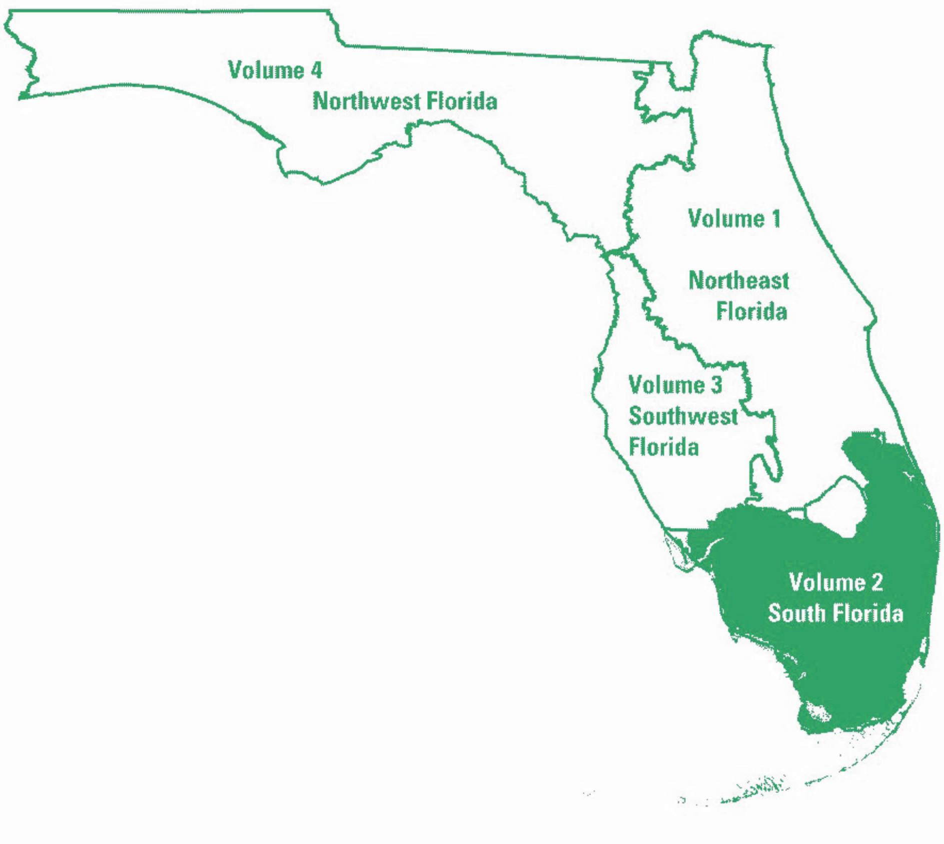
Prepared in cooperation with the State of Florida and other cooperative agencies

Water Resources Data
Florida
Water Year 2005

Volume 2A.
South Florida Surface Water



Water-Data Report FL-05-2A

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

Calendar for Water Year 2005

2004

October

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2005

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25	26	27	28	29	30	

Water Resources Data
Florida
Water Year 2005

Volume 2A. South Florida Surface Water

By C. Price, K. Overton

WATER-DATA REPORT FL-05-2A

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

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

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VOLUME 2A: SOUTH FLORIDA

PREFACE

This volume of the annual hydrologic data report of Florida 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. Hydrologic data for Florida are contained in four volumes. Figure 1 shows the area covered by Volume 2A.

Volume 1.	Northeast Florida
Volume 2.	South Florida
Volume 3.	Southwest Florida
Volume 4.	Northwest Florida

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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. This report was prepared for publication by the Hydrologic Records Section under the supervision of K. Overton, E. C. Price, and S. Prinos; and by the Hydrologic Studies Section under the supervision of Robert Renken and E. Patino. Sheila Guevara, Carolyn Price, Jose Agis, and Bruce Irvin, were the primary persons responsible for the compilation of the data 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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Hydrologic data for south Florida are contained in two volumes

Volume 2A: Surface Water
Volume 2B: Ground Water

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13. ABSTRACT *(Maximum 200 words)*

Water resources data for 2005 water year in Florida consists of continuous or daily discharge for 429 streams, periodic discharge for 9 streams, continuous or daily stage for 218 streams, periodic stage for 5 stream, peak discharge for 28 streams, and peak stage for 28 streams, continuous or daily elevations for 15 lakes, periodic elevations for 23 lakes, continuous ground-water levels for 401 wells, periodic ground-water levels for 1,098 wells, quality of water data for 211 surface-water sites, and 208 wells.

The data for South Florida included continuous or daily discharge for 91 streams, continuous or daily stage for 62 streams, no peak stage discharge for streams, 1 continuous elevation for lake, continuous ground-water levels for 248 wells, periodic ground-water levels for 187 wells, water quality for 54 surface-water sites, and 121 wells.

These data represent the National Water Data System records collected by the U.S. Geological Survey and cooperating local, State, and Federal agencies in Florida.

14. SUBJECT TERMS
***Florida, *Hydrologic data, *Surface Water, *Ground Water, *Water Quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical analyses, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses, Elevations, Water wells.**

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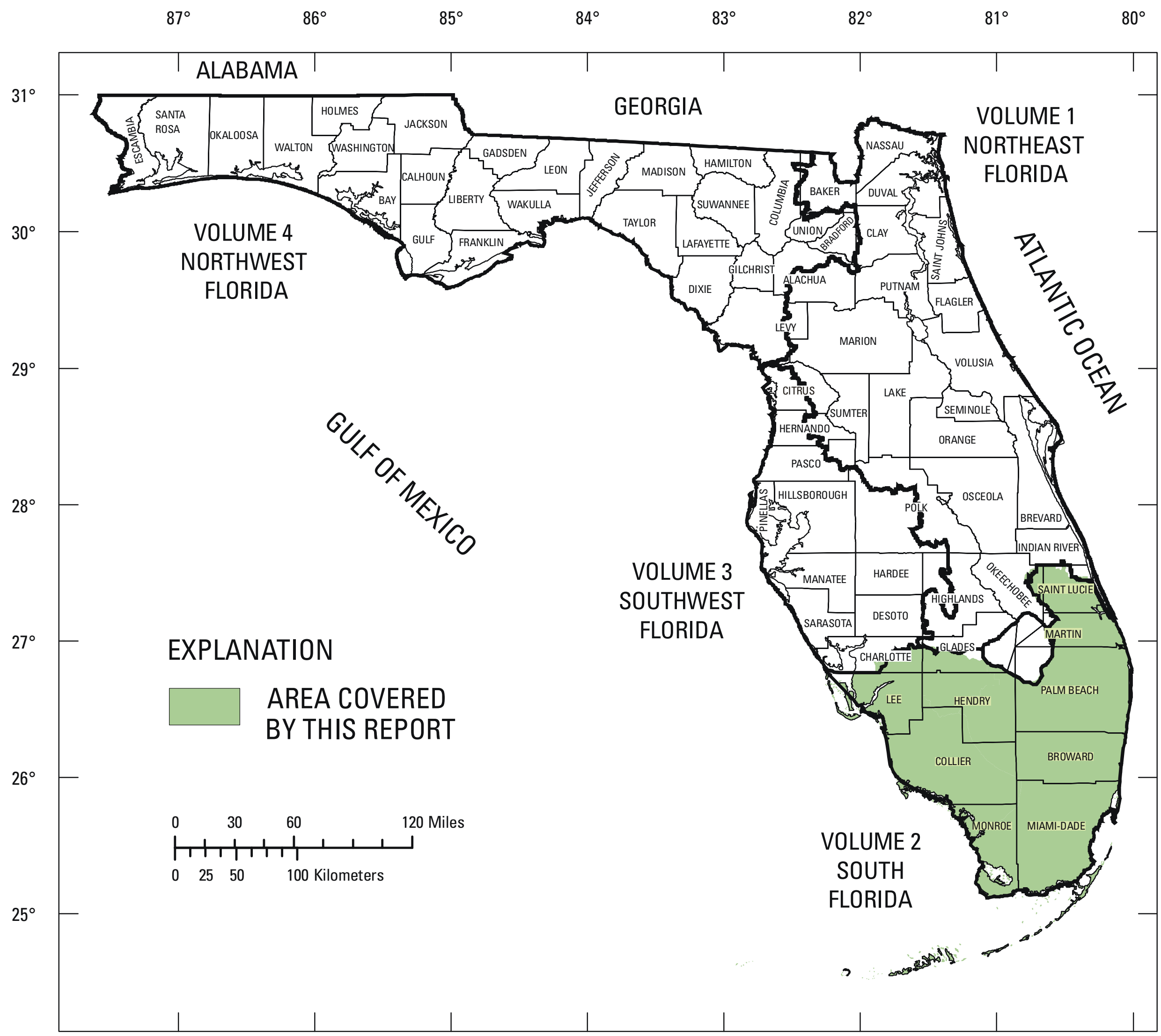

Figure 1. Geographic area covered by this report.

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STREAM AND LAKE GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

The following list shows the surface water sites where streamflow, stage, lake elevation, or daily water quality data are collected. [Letters after station names designate type of data collected: (d) discharge, (e) elevation, (g) gage heights, (s) salinity, (t) temperature]

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St Lucie River:		
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Taylor River at mouth near Homestead, FL (d,g,s,t)	251127080382100	256
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DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water stage and discharge stations in South Florida 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. Discontinued project stations with less than 3 years have not been included. Information regarding these stations may be obtained from the subdistrict office at the address given on the back side of the title page of this report. Drainage area is indeterminate for all of the stations listed below. [Letters after station names designate type of data published: (d) discharge, (e) elevation or gage heights, (g) gage heights, (q) water quality]

Station name	Station number	Period of record water years published
Airplane Prairie near Monroe, FL (g)	260345081053500	1979 - 1980
Angelfish Creek near Florida City, FL (g)	02290757	1971
Barnes Sound at Key Largo, FL (g)	02290784	1971
Barnes Sound near Florida City, FL (g)	02290760	1967 - 1968
Big Cypress Swamp at Everglades Parkway, near Sunniland, FL (d,g)	02288830	1970 - 1971
Big Cypress Swamp at Training Airport, near Miami, FL (d,g)	02288970	1970 - 1974
Big Cypress Swamp below Training Airport, near Miami, FL (g)	02288971	1970 - 1974
Big Cypress Swamp Pinelands near Monroe, FL (g)	255737081043200	1979 - 1980
Big Cypress Watershed at Everglades Pky, nr Big Cypress Indian Reservation, FL (d,g)	02289033	1970 - 1971
Billy Creek at Ft Myers, FL (g)	02293200	1944 - 1955
Biscayne Bay at Coconut Grove, Miami, FL (g) (formerly published under station number 02290755)	02290540	1963 - 1981
Biscayne Bay at Elliott Key, near Homestead, FL (g)	02290737	1967 - 1968
Biscayne Bay at Key Biscayne, near Miami Beach, FL (g) (formerly published under station number 02290753)	02290543	1964,1967, 1968
Biscayne Bay at North Miami, FL (g)	02290750	1963 - 1981
Biscayne Bay near Homestead, FL (g) (formerly published under station number 02290760)	02290732	1963 - 1981
Biscayne Bay at Ragged Key No. 5 near Florida City, FL (g)	02290705	1971
Biscayne Canal at Red Road, near Opa-Locka, FL (g)	02286320	1963 - 1979
Biscayne Canal at North Miami, FL (g)	02286330	1963
Biscayne Canal at S-28, near Miami, FL (d)	02286340	1962 - 1985
Black Creek near Richmond Heights, FL (g)	02290707	1971 - 1979
Black Creek Canal at S-21 near Goulds, FL (d,g)	02290710	1957 - 2004
Black Creek Canal below S-21 near Goulds, FL (g)	02290711	1971
Broad River near Everglades, FL (d,g) (period of record published in 1967 volume 2A)	02290880	1962 - 1965
C-1 Canal near Jupiter, FL (q)	265631080132500	1989 - 1998
C-2 Canal above S-4 near Deerfield Beach, FL (d,e)	02281490	1989 - 1993
C-2 Canal below S-4 near Deerfield Beach, FL (e)	02281491	1989 - 1993
Caloosahatchee Canal at Moore Haven, FL (d,g)	02292000	1938 - 2003
Caloosahatchee Canal at Ortona Lock near La Belle, FL (d,g)	02292480	1971 - 2003
Caloosahatchee Canal near Citrus Center, FL (d) (WSP 1304)	02292500	1934 - 1936
Camelot Canal at Control at Cape Coral, FL (g)	02293245	1987 - 1990
Camelot Canal below Control at Cape Coral, FL (g)	02293246	1987 - 1992
Canal 1 at Indiantown Road and 133 Way near Jupiter, FL (q)	265632080144200	1994 - 1998
Canal 60 at S-140 near Ft. Lauderdale, FL (d,g)	02286962	1970 - 1981
Canal 111 above S-197 near Florida City, FL (d,g)	251713080263300	1984
Canal 111 at Clv.5 between S-18C and S-197 nr Homestead., FL (e)	251823080294200	1984 - 1985
Canal 111 at U.S. Highway 1, near Florida City, FL (e)	02290780	1967 - 1969
Canal 111 below S-18-C near Florida City. FL (e)	02290770	1967 - 1969
C-7 Canal near Jupiter, FL (q)	265352080120400	1989 - 1998
C-18 Canal at G-92 near Jupiter, FL (q)	265437080103200	1989 - 1998
Canal C-18 near Jupiter, FL (d,g)	265218080144300	1980 - 1982
Canal M near Mangonia Park, FL (d,g)	02277900	1970 - 1977
Card Sound at Angelfish Creek near Florida City, FL (g)	02290756	1971
Card Sound at Model Land Canal, near Florida City, FL (g)	02290750	1967 - 1981
Card Sound Canal near Florida City, FL (d,g)	02290739	1972 - 1974
Cape Florida Channel near Key Biscayne, FL (g)	02290590	1970

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

Station name	Station number	Period of record water years published
Ceasar Creek at Adam Key, near Florida City, FL (g)	02290738	1971
Charlotte Harbor at Bokeelia, FL (g)	02293340	1990 - 1993
Cocohatchee River Canal near Naples, FL (d,g)	02291400	1966
Cocohatchee River Canal near Naples Park, FL(d,g)	02291393	1969 - 1984
Comfort Canal at N.W. 29th Avenue, Miami, FL (g)	02290520	1962 - 1970
(formerly published as South Fork Miami River at N.W. 29th Avenue)		
Coral Gables Canal at Red Road, Coral Gables, FL (g)	02290560	1963 - 1970
Coral Gables Canal at Tamiami Canal, near Coral Gables, FL (d,g)(WSP 1905)	02290550	1960 - 1963
Coral Gables Canal near South Miami, FL (d,g)	02290580	1961 - 1966
Cypress Creek Canal at S-37A, near Pompano Beach, FL (d)	02282100	1964 - 1985
Cypress Creek near Jupiter, FL (d,g)	265816080110000	1980 - 1982
E. Tributary N. Fork Loxahatchee River nr Hobe Sound, FL (d,g)	270036080070500	1980 - 1981
El Rio Canal near Boca Raton, FL (d,g)	02281625	1970 - 1972
gage heights only		1973 - 1977
El Rio Canal, SW 18th Street, Boca Raton, FL (g)	261953080054900	1982 - 1985
Equalizing Canal 1 near Greenacres City, FL (g)	02281419	1970 - 1972
Equalizing Canal 1 near Delray Beach, FL (g)	02281425	1970 - 1977
Equalizing Canal 3 near Greenacres City, FL (g)	02281513	1970 - 1977
Equalizing Canal 3 near Delray Beach, FL (g)	02281532	1970 - 1972
Equalizing Canal 3 near Boca Raton, FL (g)	02281544	1970 - 1977
Everglades 1-128S near Boynton Beach, FL (g)	02281282	1974 - 1975
Everglades 1-141S near Loxahatchee, FL (g)	02281278	1974 - 1976
Everglades 1-142S near Delray Beach, FL (g)	02281291	1974 - 1976
Everglades 159 south of pump station 6 near Andytown, FL (g)	262300080263501	1977 - 1980
Everglades 160 south of pump station near Lake Harbor, FL (g)	261557080464301	1977 - 1980
Everglades 2B in C-111 Basin near Homestead, FL (g)	251855080283400	1986 - 2001
Everglades 201-NP, near Homestead, FL (g)	02290861	1975 - 1980
Everglades 202-NP, near Miami, FL (g)	02290862	1975 - 1980
Everglades 203-NP, near Homestead, FL (g)	02290832	1974 - 1980
(formerly published as Everglades P-5S)		
Everglades 204-NP near Homestead, FL (g)	02290829	1974 - 1980
(formerly published as Everglades P-145		
Everglades 205-NP, near Miami, FL (g)	02290868	1975 - 1980
Everglades 206-NP, near Miami, FL (g)	02290811	1975 - 1980
Everglades 207 near Homestead, FL (g)	02290810	1963 - 1980
(formerly published as "Everglades P-37 near Homestead")		
Everglades 2-111S near Andytown, FL (g)	02284642	1974 - 1981
Everglades 2-112S near Margate, FL (g)	02284644	1974 - 1976
Everglades 3-62S near Andytown, FL (g)	02286960	1974 - 1979
Everglades 3-63S near Andytown, FL (g)	02286998	1974 - 1979
Everglades 3-64S near Miramar, FL (g)	02286970	1974 - 1979
Everglades 3-65S near Miami, FL (g)	02289043	1974 - 1980
Everglades P-33 near Homestead, FL (g)	02290815	1963 - 1980
Everglades P-34 near Homestead, FL (g)	02290870	1963 - 1980
Everglades P-35 near Homestead, FL (g)	02290830	1963 - 1980
Everglades P-36 near Homestead, FL (g)	02290828	1969 - 1980
Everglades P-38 near Homestead, FL (g)	02290820	1963 - 1980
Everglades P-103 near Florida City, FL (g)	02290790	1967 - 1969
Everglades P-104 near Florida City, FL (g)	02290794	1967 - 1969
Fakahatchee Slough at Janes Road near Copeland, FL (d,g)	02291047	1970 - 1972
Faka Union Canal near Copeland, FL (d,g)	02291143	1970 - 1984
Faka Union Canal near Deep Lake, FL (d,g)	260342081312500	1978 - 1983
(1984 discharge measurements only)		
Faka Union Canal near Sunniland, FL (d,g)	261616081314400	1978 - 1984
Florida Bay at Flamingo, FL (g)	02290825	1963 - 1980
Florida City Canal near Florida City, FL (g)	02290735	1963 - 1967

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

Station name	Station number	Period of record water years published
Garden Cove near Key Largo, FL (g)	02290786	1967 - 1968
Gator Hook Strand near Ochopee, FL (g)	254724081111300	1979 - 1980
Gator Slough at U.S. 41 near Ft. Myers, FL (d,g)	264437081550100	1973 - 2004
Golden Gate Canal at Naples, FL (d,g)	02291300	1965 - 1984
Golden Gate Canal near Naples, FL (d,g)	261148081401700	1978 - 1984
Golden Gate Canal near Sunniland, FL (d,g)	261642081334200	1978 - 1984
Gordon River at Naples, FL (g)	02291280	1972 - 1984
Goulds Canal near Goulds, FL (g)	02290711	1963 - 1967
(formerly published under station number 02290715)		
Grand Canal near Florida City, FL (d,g)	02290734	1972 - 1974
Gum Slough near Monroe, FL (g)	254230081022000	1979 - 1980
Harney River near Homestead, FL (d,g)	02290860	1960 - 1967
(gage heights only 1968 - 1969)		
Henderson Creek Canal near Naples, FL (d,g)	02291270	1968 - 1984
Henry Creek at Henry Creek Lock near Sherman, FL, (d,s)	02275705	1993 - 1995
(This station was transferred to the Altamonte Springs Office)		
Hillsboro Canal at S-39, near Deerfield Beach, FL (g)	02281300	1957 - 1967
Hillsboro Canal in Cons. Area No. 1 at S-6 nr Shawano, FL (g)	02281201	1963 - 1968
Hillsboro Canal near Deerfield Beach, FL (d,g)	02281500	1940 - 1991
Hillsboro Canal below Deerfield Locks, Deerfield Beach, FL (g)	02281501	1963 - 1991
Hillsboro River at Deerfield Beach, FL (g)	02281650	1968 - 1978
Hobe Groves Ditch, near Jupiter, FL (d,g)	265907080103000	1980 - 1982
Hollywood Canal at Dania, FL (d,g)	02286150	1962 - 1967
Indian River Lagoon at Sewalls Pt., Stuart, FL(g,s,t)	02253800	1997- 2003
Intracoastal Waterway at Barnes Point, near Florida City, FL (g)	02290762	1971
Intracoastal Waterway at Blue Heron Blvd. at Riveria, Beach, FL (g)	02277960	1971 - 1977
Intracoastal Waterway at Delray Beach, FL (g)	02279520	1971 - 1973
Intracoastal Waterway at Donald Ross Road, nr Juno Beach, FL (g)	02277730	1971 - 1973
Intracoastal Waterway at Golden Beach, FL(g)	02281670	1970 - 1979
Intracoastal Waterway at Hollywood, FL (g)	02286160	1968 - 1978
Intracoastal Waterway at Lauderdale-by-the Sea, FL (g)	02282300	1968 - 1978
Intracoastal Waterway at Port Everglades, at Hollywood, FL (g)	02286143	1968 - 1978
Intracoastal Waterway at Southern Blvd. at Palm Beach, FL (g)	02277994	1971 - 1973
Intracoastal Waterway at SR 706 at Jupiter, FL (g)	02277738	1980 - 1981,1989 - 1992
Intracoastal Waterway at SR 707 at Jupiter, FL (g)	02277747	1980 - 1981,1989 - 1992
L-28 Interceptor Canal South at Collier border, FL (d,g)	260823080524100	1997 - 1999
L-67A at Conservation Area 3A near Coopertown, FL (g)	255447080350200	1994 - 1996
L-67C at Conservation Area 3B near Coopertown, FL (g)	255420080340500	1994 - 1996
Lateral 47 Canal at Boca Raton, FL (g)	02281468	1989 - 1991
Lateral Canal at Seminole Road near Loxahatchee, FL (g)	02278698	1973 - 1977
Lateral Canal in Acme Drainage District, near Loxahatchee, FL (g)	02281297	1973 - 1977
Lateral Canal in Loxahatchee Groves near Loxahatchee, FL (g)	02278732	1973 - 1977
Lateral Canal on 130th Ave. North, near Jupiter, FL (g)	02277470	1973 - 1977
(formerly published as Lateral Canal on Hynie Lane Road)		
Lateral Canal on Jupiter Farms Road, near Jupiter, FL (g)	02277480	1973 - 1977
Levee 3 Canal near Clewiston, FL (d,g)	02289030	1970 - 1990
	Revised 1978-90 in WRD-2A-96	
Levee 8 Canal at West Palm Beach Canal, near Loxahatchee, FL (d,g)	02278550	1957 - 2004
Levee 28 Tieback Canal, near Andytown, FL (g)	02289027	1992 - 2004
Levee 30 near Miami Springs, FL	02289100	1960 - 1964
Levee 31W Canal at S-332, near Florida City, FL (d,g)	252523080352500	1983 - 1998
Levee 67 Extended Canal near Richmond Heights, FL (g)	02290827	1971 - 1980
Levee 67 Extended Canal at South End near Coopertown, FL (g)	253735080402100	1977 - 1980
Little River Canal at Palm Avenue, Hialeah, FL (g)	02286350	1963 - 1979
Little River Canal at S-27, at Miami, FL (d,g)	02286380	1960 - 1969
Lostmans River near Everglades, FL (d,g)	02290920	1962 - 1965
(period of record published in 1967 volume 2A)		

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

Station name	Station number	Period of record water years published
Loxahatchee River at Indiantown Road near Jupiter FL (q)	265613080100700	1989 - 1998
Loxahatchee River at Sunshine State Pkwy., nr Jupiter, FL (d,g)	265713080095600	1980 - 1982
Loxahatchee River near Hobe Sound, FL (g)	265916080083500	1977 - 1981
M-1 Canal at Canal M near Royal Palm Beach, FL (g)	02278760	1975 - 1977
M-2 Canal in Royal Palm Beach Colony near Loxahatchee, FL (g)	02277750	1973 - 1977
Mackinac Canal at Cape Coral, FL (d,g)	02293216	1987 - 1996
Manatee Bay at Canal 111, near Florida City, FL (g)	02290782	1967 - 1969
Main Lake Outlet near Ft Myers, FL (g)	02291736	1988
Matlacha Pass at Indian Field Island near Matlacha, FL (g)	02293342	1991 - 1993
Matlacha Pass at Matlacha, FL (g,q)	02293343	1989 - 1997
Matlacha Pass at Parrots Perch near St James City, FL (g)	02293280	1989 - 1997
Miami Canal above S-8, near Lake Harbor, FL (g)	02286699	1962 - 1968
(formerly Miami Canal at S-8 (auxiliary) 02286700)		
Miami Canal above S354 and S-3, at Lake Harbor, FL (g)	02286399	1958 - 1998
(Prior to October 1988, published as Miami Canal at HGS-3 and S-3 at Lake Harbor)		
Miami Canal at broken dam, near Miami, FL (d,g)	02287400	1960 - 1968
Miami Canal at N.W. 27th Avenue, Miami, FL (g)	02290510	1963 - 1979
Miami Canal at Palmetto Bypass near Hialeah, FL (d,g)	02288200	1960 - 1981
Miami Canal at Pennsuco near Miami, FL (d,g)	02287500	1963 - 1979
Miami River at Brickell Ave., Miami, FL (d,g)	02290530	1961 - 1966
Middle River Canal at U.S. Highway 1, near Ft. Lauderdale, FL (d,g)	02282800	1964 - 1967
Mid. Tributary N. Fork Loxahatchee R. nr Hobe Sound, FL (d,g)	270028080074200	1980 - 1981
Military Canal near Homestead, FL (g)	02290720	1963 - 1969
Model Land Canal near Florida City, FL (g)	02290740	1963 - 1969
Model Land Canal below ML-2, near Florida City, FL (g)	02290746	1963 - 1968
(formerly Model Land Canal at control "auxillary" 02290745)		
Monreve Ranch drainage Canal near Stuart FL (d,g)	02276984	1959 - 1973
(formerly published under station number 02276800)		
Mowry Canal near Homestead, FL (d,g)	02290725	1970 - 1989
	gage heights only published	1963 - 1970
New River at Ft. Lauderdale, FL (d,g)	02286140	1963 - 1967
North Canal near Homestead, FL (g)	02290730	1963 - 1968
North Line Canal near Miami Springs, FL (d,g)	02289900	1960 - 1963
North New River Canal at S-2 and S-351, near South Bay, FL (d,g)	02283498	1957 - 2003
North New River Canal at S-7 at Terrytown, FL (d,g)	02284300	1960 - 2003
North New River Canal below S-34, near Ft. Lauderdale, FL (d,g)	02284700	1956 - 1967
North New River Canal near Ft. Lauderdale, FL (d,g)	02285000	1939 - 1992
North New River Canal below control near Ft. Lauderdale, FL (g)	02285001	1962 - 1992
(formerly published as 02285000 North New River Canal (auxilary))		
N.W. Wellfield Canal at Conserv. Area No. 3 nr Pennsuco, FL (d,g)	02289096	1991 - 1996
N.W. Wellfield Canal near Pennsuco, FL (d,g)	02288010	1991 - 1996
Okaloacoochee Slough near Sunniland, FL (d,g)	261205081200000	1979 - 1980
Pine Channel near Big Pine, FL (g)	244123081225301	1976
Pinecrest Hammocks near Monroe, FL (e)	254635080541500	1979 - 1980
Plantation Road Canal at S-33, near Fort Lauderdale, FL (d,g)	02283200	1962 - 2004
Pompano Canal at Pompano Beach, FL (d)	02282000	1964 - 1969
(Prior to October 1948, published as Cypress Creek Canal at Pompano)		
Pompano Canal at S-38, near Pompano Beach, FL (d)	02281700	1962 - 1967
Roberts Lake Slough near Monroe, FL (d)	02290950	1973 - 1979
	gage heights only published	1980
Rogers River near Everglades, FL (d)	02290900	1962 - 1965
(period of record published in 1967 volume 2A)		
Sanibel River at Sanibel, FL (e)	02293250	1972 - 1977
Savannahs Drainage Canal at Port St Lucie, FL (d,g)	02276568	1976 - 1977
Shark River near Homestead, FL (d,g)	02290850	1960 - 1966
(gage heights only 1967 - 1969)		

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

Station name	Station number	Period of record water years published
Site 15 nr L-39 in Conserv. Area No. 2A near Shawano, FL (g)	262400080250001	1991 - 1997
S-150 at Terrytown, FL (d,g)	262007080321500	1990 - 2004
Site 34 near L-30 in Conservation Area 3B, near Miami, FL (g)	255215080291000	1993 - 1997
Six Mile Cypress Creek South near Ft. Myers, FL (d)	02291670	1988 - 1990
San Carlos Bay at St. James, City, FL (g)	02293288	1991, 1992
Snake Creek Canal at S-29, at North Miami Beach, FL (d)	02286300	1959 - 1985
Snake Creek Canal at S-30, near Hialeah, FL (d)	02286180	1963 - 1967
Snapper Creek Canal at Miller Drive, near South Miami, FL (g)	02290610	1963 - 1981
(formerly published under station number 02290600)		
Snapper Creek Canal near Coral Gables, FL (d)	02290600	1960 - 1967
gage heights only published		1968 - 1980
Snapper Creek Canal at S-22, near South Miami, FL (d)	02290700	1959 - 1985
South Fork Miami River at N.W. 29th Avenue, Miami, FL (g)	See Comfort Canal at N.W. 29th Avenue	
South New River Canal in Conservation Area No. 3 at S-9, FL (g)	02285399	1963 - 1970
South New River Canal at S-9 near Davie, FL (d)	02285400	1958 - 1970
South New River Canal at S-13, near Davie, FL (d,g,)	02286100	1957 - 2004
South New River Canal at U.S. Highway 27 near Davie, FL (g)	02285410	1975
Southwest Fork Loxahatchee River at Jupiter, FL (g)	265635080071900	1980 - 1981
Southwest Fork Loxahatchee River at S-46, FL (d)	02277700	1959 - 1965
Stilt City Tidal Station at Indian Field, nr Matlacha, FL (g)	263935082052501	1990 - 1991
St Lucie Canal at Lock, near Stuart, FL (d,g)	02277000	1952 - 2003
Tamiami Canal at 40-mile bend, near Miami, FL (g)	02288990	1961 - 1980
(formerly published as Tamiami Canal at 40-mile bend (auxiliary) :		
(1960 to 1963 water years published under 02289000, Tamiami Canal Outlets, Miami to Monroe)		
Tamiami Canal at bridge 77, near Carnestown, FL (g)	02288780	1962 - 1980
(formerly published as 02288800 Tamiami Canal at bridge 77 (auxiliary))		
Tamiami Canal at bridge 83, near Ochopee, FL (g)	255327081161300	1979 - 1980
Tamiami Canal at bridge 96, at Monroe FL (g) (twice monthly)	02288860	1962 - 1980
(formerly published as 02288900 Tamiami Canal at bridge 96 (auxiliary))		
Tamiami Canal at bridge 115, near Miami, FL (g) (twice monthly)	02288945	1962 - 1980
(formerly published as 02288900 Tamiami Canal at bridge 115 (auxiliary))		
Tamiami Canal at Red Road, Miami, FL (g)	02290500	1963 - 1980
Tamiami Canal at S-333 near Miami, FL (d,g)	02289050	1978 - 2004
Tamiami Canal at S-355A, near Miami, FL (g)	254540080361500	2000 - 2003
Tamiami Canal at S-355B, near Miami, FL (g)	254540080325700	1999 - 2003
Tamiami Canal east of levee 30, near Miami, FL (g)	02289250	1963 - 1980
(formerly published as 02289060 Tamiami east of levee 30 (auxiliary))		
Tamiami Canal Outlets, Miami to Monroe, FL (d)	02289000	1940 - 1963
Tamiami Canal west of levee 30, near Miami, FL (g) (twice monthly)	02289090	1963 - 1980
(formerly published as 02289060 Tamiami Canal west of levee 30 (auxiliary))		
Taylor Creek at HGS-6 near Okeechobee, FL (d)	02277503	1992 - 1995
(This station was transferred to the Altamonte Springs Office)		
Taylor Slough at Context Road near Homestead, FL (d)	252948080352700	1976 - 1980
Taylor Slough at Craighead Lake near Homestead, FL (g)	251148080410300	1979 - 1980
Taylor Slough at Royal Palm near Homestead, FL (g)	02290803	1970 - 1980
Taylor Slough near Homestead, FL (d)	02290800	1960 - 1985
Townsend Canal near Alva, FL (d,g)	02292780	1975 - 1996
Turnpike Borrow Canal above S-46 near Jupiter, FL (q)	26555208008500	1989 - 1998
U.S. Highway 441 Canal near Deerfiled Beach, FL (g)	02281435	1968 - 1969
Warner Creek near Jensen Beach, FL (d)	02277107	1976 - 1977
West Rolling Oaks Feeder Canal Near Davie, FL (g)	02285420	1975
West Palm Beach Canal at West Palm Beach, FL (d,g)	02279000	1939 - 2004
West Palm Beach Canal below S-5A-E near Loxahatchee, FL (d,g)	02278600	1955 - 2004

INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with State, County, and other Federal agencies, obtains a large amount of data pertaining to the water resources of Florida 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 USGS, the data are published annually in this report series entitled "Water Resources Data - Florida, Volume 2A: South Florida Surface Water and Volume 2B: South Florida Ground Water".

This report series includes records of stage, discharge, and water quality for streams; stage, contents, and water quality for lakes; and ground-water levels, contents, and water quality of ground-water wells. The data for South Florida include continuous or daily discharge for 91 streams, continuous or daily stage for 62 streams (including stage published at discharge and stage only sites), continuous elevations for 1 lake, continuous ground-water levels for 248 wells, periodic ground-water levels for 187 wells, and quality-of-water data for 54 surface-water sites and 121 wells.

Publication of this series of annual reports for Florida 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. For the 1975 water year, the report format was modified to one volume presenting data on quantities of surface water, quality of surface and ground water, and ground-water levels. For the 1977 water year, the report format was modified to a two volume set: one volume presenting data on quantity as well as quality of surface water and one volume presenting data on water levels along with quality of ground water.

Prior to introduction of this series and for several concurrent water years, water-resources data for Florida were published in USGS 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". 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 aforementioned Water-Supply Papers may be consulted in the federal repository libraries of the principal cities of the United States and may be purchased from the U.S. Geological Survey, Branch of Information Services, Box 25286, Federal Center, Denver, CO 80115 (telephone: 888-ASK-USGS).

Similar reports are published annually by the USGS for all of the United States. These official USGS 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 FL-xx-2B," where xx represents the current water year. For archiving and general distribution, reports for the 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or microfiche by the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Additional information on the National Technical Information Service may be accessed from *http://www.ntis.gov/*. Additional information, including current prices, for ordering specific reports may be obtained from the Office Chief at the address given on the back of the title page or by telephone (954) 377-5900.

COOPERATION

The USGS and various Federal, State, and local organizations have had cooperative agreements for the collection of water-resource records since 1930. Organizations that assisted in collecting the data presented in this report through cooperative agreement with the USGS are:

Broward County
City of Boca Raton
City of Cape Coral
City of Hallandale Beach
City of Hollywood
Everglades National Park
Florida Keys Aqueduct Authority
Lee County
Miami-Dade County Department of Environmental Resource Management
Palm Beach County
Seminole Tribe of Florida
South Florida Water Management District
St. Lucie County
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

Organizations that provided data are acknowledged in station manuscripts.

SUMMARY OF HYDROLOGIC CONDITIONS

This section summarizes important hydrologic events that occurred during the 2005 water year (October 1, 2004 to September 30, 2005) as well as significant natural and water-management responses to these events. Figure 2 provides a frame of reference for some of the major land areas of hydrologic significance mentioned in the summary.

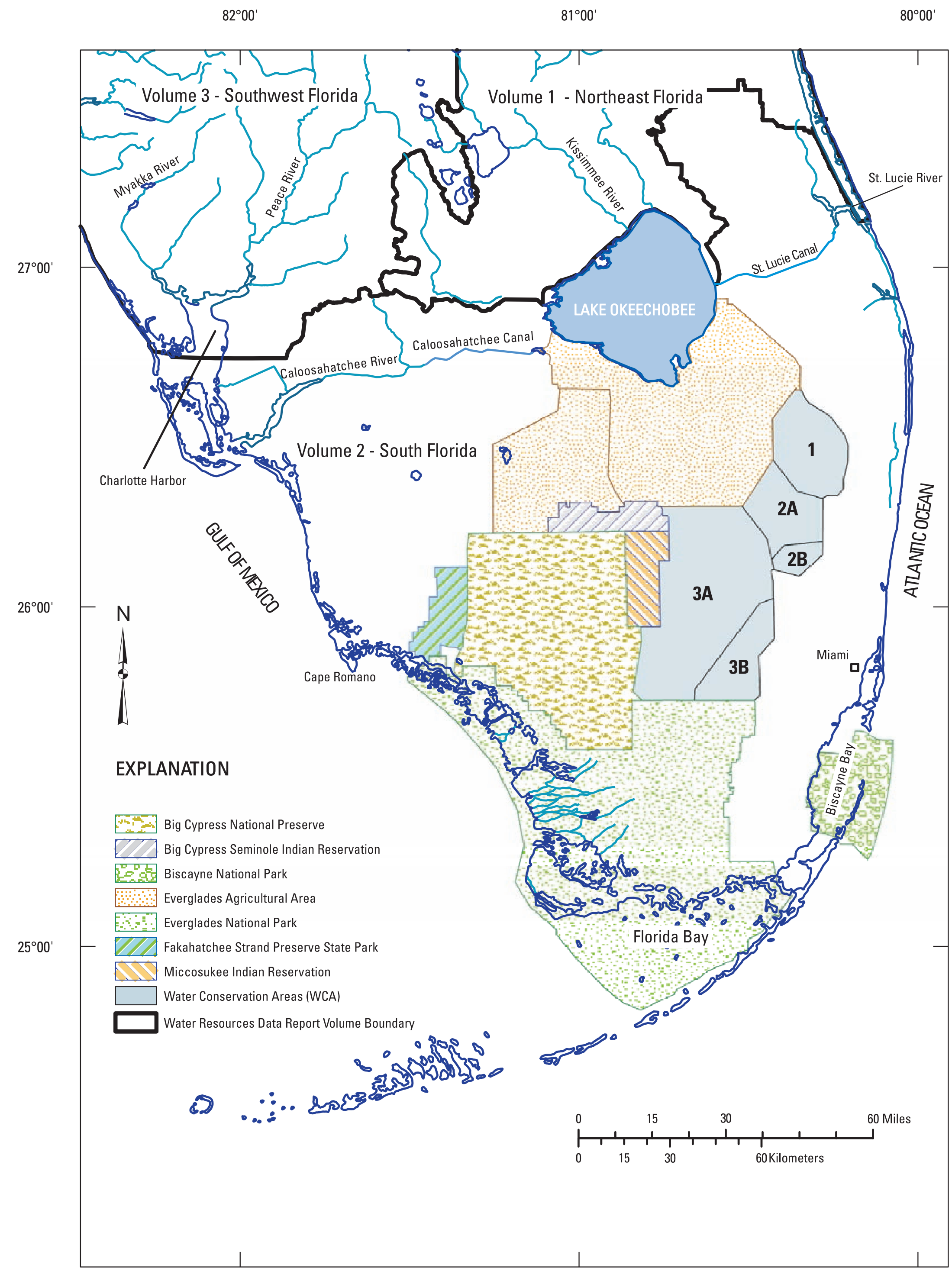

Figure 2. South Florida areas of hydrologic significance.

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SUMMARY OF HYDROLOGIC CONDITIONS (continued)

During the 2005 water year, the U.S. Geological Survey (USGS) Florida Integrated Science Center — South Florida monitored 86 continuous discharge stations, 54 continuous stage stations, and 1 lake, and also collected water-quality data at 39 miscellaneous sites in cooperation with various local, State, and Federal agencies.

Data from selected surface water stations

Six surface water discharge stations and six stage-only sites were selected to depict general surface-water conditions in selected areas for the 2005 water year. St. Lucie Canal at Lake Okeechobee (02276870) (figure 3) is located just downstream of structure S-308, which controls water releases into and from Lake Okeechobee to the St. Lucie Canal. Loxahatchee River Near Jupiter (02277600) (figure 4) monitors discharges in the Loxahatchee River near Lainhart Dam. Miami Canal at S-354 and S-3 (02286400) (figure 5) is located just downstream of structure S-354, which controls water releases into and out of Lake Okeechobee through the Miami Canal. Miami Canal at S-8 (02286700) (figure 6) is located just upstream of pump station S-8, which controls water in the Miami Canal released from the Everglades Agricultural Area (EAA) to Water Conservation Area (WCA) 3A. Miami Canal at NW 36 Street (02288600) (figure 7) is located just upstream of structure S-26 — a salinity control structure that controls water releases from the Miami Canal into the Miami River and ultimately to tide. The Tamiami Canal Outlets, Levee 67 to 40 Mile Bend (02289040) (figure 8) is a combination of flow through structures S-12 A, B, C, and D located along the Tamiami Trail. Together, these structures help control water flow from WCA 3A into Everglades National Park. Northeast Shark River Slough No. 2 (254315080331500) (figure 10) is located 2.7 miles south of the Tamiami Trail and monitors water levels in this area. The last five stations monitor water levels in their respective WCAs: Site 71 in Water Conservation Area No. 3B (255250080335001) (figure 11), Site 99 near L-35A in Water Conservation Area No. 2B (260810080222001) (figure 12), Site 63 in Water Conservation Area No. 3A (261117080315201) (figure 13), Site 17 near L-38, Water Conservation Area No. 2A (262240080258001) (figure 14), and Site 7 in Water Conservation Area No. 1 (263180080205001) (figure 15). Two hydrographs are shown for each discharge site. The upper graph (A) is the 2005 water year monthly mean discharge or gage height compared to the maximum and minimum monthly mean discharge or gage height for the period of record through the 2004 water year, and monthly mean discharge or gage height for the entire period of record through the 2005 water year. The lower graph (B) is the monthly mean discharge or gage height for the 1996-2005 water years. The data tables displayed in this publication do not have monthly mean discharge and/or gage height figures available if data for one or more days in a month are missing. Monthly mean gage height or discharge is deleted in these hydrographs if five or more days of missing record in a month exist.

Rainfall

Rainfall data collected and evaluated by the South Florida Water Management District (SFWMD) during the 2005 water year provide a framework for understanding monthly water-level variations (South Florida Water Management District, 2004, 2005). The southern Florida rainfall data provided by the SFWMD are subdivided into 16 geographic areas. Monthly rainfall totals from individual stations within each area are averaged and compared to the historical total monthly rainfall averages. The percentage of average monthly rainfall is then computed for each of the 16 geographic areas. This percentage is used throughout the discussion of surface-water conditions for the 2005 water year. The SFWMD also computes and provides the average rainfall combined from all 16 geographic areas. This statistic is also used throughout the discussion. An example of this rainfall analysis is presented in figure 3.

For the purposes of this report the following terms are used in relation to the percent of average rainfall computed by the SFWMD: "extremely lower than normal" (less than 30 percent), "well below normal" (30 to 59 percent), "slightly below normal" (between 60 and 89 percent), "normal" (90 to 149 percent), "slightly above normal" (150 to 199 percent), "well above normal" (200 to 300 percent), "extremely above normal" (greater than 300 percent).

Surface-water conditions during the 2005 Water Year

Rainfall throughout southern Florida in October was generally well below to slightly below normal except for eastern Miami-Dade County where it was about normal. Across southern Florida rainfall averaged about 2 inches, which is only about half of the 3.8 in. normally occurring during this month. Despite the low rain fall, well above average discharges were recorded through S-308 and the Tamiami Canal outlets. The high discharges through the Tamiami outlets correspond to the high water level at Site 63 in WCA No. 3A that was caused by Hurricane Jeane that had occurred in September 2004. Water levels in WCA No. 3B were actually below average for this month. Water levels in WCA 2A was well above average while the other WCAs and Northeast Shark River Slough were about average. Discharges at the Miami Canal stations were around average despite the below normal rainfall.

On average, in November, rainfall was only about 0.7 in. throughout southern Florida. This was less than a third of the normal amount of rainfall usually received (2.7 in.) Distribution of rainfall varied from well below normal to extremely lower than normal throughout most of southern Florida. The exception was Everglades National Park where rainfall was only slightly below normal. All the WCA and Northeast Shark River Slough water levels began to decline except for WCA No. 2B and No. 3B which remained nearly steady. Discharges declined (or remained at zero) at all stations.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

Unusually dry conditions persisted in December throughout all of southern Florida except the southwestern coast and the Kissimmee drainage basin areas where rainfall was normal. Total rainfall received was about 1.3 in., which was only about 70% of the normal rainfall (1.9 in.). Rainfall was extremely lower than normal in eastern Miami-Dade and Palm Beach Counties. As expected discharges at all stations continued to decline or remain at zero except for Miami Canal at S-354 which recorded releases from Lake Okeechobee down the Miami Canal into the EAA. All WCA water levels continued to decline and were at or below the average monthly mean. Water levels in Northeast Shark River Slough remained slightly above average.

In southern Florida rainfall continued to be well below normal during January. Across southern Florida rainfall averaged about 1 in. which is less than half the normal amount of rainfall (2.3 in). As the month before, discharges continued to drop or remain zero, including discharges from Lake Okeechobee through S-354. The last Tamiami Trail structure to close, S-12 D was closed by the second week of the month and all S-12 structures remained shut until the last day of March. Water levels in the Water Conservation Areas and Northeast Shark River Slough continued to decline and fall below the average monthly means except for WCA No. 2B where water levels remained consistent and slightly above average.

There was little respite for most of southern Florida in February. In some areas the conditions worsened. Rainfall was extremely lower than normal in the water conservation areas, Everglades National Park, Big Cypress National Preserve, the Florida Keys, and eastern Broward and Miami-Dade Counties. Rainfall was well below to slightly below normal in the southwestern Florida coastal area, the Everglades Agricultural Areas, and Martin, Palm Beach, and St. Lucie Counties. Only near Lake Okeechobee, the Kissimmee drainage basin, and the eastern Caloosahatchee drainage basin was rainfall normal to slightly above normal. Average southern Florida rainfall was 1.6 in., only 73 percent of normal (2.2 in.). Water was released from Lake Okeechobee to the EAA through S-354 and minimal amounts were released through S-308. No water was moved through the Miami Canal at S-8 or S-26 (Miami Canal at 36 St.). Loxahatchee River near Jupiter obtained its lowest monthly average in February and all the WCAs and Northeast Shark River Slough continued to decline with WCA No. 2A and WCA No. 1 obtaining their lowest monthly averages for the 2005 water year.

March brought a welcome change to southern Florida in the form of rainfall that was normal or greater than normal in all areas. Rainfall across southern Florida averaged about 5.4 in., slightly less than double the normal amount of rainfall. Rainfall was greatest near Lake Okeechobee, the Caloosahatchee drainage basin, the Everglades agricultural areas, the southwestern coast of Florida, and Water Conservation Areas 1 and 2. It was slightly above normal in the Kissimmee drainage basin, Broward, Martin, Palm Beach, and St. Lucie Counties, and the Big Cypress National Preserve. In response to the heavy rain, WCA No. 2A and 1 began to increase water level. All other areas except for WCA No. 2B declined just slightly, while WCA No. 2B continued its steady decline in water level. Loxahatchee River nr Jupiter rebounded sharply and water was moved through the Miami Canal increasing discharges through S-26 to tide and S-8 to WCA 3A. Discharge from Lake Okeechobee through S-354 and S-308 were less than the previous month.

Rainfall in April generally varied spatially from normal to slightly below normal. The exception was in southeastern Florida in eastern Palm Beach and Broward Counties, where rainfall was well below normal. Averaged across southern Florida about 2.3 in. of rainfall was received, which is nearly normal for this month of the year. Tamiami structure S-12D was opened the last day of March and remained open the rest of the year. The other structures were not opened until the middle of June. Discharges in the Loxahatchee River decreased this month, although they remained slightly above average for April. Average discharge decreased sharply through S-8 from the previous month but increased through S-26 to tide. Discharges from Lake Okeechobee through S-308 and S-354 increased moderately from the previous month. Water levels continued to increase to average levels in WCA No. 2A and WCA No. 1. In WCA No. 3B and 2B, water levels continued their steady decrease. WCA No. 3A and Northeast Shark River Slough rose slightly from their lowest averages of the 2005 WY.

Rainfall in May was similar to that experienced in April. Most of southern Florida received either normal or slightly lower than normal rainfall. The exceptions were Everglades National Park where rainfall was well below normal and the lower Kissimmee drainage basin where it was slightly greater than normal. Averaged across southern Florida, about 4.7 in. of rainfall was received, which is nearly normal for this month of the year, WCAs No. 1 and 3B both declined and ended up almost exactly at the monthly average for the period of record. The other areas water level's rose slightly or remained steady. Discharges from S-354 declined from the highest monthly average the month before, and continued to do so for the rest of the water year, while discharges from Lake Okeechobee through S-308 varied only slightly from the previous month. Due to the lower rainfall, discharges in the Loxahatchee River continued to decline, but were still above the mean monthly average. This month, discharges through S-8 increased moderately and discharges through S-26 decreased.

June brought about 14 inches of rainfall to southern Florida. This is nearly double the amount normally received (8.0 in.). This rainfall varied spatially, from slightly above to well above normal throughout all of southern Florida, to close to normal in Everglades National Park, the lower Kissimmee drainage basin, and Water Conservation Areas 1 and 2. In response to the excess rain, discharges through S-8 nearly reached the period of record high monthly mean and discharges at the other stations responded accordingly except for S-308 which remained steady. All Tamiami S-12 structures were opened by the end of the month. All water levels in the WCAs and Northeast Shark River Slough rose due the high amount of rain received in South Florida. All water levels were above the mean monthly average for this month.

Average rainfall received in southern Florida in July was 6.5 in., which is 93 percent of normal (7.0 in.). Distribution of this rainfall was relatively even, resulting in most areas receiving either normal or slightly lower than normal rainfall. As rainfall was less than the month before, discharges at most of the stations decreased except for the S-12 structures now that all structures were open for the entire month. Discharges from Lake Okeechobee through S-354 were minimal for the rest of the water year (data is not available for S-308). All the WCAs and Northeast Shark River Slough continued to rise with WCA No. 2A, 3A, 2B and 3B recording period of record high monthly means despite the decreasing rain.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

Average August rainfall was similar to July rainfall in that it was about 7 in. which is about 95 percent of normal (7.4 in.) for this month of the year. Again spatial distribution of this rainfall was relatively even, with the exceptions of the Florida Keys, where rainfall was well above normal for the month, and the path of Hurricane Katrina. Hurricane Katrina struck southern Florida near the border of Miami-Dade and Broward Counties as a category 1 hurricane on August 26, 2005 and caused intense localized flooding in Miami-Dade County. The Tamiami Canal Outlets continued to rise slightly for the month while all other discharge stations recorded decreased average monthly flow from July. Discharges from Lake Okeechobee through S-308 were above the mean monthly value but there is no way to compare to the month before. Northeast Shark River Slough continued to rise for the month, with a large rise occurring during the time of Hurricane Katrina while water levels in all the WCAs decreased from the high levels the month before.

Rainfall was generally slightly lower than normal in southern Florida, except for eastern Miami-Dade and Palm Beach Counties, the Florida Keys, Big Cypress National Preserve, and Water Conservation Area 3, where rainfall was about normal, and in the vicinity of Lake Okeechobee, where rainfall was well below normal. For the southern Florida area rainfall averaged 5.4 in., which is about 80 percent of normal (6.7 in). Discharge patterns varied among the different stations. Discharge down the Miami Canal at NW 36st and across Tamiami Trail decreased while discharges further north increased through S-8 to WCA 3A and down the Loxahatchee River. Minimal discharges from Lake Okeechobee were recorded at S-308 and S-354. Water levels in the WCAs remained steady or decreased except for at WCA No. 3B which remained near the monthly period of record high water level. Levels in Northeast Shark River Slough continued to rise and this station recorded its highest monthly mean for the period of record for September.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

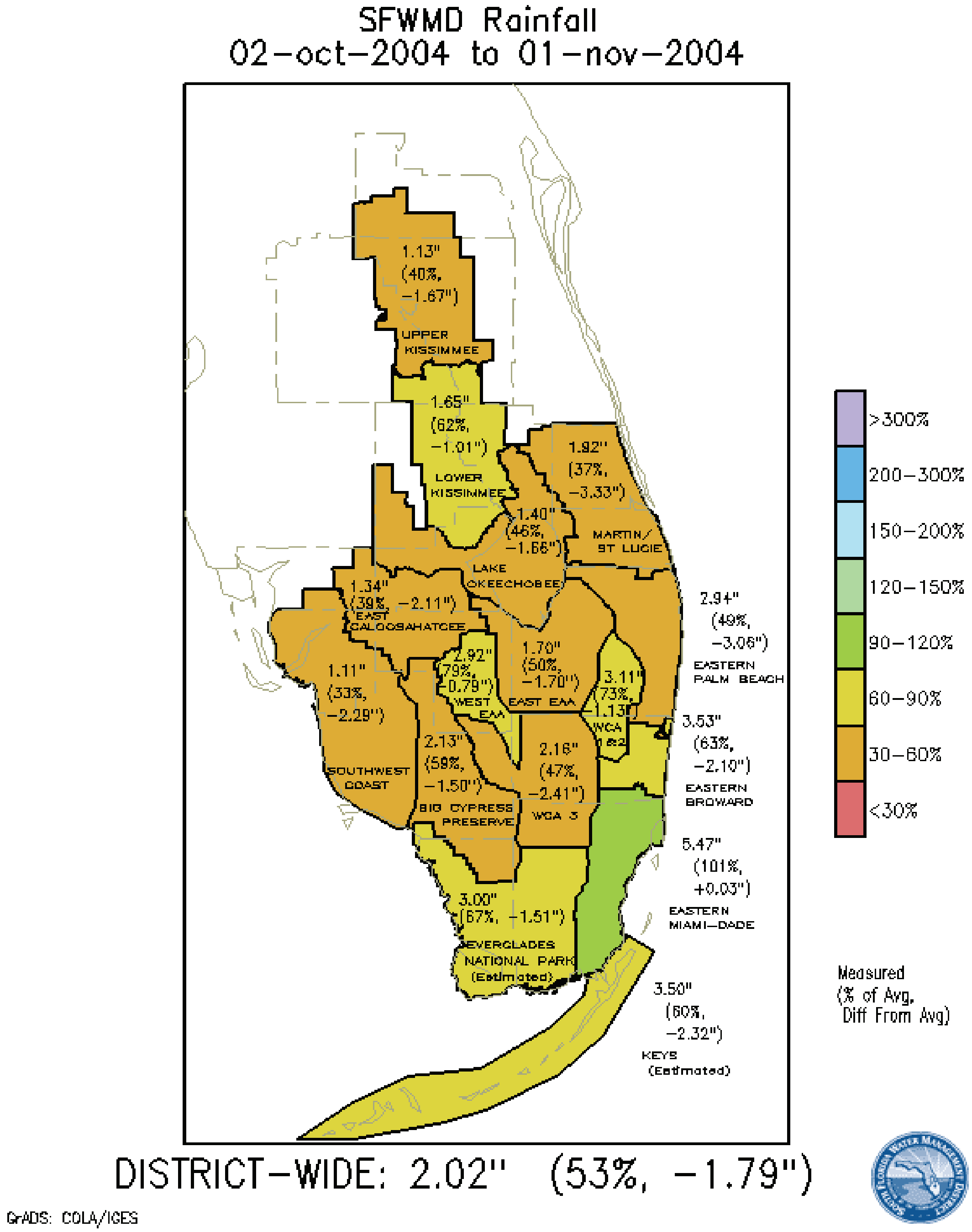


Figure 3. Example of a monthly rainfall map published by the South Florida Water management District (2004)

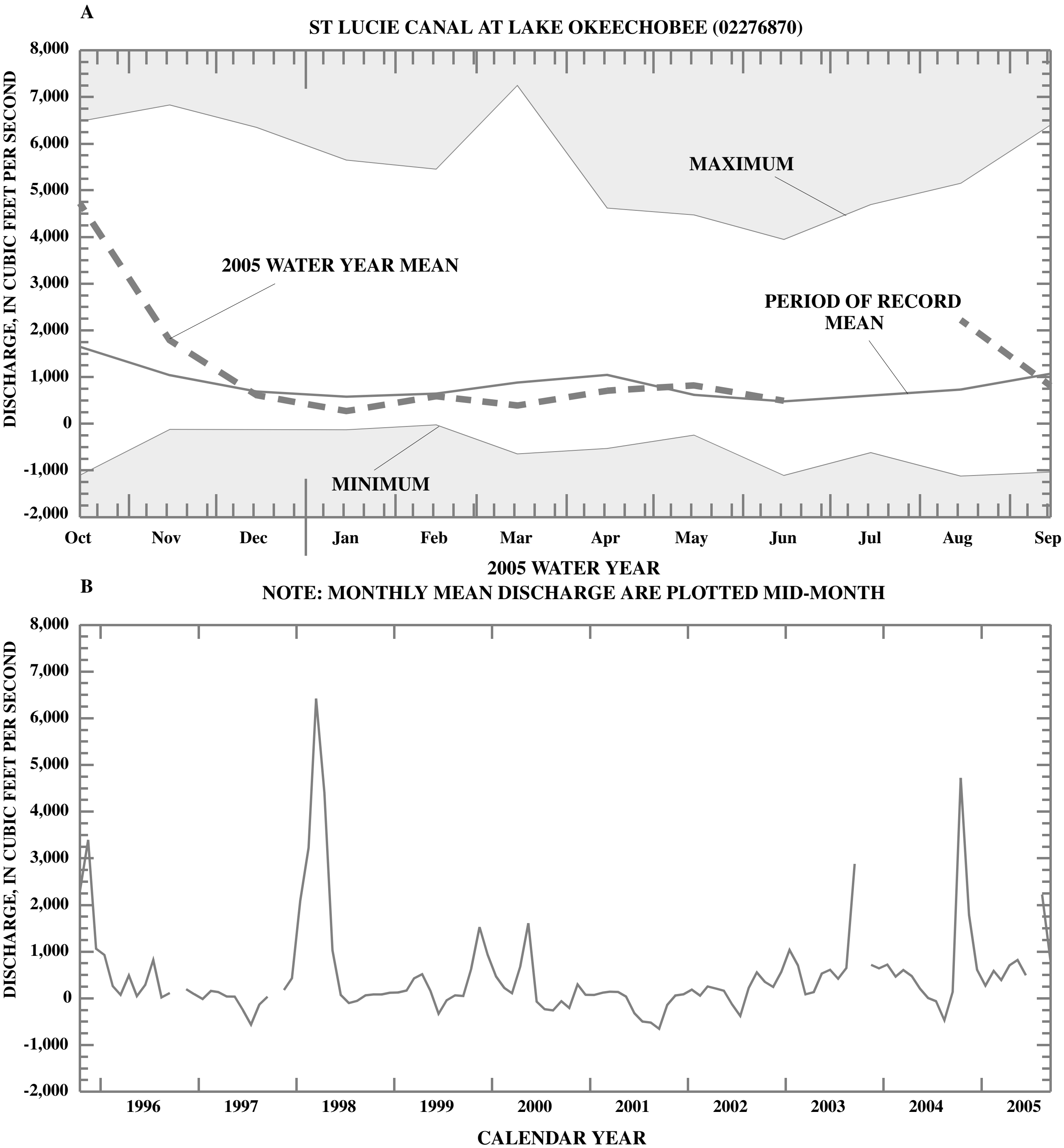


Figure 4. St. Lucie Canal at Lake Okeechobee (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and monthly mean discharge for the entire period of record; (B) the monthly mean discharge for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

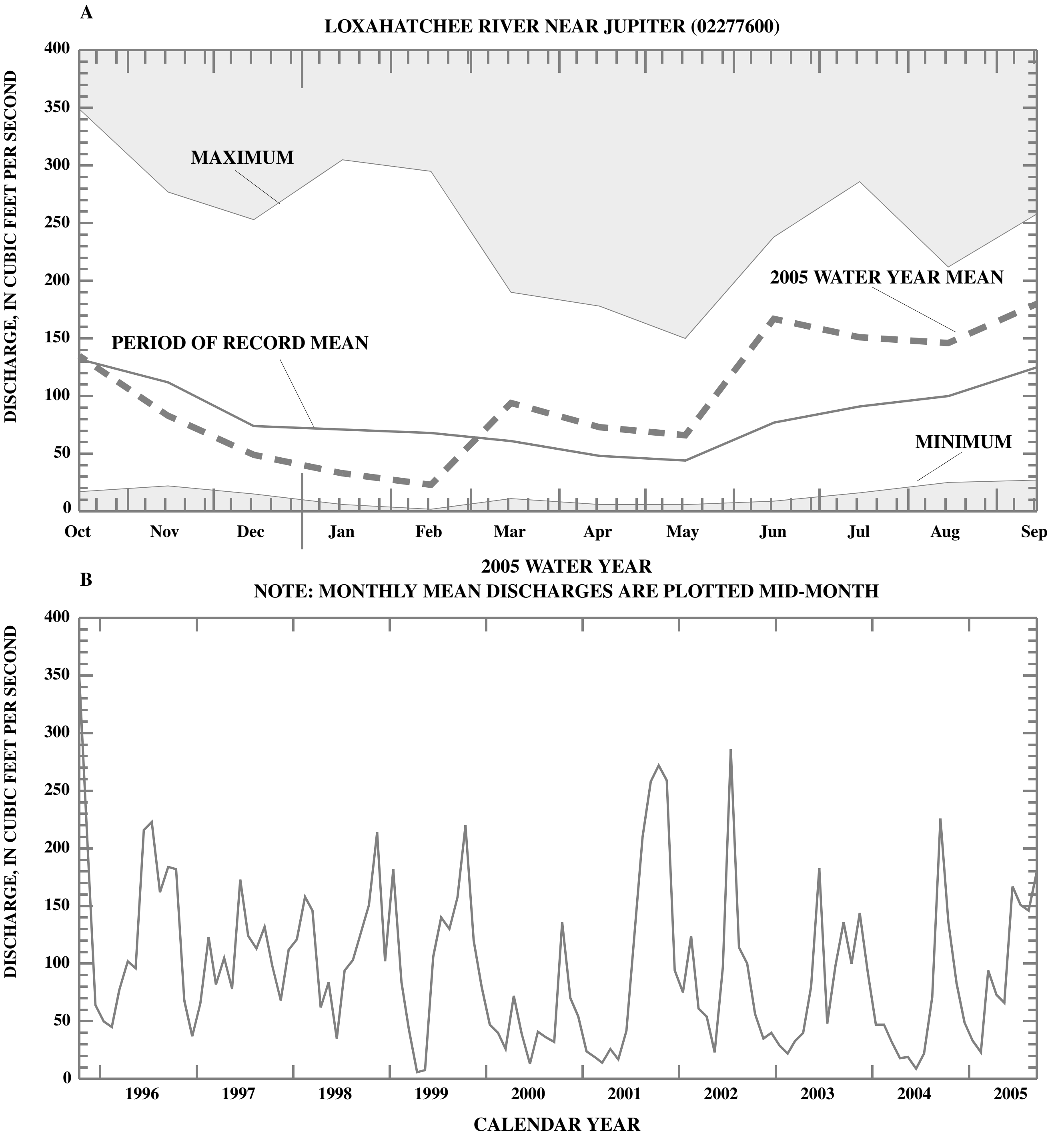
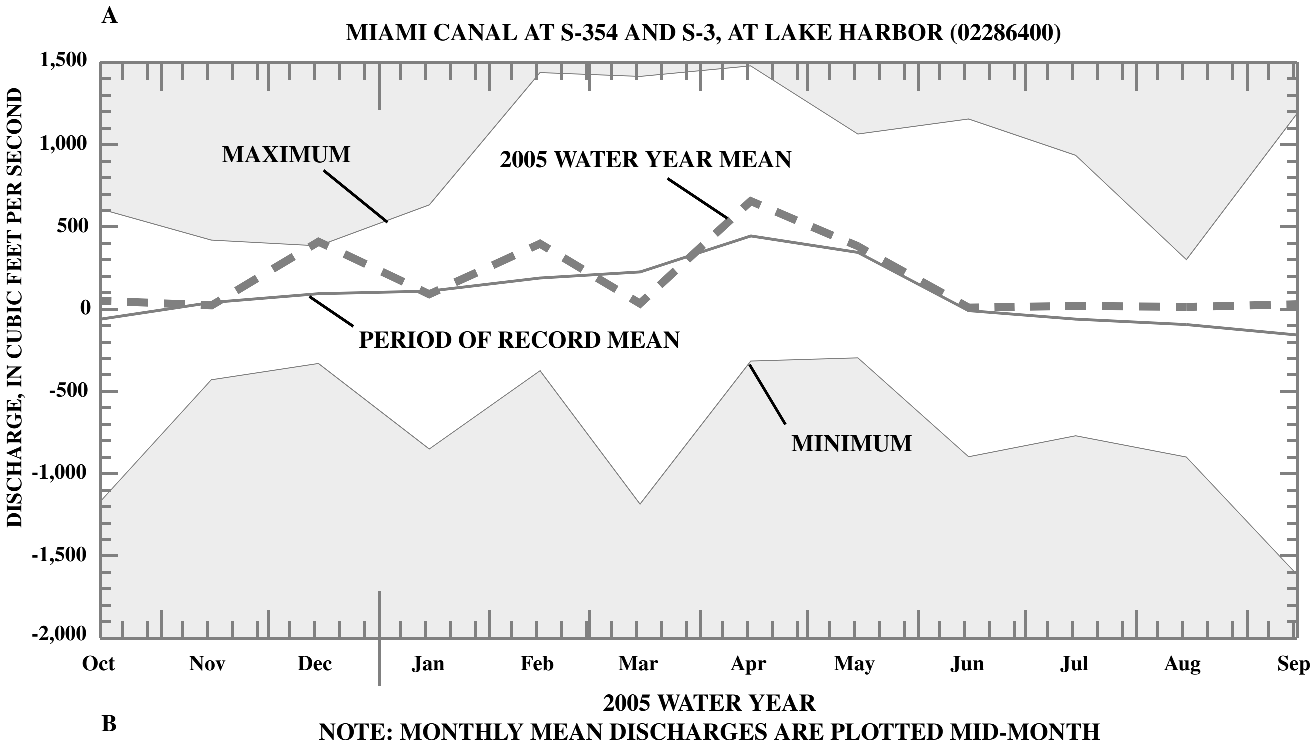


Figure 5. Loxahatchee River near Jupiter (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and the monthly mean discharge for the entire period of record; (B) monthly mean discharge for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.



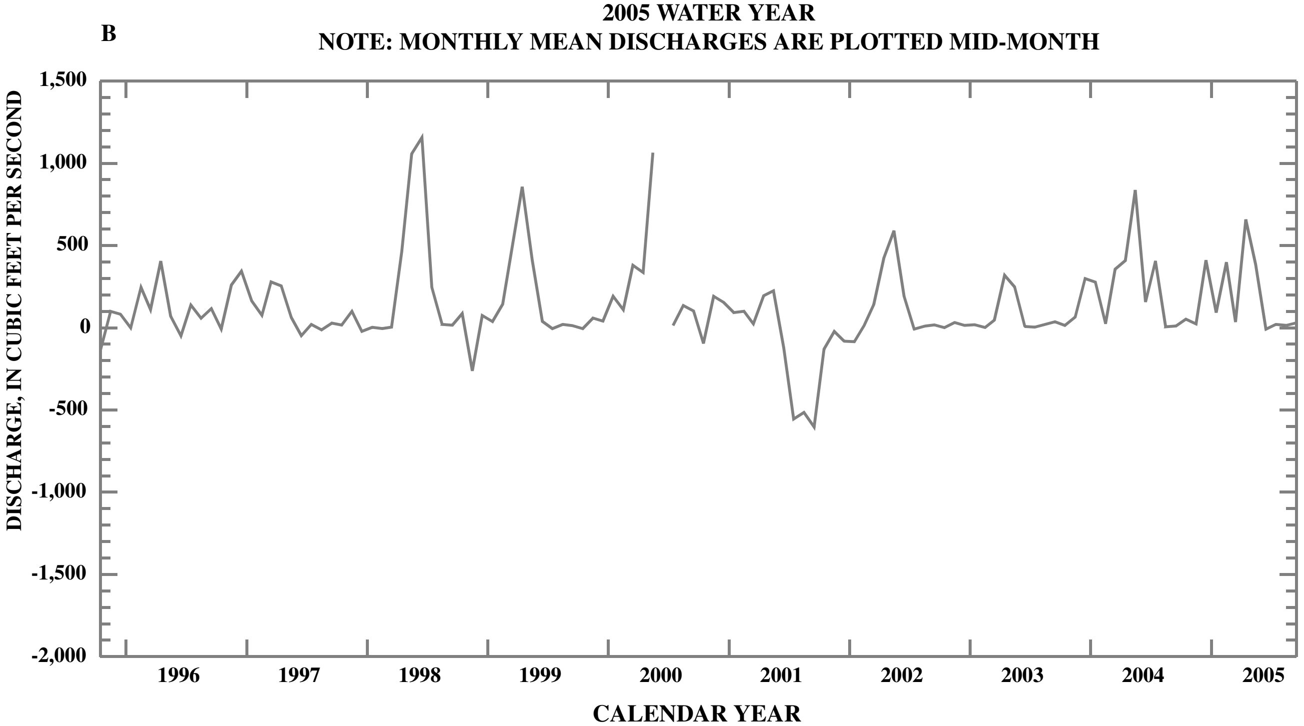
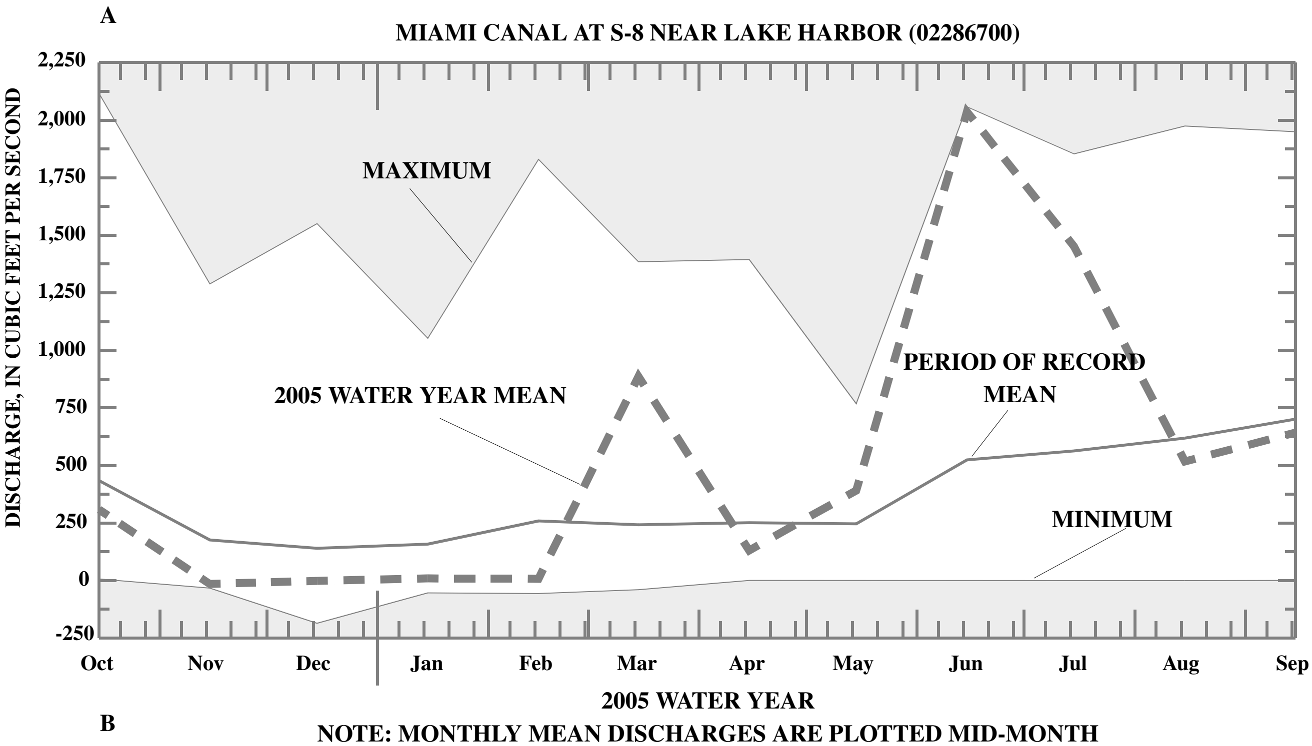


Figure 6. Miami Canal at S-354 and S-3, at Lake Harbor (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and monthly mean discharge for the entire period of record; (B) monthly mean discharge for the period of 1996-2005. Any months where there were more than 5 days of missing record are not included in these graphs unless otherwise noted.



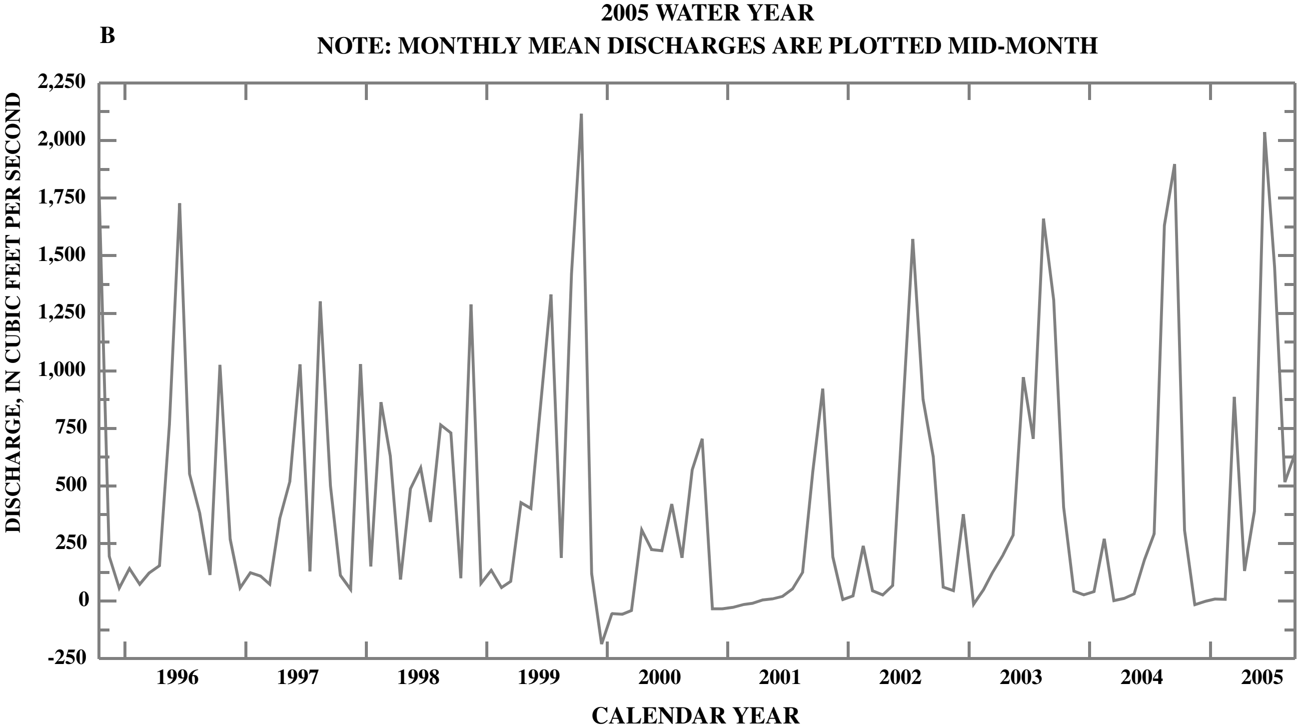
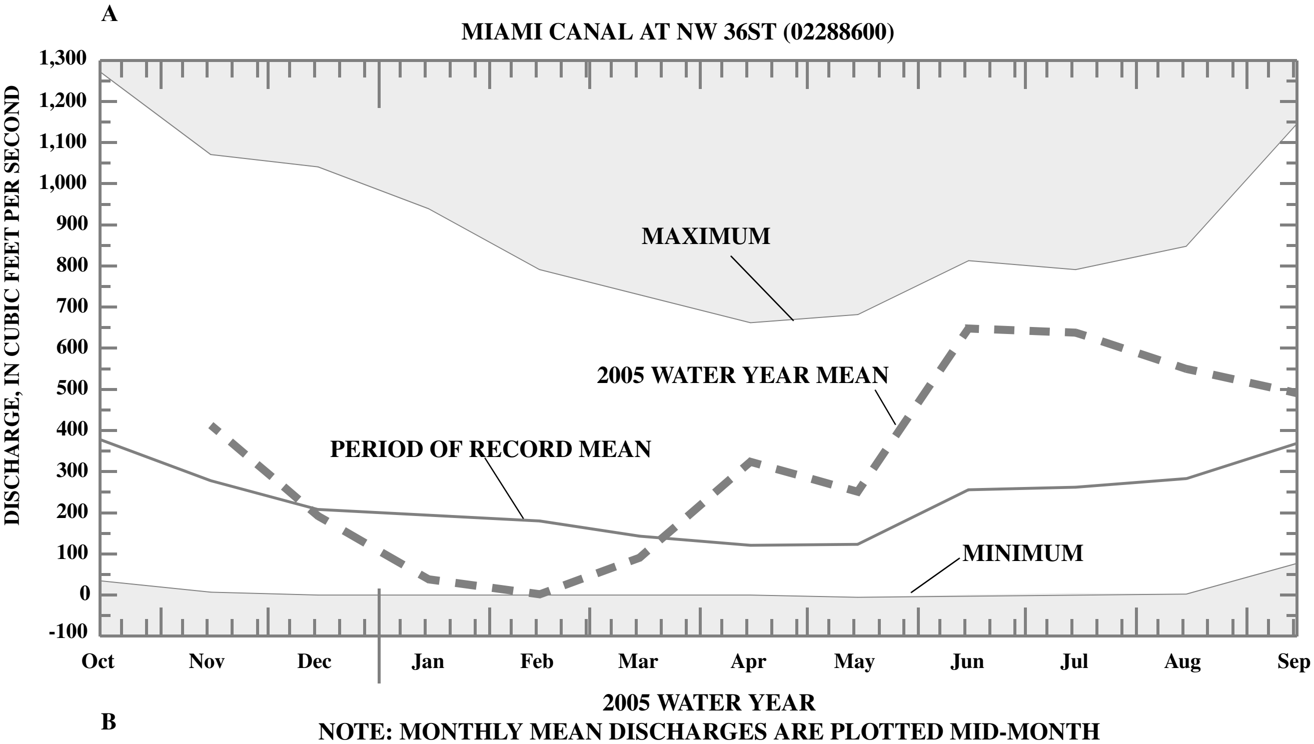


Figure 7. Miami Canal at S-8 near Lake Harbor (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and monthly mean discharge for the entire period of record; (B) monthly mean discharge for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.



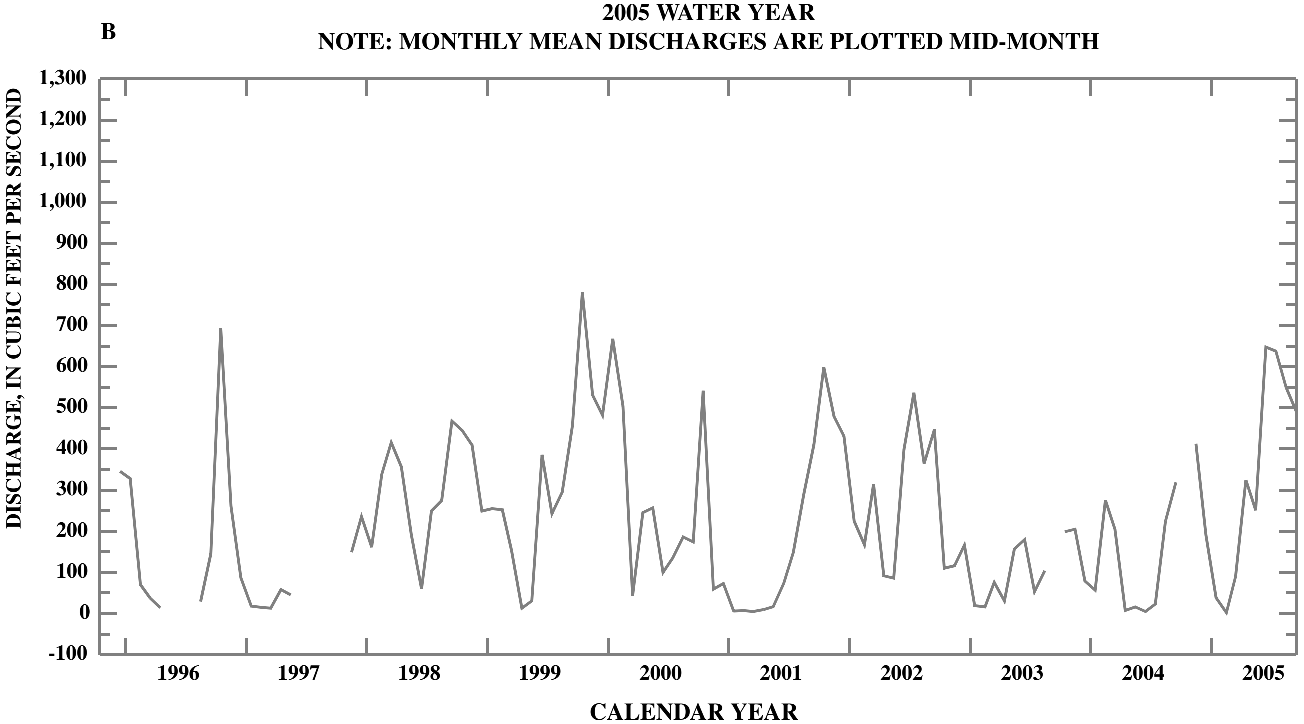
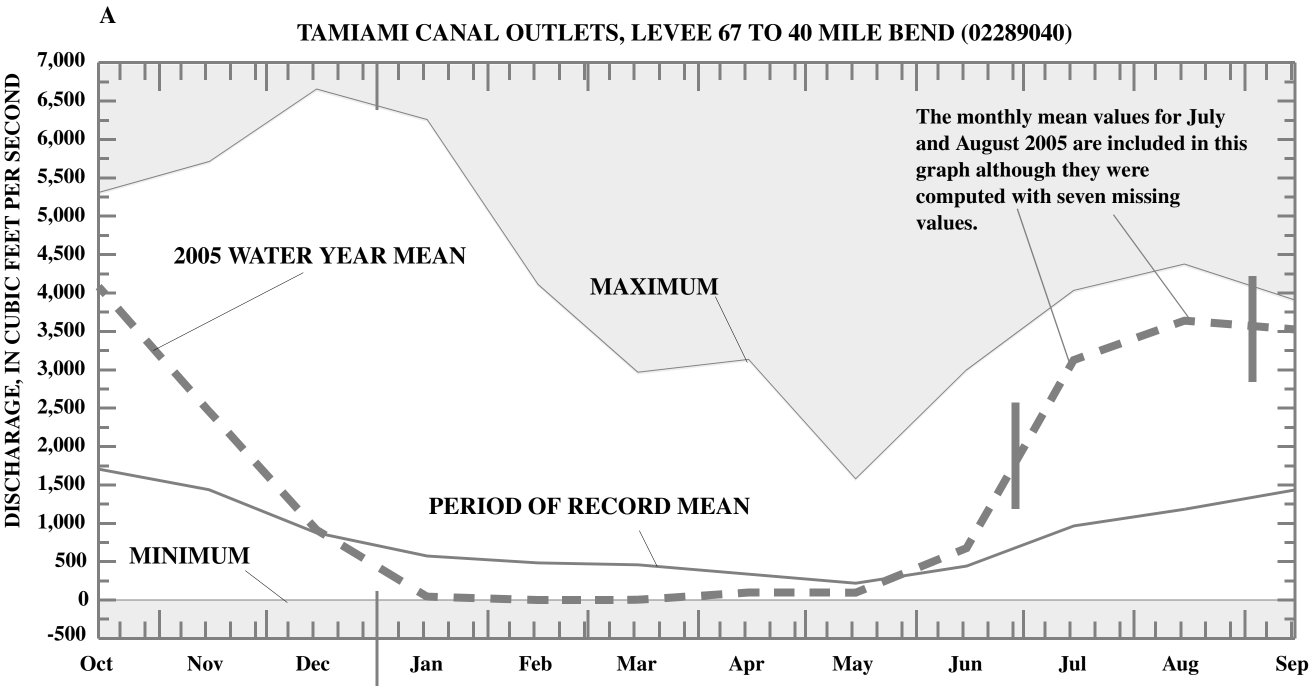


Figure 8. Miami Canal at NW 36 Street, Miami (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and monthly mean discharge for the entire period of record; (B) the monthly mean discharge for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.



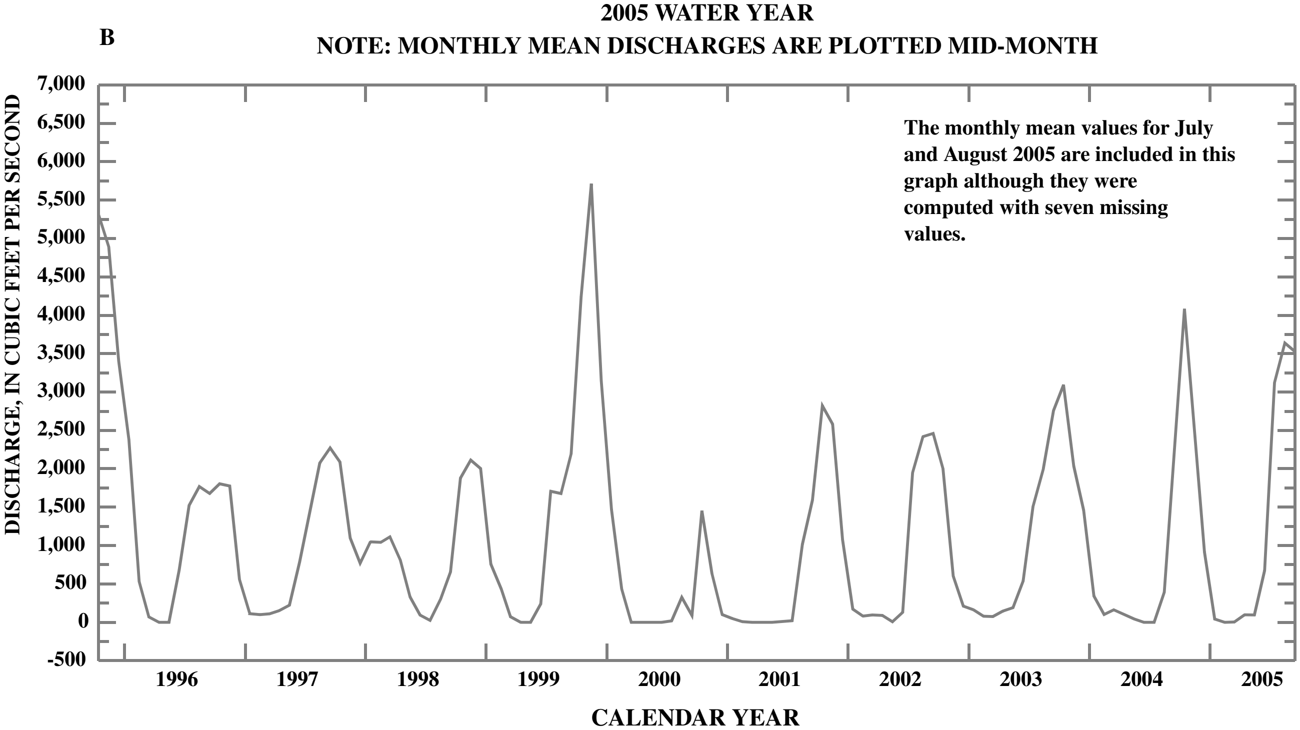


Figure 9. Tamiami Canal Outlets, Levee 67A to 40 Mile Bend (total discharge through S-12A, B, C, D) (A) 2005 monthly mean discharge compared to the maximum and minimum monthly mean discharge for the period of record through the 2004 water year, and monthly mean discharge for the entire period of record; (B) the monthly mean discharge for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

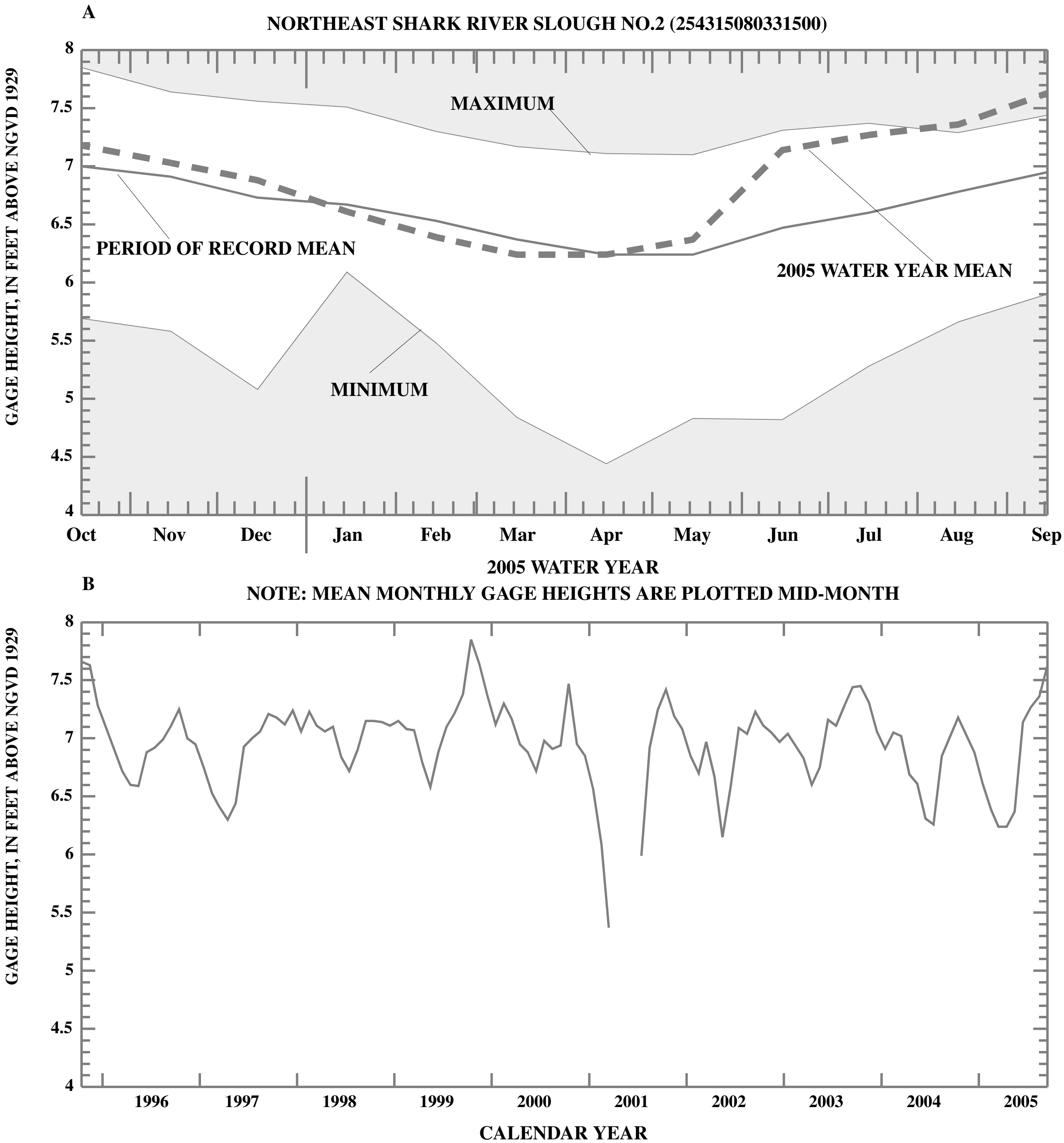


Figure 10. Northeast Shark River Slough No. 2 near Coopertown (A) 2005 monthly mean gage height compared to the maximum and minimum monthly mean gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

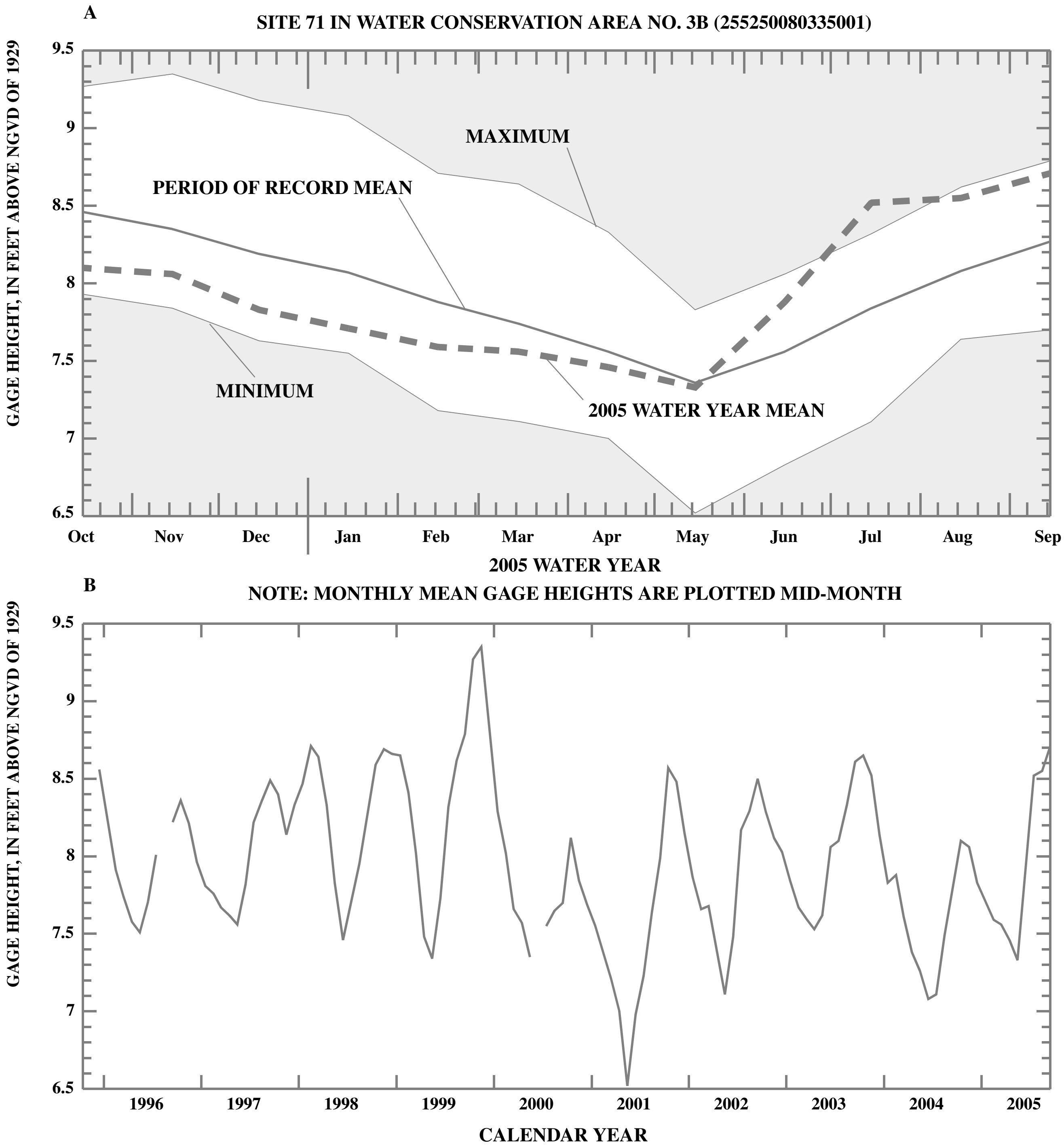
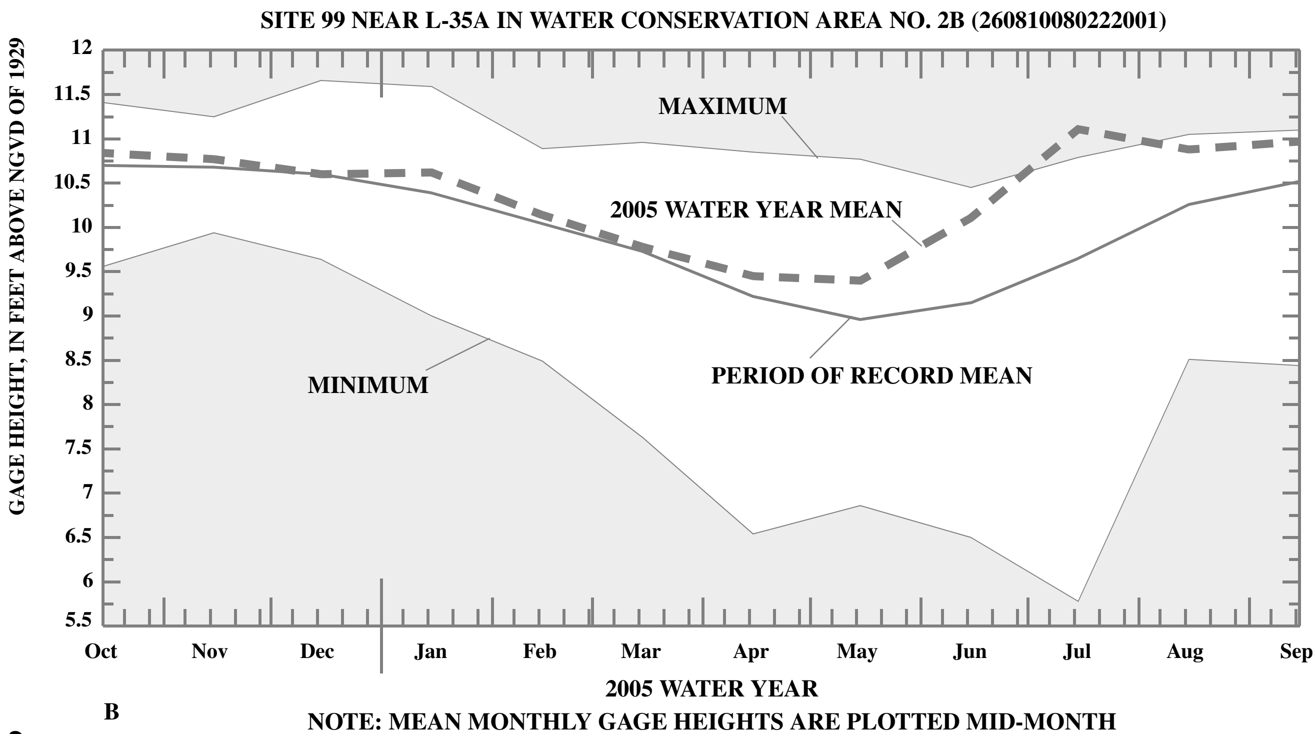


Figure 11. Site 71 in Water Conservation Area No. 3B near Coopertown (A) 2005 monthly mean gage height compared to the maximum and minimum monthly mean gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

A



B

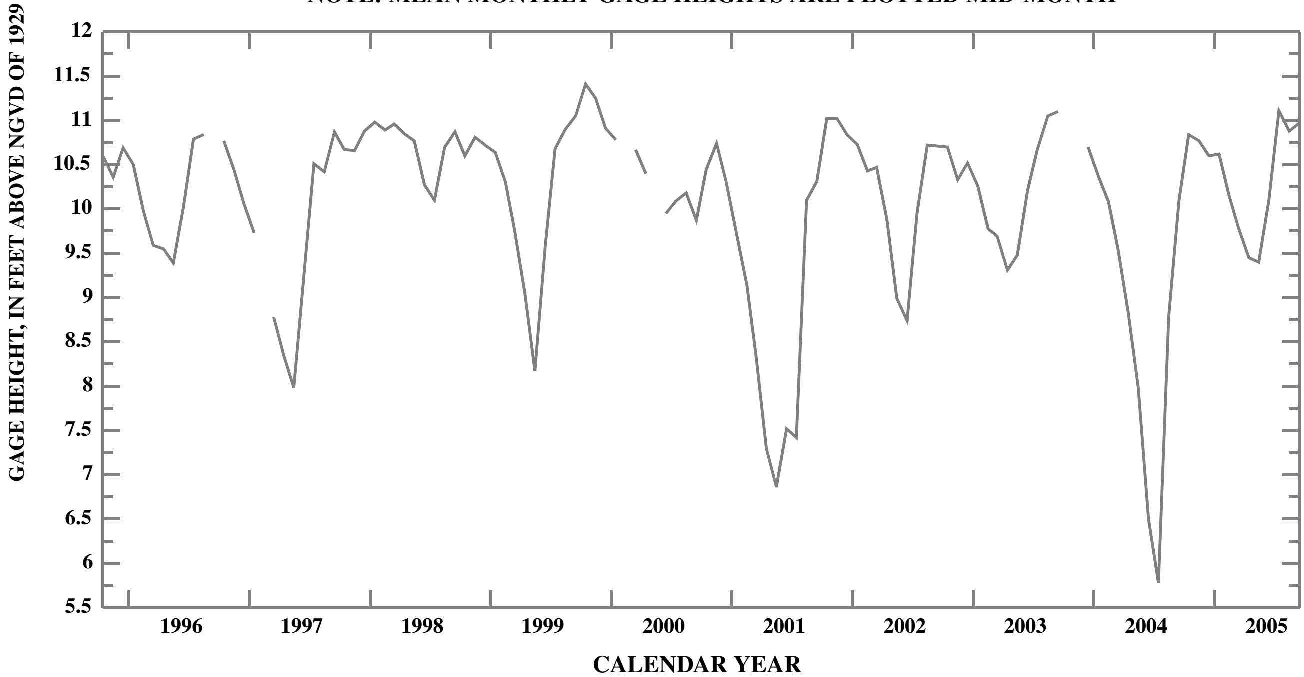


Figure 12. Site 99 near L-35A in Water Conservation Area No. 2B (A) 2005 monthly mean gage height compared to the maximum and minimum monthly mean gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

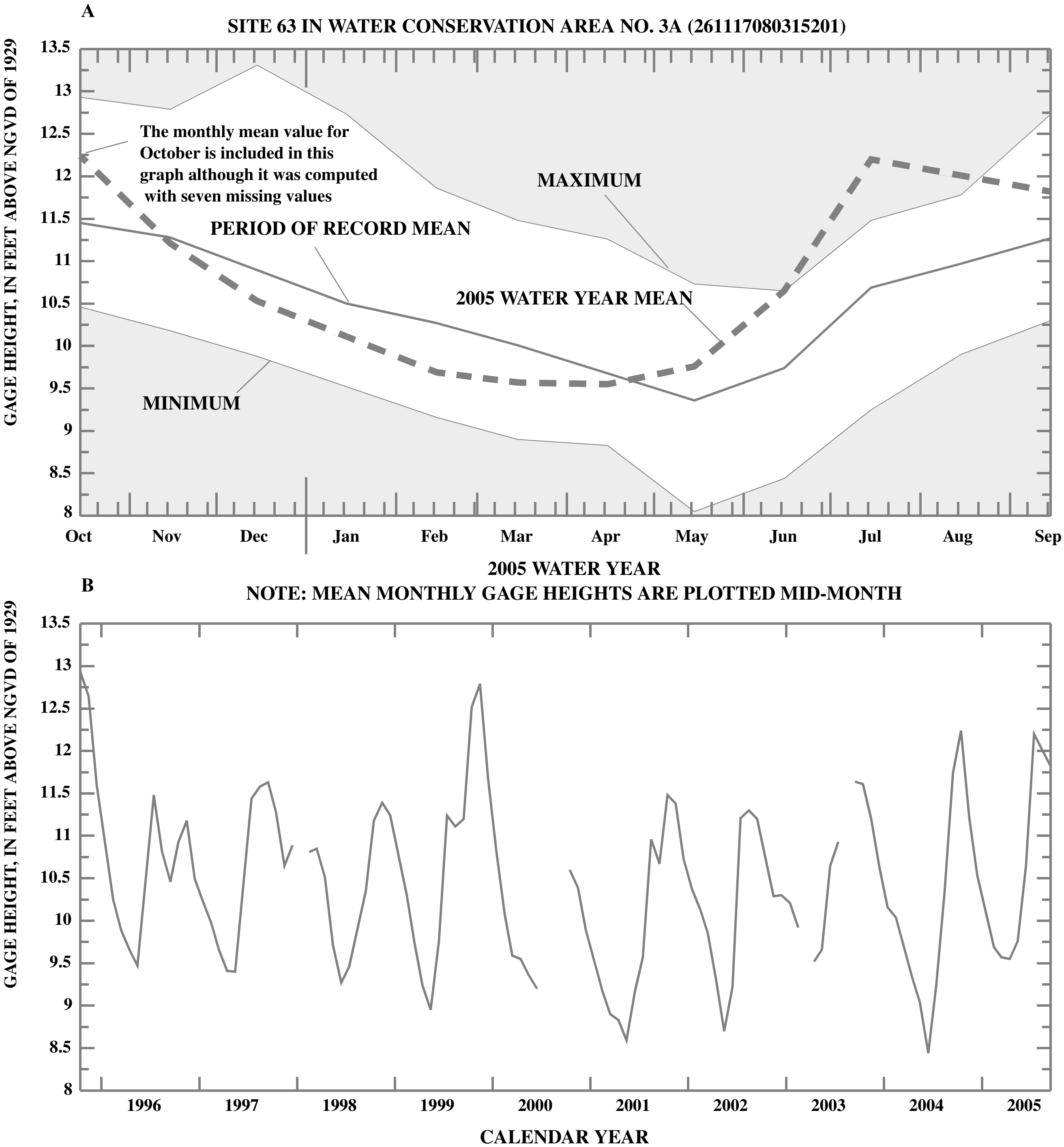
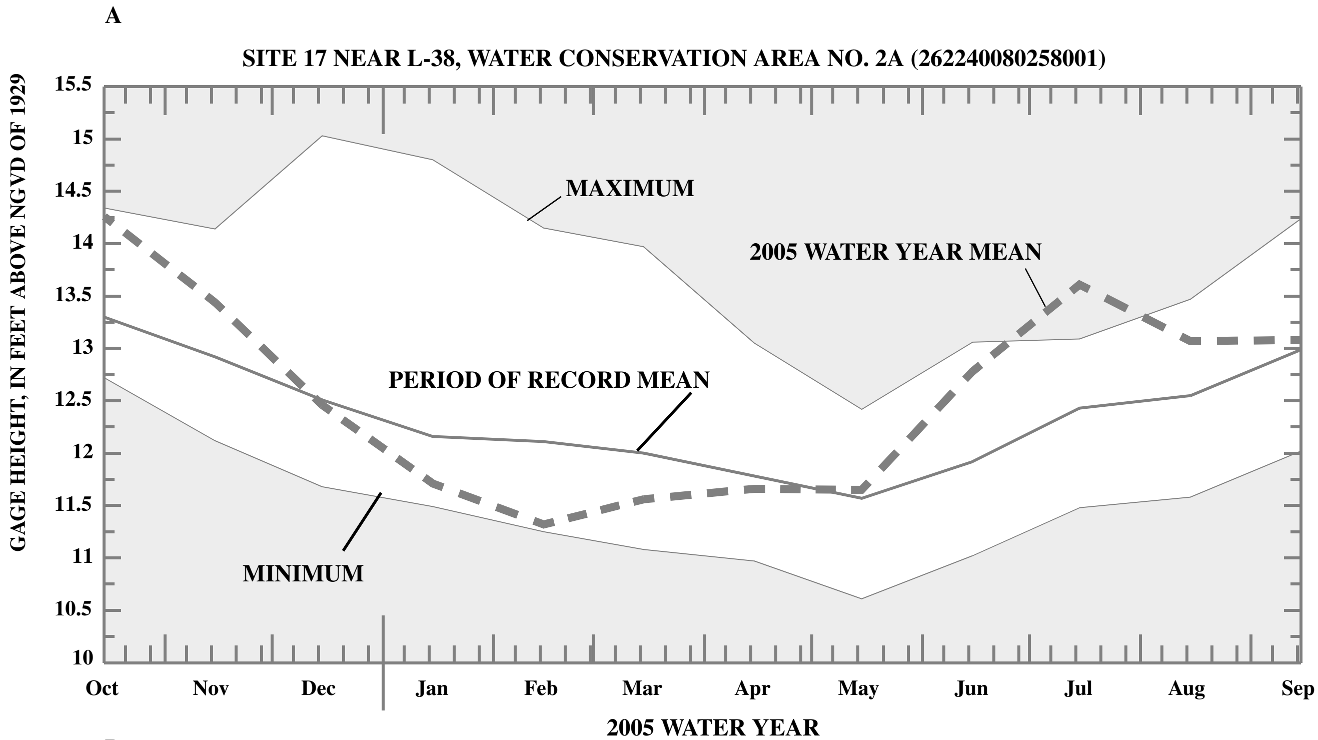


Figure 13. Site 63 in Water Conservation Area No. 3A near Andytown (A) 2005 monthly mean gage height compared to the maximum and minimum monthly mean gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.



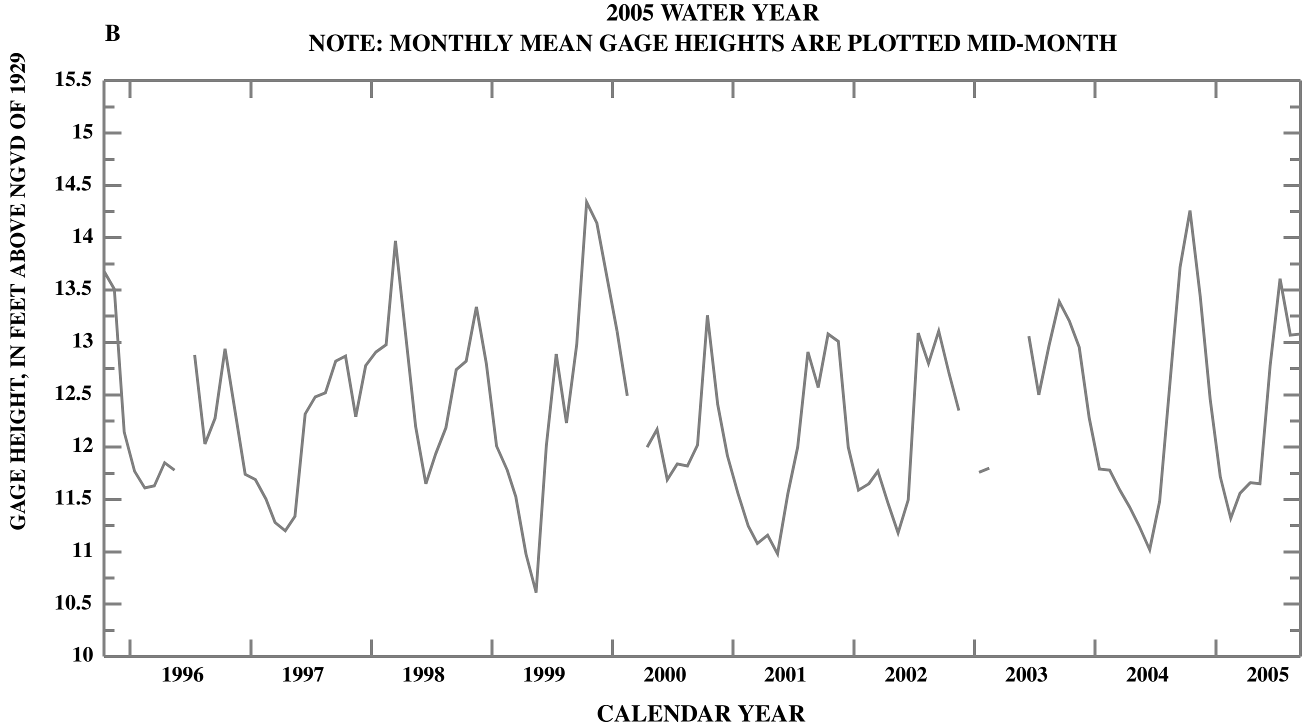


Figure 14. Site 17 near L-38, Water Conservation Area No. 2A (A) 2005 monthly mean gage height compared to the maximum and minimum monthly gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

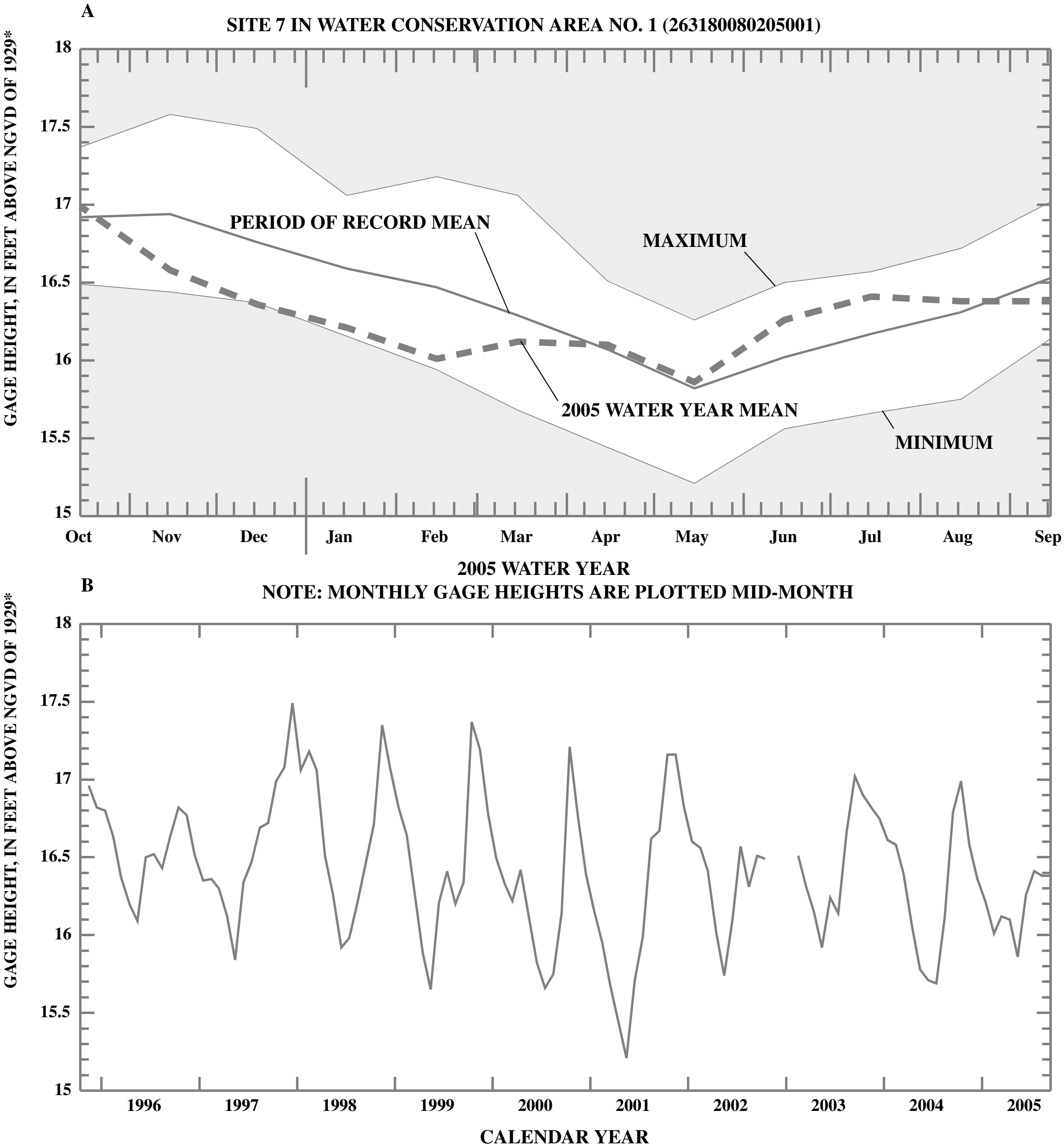


Figure 15. Site 7 in Water Conservation Area No. 1 near Shawano (A) 2005 monthly mean gage height compared to the maximum and minimum monthly mean gage height for the period of record through the 2004 water year, and monthly mean gage height for the entire period of record; (B) the monthly mean gage height for the period of 1996-2005. Any months that have more than 5 days of missing record are not included in these graphs unless otherwise noted. *The datum of gage is NGVD 1929 converted through VERTCON using the NAVD 88 survey levels from a benchmark provided by the Department of Environmental Protection. The data before the 2004 water year is published at a datum 0.102 ft higher than the present datum. All data used for the development of this graph were converted to the present datum.

SUMMARY OF HYDROLOGIC CONDITIONS (continued)

Surface-Water Station Functions

The south Florida surface-water data-collection network has various types of stations to meet the needs of water managers and others. These stations are grouped below according to major functions. These groups contain representative stations from the south Florida surface-water data-collection network.

The following USGS stations monitor the release of water into the St. Lucie Canal from Lake Okeechobee and other inflows

02276870 St. Lucie Canal at Lake Okeechobee (S-308)
272524080221800 Five Mile Canal Above S-29-1-4 Nr Ft. Pierce, Fl

The following USGS stations at the S-5A complex monitor water releases to and from Lake Okeechobee, the water conservation areas, and the coast:

02278450 West Palm Beach Canal above S-5A, near Loxahatchee (pump - west gate)
02278500 Diversions to Water Conservation Area No. 1 at S-5A and S-5A-S (pump + south gate)
02278550 Levee 8 Canal at West Palm Beach Canal, nr Loxahatchee (east + west + south gate)
02278600 West Palm Beach Canal below S-5A-E near Loxahatchee (east gate only)

The following USGS stations monitor the release of water from Lake Okeechobee into the Everglades Agricultural Area:

265501080364900 Levee 8 Canal near Canal Point
02278000 West Palm Beach Canal at S-352, at Canal Point
02280500 Hillsboro Canal below S-351, near South Bay
02283500 North New River Canal below S-2 and S-351, near South Bay
02286400 Miami Canal at S-354 and S-3, at Lake Harbor
264514080550700 Industrial Canal at Clewiston

The following USGS stations monitor the release of water from the Everglades Agricultural Area into the water-conservation areas:

02281200 Hillsboro Canal at S-6 near Shawano
02286700 Miami Canal at S-8 near Lake Harbor
261533080571600 L-28 Interceptor Canal below S-190 near Clewiston
261543080495000 L-28 Canal above S-140 near Clewiston
02289031 Levee 3 Canal Below G-155 nr Clewiston
02289032 Levee 4 Canal Below G-88 nr Clewiston

The following USGS discharge stations monitor discharges within and into the Loxahatchee River

02277600 Loxahatchee River Near Jupiter
265708080093700 Hobe Ditch Trib To Lox River .5 Mi Above Mouth
265818080111900 Cypress Creek Canal Below Gulfstream Bridge
270022080094600 Kitchings Creek nr Hobe Sound

Surface-Water Station Functions (continued)

The following USGS stations monitor continuous water levels in the water-conservation areas:

02278501 Water Conservation Area No. 1 below S-5 Complex, near Loxahatchee
263537080211400 North Loxahatchee Conservation Area No. 1 near Boynton Beach
262528080202700 South Loxahatchee Conservation Area No. 1 near Boynton Beach
263180080205001 Site 7 in Water Conservation Area No. 1 near Shawano
263050080145001 Site 8T in Water Conservation Area No. 1 near Boynton Beach
263000080120001 Site 8C near L-40 in Water Conservation Area No. 1 nr Boynton Beach
262750080175001 Site 9 in Water Conservation Area No. 1 near Boynton Beach
261710080190001 Site 19 in Water Conservation Area No. 2A near Coral Springs
262240080258001 Site 17 near L-38, Water Conservation Area No. 2A nr Coral Springs
261117080315201 Site 63 in Water Conservation Area No. 3A near Andytown
261023080443001 Site 62 in Water Conservation Area No. 3A near Andytown
260810080222001 Site 99 near L-35A in Water Conservation Area No. 2B near Sunrise
260037080303401 Site 76 in Water Conservation Area No. 3B near Andytown
255828080401301 Site 64 in Water Conservation Area No. 3A near Coopertown
255300080370001 Site 69 in Water Conservation Area No. 3B near Coopertown
254848080432001 Site 65 in Water Conservation Area No. 3A near Coopertown
255250080335001 Site 71 in Water Conservation Area No. 3B near Coopertown

The USGS monitors the following stations to determine the discharge into Big Cypress National Preserve and Everglades National Park:

02288800 Tamiami Canal Outlets, Monroe to Carnestown
02288900 Tamiami Canal Outlets, 40 Mile Bend to Monroe
02289040 Tamiami Canal Outlets, Levee 67A to 40 Mile Bend (total discharge through S-12A, B, C, D)
254543080491101 Tamiami Canal below S-12A (total discharge through S-12A)
02289019 Tamiami Canal below S-12B (total discharge through S-12B)
02289041 Tamiami Canal below S-12C (total discharge through S-12C)
254543080405401 Tamiami Canal below S-12D (total discharge through S-12D)
02289060 Tamiami Canal Outlets, Levee 30 to L-67A
022907647 Levee 31 North Extension at 1 mile near West Miami
02290765 Levee 31 North Extension at 3 mile near West Miami
02290766 Levee 31 North Extension at 4 mile near West Miami
02290767 Levee 31 North Extension at 5 mile near West Miami
02290768 Levee 31 North Extension at 7 mile near West Miami
02290769 Canal 111 above S-18C, near Florida City
02291000 Barron River Canal near Everglades

The following stations monitor discharge from the Water Conservation Areas to the structures along the east coast.

02281400 Hillsboro Canal near Margate
02286200 Snake Creek Canal at NW 67the Avenue, near Hialeah
02287395 Miami Canal East of Levee-30, near Miami
02287497 N.W. Wellfield Canal near Dade Broward Levee near Pennsuco, FL
02289500 Tamiami Canal near Coral Gables, FL

Surface-Water Station Functions (continued)

The following USGS stations are representative of continuous surface-water elevations in southern Miami-Dade County:

254315080331500 Northeast Shark River Slough No. 2 near Coopertown
254130080380500 Northeast Shark River Slough No. 1 near Coopertown
254100080402400 L-67 Extended Canal West, near Florida City
254100080402200 Northeast Shark River Slough East of L-67 Extension nr Richmond Heights
253828080391100 Northeast Shark River Slough No. 4, North of Grossman
253753080393600 Northeast Shark River Slough No. 5, South of Grossman
251716080342100 Everglades 5A in C-111 Basin near Homestead
251724080341400 Everglades 5B in C-111 Basin near Homestead
251906080283400 Everglades 2A in C-111 Basin near Homestead
251946080254800 Everglades 1 in C-111 Basin near Homestead
252036080324300 Everglades 4 in C-111 Basin near Homestead
252043080302400 Everglades 3 in C-111 Basin near Homestead

The following USGS discharge monitoring sites are located along the coast in Miami-Dade, Broward, and Palm Beach Counties:

02282700 Middle River Canal at S-36, near Fort Lauderdale
02288600 Miami Canal at NW 36th Street, Miami (S-26)

The following USGS discharge monitoring sites are located on the southwestern coast of Florida:

02291500 Imperial River near Bonita Springs
02291524 Spring Creek Headwater near Bonita Springs
02291580 North Branch Estero River at Estero
02291597 South Branch Estero River at Estero
02291673 Tenmile Canal at Control Near Estero
02291669 Sixmile Cypress Creek North Ft. Meyers
02292900 Caloosahatchee River at S-79 near Olga
02293214 Meade Canal at Cape Coral
02293230 Whiskey Creek at Ft. Meyers, FL
02293240 Aries Canal at Cape Coral
02293241 San Carlos Canal at Cape Coral
02293243 Courtney Canal at Cape Coral
02293345 Shadroe Canal at Cape Coral
02293346 Horseshoe Canal at Cape Coral
02293347 Hermosa Canal at Cape Coral
02293264 Gator Slough at SR 765 near Ft. Myers
264437081550100 Gator Slough at U.S. 41 near Ft. Myers

Surface-Water Station Functions (continued)

The following USGS stations monitor continuous water level and water quality parameters in the Loxahatchee and St. Lucie Rivers

02277100 St. Lucie River at Speedy Point, Stuart, FL
02277110 St. Lucie Estuary at A1A (Steele Pt), Stuart, FL
265645080055900 Loxahatchee River at Pompano Dr. nr Jupiter, FL
265651080045500 Loxahatchee River at Coast Guard Dock nr Jupiter, FL
265906080093500 Loxahatchee River at Mile 9.1 nr Jupiter
265912080082900 Loxahatchee River at Boy Scout Camp near Hobe Sound, FL
265929080091800 Loxahatchee River Outlet at Kitchings Creek
272229080203400 St. Lucie River at Midway Rd. nr Pt. St. Lucie, FL
271929080195900 St. Lucie River at Prima Vista Rd., Pt. St. Lucie

The following USGS stations monitor continuous canal water level only:

255026080231300 Snapper Creek Canal Extension at MW 74th Street, near Hialeah, FL
261150080270001 North New River Canl at S-11-A near Andytown
261200080275001 North New River Canl at S-11-B near Andytown
261300080280001 North New River Canl at S-11-C near Andytown
261952080074500 E-3 Canal, SW 18th Street, Boca Raton, FL
262100080190001 Hillsboro Canal at S-10-A near Deerfield Beach, FL
262200080210001 Hillsboro Canal at S-10-C near Deerfield Beach, FL
262300080220001 Hillsboro Canal at S-10-D near Deerfield Beach, FL
262337080074800 E-3 Canal at NW 51st Street, Boca Raton, FL
262358080055700 E-4 Canal at Clint-Moore Road, Boca Raton, FL

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 61 sites in small drainage basins in 39 States that was established in 1963 to provide consistent streamflow data representative of undeveloped watersheds nationwide, and from which data could be analyzed on a continuing basis for use in comparison and contrast with conditions observed in basins more obviously affected by human activities. At selected sites, water-quality information is being gathered on major ions and nutrients, primarily to assess the effects of acid deposition on stream chemistry. Additional information on the Hydrologic Benchmark Program may be accessed from *http://ny.water.usgs.gov/hbn/*.

National Stream-Quality Accounting Network (NASQAN) is a network of sites used to monitor the water quality of large rivers within the Nation's largest river basins. From 1995 through 1999, a network of approximately 40 stations was operated in the Mississippi, Columbia, Colorado, and Rio Grande River basins. For the period 2000 through 2004, sampling was reduced to a few index stations on the Colorado and Columbia Rivers so that a network of five stations could be implemented on the Yukon River. 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 (NAWQA) Program; (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. Additional information about the NASQAN Program may be accessed from *http://water.usgs.gov/nasqan/*.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a network of monitoring sites that provides continuous measurement and assessment of the chemical constituents in precipitation throughout the United States. As the lead Federal agency, the USGS works together with over 100 organizations to provide a long-term, spatial and temporal record of atmospheric deposition generated from this network of 250 precipitation-chemistry monitoring sites. The USGS supports 74 of these 250 sites. This long-term, nationally consistent monitoring program, coupled with ecosystem research, provides critical information toward a national scorecard to evaluate the effectiveness of ongoing and future regulations intended to reduce atmospheric emissions and subsequent impacts to the Nation's land and water resources. Reports and other information on the NADP/NTN Program, as well as data from the individual sites, may be accessed from *http://bqs.usgs.gov/acidrain/*.

The USGS National Water-Quality Assessment (NAWQA) Program 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; to provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and to provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 42 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 is 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 water-resources managers to use in making decisions 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 for collaboration among the agencies. Additional information about the NAWQA Program may be accessed from *http://water.usgs.gov/nawqa/*.

The USGS National Streamflow Information Program (NSIP) is a long-term program with goals to provide framework streamflow data across the Nation. Included in the program are creation of a permanent Federally funded streamflow network, research on the nature of streamflow, regional assessments of streamflow data and databases, and upgrades in the streamflow information delivery systems. Additional information about NSIP may be accessed from *http://water.usgs.gov/nsip/*.

EXPLANATION OF THE RECORDS

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 and ground water, and ground-water level data. 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 or well, in this report is assigned a unique identification number. 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 regular surface-water stations and the "latitude-longitude" system is used for wells and for surface-water stations where only miscellaneous observations are made.

Downstream Order and Station Number

Since October 1, 1950, hydrologic-station records in USGS reports have been listed in order of downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary entering between two main-stream stations is listed between those stations. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is located with respect to the stream to which it is immediately tributary is indicated by an indention in that list of stations in the front of this report. Each indentation represents one rank. This downstream order and system of indentation indicates which stations are on tributaries between any two stations and the rank of the tributary on which each station is located.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These station numbers are in the same downstream order used in this report. In assigning a station number, 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 composed of both types of stations. Gaps are consecutive. The complete eight-digit (or 10-digit) number for each station, such as 02228500, which appears just to the left of the station name, includes the 2-digit part number "02" plus the 6- to 12-digit downstream-order number "228500." The part number designates the major river basin; for example, part "02" is the South Atlantic Slope and eastern Gulf of Mexico basins. In areas of high station density, an additional two digits may be added to the station identification number to yield a 10-digit number. The stations are numbered in downstream order as described above between stations of consecutive 8-digit numbers.

Numbering System for Wells and Miscellaneous Sites

The USGS well and miscellaneous site-numbering system is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, and the next 7 digits denote degrees, minutes, and seconds of longitude; the last 2 digits are a sequential number for wells within a 1-second grid. In the event that the latitude-longitude coordinates for a well and miscellaneous site are the same, a sequential number such as "01," "02," and so forth, would be assigned as one would for wells (see fig. 12). The 8-digit, downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

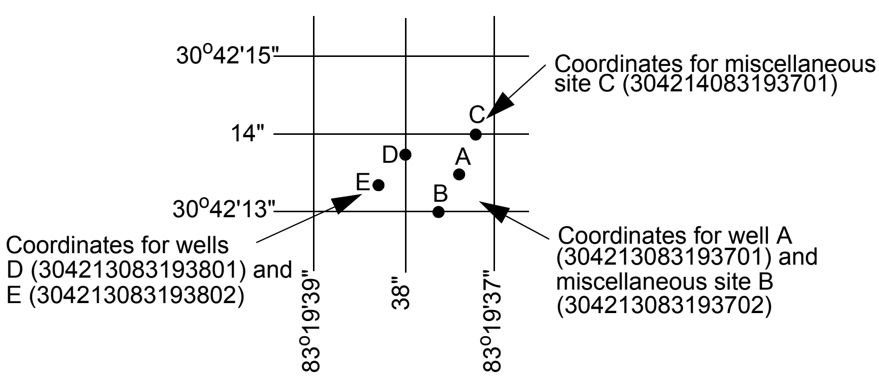


Figure 16. System for numbering wells and miscellaneous sites. (latitude and longitude)

EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a stage-recording device through which either instantaneous or mean daily discharges may be computed for any time, or any period of time, during the period of record. Complete records of lake elevation, similarly, are those for which stage may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a stage-recording device or daily or weekly observations, but need not be. Because daily mean discharges and lake elevations 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 and partial-record stations for which data are given in this report are shown in figures preceding each sub-basin.

Data Collection and Computation

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and volume of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from a water-stage recorder that is either downloaded electronically in the field to a laptop computer or similar device or is transmitted using telemetry such as GOES satellite, land-line or cellular-phone modems, or by radio transmission. Measurements of discharge are made with a current meter or acoustic Doppler current profiler, using the general methods adopted by the USGS. These methods are described in standard textbooks, USGS Water-Supply Paper 2175, and the Techniques of Water-Resources Investigations of the United States Geological Survey (TWRIs), Book 3, Chapters A1 through A19 and Book 8, Chapters A2 and B2, which may be accessed from *http://water.usgs.gov/pubs/twri/*. The methods are consistent with the American Society for Testing and Materials (ASTM) standards and generally follow the standards of the International Organization for Standards (ISO).

For stream-gaging stations, discharge-rating tables for any stage are prepared from stage-discharge curves. If extensions to the rating curves are necessary to express discharge greater than measured, the extensions are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, or computation of flow over dams and weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharges are computed from the daily values. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features of the stream channel, the daily mean discharge is computed by the shifting-control method in which correction factors that are based on individual discharge measurements and notes by engineers and observers are used when applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the controlling section, the daily mean discharge is computed by the shifting-control method.

The stage-discharge relation at some stream-gaging stations is affected by backwater from reservoirs, tributary streams, or other sources. Such an occurrence 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 at some distance from the base gage.

An index velocity is measured using ultrasonic or acoustic instruments at some stream-gaging stations, and this index velocity is used to calculate an average velocity for the flow in the stream. This average velocity along with a stage-area relation is then used to calculate average discharge.

At some stations, the stage-discharge relation is affected by changing stage. At these stations, the rate of change in stage is used as a factor in computing discharge.

At some stream-gaging stations in the northern United States, the stage-discharge relation is affected by ice in the winter; therefore, computation of the discharge in the usual manner is impossible. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter-discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge from other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the volume or contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly changes are computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys, the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some stream-gaging stations, periods of time occur when no gage-height record is obtained or the recorded gage height is faulty and cannot be used to compute daily discharge or contents. Such a situation can happen when the recorder stops or otherwise fails to operate properly, the intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records from other stations in the same or nearby basins. Likewise, lake or reservoir volumes may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

Data Presentation

The records published for each continuous-record surface-water discharge station (stream-gaging station) consist of five parts: (1) the station manuscript or description; (2) the data table of daily mean values of discharge for the current water year with summary data; (3) a tabular statistical summary of monthly mean flow data for a designated period, by water year; (4) 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; and (5) a hydrograph of discharge.

Station Manuscript

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 follow that clarify information presented under the various headings of the station description.

LOCATION.—Location information 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 term indicates the time 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 its flow reasonably can be considered equivalent to flow at the present station.

REVISED RECORDS.—If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

GAGE.—The type of gage in current use, the datum of the current gage referred to a standard datum, 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 either will be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily discharge table. (See section titled Identifying Estimated Daily Discharge.) Information is presented 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, the outlet works and spillway, and the purpose and use of the reservoir.

COOPERATION.—Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.—Information here documents 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 USGS.

REVISIONS.—Records are revised if errors in published records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based national data system, NWISWeb (*http://water.usgs.gov/nwis/nwis*). Users are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent data updates. Updates to NWISWeb are made on an annual basis.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because no current or, possibly, future station manuscript would be published for these stations 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 USGS Water Science Center (address given on the back of the title page of this report) to determine if the published records were revised after the station was discontinued. If, however, the data for a discontinued station were obtained by computer retrieval, the data would be current. 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 stage-capacity table when daily volumes are given.

Peak Discharge Greater than Base Discharge

Tables of peak discharge above base discharge are included for some stations where secondary instantaneous peak discharge data are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood-related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years or a 91-percent chance of exceedence in any 1 year.

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 arithmetic 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 each month. Discharge for the month is 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). Values for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if extensive regulation or diversion is in effect 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 volumes are given. These values are identified by a symbol and a corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed MEAN), maximum (MAX), and minimum (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 values. 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. The designated period will consist of all of the station record within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are 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 records within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station.

The water years for which the statistics are computed are 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 in the REMARKS paragraph of the manuscript or in footnotes. 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 designated-period column may not be within the selected water years listed in the heading. When the dates of occurrence do not fall within the selected water years listed in the heading, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration-curve statistics and runoff data also are given. Runoff data may be omitted if extensive regulation or diversion of flow is in effect in the drainage basin.

The following summary statistics data are provided with each continuous record of discharge. Comments that 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.

ANNUAL MEAN.—The arithmetic mean for the individual daily mean discharges for the year noted or for the designated period.

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 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.

MAXIMUM PEAK FLOW.—The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or in the REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE.—The maximum instantaneous peak stage occurring for the water year or designated period. Occasionally the maximum stage for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, 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 equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.
>
> Cubic feet 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) indicate 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 table lists annual maximum stage and discharge at crest-stage stations, and the second table lists 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 often made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for a 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. This identification is shown either by flagging individual daily values with the letter "e" and noting in a table footnote, "e–Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of Field Data and Computed Results

The accuracy of streamflow data 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 observations of stage, measurements of discharge, and interpretations of records.

The degree of accuracy of the records is stated in the REMARKS in the station description. "Excellent" indicates that about 95 percent of the daily discharges are within 5 percent of the true value; "good" within 10 percent; and "fair," within 15 percent. "Poor" indicates that daily discharges have less than "fair" accuracy. Different accuracies may be attributed to different parts of a given record.

Values of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 ft^3/s; to the nearest tenths between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to three significant figures above 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharge values listed for partial-record stations.

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, values 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 Data Records Available

Information of a more detailed nature than that published for most of the stream-gaging stations such as discharge measurements, gage-height records, and rating tables is available from the USGS Water Science Center. Also, most stream-gaging station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the USGS Water Science Center. (see address that is shown on the back of the title page of this report).

EXPLANATION OF PRECIPITATION RECORDS

Data Collection and Computation

Rainfall data generally are collected using electronic data loggers that measure the rainfall in 0.01-inch increments every 15 minutes using either a tipping-bucket rain gage or a collection well gage. Twenty-four hour rainfall totals are tabulated and presented. A 24-hour period extends from just past midnight of the previous day to midnight of the current day. Snowfall-affected data can result during cold weather when snow fills the rain-gage funnel and then melts as temperatures rise. Snowfall-affected data are subject to errors. Missing values are indicated by this symbol "---" in the table.

Data Presentation

Precipitation records collected at surface-water gaging stations are identified with the same station number and name as the stream-gaging station. Where a surface-water daily-record station is not available, the precipitation record is not published, but is available in the files of the U.S. Geological Survey.

Information pertinent to the history of a precipitation station is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, period of record, and general remarks.

The following information is provided with each precipitation station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.—Information on the type of rainfall collection system is given.

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

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs, which may be accessed from http://water.usgs.gov/pubs/twri/.

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 at several verticals to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

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. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values (and sometimes mean or median values) for each constituent measured and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

SURFACE-WATER-QUALITY RECORDS

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because discharge data are useful in the interpretation of surface-water quality. Records of surface-water quality in this report 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 *continuous-record station* is a site where data are collected on a regularly scheduled basis. Frequency may be one 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 continuous- or partial-record station, where 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 *continuous records* as used in this report and *continuous recordings* that refer to a continuous graph or a series of discrete values recorded at short intervals. 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.

Accuracy of the Records

One of four accuracy classifications is applied for measured physical properties at continuous-record stations on a scale ranging from poor to excellent. The accuracy rating is based on data values recorded before any shifts or corrections are made. Additional consideration also is given to the amount of publishable record and to the amount of data that have been corrected or shifted.

Rating classifications for continuous water-quality records

[≤, less than or equal to; ±, plus or minus value shown; °C, degree Celsius; >, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Measured physical property	Ratings of accuracy (based on combined fouling and calibration drift corrections applied to record)			
	Excellent	**Good**	**Fair**	**Poor**
Water temperature	≤ ±0.2 °C	> ±0.2 - 0.5 °C	> ±0.5 - 0.8 °C	> ±0.8 °C
Specific conductance	≤ ±3%	> ±3 - 10%	> ±10 - 15%	> ±15%
Dissolved oxygen	≤ ±0.3 mg/L or ≤ ± 5%, whichever is greater	> ±0.3 - 0.5 mg/L or > ±5 - 10%, whichever is greater	> ±0.5 - 0.8 mg/L or > ± 10 - 15% whichever is greater	> ±0.8 mg/L or > ± 15%, whichever is greater
pH	≤ ±0.2 unit	> ±0.2 - 0.5 unit	> ±0.5 - 0.8 unit	> ±0.8 unit
Turbidity	≤ ±5% turbidity units or ≤ ± 5%, whichever is greater	> ±0.5 - 1.0 turbidity units or > ± 5 -10%, whichever is greater	> 1.0 - 1.5 turbidity units or > ±10 - 15%, whichever is greater	> ± 1.5 turbidity units or > ±15%, whichever is greater

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. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

Onsite Measurements and Sample Collection

In obtaining water-quality data, a major concern is assuring that the data obtained represent the naturally occurring quality of the water. To ensure this, certain measurements, such as water temperature, pH, and dissolved oxygen, must be made onsite when the samples are collected. To assure that measurements made in the laboratory also represent the naturally occurring water, carefully prescribed procedures must 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 onsite measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1-A9. Most of the methods used for collecting and analyzing water samples are described in the TWRIs, which may be accessed from *http://water.usgs.gov/pubs/twri/*. Also, detailed information on collecting, treating, and shipping samples can be obtained from the USGS Water Science Center (see address that is shown on the back of title page in this report).

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at the time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. 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 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 USGS Water Science Center (see address that is shown on the back of title page in this report).

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, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross section.

During periods of rapidly changing flow or rapidly changing concentration, samples may be collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration are computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily discharges of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

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

In addition to the records of suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for biochemical oxygen demand (BOD) and indicator bacteria are analyzed locally. All other samples are analyzed in the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chapter C1. Methods used by the USGS laboratories are given in the TWRIs, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. The TWRI publications may be accessed from *http://water.usgs.gov/pubs/twri/*. These methods are consistent with ASTM standards and generally follow ISO standards.

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, pH, water temperature, dissolved oxygen, and suspended sediment 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 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 information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

DRAINAGE AREA.—See Data Presentation information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—This indicates the time periods for which published water-quality records for the station are available. 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 on instrumentation is given only if a water-quality monitor temperature record, sediment pumping sampler, or other sampling device is 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 USGS by a cooperating organization are identified here.

EXTREMES.—Maximums and minimums are given only for parameters measured daily or more frequently. For parameters measured weekly or less frequently, true maximums or minimums may not have been obtained. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.—Records are revised if errors in published water-quality records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based national data system, NWISWeb (*http://waterdata.usgs.gov/nwis*). Users of USGS water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent updates. Updates to the NWISWeb are made on an annual basis.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables 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 section:

Printed Output	Remark
E	Value is estimated.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
M	Presence of material verified, but not quantified.
N	Presumptive evidence of presence of material.
U	Material specifically analyzed for, but not detected.
A	Value is an average.

Water-Quality Control Data

The USGS National Water Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. Falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a nondetection for a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as less than LRL for samples in which the analyte either was not detected or did not pass identification. Analytes detected at concentrations between the LT-MDL and the LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of “E.” These data should be used with the understanding that their uncertainty is greater than that of data reported without the E remark code.

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by a USGS Science Center are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples. These data are not presented in this report but are available from the USGS Science Center (see address that is shown on the back of the title page of this report).

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated in the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. Many types of blank samples are possible; each is designed to segregate a different part of the overall data-collection process. The types of blank samples collected by this USGS Water Science Center are:

Field blank—A blank solution that is subjected to all aspects of sample collection, field processing preservation, transportation, and laboratory handling as an environmental sample.

Trip blank—A blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank—A blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank—A blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank—A blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank—A blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank—A blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory. The reference material composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. Many types of replicate samples are possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

Concurrent samples—A type of replicate sample in which the samples are collected simultaneously with two or more samplers or by using one sampler and alternating the collection of samples into two or more compositing containers.

Sequential samples—A type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample—A type of replicate sample in which a sample is split into subsamples, each subsample contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Generally, only ground-water level data from selected wells with continuous record from a basic network of observation wells are published in this report. This basic network contains observation wells located so that the most significant data are obtained from the fewest wells in the most important aquifers.

Site Identification Numbers

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is produced for local needs. (See NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES in this report for a detailed explanation).

Data Collection and Computation

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the TWRIs referred to in the Onsite Measurements and Sample Collection and the Laboratory Measurements sections in this report. In addition, TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1 through A9. The TWRI publications may be accessed from *http://water.usgs.gov/pubs/twri/*. The values in this report represent water-quality conditions at the time of sampling, as much as possible, and that are consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. Trained personnel collected all samples. Most of the wells sampled were pumped long enough to ensure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings. Wells that have very long open intervals (generally 20 ft or greater), were sampled using a down hole sampling device that collects a water sample from the bottom of the well.

Water-level measurements in this report are given in feet with reference to land-surface datum, elevation described in feet above or below National Geodetic Vertical Datum of 1929 (NGVD 29), unless otherwise noted. The elevation of the land-surface datum (lsd) above sea level is also given in the well description. Land-surface datum is a datum plane that is approximately at land surface at each well. 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 of water of several hundred feet, the error in 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 only to a tenth of a foot or a larger unit.

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Accuracy of Ground-Water Level Data

A number of factors affect the accuracy of the ground-water level data published in this report. These factors can be logically separated into those that are related to ground-water level measurement methods (Method-Related Factors) and those that are independent of the methods.

Method-Independent Factors

Water levels are determined using a specific measuring point (MP) at each well. The elevation of this point for most wells published in this report was determined relative to the National Geodetic Vertical Datum of 1929 (NGVD 1929). Scientific advances in determining vertical elevations have caused the development of the North American Vertical Datum of 1988 (NAVD 1988). The National Geodetic Survey (NGS) has completed an extensive releveling effort that provides elevations referenced to NAVD 1988. The U.S. Geological Survey is currently considering how best to utilize the newer NAVD 1988 and yet maintain the continuity of data in south Florida.

Some stations in this report have been surveyed using a benchmark elevation surveyed in NAVD 1988. In an attempt to publish the elevation of each station within the hydrologic monitoring network in the same datum plane, the elevation of the NAVD 1988 benchmark was converted using the VERTCON or CORPSCON software of the National Geodetic Survey to provide a reference elevation in NGVD 1929. The NGVD 1929 datum determined using VERTCON or CORPSCON is known to differ from the historic NGVD 1929 elevation datum (historic NGVD). Hydrologic model development for some sites has required publication of data in the NAVD 1988 datum. The datum of each station is clearly defined in the DATUM or GAGE section of each station manuscript.

Water levels in wells open to highly transmissive aquifers may be affected by barometric pressure. The water-level data in this publication have not been adjusted for barometric pressure effects. Water levels may also be affected by density differences. For example highly saline water has a greater density than fresh water. Water levels have not been adjusted for density effects.

Method-Related Factors

Water-level data are collected using a number of different methods. Each method has inherent factors that affect the accuracy of measured water levels.

STEEL TAPE AND CHALK -- This generally is the most accurate method of measuring the elevation difference between a reference point and the water level in a ground-water well. When the water level is measured using this method, at least two separate measurements are performed. These measurements must agree to within 0.02 ft before the average value is recorded. The precision of this method, is $\pm$ 0.02 ft.

PRESSURE GAGE -- Wells under artesian pressure are monitored using a mechanical pressure gage. These pressure gages are graduated to 0.2 ft. Gages are periodically checked using a pressure manifold to compare gage readings over a range of known pressures. Corrections are applied to the gage readings based on these checks. The reported value is estimated to the nearest tenth of a foot. The precision of this method should be considered to be about $\pm$ 0.1 ft.

FLOAT AND RECORDER -- The accuracy of data recorded using this method is affected by friction within the recorder system as well as friction between the float and the well casing. In large-diameter wells (6 in. or greater), where large floats are used, these effects are minimal; however in small-diameter wells (2 to 6 in.) these effects can be substantial. Friction might significantly affect the data where water-surface fluctuations are very small. Every effort has been made to reduce frictional effects to a minimum.

The accuracy of this method may also be affected by slippage of the float tape or wire, leaks in the float, or biological factors (for example, amphibians crawling on the float). The accuracy of the recorder reading is periodically verified using steel tape and chalk measurements. When the difference between these tape measurements and the recorded value is 0.05 ft or greater, the recorder is reset and a gage-height correction is applied to the data. Uncertainty in water levels for wells verified by steel tape measurements is generally no greater than $\pm$ 0.05 ft.

PRESSURE TRANSDUCER AND RECORDER -- In wells where artesian pressure, frictional effects, or an extensive range in water levels have made float and recorder systems infeasible, pressure transducers have been installed. Transducers are selected that meet or exceed the float and recorder system accuracy. Water levels may be verified using either steel tape or pressure gage measurements. Uncertainty in those verified by steel-tape measurements is generally considered to be no greater than $\pm$ 0.05 ft and uncertainty for those verified using pressure gage readings is generally considered to be about $\pm$ 0.1 ft.

The type of method used to collect water-level data is identified in the INSTRUMENTATION section of each station manuscript.

Data Presentation

Water-level data are presented in alphabetical order by county. The primary identification number for a given well is the 15-digit site identification number that appears in the upper left corner of the table. The secondary identification number is the local or county well number. Well locations are shown and each well is identified on the map by an index number (fig. 13-22) that is cross-referenced to its identification number in a location key preceding the map.

Each well record consists of three parts: the well description, the data table of water levels observed during the water year, and, for most wells, a hydrograph following the data table. Well descriptions are presented in the headings preceding the tabular data.

The following comments clarify information presented in these various headings.

LOCATION.—This paragraph follows the well-identification number and reports the hydrologic-unit number and a geographic point of reference. Latitudes and longitudes used in this report are reported as North American Datum of 1927 unless otherwise specified.

AQUIFER.—This entry designates by name and geologic age the aquifer that the well taps.

WELL CHARACTERISTICS.—This entry describes the well in terms of depth, casing diameter and depth or screened interval, method of construction, use, and 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 continuous, monthly, or some other frequency of measurement.

DATUM.—This entry describes the measuring point. The measuring point is described physically (such as top of casing, top of instrument shelf, and so forth).

LAND-SURFACE DATUM.—This is a new section started for water year 2003, to document land-surface datum. The elevation of the land-surface datum is described in feet above National Geodetic Vertical Datum of 1929 (NGVD 29), and is estimated from a field measurement to the nearest tenth of a foot. However because land surface varies the precision of this value is considered to be about +/- 0.5 ft.

REMARKS.—This entry describes factors that may affect the water level in a well or the measurement of the water level, when various methods of measurement were begun, and the network (climatic, terrane, local, or areal effects) or the special project to which the well belongs.

PERIOD OF RECORD.—This entry indicates the time period for which records are published for the well, the month and year at the start of publication of water-level records by the USGS, and the words “to current year” if the records are to be continued into the following year. Time periods for which water-level records are available, but are not published by the USGS, may be noted.

EXTREMES FOR PERIOD OF RECORD.—This entry contains the highest and lowest instantaneously recorded or measured water levels of the period of published record, with respect to land-surface datum or sea level, and the dates of occurrence.

Water-Level Tables

A table of water levels follows the well description for each well. Water-level measurements in this report are given in feet with reference to either sea level or land-surface datum (lsd). Missing records are indicated by dashes in place of the water-level value.

For wells not equipped with recorders, water-level measurements were obtained periodically by steel or electric tape or pressure gage. Tables of periodic water-level measurements in these wells show the date of measurement and the measured water-level value.

Hydrographs

Hydrographs are a graphic display of water-level fluctuations over a period of time. In this report, current water year and, when appropriate, period-of-record hydrographs are shown. Hydrographs that display periodic water-level measurements show points that may be connected with a dashed line from one measurement to the next. Hydrographs that display recorder data show a solid line representing the mean water level recorded for each day. Missing data are indicated by a blank space or break in a hydrograph. Missing data may occur as a result of recorder malfunctions, battery failures, or mechanical problems related to the response of the recorder’s float mechanism to water-level fluctuations in a well.

EXPLANATION OF RECORDS OF BULK ELECTRICAL CONDUCTIVITY

Bulk electrical conductivity is the combined electrical conductivity of all material (including pore water) within an approximately 8- to 40-inch doughnut-shaped area surrounding an electromagnetic induction probe (McNeill and others, 1990). Bulk electrical conductivity is affected by different physical and chemical properties of the material including the dissolved-solids concentration of the pore water, and the lithology and porosity of the rock. Polyvinyl chloride (PVC) casings do not interfere with these measurements; however, for those wells where a steel or galvanized iron casing extends part way down the well, the probe cannot sense the materials outside of the casing. As the probe is lowered down the well and out of the influence of a metallic casing, a spike is usually created in the data. Metal well centralizers can also affect the data collected and can cause very large spikes in the data at the depths where the centralizers are installed. These spikes are much different than the changes in bulk electromagnetic conductivity caused by natural lithologic or pore water variations and as such are readily recognizable. As the probe passes through different layers of rock, the different physical properties will cause variation in the recorded conductivity values. A clean sand or sandstone will generally produce lower conductivity values than clay or mudstone. Although the properties of the rocks or well construction will remain constant from year to year, those of the pore water may change due to saltwater intrusion. Conductivity values from freshwater-saturated rocks typically are less than 25 mS/m, whereas conductivity values from saltwater-saturated rocks are typically greater than 67 mS/m (Hittle, 1999). Therefore, electromagnetic induction logging can be used to assess increases or decreases in the conductivity of pore waters caused by movement of the saltwater interface.

Data Collection and Computation

Measurements generally are made during the period of lowest aquifer water levels, in April of each year. However, some wells may have additional logs. During periods of decreased water levels, saltwater intrusion into a freshwater aquifer is likely to be at a maximum. In wells where saltwater is detectable, the graphic representation of data from successive years will show any vertical movement of the saltwater-freshwater interface. Measuring this vertical movement of the interface is the primary use of the bulk electrical conductivity logs published in this report. Upward movement of the interface between freshwater and saltwater in a monitoring well indicates that saltwater intrusion is increasing in that area. Downward movement of the interface indicates recession of the saltwater front near the monitoring well.

In the bulk electrical conductivity graphs of some of the wells logged for this report, the interface position can be seen as the point where low values of conductivity increase suddenly to values generally above 67 mS/m (usually near the bottom of the well). However, the interface position is not as apparent in other wells, and in some, there is no interface. Some locations have been identified where saltwater contamination of the aquifer is occurring above the base of the aquifer as a result of seepage of saline from canals. The bulk electrical conductivity logs detect the changes in fluid conductivity that occur as a result of this seepage.

In wells selected for electromagnetic induction logging, a water sample may be collected and analyzed as a check of the level of salinity. Because bulk electrical conductivity is a function of fluid conductivity, lithology, and porosity, the relationship between the electromagnetic induction logs and the chloride samples may not be as obvious as is the general relationship between fluid conductivity and chloride concentrations. If the rock is not very porous, then the change in bulk electrical conductivity caused by changes in the salinity of the pore water may be smaller than might be expected. Nonetheless, the long-term changes in the bulk electrical conductivity logs are sufficient to assess upward or downward movement of the interface. To aid in interpretation of the bulk electrical conductivity logs, the chloride concentration is shown on the graph of bulk electrical conductivity if water samples have been collected.

The instrument used to collect data for this report is calibrated prior to each field session. The calibration procedure establishes a mathematical constant (calibration factor) that is used to convert raw instrument readings in counts per second (cps) into values of bulk electrical conductivity in millisiemens per meter (mS/m). When data were graphed for the 2000 annual water resources data report, offsets and amplitude differentials occurred in the calibrated values of bulk electrical conductivity for each well between successive years. Investigation revealed that some of the observed offsets and amplitude differentials were caused by differing calibration factors between years. Most calibration factors differed because of temperature and humidity differences during calibration. The calibration procedures adopted during the 2000 water year were designed to minimize the influence of variable temperature and humidity. Before calibrating, the electromagnetic induction probe was lowered into a well and allowed to equilibrate in the water column. The probe was then removed from the well and the instrument immediately calibrated.

Factors other than variable temperature and humidity also have caused offsets and amplitude differentials. One such example occurred with data collected for the 2000 water year. Prior to logging for the 2000 water year, the instrument firmware and software was updated. After logging, it was found that the data had been truncated at the decimal point. Errors in calibration have also been identified and corrected (see Accuracy of Bulk Electrical Conductivity).

Accuracy of Bulk Electrical Conductivity

There are two components that affect the quality of the electromagnetic induction logs published in this report: (1) vertical or depth accuracy, and (2) accuracy and precision of measured bulk electrical conductivity. Vertical accuracy, which affects the determined interface position, is the most critical factor in this monitoring effort. A quality control program sets the velocity of the probe at 12 ft/min (feet per minute) while logging. Before logging begins, a spot on the probe, 3.32 feet above the sensing head, is aligned with the measuring point of the well. Where possible, the data recorded as the probe was moved up the well were used to produce the graphs for this report. Depth values from successive water years were adjusted, if needed, to coincide at one or more specific conductivity peak recorded from an upper part of the well. Depth values were interpolated to the nearest tenth of a foot. The precision of depth determinations using this reporting method should be considered to be about ±0.1 foot.

The accuracy and precision of measured bulk electrical conductivity are a function of both the inherent accuracy of the electromagnetic induction probe and its calibration. The inherent precision of the probe is considered by the manufacturer to be ±5 percent of the full scale. For the logs collected, the electromagnetic induction probe was set to a full scale of 1,000 mS/m. This translates into a precision of ±50 mS/m at full scale. Analysis indicated that the offsets caused by the effects of temperature and humidity on calibration were generally within this range.

In the 1998 water year and for all water years after 2001, the electromagnetic induction probe was calibrated using standards of 0 and 345 mS/m. There are a number of monitoring wells where the measured bulk electrical conductivity exceeds 345 mS/m. For these wells, a calibration standard of 345 mS/m was still used. This is because the probe would have to be set to a full scale of 10,000 mS/m in order to be calibrated using the next available standard (1,301 mS/m). This value would greatly exceed the normal range in bulk electrical conductivity expected. The 345 mS/m calibration constant was also considered to be acceptable because within the range 0 to 1,000 mS/m, the response of the probe is considered to be linear; therefore calibrating the probe to this standard should not significantly reduce accuracy.

In the water years prior to 2002 (excluding 1998), the electromagnetic induction probe generally was calibrated using a 1,301 mS/m standard even though the full scale of the probe was 1,000 mS/m. This caused a calibration error in the data collected. To correct this error, a multiplier of 0.7686 was applied to all of the affected data.

Accuracy of data collected during the 2000 water year may have been affected by the firmware or software update in December 1999. The data collected using this new software and firmware was considerably offset relative to previous electromagnetic induction logs. In addition, the final values were truncated at the decimal point, whereas those collected prior to the update were recorded to the thousandths decimal place. These final values are the result of a multiplication of the raw data from the instrument and a calibration factor. It is unknown whether or not the raw values were truncated at the decimal point. If so, the resulting error could be on the order of 5 mS/m too low. Because the offset data from the 2000 water year are often 5 mS/m lower than the data from other years, truncation of the raw data probably is the explanation.

Data Presentation

Records of conductivity are published individually on the page immediately following the well manuscript. Data for conductivity are identified by well number. Each record consists of a single graph representing conductivity, a lithologic log, and a brief explanation.

RECORDS OF GROUND-WATER-QUALITY

Records of ground-water quality in this report differ from other types of records in that, for the salinity network sites, they consist of a limited set of measurements for the water year. The quality of ground water ordinarily changes slowly; therefore, for most general purposes, a small number of samples except for a few samples taken seasonally during the year, is sufficient. Frequent measurement of the same constituents is not necessary unless one is concerned with a particular problem, such as monitoring for saltwater intrusion. In the special cases where the quality of ground water may change more rapidly, more frequent measurements are made to identify the nature of the changes.

Data Collection and Computation

The ground-water-quality data in this report were obtained mostly as a part of the Florida Integrated Science Center - Fort Lauderdale (FISC-Fort Lauderdale) salinity network or as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some wells within a county but not for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality in the report area. Such a view can be attained only by considering records for this year in context with similar records obtained for these and other counties in earlier years.

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey National Field Manual for the collection of Water-Quality Data and the "Laboratory Measurements" sections in this data report and are also described in the TWRIs, which may be accessed from *http://water.usgs.gov/pubs/twri/*. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in TWRI, Book 1, Chapter D2; Book 5, Chapters A1, A3, and A4 and Book 9, Chapters A1-A6. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS Science Center. (See address that is shown on the back of the title page of this report.)

The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Laboratory Measurements

Analysis for sulfide and measurement of alkalinity, pH, water temperature, specific conductance, and dissolved oxygen are performed onsite. All other sample analyses are performed at the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used by the USGS laboratory are given in TWRI, Book 1, Chapter D2; and Book 5, Chapters A1, A3, and A4, which may be accessed from *http://water.usgs.gov/pubs/twri/*.

Data Presentation

The records of ground-water quality are published immediately following the ground-water level records of each county. Data for quality of ground water are identified by well number. The prime identification number for wells sampled is the 15-digit number derived from the latitude-longitude locations. The Remark Codes listed for surface-water-quality records are also applicable to ground-water-quality records.

ACCESS TO USGS WATER DATA

The USGS 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 from *http://water.usgs.gov*.

Water-quality data and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on various media. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each USGS Water Science Center. (See address that is shown on the back of the title page of this report.)

VOLUME 2A: SOUTH FLORIDA

DEFINITION OF TERMS

Specialized technical terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. Terms such as algae, water level, and precipitation are used in their common everyday meanings, definitions of which are given in standard dictionaries. Not all terms defined in this alphabetical list apply to every State. See also table for converting English units to International System (SI) Units. Other glossaries that also define water-related terms are accessible from *http://water.usgs.gov/glossaries.html*.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an “unfiltered” sample (formerly reported as alkalinity).

Acre-foot (AC-FT, acre-ft) is a unit of volume, commonly used to measure quantities of water used or stored, equivalent to the volume of water required to cover 1 acre to a depth of 1 foot and equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters. (See also “Annual runoff”)

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

Adjusted discharge is discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage).

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. (See also “Biomass” and “Dry weight”)

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a “filtered” sample.

Annual runoff is the total quantity of water that is discharged (“runs off”) from a drainage basin in a year. Data reports may present annual runoff data as volumes in acre-feet, as discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches.

Annual 7-day minimum is the lowest mean value for any 7-consecutive-day period in a year. Annual 7-day minimum values are reported herein for the calendar year and the water year (October 1 through September 30). Most low-flow frequency analyses use a climatic year (April 1-March 31), which tends to prevent the low-flow period from being artificially split between adjacent years. 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.)

Aroclor is the registered trademark for a group of poly-chlorinated biphenyls that were manufactured by the Monsanto Company prior to 1976. Aroclors are assigned specific 4-digit reference numbers dependent upon molecular type and degree of substitution of the biphenyl ring hydrogen atoms by chlorine atoms. The first two digits of a numbered aroclor represent the molecular type, and the last two digits represent the percentage weight of the hydrogen-substituted chlorine.

Artificial substrate is a device that purposely is 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 collected. 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. (See also “Substrate”)

Ash mass is the mass or amount of residue present after the residue from a dry-mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2). (See also “Biomass” and “Dry mass”)

Aspect is the direction toward which a slope faces with respect to the compass.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, whereas 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.

Bankfull stage, as used in this report, is the stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

Base discharge (for peak discharge) is a discharge value, determined for selected stations, above which peak discharge data are published. The base discharge at each station is selected so that an average of about three peak flows per year will be published. (See also “Peak flow”)

Base flow is sustained flow of a stream in the absence of direct runoff. It includes natural and human-induced streamflows. Natural base flow is sustained largely by ground-water discharge.

Bed material is the sediment mixture of which a stream-bed, lake, pond, reservoir, or estuary bottom is composed. (See also "Bedload" and "Sediment")

Bedload is material in transport that primarily is supported by the streambed. In this report, bedload is considered to consist of particles in transit from the bed to the top of the bedload sampler nozzle (an elevation ranging from 0.25 to 0.5 foot). These particles are retained in the bedload sampler. A sample collected with a pressure-differential bedload sampler also may contain a component of the suspended load.

Bedload discharge (tons per day) is the rate of sediment moving as bedload, reported as dry weight, that passes through a cross section in a given time. NOTE: Bedload discharge values in this report may include a component of the suspended-sediment discharge. A correction may be necessary when computing the total sediment discharge by summing the bedload discharge and the suspended-sediment discharge. (See also "Bedload," "Dry weight," "Sediment," and "Suspended-sediment discharge")

Benthic organisms are the group of organisms inhabiting the bottom of an aquatic environment. They include a number of types of organisms, such as bacteria, fungi, insect larvae and nymphs, snails, clams, and crayfish. They are useful as indicators of water quality.

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 microorganisms, such as bacteria.

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

Biomass pigment ratio is an indicator of the total proportion of periphyton that are autotrophic (plants). This also is called the Autotrophic Index.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton and periphyton organisms with a blue pigment in addition to a green pigment called chlorophyll. Blue-green algae can cause nuisance water-quality conditions in lakes and slow-flowing rivers; however, they are found commonly in streams throughout the year. The abundance of blue-green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (mm^3/mL). The abundance of blue-green algae in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter (mm^3/cm^2). (See also "Phytoplankton"and "Periphyton")

Bottom material (See "Bed material")

Bulk electrical conductivity is the combined electrical conductivity of all material within a doughnut-shaped volume surrounding an induction probe. Bulk conductivity is affected by different physical and chemical properties of the material including the dissolved-solids content of the pore water, and the lithology and porosity of the rock.

Canadian Geodetic Vertical Datum 1928 is a geodetic datum derived from a general adjustment of Canada's first order level network in 1928.

Cell volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are used frequently in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (mm^3) is determined by obtaining critical cell measurements or cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formulae used to compute biovolume are as follows:

$$\text{sphere } 4/3\ pr^3 \quad \text{cone } 1/3\ pr^2h \quad \text{cylinder } pr^2h.$$

pi (*p*) is the ratio of the circumference to the diameter of a circle; pi = 3.14159….

From cell volume, total algal biomass expressed as biovolume (mm^3/mL) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes for all species.

Cells/volume refers to the number of cells of any organism that 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 volume, and generally are reported as cells or units per milliliter (mL) or liter (L).

Cfs-day (See "Cubic foot per second-day")

Channel bars, as used in this report, are the lowest prominent geomorphic features higher than the channel bed.

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 BOD or with carbonaceous organic pollution from sewage or industrial wastes. [See also "Biochemical oxygen demand (BOD)"]

Clostridium perfringens (*C. perfringens*) is a spore-forming bacterium that is common in the feces of human and other warmblooded animals. Clostridial spores are being used experimentally as an indicator of past fecal contamination and the presence of microorganisms that are resistant to disinfection and environmental stresses. (See also “Bacteria”)

Coliphages are viruses that infect and replicate in coliform bacteria. They are indicative of sewage contamination of water and of the survival and transport of viruses in the environment.

Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable bound-aries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases, the water level can rise above the ground surface, yielding a flowing well.

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.

Continuous-record station is a site where data are collected with sufficient frequency to define daily mean values and variations within a day.

Control designates a feature in the channel that physically affects the water-surface elevation and thereby determines the stage-discharge relation at the gage. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure, as used in this report, 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 saltwater.

Cubic foot per second (CFS, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second or approximately 449 gallons per minute, or 0.02832 cubic meters per second. The term “second-foot” sometimes is used synonymously with “cubic foot per second” but is now obsolete.

Cubic foot per second-day (CFS-DAY, Cfs-day, [$(ft^3/s)/d$]) 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, 1.98347 acre-feet, 646,317 gallons, or 2,446.6 cubic meters. The daily mean discharges reported in the daily value data tables numerically are equal to the daily volumes in cfs-days, and the totals also represent volumes in cfs-days.

Cubic foot per second per square mile [CFSM, $(ft^3/s)/mi^2$] 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. (See also “Annual runoff”)

Daily mean suspended-sediment concentration is the time-weighted mean concentration of suspended sediment passing a stream cross section during a 24-hour day. (See also “Sediment” and “Suspended-sediment concentration”)

Daily record station is a site where data are collected with sufficient frequency to develop a record of one or more data values per day. The frequency of data collection can range from continuous recording to data collection on a daily or near-daily basis.

Data collection platform (DCP) is an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry.

Data logger is a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data usually are downloaded from onsite data loggers for entry into office data systems.

Datum is a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or Universal Transverse Mercator (UTM) coordinates. (See also “Gage datum,” “Land-surface datum,” “National Geodetic Vertical Datum of 1929,” and “North American Vertical Datum of 1988”)

Diatoms (*Bacillariophyta*) are unicellular or colonial algae with a siliceous cell wall. The abundance of diatoms in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (mm^3/mL). The abundance of diatoms in periphyton samples is given in cells per square centimeter ($cells/cm^2$) or biovolume per square centimeter (mm^3/cm^2). (See also “Phytoplankton” and “Periphyton”)

Diel is of or pertaining to a 24-hour period of time; a regular daily cycle.

Discharge, or flow, is the rate that matter passes through a cross section of a stream channel or other water body per unit of time. The term commonly refers to the volume of water (including, unless otherwise stated, any sediment or other constituents suspended or dissolved in the water) that passes a cross section in a stream channel, canal, pipeline, and so forth, within a given period of time (cubic feet per second). Discharge also can apply to the rate at which constituents, such as suspended sediment, bedload, and dissolved or suspended chemicals, pass through a cross section, in which cases the quantity is expressed as the mass of constituent that passes the cross section in a given period of time (tons per day).

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal and State agencies that collect water-quality data. Determinations of “dissolved” constituent concentrations are made on sample water that has been filtered.

Dissolved oxygen (DO) is the molecular oxygen (oxygen gas) dissolved in water. The concentration in water is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved-solids concentration. Photosynthesis and respiration by plants commonly cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved-solids concentration in water is the quantity of dissolved material in a sample of water. It 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, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. In the mathematical calculation, the bicarbonate value, in milligrams per liter, is multiplied by 0.4917 to convert it to carbonate. Alternatively, alkalinity concentration (as mg/L $CaCO_3$) can be converted to carbonate concentration by multiplying by 0.60.

Diversity index (H) (Shannon index) is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i \approx 1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n},$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area upstream from the location, measured in a horizontal plane, that has a common outlet at the site for its surface runoff from precipitation that normally drains by gravity into a stream. Drainage areas given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth’s surface that contains a drainage system with a common outlet for its surface runoff. (See “Drainage area”)

Dry mass refers to the mass of residue present after drying in an oven at 105 °C, 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. (See also “Ash mass,” “Biomass,” and “Wet mass”)

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 °C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue. (See also “Wet weight”)

Embeddedness is the degree to which gravel-sized and larger particles are surrounded or enclosed by finer-sized particles. (See also “Substrate embeddedness class”)

Enterococcus bacteria commonly are found in the feces of humans and other warmblooded animals. Although some strains are ubiquitous and not related to fecal pollution, the presence of enterococci in water is an indication of fecal pollution and the possible presence of enteric pathogens. *Enterococcus* bacteria are those bacteria that produce pink to red colonies with black or reddish-brown precipitate after incubation at 41 °C on mE agar (nutrient medium for bacterial growth) and subsequent transfer to EIA medium. Enterococci include *Streptococcus feacalis*, *Streptococcus feacium*, *Streptococcus avium*, and their variants. (See also “Bacteria”)

EPT Index is the total number of distinct taxa within the insect orders *Ephemeroptera*, *Plecoptera*, and *Trichoptera*. This index summarizes the taxa richness within the aquatic insects that generally are considered pollution sensitive; the index usually decreases with pollution.

Escherichia coli (E. coli) are bacteria present in the intestine and feces of warmblooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5 °C on mTEC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Estimated (E) value of a concentration is reported when an analyte is detected and all criteria for a positive result are met. If the concentration is less than the method detection limit (MDL), an E code will be reported with the value. If the analyte is identified qualitatively as present, but the quantitative determination is substantially more uncertain, the National Water Quality Laboratory will identify the result with an E code even though the measured value is greater than the MDL. A value reported with an E code should be used with caution. When no analyte is detected in a sample, the default reporting value is the MDL preceded by a less than sign (<). For bacteriological data, concentrations are reported as estimated when results are based on non-ideal colony counts.

Euglenoids (*Euglenophyta*) are a group of algae that usually are free-swimming and rarely creeping. They have the ability to grow either photosynthetically in the light or heterotrophically in the dark. (See also “Phytoplankton”)

Extractable organic halides (EOX) are organic compounds that contain halogen atoms such as chlorine. These organic compounds are semivolatile and extractable by ethyl acetate from air-dried streambed sediment. The ethyl acetate extract is combusted, and the concentration is determined by microcoulometric determination of the halides formed. The concentration is reported as micrograms of chlorine per gram of the dry weight of the streambed sediment.

Fecal coliform bacteria are present in the intestines or feces of warmblooded animals. They often are 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. (See also “Bacteria”)

Fecal streptococcal bacteria are present in the intestines of warmblooded animals and are ubiquitous in the environment. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that 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. (See also “Bacteria”)

Filtered pertains to constituents in a water sample passed through a filter of specified pore diameter, most commonly 0.45 micrometer or less for inorganic analytes and 0.7 micrometer for organic analytes.

Filtered, recoverable is the amount of a given constituent that is in solution after the part of a representative water-suspended sediment sample that has passed through a filter has been extracted. Complete recovery is not achieved by the extraction procedure and thus the analytical determination represents something less than 95 percent of the total constituent concentration in the sample. To achieve comparability of analytical data, equivalent extraction procedures are required of all laboratories performing such analyses because different procedures are likely to produce different analytical results.

Fire algae (*Pyrrhophyta*) are free-swimming unicells characterized by a red pigment spot. (See also “Phytoplankton”)

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is exceeded. For example, the 90^{th} percentile of river flow is the streamflow exceeded 90 percent of the time in the period of interest.

Gage datum is a horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

Gage height (G.H.) is the water-surface elevation, in feet above the gage datum. If the water surface is below the gage datum, the gage height is negative. Gage height often is used interchangeably with the more general term “stage,” although gage height is more appropriate when used in reference to a reading on a gage.

Gage values are values that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals.

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

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening technique for semivolatile organic compounds that are extractable from water in methylene chloride.

Geomorphic channel units, as used in this report, are fluvial geomorphic descriptors of channel shape and stream velocity. Pools, riffles, and runs are types of geomorphic channel units considered for National Water-Quality Assessment (NAWQA) Program habitat sampling.

Green algae (*Chlorophyta*) are unicellular or colonial algae with chlorophyll pigments similar to those in terrestrial green plants. Some forms of green algae produce mats or floating “moss” in lakes. The abundance of green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (μm^3/mL). The abundance of green algae in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter (mm^3/cm^2). (See also “Phytoplankton” and “Periphyton”)

Habitat, as used in this report, includes all nonliving (physical) aspects of the aquatic ecosystem, although living components like aquatic macrophytes and riparian vegetation also are usually included. Measurements of habitat typically are made over a wider geographic scale than are measurements of species distribution.

Habitat quality index is the qualitative description (level 1) of instream habitat and riparian conditions surrounding the reach sampled. Scores range from 0 to 100 percent with higher scores indicative of desirable habitat conditions for aquatic life. Index only applicable to wadable streams.

Hardness of water is a physical-chemical characteristic that commonly is recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations (primarily calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate ($CaCO_3$).

High tide is the maximum height reached by each rising tide. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day. See NOAA Web site: http://www.csc.noaa.gov/text/glossary.html (see "High water")

Hilsenhoff's Biotic Index (HBI) is an indicator of organic pollution that uses tolerance values to weight taxa abundances; usually increases with pollution. It is calculated as follows:

$$HBI = sum\frac{(n)(a)}{N},$$

where *n* is the number of individuals of each taxon, *a* is the tolerance value of each taxon, and *N* is the total number of organisms in the sample.

Horizontal datum (See "Datum")

Hydrologic index stations referred to in this report are continuous-record gaging stations that have been selected as representative of streamflow patterns for their respective regions. Station locations are shown on index maps.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the USGS. Each hydrologic unit is identified by an 8-digit number.

Inch (IN., in.), in reference to streamflow, as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were distributed uniformly on it. (See also "Annual runoff")

Instantaneous discharge is the discharge at a particular instant of time. (See also "Discharge")

International Boundary Commission Survey Datum refers to a geodetic datum established at numerous monuments along the United States-Canada boundary by the International Boundary Commission.

Island, as used in this report, is a mid-channel bar that has permanent woody vegetation, is flooded once a year, on average, and remains stable except during large flood events.

Laboratory reporting level (LRL) generally is equal to twice the yearly determined long-term method detection level (LT-MDL). The LRL controls false negative error. The probability of falsely reporting a nondetection for a sample that contained an analyte at a concentration equal to or greater than the LRL is predicted to be less than or equal to 1 percent. The value of the LRL will be reported with a "less than" (<) remark code for samples in which the analyte was not detected. The National Water Quality Laboratory (NWQL) collects quality-control data from selected analytical methods on a continuing basis to determine LT-MDLs and to establish LRLs. These values are reevaluated annually on the basis of the most current quality-control data and, therefore, may change. The LRL replaces the term 'non-detection value' (NDV).

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

Latent heat flux (often used interchangeably with latent heat-flux density) is the amount of heat energy that converts water from liquid to vapor (evaporation) or from vapor to liquid (condensation) across a specified cross-sectional area per unit time. Usually expressed in watts per square meter.

Light-attenuation coefficient, also known as the extinction coefficient, is a measure of water clarity. Light is attenuated according to the Lambert-Beer equation:

$$I = I_o e^{-\lambda L},$$

where I_o is the source light intensity, *I* is the light intensity at length *L* (in meters) from the source, *l* is the light-attenuation coefficient, and *e* is the base of the natural logarithm. The light-attenuation coefficient is defined as

$$\lambda = -\frac{1}{L}\log_e\frac{I}{I_o} .$$

Lipid is any one of a family of compounds that are insoluble in water and that make up one of the principal components of living cells. Lipids include fats, oils, waxes, and steroids. Many environmental contaminants such as organochlorine pesticides are lipophilic.

Long-term method detection level (LT-MDL) is a detection level derived by determining the standard deviation of a minimum of 24 method detection limit (MDL) spike-sample measurements over an extended period of time. LT-MDL data are collected on a continuous basis to assess year-to-year variations in the LT-MDL. The LT-MDL controls false positive error. The chance of falsely reporting a concentration at or greater than the LT-MDL for a sample that did not contain the analyte is predicted to be less than or equal to 1 percent.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. See NOAA Website: http://www.csc.noaa.gov/text/glossary.html (see "Low water")

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that usually are arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

Mean concentration of suspended sediment (Daily mean suspended-sediment concentration) is the time-weighted concentration of suspended sediment passing a stream cross section during a given time period. (See also "Daily mean suspended-sediment concentration" and "Suspended-sediment concentration")

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

Mean high or **low tide** is the average of all high or low tides, respectively, over a specific period.

Mean sea level is a local tidal datum. It is the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; for example, monthly mean sea level and yearly mean sea level. In order that they may be recovered when needed, such datums are referenced to fixed points known as benchmarks. (See also "Datum")

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

Megahertz is a unit of frequency. One megahertz equals one million cycles per second.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

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.

Method code is a one-character code that identifies the analytical or field method used to determine a value stored in the National Water Information System (NWIS).

Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. It is determined from the analysis of a sample in a given matrix containing the analyte. At the MDL concentration, the risk of a false positive is predicted to be less than or equal to 1 percent.

Method of Cubatures is a method of computing discharge in tidal estuaries based on the conservation of mass equation.

Methylene blue active substances (MBAS) indicate the presence of detergents (anionic surfactants). 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, µg/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 kilogram (UG/KG, µg/kg) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass (kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, mg/L) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter. One microgram per liter is equivalent to 1 part per billion.

Microsiemens per centimeter (US/CM, µS/cm) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

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

Minimum reporting level (MRL) is the smallest measured concentration of a constituent that may be reliably reported by using a given analytical method.

Miscellaneous site, miscellaneous station, or **miscellaneous sampling site** is a site where streamflow, sediment, and/or water-quality data or water-quality or sediment samples are collected once, or more often on a random or discontinuous basis to provide better areal coverage for defining hydrologic and water-quality conditions over a broad area in a river basin.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Multiple-plate samplers are artificial substrates of known surface area used for obtaining benthic invertebrate samples. They consist of a series of spaced, hardboard plates on an eyebolt.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

National Geodetic Vertical Datum of 1929 (NGVD 29) is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. It formerly was called “Sea Level Datum of 1929” or “mean sea level.” Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. See NOAA Web site: *http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88* (See “North American Vertical Datum of 1988”)

Natural substrate refers to any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives. (See also “Substrate”)

Nekton are the consumers in the aquatic environment and consist of large, free-swimming organisms that are capable of sustained, directed mobility.

Nonfilterable refers to the portion of the total residue retained by a filter.

North American Datum of 1927 (NAD 27) is the horizontal control datum for the United States that was defined by a location and azimuth on the Clarke spheroid of 1866.

North American Datum of 1983 (NAD 83) is the horizontal control datum for the United States, Canada, Mexico, and Central America that is based on the adjustment of 250,000 points including 600 satellite Doppler stations that constrain the system to a geocentric origin. NAD 83 has been officially adopted as the legal horizontal datum for the United States by the Federal government.

North American Vertical Datum of 1988 (NAVD 88) is a fixed reference adopted as the official civilian vertical datum for elevations determined by Federal surveying and mapping activities in the United States. This datum was established in 1991 by minimum-constraint adjustment of the Canadian, Mexican, and United States first-order terrestrial leveling networks.

Open or **screened interval** is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediment. May be reported as dissolved organic carbon (DOC), particulate organic carbon (POC), or total organic carbon (TOC).

Organic mass or **volatile mass of a living substance** is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass. (See also “Ash mass,” “Biomass,” and “Dry mass”)

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 (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.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter code is a 5-digit number used in the USGS computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method uses the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, sedigraph) 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, as used in this report, agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	>0.00024 - 0.004	Sedimentation
Silt	>0.004 - 0.062	Sedimentation
Sand	>0.062 - 2.0	Sedimentation/sieve
Gravel	>2.0 - 64.0	Sieve
Cobble	>64 - 256	Manual measurement
Boulder	>256	Manual measurement

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. For the sedimentation method, 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.

Peak flow (peak stage) is an instantaneous local maximum value in the continuous time series of streamflows or stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak.

Percent composition or **percent of total** 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, weight, mass, or volume.

Percent shading is a measure of the amount of sunlight potentially reaching the stream. A clinometer is used to measure left and right bank canopy angles. These values are added together, divided by 180, and multiplied by 100 to compute percentage of shade.

Periodic-record station is a site where stage, discharge, sediment, chemical, physical, or other hydrologic measurements are made one or more times during a year but at a frequency insufficient to develop a daily record.

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

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

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7.0 standard units are termed “acidic,” and solutions with a pH greater than 7.0 are termed “basic.” Solutions with a pH of 7.0 are neutral. The presence and concentration of many dissolved chemical constituents found in water are affected, in part, by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms also are affected, in part, by the hydrogen-ion activity of water.

Phytoplankton is the plant part of the plankton. They usually are 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 commonly are known as algae. (See also “Plankton”)

Picocurie (PC, pCi) is one-trillionth (1×10^{-12}) of the amount of radioactive nuclide represented by a curie (Ci). A curie is the quantity of radioactive nuclide that yields 3.7×10^{10} radioactive disintegrations per second (dps). A picocurie yields 0.037 dps, or 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. Concentrations are expressed as a number of cells per milliliter (cells/mL) of sample.

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.

Polychlorinated naphthalenes (PCNs) are industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to polychlorinated biphenyls (PCBs) and have been identified in commercial PCB preparations.

Pool, as used in this report, is a small part of a stream reach with little velocity, commonly with water deeper than surrounding areas.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photo-synthetic 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.

Primary productivity (carbon method) is expressed as milligrams of carbon per area per unit time [mg C/(m^2/time)] for periphyton and macrophytes or per volume [mg C/(m^3/time)] for phytoplankton. The carbon method defines 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 with unenriched water samples. Unit time may be either the hour or day, depending on the incubation period. (See also “Primary productivity”)

Primary productivity (oxygen method) is expressed as milligrams of oxygen per area per unit time [mg O/(m2/time)] for periphyton and macrophytes or per volume [mg O/(m^3/time)] for phytoplankton. The oxygen method defines 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. (See also “Primary productivity”)

Radioisotopes are isotopic forms of elements that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus; for example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Reach, as used in this report, is a length of stream that is chosen to represent a uniform set of physical, chemical, and biological conditions within a segment. It is the principal sampling unit for collecting physical, chemical, and biological data.

Recoverable is the amount of a given constituent that is in solution after a representative water sample has been extracted or digested. Complete recovery is not achieved by the extraction or digestion and thus the determination represents something less than 95 percent of the constituent present in the sample. To achieve comparability of analytical data, equivalent extraction or digestion procedures are required of all laboratories performing such analyses because different procedures are likely to produce different analytical results. (See also “Bed material”)

Recurrence interval, also referred to as **return period**, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or nonexceedance of a specified low flow). The terms “return period” and “recurrence interval” do not imply regular cyclic occurrence. The actual times between occurrences vary randomly, with most of the times being less than the average and a few being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day, 10-year low flow (7Q10) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the nonexceedances of the 7Q10 occur less than 10 years after the previous nonexceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous nonexceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the 7Q10.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

Return period (See “Recurrence interval”)

Riffle, as used in this report, is a shallow part of the stream where water flows swiftly over completely or partially submerged obstructions to produce surface agitation.

River mileage is the curvilinear distance, in miles, measured upstream from the mouth along the meandering path of a stream channel in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council and typically is used to denote location along a river.

Run, as used in this report, is a relatively shallow part of a stream with moderate velocity and little or no surface turbulence.

Runoff is the quantity of water that is discharged ("runs off") from a drainage basin during a given time period. Runoff data may be presented as volumes in acre-feet, as mean discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches. (See also "Annual runoff")

Salinity is the total quantity of dissolved salts, measured by weight in parts per thousand. Values in this report are calculated from specific conductance and temperature. Seawater has an average salinity of about 35 parts per thousand (for additional information, refer to: Miller, R.L., Bradford, W.L., and Peters, N.E., 1988, Specific conductance: theoretical considerations and application to analytical quality control: U.S. Geological Survey Water-Supply Paper 2311, 16 p.)

Sea level, as used in this report, refers to one of the two commonly used national vertical datums (NGVD 1929 or NAVD 1988). See separate entries for definitions of these datums.

Sediment is solid material that originates mostly from disintegrated rocks; when transported by, suspended in, or deposited from water, it is referred to as "fluvial sediment." Sediment 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 affected by environmental and land-use factors. Some major factors are topography, soil characteristics, land cover, and depth and intensity of precipitation.

Sensible heat flux (often used interchangeably with latent sensible heat-flux density) is the amount of heat energy that moves by turbulent transport through the air across a specified cross-sectional area per unit time and goes to heating (cooling) the air. Usually expressed in watts per square meter.

Seven-day, 10-year low flow (7Q10) is the discharge below which the annual 7-day minimum flow falls in 1 year out of 10 on the long-term average. The recurrence interval of the 7Q10 is 10 years; the chance that the annual 7-day minimum flow will be less than the 7Q10 is 10 percent in any given year. (See also "Annual 7-day minimum" and "Recurrence interval")

Shelves, as used in this report, are streambank features extending nearly horizontally from the flood plain to the lower limit of persistent woody vegetation.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Sodium hazard in water is an index that can be used to evaluate the suitability of water for irrigating crops.

Soil heat flux (often used interchangeably with soil heat-flux density) is the amount of heat energy that moves by conduction across a specified cross-sectional area of soil per unit time and goes to heating (or cooling) the soil. Usually expressed in watts per square meter.

Soil-water content is the water lost from the soil upon drying to constant mass at 105 °C; expressed either as mass of water per unit mass of dry soil or as the volume of water per unit bulk volume of soil.

Specific electrical conductance (conductivity) is a measure of the capacity of water (or other media) to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific electrical conductance is a function of the types and quantity of dissolved substances in water and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75 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.

Stable isotope ratio (per MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific water, to evaluate mixing of different water, as an aid in determining reaction rates, and other chemical or hydrologic processes.

Stage (See "Gage height")

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

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.

Substrate embeddedness class is a visual estimate of riffle streambed substrate larger than gravel that is surrounded or covered by fine sediment (<2 mm, sand or finer). Below are the class categories expressed as the percentage covered by fine sediment:

0	no gravel or larger substrate	**3**	26-50 percent
1	> 75 percent	**4**	5-25 percent
2	51-75 percent	**5**	< 5 percent

Surface area of a lake is that area (acres) encompassed by the boundary of the lake as shown on USGS topographic maps, or other available maps or photographs. Because surface area changes with lake stage, surface areas listed in this report represent those determined for the stage at the time the maps or photographs were obtained.

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

Surrogate is an analyte that behaves similarly to a target analyte, but that is highly unlikely to occur in a sample. A surrogate is added to a sample in known amounts before extraction and is measured with the same laboratory procedures used to measure the target analyte. Its purpose is to monitor method performance for an individual sample.

Suspended is the amount (concentration) of undissolved material in a water-sediment mixture. Most commonly refers to that 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-micrometer filter has been extracted or digested. Complete recovery is not achieved by the extraction or digestion procedures and thus the determination represents less than 95 percent of the constituent present in the sample. To achieve comparability of analytical data, equivalent extraction or digestion procedures are required of all laboratories performing such analyses because different procedures are likely to produce different analytical results. (See also “Suspended”)

Suspended sediment is sediment carried in suspension by the turbulent components of the fluid or by the Brownian movement (a law of physics). (See also “Sediment”)

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 foot above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The analytical technique uses the mass of all of the sediment and the net weight of the water-sediment mixture in a sample to compute the suspended-sediment concentration. (See also “Sediment” and “Suspended sediment”)

Suspended-sediment discharge (tons/d) is the rate of sediment transport, as measured by dry mass or volume, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft^3/s) x 0.0027. (See also “Sediment,” “Suspended sediment,” and “Suspended-sediment concentration”)

Suspended-sediment load is a general term that refers to a given characteristic of the material in suspension that passes a point during a specified period of time. The term needs to be qualified, such as “annual suspended-sediment load” or “sand-size suspended-sediment load,” and so on. It is not synonymous with either suspended-sediment discharge or concentration. (See also “Sediment”)

Suspended solids, total residue at 105 °C concentration is the concentration of inorganic and organic material retained on a filter, expressed as milligrams of dry material per liter of water (mg/L). An aliquot of the sample is used for this analysis.

Suspended, total is the total amount of a given constituent in the part of a water-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. 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 directly analyzing portions of the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total concentrations of the constituent. (See also “Suspended”)

Synoptic studies are short-term investigations of specific water-quality conditions during selected seasonal or hydrologic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

Taxa (Species) richness is the number of species (taxa) present in a defined area or sampling unit.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchial 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:	Arthropeda
Class:	Insecta
Order:	Ephemeroptera
Family:	Ephemeridae
Genus:	*Hexagenia*
Species:	*Hexagenia limbata*

Thalweg is the line formed by connecting points of minimum streambed elevation (deepest part of the channel).

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term “temperature recorder” is used in the table descriptions 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 resulting from the mixing of flow proportionally to the duration of the concentration.

Tons per acre-foot (T/acre-ft) is the dry mass (tons) of a constituent per unit volume (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, tons/d) is a common chemical or sediment discharge unit. It is the quantity of a substance in solution, in suspension, or as bedload that passes a stream section during a 24-hour period. It is equivalent to 2,000 pounds per day, or 0.9072 metric ton per day.

Total is the amount of a given constituent in a representative whole-water (unfiltered) 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 at least 95 percent of the constituent in the sample.)

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warmblooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that 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 milliliters of sample. (See also “Bacteria”)

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as “total sediment discharge,” “total chloride discharge,” and so on.

Total in bottom material is the amount of a given constituent in a representative sample of bottom material. 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 judge when the results should be reported as “total in bottom material.”

Total length (fish) is the straight-line distance from the anterior point of a fish specimen’s snout, with the mouth closed, to the posterior end of the caudal (tail) fin, with the lobes of the caudal fin squeezed together.

Total load refers to all of a constituent in transport. When referring to sediment, it includes suspended load plus bed load.

Total organism count is the number of organisms collected and enumerated in any particular sample. (See also “Organism count/volume”)

Total recoverable is the amount of a given constituent in a whole-water sample after a 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 for whole-water samples, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures may produce different analytical results.

Total sediment discharge is the mass of suspended-sediment plus bed-load transport, measured as dry weight, that passes a cross section in a given time. It is a rate and is reported as tons per day. (See also "Bedload," "Bedload discharge," "Sediment," "Suspended sediment," and "Suspended-sediment concentration")

Total sediment load or **total load** is the sediment in transport as bedload and suspended-sediment load. The term may be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It differs from total sediment discharge in that load refers to the material, whereas discharge refers to the quantity of material, expressed in units of mass per unit time. (See also "Sediment," "Suspended-sediment load," and "Total load")

Transect, as used in this report, is a line across a stream perpendicular to the flow and along which measurements are taken, so that morphological and flow characteristics along the line are described from bank to bank. Unlike a cross section, no attempt is made to determine known elevation points along the line.

Turbidity is an expression of the optical properties of a liquid that causes light rays to be scattered and absorbed rather than transmitted in straight lines through water. Turbidity, which can make water appear cloudy or muddy, is caused by the presence of suspended and dissolved matter, such as clay, silt, finely divided organic matter, plankton and other microscopic organisms, organic acids, and dyes (ASTM International, 2003, D1889–00 Standard test method for turbidity of water, in ASTM International, Annual Book of ASTM Standards, Water and Environmental Technology, v. 11.01: West Conshohocken, Pennsylvania, 6 p.). The color of water, whether resulting from dissolved compounds or suspended particles, can affect a turbidity measurement. To ensure that USGS turbidity data can be understood and interpreted properly within the context of the instrument used and site conditions encountered, data from each instrument type are stored and reported in the National Water Information System (NWIS) using parameter codes and measurement reporting units that are specific to the instrument type, with specific instruments designated by the method code. The respective measurement units, many of which also are in use internationally, fall into two categories: (1) the designations NTU, NTRU, BU, AU, and NTMU signify the use of a broad spectrum incident light in the wavelength range of 400-680 nanometers (nm), but having different light detection configurations; (2) The designations FNU, FNRU, FBU, FAU, and FNMU generally signify an incident light in the range between 780-900 nm, also with varying light detection configurations. These reporting units are equivalent when measuring a calibration solution (for example, formazin or polymer beads), but their respective instruments may not produce equivalent results for environmental samples. Specific reporting units are as follows:

NTU (Nephelometric Turbidity Units): white or broadband [400-680 nm] light source, 90 degree detection angle, one detector.

NTRU (Nephelometric Turbidity Ratio Units): white or broadband [400-680 nm] light source, 90 degree detection angle, multiple detectors with ratio compensation.

BU (Backscatter Units): white or broadband [400-680 nm] light source, 30 ± 15 degree detection angle (backscatter).

AU (Attenuation Units): white or broadband [400-680 nm] light source, 180 degree detection angle (attenuation).

NTMU (Nephelometric Turbidity Multibeam Units): white or broadband [400-680 nm] light source, multiple light sources, detectors at 90 degrees and possibly other angles to each beam.

FNU (Formazin Nephelometric Units): near infrared [780-900 nm] or monochrome light source, 90 degree detection angle, one detector.

FNRU (Formazin Nephelometric Ratio Units): near infrared [780-900 nm] or monochrome light source, 90 degree detection angle, multiple detectors, ratio compensation.

FBU (Formazin Backscatter Units): near infrared [780-900 nm] or monochrome light source, 30±15 degree detection angle.

FAU (Formazin Attenuation Units): near infrared [780-900 nm] light source, 180 degree detection angle.

FNMU (Formazin Nephelometric Multibeam Units): near infrared [780-900 nm] or monochrome light source, multiple light sources, detectors at 90 degrees and possibly other angles to each beam.

For more information please see *http://water.usgs.gov/owq/FieldManual/Chapter6/6.7_contents.html*.

Ultraviolet (UV) absorbance (absorption) at 254 or 280 nanometers is a measure of the aggregate concentration of the mixture of UV absorbing organic materials dissolved in the analyzed water, such as lignin, tannin, humic substances, and various aromatic compounds. UV absorbance (absorption) at 254 or 280 nanometers is measured in UV absorption units per centimeter of path length of UV light through a sample.

Unconfined aquifer is an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure. (See "Water-table aquifer")

Unfiltered pertains to the constituents in an unfiltered, representative water-suspended sediment sample.

Unfiltered, recoverable is the amount of a given constituent in a representative water-suspended sediment sample that has been extracted or digested. Complete recovery is not achieved by the extraction or digestion treatment and thus the determination represents less than 95 percent of the constituent present in the sample. To achieve comparability of analytical data, equivalent extraction or digestion procedures are required of all laboratories performing such analyses because different procedures are likely to produce different analytical results.

Vertical datum (See "Datum")

Volatile organic compounds (VOCs) are organic compounds that can be isolated from the water phase of a sample by purging the water sample with inert gas, such as helium, and, subsequently, analyzed by gas chromatography. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They often are components of fuels, solvents, hydraulic fluids, paint thinners, and dry-cleaning agents commonly used in urban settings. VOC contamination of drinking-water supplies is a human-health concern because many are toxic and are known or suspected human carcinogens.

Water table is that surface in a ground-water body at which the water pressure is equal to the atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which the water table is found.

Water year in USGS 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, 2002, is called the "2002 water year."

Watershed (See "Drainage basin")

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.

Wet mass is the mass of living matter plus contained water. (See also "Biomass" and "Dry mass")

Wet weight refers to the weight of animal tissue or other substance including its contained water. (See also "Dry weight")

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

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are 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. (See also "Plankton")

SELECTED REFERENCES

American Public Health Association, and others, 1965, Standard methods for the examination of water and waste-water, 12th edition: American Public Health Association, New York, 769 p.

Bureau of Economic and Business Research, 1998, Florida estimatesof population: University of Florida Report.

California State Water Quality Control Board, 1963, Water quality criteria; Pub. 3-A, 226 p.

Conover, C.S., and Leach, S.D., 1975, River basin and hydrologic unit map of Florida: Florida Bureau of Geology Map Series 72.

Ellis, M.M., Westfall, B.A., and Ellis, M.D., 1946, Determination of water quality, U.S. Fish and Wildlife Reserve Report 9, 122 p.

Florida Department of Environmental Regulation, 1983, Water quality standards: Chapter 17-3 in Florida Administrative Code.

-----1984, Public drinking water systems: Chapter 17-22 in Florida Administrative Code.

Hem, J.D., 1970, Study and interpretations of the chemical characteristics of natural water: U.S. Geological Survey Water-Supply Paper 1473, second edition, 363 p.

Hittle, Clinton, D.,1999, Delineation of saltwater intrusion in the Surficial Aquifer System in eastern Palm Beach, Martin, and St.Lucie counties, Florida, 1997-1998: U.S. Geological Survey Water-Resources Investigations Report 99-4214, Sheet in pocket.

Kirkor, Teodor, 1951, Protecting public waters from pollution in the USSR: Sewage Works Journal, v. 23, p. 938.

Langbein, W.B., and Iseri, K.T., 1960, General introduction and hydrologic definitions: U.S. Geological Survey Water-Supply Paper 1541-A, 29 p.

Maier, F.J., 1950, Fluoridation of public water supplies: Journal of the American Water Works Association, v. 42, pt. 1, p. 1120-1132.

Maxcy, K.F., 1950, Report on the relation of nitrite concentrations in well waters to the occurrence of methemoglobinemia: National Research Council, Sanitary Engineering and Environment Bulletin, Appendix D, 271 p.

McNeill, J.D., Bosnar, M.,and Snelgrove, F.B., 1990, Resolution of an electronic borehole conductivity logger for geotechnical and ground water applications, Technical note TN-25: Geonics Limited, Mississauga, Ontario, Canada, 28 p.

Paynter, O.E., 1960, The chronic toxicity of dodecylbenzene sodium sulfonate: U.S. Public Health Conference on Physiological Aspects of Water Quality Proc., Washington, D.C., Sept. 8-9, 1960, 175-179 p.

Prinos, S.T., Lietz, A.C., and Irvin, R.B., 2002, Design of a Real-Time Ground-Water Level Monitoring Network and Portrayal of Hydrologic Data in Southern Florida. U.S. Geological Survey Water-Resources Investigations Report 01-4275, 108 p.

Rose, Arthur and Elizabeth, 1966, The condensed chemical dictionary: Reinhold Publishing Corporation, New York, 7th ed., 285 p.

South Florida Water Management District, 2004, Monthly Rainfall Map, October 2, 2004 to November 1, 2004, Available from World Wide Web <*http://www.sfwmd.gov/curre/rainmaps/monthly.html*> (accessed June 5, 2006).

-----2004, 2005 Monthly Rainfall Maps, October 2, 2004 to September 1, 2005, Available from World Wide Web <*http://www.sfwmd.gov/curre/rainmaps/monthly.html*> (accessed June 5, 2006).

Swenson, H.A., and Baldwin, H.L., 1965, A primer on water quality: Washington, U.S. Government Printing Office, 27 p.

U.S. Bureau of the Census, Population Estimates Program, 2000 County Population Estimates and Demographic Components of Population Change: Annual Time Series, July 1, 1990 to July 1, 1999, Available from World Wide Web <*http://www.census.gov/popest/archives/1990s/co-99-08/99C8_12.txt*> (accessed June 7, 2006)

-----2006,2005 Population Estimates, Geographic Area: Florida -- County. Available from World Wide Web <*http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US12&-_box_head_nbr=GCT-T1&-ds_name=PEP_2005_EST&-_lang=en&-format=ST-2&-_sse=on*> (accessed June 7, 2006)

U.S. Environmental Protection Agency, 1975, National interim primary drinking water regulations: Federal Register, v. 40, no. 51, March 14, p. 11990-11998.

-----1976 (1977), Quality criteria for water: U.S. Government Printing Office, 256 p.

---- 1977, National secondary drinking water regulations: Federal Register, v. 42, no. 62, March 31, 1977, p. 17143-17146.

Public Health Service, 1962, Drinking water standards: U.S. Department of Health, Education, and Welfare, Public Health Service: Pub. no. 956.

Wayman, C.H., Robertson, J.B., and Page, H.G., 1962, Foaming characteristics of synthetic detergent solutions: U.S. Geological Survey Professional Paper 450D, art. 178, D198 p.

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