.16	13.06	13.84	12.20	12.15	12.17	11.46	11.11	10.46	11.01
10	13.78	13.73	13.21	12.90	13.88	12.16	12.13	12.19	11.96	11.14	10.48	11.05
15	13.75	13.24	13.05	13.27	13.41	12.13	12.11	12.03	10.84	11.45	10.62	11.02
20	13.83	13.23	12.99	13.07	13.83	12.12	12.18	11.49	10.63	11.62	10.85	10.81
25	13.68	13.39	12.97	13.02	13.20	11.97	11.97	11.23	10.69	11.81	10.83	10.68
EOM	13.74	13.39	13.06	13.61	12.55	12.15	12.01	11.51	10.70	10.79	10.92	10.64
WTR YR 2000	HIGHEST		10.34	AUG 8		LOWEST		14.21	OCT 1, 2			



## GROUND-WATER LEVELS

## HURON COUNTY

434947083233301. Local number, 16N 9E 2CDA.

LOCATION.--Lat 43°49'47", long 83°23'33", Hydrologic Unit 04080103, 6 mi west of Pigeon at Wildfowl Bay State Wildlife Area. Owner: Huron County.

AQUIFER.--Saginaw, Marshall Formation (Pennsylvanian, Mississippian age).

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 180 ft, cased to 147 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 582 ft above sea level, from topographic map. Measuring point: Top of casing, 2.2 ft above land-surface datum.

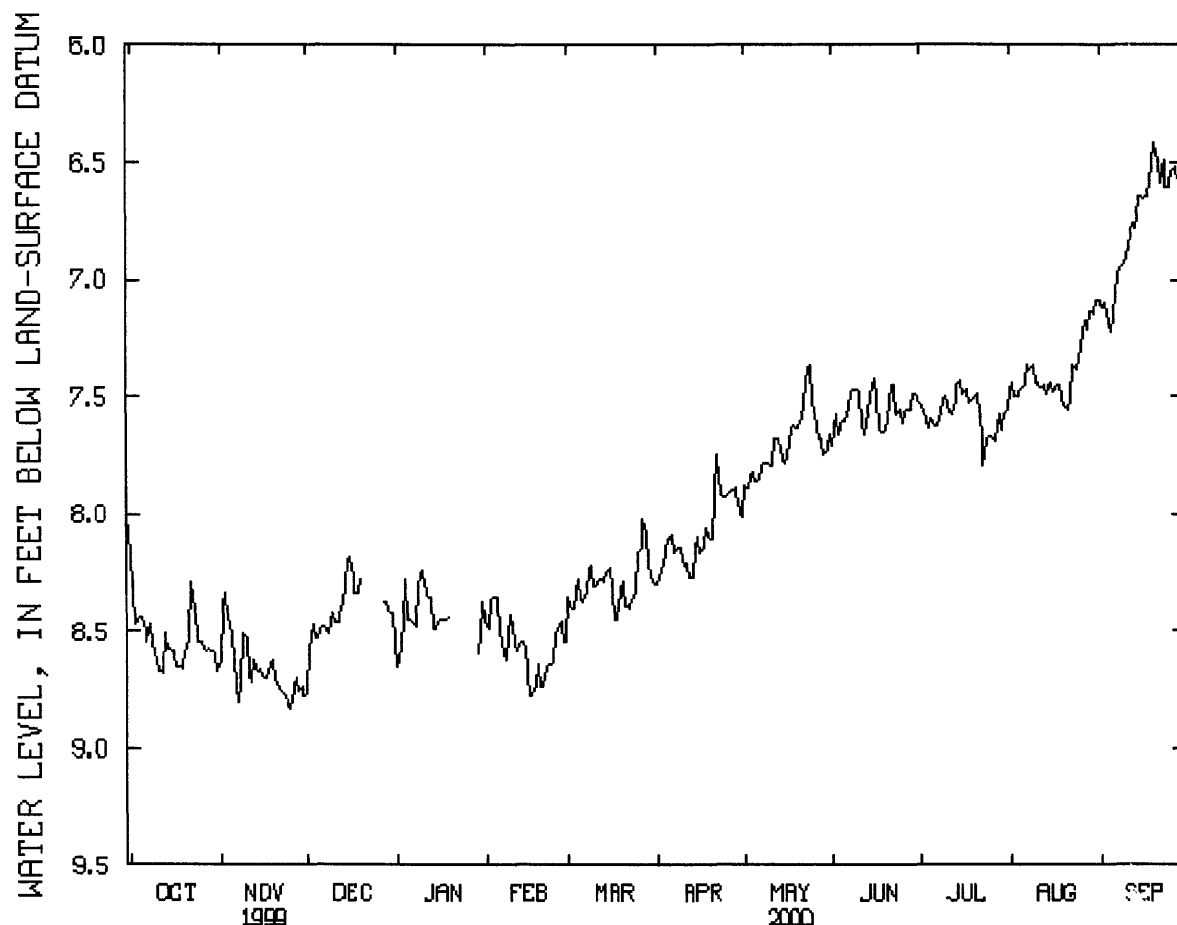
PERIOD OF RECORD.--February 1991 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 3.12 ft below land-surface datum, Apr. 20, 1993; lowest recorded, 9.21 ft below land-surface datum, Aug. 4, 1998.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lowest water level measured, 12.30 ft below land-surface datum, June 2, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.44	8.50	8.53	8.45	8.36	8.36	8.13	7.86	7.60	7.59	7.47	7.22
10	8.61	8.53	8.42	8.24	8.46	8.31	8.22	7.79	7.48	7.50	7.44	6.91
15	8.58	8.66	8.21	8.49	8.56	8.23	8.10	7.78	7.42	7.43	7.44	6.64
20	8.59	8.69	8.28	---	8.73	8.29	8.11	7.63	7.60	7.50	7.54	6.41
25	8.54	8.83	---	---	8.53	8.16	7.92	7.51	7.61	7.67	7.35	6.61
EOM	8.67	8.77	8.42	8.37	8.55	8.30	8.01	7.66	7.50	7.56	7.09	6.51
WTR YR 2000	HIGHEST		6.31	SEP 20, 21		LOWEST		8.83	NOV 25			



## GROUND-WATER LEVELS

## HURON COUNTY

435736083094801. Local number, 18N 11E 27AADD.

LOCATION.--Lat 43°57'36", long 83°09'48", Hydrologic Unit 04080103, 6 mi northeast of Caseville at Rush Lake State Game Area. Owner: Huron County.

AQUIFER.--Marshall Sandstone.

WELL CHARACTERISTICS.--Rotary drilled observation well, diameter 4 in, depth 200 ft, cased to 178 ft.

INSTRUMENTATION.--Water-level recorder.

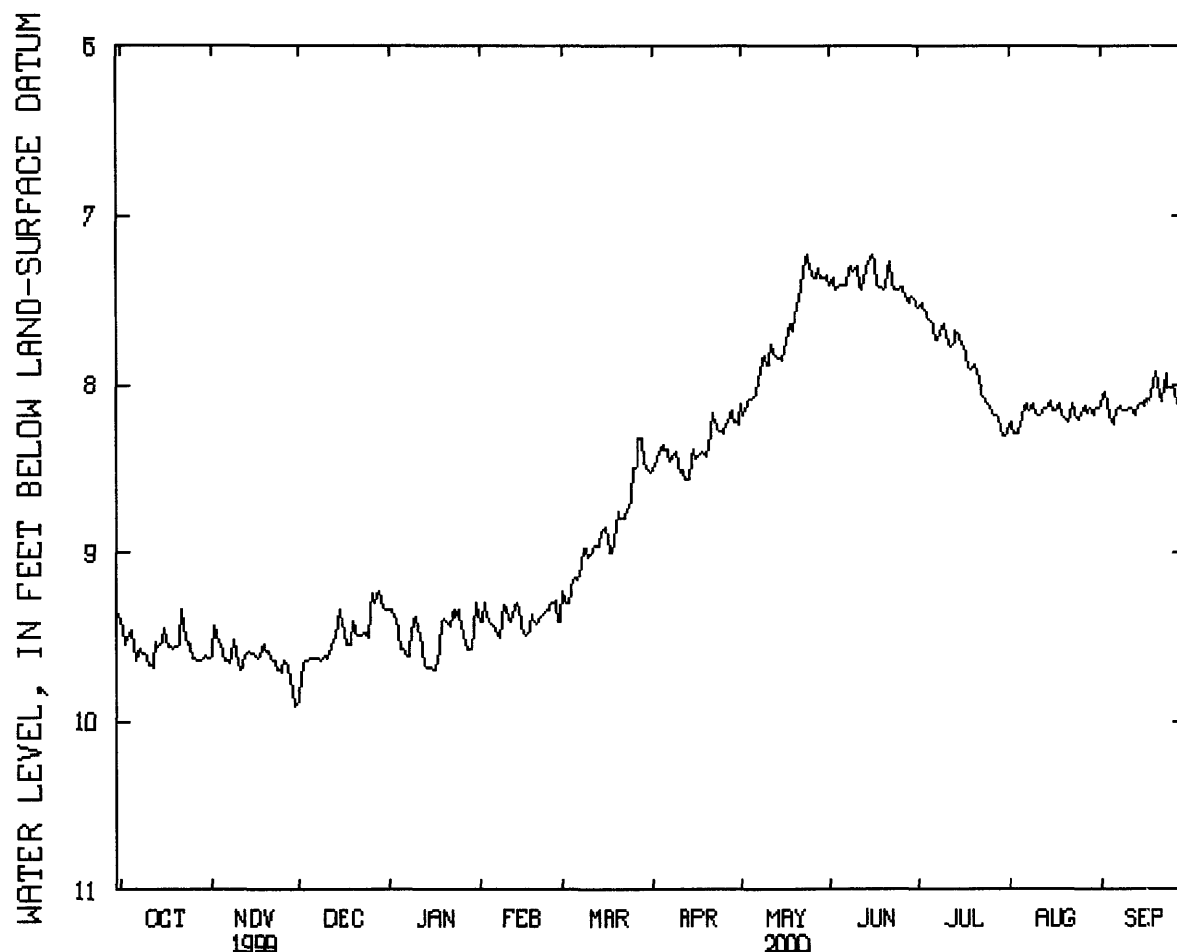
DATUM.--Elevation of land-surface datum is 600 ft above sea level, from topographic map. Measuring Point: Top of casing, 4.03 ft above land-surface datum.

PERIOD OF RECORD.--October 1988 to August 1989, December 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 4.71 ft below land-surface datum, Mar. 21, 1997; lowest recorded, 9.91 ft below land-surface datum, Nov. 30, 1999.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.46	9.57	9.62	9.57	9.42	9.15	8.39	8.09	7.40	7.61	8.26	8.23
10	9.60	9.63	9.60	9.38	9.32	9.02	8.52	7.88	7.31	7.64	8.16	8.15
15	9.52	9.59	9.34	9.67	9.32	8.85	8.39	7.86	7.23	7.70	8.10	8.12
20	9.55	9.58	9.41	9.39	9.41	8.75	8.39	7.60	7.42	7.89	8.20	7.93
25	9.54	9.70	9.50	9.33	9.33	8.49	8.28	7.31	7.42	8.11	8.21	8.02
EOM	9.62	9.91	9.33	9.29	9.40	8.52	8.24	7.35	7.51	8.28	8.14	8.04
WTR YR 2000	HIGHEST		7.16	JUN 15		LOWEST		9.91	NOV 30			



## GROUND-WATER LEVELS

## INGHAM COUNTY

423127084321901. Local number, 4N 2W 16DAAA.

LOCATION.--Lat 42°43'57", long 84°32'51", Hydrologic Unit 04050004, between Cedar Street and Museum Drive, Lansing Township in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in, depth 417 ft, cased.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 829.10 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

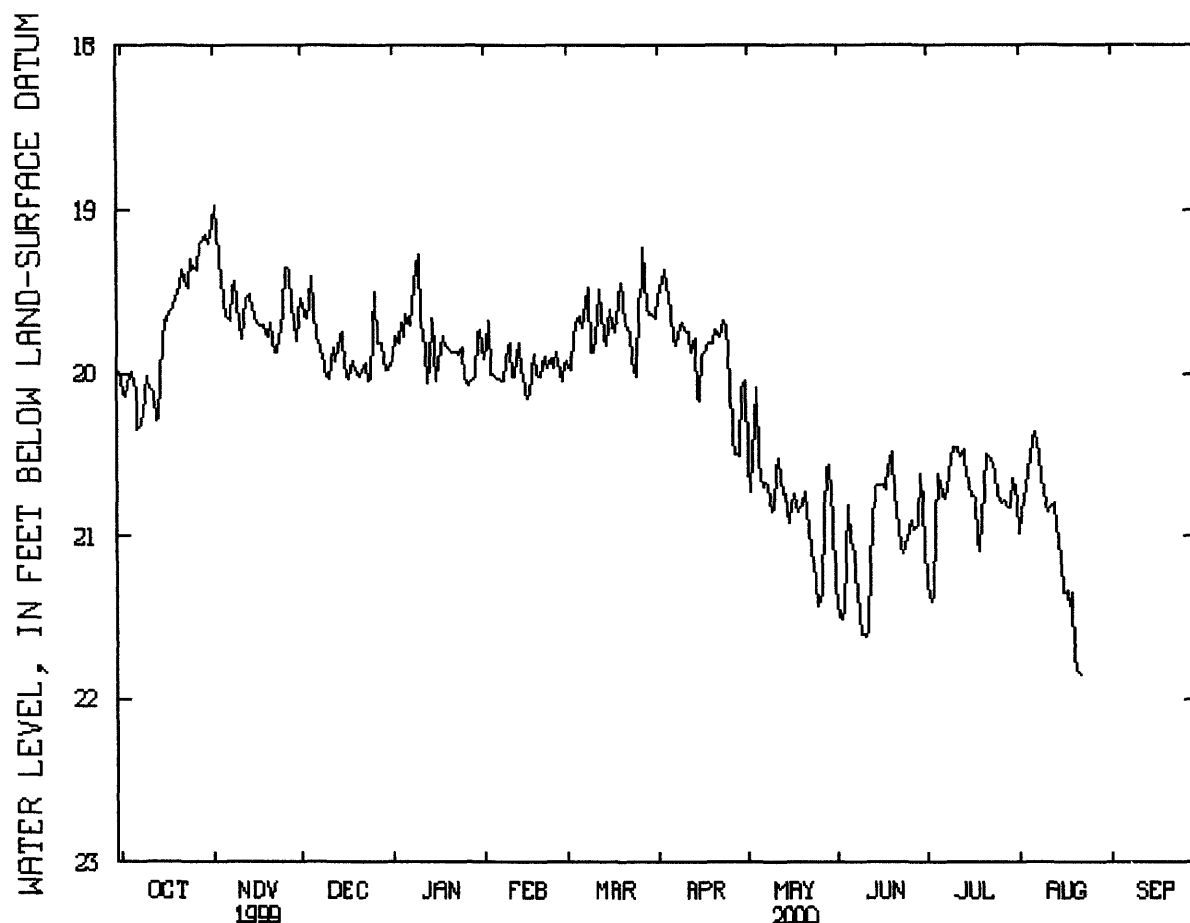
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--September 1945 to current year

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 17.59 ft below land-surface datum, May 13, 1999; lowest recorded, 67.0 ft below land-surface datum, August 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	19.99	19.53	19.40	19.77	20.01	19.65	19.51	20.54	21.02	20.61	20.51	---
10	20.01	19.67	20.02	19.27	19.81	19.87	19.75	20.84	21.62	20.45	20.78	---
15	19.82	19.59	19.74	19.66	20.01	19.62	20.17	20.91	20.68	20.65	21.14	---
20	19.54	19.77	19.97	19.84	20.02	19.53	19.73	20.81	20.74	20.72	21.74	---
25	19.31	19.64	20.03	19.85	19.96	19.57	20.05	21.43	20.97	20.74	---	---
EOM	19.21	19.80	19.98	19.73	19.95	19.66	20.05	21.27	21.03	20.77	---	---
WTR YR 2000	HIGHEST		18.89	NOV 1		LOWEST		21.85	AUG 22, 23			



## GROUND-WATER LEVELS

## INGHAM COUNTY

423805084311801. Local number, 3N 2W 23BCBD.

LOCATION.--Lat 42°38'05", long 84°31'18", Hydrologic Unit 04050004, at Holt High School, at Sycamore Street, Delhi Township in Holt. Owner: Holt High School.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in, depth 188 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 895 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

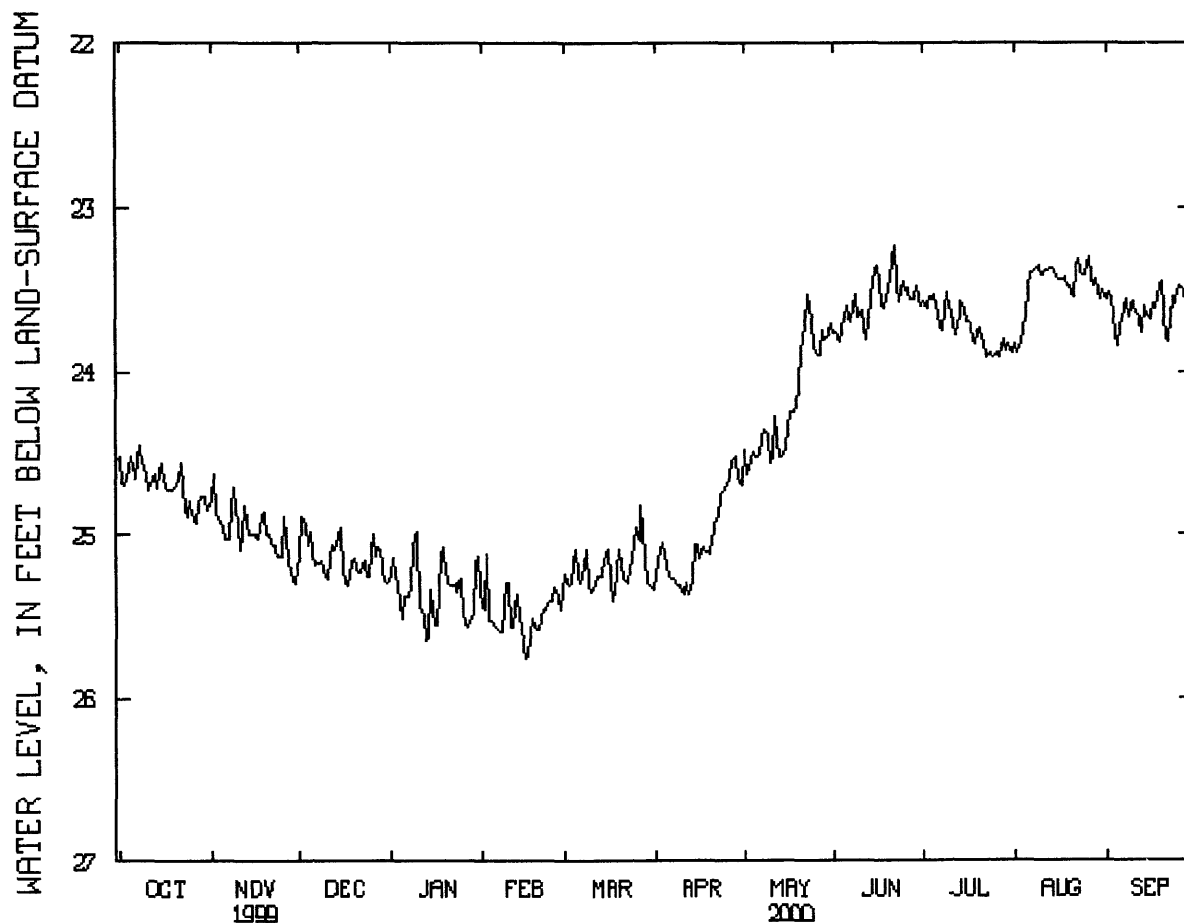
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--March 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 18.3 ft below land-surface datum, May 1983; lowest recorded, 26.34 ft below land-surface datum, June 5, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.53	24.94	24.98	25.51	25.54	25.22	25.20	24.53	23.60	23.53	23.64	23.85
10	24.62	24.92	25.24	24.98	25.29	25.35	25.37	24.56	23.63	23.59	23.41	23.58
15	24.57	24.99	24.96	25.34	25.56	25.10	25.06	24.48	23.35	23.61	23.41	23.65
20	24.71	25.00	25.15	25.22	25.58	25.16	25.04	24.09	23.44	23.73	23.48	23.45
25	24.80	25.13	25.25	25.27	25.41	24.96	24.70	23.84	23.50	23.92	23.41	23.53
EOM	24.85	25.29	25.29	25.13	25.37	25.34	24.70	23.71	23.60	23.88	23.51	23.34
WTR YR 2000	HIGHEST			23.12	JUN 21			LOWEST	25.76	FEB 16		



## GROUND-WATER LEVELS

## INGHAM COUNTY

424235084311201. Local number, 4N 2W 27BB.

LOCATION.--Lat 42°42'35", long 84°31'12", Hydrologic Unit 04050004, at Fenner Arboretum in Lansing. Owner: U.S. Geological Survey.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in, depth 215 ft, cased to 51 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 835 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.7 ft above land-surface datum.

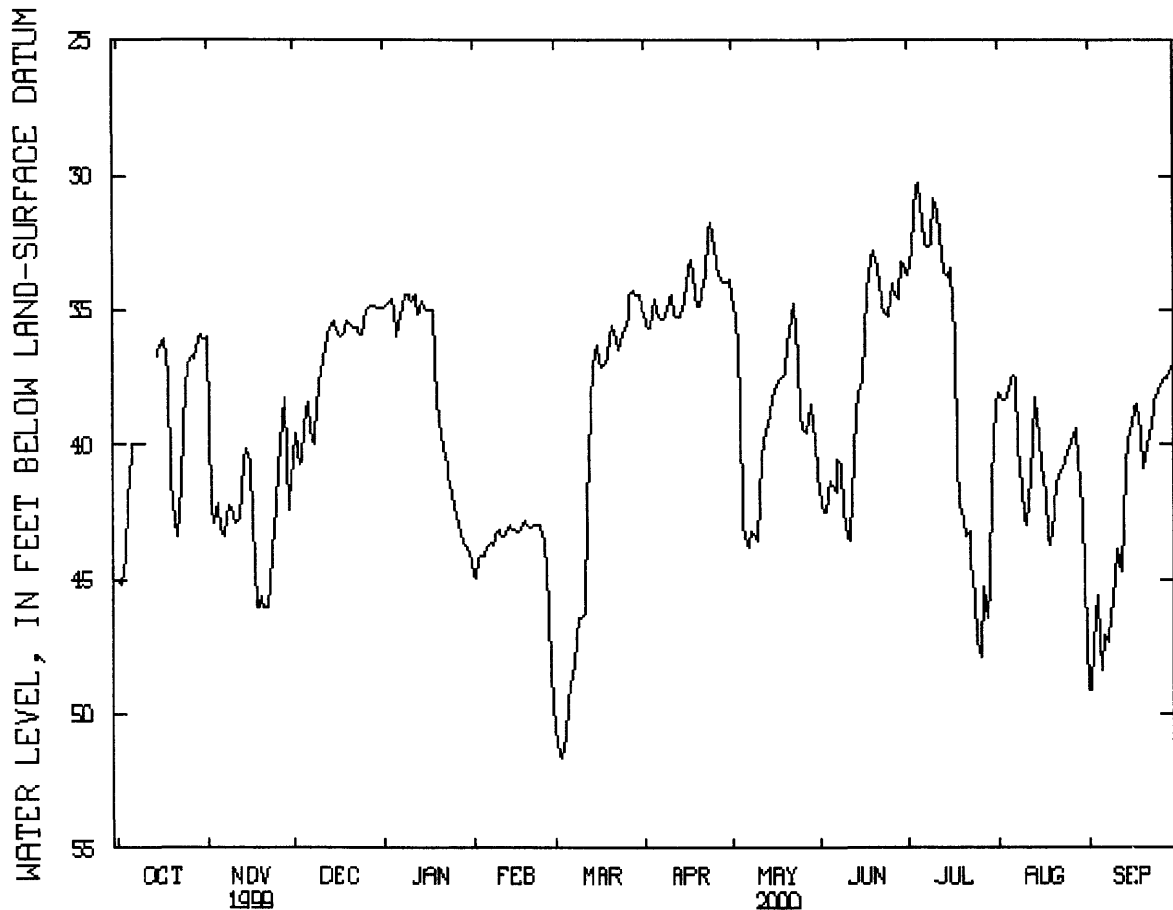
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--July 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 20.24 ft below land-surface datum, Dec. 29, 1993; lowest recorded, 89.5 ft below land-surface datum, October 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	42.07	42.12	39.29	34.79	44.13	49.70	34.60	43.05	41.47	30.26	37.95	47.11
10	39.90	42.50	37.82	34.41	43.16	46.42	34.43	43.58	43.30	30.87	42.64	44.98
15	36.74	40.14	35.37	34.72	43.11	36.31	34.76	38.36	37.68	33.74	39.61	39.85
20	41.31	45.54	35.37	38.44	42.97	36.07	34.89	37.37	33.03	42.64	43.27	40.87
25	38.07	42.43	35.86	41.66	43.22	35.73	32.57	38.93	34.63	47.28	40.20	38.14
EOM	36.05	42.07	34.92	43.93	49.38	34.78	33.82	40.92	33.40	38.57	44.94	37.00
WTR YR 2000	HIGHEST		29.60	JUL 5	LOWEST		51.60	MAR 3				



## GROUND-WATER LEVELS

## INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.

LOCATION.--Lat 42°44'24", long 84°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in, depth 424 ft.

INSTRUMENTATION.--Water-level recorder. Monthly measurements prior to August 1960.

DATUM.--Elevation of land-surface datum is 858.72 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

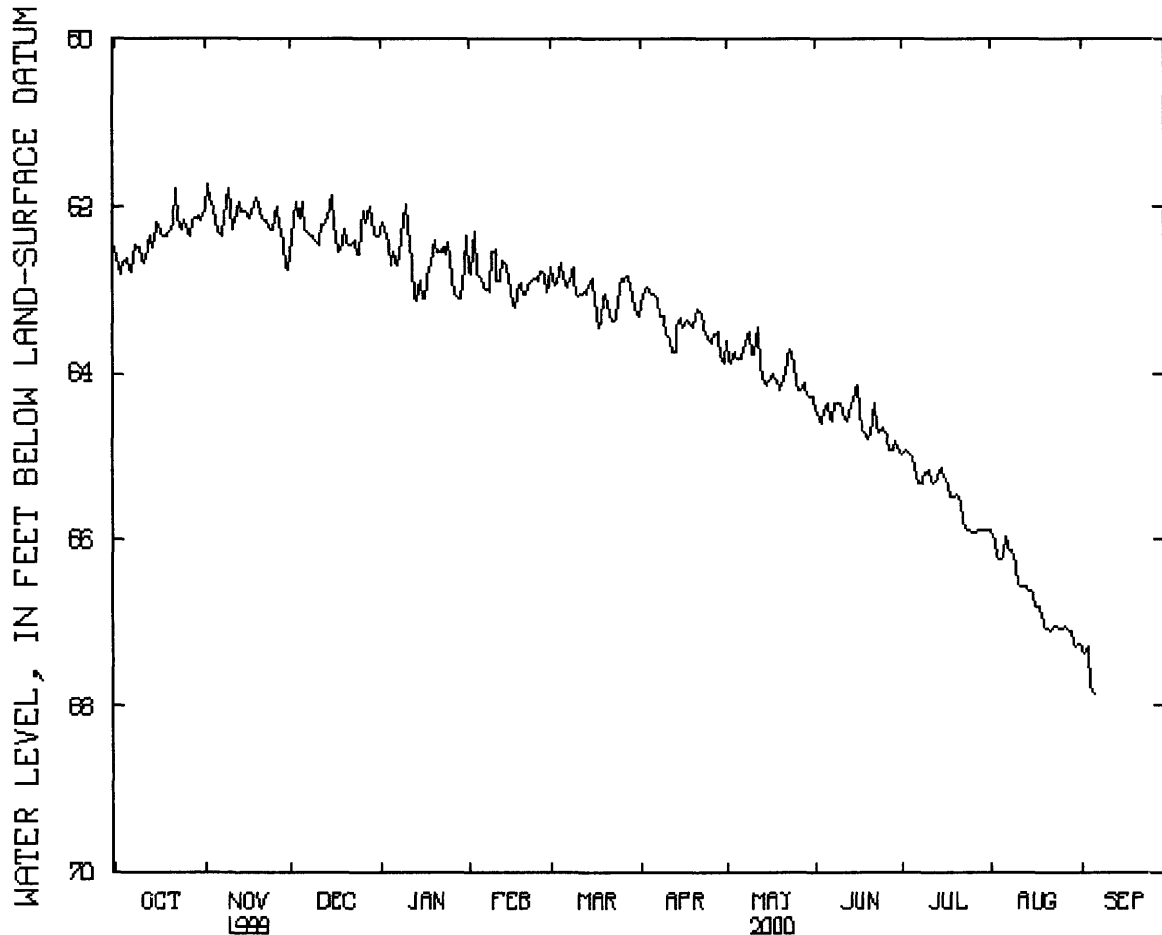
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--December 1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.3 ft below land-surface datum, December 1929; lowest recorded, 168.3 ft below land-surface datum, May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	62.62	62.10	61.96	62.68	62.85	62.83	63.05	63.84	64.37	65.01	66.22	67.86
10	62.50	61.97	62.40	61.97	62.52	63.07	63.54	63.77	64.38	65.16	66.38	---
15	62.29	62.05	61.88	62.89	62.84	62.86	63.35	64.14	64.17	65.14	66.64	---
20	62.31	62.04	62.29	62.39	63.04	63.03	63.36	64.20	64.74	65.46	67.07	---
25	62.17	62.28	62.58	62.44	62.89	62.86	63.61	64.07	64.73	65.92	67.09	---
EOM	62.16	62.76	62.36	62.34	62.98	63.31	63.88	64.30	64.91	65.90	67.27	---
WTR YR 2000	HIGHEST		61.40	OCT 22		LOWEST		67.87	SEP 6			



## GROUND-WATER LEVELS

## INGHAM COUNTY

424502084331301. Local number, 4N 2W 9BDAD.

LOCATION.--Lat 42°45'02", 84°33'13", Hydrologic Unit 04050004, at North Grand River Avenue, Lansing Township in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in, depth 401 ft, cased to 49 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 828.81 ft above sea level. Measuring point: Plywood instrument shelf, 4.0 ft above land-surface datum.

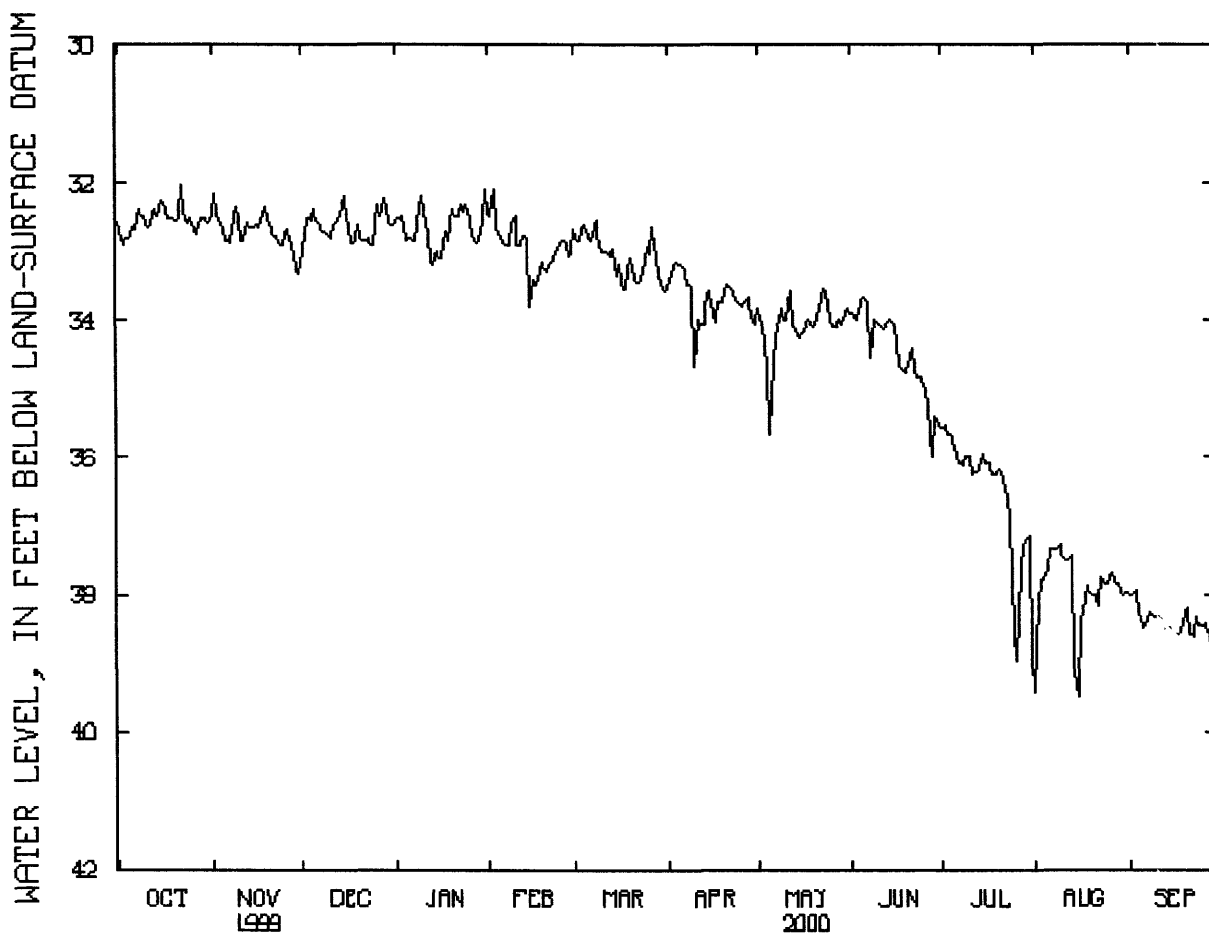
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 15.6 ft below land-surface datum, March 1931; lowest recorded, 179.4 ft below land-surface datum, April 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	32.76	32.64	32.37	32.83	32.71	32.68	33.18	35.67	33.68	35.73	37.65	38.44
10	32.48	32.49	32.72	32.18	32.48	32.98	34.65	33.98	34.02	35.96	37.41	38.32
15	32.28	32.63	32.19	32.98	33.78	33.35	33.55	34.26	34.03	35.94	39.48	38.57
20	32.52	32.56	32.60	32.36	33.24	33.09	33.63	34.06	34.68	36.17	38.02	38.20
25	32.51	32.91	32.91	32.30	32.91	32.93	33.76	33.94	34.94	38.53	37.84	38.45
EOM	32.58	33.30	32.59	32.09	33.02	33.58	34.03	33.84	35.48	38.93	37.97	38.47
WTR YR 2000	HIGHEST			31.67	JAN 10			LOWEST	39.48	AUG 15		





## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

420838085344501. Local number, 4S 11W 3CDDA.

LOCATION.--Lat 42°08'38", long 85°34'45", Hydrologic Unit 04050003, in Prairie View Park, 300 ft north of U Avenue, and 3.0 mi south of Portage.

Owner: Kalamazoo County.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 190 ft, screened 180 ft to 190 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 870 ft above sea level, from topographic map. Measuring point: Top of shelter base, 2.5 ft above land-surface datum.

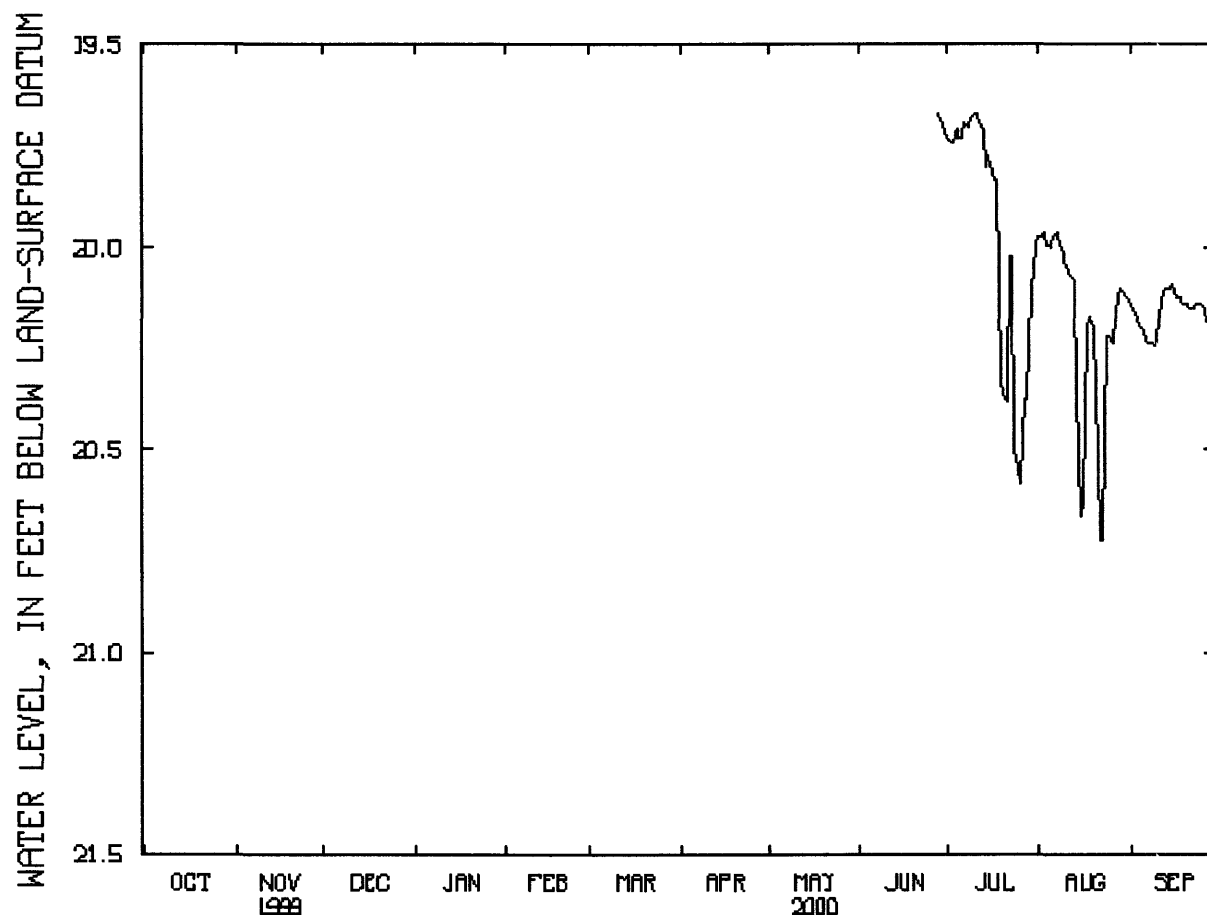
PERIOD OF RECORD.--October 1969 to September 1992, June to September 2000.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 18.03 ft below land-surface datum, Apr. 17, 1985; lowest recorded, 20.72 ft below land-surface datum, Aug. 22, 23, 2000.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lowest water level measured, 20.85 ft below land-surface datum, Nov. 17, 1999.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	--	--	--	--	--	--	--	--	19.73	20.00	20.20
10	--	--	--	--	--	--	--	--	--	19.67	20.03	20.24
15	--	--	--	--	--	--	--	--	--	19.77	20.66	20.09
20	--	--	--	--	--	--	--	--	--	20.36	20.19	20.14
25	--	--	--	--	--	--	--	--	--	20.54	20.22	20.14
EOM	--	--	--	--	--	--	--	--	19.71	20.00	20.12	20.20



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421127085321701. Local number, 3S 11W 24DBCA.

LOCATION.--Lat 42°11'27", long 85°32'17", Hydrologic Unit 04050003, in Ramona Park in Portage. Owner: City of Portage.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 183 ft, screened 178 ft to 183 ft.

INSTRUMENTATION.--Periodic measurements.

DATUM.--Elevation of land-surface datum is 861.77 ft above sea level (levels by City of Portage). Measuring point: Top of casing, 0.3 ft below land-surface datum.

REMARKS.--Water level measurements provided by City of Portage.

PERIOD OF RECORD.--March 1999 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 12.35 ft below land-surface datum, May 14, 1999; lowest measured, 15.87 ft below land-surface datum, May 8, 2000.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	14.40	APR 3	14.03	MAY 9	15.83	JUN 14	14.69	JUL 20	14.85	AUG 25	15.20
OCT 15	14.11	APR 4	14.05	MAY 10	15.65	JUN 15	14.66	JUL 21	14.65	AUG 26	15.19
OCT 23	13.98	APR 5	14.11	MAY 11	15.49	JUN 16	14.65	JUL 22	14.60	AUG 27	15.02
OCT 27	13.95	APR 6	14.15	MAY 12	15.44	JUN 17	14.72	JUL 23	14.80	AUG 28	15.05
NOV 5	13.98	APR 7	14.15	MAY 13	15.42	JUN 18	14.82	JUL 24	14.96	AUG 29	15.20
NOV 12	14.02	APR 8	14.50	MAY 14	15.38	JUN 19	14.78	JUL 25	14.79	AUG 30	15.30
NOV 17	14.15	APR 9	14.50	MAY 15	15.54	JUN 20	14.86	JUL 26	14.86	AUG 31	15.25
NOV 23	14.27	APR 10	14.19	MAY 16	15.66	JUN 21	14.57	JUL 27	14.96	SEP 1	15.30
DEC 9	14.50	APR 11	14.19	MAY 17	15.66	JUN 22	14.76	JUL 28	15.05	SEP 2	15.35
DEC 15	14.40	APR 12	14.20	MAY 18	15.45	JUN 23	14.78	JUL 29	14.81	SEP 3	15.30
DEC 28	13.90	APR 13	14.22	MAY 19	15.30	JUN 24	14.70	JUL 30	14.85	SEP 4	15.35
JAN 7	14.41	APR 14	15.53	MAY 20	15.02	JUN 25	14.70	JUL 31	14.87	SEP 5	15.28
JAN 14	14.45	APR 15	15.60	MAY 21	14.97	JUN 26	14.65	AUG 1	14.70	SEP 6	15.40
JAN 21	14.55	APR 16	15.65	MAY 22	14.90	JUN 27	14.48	AUG 2	14.81	SEP 7	15.34
JAN 27	14.70	APR 17	15.72	MAY 23	14.88	JUN 28	14.45	AUG 3	14.90	SEP 8	15.32
FEB 4	14.37	APR 18	15.77	MAY 24	14.88	JUN 29	14.45	AUG 4	14.91	SEP 9	15.46
FEB 8	14.32	APR 19	15.83	MAY 25	14.96	JUN 30	14.60	AUG 5	14.75	SEP 10	15.23
FEB 18	14.37	APR 20	15.69	MAY 26	15.05	JUL 1	14.53	AUG 6	14.60	SEP 11	15.23
FEB 23	14.31	APR 21	15.48	MAY 27	14.90	JUL 2	14.45	AUG 7	14.80	SEP 12	15.30
MAR 3	14.33	APR 22	15.40	MAY 28	14.80	JUL 3	14.30	AUG 8	14.69	SEP 13	15.12
MAR 10	14.45	APR 23	15.44	MAY 29	14.70	JUL 4	14.25	AUG 9	14.88	SEP 14	15.34
MAR 16	14.16	APR 24	15.45	MAY 30	14.70	JUL 5	14.30	AUG 10	14.76	SEP 15	15.30
MAR 17	14.50	APR 25	15.53	MAY 31	14.75	JUL 6	14.30	AUG 11	15.03	SEP 16	15.25
MAR 20	14.28	APR 26	15.53	JUN 1	14.79	JUL 7	14.30	AUG 12	15.08	SEP 17	15.21
MAR 21	14.29	APR 27	15.73	JUN 2	14.80	JUL 8	14.36	AUG 13	14.95	SEP 18	15.40
MAR 22	14.22	APR 28	15.76	JUN 3	14.70	JUL 9	14.33	AUG 14	15.12	SEP 19	15.25
MAR 23	14.14	APR 29	15.75	JUN 4	14.77	JUL 10	14.45	AUG 15	15.01	SEP 20	15.45
MAR 24	14.16	APR 30	15.72	JUN 5	14.69	JUL 11	14.40	AUG 16	15.16	SEP 21	15.30
MAR 26	14.10	MAY 1	15.69	JUN 6	14.78	JUL 12	14.45	AUG 17	15.14	SEP 22	15.45
MAR 27	14.11	MAY 2	15.69	JUN 7	14.82	JUL 13	14.50	AUG 18	15.16	SEP 23	15.30
MAR 28	14.14	MAY 3	15.62	JUN 8	14.64	JUL 14	14.90	AUG 19	15.12	SEP 24	15.20
MAR 29	14.13	MAY 4	15.82	JUN 9	14.76	JUL 15	14.57	AUG 20	15.17	SEP 25	15.20
MAR 30	14.19	MAY 5	15.85	JUN 10	14.71	JUL 16	14.74	AUG 21	15.17	SEP 26	15.17
MAR 31	14.17	MAY 6	15.70	JUN 11	14.75	JUL 17	14.80	AUG 22	15.19	SEP 27	15.18
APR 1	14.20	MAY 7	15.72	JUN 12	14.76	JUL 18	14.75	AUG 23	15.18	SEP 29	15.29
APR 2	14.06	MAY 8	15.87	JUN 13	14.66	JUL 19	14.80	AUG 24	15.20	SEP 30	15.25
WTR YR 2000		HIGHEST	13.90	DEC 28		LOWEST	15.87	MAY 8			

## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421150085383901. Local number, 3S 11W 19BDD1.

LOCATION.--Lat 42°11'50", long 85°38'39", Hydrologic Unit 04050003, in Gourdneck State Game Area, near intersection of Angling Road and Centre Avenue, 1.5 mi southwest of Portage. Owner: Pharmacia & Upjohn.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in, depth 65 ft, screened 63 ft to 65 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 890.18 ft above sea level. Measuring point: Plywood shelter base, 2.8 ft above land-surface datum.

PERIOD OF RECORD.--November 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 23.76 ft below land-surface datum, Apr. 28, 29, 1999; lowest recorded, 24.81 ft below land-surface datum, Sept. 8-10, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.49	24.51	24.58	24.59	24.67	24.67	24.72	24.56	24.33	24.51	24.61	24.79
10	24.50	24.53	24.55	24.58	24.68	24.70	24.70	24.57	24.41	24.48	24.62	24.81
15	24.52	24.54	24.55	24.60	24.69	24.70	24.71	24.50	24.42	24.54	24.70	24.51
20	24.52	24.55	24.54	24.61	24.70	24.70	24.69	24.38	24.47	24.62	24.71	24.57
25	24.52	24.56	24.57	24.63	24.66	24.70	24.46	24.33	24.48	24.68	24.72	24.54
EOM	24.54	24.58	24.58	24.64	24.65	24.71	24.53	24.31	24.50	24.60	24.75	24.61

WTR YR 2000

HIGHEST

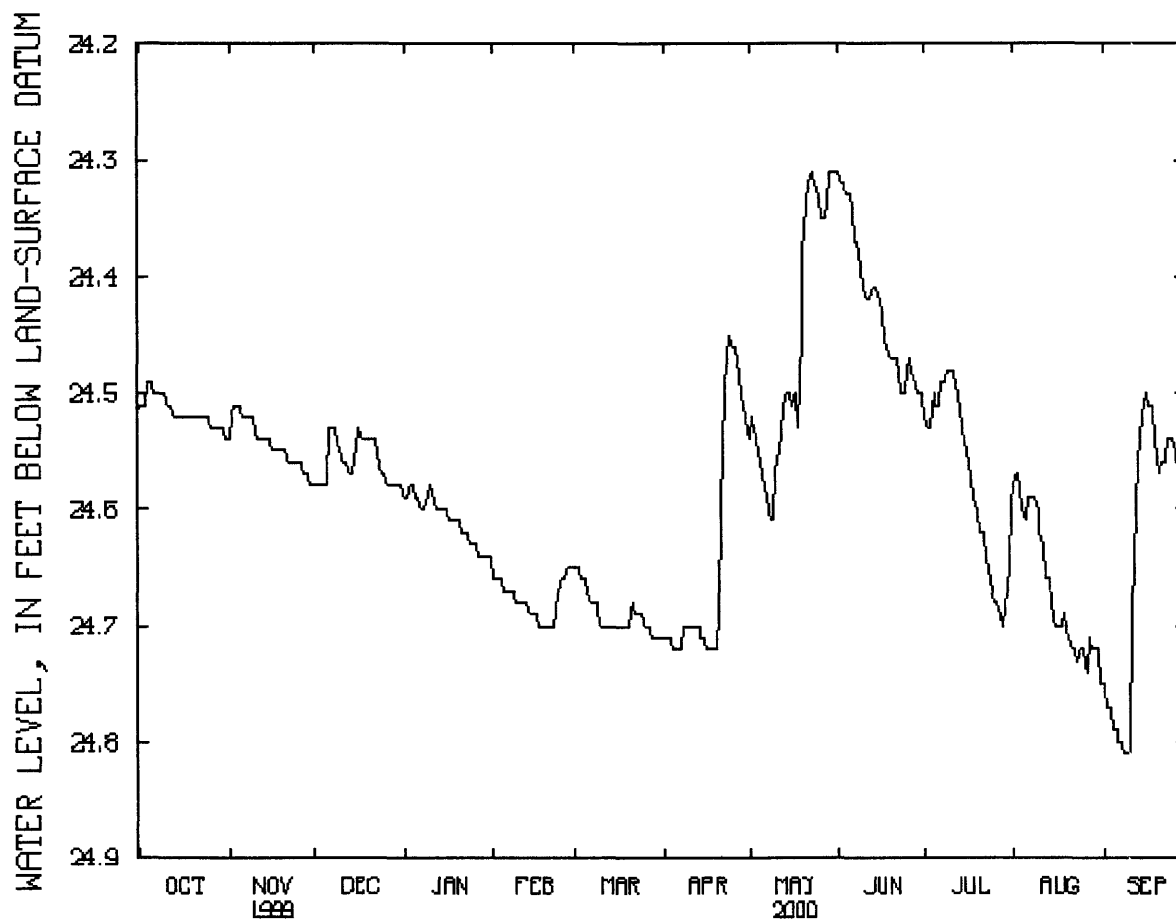
24.30

MAY 30-JUN 2

LOWEST

24.81

SEP 8-10



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421150085383902. Local number, 3S 11W 19BDD2.

LOCATION.--Lat 42°11'50", long 85°38'39", Hydrologic Unit 04050003, in Gourdneck State Game Area, near intersection of Angling Road and Centre Avenue, 1.5 mi southwest of Portage. Owner: Pharmacia &amp; Upjohn.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in, depth 177 ft, screened 175 ft to 177 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 889.90 ft above sea level. Measuring point: Plywood shelter base, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--November 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 22.00 ft below land-surface datum, Apr. 30 - May 3, 1999; lowest recorded, 23.34 ft below land-surface datum, Sept. 8-10, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.88	22.92	23.00	23.05	23.16	23.18	23.25	23.14	22.84	23.05	23.14	23.32
10	22.90	22.96	23.00	23.06	23.16	23.20	23.26	23.16	22.91	22.98	23.13	23.34
15	22.90	22.96	22.99	23.06	23.19	23.21	23.26	23.06	22.91	23.06	23.22	23.04
20	22.92	22.97	23.01	23.11	23.20	23.21	23.23	22.93	22.99	23.13	23.26	23.10
25	22.92	22.98	23.02	23.12	23.18	23.21	23.01	22.87	23.02	23.20	23.25	23.07
EOM	22.96	23.01	23.04	23.14	23.15	23.24	23.11	22.82	23.02	23.13	23.28	23.14

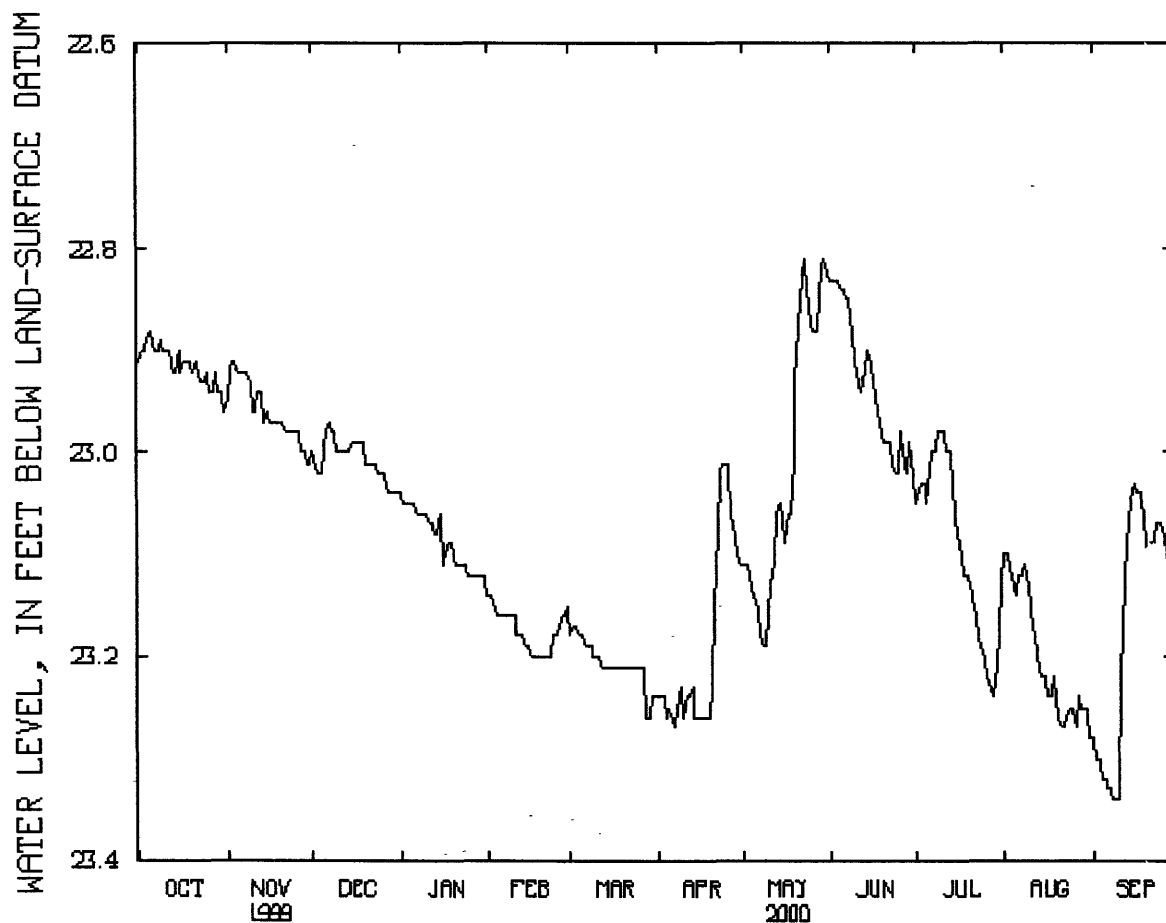
WTR YR 2000

HIGHEST 22.78

MAY 31

LOWEST 23.34

SEP 8-10



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421151085351601. Local number, 3S 11W 22BBCD.

LOCATION.--Lat 42°11'51", long 85°35'16", Hydrologic Unit 04050003, at Portage Central High School, Kalamazoo Township in Portage. Owner: Portage Public Schools.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 12 in, depth 102 ft, screened 87 ft to 102 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.0 ft above land-surface datum.

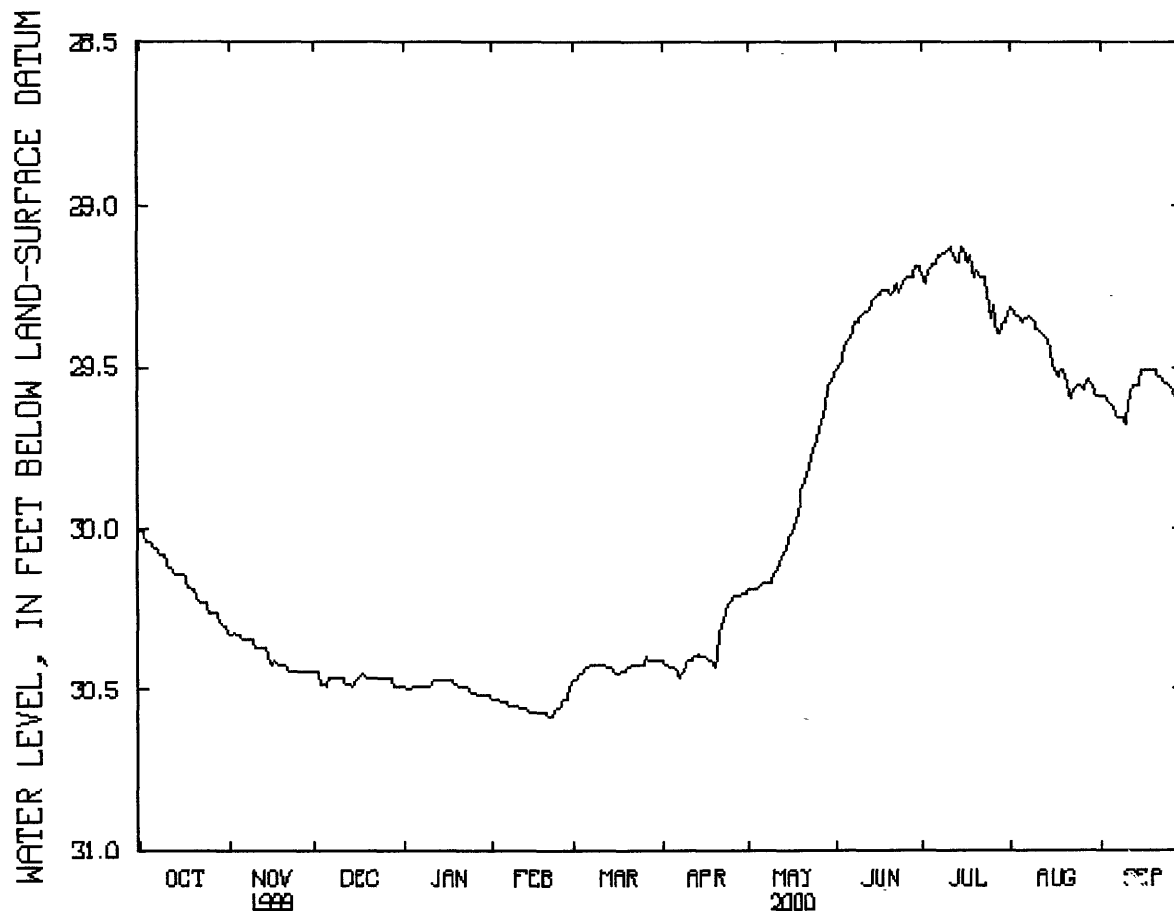
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--June 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 24.8 ft below land-surface datum, April 1985; lowest recorded, 30.58 ft below land-surface datum, Feb. 21, 22, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.05	30.33	30.49	30.49	30.54	30.43	30.43	30.18	29.42	29.18	29.36	29.63
10	30.08	30.37	30.46	30.49	30.56	30.42	30.41	30.15	29.34	29.14	29.38	29.68
15	30.14	30.41	30.47	30.47	30.57	30.45	30.40	30.04	29.28	29.13	29.48	29.51
20	30.19	30.42	30.46	30.49	30.57	30.43	30.41	29.89	29.28	29.20	29.52	29.51
25	30.26	30.44	30.46	30.51	30.55	30.42	30.22	29.73	29.23	29.35	29.56	29.56
EOM	30.30	30.44	30.49	30.52	30.48	30.41	30.20	29.53	29.19	29.34	29.59	29.62
WTR YR 2000	HIGHEST		29.13	JUL 10-16		LOWEST		30.58	FEB 21, 22			



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.

LOCATION.--Lat 42°13'25", long 85°40'48", Hydrologic Unit 04050003, at Kalamazoo Valley Community College. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in, depth 248 ft, screened 245 ft to 248 ft.

INSTRUMENTATION.--Water-level recorder.

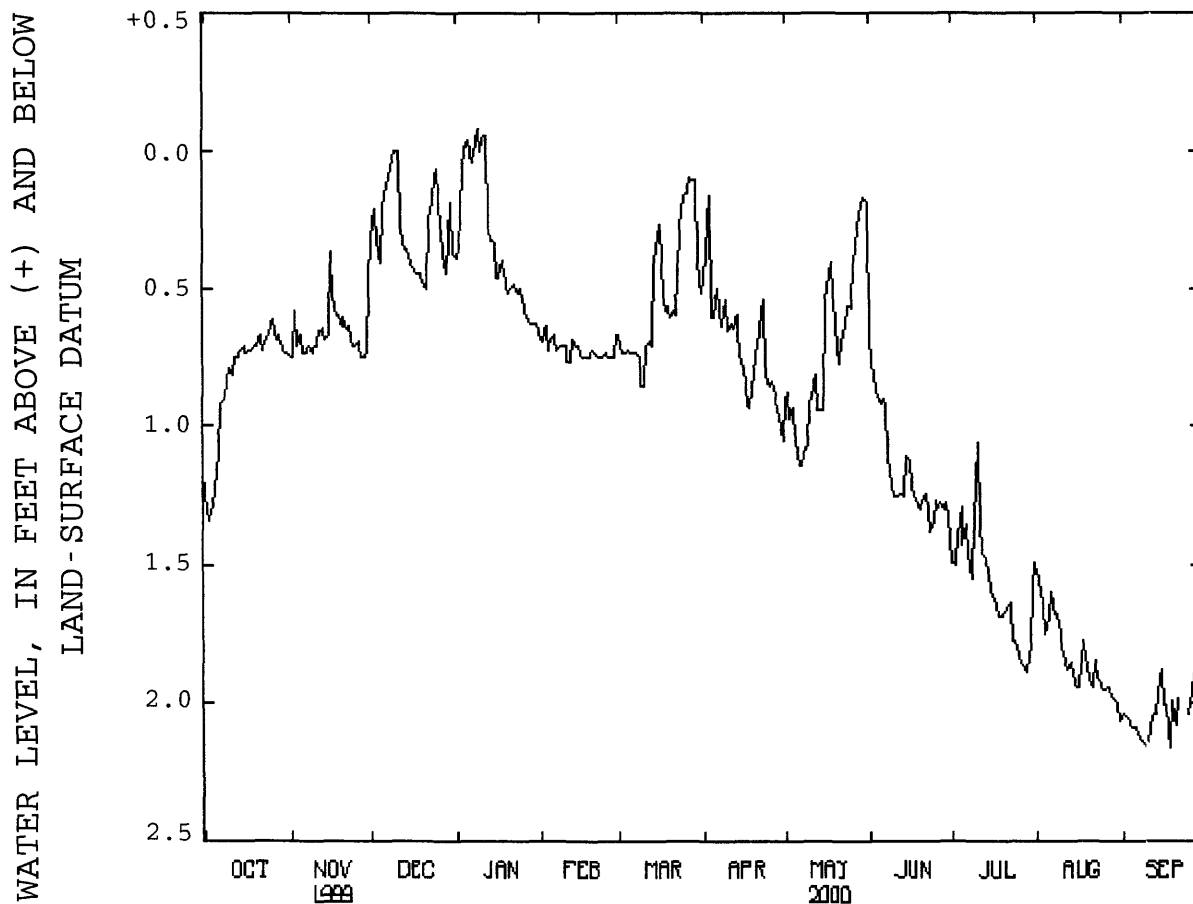
DATUM.--Elevation of land-surface datum is 880 ft above sea level, from topographic map. Measuring point: Top of shelter base, 3.5 ft above land-surface datum.

PERIOD OF RECORD.--March 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, +2.98 ft above land-surface datum, Sept 4, 1969; lowest recorded, 2.16 ft below land-surface datum, Sept. 10, 18, 2000.

WATER LEVEL, IN FEET ABOVE (+) AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	1.17	.67	.21	+.02	.68	.73	.60	1.04	.92	1.43	1.70	2.09
10	.79	.71	.00	.00	.71	.85	.65	.93	1.25	1.06	1.80	2.16
15	.70	.67	.39	.33	.70	.31	.77	.94	1.12	1.59	1.94	1.88
20	.71	.63	.47	.51	.72	.60	.75	.63	1.27	1.67	1.91	2.08
25	.63	.70	.06	.50	.73	.15	.85	.57	1.27	1.82	1.95	2.04
EOM	.73	.48	.37	.64	.67	.51	1.05	.18	1.39	1.49	2.06	---
WTR YR 2000	HIGHEST			+.018	JAN 10	LOWEST			2.16	SEP 10, 18		



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421332085401901. Local number, 3S 12W 11AD1.

LOCATION.--Lat 42°13'32", long 85°40'19", Hydrologic Unit 04050003, at Al Sabo Land Preserve, Texas Township, 3.0 mi west of Portage. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 300 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

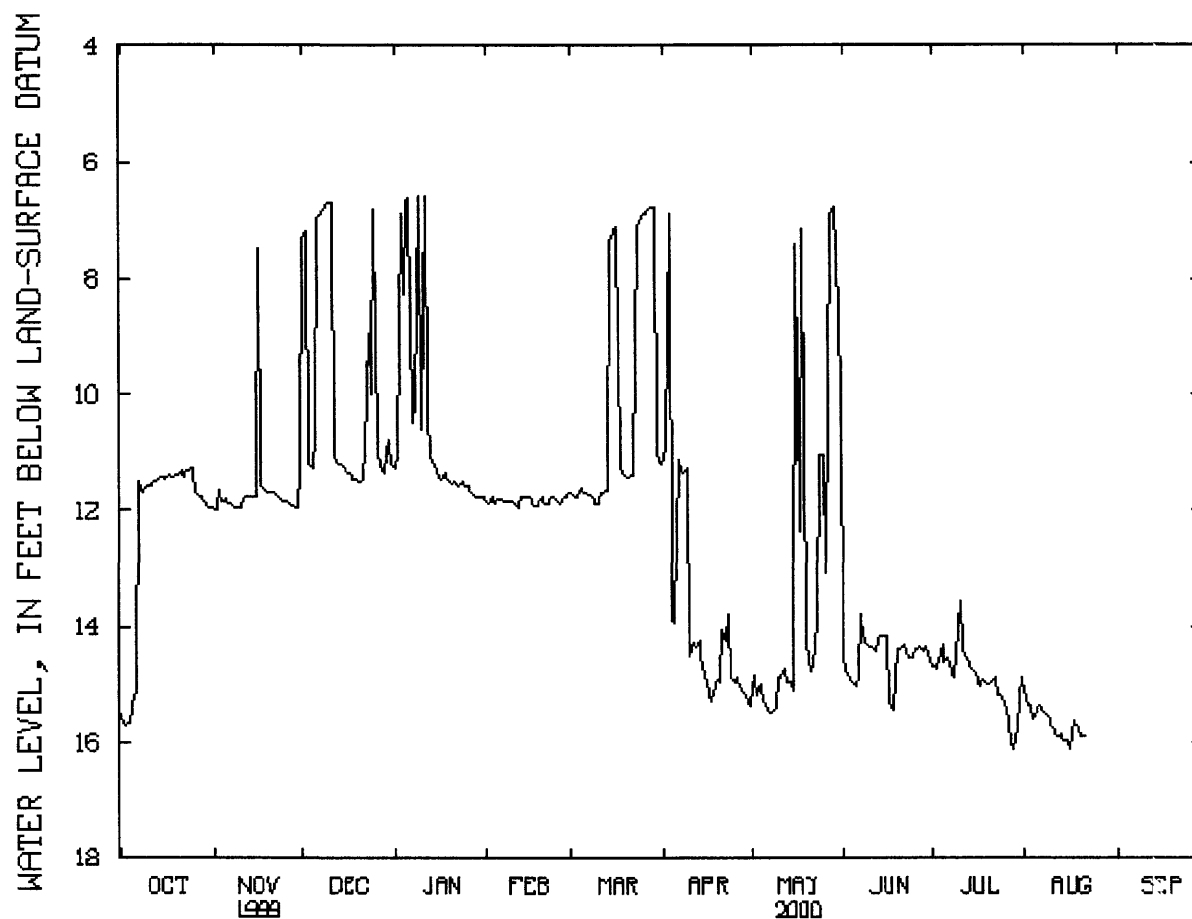
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--December 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 4.5 ft below land-surface datum, July 1973; lowest recorded, 17.09 ft below land-surface datum, July 20, 1994.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.21	11.82	10.80	6.69	11.80	11.70	13.96	15.31	15.03	14.60	15.49	---
10	11.57	11.94	6.71	10.58	11.85	11.87	14.53	14.90	14.36	13.58	15.70	---
15	11.45	11.76	11.29	11.28	11.76	7.22	14.79	15.08	14.18	14.76	15.96	---
20	11.39	11.70	11.50	11.53	11.79	11.42	14.95	14.27	14.42	15.02	15.88	---
25	11.26	11.84	6.82	11.55	11.83	6.91	14.96	11.05	14.38	15.28	---	---
EOM	11.94	11.36	11.21	11.78	11.68	11.18	15.36	9.89	14.55	14.86	---	---
WTR YR 2000	HIGHEST			6.47	JAN 12			LOWEST	16.13	JUL 28		



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421332085401902. Local number, 3S 12W 22AD2.

LOCATION.--Lat 42°13'32", long 85°40'19", Hydrologic Unit 04050003, at Al Sabo Land Preserve, Texas Township, 3.0 mi west of Portage. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in, depth 38 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

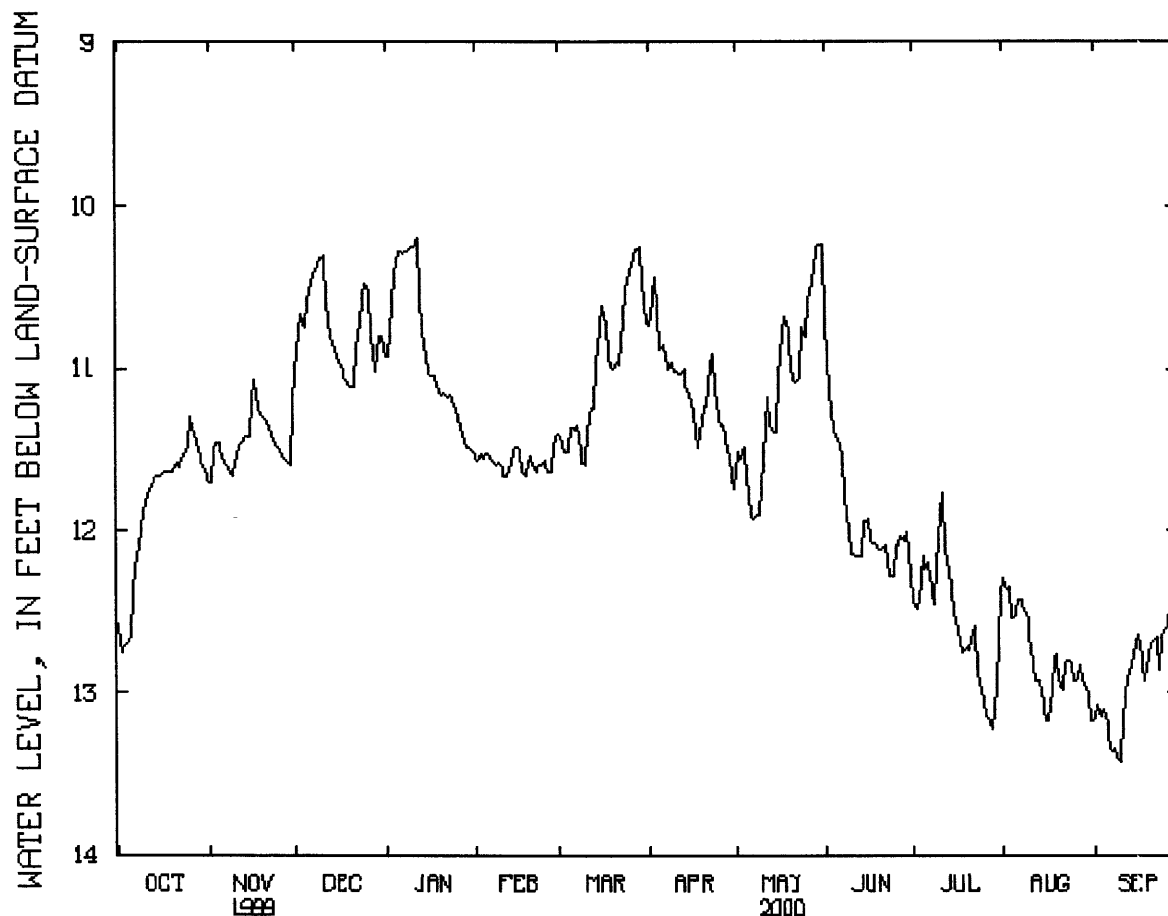
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--January 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 9.1 ft below land-surface datum, August 1975; lowest recorded, 13.42 ft below land-surface datum, Sept. 10, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.66	11.46	10.61	10.36	11.53	11.37	10.89	11.67	11.44	12.24	12.52	13.16
10	11.89	11.60	10.33	10.26	11.61	11.59	11.02	11.75	12.15	11.92	12.65	13.42
15	11.67	11.43	10.92	10.92	11.49	10.76	11.16	11.39	11.93	12.50	13.17	12.70
20	11.63	11.31	11.11	11.17	11.55	11.00	11.24	10.88	12.12	12.74	12.91	12.72
25	11.49	11.50	10.49	11.23	11.57	10.42	11.28	10.81	12.10	13.02	12.92	12.61
EOM	11.62	11.25	10.81	11.52	11.44	10.73	11.74	10.24	12.25	12.40	13.17	12.52
WTR YR 2000	HIGHEST			10.15	JAN 12			LOWEST	13.42	SEP 10		





## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421358085322401. Local number, 3S 11W 1DCBB.

LOCATION.--Lat 42°13'58", long 85°32'24", Hydrologic Unit 04050003, near intersection of Sprinkle Road and Winthrop Avenue in Portage. Owner: City of Portage.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 179 ft, screened 134 ft to 179 ft.

INSTRUMENTATION.--Periodic measurements.

DATUM.--Elevation of land-surface datum is 856.64 ft above sea level (levels by City of Portage). Measuring point: Top of casing, 2.0 ft above land-surface datum.

REMARKS.--Water level measurements provided by City of Portage.

PERIOD OF RECORD.--March 1999 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.62 ft below land-surface datum, May 14, 1999; lowest measured, 18.73 ft below land-surface datum, Feb. 23, 2000.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	17.92	FEB 18	18.68	JUN 9	16.71
OCT 15	17.84	FEB 23	18.73	JUN 16	16.67
OCT 23	18.02	MAR 2	18.66	JUN 23	16.84
OCT 27	18.15	MAR 8	18.61	JUN 30	16.95
NOV 5	18.23	MAR 16	18.70	JUL 7	16.90
NOV 12	18.32	MAR 23	18.57	JUL 13	16.80
NOV 17	18.35	MAR 30	18.63	JUL 20	17.00
NOV 23	18.38	APR 7	18.65	JUL 30	16.72
DEC 3	18.50	APR 12	18.59	AUG 4	16.83
DEC 9	18.60	APR 20	18.52	AUG 11	16.95
DEC 17	18.55	APR 25	18.21	AUG 18	17.05
DEC 30	18.40	APR 27	18.13	AUG 22	17.07
JAN 7	18.37	MAY 4	18.03	AUG 24	17.13
JAN 14	18.51	MAY 10	17.95	AUG 30	17.40
JAN 21	18.48	MAY 19	17.59	SEP 10	17.28
JAN 27	18.58	MAY 26	17.40	SEP 14	17.15
FEB 4	18.51	MAY 30	16.90	SEP 21	17.45
FEB 8	18.52	JUN 1	16.81	SEP 26	17.26
WTR YR 2000	HIGHEST 16.67	JUN 16	LOWEST 18.73	FEB.23	

## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421435085353701. Local number, 3S 11W 4ABAD1.

LOCATION.--Lat 42°14'35", long 85°35'37", Hydrologic Unit 04050003, at Kilgore Road pump station No. 9 in Kalamazoo. Owner: City of Kalamazoo

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 36 ft, screened 33 ft to 36 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

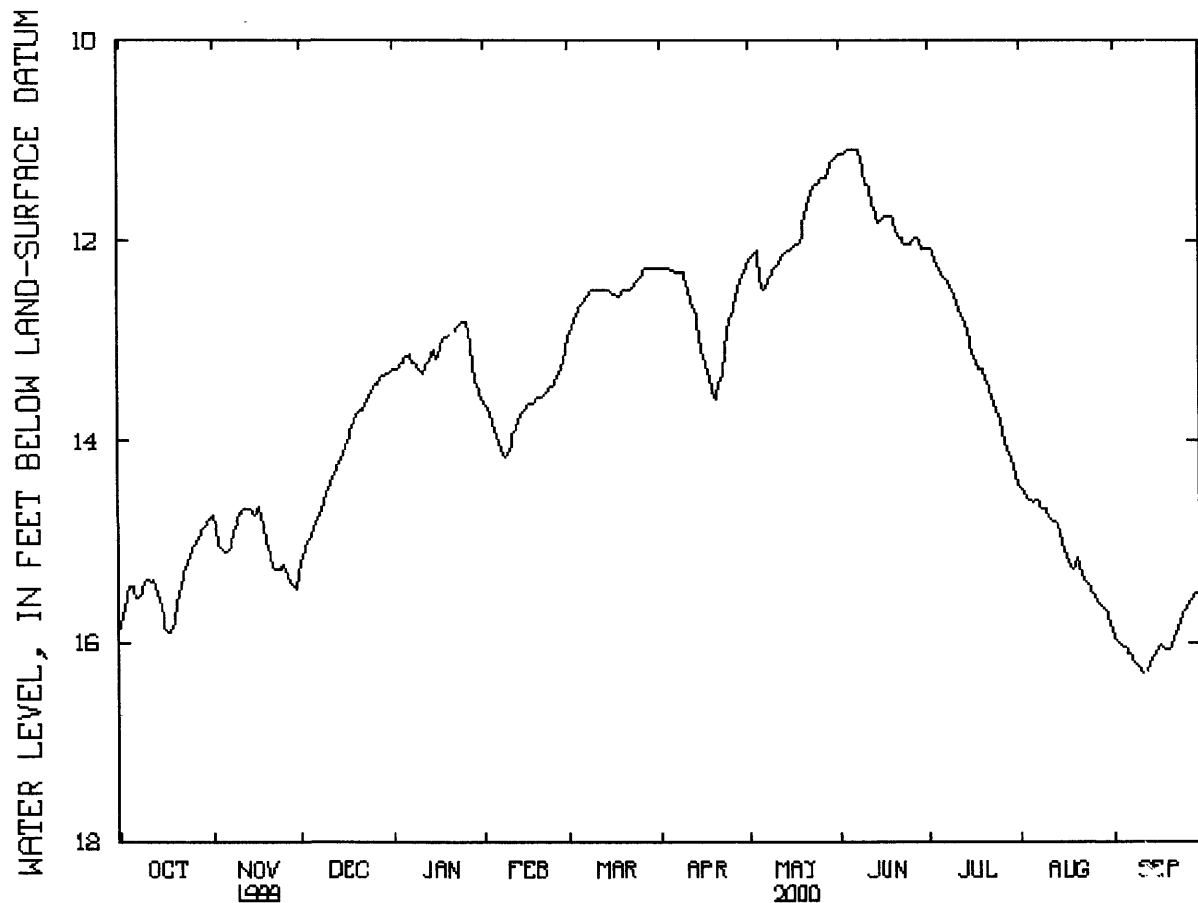
PERIOD OF RECORD.--September 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 9.17 ft below land-surface datum, Apr. 27, 1993; lowest recorded, 17.27 ft below land-surface datum, Sept. 27, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.43	15.09	14.87	13.20	13.89	12.63	12.29	12.37	11.08	12.29	14.60	16.08
10	15.39	14.73	14.52	13.28	14.06	12.47	12.42	12.27	11.43	12.60	14.72	16.26
15	15.70	14.74	14.13	13.08	13.69	12.51	13.03	12.09	11.78	13.00	15.06	16.12
20	15.61	15.11	13.74	12.92	13.55	12.49	13.57	11.81	11.87	13.36	15.16	16.04
25	15.10	15.24	13.52	12.81	13.42	12.36	12.73	11.40	12.02	13.78	15.52	15.69
EOM	14.77	15.36	13.31	13.57	13.08	12.27	12.28	11.14	12.07	14.40	15.81	15.50

WTR YR 2000      HIGHEST    11.07      JUN 5-8      LOWEST    16.30      SEP 11, 12



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421435085353702. Local number, 3S 11W 4ABAD2.

LOCATION.--Lat 42°14'35", long 85°35'37", Hydrologic Unit 04050003, at Kilgore Road pump station No. 9 in Kalamazoo. Owner: City of Kalamazoo

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 148 ft, screened 145 ft to 148 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--September 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 10.73 ft below land-surface datum, May 4, 5, 1993; lowest recorded, 20.08 ft below land-surface datum, Sept. 20, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	17.98	17.82	16.08	14.65	16.90	14.15	14.01	16.04	12.79	14.99	16.56	17.30
10	17.92	17.23	15.67	16.19	15.44	14.11	16.28	13.74	15.20	15.32	16.55	17.30
15	19.11	17.46	15.33	14.54	15.05	14.16	16.74	13.56	15.07	15.80	17.30	17.32
20	16.69	17.97	15.39	14.37	14.95	14.15	17.29	13.30	14.78	16.24	16.58	17.40
25	17.38	17.91	14.84	14.37	14.81	14.00	16.05	12.95	13.69	16.55	17.30	17.03
EOM	15.98	16.65	15.40	16.60	14.45	13.97	13.77	12.79	13.72	17.14	17.30	16.91

WTR YR 2000

HIGHEST

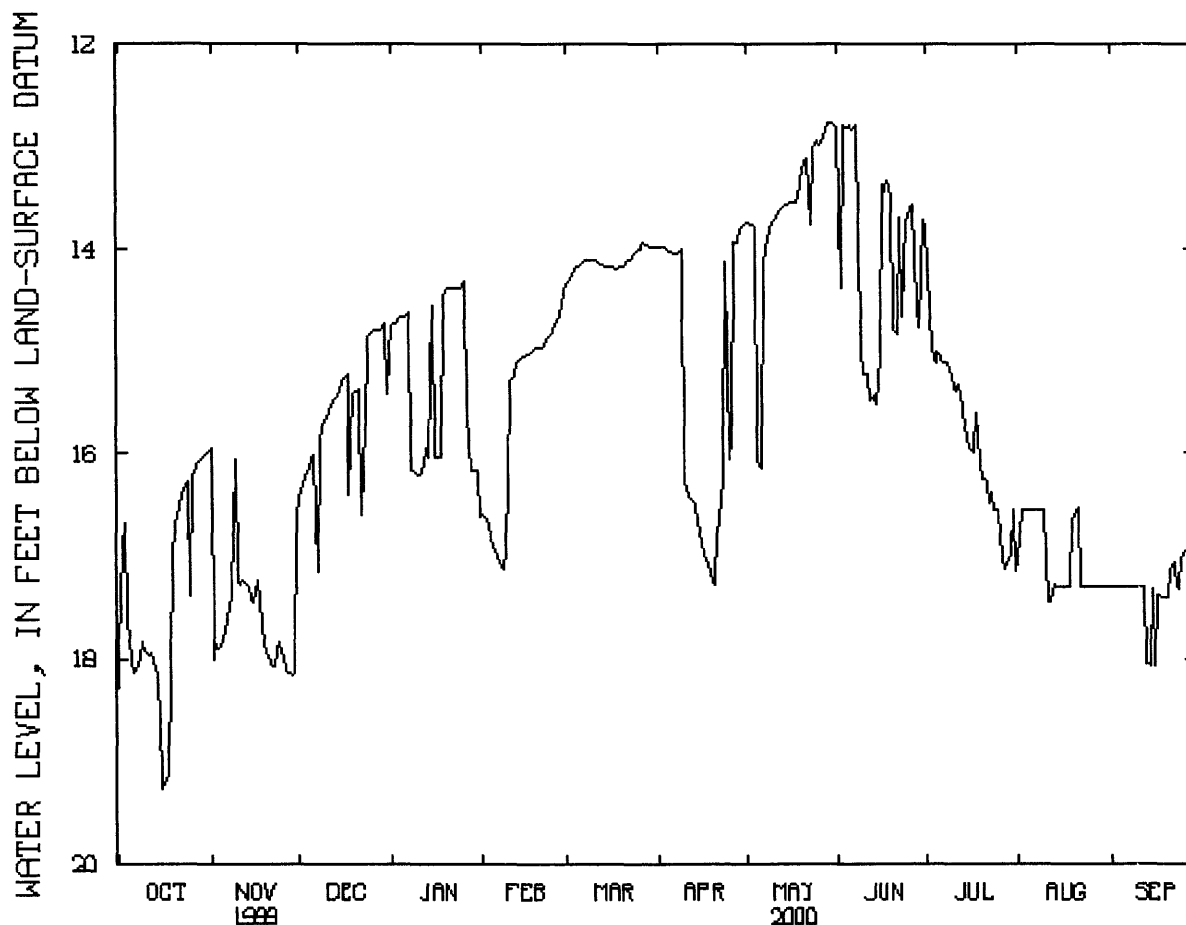
12.69

JUN 2

LOWEST

19.27

OCT 16



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421448085383601. Local number, 2S 11W 31CD.

LOCATION.--Lat 42°14'48", long 85°38'36", Hydrologic Unit 04050003, at city well field, 1,000 ft from U.S. Highway 131 in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 226 ft, screened 216 ft to 226 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 910 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

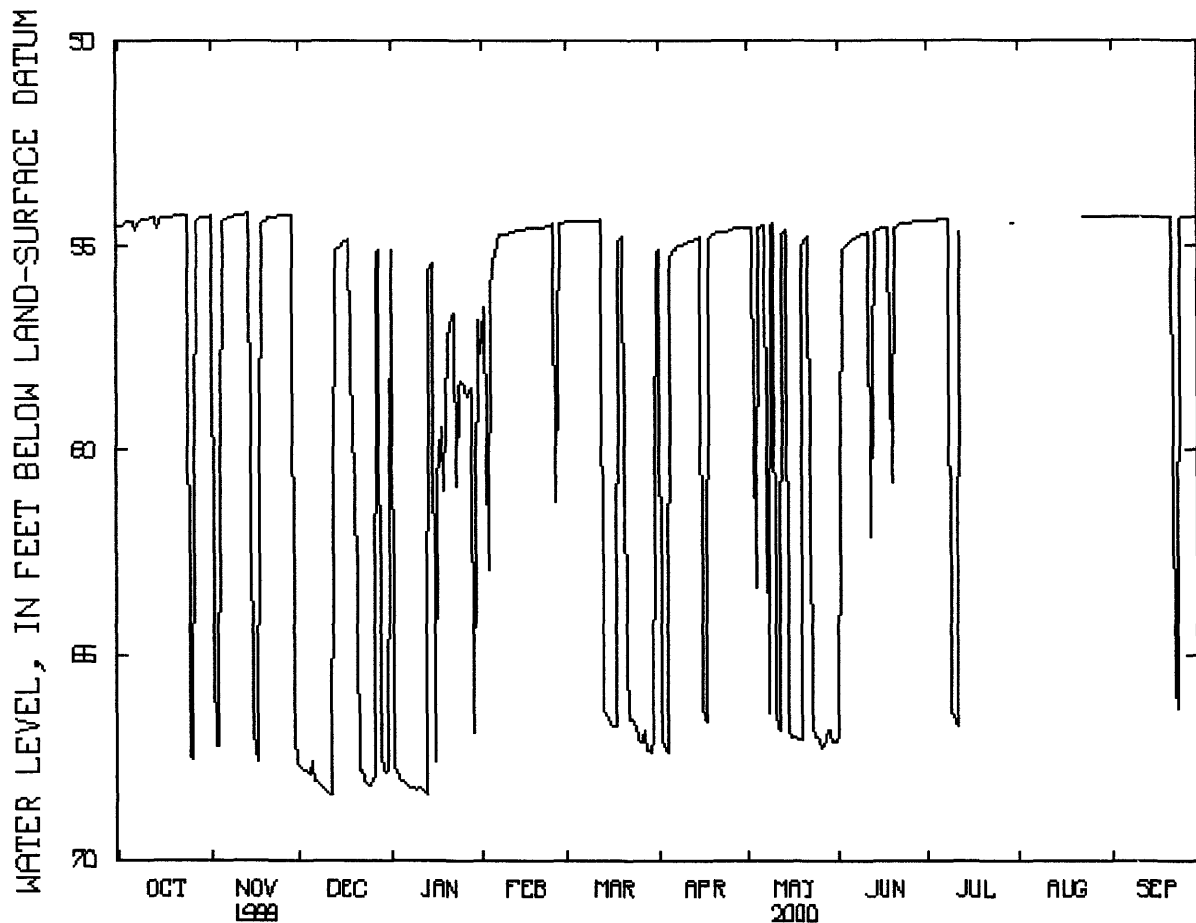
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 41.39 ft below land-surface datum, Sept. 12, 1982; lowest recorded, 71.75 ft below land-surface datum, May 22, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	54.41	54.36	67.59	68.09	55.36	54.39	55.25	54.52	54.89	54.35	---	54.30
10	54.34	54.22	68.27	68.26	54.65	54.37	54.92	54.46	54.69	66.55	---	54.29
15	54.27	66.86	54.95	55.37	54.59	66.62	54.76	66.77	54.56	---	---	54.27
20	54.23	54.35	60.09	57.34	54.53	54.74	54.67	54.95	54.51	---	---	54.26
25	67.39	54.23	68.18	58.29	54.45	67.09	54.60	67.05	54.43	---	54.30	54.31
EOM	54.24	67.51	67.79	57.61	54.43	55.23	54.55	67.07	54.39	---	54.29	54.29
WTR YR 2000	HIGHEST			54.15	NOV 15			LOWEST	68.39	JAN 13		



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421457085325801. Local number, 2S 11W 36CB.

LOCATION.--Lat 42°14'57", long 85°32'58", Hydrologic Unit 04050003, in city well field, 500 ft from Emerald Street in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 226 ft, screened 216 ft to 226 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.5 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

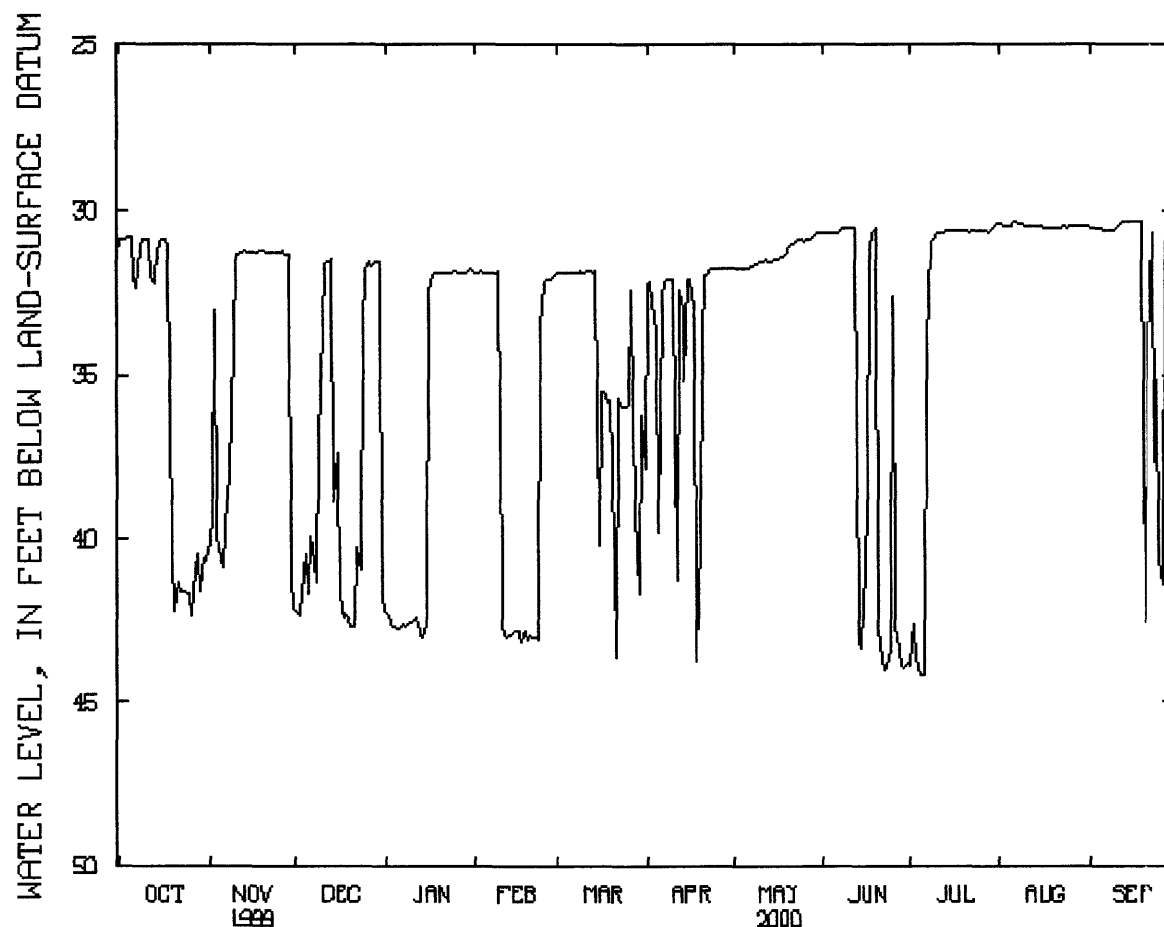
PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 25.35 ft below land-surface datum, April 1985; lowest recorded, 50.4 ft below land-surface datum, June 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.78	40.54	41.70	42.75	31.87	31.88	39.81	31.75	30.64	44.16	30.48	30.60
10	30.85	31.35	35.28	42.52	41.62	31.87	32.06	31.59	30.58	30.69	30.48	30.58
15	30.91	31.29	37.37	42.69	42.81	40.21	32.11	31.50	41.00	30.61	30.52	30.35
20	42.20	31.27	42.71	31.89	42.94	37.69	34.16	31.13	42.79	30.62	30.58	42.51
25	41.63	31.31	31.84	31.84	32.29	35.92	31.76	30.93	32.66	30.63	30.53	40.59
EOM	40.69	42.14	41.79	31.80	31.96	37.84	31.79	30.69	43.82	30.43	30.52	30.54

WTR YR 2000                      HIGHEST    30.31                      SEP 12                      LOWEST    44.17                      JUL 6



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421552085384001. Local number, 2S 11W 30CBD1.

LOCATION.--Lat 42°15'52", long 85°38'40", Hydrologic Unit 04050003, at Western Michigan University Baker Farm in Kalamazoo. Owner: Western Michigan University.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 5 in, depth 240 ft, screened 215 ft to 240 ft.

INSTRUMENTATION.--Water-level recorder.

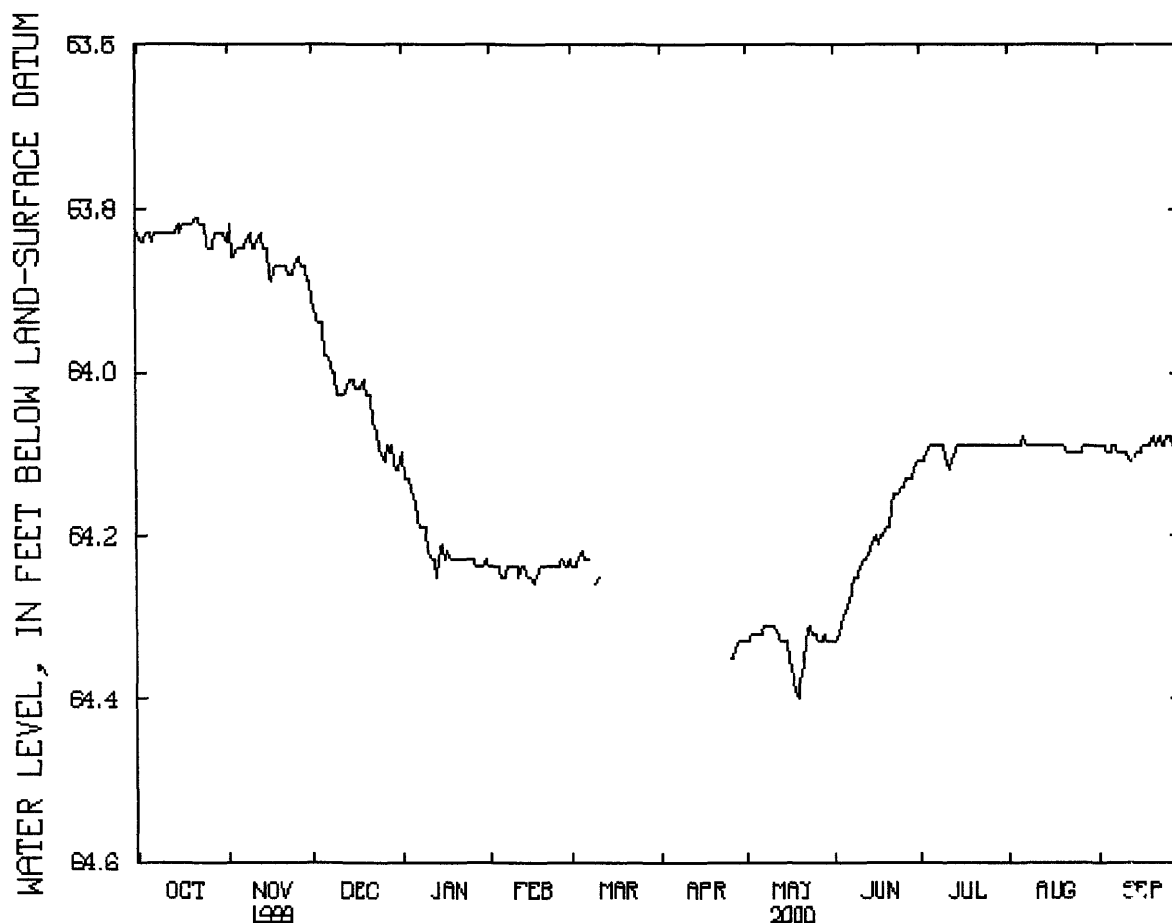
DATUM.--Elevation of land-surface datum is 936.01 ft above sea level (levels by City of Kalamazoo). Measuring point: Plywood shelter base, 1.6 ft above land-surface datum.

PERIOD OF RECORD.--October 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 62.72 ft below land-surface datum, Oct. 1, 1998; lowest recorded, 64.40 ft below land-surface datum, May 19, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	63.83	63.85	63.98	64.15	64.25	64.23	---	64.32	64.29	64.09	64.09	64.10
10	63.83	63.85	64.03	64.22	64.24	64.25	---	64.31	64.24	64.11	64.09	64.10
15	63.82	63.85	64.01	64.21	64.25	---	---	64.33	64.20	64.09	64.09	64.10
20	63.82	63.87	64.03	64.23	64.24	---	---	64.38	64.19	64.09	64.09	64.08
25	63.84	63.87	64.10	64.23	64.24	---	64.35	64.32	64.14	64.09	64.10	64.08
EOM	63.83	63.89	64.12	64.24	64.23	---	64.33	64.33	64.11	64.09	64.09	64.08
WTR YR 2000	HIGHEST			63.79	OCT 21, 22			LOWEST		64.40	MAY 19	



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421552085384002. Local number, 2S 11W 30CBDC2.

LOCATION.--Lat 42°15'52", long 85°38'40", Hydrologic Unit 04050003, at Western Michigan University Baker Farm in Kalamazoo. Owner: Western Michigan University.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in, depth 89 ft, screened 74 ft to 89 ft.

INSTRUMENTATION.--Water-level recorder.

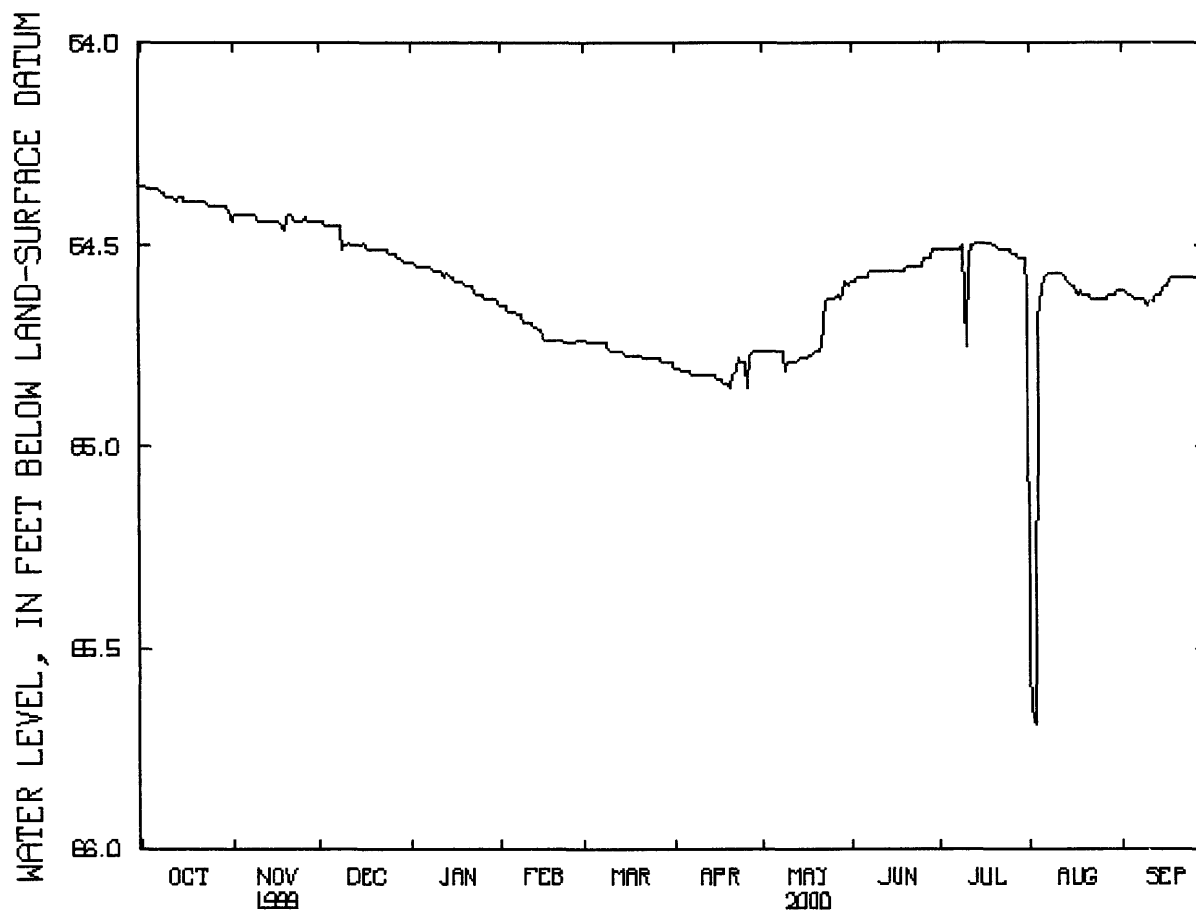
DATUM.--Elevation of land-surface datum is 936.34 ft above sea level (levels by City of Kalamazoo). Measuring point: Plywood shelter base, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--October 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 63.52 ft below land-surface datum, Oct. 1, 1998; lowest recorded, 65.69 ft below land-surface datum, Aug. 3, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	64.36	64.42	64.45	64.55	64.66	64.74	64.81	64.76	64.58	64.51	64.61	64.63
10	64.38	64.44	64.50	64.56	64.69	64.76	64.82	64.79	64.56	64.75	64.57	64.65
15	64.38	64.44	64.50	64.58	64.71	64.77	64.82	64.78	64.56	64.49	64.60	64.61
20	64.39	64.42	64.51	64.60	64.73	64.77	64.85	64.76	64.55	64.50	64.62	64.58
25	64.40	64.44	64.52	64.62	64.74	64.78	64.79	64.63	64.55	64.51	64.63	64.58
EOM	64.41	64.44	64.54	64.64	64.73	64.79	64.76	64.60	64.51	64.60	64.61	64.60
WTR YR 2000	HIGHEST		64.34	OCT 1-3, 5			LOWEST		65.69	AUG 3		



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421614085270801. Local number, 2S 10W 26BBCC.

LOCATION.--Lat 42°16'14", long 85°27'08", Hydrologic Unit 04050003, at end of Miller Road by Morrow Lake, Comstock Township, 4 mi east of Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 27 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

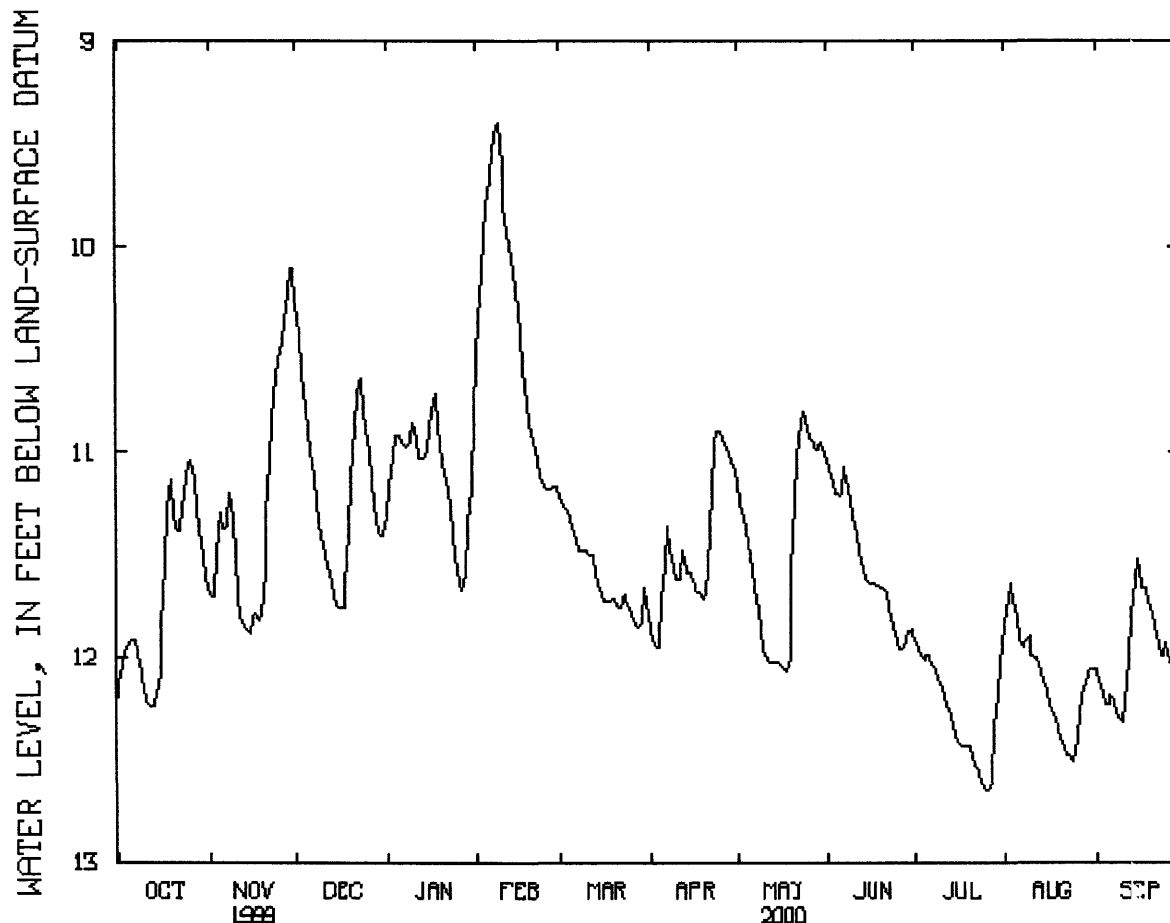
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--February 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 5.88 ft below land-surface datum, Apr. 7-11, 1988; lowest recorded, 13.14 ft below land-surface datum, Sept 13-15, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.91	11.29	10.88	10.91	9.80	11.36	11.72	11.44	11.21	11.99	11.79	12.23
10	12.16	11.51	11.40	10.86	9.59	11.48	11.62	11.94	11.31	12.14	11.99	12.31
15	12.08	11.88	11.76	11.00	10.20	11.68	11.58	12.02	11.63	12.36	12.15	11.52
20	11.30	11.58	11.13	11.03	10.90	11.71	11.69	11.58	11.66	12.43	12.39	11.77
25	11.05	10.56	10.88	11.50	11.18	11.78	10.90	10.87	11.92	12.64	12.47	11.93
EOM	11.62	10.11	11.40	10.81	11.16	11.78	11.08	11.00	11.86	11.96	12.05	12.09
WTR YR 2000	HIGHEST			9.32	FEB 8, 9			LOWEST	12.65	JUL 26		





## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421614085354001. Local number, 2S 11W 28AA.

LOCATION.--Lat 42°16'14", long 85°35'40", Hydrologic Unit 04050003, near intersection of Peeler Street and Crosstown Parkway in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 245 ft, screened 235 ft to 245 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 820 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 4.0 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

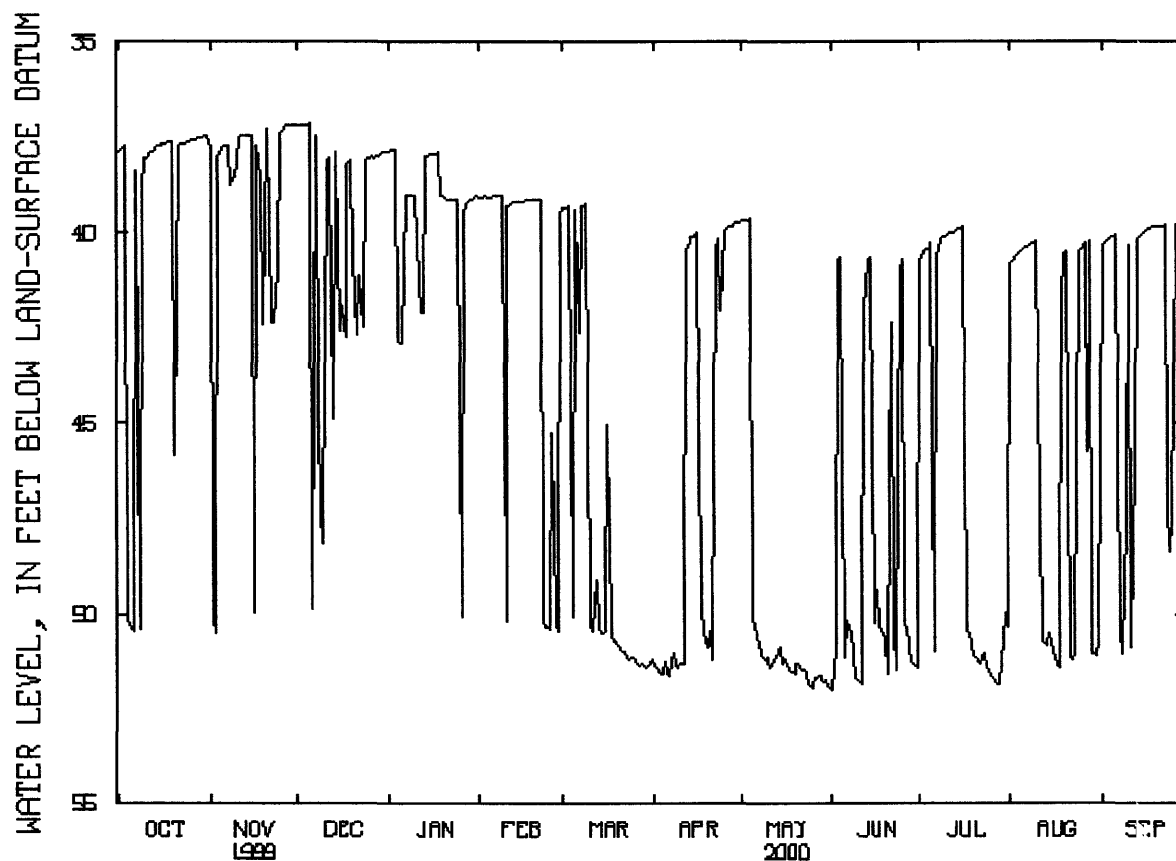
PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 29.0 ft below land-surface datum, May 1988; lowest recorded, 64.63 ft below land-surface datum, July 15, 1986.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	50.35	37.81	37.13	42.86	39.05	39.38	51.24	50.07	51.10	40.26	40.43	40.07
10	38.05	38.21	48.12	39.02	50.14	50.15	51.32	51.16	51.73	40.04	40.17	40.30
15	37.69	37.42	42.55	37.95	39.16	50.40	40.05	51.25	50.21	39.86	50.85	39.94
20	45.83	37.45	40.59	39.08	39.12	50.79	50.45	51.31	51.58	51.10	40.45	39.80
25	37.59	37.39	38.07	39.11	50.37	51.19	39.94	51.91	40.65	51.54	40.38	47.68
EOM	37.48	37.19	37.86	39.03	39.53	51.18	39.70	51.92	51.44	50.32	50.81	39.65

WTR YR 2000                      HIGHEST      37.00      DEC 21                      LOWEST      51.96      JUN 1



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CD.

LOCATION.--Lat 42°16'41", long 85°35'06", Hydrologic Unit 04050003, at intersection of Crosstown Parkway and Stockbridge Avenue in Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 137 ft, screened 134 ft to 137 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 764.7 ft above sea level. Measuring point: Plywood instrument shelf, 2.6 ft above land-surface datum.

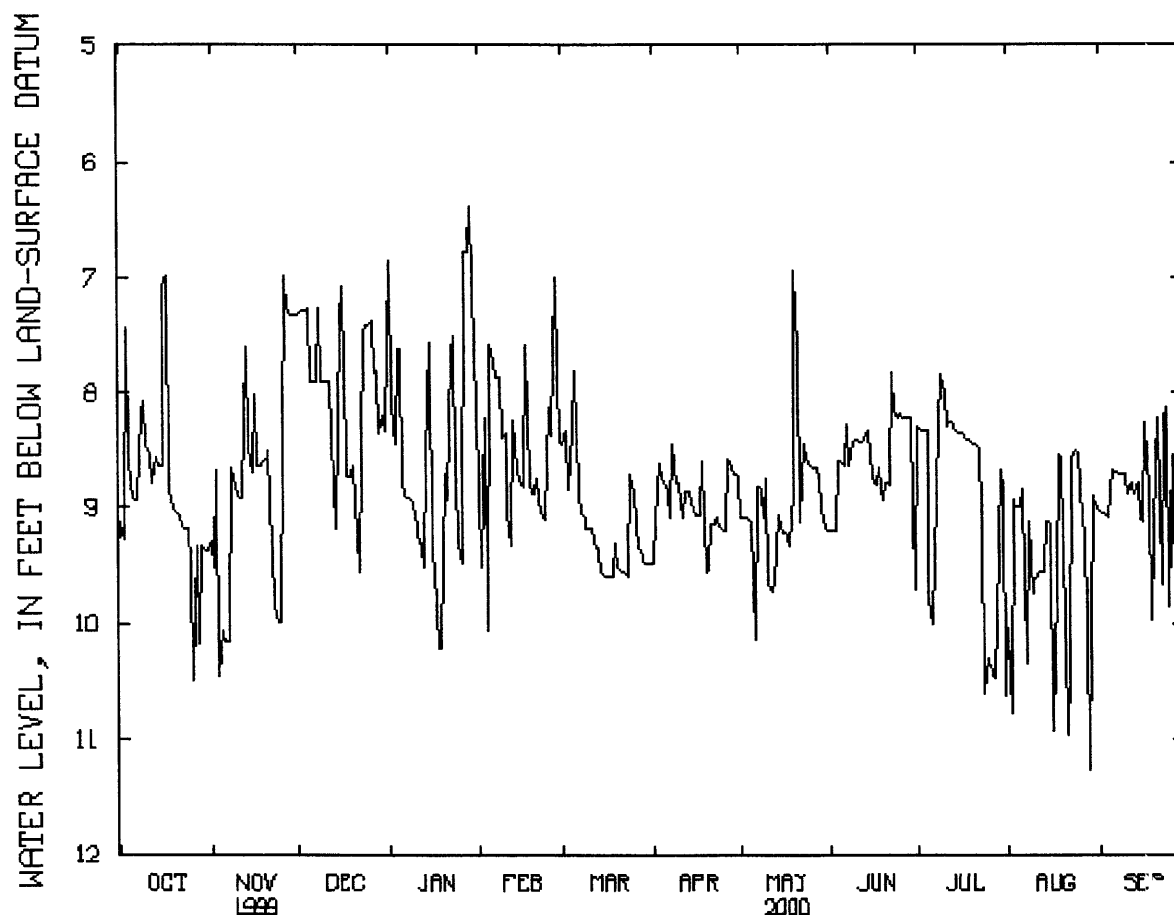
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1960 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 3.60 ft below land-surface datum, May 5, 6, 1995; lowest recorded, 31.1 ft below land surface datum, August 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.92	10.06	7.91	7.61	7.59	7.82	8.77	9.14	8.62	9.78	9.00	8.67
10	8.46	8.87	7.91	9.05	8.36	9.18	8.80	8.75	8.41	8.01	9.64	8.71
15	8.65	8.68	7.40	7.57	8.75	9.60	9.00	9.15	8.70	8.35	9.15	9.09
20	9.02	8.56	8.64	8.71	8.87	9.52	9.54	6.95	8.80	8.45	9.25	8.61
25	9.48	9.99	7.41	9.31	8.13	8.85	9.20	8.63	8.19	10.32	8.53	9.85
EOM	9.38	7.33	8.34	8.12	8.40	9.48	8.73	9.20	9.70	10.63	8.98	8.06
WTR YR 2000	HIGHEST		4.42	JUN 1		LOWEST		11.26	AUG 29			



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421716085373702. Local number, 2S 11W 20BB2.

LOCATION.--Lat 42°17'16", long 85°37'37", Hydrologic Unit 04050003, at intersection of Howard Street and Kendall Street in Kalamazoo Township, in Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 106 ft, screened 103 ft to 106 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 880 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.3 ft above land-surface datum.

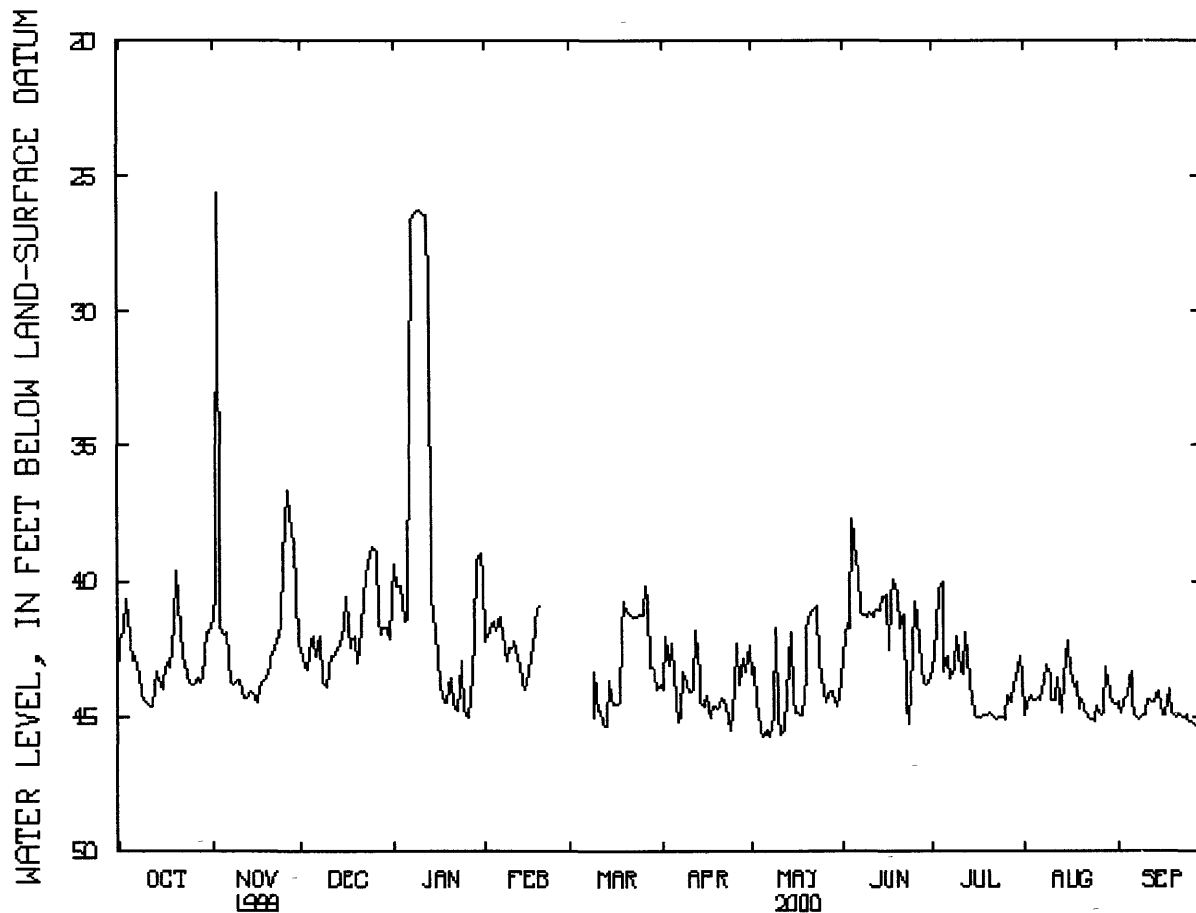
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 12.5 ft below land-surface datum, February 1976; lowest recorded, 48.4 ft below land-surface datum, June 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	42.94	41.94	42.02	41.48	41.78	---	43.34	45.71	39.11	43.28	44.29	43.30
10	44.46	43.63	43.88	26.25	42.36	44.77	44.07	44.82	41.14	43.12	44.32	44.92
15	43.99	44.18	41.81	41.80	43.82	44.50	44.55	44.19	40.51	44.77	42.18	44.46
20	39.59	43.16	43.03	43.51	---	41.07	44.55	41.80	41.73	44.86	44.35	45.01
25	43.79	39.25	38.72	44.76	---	41.26	44.08	43.99	40.75	45.10	44.66	45.17
EOM	41.85	42.39	42.09	39.69	---	43.75	42.35	43.76	43.54	43.43	44.50	44.96
WTR YR 2000	HIGHEST			22.56	NOV 27			LOWEST	45.72	MAY 7		



## GROUND-WATER LEVELS

## KALAMAZOO COUNTY

421918085283801. Local number, 2S 10W 4D.

LOCATION.--Lat 42°19'18", long 85°28'38", Hydrologic Unit 04050003, at Campbell well field near Campbell Lake, 2 mi east of Eastwood. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 13 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 836.50 ft above sea level. Measuring point: Plywood instrument shelf, 1.0 ft above land-surface datum.

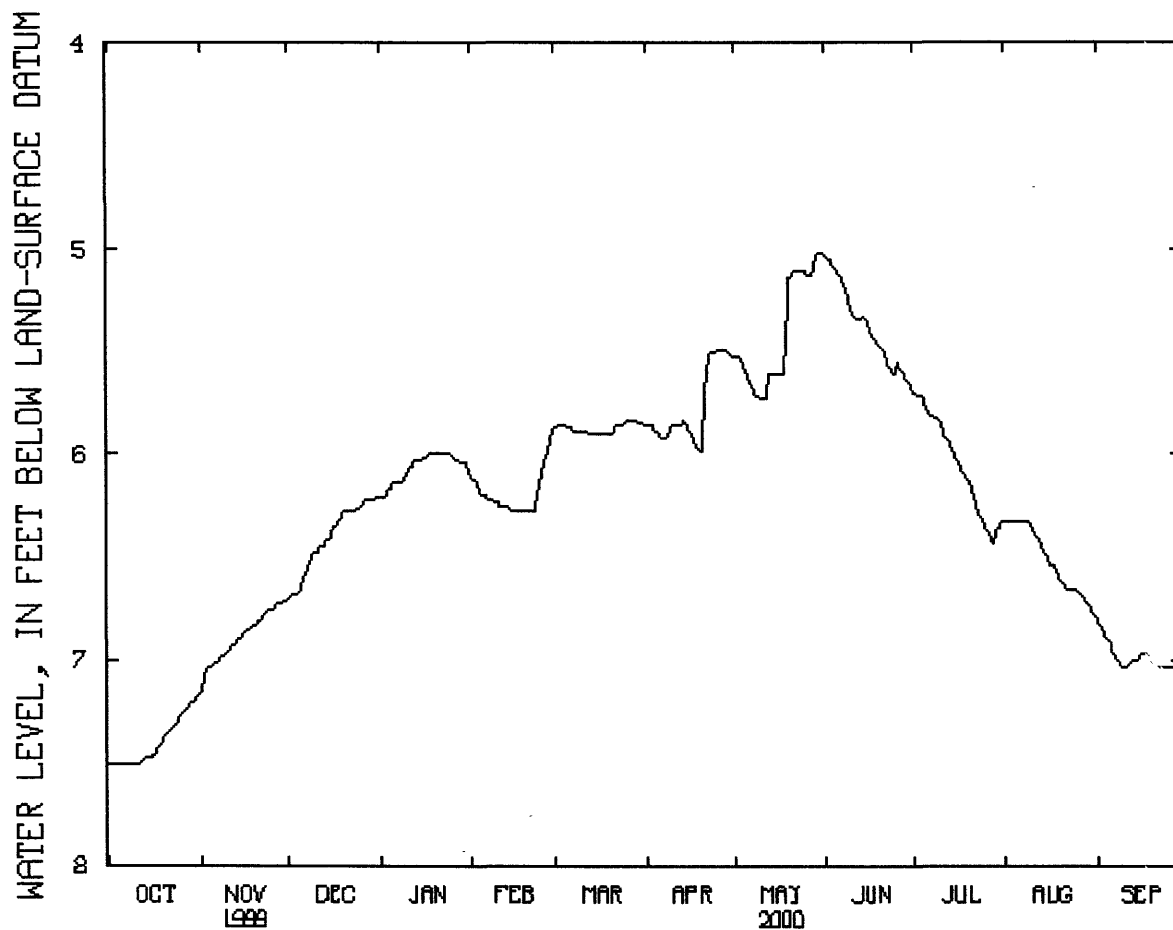
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--March 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 1.9 ft below land-surface datum, April 1974; lowest recorded, 7.51 ft below land-surface datum, Sept. 27 to Oct. 9, 1999.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.51	7.02	6.66	6.16	6.19	5.87	5.89	5.59	5.10	5.76	6.32	6.92
10	7.50	6.96	6.48	6.10	6.23	5.89	5.85	5.73	5.29	5.84	6.35	7.03
15	7.47	6.88	6.40	6.02	6.28	5.90	5.85	5.60	5.35	6.00	6.50	6.99
20	7.37	6.82	6.28	6.00	6.28	5.90	5.98	5.13	5.48	6.14	6.61	7.03
25	7.27	6.75	6.26	6.00	6.10	5.83	5.49	5.11	5.60	6.33	6.66	7.03
EOM	7.17	6.71	6.21	6.07	5.90	5.85	5.52	5.01	5.66	6.32	6.78	7.06
WTR YR 2000	HIGHEST		5.01	MAY 30-JUN 1			LOWEST	7.51	OCT 1-9			



## GROUND-WATER LEVELS

## MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.

LOCATION.--Lat 41°52'06", long 83°41'44", Hydrologic Unit 04100002, at Teal Road, 2 mi southeast of Petersburg. Owner: U.S. Geological Survey.

AQUIFER.--Detroit River Group of Devonian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 72 ft, cased to 53 ft, open bottom.

INSTRUMENTATION.--Water-level recorder.

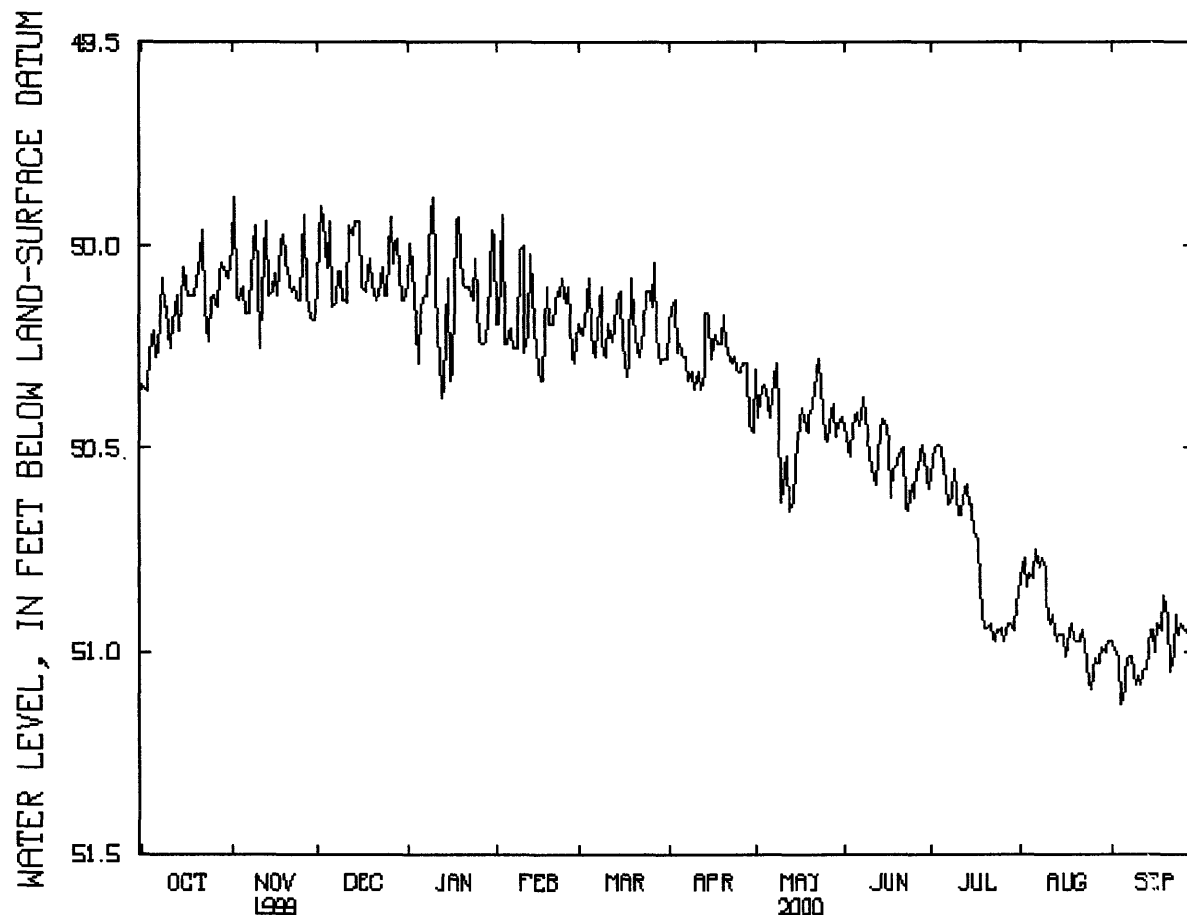
DATUM.--Elevation of land-surface datum is 680 ft above sea level, from topographic map. Measuring point: Top of casing, 2.5 ft above land-surface datum.

PERIOD OF RECORD.--November 1978 to September 1988, December 1997 to September 1998 (monthly measurement), October 1988 to September 1991, October 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.30 ft below land-surface datum, Mar. 26, 1982; lowest recorded, 51.13 ft below land-surface datum, Sept. 4, 2000.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	50.21	50.10	49.94	50.29	50.24	50.22	50.24	50.35	50.41	50.50	50.82	51.10
10	50.15	50.06	50.13	49.88	50.00	50.27	50.35	50.63	50.52	50.66	50.88	51.06
15	50.07	50.11	49.94	50.08	50.25	50.11	50.17	50.55	50.44	50.64	50.96	50.95
20	50.09	50.07	50.09	50.09	50.19	50.17	50.17	50.42	50.51	50.94	50.97	50.91
25	50.13	50.13	50.12	50.03	50.14	50.11	50.31	50.47	50.62	50.94	51.09	50.93
EOM	50.08	50.18	50.13	49.97	50.23	50.28	50.46	50.42	50.60	50.86	50.97	50.88
WTR YR 2000	HIGHEST		49.55	DEC 26		LOWEST		51.13	SEP 4			



## GROUND-WATER LEVELS

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.

LOCATION.--Lat 41°52'35", long 83°41'40", Hydrologic Unit 04100002, at Teal Road, 1.5 mi southeast of Petersburg. Owner: Michigan Department of Natural Resources.

**AQUIFER.**--Sand of Pleistocene age.

**WELL CHARACTERISTICS.**--Drilled water-table well, diameter 1.25 in, depth 17 ft, screened 14 ft to 17 ft.

**INSTRUMENTATION.**--Periodic measurements.

DATUM.--Elevation of land-surface datum is 675 ft above sea level, from topographic map. Measuring point: Top of casing, 4.0 ft above land-surface datum.

PERIOD OF RECORD.--December 1965 to September 1991, February 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft below land-surface datum, Feb. 14, 1966; lowest measured, 8.56 ft below land-surface datum, Feb. 1, 2000.

## WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	8.40	FEB 1	8.56	APR 17	8.23	JUN 6	6.66	JUL 18	6.99	AUG 29	7.64
DEC 27	8.55	MAR 15	8.50								

## GROUND-WATER LEVELS

## OAKLAND COUNTY

424109083384301. Local number, 3N 7E 5BA.

LOCATION.--Lat 42°41'09", long 83°38'43", Hydrologic Unit 04080203, 150 ft west of Fish Lake Road, 1.2 mi east of Clyde. Owner: American Aggregates Company.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 49 ft.

INSTRUMENTATION.--Water-level recorder.

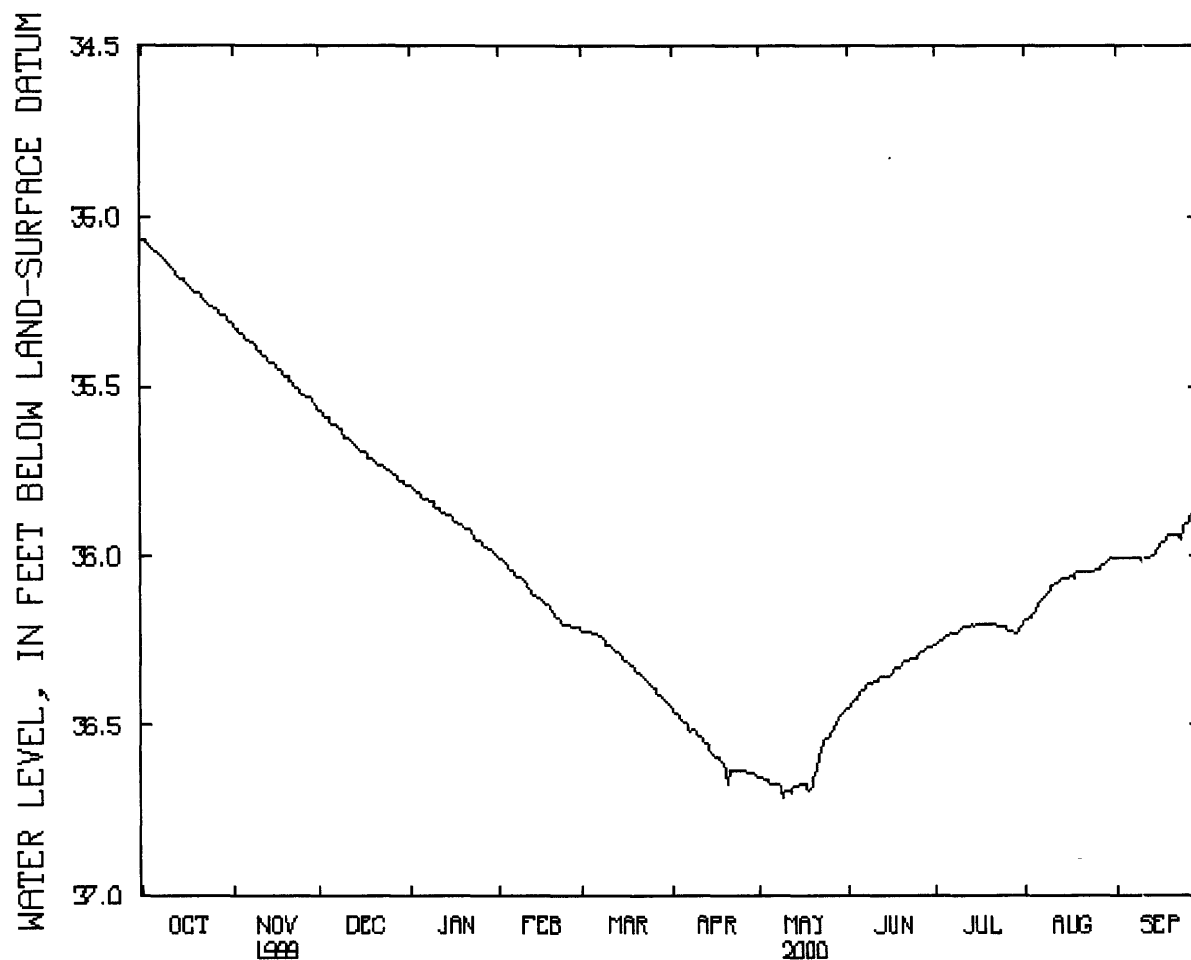
DATUM.--Elevation of land-surface datum is 1,055 ft above sea level, from topographic map. Measuring point: Top of flange, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--April 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 29.5 ft below land-surface datum, June 1976; lowest recorded, 38.7 ft below land-surface datum, December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.10	35.35	35.61	35.82	36.04	36.23	36.49	36.67	36.40	36.24	36.15	36.01
10	35.14	35.40	35.65	35.86	36.08	36.26	36.53	36.69	36.37	36.21	36.09	36.02
15	35.18	35.43	35.69	35.88	36.12	36.31	36.58	36.67	36.35	36.20	36.07	35.98
20	35.22	35.47	35.72	35.92	36.17	36.34	36.67	36.66	36.31	36.20	36.05	35.94
25	35.26	35.52	35.75	35.95	36.20	36.39	36.63	36.53	36.29	36.21	36.04	35.91
EOM	35.31	35.56	35.79	36.00	36.21	36.44	36.65	36.45	36.26	36.20	36.01	35.84
WTR YR 2000	HIGHEST			35.05	OCT 1	LOWEST			36.71	MAY 9		



## GROUND-WATER LEVELS

## WASHTENAW COUNTY

421322083441301. Local number, 3S 6E 16BCCD.

LOCATION.--Lat 42°13'22", long 83°44'13", Hydrologic Unit 04090005, at Ann Arbor Municipal Airport. Owner: City of Ann Arbor.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 10 in, depth 55 ft, screened 35 ft to 55 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 821.50 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

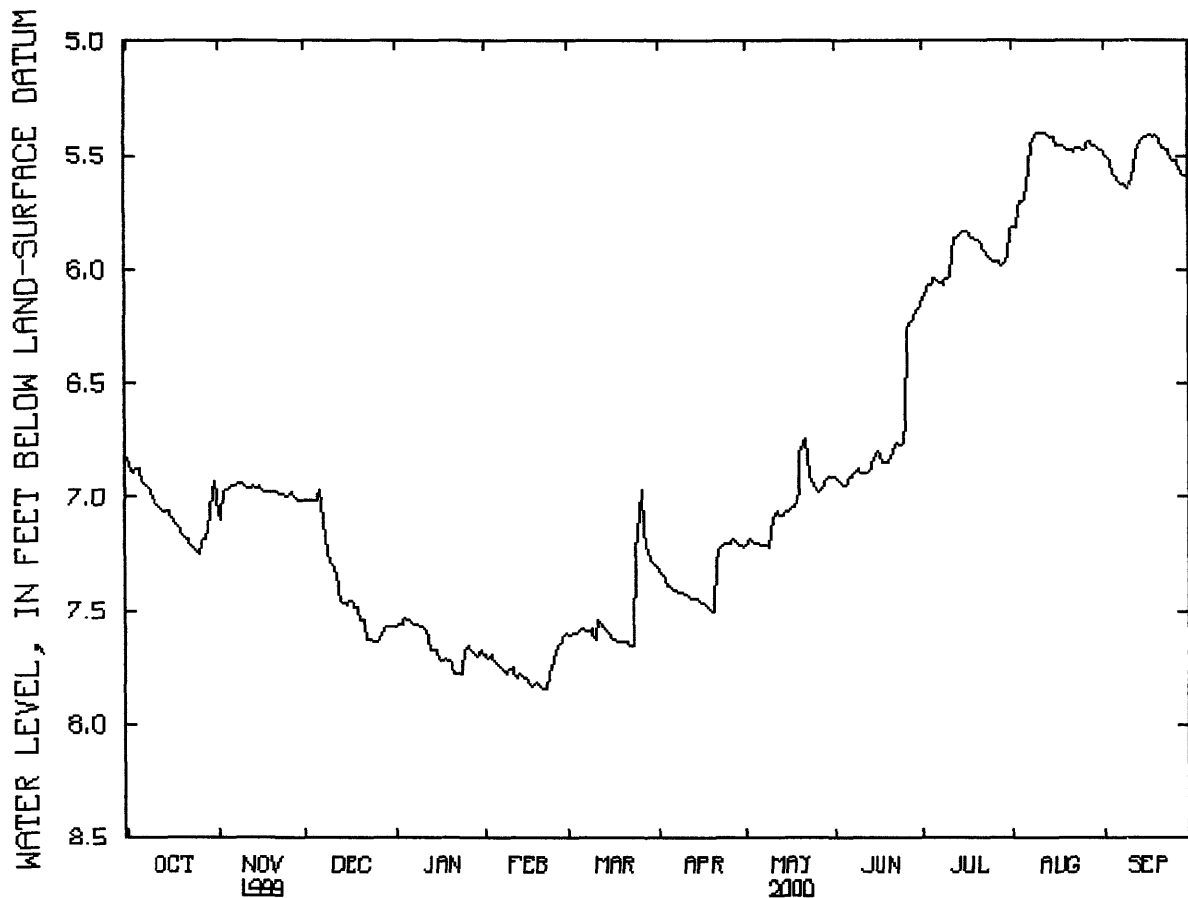
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--September 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 0.69 ft below land-surface datum, Mar. 10, 1974; lowest recorded, 15.86 ft below land-surface datum, Oct. 18, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000  
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.88	6.96	7.02	7.54	7.73	7.58	7.39	7.20	6.94	6.04	5.69	5.60
10	7.00	6.95	7.29	7.57	7.75	7.62	7.43	7.17	6.90	6.03	5.40	5.65
15	7.06	6.95	7.48	7.68	7.80	7.61	7.46	7.07	6.80	5.83	5.42	5.42
20	7.17	6.98	7.54	7.73	7.83	7.64	7.50	6.81	6.83	5.87	5.48	5.43
25	7.24	7.00	7.64	7.68	7.69	7.08	7.20	6.96	6.68	5.96	5.48	5.52
EOM	6.93	7.02	7.57	7.69	7.60	7.31	7.22	6.91	6.16	5.83	5.48	5.59
WTR YR 2000	HIGHEST			5.38	AUG 9, SEP 20			LOWEST	7.84	FEB 21, 22		





## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan

REMARKS.--Systems with (com) after their names are multiple well systems and the samples are considered composites. The other systems may be single or multiple well systems. For these multiple well systems, the samples can be attributed to a single well.

LOCAL WELL NUMBER	DATE	TIME	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
LIVINGSTON COUNTY										
VIR093-1	11-02-99	0850	739	.4	7.3	--	--	471	13.0	--
	03-21-00	0942	744	.1	7.6	--	--	459	9.5	--
	07-26-00	0900	739	.3	7.4	7.4	616	473	20.5	63
VIR093-2 (com)	07-07-99	0905	746	1.8	7.7	--	--	378	11.0	--
	12-02-99	0935	741	2.0	7.3	--	--	581	10.5	--
VIR093-3	11-03-99	1015	732	.1	7.2	--	--	735	11.0	--
	03-01-00	0905	727	.1	7.2	--	--	706	10.5	--
	08-02-00	0857	733	.1	7.1	7.1	728	742	11.5	82
VIR093-4 (com)	07-06-99	0935	754	3.3	7.0	--	--	405	12.0	--
MACOMB COUNTY										
VIR099-1	10-26-99	1030	739	.6	7.0	--	--	1040	10.0	--
	02-28-00	0940	745	.2	7.2	--	--	1140	9.0	--
	07-25-00	1030	743	2.8	7.0	7.2	1090	1100	10.5	120
OAKLAND COUNTY										
VIR125-1	08-03-99	1030	742	.7	--	--	--	505	11.5	--
	12-07-99	1100	743	.1	7.2	--	--	721	10.5	--
	05-08-00	1039	730	.1	7.2	--	--	768	10.5	--
VIR125-2 (com)	07-27-99	1000	713	1.2	--	--	--	--	14.0	--
	11-30-99	0945	751	1.5	7.2	--	--	679	11.0	--
	04-18-00	0942	--	--	7.4	--	--	--	11.0	--
	08-29-00	0953	739	1.3	7.1	7.4	749	717	11.5	100
VIR125-3	09-01-99	1003	742	.1	7.1	--	--	707	12.0	--
	11-16-99	1035	736	.2	7.3	--	--	635	11.0	--
	03-27-00	0923	717	.1	7.3	--	--	689	10.5	--
	08-14-00	1006	737	.2	7.7	7.3	680	713	12.5	78
VIR125-4	07-28-99	0915	734	.1	6.8	--	--	1150	13.5	--
	12-16-99	1058	733	.1	7.0	--	--	1170	11.5	--
	05-15-00	1027	741	.1	7.0	--	--	1110	12.5	--
VIR125-5 (com)	06-30-99	1000	--	--	7.8	--	--	--	11.0	--
	11-15-99	0950	734	.1	7.3	--	--	619	11.0	--
	03-28-00	0950	714	<.1	7.3	--	--	621	11.5	--
	08-09-00	1231	728	.1	7.3	--	--	638	11.0	--
VIR125-6	06-29-99	0936	--	.2	7.3	--	--	577	11.5	--
	11-17-99	0950	738	.2	7.4	--	--	556	11.5	--
	03-29-00	--	726	.1	7.3	--	--	558	11.5	--
	09-05-00	1148	740	.1	7.3	7.5	565	561	10.5	77
VIR125-7	11-01-99	1000	738	.8	7.2	--	--	979	11.0	--
	02-22-00	0950	739	1.7	7.3	--	--	998	10.0	--
	07-12-00	1000	736	.1	7.3	7.4	981	994	10.5	96
VIR125-8 (com)	08-18-99	--	740	3.2	--	--	--	400	11.5	--
	01-12-00	1020	742	7.3	7.3	--	--	472	10.0	--
	06-12-00	1047	741	3.6	7.4	7.4	595	587	10.0	72
VIR125-9 (com)	07-21-99	1000	--	4.1	7.3	--	--	500	12.0	--
	12-14-99	0930	734	2.7	7.6	--	--	676	10.5	--
VIR125-10 (com)	08-16-99	0941	742	3.6	--	--	--	412	22.0	--
	01-10-00	0940	711	4.5	7.4	--	--	332	11.0	--
	05-16-00	0935	737	2.6	7.4	--	--	531	11.5	--
VIR125-11	08-02-99	--	742	1.6	--	--	--	550	16.5	--
	02-09-00	1053	734	.2	7.2	--	--	683	9.5	--
	08-21-00	1023	745	.3	7.3	--	--	712	22.0	--
VIR125-12 (com)	08-09-99	0930	--	2.1	7.5	--	--	400	12.0	--
	12-20-99	0900	734	1.5	7.3	--	--	583	12.0	--
	05-17-00	1009	739	1.3	7.3	--	--	582	11.5	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	CAR- CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)
LIVINGSTON COUNTY									
VIR093-1	11-02-99	--	--	--	--	--	--	--	--
	03-21-00	--	--	--	--	--	--	--	--
	07-26-00	20	0.9	11	269	329	0	7.9	.4
VIR093-2 (com)	07-07-99	--	--	--	--	--	--	--	--
	12-02-99	--	--	--	--	--	--	--	--
VIR093-3	11-03-99	--	--	--	--	--	--	--	--
	03-01-00	--	--	--	--	--	--	--	--
	08-02-00	23	1.6	26	251	306	0	62	.2
VIR093-4	07-06-99	--	--	--	--	--	--	--	--
MACOMB COUNTY									
VIR099-1	10-26-99	--	--	--	--	--	--	--	--
	02-28-00	--	--	--	--	--	--	--	--
	07-25-00	36	1.8	51	312	381	0	120	.1
OAKLAND COUNTY									
VIR125-1	08-03-99	--	--	--	--	--	--	--	--
	12-07-99	--	--	--	--	--	--	--	--
	05-08-00	--	--	--	--	--	--	--	--
VIR125-2 (com)	07-27-99	--	--	--	--	--	--	--	--
	11-30-99	--	--	--	--	--	--	--	--
	04-18-00	--	--	--	--	--	--	--	--
	08-29-00	32	1.5	13	320	391	0	28	.4
VIR125-3	09-01-99	--	--	--	--	--	--	--	--
	11-06-99	--	--	--	--	--	--	--	--
	03-27-00	--	--	--	--	--	--	--	--
	08-14-00	17	1.4	21	263	321	0	63	<.1
VIR125-4	07-28-99	--	--	--	--	--	--	--	--
	12-16-99	--	--	--	--	--	--	--	--
	05-15-00	--	--	--	--	--	--	--	--
VIR125-5 (com)	06-30-99	--	--	--	--	--	--	--	--
	11-15-99	--	--	--	--	--	--	--	--
	03-28-00	--	--	--	--	--	--	--	--
	08-09-00	--	--	--	--	--	--	--	--
VIR125-6	06-29-99	--	--	--	--	--	--	--	--
	11-17-99	--	--	--	--	--	--	--	--
	03-29-00	--	--	--	--	--	--	--	--
	09-04-00	25	0.8	3.7	252	308	0	14	.3
VIR125-7	11-01-99	--	--	--	--	--	--	--	--
	02-22-00	--	--	--	--	--	--	--	--
	07-12-00	32	2.9	51	290	353	0	110	.1
VIR125-8 (com)	08-18-99	--	--	--	--	--	--	--	--
	01-12-00	--	--	--	--	--	--	--	--
	06-12-00	26	1.3	16	292	356	0	11	.5
VIR125-9 (com)	07-21-99	--	--	--	--	--	--	--	--
	12-14-99	--	--	--	--	--	--	--	--
VIR125-10 (com)	08-16-99	--	--	--	--	--	--	--	--
	01-10-00	--	--	--	--	--	--	--	--
	05-16-00	--	--	--	--	--	--	--	--
VIR125-11	08-02-99	--	--	--	--	--	--	--	--
	02-03-00	--	--	--	--	--	--	--	--
	08-21-00	--	--	--	--	--	--	--	--
VIR125-12 (com)	08-09-99	--	--	--	--	--	--	--	--
	12-20-99	--	--	--	--	--	--	--	--
	05-17-00	--	--	--	--	--	--	--	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	SILICA, DIS- SOLVED (MG/L AS SiO <sub>2</sub> ) (00955)	SULFATE DIS- SOLVED (MG/L AS SO <sub>4</sub> ) (00945)	NITRO- GEN, AM- MONIA + ORGANIC DIS- (MG/L AS N) (00623)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO <sub>2</sub> +NO <sub>3</sub> DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
LIVINGSTON COUNTY									
VIR093-1	11-02-99	--	--	--	--	--	--	--	--
	03-21-00	--	--	--	--	--	--	--	--
	07-26-00	17	0.4	0.13	0.095	<0.050	<0.010	<0.006	<0.010
VIR093-2 (com)	07-07-99	--	--	--	--	--	--	--	--
	12-02-99	--	--	--	--	--	--	--	--
VIR093-3	11-03-99	--	--	--	--	--	--	--	--
	03-01-00	--	--	--	--	--	--	--	--
	08-02-00	11	33	E.10	<.020	<.050	<.010	<.006	<.010
VIR093-4 (com)	07-06-99	--	--	--	--	--	--	--	--
MACOMB COUNTY									
VIR099-1	10-26-99	--	--	--	--	--	--	--	--
	02-28-00	--	--	--	--	--	--	--	--
	07-25-00	13	48	--	--	.343	--	E.003	<.010
OAKLAND COUNTY									
VIR125-1	08-03-99	--	--	--	--	--	--	--	--
	12-07-99	--	--	--	--	--	--	--	--
	05-08-00	--	--	--	--	--	--	--	--
VIR125-2 (com)	07-27-99	--	--	--	--	--	--	--	--
	11-30-99	--	--	--	--	--	--	--	--
	04-18-00	--	--	--	--	--	--	--	--
	08-29-00	18	54	.24	.178	<.050	<.010	.008	<.010
VIR125-3	09-01-99	--	--	--	--	--	--	--	--
	11-16-99	--	--	--	--	--	--	--	--
	03-27-00	--	--	--	--	--	--	--	--
	08-14-00	12	1.3	5.4	4.65	<.050	<.010	.027	.038
VIR125-4	07-28-99	--	--	--	--	--	--	--	--
	12-16-99	--	--	--	--	--	--	--	--
	05-15-00	--	--	--	--	--	--	--	--
VIR125-5 (com)	06-30-99	--	--	--	--	--	--	--	--
	11-15-99	--	--	--	--	--	--	--	--
	03-28-00	--	--	--	--	--	--	--	--
	08-09-00	--	--	--	--	--	--	--	--
VIR125-6	06-29-99	--	--	--	--	--	--	--	--
	11-17-99	--	--	--	--	--	--	--	--
	03-29-00	--	--	--	--	--	--	--	--
	09-05-00	15	35	<.10	.030	<.050	<.010	<.006	<.010
VIR125-7	11-01-99	--	--	--	--	--	--	--	--
	02-22-00	--	--	--	--	--	--	--	--
	07-12-00	11	67	.16	.099	<.050	<.010	<.006	<.010
VIR125-8 (com)	08-18-99	--	--	--	--	--	--	--	--
	01-12-00	--	--	--	--	--	--	--	--
	06-12-00	16	23	.21	.131	<.050	<.010	<.006	.012
VIR125-9 (com)	07-21-99	--	--	--	--	--	--	--	--
	12-14-99	--	--	--	--	--	--	--	--
VIR125-10 (com)	08-16-99	--	--	--	--	--	--	--	--
	01-10-00	--	--	--	--	--	--	--	--
	05-16-00	--	--	--	--	--	--	--	--
VIR125-11	08-02-99	--	--	--	--	--	--	--	--
	02-09-00	--	--	--	--	--	--	--	--
	08-21-00	--	--	--	--	--	--	--	--
VIR125-12 (com)	08-09-99	--	--	--	--	--	--	--	--
	12-20-99	--	--	--	--	--	--	--	--
	05-17-00	--	--	--	--	--	--	--	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	COLI- PHAGE, E. COLI C HOST, 1-AGAR, (PLAQUE 100 ML) (90905)	COLI- PHAGE, E. COLI F-AMP, 1-AGAR, (PLAQUE 100 ML) (90904)	COLIPGE F-SPEC FAMP 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99335)	COLIPGE F-SPEC FAMP 2-STEP, PRE/ABS PER 100ML 1=Y, 2=N (99334)	COLIPGE SOM, EC C-HOST, 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99329)	COLIPGE SOM, EC C-HOST, 2-STEP, PRE/ABS PER 100ML 1=Y, 2=N (99328)
LIVINGSTON COUNTY									
VIR093-1	11-02-99	--	--	<1	<1	--	--	--	--
	03-21-00	--	--	<1	<1	--	--	--	--
	07-26-00	0.8	264	<1	<1	2	2	2	2
VIR093-2 (com)	07-07-99	--	--	<1	<1	--	--	--	--
	12-02-99	--	--	<1	<1	--	--	--	--
VIR093-3	11-03-99	--	--	<1	<1	--	--	--	--
	03-01-00	--	--	<1	<1	2	--	2	--
	08-02-00	1.0	416	<1	<1	2	2	2	2
VIR093-4 (com)	07-06-99	--	--	<1	<1	--	--	--	--
MACOMB COUNTY									
VIR099-1	10-26-99	--	--	<1	<1	--	--	--	--
	02-28-00	--	--	<1	<1	2	--	2	--
	07-25-00	<0.3	622	<1	<1	2	2	2	2
OAKLAND COUNTY									
VIR125-1	08-03-99	--	--	<1	<1	--	--	--	--
	12-07-99	--	--	<1	<1	--	--	--	--
	05-08-00	--	--	<1	<1	2	2	2	2
VIR125-2 (com)	07-27-99	--	--	<1	<1	--	--	--	--
	11-30-99	--	--	<1	<1	--	--	--	--
	04-18-00	--	--	<1	<1	2	2	2	2
	08-29-00	1.6	457	<1	<1	2	2	2	2
VIR125-3	09-01-99	--	--	<1	<1	--	--	--	--
	11-16-99	--	--	<1	<1	--	--	--	--
	03-27-00	--	--	<1	<1	2	2	2	2
	08-14-00	4.0	373	<1	<1	2	2	2	2
VIR125-4	07-28-99	--	--	<1	<1	--	--	--	--
	12-16-99	--	--	<1	<1	--	--	--	--
	05-15-00	--	--	<1	<1	2	2	2	2
VIR125-5 (com)	06-30-99	--	--	<1	<1	--	--	--	--
	11-15-99	--	--	<1	<1	--	--	--	--
	03-28-00	--	--	<1	<1	2	2	2	2
	08-09-00	--	--	<1	<1	2	2	2	2
VIR125-6	06-29-99	--	--	<1	<1	--	--	--	--
	11-17-99	--	--	<1	<1	--	--	--	--
	03-29-00	--	--	<1	<1	2	2	2	2
	09-05-00	0.6	329	<1	<1	2	2	2	2
VIR125-7	11-01-99	--	--	<1	<1	--	--	--	--
	02-22-00	--	--	<1	<1	2	--	2	--
	07-12-00	0.8	579	<1	<1	2	2	2	2
VIR125-8 (com)	08-18-99	--	--	<1	<1	--	--	--	--
	01-12-00	--	--	<1	<1	2	--	2	--
	06-12-00	0.8	346	<1	<1	2	2	2	2
VIR125-9 (com)	07-21-99	--	--	<1	<1	--	--	--	--
	12-14-99	--	--	<1	<1	--	--	--	--
VIR125-10 (com)	08-16-99	--	--	<1	<1	--	--	--	--
	01-10-00	--	--	<1	<1	2	--	2	--
	05-16-00	--	--	<1	<1	2	2	2	2
VIR125-11	08-02-99	--	--	<1	<1	--	--	--	--
	02-09-00	--	--	<1	<1	2	--	2	--
	08-21-00	--	--	<1	<1	2	2	2	2
VIR125-12 (com)	08-09-99	--	--	<1	<1	--	--	--	--
	12-20-99	--	--	<1	<1	--	--	--	--
	05-17-00	--	--	<1	<1	2	2	2	2

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	E. COLI WTR UNFLTRD MF, MI (COLS./ 100 ML) (90901)	ENTERIC VIRUS, TOTAL CULT., 1-MDS (MPN / 100 L) (90910)	ENTERO- OCCI (MEI) MF 24 HOUR (COL / 100 ML) (90909)	COLI- FORM, TOTAL, WTR UNF MF, MI (COLS./ 100 ML) (90900)	BORON, DIS- SOLVED AS B) (01020)	BROMIDE DIS- SOLVED AS BR) (71870)	IRON, DIS- SOLVED AS FE) (01046)	MANGA- NESE, DIS- SOLVED AS MN) (01056)
LIVINGSTON COUNTY									
VIR093-1	11-02-99	<1	--	<1	<1	--	--	--	--
	03-21-00	<1	--	<1	<1	--	--	--	--
	07-26-00	<1	<1.0	<1	<1	32	.02	310	16
VIR093-2 (com)	07-07-99	<1	--	<1	<1	--	--	--	--
	12-02-99	<1	--	<1	K8	--	--	--	--
VIR093-3	11-03-99	<1	--	<1	<1	--	--	--	--
	03-01-00	<1	--	<1	<1	--	--	--	--
	08-02-00	<1	--	<1	K1	25	.06	680	60
VIR093-4 (com)	07-06-99	<1	--	<1	2	--	--	--	--
MACOMB COUNTY									
VIR099-1	10-26-99	<1	--	<1	<1	--	--	--	--
	02-28-00	<1	--	<1	<1	--	--	--	--
	07-25-00	<1	--	<1	<1	37	.24	160	130
OAKLAND COUNTY									
VIR125-1	08-03-99	K2	--	<1	K250	--	--	--	--
	12-07-99	<1	--	<1	<1	--	--	--	--
	05-08-00	--	<1.0	--	--	--	--	--	--
VIR125-2 (com)	07-27-99	<1	--	<1	<1	--	--	--	--
	11-30-99	<1	--	<1	<1	--	--	--	--
	04-18-00	<1	<1.0	<1	<1	--	--	--	--
	08-29-00	<1	--	<1	K5	39	.07	1950	34
VIR125-3	09-01-99	<1	--	<1	K3	--	--	--	--
	11-16-99	K6	--	K88	K81	--	--	--	--
	03-27-00	<1	--	K1	<1	--	--	--	--
	08-14-00	<1	<1.0	<1	<1	28	.04	4120	120
VIR125-4	07-28-99	<1	--	K9	<1	--	--	--	--
	12-16-99	<1	--	<1	<1	--	--	--	--
	05-15-00	<1	<1.0	<1	<1	--	--	--	--
VIR125-5 (com)	06-30-99	<1	--	<1	<1	--	--	--	--
	11-15-99	<1	--	<1	<1	--	--	--	--
	03-28-00	<1	<1.0	<1	<1	--	--	--	--
	08-09-00	<1	<1.0	<1	<1	--	--	--	--
VIR125-6	06-29-99	<1	--	<1	<1	--	--	--	--
	11-17-99	<1	--	<1	<1	--	--	--	--
	03-29-00	<1	<1.0	<1	<1	--	--	--	--
	09-05-00	<1	--	<1	<1	19	.06	1000	25
VIR125-7	11-01-99	<1	--	<1	<1	--	--	--	--
	02-22-00	<1	--	<1	<1	--	--	--	--
	07-12-00	<1	<1.0	<1	<1	64	.15	970	57
VIR125-8 (com)	08-18-99	<1	--	<1	<1	--	--	--	--
	01-12-00	<1	--	<1	<1	--	--	--	--
	06-12-00	<1	<1.0	<1	<1	51	.09	1260	31
VIR125-9 (com)	07-21-99	<1	--	<1	<1	--	--	--	--
	12-14-99	<1	--	<1	<1	--	--	--	--
VIR125-10 (com)	08-16-99	<1	--	<1	<1	--	--	--	--
	01-10-00	<1	--	<1	<1	--	--	--	--
	05-16-00	<1	<1.0	<1	<1	--	--	--	--
VIR125-11	08-02-99	<1	--	<1	<1	--	--	--	--
	02-09-00	<1	--	<1	<1	--	--	--	--
	08-21-00	<1	--	<1	<1	--	--	--	--
VIR125-12 (com)	08-09-99	--	--	--	--	--	--	--	--
	12-20-99	<1	--	<1	<1	--	--	--	--
	05-17-00	<1	<1.0	<1	<1	--	--	--	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	TIME	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OAKLAND COUNTY										
VIR125-13 (com)	10-05-99	0955	743	2.8	7.3	--	--	588	10.5	--
	02-02-00	1040	745	1.9	7.4	--	--	579	10.0	--
	06-13-00	1025	736	.1	7.4	7.6	600	586	10.0	72
VIR125-14 (com)	08-17-99	0930	734	1.0	--	--	--	380	12.0	--
	01-11-00	1005	720	2.2	7.5	--	--	456	11.0	--
	05-30-00	1025	738	.9	7.5	7.8	519	515	11.0	64
VIR125-15	11-09-99	0823	735	.1	7.5	--	--	554	11.5	--
	04-24-00	0930	734	.1	7.6	--	--	564	11.5	--
	08-01-00	0955	730	.3	7.3	7.4	575	584	11.5	62
VIR125-16 (com)	10-06-99	0940	739	.1	7.4	--	--	491	10.5	--
	01-18-00	1110	735	1.1	7.5	--	--	429	10.5	--
	05-31-00	1047	734	.1	7.4	7.4	500	503	10.5	69
	08-15-00	0950	733	.2	7.3	--	--	498	11.0	--
VIR125-17 (com)	10-25-99	0940	740	2.1	7.3	--	--	525	11.5	--
	02-15-00	1025	742	1.5	7.4	--	--	526	11.0	--
	06-27-00	0940	737	.1	7.4	7.6	484	528	11.5	75
VIR125-18 (com)	06-22-99	1115	740	.4	7.4	--	--	470	10.5	--
	11-10-99	1015	728	3.2	7.5	--	--	463	11.0	--
	04-17-00	0950	731	.7	7.5	--	--	468	10.5	--
	08-28-00	1227	733	4.8	7.3	7.7	484	462	10.5	52
VIR125-19 (com)	10-04-99	0950	744	2.3	7.4	--	--	521	11.0	--
	01-26-00	0900	740	1.3	7.2	--	--	514	10.0	--
	06-14-00	1020	733	2.2	7.3	7.5	539	536	10.5	64
VIR125-20	08-31-99	0934	742	.3	7.1	--	--	798	15.5	--
	01-03-00	1425	735	.5	7.2	--	--	679	10.5	--
VIR125-21 (com)	07-20-99	0922		2.2	7.1	--	--	320	13.0	--
	12-09-99	0930	745	.5	7.0	--	--	960	11.5	--
VIR125-22 (com)	11-22-99	0945	738	3.1	7.4	--	--	569	11.0	--
	02-29-00	1018	740	2.3	7.5	--	--	558	11.0	--
	07-19-00	1036	734	2.9	7.4	7.6	583	571	11.5	70
VIR125-23	06-23-99	0950	--	.1	7.3	--	--	692	11.0	--
	12-01-99	1010	750	.1	7.4	--	--	697	11.0	--
	04-19-00	1030	737	.1	7.6	--	--	700	11.0	--
	09-20-00	1115	726	.1	7.4	7.5	717	727	10.5	100
VIR125-24 (com)	08-11-99	1000	--	2.6	7.6	--	--	510	12.0	--
	01-05-00	1005	743	1.7	7.6	--	--	633	11.0	--
	05-23-00	1042	725	2.2	7.6	7.7	647	652	12.5	51
VIR125-25 (com)	08-04-99	0930	--	--	--	--	--	--	--	--
	12-15-99	1015	730	3.7	7.3	--	--	588	11.0	--
VIR125-26 (com)	10-27-99	1013	746	2.3	7.4	--	--	484	11.5	--
	02-16-00	0958	737	1.0	7.6	--	--	463	11.0	--
	06-28-00	1027	738	1.3	7.5	7.7	491	489	11.5	49
WASHTENAW COUNTY										
VIR161-1	11-08-99	0950	744	5.4	7.6	--	--	733	12.0	--
	03-08-00	0947	739	4.0	6.9	--	--	707	11.5	--
	07-17-00	1032	735	2.8	7.7	7.3	648	796	13.0	84
VIR161-2	09-29-99	1000	744	<.1	7.1	--	--	753	12.0	--
	02-08-00	0941	748	.1	7.2	--	--	767	12.0	--
	06-26-00	0948	736	.1	7.1	7.2	727	813	12.0	110
VIR161-3	09-28-99	1030	742	<.1	7.4	--	--	1440	12.0	--
	01-04-00	1015	732	.1	7.5	--	--	1440	10.5	--
	05-22-00	1018	734	.3	7.4	7.5	1380	1420	11.0	64
	08-22-00	0906	743	.3	7.2	--	--	1410	12.5	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	ALKA- LINITY WAT DIS TOT IT FIELD (MG/L AS CACO3) (39086)	BICAR- BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	CAR- BONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)
OAKLAND COUNTY									
VIR125-13 (com)	10-05-99	--	--	--	--	--	--	--	--
	02-02-00	--	--	--	--	--	--	--	--
	06-13-00	28	1.1	15	276	336	0	18	.6
VIR125-14 (com)	08-17-99	--	--	--	--	--	--	--	--
	01-11-00	--	--	--	--	--	--	--	--
	05-30-00	22	1.2	8.5	207	252	0	9.1	.6
VIR125-15	11-09-99	--	--	--	--	--	--	--	--
	04-24-00	--	--	--	--	--	--	--	--
	08-01-00	21	1.7	18	194	237	0	52	.2
VIR125-16 (com)	10-06-99	--	--	--	--	--	--	--	--
	01-18-00	--	--	--	--	--	--	--	--
	05-31-00	22	.8	4.9	474	578	0	7.2	.2
	08-15-00	--	--	--	--	--	--	--	--
VIR125-17 (com)	10-25-99	--	--	--	--	--	--	--	--
	02-15-00	--	--	--	--	--	--	--	--
	06-27-00	20	1.0	7.2	290	353	0	2.2	.3
VIR125-18 (com)	06-22-99	--	--	--	--	--	--	--	--
	11-10-99	--	--	--	--	--	--	--	--
	04-17-00	--	--	--	--	--	--	--	--
	08-28-00	22	1.2	18	222	271	0	7.7	.8
VIR125-19 (com)	10-04-99	--	--	--	--	--	--	--	--
	01-26-00	--	--	--	--	--	--	--	--
	06-14-00	21	1.1	12	249	304	0	13	.6
VIR125-20	08-31-99	--	--	--	--	--	--	--	--
	01-03-00	--	--	--	--	--	--	--	--
VIR125-21 (com)	07-20-99	--	--	--	--	--	--	--	--
	12-09-99	--	--	--	--	--	--	--	--
VIR125-22 (com)	11-22-99	--	--	--	--	--	--	--	--
	02-29-00	--	--	--	--	--	--	--	--
	07-19-00	25	1.2	12	269	329	0	16	.5
VIR125-23	06-23-99	--	--	--	--	--	--	--	--
	12-01-99	--	--	--	--	--	--	--	--
	04-19-00	--	--	--	--	--	--	--	--
	09-20-00	32	1.0	5.0	231	282	0	10	.2
VIR125-24 (com)	08-11-99	--	--	--	--	--	--	--	--
	01-05-00	--	--	--	--	--	--	--	--
	05-23-00	21	1.3	50	259	316	0	61	.8
VIR125-25 (com)	08-04-99	--	--	--	--	--	--	--	--
	12-15-99	--	--	--	--	--	--	--	--
VIR125-26 (com)	10-27-99	--	--	--	--	--	--	--	--
	02-16-00	--	--	--	--	--	--	--	--
	06-28-00	22	1.1	19	255	311	0	5.7	.7
WASHTENAW COUNTY									
VIR161-1	11-08-99	--	--	--	--	--	--	--	--
	03-08-00	--	--	--	--	--	--	--	--
	07-17-00	21	1.5	14	271	331	0	34	.2
VIR161-2	09-29-99	--	--	--	--	--	--	--	--
	02-08-00	--	--	--	--	--	--	--	--
	06-26-00	32	1.4	5.0	320	391	0	29	.3
VIR161-3	09-28-99	--	--	--	--	--	--	--	--
	01-04-00	--	--	--	--	--	--	--	--
	05-22-00	19	3.4	190	259	316	0	200	.8
	08-22-00	--	--	--	247	302	0	--	--

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
OAKLAND COUNTY									
VIR125-13 (com)	10-05-99	--	--	--	--	--	--	--	--
	02-02-00	--	--	--	--	--	--	--	--
	06-13-00	18	22	.37	.282	<0.050	<0.010	<0.006	<0.010
VIR125-14 (com)	08-17-99	--	--	--	--	--	--	--	--
	01-11-00	--	--	--	--	--	--	--	--
	05-30-00	15	51	--	--	--	--	--	--
VIR125-15	11-09-99	--	--	--	--	--	--	--	--
	04-24-00	--	--	--	--	--	--	--	--
	08-01-00	11	27	.27	.192	<.050	<.010	<.006	.016
VIR125-16 (com)	10-06-99	--	--	--	--	--	--	--	--
	01-18-00	--	--	--	--	--	--	--	--
	05-31-00	16	24	.20	.100	<.050	<.010	<.006	<.010
	08-15-00	--	--	--	--	--	--	--	--
VIR125-17 (com)	10-25-99	--	--	--	--	--	--	--	--
	02-15-00	--	--	--	--	--	--	--	--
	06-27-00	18	4.8	.25	.174	<.050	<.010	E.003	<.010
VIR125-18 (com)	06-22-99	--	--	--	--	--	--	--	--
	11-10-99	--	--	--	--	--	--	--	--
	04-17-00	--	--	--	--	--	--	--	--
	08-28-00	15	18	.43	.355	<.050	<.010	.010	<.010
VIR125-19 (com)	10-04-99	--	--	--	--	--	--	--	--
	01-26-00	--	--	--	--	--	--	--	--
	06-14-00	16	14	.14	.089	<.050	<.010	<.006	<.010
VIR125-20	08-31-99	--	--	--	--	--	--	--	--
	01-03-00	--	--	--	--	--	--	--	--
VIR125-21 (com)	07-20-99	--	--	--	--	--	--	--	--
	12-09-99	--	--	--	--	--	--	--	--
VIR125-22 (com)	11-22-99	--	--	--	--	--	--	--	--
	02-29-00	--	--	--	--	--	--	--	--
	07-19-00	17	20	<.10	<.020	.071	<.010	<.006	<.010
VIR125-23	06-23-99	--	--	--	--	--	--	--	--
	12-01-99	--	--	--	--	--	--	--	--
	04-19-00	--	--	--	--	--	--	--	--
	09-20-00	16	150	E.10	.055	<.050	<.010	<.006	<.010
VIR125-24 (com)	08-11-99	--	--	--	--	--	--	--	--
	01-05-00	--	--	--	--	--	--	--	--
	05-23-00	16	12	.31	.228	<.050	<.010	<.006	<.010
VIR125-25 (com)	08-04-99	--	--	--	--	--	--	--	--
	12-15-99	--	--	--	--	--	--	--	--
VIR125-26 (com)	10-27-99	--	--	--	--	--	--	--	--
	02-16-00	--	--	--	--	--	--	--	--
	06-28-00	16	10	.35	.276	<.050	<.010	E.004	<.010
WASHTENAW COUNTY									
VIR161-1	11-08-99	--	--	--	--	--	--	--	--
	03-08-00	--	--	--	--	--	--	--	--
	07-17-00	13	24	.49	.316	<.050	<.010	<.006	.013
VIR161-2	09-29-99	--	--	--	--	--	--	--	--
	02-08-00	--	--	--	--	--	--	--	--
	06-26-00	18	66	.23	.057	<.050	<.010	<.006	.011
VIR161-3	09-28-99	--	--	--	--	--	--	--	--
	01-04-00	--	--	--	--	--	--	--	--
	05-22-00	13	120	.40	.350	<.050	<.010	<.006	<.010
	08-22-00	--	--	--	--	--	--	--	--



## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	COLI- PHAGE, E. COLI C HOST, 1-AGAR, (PLAQUE 100 ML) (90905)	COLI- PHAGE, E. COLI F-AMP, 1-AGAR, (PLAQUE 100 ML) (90904)	COLIPGE F-SPEC FAMP 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99335)	COLIPGE F-SPEC FAMP 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99334)	COLIPGE SOM, EC C-HOST, 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99329)	COLIPGE SOM, EC C-HOST, 2-STEP, PRE/ABS PER 1 L 1=Y, 2=N (99328)
OAKLAND COUNTY									
VIR125-13 (com)	10-05-99	--	--	<1	<1	--	--	--	--
	02-02-00	--	--	<1	<1	2	--	2	--
	06-13-00	1.6	346	<1	<1	2	2	2	2
VIR125-14 (com)	08-17-99	--	--	<1	<1	--	--	--	--
	01-11-00	--	--	<1	<1	2	--	2	--
	05-30-00	1.1	309	<1	<1	2	2	2	2
VIR125-15	11-09-99	--	--	<1	<1	--	--	--	--
	04-24-00	--	--	<1	<1	2	2	2	2
	08-01-00	1.2	328	<1	<1	2	2	2	2
VIR125-16 (com)	10-06-99	--	--	<1	<1	--	--	--	--
	01-18-00	--	--	<1	<1	2	--	2	--
	05-31-00	1.2	295	<1	<1	2	2	2	2
	08-15-00	--	--	<1	<1	2	2	2	2
VIR125-17 (com)	10-25-99	--	--	<1	<1	--	--	--	--
	02-15-00	--	--	<1	<1	2	--	1	--
	06-27-00	1.4	309	<1	<1	2	2	2	2
VIR125-18 (com)	06-22-99	--	--	<1	<1	--	--	--	--
	11-10-99	--	--	<1	<1	--	--	--	--
	04-17-00	--	--	<1	<1	2	2	2	2
	08-28-00	0.9	279	<1	<1	2	2	2	2
VIR125-19 (com)	10-04-99	--	--	<1	<1	--	--	--	--
	01-26-00	--	--	<1	<1	2	--	2	--
	06-14-00	0.8	306	<1	<1	2	2	2	2
VIR125-20	08-31-99	--	--	<1	<1	--	--	--	--
	01-03-00	--	--	<1	<1	2	--	2	--
VIR125-21 (com)	07-20-99	--	--	<1	<1	--	--	--	--
	12-09-99	--	--	<1	<1	--	--	--	--
VIR125-22 (com)	11-22-99	--	--	<1	<1	--	--	--	--
	02-29-00	--	--	<1	<1	2	--	2	--
	07-19-00	0.5	335	<1	<1	2	2	2	2
VIR125-23	06-23-99	--	--	<1	<1	--	--	--	--
	12-01-99	--	--	<1	<1	--	--	--	--
	04-19-00	--	--	<1	<1	2	2	2	2
	09-20-00	1.0	473	<1	<1	2	2	2	2
VIR125-24 (com)	08-11-99	--	--	<1	<1	--	--	--	--
	01-05-00	--	--	<1	<1	2	--	2	--
	05-23-00	1.6	363	<1	<1	2	2	2	2
VIR125-25 (com)	08-04-99	--	--	<1	<1	--	--	--	--
	12-15-99	--	--	<1	<1	--	--	--	--
VIR125-26 (com)	10-27-99	--	--	<1	<1	--	--	--	--
	02-16-00	--	--	<1	<1	2	--	2	--
	06-28-00	1.2	284	<1	<1	2	2	2	2
WASHTENAW COUNTY									
VIR161-1	11-08-99	--	--	<1	<1	--	--	--	--
	03-08-00	--	--	<1	<1	2	--	2	--
	07-17-00	2.9	391	<1	<1	2	2	2	2
VIR161-2	09-29-99	--	--	<1	<1	--	--	--	--
	02-08-00	--	--	<1	<1	2	--	2	--
	06-26-00	1.3	491	<1	<1	2	2	2	2
VIR161-3	09-28-99	--	--	<1	<1	--	--	--	--
	01-04-00	--	--	<1	<1	2	--	2	--
	05-22-00	1.2	778	<1	<1	2	2	2	2
	08-22-00	--	--	<1	<1	2	2	2	2

## GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

USGS-USEPA study on the occurrence of ground-water pathogens in small public ground-water supplies in southeast Michigan--Continued

LOCAL WELL NUMBER	DATE	E. COLI WTR UNFLTRD MF, MI (COLS. / 100 ML) (90901)	ENTERIC VIRUS, TOTAL CULT., 1-MDS (MPN / 100 L) (90910)	ENTERO- COCCI (MEI) MF 24 HOUR (COL / 100 ML) (90909)	COLI- FORM, TOTAL, WTR UNF MF, MI (COLS. / 100 ML) (90900)	BORON, DIS- SOLVED (UG/L AS B) (01020)	BROMIDE DIS- SOLVED (MG/L AS BR) (71870)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
OAKLAND COUNTY									
VIR125-13 (com)	10-05-99	<1	--	<1	K18	--	--	--	--
	02-02-00	<1	--	<1	<1	--	--	--	--
	06-13-00	<1	<1.0	<1	<1	51	.05	940	22
VIR125-14 (com)	08-17-99	<1	--	<1	<1	--	--	--	--
	01-11-00	<1	--	<1	<1	--	--	--	--
	05-30-00	<1	<1.0	<1	<1	50	.06	940	20
VIR125-15	11-09-99	<1	--	<1	<1	--	--	--	--
	04-24-00	<1	--	<1	<1	--	--	--	--
	08-01-00	<1	--	<1	K4	29	.08	1520	32
VIR125-16 (com)	10-06-99	<1	--	<1	<1	--	--	--	--
	01-18-00	<1	--	<1	<1	--	--	--	--
	05-31-00	<1	<1.0	<1	<1	25	.04	1220	21
	08-15-00	<1	--	<1	<1	--	--	--	--
VIR125-17 (com)	10-25-99	<1	--	<1	<1	--	--	--	--
	02-15-00	<1	--	<1	<1	--	--	--	--
	06-27-00	<1	<1.0	<1	<1	42	.04	1550	11
VIR125-18 (com)	06-22-99	<1	--	<1	<1	--	--	--	--
	11-10-99	<1	--	<1	<1	--	--	--	--
	04-17-00	<1	<1.0	<1	<1	--	--	--	--
	08-28-00	<1	<1.0	<1	<1	82	.07	730	14
VIR125-19 (com)	10-04-99	<1	--	<1	<1	--	--	--	--
	01-26-00	<1	--	<1	<1	--	--	--	--
	06-14-00	<1	--	<1	<1	37	.04	640	20
VIR125-20	08-31-99	<1	--	<1	<1	--	--	--	--
	01-03-00	<1	--	K2	K1	--	--	--	--
VIR125-21 (com)	07-20-99	<1	--	K4	<1	--	--	--	--
	12-09-99	<1	--	<1	<1	--	--	--	--
VIR125-22 (com)	11-22-99	<1	--	<1	<1	--	--	--	--
	02-29-00	<1	--	<1	<1	--	--	--	--
	07-19-00	<1	<1.0	<1	<1	30	.04	<10	12
VIR125-23	06-23-99	<1	--	<1	<1	--	--	--	--
	12-01-99	<1	--	<1	<1	--	--	--	--
	04-19-00	<1	--	<1	<1	--	--	--	--
	09-20-00	<1	--	<1	<1	37	.14	1600	26
VIR125-24 (com)	08-11-99	<1	--	<1	<1	--	--	--	--
	01-05-00	<1	--	<1	<1	--	--	--	--
	05-23-00	<1	<1.0	<1	<1	78	.13	420	9
VIR125-25 (com)	08-04-99	K1	--	<1	K1	--	--	--	--
	12-15-99	<1	--	<1	<1	--	--	--	--
VIR125-26 (com)	10-27-99	<1	--	<1	<1	--	--	--	--
	02-16-00	<1	--	<1	<1	--	--	--	--
	06-28-00	<1	<1.0	<1	<1	92	.05	810	9
WASHTENAW COUNTY									
VIR161-1	11-08-99	<1	--	<1	1	--	--	--	--
	03-08-00	<1	--	<1	<1	--	--	--	--
	07-17-00	<1	<1.0	<1	<1	54	.07	1620	110
VIR161-2	09-29-99	<1	<1.0	<1	<1	--	--	--	--
	02-08-00	<1	--	<1	<1	--	--	--	--
	06-26-00	<1	<1.0	<1	K17	30	.09	2290	49
VIR161-3	09-28-99	<1	--	<1	<1	--	--	--	--
	01-04-00	<1	--	<1	<1	--	--	--	--
	05-22-00	<1	<1.0	<1	<1	494	.25	850	22
	08-22-00	<1	--	<1	<1	--	--	--	--

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## CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
<i>Length</i>		
inch (in.)	$2.54 \times 10^1$	millimeter
	$2.54 \times 10^{-2}$	meter
foot (ft)	$3.048 \times 10^{-1}$	meter
mile (mi)	$1.609 \times 10^0$	kilometer
<i>Area</i>		
acre	$4.047 \times 10^3$	square meter
	$4.047 \times 10^{-1}$	square hectometer
	$4.047 \times 10^{-3}$	square kilometer
square mile (mi <sup>2</sup> )	$2.590 \times 10^0$	square kilometer
<i>Volume</i>		
gallon (gal)	$3.785 \times 10^0$	liter
	$3.785 \times 10^0$	cubic decimeter
	$3.785 \times 10^{-3}$	cubic meter
million gallons (Mgal)	$3.785 \times 10^3$	cubic meter
	$3.785 \times 10^{-3}$	cubic hectometer
cubic foot (ft <sup>3</sup> )	$2.832 \times 10^1$	cubic decimeter
	$2.832 \times 10^{-2}$	cubic meter
cubic-foot-per-second day [(ft <sup>3</sup> /s) d]	$2.447 \times 10^3$	cubic meter
	$2.447 \times 10^{-3}$	cubic hectometer
acre-foot (acre-ft)	$1.233 \times 10^3$	cubic meter
	$1.233 \times 10^{-3}$	cubic hectometer
	$1.233 \times 10^{-6}$	cubic kilometer
<i>Flow</i>		
cubic foot per second (ft <sup>3</sup> /s)	$2.832 \times 10^1$	liter per second
	$2.832 \times 10^1$	cubic decimeter per second
	$2.832 \times 10^{-2}$	cubic meter per second
gallon per minute (gal/min)	$6.309 \times 10^{-2}$	liter per second
	$6.309 \times 10^{-2}$	cubic decimeter per second
	$6.309 \times 10^{-5}$	cubic meter per second
million gallons per day (Mgal/d)	$4.381 \times 10^1$	cubic decimeter per second
	$4.381 \times 10^{-2}$	cubic meter per second
<i>Mass</i>		
ton (short)	$9.072 \times 10^{-1}$	megagram or metric ton

**Sea level:** In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment for the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

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