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Streamflow and Water-Quality Characteristics of the Ottawa River and Selected Tributaries in Allen, Hardin, and Putnam Counties, Ohio

Open-File Report 03-215

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

Cover photo: Little Ottawa River near Lima, a tributary to the Ottawa River, was one of the sites where streamflow and water-quality measurements were made. (Photo by Kimberly H. Shaffer.)

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Columbus, Ohio
2003

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CONVERSION FACTORS, DATUM, AND ABBREVIATIONS

Multiply	By	To obtain
mile (mi)	1.609	kilometer
square mile (mi2)	2.590	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Temperature is given in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by use of the following equation:
°F = 1.8(°C) + 32

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD of 1929).

Abbreviated water-quality units used in this report: Chemical concentrations and water temperature are given in metric units. Chemical concentration is given in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is approximately the same as for concentrations in parts per million.

Specific conductance of water is expressed in microsiemens per centimeter at 25 degrees Celsius (µS/cm). This unit is equivalent to micromhos per centimeter at 25 degrees Celsius (µmho/cm), formerly used by the U.S. Geological Survey.

Other abbreviations used in this report:

EWI	Equal width increment
MCL	Maximum Contaminant Level
ORC	Ottawa River Coalition
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

Streamflow and Water-Quality Characteristics of the Ottawa River and Selected Tributaries in Allen, Hardin, and Putnam Counties, Ohio

by Kimberly Shaffer

Abstract

Streamflow and water-quality measurements were made on the Ottawa River and selected tributaries between 1999 to 2002. Ten sets of streamflow measurements were made at an index station on the Auglaize River at Fort Jennings (station 04186500) and at 19 other sites along the Ottawa River and selected tributaries. These data were collected to relate daily mean streamflow at the Auglaize River at Fort Jennings and the instantaneous streamflow at each of the other 19 sites.

Two sets of water-quality samples were collected and 4 or 5 dissolved-oxygen measurements were made at the 19 sites. Water samples were collected during periods of potential stress on the aquatic communities, once during low flow and once during a runoff event that occurred after recent land application of pesticides. The first set of water-quality samples was analyzed for groups of nutrients, major ions and trace elements, and physical properties, whereas the second set was analyzed for nutrients, pesticides, and physical properties.

With regard to nutrients and physical properties, median values of specific conductance, pH, dissolved oxygen, alkalinity, and orthophosphate were higher during low flow than during the runoff event. In contrast, the median concentrations of total phosphorus, ammonia nitrogen, nitrite plus nitrate nitrogen, and ammonia plus organic nitrogen were higher during the runoff event than during low flow. Orthophosphate, total phosphorus, and dissolved-oxygen concentrations all had wider ranges during the low-flow sampling than the runoff-event sampling.

Of the 25 major ions and trace elements analyzed for, 15 were detected in all 18 samples, and 10 were detected infrequently or not detected at all. The runoff samples were analyzed for 48 pesticides, 18 of which were detected in one or more samples and 30 of which were not detected. Of the 18 pesticides detected, 13 were detected in 5 or more samples. Five pesticides—acetochlor, atrazine, deethylatrazine, metolachlor, and simazine—were detected in all the samples.

Introduction

The water quality of the Ottawa River and its tributaries is an issue of concern for the Ottawa River Coalition (ORC). Of particular concern are periods of water-quality stress on aquatic life. These periods tend to occur during the spring, after agricultural nutrient and pesticide application elevated, and during the summer, when water temperatures are at maximum and streamflows and dissolved-oxygen concentrations are at minimum. At these periods, point and nonpoint sources of nutrients, major ions and trace elements, and pesticides would likely be at elevated concentrations. Nonpoint sources of nutrients, pesticides, and major ions and trace elements include sources such as the natural weathering of soil and rocks; failing septic systems; application of pesticides and fertilizers to crops, lawns, and golf courses; atmospheric deposition; and pet and livestock waste. Point sources of nutrients and major ions and trace elements include sources such as effluent (discharges) from municipal and industrial wastewater facilities.

The ORC has pursued various measures to understand and protect the Ottawa River, including educational and public-awareness activites and a water-quality assessment of the watershed. In 1995, the ORC began collecting

water-quality data at 20 sites to determine physical properties and chemical concentrations in stream water throughout the watershed but did not make concurrent streamflow measurements.

Although the chemical-concentration data collected are useful, information on chemical loads (computed by multiplying chemical concentrations and streamflow) is needed for watershed-management plan development. In order to obtain streamflow data and otherwise augment the available water-quality data for the watershed, the U.S. Geological Survey (USGS), in cooperation with the ORC, did a three-year streamflow and water-quality study, with emphasis on collecting information for periods of potential stress on aquatic life. This report presents streamflow and water-quality data for the Ottawa River and its tributaries collected during that study.

Description of study area

The study area includes the Ottawa River and selected tributaries in Hardin, Allen, and Putnam Counties, all in western Ohio (fig. 1). The index station, Auglaize River near Fort Jennings, is in southern Putnam County. The primary land use varies throughout the watershed. The upstream and downstream parts of the Ottawa River Basin are mostly agricultural. The central part of the watershed, including Lima, is urban—mainly residential and industrial, interspersed with golf courses, commercial areas, and agricultural areas.

Acknowledgments

The author acknowledges and thanks the Ottawa River Coalition—especially Beth Seibert, Coordinator—for the planning and implementation of this project.

Methods of study

Streamflow and water-quality data were collected at 19 sites along the Ottawa River and its tributaries (fig. 1). The streamflow-gaging station Auglaize River near Fort Jennings (station 04186500) was used as an index station to provide a long-term source of reference for the streamflow-data.

Site selection

The 19 sites used in this study were selected primarily for proximity to the 20 sites where the ORC had collected data in previous years. Eighteen of the sites are either at or near the 20 ORC sites. The remaining site, the Ottawa River at State Route 117, was selected because a study done by the Ohio Environmental Protection Agency (1996) showed a dissolved-oxygen sag at this site. Each site was selected so that streamflow measurements and representative water-quality samples could coincide. Nine sites were on tributaries to the Ottawa River and were as near as possible to the mouth of the tributary (usually at the first bridge upstream from the mouth). The 10 remaining sites were on the Ottawa River.

The index station used during this study, Auglaize River near Fort Jennings (USGS station number 04186500), was chosen because it and the Ottawa River Watershed are geographically close and have similar drainage areas (332 mi^2 and 372 mi^2, respectively), similar land use, and similar climate characteristics. The Auglaize River near Fort Jennings streamflow-gaging station operated from August 1921 to December 1935 and has operated continuously since October 1940, including the time period during which the ORC collected data. The station is in the Maumee River Basin at a latitude of 40°56′55″ and a longitude of 84°15′58″. The station is 200 ft upstream from the U.S. Highway 224 bridge, 6 mi upstream from the mouth of the Ottawa River, 7.3 mi downstream from Jennings Creek, and 3.5 mi northeast of Fort Jennings.

Streamflow measurements

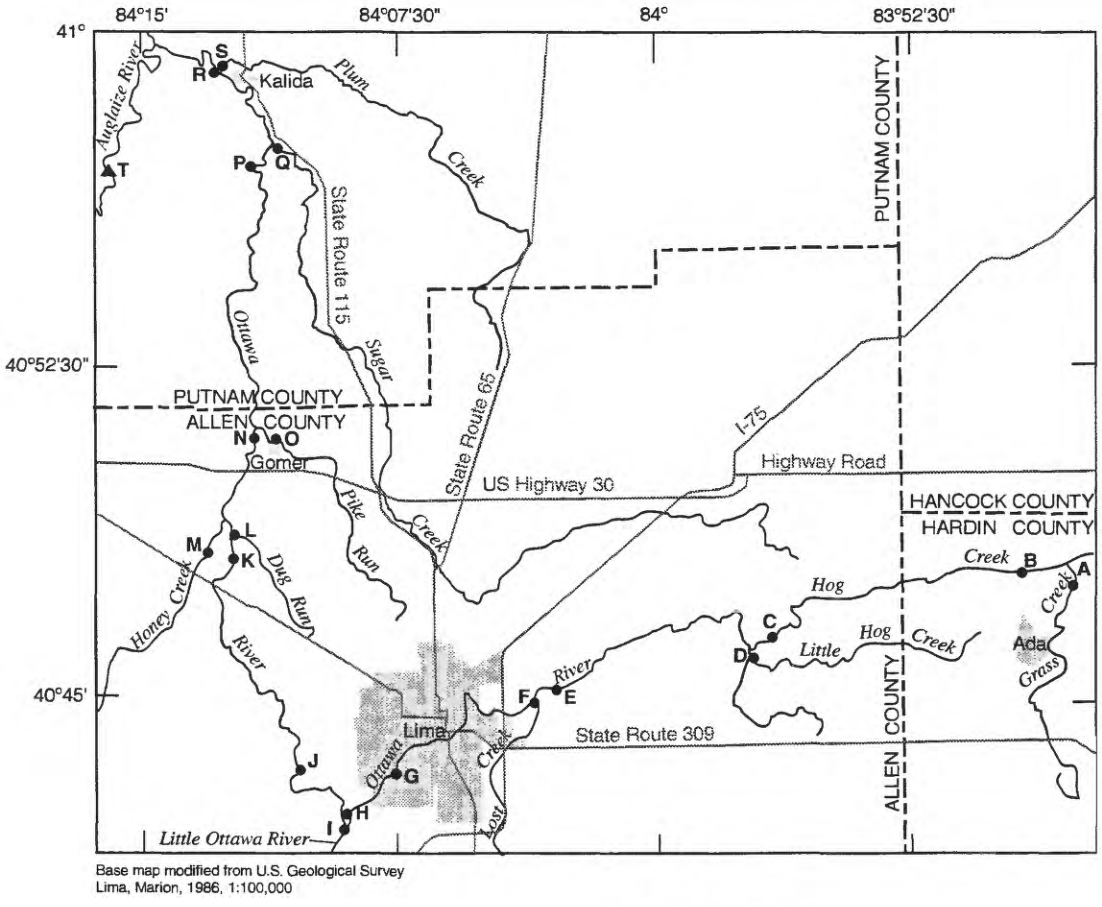
Streamflow measurements determine the volume of water that passes a cross section of a stream in a given time (reported in units of cubic feet per second) and were made by means of standard USGS procedures (Rantz and others, 1982). These measurements were used to depict relations between instantaneous streamflow at a selected site and the daily mean streamflow at the index station.

Streamflow measurements were made periodically at the 19 sites and the index station starting in the fall of 1999 and continuing until the summer of 2002, for a total of 10 sets. Each of the 10 sets of streamflow measurements was made over a period of 2-3 days during nonwinter months when flow was low, except for one set associated with a runoff event.

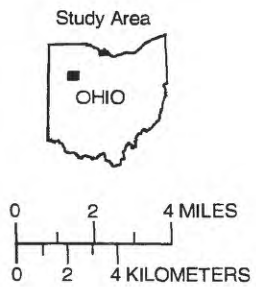
Water-quality field and laboratory analyses

Water-quality sampling was done twice, once in summer 2000 and once in spring 2001. The first sampling round (summer of 2000) measured nutrients and 25 major ions and trace elements during low flow, when effluent (discharges) from point sources would likely be at its highest proportion of streamflow. The second sampling round (spring of 2001) measured nutrients and 48 pesticides during a springtime runoff event after most crops were planted and most pesticides were applied. Two of the 10 sets of streamflow measurements coincided with the sample collection and field measurements.

Field analyses. Alkalinity, water temperature, pH, specific conductance, dissolved oxygen, air temperature,



Base map modified from U.S. Geological Survey
Lima, Marion, 1986, 1:100,000



EXPLANATION

▲ INDEX STATION
- T Auglaize River at Ft. Jennings (04186500)

● SITE LOCATION
- A Grass Creek near Ada
- B Hog Creek near Ada
- C Hog Creek at Lafayette
- D Little Hog Creek at Lafayette
- E Ottawa River at Metzger Road at Lima
- F Lost Creek near Lima
- G Ottawa River at Lima
- H Ottawa River at Shawnee Road near Lima
- I Little Ottawa River near Lima
- J Ottawa River at State Route 117 near Lima
- K Ottawa River near Elida
- L Dug Run near Elida
- M Honey Run near Elida
- N Ottawa River at Gomer
- O Pike Run at Gomer
- P Ottawa River near Kalida
- Q Sugar Creek near Kalida
- R Ottawa River at Kalida
- S Plum Creek at Kalida

Figure 1. Location of study area and sites.

and atmospheric pressure were measured in the field during both sampling trips. A four-parameter water-quality meter was used for field analysis of water temperature, pH, specific conductance, and dissolved oxygen. The meter was calibrated with standard solutions before each day's use. A separate thermometer was used to measure air temperature, and an aneroid barometer was used to measure atmospheric pressure (Shelton, 1994). Alkalinity (reported in milligrams per liter as $CaCO_3$) was determined by means of the incremental titration method (Shelton, 1994).

Additional dissolved-oxygen measurements were made during separate site visits, once during the first set of streamflow measurements and twice thereafter during 4-hour periods in the morning so as to reduce the effects of photosynthesis and varied atmospheric pressure. One of the two latter measurement rounds coincided with one of the days of the runoff sampling; therefore, one or two dissolved-oxygen measurements might be tabulated for that day.

Laboratory analyses. Water samples analyzed for nutrients and pesticides or major ions and trace elements were collected, composited, filtered if necessary, bottled, and chemically preserved if necessary by means of methods described by Shelton (1994). Before samples were collected, water-quality equipment was cleaned and field rinsed with native water. Samples were then collected by means of the equal-width-increment (EWI) sampling where possible or by dip sampling where EWI sampling was not possible (Shelton, 1994). After any necessary filtration and chemical preservation, water samples were immediately chilled and shipped on ice to the USGS National Water Quality Laboratory in Arvada, Colorado, for analysis.

Quality-control and quality-assurance practices

Quality-control practices (blank and replicate samples) were used to assess bias, precision, and variability in the collection, handling, and analysis of water-quality samples. Replicate samples, a set of samples that are collected, handled onsite, shipped, and analyzed in an identical manner so that the samples are thought to be identical in composition (Francy and others, 1998), were used to measure variability and precision characteristics associated with the sampling and analytical procedures. Blank samples, which are samples of constituent-free water that undergo the same handling, transportation, and analytical procedures that a stream-water sample does (Francy and others, 1998), were used to identify and assess sources of contamination and bias. For the two sampling rounds, blank samples and replicate samples were collected by each crew (appendix A1 and A2). The results of the blank samples were examined to ensure that there was no contamination or bias from the sample collection, processing, transportation and/or handling procedures. Additionally, the results from the replicate samples were examined to better understand the precision and variability of the samples.

Quality-assurance practices ensured that the data were representative and complete. To ensure that samples were representative of the actual environmental conditions, samples were collected from locations typical of the site; approved sampling, analytical, preservation and transportation (holding times) methods and equipment were used applying standard USGS methods (Francy and others, 1998). To ensure that data sets were complete, the data were examined for missing values and departures from expected ranges of values (Francy and others, 1998).

Relation between streamflow at index station and synoptic sites

Instantaneous streamflows at the 19 study sites listed in table 1 were plotted against the daily mean streamflows from the Auglaize River at Fort Jennings on the same days. The results of these graphical comparisons are shown in figures 2-11 (at back of report.) Although the Ottawa River Watershed and the area draining to the index station have several key similarities at the watershed scale, local factors can result in considerable scatter in the data and can make establishing a consistent streamflow-streamflow relation difficult, if not impossible. Examples of such local factors include differences in withdrawals or discharges, precipitation and (or) evapotranspiration, geology and certain streambed characteristics, physiography, and land use.

Table 1. Site location, dissolved oxygen concentrations, and streamflow data for the Ottawa River and selected tributaries

[mg/L, milligrams per liter; ft^3/s, cubic feet per second; quad, U.S. Geological Survey 7.5-minute topographic quadrangle map.]

Station letter	Station number	Station name	Location	Date	Time	Oxygen, dissolved (mg/L)	Stream-flow (ft^3/s)
A	404728083475300	Grass Creek near Ada, Ohio	Latitude 40°47′28″, longitude 83°47′53″, Hardin County, Hydrologic Unit 04100007, at Airport Road bridge over Grass Creek 1.5 mi northeast of Ada, Ohio. (Ada 1:24000 quad)	09/17/99	0915	7.4	0.75
				07/11/00	0950		2.5
				09/19/00	0745	4.2	
				09/19/00	1545		.99
				10/23/00	0930		1.1
				05/15/01	1010	6.6	22
				08/13/01	0925		1.1
				09/18/01	0815	6.6	
				09/18/01	1340		7.2
				11/18/01	0850		1.0
				07/15/02	0945		.71
				09/16/02	0920		.68
B	404746083492400	Hog Creek near Ada, Ohio	Latitude 40°47′46″, longitude 83°49′24″, Hardin County, Hydrologic Unit 04100007, at State Route 235 bridge over Hog Creek, 1.5 mi north of Ada, Ohio. (Ada 1:24000 quad)	09/17/99	0915	6.5	.97
				07/11/00	0950		14
				09/19/00	0800	6.9	
				09/20/00	0845		1.6
				10/23/00	1030		5.4
				05/15/01	1320	7.4	58
				08/13/01	0930		4.4
				09/18/01	0840	5.8	
				09/18/01	1240		14
				11/18/01	1005		4.1
				07/15/02	1103		.95
				09/16/02	1022		1.4
C	404616083564200	Hog Creek at Lafayette, Ohio	Latitude 40°46′16″, longitude 83°56′42″, Allen County, Hydrologic Unit 04100007, along North side of State Route 81 between Center Road and Swaney Road, 1 mi northeast of Lafayette, Ohio.(Beaverdam 1:24000 quad)	09/17/99	0930	5.8	.81
				07/11/00	1120		17
				09/19/00	0830	8.5	
				09/19/00	1410		1.7
				10/23/00	1200		5.7
				05/15/01	1615	7.1	35
				08/13/01	1035		7.3
				09/18/01	0910	7.5	
				09/18/01	1125		3.9
				11/18/01	1110		5.6
				07/15/02	1231		1.2
				09/16/02	1202		.96
D	404602083571700	Little Hog Creek at Lafayette, Ohio	Latitude 40°46′02″, longitude 83°57′17″, Allen County, Hydrologic Unit 04100007, at State Route 81 bridge over Little Hog Creek, 0.5 mi northwest of Lafayette, Ohio.(Beaverdam 1:24000 quad)	09/17/99	1000	7.2	.07
				07/11/00	1134		1.7
				09/19/00	0845	6.2	
				09/19/00	1230		.15
				10/23/00	1300		2.1
				05/15/01	1810	7.8	36
				08/13/01	1130		.35
				09/18/01	0935	6.6	
				09/18/01	1300		7.6
				11/18/01	1225		.82
				07/15/02	1350		.10
				09/16/02	1325		.14

Table 1. Site location, dissolved oxygen concentrations, and streamflow data for the Ottawa River and selected tributaries —Continued

[mg/L, milligrams per liter; ft^3/s, cubic feet per second; quad, U.S. Geological Survey 7.5-minute topographic quadrangle map.]

Station letter	Station number	Station name	Location	Date	Time	Oxygen, dissolved (mg/L)	Stream-flow (ft^3/s)
E	404504084030300	Ottawa River at Metzger Road at Lima, Ohio	Latitude 40°45′04″, longitude 84°03′03″, Allen County, Hydrologic Unit 04100007, at the North end of Metzger Road, downstream of the pump station, 0.2 mi south of the Lima Reservoir, and 0.5 mi north of Metzger Reservoir, 2 miles east of Lima, Ohio.(Cairo 1:24000 quad)	09/17/99	1130	6.9	.81
				07/11/00	1245		21
				09/19/00	0915	4.3	no flow
				10/23/00	1405		no flow
				05/16/01	0830	7.9	69
				08/13/01	1320		9.7
				09/18/01	0955		no flow
				11/18/01	1340		no flow
				07/15/02	1540		1.5
				09/16/02	1413		no flow
F	404448084034000	Lost Creek near Lima, Ohio	Latitude 40°44′48″, longitude 84°03′40″, Allen County, Hydrologic Unit 04100007, north of High Street/Reservoir Road Bridge over Lost Creek, northeast of bait shop, 1 mi east of Lima, Ohio.(Lima 1:24000 quad)	09/17/99	1145	6.5	.33
				07/11/00	1255		1.7
				09/19/00	0940	8.2	
				09/19/00	1010		.22
				10/23/00	1430		.69
				05/16/01	0930	8.3	129
				08/13/01	1220		.67
				09/18/01	1015	7.3	
				09/18/01	1130		24.6
				11/18/01	1400		.83
				07/15/02	1700		.48
				09/16/02	1425		.64
G	04187100	Ottawa River at Lima, Ohio	Latitude 40°43′29″, longitude 84°07′35″, Allen County, Hydrologic Unit 04100007, at discontinued gaging station at the Lima Wastewater Treatment Plant in Lima, Ohio.(Cridersville 1:24000 quad)	09/15/99	1445	6.6	1.4
				07/11/00	1610		30
				09/18/00	1515	9.9	2.6
				09/19/00	0840	10.0	
				10/23/00	1550		12
				05/15/01	1015	7.7	135
				08/13/01	1530		2.9
				09/18/01	1030	7.7	
				09/18/01	1110		44
				11/18/01	1530		5.1
				07/15/02	1836		4.0
				09/16/02	1625		1.5
H	404224084090500	Ottawa River at Shawnee Road near Lima, Ohio	Latitude 40°42′40″, longitude 84°09′05″, Allen County, Hydrologic Unit 04100007, at Shawnee Road bridge over Ottawa River near the intersection of Shawnee Road and Amanda Road, 1 mi south of Lima, Ohio.(Cridersville 1:24000 quad)	09/15/99	1700	7.5	24
				07/11/00	1503		51
				09/18/00	1300	5.0	32
				09/19/00	0830	3.4	
				10/24/00	0830		35
				05/15/01	1145	8.6	169
				08/13/01	1530		30
				09/18/01	0950	8.3	
				09/18/01	1250		93
				11/18/01	0930		23
				07/15/02	1720		27
				09/17/02	0832		19

Table 1. Site location, dissolved oxygen concentrations, and streamflow data for the Ottawa River and selected tributaries —Continued

[mg/L, milligrams per liter; ft^3/s, cubic feet per second; quad, U.S. Geological Survey 7.5-minute topographic quadrangle map.]

Station letter	Station number	Station name	Location	Date	Time	Oxygen, dissolved (mg/L)	Stream-flow (ft^3/s)
I	404221084091500	Little Ottawa River near Lima, Ohio	Latitude 40°42′21″, longitude 84°09′15″, Allen County, Hydrologic Unit 04100007, 300 yards south of the intersection of the Little Ottawa River and Amanda Road, 1 mi southwest of Lima, Ohio. (Cridersville 1:24000 quad)	09/15/99			no flow
				07/11/00	1510		1.6
				09/18/00	1000	6.2	.04
				09/19/00	0820	6.3	
				10/24/00	1030		.12
				05/16/01	0850	6.8	52
				08/13/01	1715		.21
				09/18/01	0920	6.9	
				09/18/01	1440		2.5
				11/18/01	1100		.65
				07/15/02	1845		.10
				09/16/02	1740		no flow
J	404322084102600	Ottawa River at State Route 117 near Lima, Ohio	Latitude 40°43′22″, longitude 84°10′26″, Allen County, Hydrologic Unit 04100007, at State Route 117 bridge over Ottawa River, 1 mi south of Lima, Ohio. (Cridersville 1:24000 quad)	09/16/99	0915	5.4	18
				07/11/00	1634		54
				09/19/00	0905	4.5	
				09/19/00	0930	4.5	26
				10/24/00	0850		26
				05/15/01	1400	8.3	294
				08/14/01	1430		28
				09/17/01	1610		28
				09/18/01	0855	6.3	
				11/18/01	1620		26
				07/15/02	1550		26
				09/17/02	0911		19
K	404808084121700	Ottawa River at Elida, Ohio	Latitude 40°48′08″, longitude 84°12′17″, Allen County, Hydrologic Unit 04100007, 300 ft North of the end of Troyer Road, 1 mi north of Elida, Ohio. (Elida 1:24000 quad)	09/16/99	1130	8.1	22
				07/12/00	1523		52
				09/19/00	0730	6.9	
				09/19/00	1100	7.9	33
				10/23/00	1510		39
				05/15/01	1545	8.2	399
				08/14/01	1200		30
				09/17/01	1350		26
				09/18/01	0820	7.1	
				11/19/01	1045		31
				07/15/02	1325		27
				09/17/02	1050		20
L	404839084121400	Dug Run near Elida, Ohio	Latitude 40°48′39″, longitude 84°12′14″, Allen County, Hydrologic Unit 04100007, at Dutch Hollow Road bridge over Dug Run, 1.5 mi north of Elida, Ohio.(Elida 1:24000 quad)	09/16/99	1545	11.0	.49
				07/12/00	1419		2.3
				09/19/00	0750	6.7	
				09/19/00	1330	12.7	1.3
				10/23/00	1335		.91
				05/16/01	1400	6.2	32
				08/14/01	1045		.90
				09/17/01	1239		.79
				09/18/01	0718	6.1	
				11/18/01	1335		1.1
				07/15/02	1154		.67
				09/17/02	0928		.76

Table 1. Site location, dissolved oxygen concentrations, and streamflow data for the Ottawa River and selected tributaries —Continued

[mg/L, milligrams per liter; ft^3/s, cubic feet per second; quad, U.S. Geological Survey 7.5-minute topographic quadrangle map.]

Station letter	Station number	Station name	Location	Date	Time	Oxygen, dissolved (mg/L)	Stream-flow (ft^3/s)
M	404826084130400	Honey Run near Elida, Ohio	Latitude 40°48′26″, longitude 84°13′04″, Allen County, Hydrologic Unit 04100007, at Billymack Road bridge over Honey Run, 1.5 mi northwest of Elida, Ohio.(Elida 1:24000 quad)	09/16/99	0915	3.0	.01
				07/12/00	1410		1.3
				09/19/00	0740	5.7	
				09/19/00	1215	6.0	.47
				10/23/00	1634		1.2
				05/16/01	1115	6.8	66
				08/14/01	1310		.11
				09/17/01	1518		.18
				09/18/01	0755	5.7	
				11/18/01	1230		.89
				07/15/02	1440		.15
				09/17/02	1059		.05
N	405051084114000	Ottawa River at Gomer, Ohio	Latitude 40°50′51″, longitude 84°11′40″, Allen County, Hydrologic Unit 04100007, at Lincoln Highway bridge over the Ottawa River, 0.5 mile west of Gomer, Ohio.(Elida 1:24000 quad)	09/16/99	1340	12.1	23
				07/12/00	1253		63
				09/19/00	0755	5.8	
				09/19/00	1600	11.9	36
				10/23/00	1212		52
				05/16/01	0830	7.4	571
				08/14/01	0830		33
				09/17/01	0905		27
				09/18/01	1010	7.9	
				11/18/01	1445		34
				07/15/02	1000		27
				09/17/02	0801		21
O	405048084111000	Pike Run at Gomer, Ohio	Latitude 40°50′48″, longitude 84°11′10″, Allen County, Hydrologic Unit 04100007,at Gomer Road bridge over Pike Run, on the northside of Gomer, Ohio.(Elida 1:24000 quad)	09/16/99	1615	7.4	1.2
				07/12/00	1245		3.6
				09/19/00	0730	5.7	
				09/19/00	1445	7.0	1.7
				10/23/00	1046		1.6
				05/15/01	1400	7.5	59
				08/14/01	1205		1.1
				09/17/01	1036		1.6
				09/18/01	0955	6.9	
				11/19/01	0945		2.6
				07/16/02	0736		1.3
				09/16/02	1640		1.3
P	405700084113600	Ottawa River near Kalida, Ohio	Latitude 40°57′00″, longitude 84°11′36″, Putnam County, Hydrologic Unit 04100007, 0.2 mi north of County Road 43 on east side of County Road 17 across from old brick house, 2 mi south of Kalida, Ohio.(Kalida 1:24000 quad)	09/16/99	1130	9.5	26
				07/12/00	1115		77
				09/18/00	1600	10.3	32
				09/19/00	0845	7.6	
				10/23/00	1120		54
				05/16/01	1030	7.5	754
				08/14/01	1010		33
				09/17/01	1510		29
				09/18/01	0825	7.5	
				11/19/01	0755		41
				07/16/02	0930		30
				09/16/02	1442		24

Table 1. Site location, dissolved oxygen concentrations, and streamflow data for the Ottawa River and selected tributaries—Continued

[mg/L, milligrams per liter; ft^3/s, cubic feet per second; quad, U.S. Geological Survey 7.5-minute topographic quadrangle map.]

Station letter	Station number	Station name	Location	Date	Time	Oxygen, dissolved (mg/L)	Stream-flow (ft^3/s)
Q	04187995	Sugar Creek near Kalida, Ohio	Latitude 40°57′16″, longitude 84°10′45″, Putnam County, Hydrologic Unit 04100007,County Road 66 bridge over Sugar Creek, 2.5 mi southeast of Kalida, Ohio.(Kalida 1:24000 quad)	09/16/99			no flow
				07/12/00	1038		10.4
				09/18/00	1500	11.1	2.1
				09/19/00	0825	5.8	
				10/23/00	0950		2.0
				05/15/01	1200	7.6	173
				08/14/01	0920		no flow
				09/17/01	1730		.46
				09/18/01	0755	6.2	
				11/19/01	0740		4.4
				07/16/02	0732		no flow
				09/16/02	1421		no flow
R	405901084124600	Ottawa River at Kalida, Ohio	Latitude 40°59′01″, longitude 84°12′46″, Putnam County, Hydrologic Unit 04100007, at end of drive into St. Michaels Cemetery accessed by State Route 114, 0.2 mi northwest of Kalida, Ohio.(Kalida 1:24000 quad)	09/16/99	1315	10.9	23
				07/12/00	0916		95
				09/18/00	1230	9.8	35
				09/19/00	0920	6.6	
				10/23/00	1425		53
				05/16/01	1230	7.9	980
				08/14/01	1630		31
				09/17/01	1240		31
				09/18/01	0915	7.4	
				11/19/01	1010		44
				07/16/02	1239		28
				09/16/02	1314		25
S	405913084123300	Plum Creek at Kalida, Ohio	Latitude 40°59′13″, longitude 84°12′33″, Putnam County, Hydrologic Unit 04100007, at State Route 114 bridge over Plum Creek, 0.2 mi northwest of Kalida, Ohio.(Kalida 1:24000 quad)	09/16/99	1530	8.1	.22
				07/12/00	0920		9.3
				09/18/00	1030	7.8	1.4
				09/19/00	0905	6.0	
				10/23/00	1310		1.2
				05/15/01	0945	8.2	38
				08/14/01	0805		.27
				09/17/01	1140		.48
				09/18/01	0900	5.8	
				11/19/01	0850		2.8
				07/16/02	1110		.44
				09/16/02	1228		.24

Water-quality characteristics

Water-quality data from the first sampling round (summer of 2000) are listed in Appendix 1, and the data from the second sampling round (spring of 2001) are listed in Appendix 2. Quality-control data (analyses of duplicate samples) are included as a second row of data for the same site and date at selected sites. The four or five dissolved-oxygen concentration data are listed on table 1.

Minimum, median, and maximum values of the nutrient and dissolved-oxygen concentrations and physical properties measured at the 18 or 19 sites are listed in table 2 (table 2 and all remaining tables are at back of report) for samples collected during low-flow and runoff events. Only 18 sites were sampled during the summer 2000 sampling round because there was no flow at the Ottawa River at Metzger Road (site E).

The median values of specific conductance, pH, dissolved oxygen, alkalinity, and orthophosphate were higher during low flow than during the runoff event. In contrast, the median concentrations of total phosphorus, ammonia nitrogen, nitrite plus nitrate nitrogen, and ammonia plus organic nitrogen were higher during the runoff event than during low flow. Concentrations of orthophosphate, phosphorus, and dissolved oxygen all exhibited wider ranges (lowest minimum value and the highest maximum value) during low flow than during the runoff event.

Concentrations of nitrite plus nitrate nitrogen in nine samples exceeded the U.S. Environmental Protection Agency (USEPA, 2002) Maximum Contaminant Level (MCL) for nitrate (10 mg/L, as nitrogen) during the runoff event, whereas concentrations in only one sample exceeded this standard during low flow. Although the MCL applies to treated drinking water and not to the samples collected

during this study, the MCL provides a frame of reference for evaluating the water-quality data.

Water-quality samples were collected and analyzed for major ions and trace elements during the low-flow period in September 2000. Summary statistics for the 15 constituents that were detected at all 18 sites are listed in table 3. An additional 10 constituents were detected infrequently (table 4) or not detected at all (table 5). As a frame of reference, lead concentrations, detected at 1 to 2 µg/L, were well below the 15-µg/L USEPA action level for treated drinking water.

During a runoff event in May 2001, water-quality samples were collected and analyzed for 48 pesticides. Of the 48 pesticides, 18 were detected, 13 of which were detected at five or more sites (table 6). The pesticides trifluralin, DCPA, malathion, tebuthiuron, and terbuthylylazine were detected at 3 or fewer sites, and 30 pesticides were not detected at any site (table 7). Acetochlor, atrazine, deethylatrazine, metolachlor, and simazine were detected in all 19 samples. The USEPA has established MCLs for drinking water of 3 µg/L for atrazine and 4 µg/L for simazine. Although the MCLs do not apply to stream water, they can be used as a frame of reference for evaluating the magnitude of the concentrations observed in the samples. Concentrations of atrazine exceeded the MCL at 13 sites; the simazine MCL was exceeded at 1 site. Of the three other pesticides detected in all 19 samples, acetochlor and metochlor do not have MCLs, and deethylatrazine is an atrazine metabolite. Detections of pesticides were not unexpected because sampling was targeted during a runoff event after recent planting and pesticide application.

Summary

In cooperation with the ORC, the USGS made 10 streamflow measurements at each of 19 stream sites and at a USGS gaging station (index station). Nineteen plots were made of the daily mean streamflow at Auglaize River near Fort Jennings and the instantaneous streamflow at the 19 sites.

Two sets of samples were collected and analyzed for water-quality constituents at the 18 or 19 sites. Dissolved-oxygen concentrations were measured four or five times. The water-quality samples were collected during two periods when stream conditions potentially placed stress on aquatic life. Samples were collected and analyzed for nutrients and physical properties during both sampling rounds.

During low flow, the median values of specific conductance, pH, dissolved oxygen, alkalinity, and orthophosphate were higher than during the runoff-sampling. In contrast, the median concentrations in runoff samples were higher than in low-flow samples for total phosphorus, ammonia nitrogen, nitrite plus nitrate nitrogen, and , ammonia plus organic nitrogen. Concentrations of orthophosphate, phosphorus, and dissolved oxygen all exhibited wider ranges (lowest minimum value and the highest maximum value) during low flow than during the runoff event.

Water samples were collected and analyzed for major ions and trace elements during a low-flow period and for pesticides during a runoff event. Samples collected during the low-flow period were analyzed for 25 major ions and trace elements, 15 of which were detected in all the samples and 10 that were detected infrequently or not at all. Samples collected during the runoff event were analyzed for 48 pesticides, 18 of which were detected. Of the18 pesticides detected, 5 were detected in all the samples: acetochlor, atrazine, deethylatrazine, metolachlor, and simazine. Alachlor and prometon were detected in 18 of the 19 samples, diazinon was detected in 17 samples, carbaryl and metribuzin sencor in 13, cyanazine in 8, chlorpyrifos in 6, and pendimethalin in 5 samples. The remaining pesticides—DCPA, malathion, tebuthiuron, terbuthylazine, and trifluralin—were detected in one, two, or three of the samples. Neither the pesticide nor the major ion and trace element data are unexpected, as both sets of analyses were targeted during times when environmental conditions could cause the pesticides and major ions and trace elements to be at high concentrations.

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Shelton, L.R., 1994, Field guide for collecting and processing stream-water samples for the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 94-455, p. 1-39.

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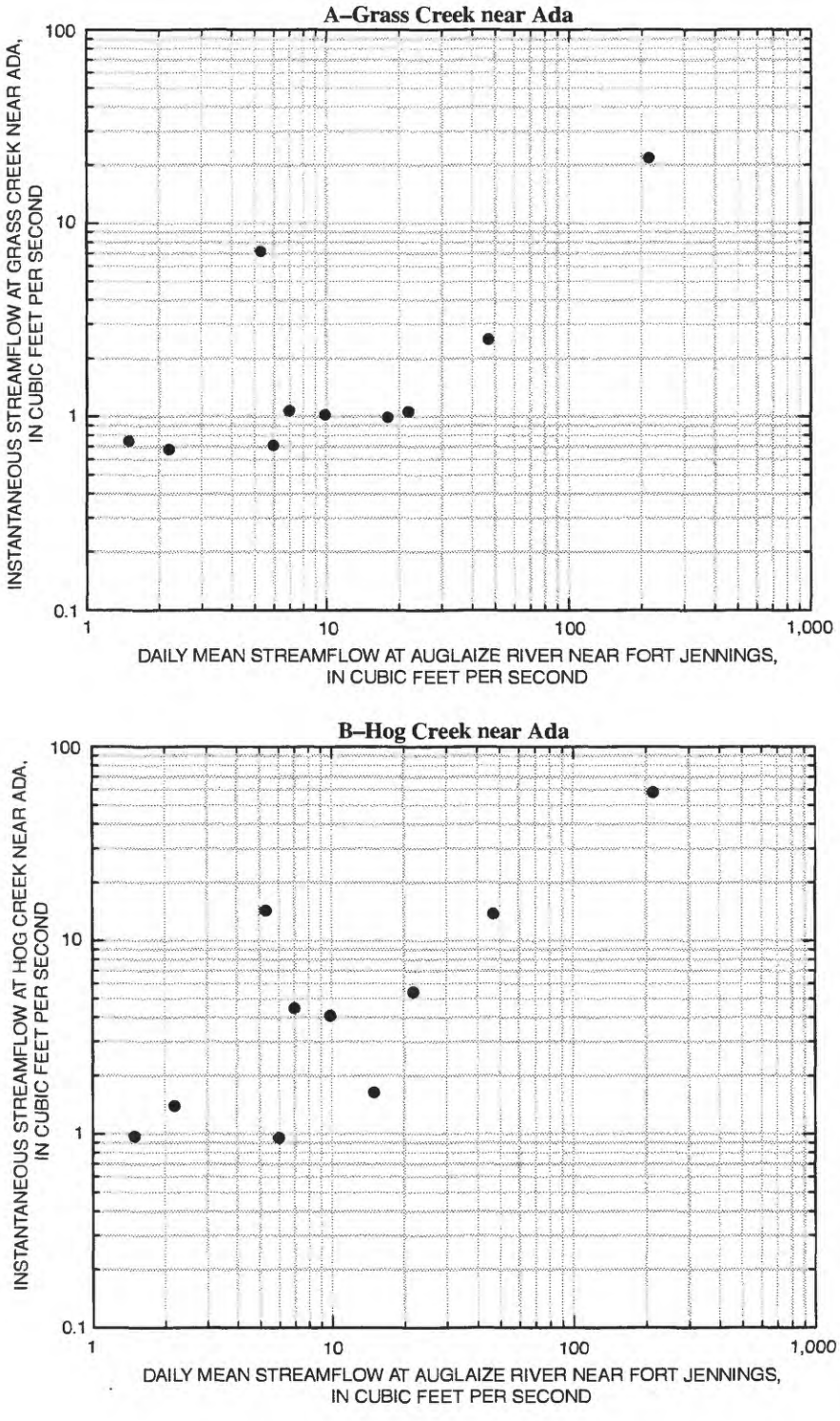

Figure 2. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Grass Creek and Hog Creek near Ada, Ohio.

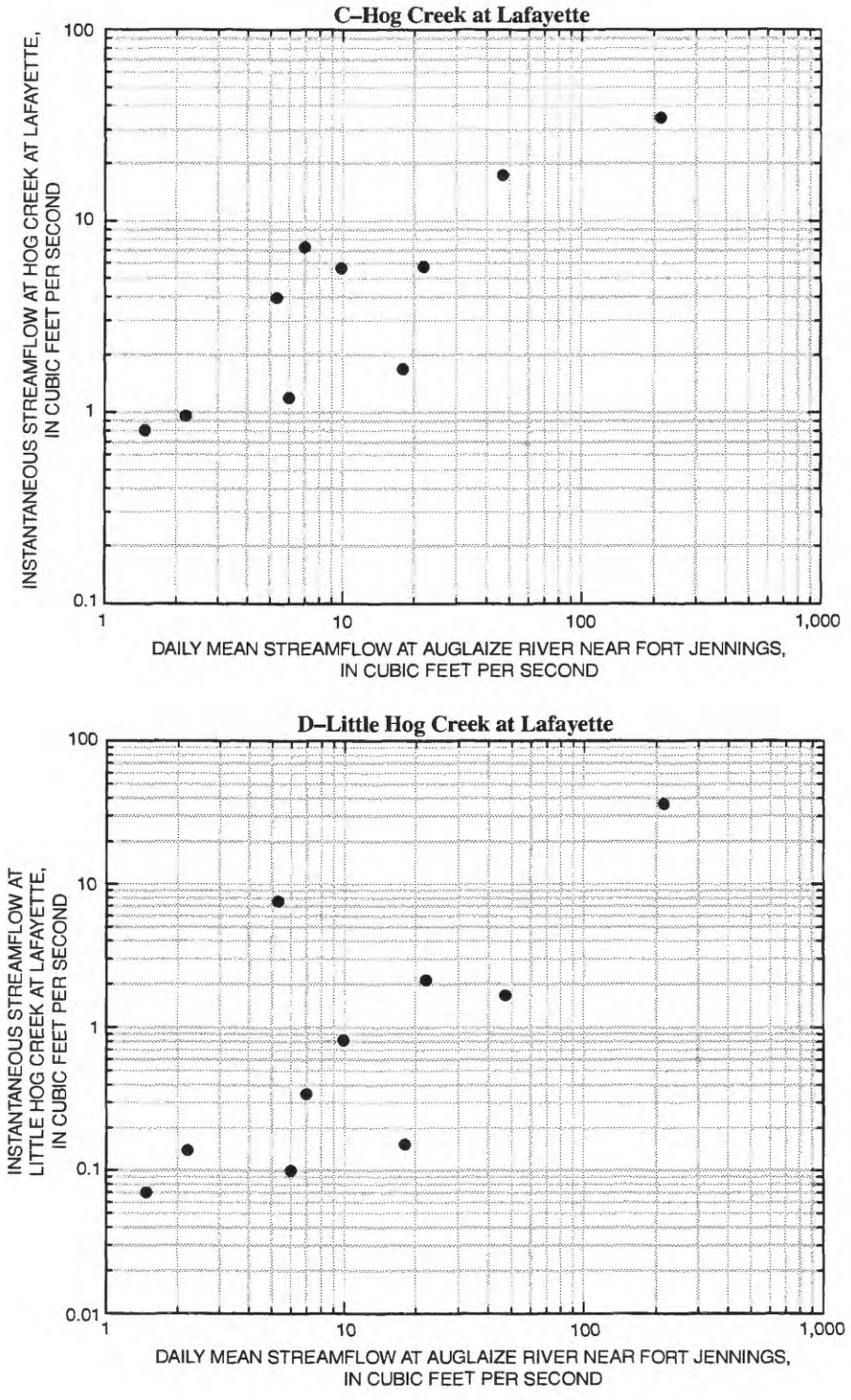

Figure 3. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Hog Creek and Little Hog Creek at Lafayette, Ohio.

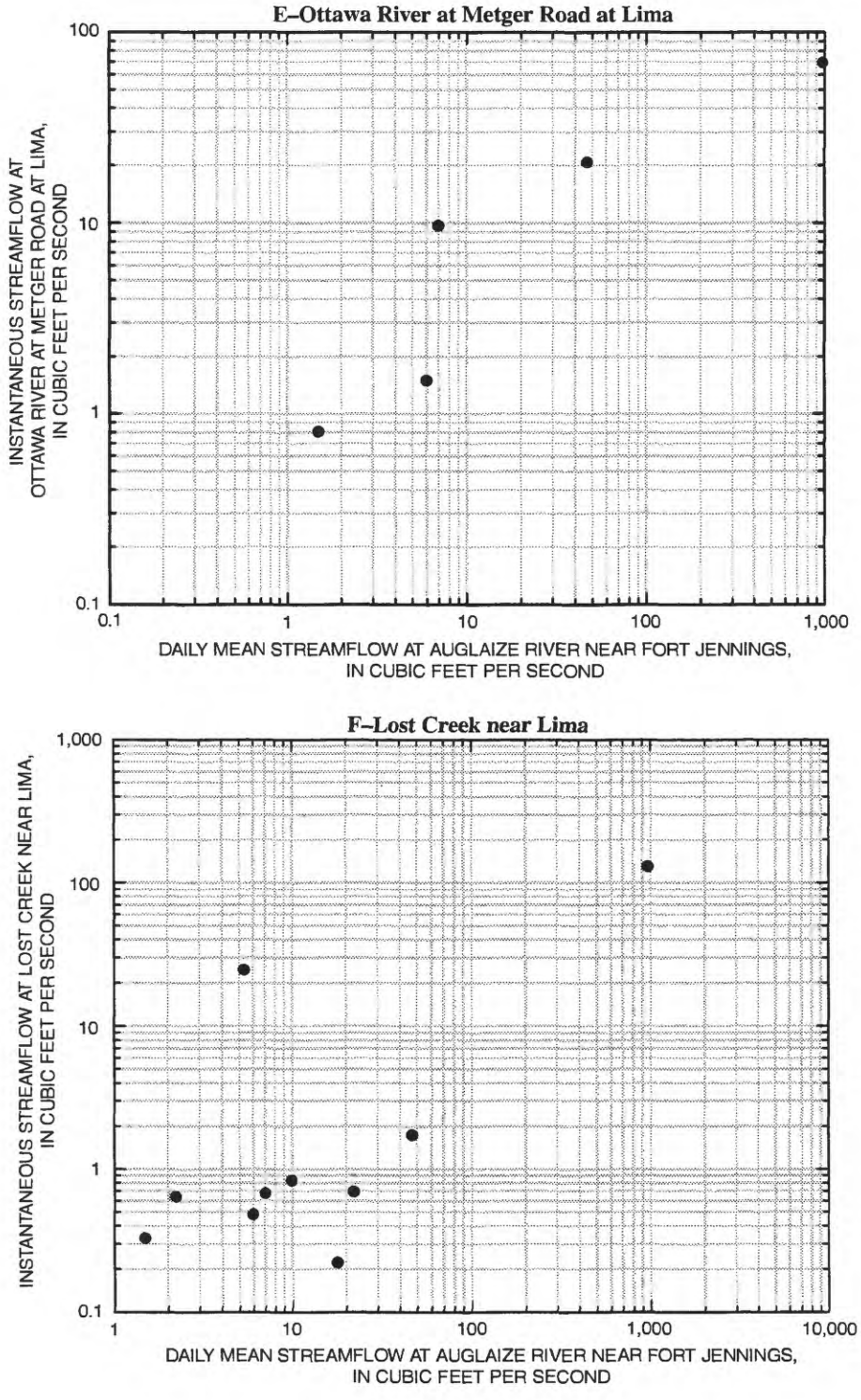

Figure 4. Relation between mean daily streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Ottawa River at Metzger Road at Lima and Lost Creek near Lima, Ohio.

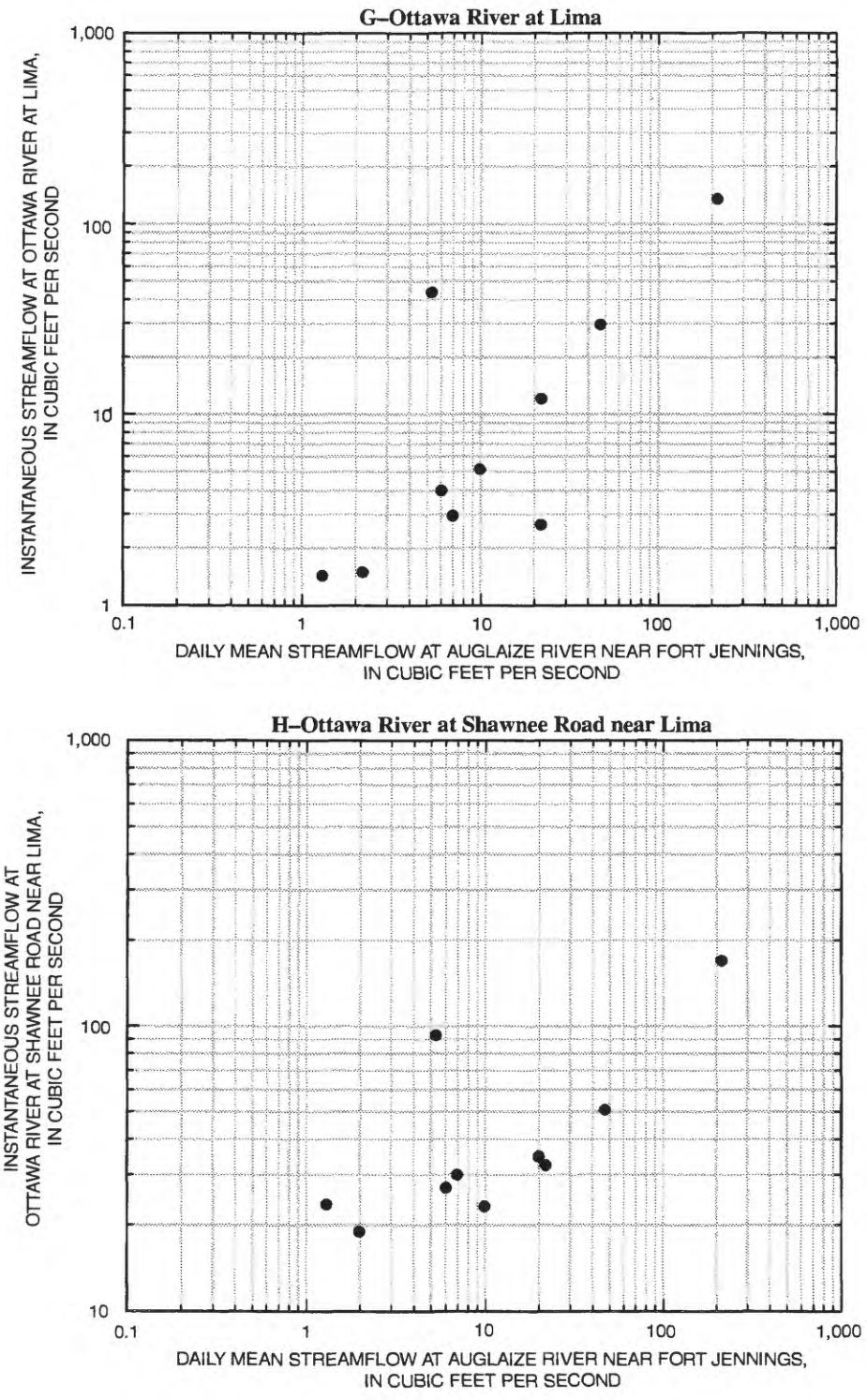

Figure 5. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Ottawa River at Lima and at Shawnee Road near Lima, Ohio.

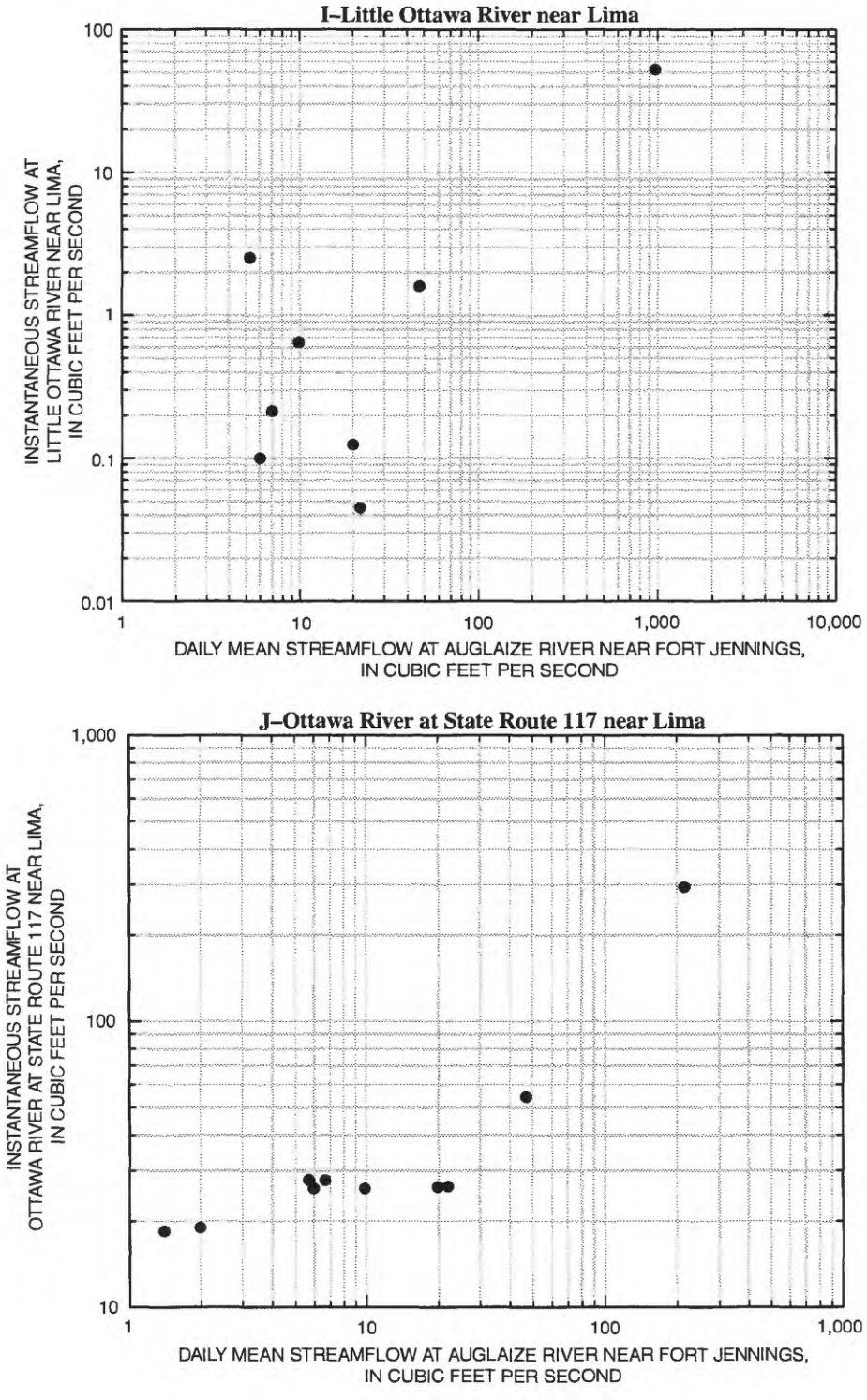

Figure 6. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Little Ottawa River and Ottawa River at State Route 117 near Lima, Ohio.

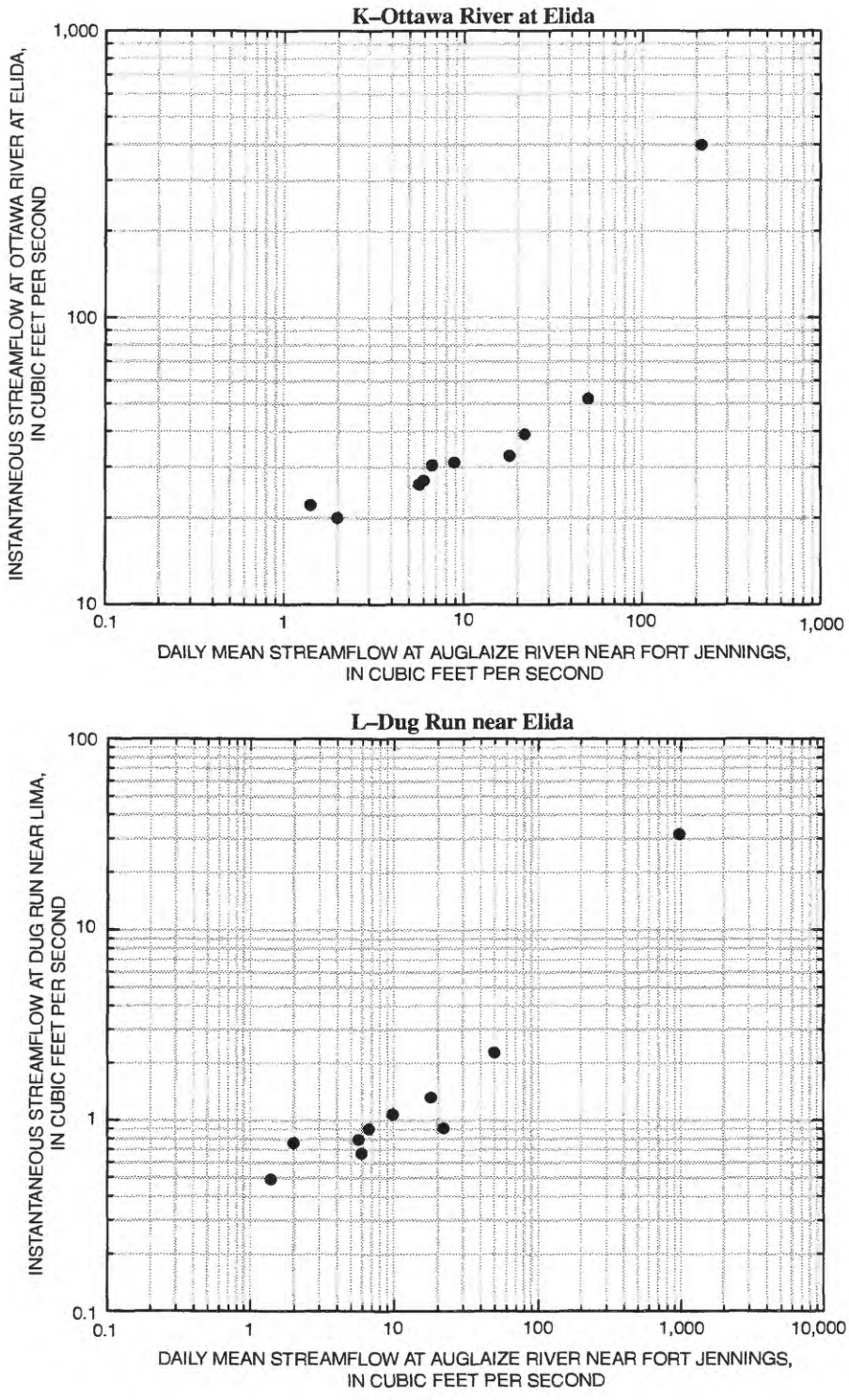

Figure 7. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Ottawa River at Elida and Dug Run near Elida, Ohio.

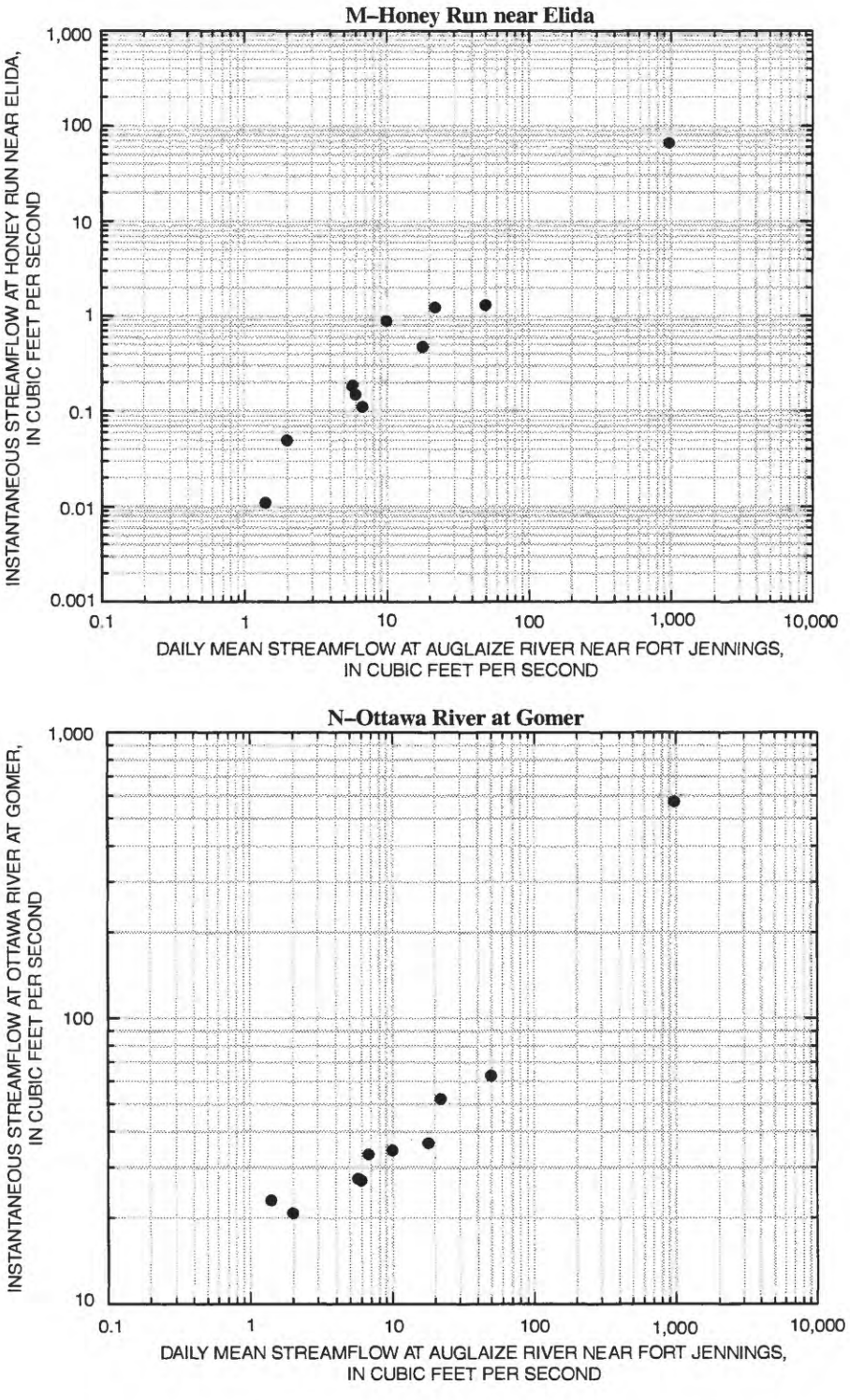

Figure 8. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Honey Run near Elida and Ottawa River at Gomer, Ohio.

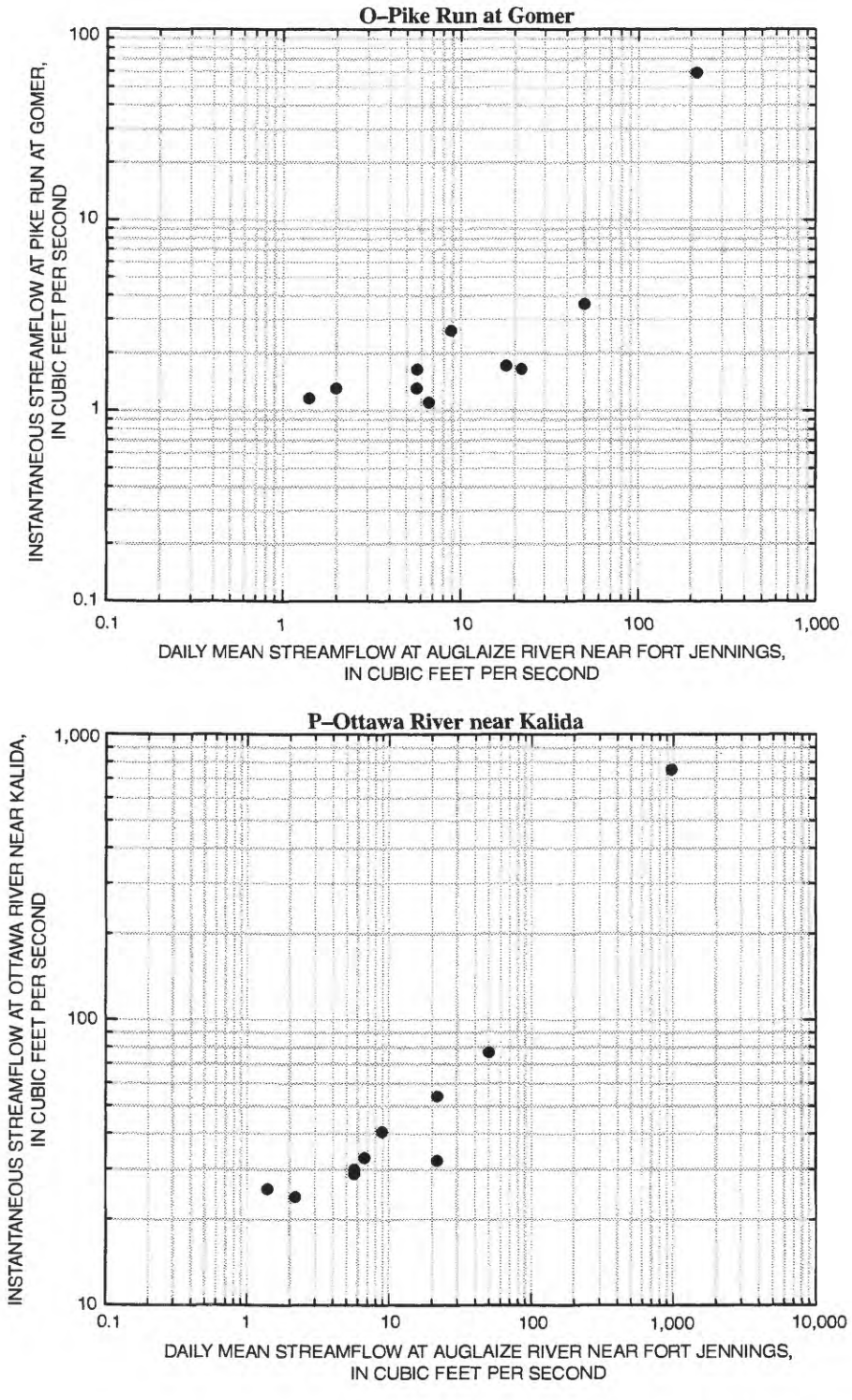

Figure 9. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Pike Run at Gomer and Ottawa River near Kalida, Ohio.

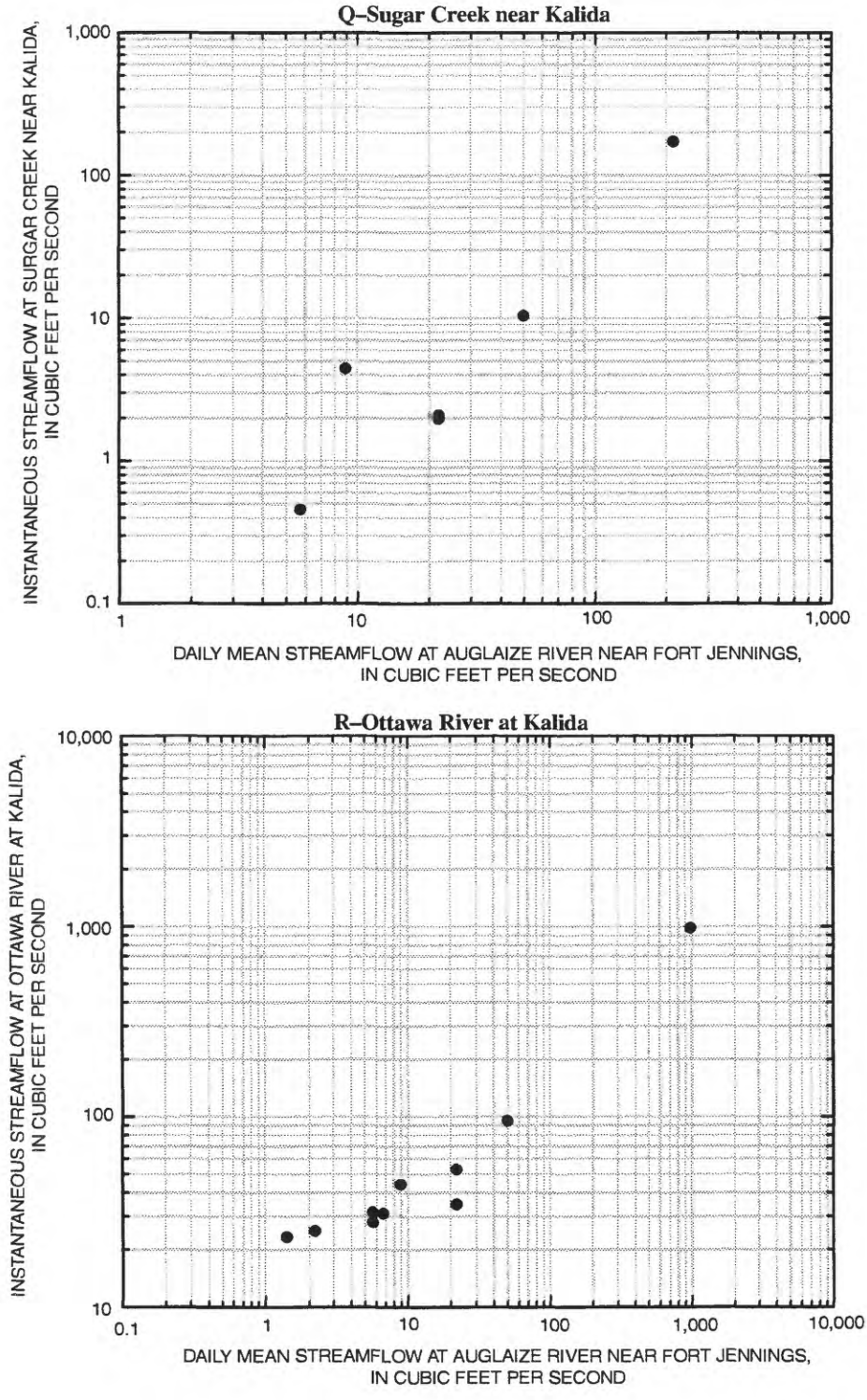

Figure 10. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Sugar Creek near Kalida and Ottawa River at Kalida, Ohio.

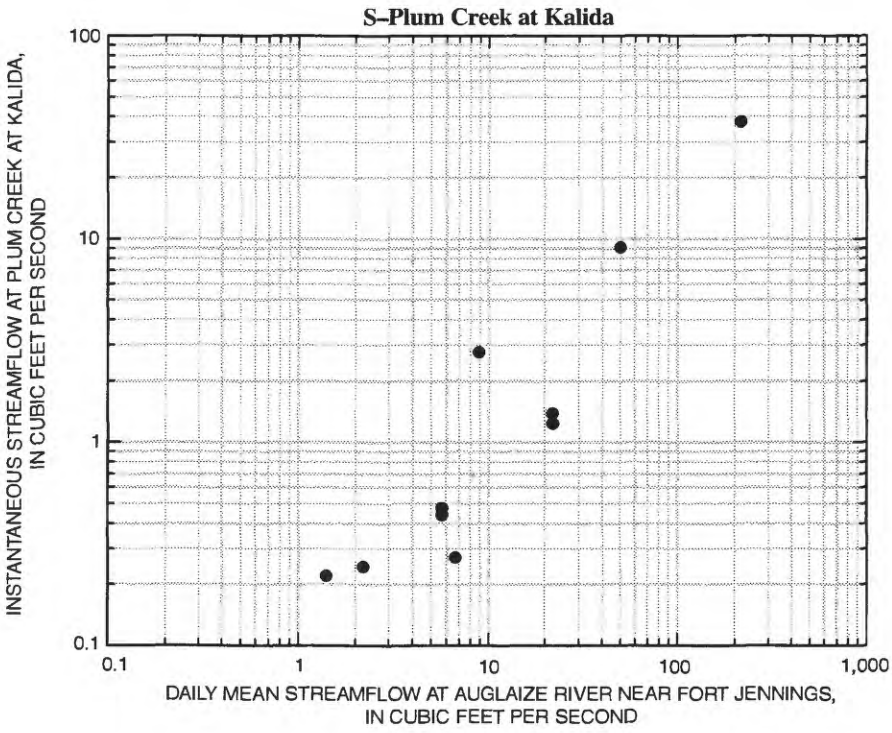

Figure 11. Relation between daily mean streamflow at Auglaize River near Ft. Jennings and instantaneous streamflow at Plum Creek at Kalida, Ohio.

Table 2. Statistical summary of physical properties and nutrient concentrations for samples collected at sites along the Ottawa River and selected tributaries

[°C, degrees Celsius; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; $CaCO_3$, calicum carbonate; N, nitrogen; P, phosphorus; e, estimated.]

Physical property or constituent	Number of samples	Concentration or value		
		Minimum	Median	Maximum
Water Temperature (°C)				
Low flow (sampling round 1)	18	14.0	18.0	21.0
Runoff event (sampling round 2)	19	14.0	16.0	18.0
Specific conductance (µS/cm)				
Low flow (sampling round 1)	18	738	1010	1730
Runoff event (sampling round 2)	19	493	634	784
pH (standard units)				
Low flow (sampling round 1)	18	7.2	7.8	8.4
Runoff event (sampling round 2)	19	7.2	7.6	7.9
Dissolved oxygen (mg/L)				
Low flow (sampling round 1)	18	4.2	7.8	12.7
Runoff event (sampling round 2)	19	6.2	7.6	8.6
Alkalinity (mg/L as $CaCO_3$)				
Low flow (sampling round 1)	18	83	154	272
Runoff event (sampling round 2)	19	79	121	248
Nitrogen, ammonia plus organic, total (mg/L as N)				
Low flow (sampling round 1)	18	.55	.94	2.7
Runoff event (sampling round 2)	19	.94	2.2	3.5
Nitrogen, ammonia, dissolved (mg/L as N)				
Low flow (sampling round 1)	18	e.016	.076	1.3
Runoff event (sampling round 2)	19	.089	.419	1.55
Nitrogen, nitrite plus nitrate, dissolved (mg/L as N)				
Low flow (sampling round 1)	18	e.036	3.20	10.7
Runoff event (sampling round 2)	19	.680	9.53	32.4
Phosphorus, orthophosphate, dissolved (mg/L as P)				
Low flow (sampling round 1)	18	.021	.398	1.34
Runoff event (sampling round 2)	19	.044	.143	.314
Phosphorus, total (mg/L as P)				
Low flow (sampling round 1)	18	.094	.413	1.53
Runoff event (sampling round 2)	19	.179	.428	.597

Table 3. Statistical summary of major ions and trace-element concentrations found at 18 sites along the Ottawa River and selected tributaries during September 2000

[µg/L, micrograms per liter, mg/L, milligrams per liter. Statistics based on 18 samples. Charges of major ions and trace elements are implied; e, estimated.]

Major ions or trace elements	Minimum	Median	Maximum
Aluminum, total recoverable (µg/L as Al)	34	158	645
Barium, total recoverable (µg/L as Ba)	16.4	47.3	68.3
Boron, total recoverable (µg/L as B)	102	206	424
Calcium, dissolved (mg/L as Ca)	67.2	90.3	109
Chloride, dissolved (mg/L as Cl)	55.8	98	248
Fluoride, dissolved (mg/L as F)	.3	.7	1.2
Iron, total recoverable (µg/L as Fe)	90	390	1110
Lithium, total recoverable (µg/L as Li)	e5.1	17.0	33.9
Magnesium, dissolved (mg/L as Mg)	21	32.3	47.9
Manganese, total recoverable (µg/L as Mn)	5	47	86
Potassium, dissolved (mg/L as K)	5.8	7.1	10.9
Silica, dissolved (mg/L as SiO_2)	2.03	6.69	12.8
Sodium, dissolved (mg/L as Na)	36.1	72.0	205
Strontium, total recoverable (µg/L as Sr)	645	2600	5170
Sulfate, dissolved (mg/L as SO_4)	101	186	338

Table 4. Statistical summary of infrequently detected major ions and trace elements at sites along the Ottawa River and selected tributaries during low flow

[µg/L, micrograms per liter, mg/L, milligrams per liter; --, denotes no median detection concentration for major ions and trace elements that only have two detections. Statistics based on 18 samples. Charges of major ions and trace elements are implied. Reported concentrations lower than reporting limit are detected values with concentrations too low to accurately measure; e, estimated.]

Major ions, trace elements and residue	Reporting limit	Number of detections	Reported concentrations		
			Minimum	Median	Maximum
Lead, total recoverable (µg/L as Pb)	1	13	e1	1	2
Molybdenum, total recoverable (µg/L as Mo)	70	1	e47	--	e47
Residue, total at 105°C, suspended (mg/L)	10	5	13	20	29
Vanadium, total (µg/L as V)	10	2	e10	--	e10
Zinc, total recoverabl (µg/L as Zn)	31	5	e16	20	e21

Table 5. Reporting limits for nondetected major ions and trace elements

[µg/L, micrograms per liter. Charges of trace elements are implied.]

Trace elements not detected	Reporting limit
Beryllium, total recoverable (µg/L as Be)	5
Cadmium, water, total, unfiltered (µg/L as Cd)	8
Cobalt, total recoverable (µg/L as Co)	16
Copper, total recoverable (µg/L as Cu)	20
Nickel, total recoverable (µg/L as Ni)	39
Silver, total recoverable (µg/L as Ag)	7

Table 6. Statistical summary of post-application pesticide detections in water samples from the Ottawa River and selected tributaries, May 2001

[µg/L, microgram per liter; --, denotes no median detection concentration for pesticides that only had two detections, statistics based on 19 samples. Reported concentrations lower than reporting limit are detected values with concentrations too low to accurately measure; e, estimated.]

Pesticide	Reporting limit (µg/L)	Number of samples	Number of detection	Reported concentrations, in micrograms per liter		
				Minimum detection	Median detection	Maximum detection
Acetochlor	0.05	19	19	0.173	2.56	15.8
Alachlor	.010	19	18	.006	.016	.179
Atrazine	.05	19	19	.370	9.64	e44.8
Carbaryl	.041	19	13	e.005	.020	e.057
Chlorpyrifos	.010, .005*	19	6	e.004	.010	.025
Cyanazine	.018	19	8	e.006	.011	.023
DCPA	.003	19	2	e.002	--	.006
Deethylatrazine	.05	19	19	e.098	.386	e1.6
Diazinon	.005	19	17	.003	.026	.060
Malathion	.013, .027 *	19	2	e.004	--	e .012
Metolachlor	.05	19	19	.058	2.64	16.8
Metribuzin	.006	19	13	.012	.582	2.23
Pendimethalin	.010, .030 *	19	5	e.009	.040	.127
Prometon	.015	19	18	e.010	.048	.300
Simazine	.05	19	19	.035	.907	13.3
Tebuthiuron	.016	19	3	e.014	.023	.026
Terbuthylazine	--	19	2	e.002	--	e .026
Trifluralin	.009	19	1	e.006		e.006

* Interferences in analysis or change in dilution of a sample may lead to more than one reporting limit.

Table 7. Reporting limits for undetected pesticides

[µg/L, micrograms per liter.]

Pesticides not detected	Reporting limit (µg/L)	Pesticides not detected	Reporting limit (µg/L)
2,6-Diethylaniline	0.002	Molinate	.002
alpha-BHC	.005	Napropamide	.007
Benfluralin	.010	*p, p'*-DDE	.003
Butylate	.002	Parathion	.007
Carbofuran	.020	Pebulate	.002
Dieldrin	.005	*cis*-Permethrin	.006
Disulfoton	.021	Phorate	.011
EPTC	.002	Pronamide	.004
Ethalfluralin	.009	Propachlor	.010
Ethoprop	.005	Propanil	.011
Fonofos	.003	Propargite	.023
Lindane	.004	Terbacil	.034
Linuron	.035	Terbufos	.017
Methylazinphos	.050	Thiobencarb	.005
Methylparathion	.006	Triallate	.002

APPENDIXES

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Time	Discharge, instantaneous (ft^3/s) (00061)	Barometric pressure (mm of Hg) (00025)	Oxygen, dissolved (mg/L) (00300)	Oxygen, dissolved (percent of saturation) (00301)	pH, whole water, field (standard units (00400)	pH, whole water, lab (standard units) (00403)	Specific conductance, lab (µS/cm) (90095)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
Sept. 19	1545	.99	738	4.2	43	7.2	9.2	1030
			404746083492400 HOG CREEK NEAR ADA, OHIO					
Sept. 20	0845	1.6	738	6.9	74	8.2	8.2	1020
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
Sept. 19	1410	1.7	738	8.5	88	7.8	8.1	949
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
Sept. 19	1230	.15	738	6.2	64	7.7	8.2	1460
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
Sept. 19	0915	--	--	--	--	--	--	--
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
Sept. 19	1010	.22	739	8.2	80	7.7	8.0	797
			04187100 OTTAWA RIVER AT LIMA, OHIO					
Sept. 18	1515	2.7	743	10.0	114	8.4	7.8	837
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
Sept. 18	1300	32	743	4.9	55	7.5	7.3	1770
18	1301	--	743	4.9	55	7.5	7.3	1780
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
Sept. 18	1000	.04	744	6.2	62	7.7	7.8	815
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
Sept. 19	0930	26	740	4.5	50	7.6	7.8	1700
			404808084121700 OTTAWA RIVER AT ELIDA, OHIO					
Sept. 19	1100	33	740	7.9	87	7.8	7.9	1610
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
Sept. 19	1330	1.3	740	12.7	145	8.4	8.4	1010
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
Sept. 19	1215	.47	740	6.0	64	7.7	7.9	965
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
Sept. 19	1600	36.5	740	11.9	139	8.3	8.2	1540
19	1601	--	740	11.9	139	8.3	8.3	1530
			405048084111000 PIKE RUN AT GOMER, OHIO					
Sept. 19	1445	1.7	740	7.0	76	7.8	8.0	884
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
Sept. 18	1600	32	743	10.3	116	8.3	8.3	1170
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
Sept. 18	1500	2.1	743	11.1	125	8.1	8.2	842

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Time	Discharge, instant-aneous (ft^3/s) (00061)	Barometric pressure (mm of Hg) (00025)	Oxygen, dissolved (mg/L) (00300)	Oxygen, dissolved (percent of saturation) (00301)	pH, whole water, field (standard units) (00400	pH, whole water, lab (standard units) (00403)	Specific conduct-ance, lab (µS/cm) (90095)
405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO								
Sept. 18	1230	35	743	9.8	106	8.0	8.2	1030
405913084123300 PLUM CREEK AT KALIDA, OHIO								
Sept. 18	1030	1.4	744	7.8	81	7.8	8.0	1500
405913084123399 BLANK SAMPLE								
Sept. 19	1801	--	--	--	--	--	8.1	e3
20	1431	--	--	--	--	--	8.6	7

Date	Specific conduct-ance, field (µS/cm) (00095)	Air temperature (deg C) (00020)	Calcium, dissolved (mg/L as Ca) (00915)	Magnesium, dissolved (mg/L as Mg) (00925)	Potassium, dissolved (mg/L as K) (00935)	Sodium, dissolved mg/L as Na) (00930)	Alkalinity, water, dissolved, field (mg/L as $CaCO_3$) (39086)
404728083475300 GRASS CREEK NEAR ADA, OHIO							
Sept. 19	738	16.5	83.9	32.4	9.9	71.2	83
404746083492400 HOG CREEK NEAR ADA, OHIO							
Sept. 20	1010	16.5	92.7	34.4	7.7	58.1	133
404616083564200 HOG CREEK AT LAFAYETTE, OHIO							
Sept. 19	920	16.5	94.0	32.2	6.3	47.7	199
404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO							
Sept. 19	1390	17.0	98.9	47.9	7.0	118	272
404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO							
Sept. 19	0915	--	--	--	--	--	--
404448084034000 LOST CREEK NEAR LIMA, OHIO							
Sept. 19	780	17.0	71.9	21.0	6.6	46.1	135
04187100 OTTAWA RIVER AT LIMA, OHIO							
Sept. 18	830	26.5	80.9	33.2	5.8	36.1	172
404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO							
Sept. 18	1730	22.0	95.6	38.8	9.7	205	156
18	1730	22.0	98.3	38.2	10.1	197	156
404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO							
Sept. 18	804	17.0	67.2	23.2	6.3	55.8	175
404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO							
Sept. 19	1720	17.0	97.6	38.2	10.9	182	152
404808084121700 OTTAWA RIVER AT ELIDA, OHIO							
Sept. 19	1630	17.0	96.7	35.4	10.5	169	152

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Specific conductance, field (µS/cm) (00095)	Air temperature (deg C) (00020)	Calcium, dissolved (mg/L as Ca) (00915)	Magnesium, dissolved (mg/L as Mg) (00925)	Potassium, dissolved (mg/L as K) (00935)	Sodium, dissolved mg/L as Na) (00930)	Alkalinity, water, dissolved, field (mg/L as $CaCO_3$) (39086)
			404839084121400 DUG RUN NEAR ELIDA, OHIO				
Sept. 19	1010	17.0	94.7	27.1	8.4	72.7	142
			404826084130400 HONEY RUN NEAR ELIDA, OHIO				
Sept. 19	971	17.0	109	30.2	6.7	44.3	240
			405051084114000 OTTAWA RIVER AT GOMER, OHIO				
Sept. 19	1550	16.5	98.5	35.8	10.1	163	154
19	1550	16.5	97.1	35.2	9.93	160	154
			405048084111000 PIKE RUN AT GOMER, OHIO				
Sept. 19	890	19.0	85.9	22.2	7.2	59.7	154
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO				
Sept. 18	1190	22.0	84.8	29.2	7.6	101	156
			04187995 SUGAR CREEK NEAR KALIDA, OHIO				
Sept. 18	844	22.0	69.5	25.3	6.6	55.2	154
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO				
Sept. 18	1040	21.0	79.9	27.6	6.7	81.3	164
			405913084123300 PLUM CREEK AT KALIDA, OHIO				
Sept. 18	1480	17.0	88.0	36.7	7.0	146	194
			405913084123399 BLANK SAMPLE				
Sept. 19	--	--	.06	e.011	<.24	<.1	--
20	--	--	.04	<.014	<.24	<.1	--

Date	Carbonate water, dissolved, field (mg/L as CO_3) (00452)	Chloride, dissolved (mg/L as Cl) (00940)	Fluoride, dissolved (mg/L as F) (00950)	Silica, total (mg/L as SiO_2) (00956)	Sulfate, dissolved (mg/L as SO_4) (00945)	Nitrogen, ammonia plus organic, total (mg/L as N) (00625)	Nitrogen, ammonia, dissolved (mg/L as N) (00608)
			404728083475300 GRASS CREEK NEAR ADA, OHIO				
Sept. 19	23	90.8	.7	3.80	260	1.2	.048
			404746083492400 HOG CREEK NEAR ADA, OHIO				
Sept. 20	3	81.4	.7	3.20	228	.99	.124
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	--	74.2	.6	3.28	181	.69	.066
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	4	180	.9	7.21	192	.55	.038

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Carbonate water, dissolved, field (mg/L as CO_3) (00452)	Chloride, dissolved (mg/L as Cl) (00940)	Fluoride, dissolved (mg/L as F) (00950)	Silica, total (mg/L as SiO_2) (00956)	Sulfate, dissolved (mg/L as SO_4) (00945)	Nitrogen, ammonia plus organic, total (mg/L as N) (00625)	Nitrogen, ammonia, dissolved (mg/L as N) (00608)
404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO							
Sept. 19	--	--	--	--	--	--	--
404448084034000 LOST CREEK NEAR LIMA, OHIO							
Sept. 19	--	84.5	.5	5.54	110	.68	.074
04187100 OTTAWA RIVER AT LIMA, OHIO							
Sept. 18	84	55.8	.7	2.03	180	1.3	e.016
04224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO							
Sept. 18	--	248	1.1	8.41	334	2.7	1.33
18	--	246	1.1	8.41	338	2.8	1.34
404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO							
Sept. 18	--	85.6	.6	7.21	101	.71	.073
404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO							
Sept. 19	--	224	1.0	8.00	338	1.7	.236
404808084121700 OTTAWA RIVER AT ELIDA, OHIO							
Sept. 19	--	189	1.2	8.42	326	1.2	.196
404839084121400 DUG RUN NEAR ELIDA, OHIO							
Sept. 19	--	111	.7	4.48	153	.98	.144
404826084130400 HONEY RUN NEAR ELIDA, OHIO							
Sept. 19	--	82.4	.3	12.8	115	.58	.110
405051084114000 OTTAWA RIVER AT GOMER, OHIO							
Sept. 19	--	183	1.2	7.81	309	.97	.059
19	--	185	1.1	7.78	317	.98	.054
405048084111000 PIKE RUN AT GOMER, OHIO							
Sept. 19	--	94.9	.6	6.52	120	1.0	.419
405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO							
Sept. 18	--	127	.9	7.03	232	e.92	.077
04187995 SUGAR CREEK NEAR KALIDA, OHIO							
Sept. 18	--	88.7	.4	5.27	121	e.73	.052
405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO							
Sept. 18	--	101	.8	6.86	194	e.76	.043
405913084123300 PLUM CREEK AT KALIDA, OHIO							
Sept. 18	--	246	.7	4.46	174	e.87	.114
405913084123399 BLANK SAMPLE							
Sept. 19	--	<.3	<.1	.07	<.3	e.05	.036
20	--	1.0	<.1	<.07	<.3	e.02	e.020

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Nitrogen, nitrite plus nitrate, dissolved (mg/L as N) (00631)	Phosphorus, ortho-phosphate, dissolved (mg/L as P) (00671)	Phosphorus, total (mg/L as P) (00665)	Residue, total at 105 deg C, suspended (mg/L) (00530)	Aluminum, total recoverable (µg/L as Al) (01105)	Barium, total recoverable (µg/L as Ba) (01007)	Beryllium, total recoverable (µg/L as Be) (01012)
			404728083475300 GRASS CREEK NEAR ADA, OHIO				
Sept. 19	10.7	.549	.762	<10	59	16.4	<5
			404746083492400 HOG CREEK NEAR ADA, OHIO				
Sept. 20	5.49	.623	.924	24	410	41.1	<5
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	2.35	.783	.416	<10	257	58.7	<5
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	1.31	.338	.411	<10	53	51.6	<5
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO				
Sept. 19	--	--	--	--	--	--	--
			404448084034000 LOST CREEK NEAR LIMA, OHIO				
Sept. 19	.641	.065	.108	<10	177	48.4	<5
			04187100 OTTAWA RIVER AT LIMA, OHIO				
Sept. 18	e.036	.021	.175	<10	157	42.4	<5
			04224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO				
Sept. 18	4.15	.552	.698	<10	81	60.3	<5
18	4.11	.019	.737	<10	88	56.5	<5
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO				
Sept. 18	.516	.493	.588	<10	166	29.9	<5
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO				
Sept. 19	4.22	.601	.742	<10	102	56.1	<5
			404808084121700 OTTAWA RIVER AT ELIDA, OHIO				
Sept. 19	6.55	.559	.695	<10	149	46.0	<5
			404839084121400 DUG RUN NEAR ELIDA, OHIO				
Sept. 19	8.52	1.34	1.53	<10	34	36.0	<5
			404826084130400 HONEY RUN NEAR ELIDA, OHIO				
Sept. 19	1.42	.081	.094	<10	158	65.2	<5
			405051084114000 OTTAWA RIVER AT GOMER, OHIO				
Sept. 19	6.64	.457	.562	<10	132	45.8	<5
19	6.69	.447	.561	<10	135	45.3	<5
			405048084111000 PIKE RUN AT GOMER, OHIO				
Sept. 19	3.31	.279	.333	<10	97	47.6	<5
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO				
Sept. 18	3.09	.233	e.340	20	466	47.0	<5
			04187995 SUGAR CREEK NEAR KALIDA, OHIO				
Sept. 18	.487	.059	e.133	13	329	48.7	<5

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Nitrogen, nitrite plus nitrate, dissolved (mg/L as N) (00631)	Phosphorus, ortho-phosphate, dissolved (mg/L as P) (00671)	Phosphorus, total (mg/L as P) (00665)	Residue, total at 105 deg C, suspended (mg/L) (00530)	Aluminum, total recoverable (µg/L as Al) (01105)	Barium, total recoverable (µg/L as Ba) (01007)	Beryllium, total recoverable (µg/L as Be) (01012)
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO				
Sept. 18	2.13	.238	e.133	16	371	44.4	<5
			405913084123399 BLANK SAMPLE				
Sept. 19	<.037	<.010	e.001	<10	<28	e.5	<5
20	<.037	<.010	e.002	<10	<28	2.0	<5

Date	Boron, total recoverable (µg/L as B) (01022)	Cadmium, water, total unfiltered (µg/L as Cd) (01027)	Cobalt, total recoverable (µg/L as Co) (01037)	Copper, total recoverable (µg/L as Cu) (01042)	Iron, total recoverable (µg/L as Fe) (01045)	Lead, total recoverable (µg/L as Pb) (01051)	Lithium, total recoverable (µg/L as Li) (01132)
			404728083475300 GRASS CREEK NEAR ADA, OHIO				
Sept. 19	300	<8.0	<16	<20	90	<1	32.3
			404746083492400 HOG CREEK NEAR ADA, OHIO				
Sept. 20	246	<8.0	<16	<20	710	e1	27.4
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	153	<8.0	<16	<20	390	e1	22.0
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO				
Sept. 19	199	<8.0	<16	<20	90	<1	33.9
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO				
Sept. 19	--	--	--	--	--	--	--
			404448084034000 LOST CREEK NEAR LIMA, OHIO				
Sept. 19	108	<8.0	<16	<20	370	e1	e5.1
			04187100 OTTAWA RIVER AT LIMA, OHIO				
Sept. 18	201	<8.0	<16	<20	430	2	14.5
			04224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO				
Sept. 18	355	<8.0	<16	<20	420	2	22.5
18	336	<8.0	<16	<20	420	2	20.6
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO				
Sept. 18	131	<8.0	<16	<20	340	e1	9.5
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO				
Sept. 19	418	<8.0	<16	<20	400	2	21.3
			404808084121700 OTTAWA RIVER AT ELIDA, OHIO				
Sept. 19	424	<8.0	<16	<20	320	1	19.7
			404839084121400 DUG RUN NEAR ELIDA, OHIO				
Sept. 19	211	<8.0	<16	<20	160	<1	12.0

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Boron, total recoverable (µg/L as B) (01022)	Cadmium, water, total unfiltered (µg/L as Cd) (01027)	Cobalt, total recoverable (µg/L as Co) (01037)	Copper, total recoverable (µg/L as Cu) (01042)	Iron, total recoverable (µg/L as Fe) (01045)	Lead, total recoverable (µg/L as Pb) (01051)	Lithium, total recoverable (µg/L as Li) (01132)
404826084130400 HONEY RUN NEAR ELIDA, OHIO							
Sept. 19	102	<8.0	<16	<20	390	<1	11.0
405051084114000 OTTAWA RIVER AT GOMER, OHIO							
Sept. 19	402	<8.0	<16	<20	280	e1	17.8
19	403	<8.0	<16	<20	280	2	18.4
405048084111000 PIKE RUN AT GOMER, OHIO							
Sept. 19	162	<8.0	<16	<20	180	<1	9.5
405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO							
Sept. 18	304	<8.0	<16	<20	780	2	16.3
04187995 SUGAR CREEK NEAR KALIDA, OHIO							
Sept. 18	119	<8.0	<16	<20	600	e1	9.7
405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO							
Sept. 18	234	<8.0	<16	<20	620	1	13.0
405913084123300 PLUM CREEK AT KALIDA, OHIO							
Sept. 18	182	<8.0	<16	<20	1110	1	18.4
405913084123399 BLANK SAMPLE							
Sept. 19	e13	<8.0	<16	<20	<20	<1	<7.0
20	e13	<8.0	<16	<20	<20	<1	<7.0

Date	Manganese, total recoverable (µg/L as Mn) (01055)	Molybdenum, total recoverable (µg/L as Mo) (01062)	Nickel, total recoverable (µg/L asNi) (01067)	Silver, total recoverable (µg/L as Ag) (01077)	Strontium, total recoverable (µg/L as Sr) (01082)	Vanadium, total (µg/L as V) (01087)	Zinc, total recoverable (µg/L as Zn) (01092)
404728083475300 GRASS CREEK NEAR ADA, OHIO							
Sept. 19	5	<70	<39	<7	4200	<10	<31
404746083492400 HOG CREEK NEAR ADA, OHIO							
Sept. 20	36	<70	<39	<7	4020	<10	e20
404616083564200 HOG CREEK AT LAFAYETTE, OHIO							
Sept. 19	48	<70	<39	<7	3240	<10	e16
404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO							
Sept. 19	28	<70	<39	<7	5170	<10	<31
404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO							
Sept. 19	--	--	--	--	--	--	--
404448084034000 LOST CREEK NEAR LIMA, OHIO							
Sept. 19	53	<70	<39	<7	645	<10	<31

Table A-1. Water-quality data for the Ottawa River and selected tributaries in Ohio, September 18-20, 2000 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reported is less than that indicated; --, no data; e, estimated.]

Date	Manganese, total recoverable (µg/L as Mn) (01055)	Molybdenum, total recoverable (µg/L as Mo) (01062)	Nickel, total recoverable (µg/L asNi) (01067)	Silver, total recoverable (µg/L as Ag) (01077)	Strontium, total recoverable (µg/L as Sr) (01082)	Vanadium, total (µg/L as V) (01087)	Zinc, total recoverable (µg/L as Zn) (01092)
			04187100 OTTAWA RIVER AT LIMA, OHIO				
Sept. 18	66	<70	<39	<7	1840	<10	<31
			04224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO				
Sept. 18	65	<70	<39	<7	4230	<10	e21
18		e44.4	<39	<7	4020	<10	<31
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO				
Sept. 18	86	<70	<39	<7	2570	<10	<31
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO				
Sept. 19	49	e47	<39	<7	4110	e10	e17
			404808084121700 OTTAWA RIVER AT ELIDA, OHIO				
Sept. 19	32	<70	<39	<7	3940	<10	<31
			404839084121400 DUG RUN NEAR ELIDA, OHIO				
Sept. 19	21	<70	<39	<7	1330	<10	e21
			404826084130400 HONEY RUN NEAR ELIDA, OHIO				
Sept. 19	67	<70	<39	<7	801	<10	<31
			405051084114000 OTTAWA RIVER AT GOMER, OHIO				
Sept. 19	24	e40	<39	<7	3720	<10	<31
19	24	<70	<39	<7	3660	<10	<31
			405048084111000 PIKE RUN AT GOMER, OHIO				
Sept. 19	38	<70	<39	<7	828	<10	<31
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO				
Sept. 18	46	<70	<39	<7	2640	<10	<31
			04187995 SUGAR CREEK NEAR KALIDA, OHIO				
Sept. 18	50	<70	<39	<7	737	<10	<31
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO				
Sept. 18	36	<70	<39	<7	2210	e10	<31
			405913084123300 PLUM CREEK AT KALIDA, OHIO				
Sept. 18	63	<70	<39	<7	2020	<10	<31
			405913084123399 BLANK SAMPLE				
Sept. 19	<3	<70	<39	<7	1.46	<10	<31
20	<3	<70	<39	<7	1.54	<10	<31

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Discharge, instantaneous (ft^3/s) (00061)	Barometric pressure (mm of Hg) (00025)	Oxygen, dissolved (mg/L) (00300)	Oxygen, dissolved (percent of saturation) (00301)	pH, whole water, field (standard units) (00400	Specific conductance, field (µS/cm) (00095)	Temperature, air (deg C) (00020)	Temperature, water (deg C) (00010)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	22	736	6.6	67	7.4	584	14.5	14.0
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	58	734	7.4	83	7.4	609	19.5	15.0
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	35	733	7.1	88	7.8	752	24.0	17.5
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	36	733	7.8	102	7.8	625	26.5	17.0
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	69	736	7.9	88	7.9	679	18.5	16.5
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	129	735	8.3	96	7.8	493	20.5	16.0
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	135	745	7.7	77	7.6	660	14.5	16.0
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	221	745	8.6	91	7.6	777	16.5	17.0
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	52	733	6.8	76	7.6	548	18.5	16.5
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	294	740	8.3	95	7.6	728	20.0	17.0
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	399	743	8.2	95	7.6	784	21.5	18.0
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	32	733	6.2	74	7.4	582	22.0	17.0
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	66	734	6.8	76	7.2	634	19.0	15.0
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	571	745	7.4	80	7.4	722	17.5	16.0
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	59	740	7.5	97	7.6	503	26.5	15.5
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	754	745	7.5	83	7.5	647	19.0	16.0
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	173	742	7.6	93	7.5	585	24.0	14.5

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Discharge, instant-aneous (ft^3/s) (00061)	Barometric pressure (mm of Hg) (00025)	Oxygen, dissolved (mg/L) (00300)	Oxygen, dissolved (percent of saturation) (00301)	pH, whole water, field (standard units) (00400	Specific conduct-ance, field (µS/cm) (00095)	Temper-ature, air (deg C) (0020)	Temper-ature, water (deg C) (00010)
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	980	745	7.9	88	7.5	645	19.5	16.0
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	38	743	8.2	88	7.7	600	18.0	15.0
			405913084123399 BLANK SAMPLE					
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--

Date	Alkalinity, water, dissolved, IT, field (mg/L as $CaCO_3$) (39086)	Nitrogen, ammonia, dissolved (mg/L as N) (00608)	Nitrogen, ammonia plus organic, total (mg/L as N) (00625)	Nitrogen, nitrite plus nitrate, dissolved (mg/L as N) (00631)	Phos-phorus, ortho-phosphate, dissolved (mg/ as P) (00671)	Phos-phorus, total (mg/L as P) (00665)	2,6-Diethyl-aniline, water, filtered (µg/L) (82660)	Aceto-chlor (µg/L) (49260)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	121	.585	1.6	9.53	.314	.428	<.002	2.22
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	144	.378	1.7	11.2	.215	.333	<.002	2.56
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	185	.089	.94	4.00	.161	.301	<.002	.816
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	155	.312	1.7	9.10	.216	.179	<.002	6.16
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	166	.318	1.8	7.07	.118	.272	<.002	4.65
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	95	.543	3.3	7.40	.083	.566	<.002	5.98
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	202	.414	1.2	.68	.067	.196	<.002	.173
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	176	.278	1.4	2.48	.186	.367	<.002	.195
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	98	.419	2.6	8.37	.143	.597	<.002	7.62
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	204	.331	1.8	2.92	.117	.475	<.002	e.283

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Alkalinity, water, dissolved, IT, field (mg/L as $CaCO_3$) (39086)	Nitrogen, ammonia, dissolved (mg/L as N) (00608)	Nitrogen, ammonia plus organic, total (mg/L as N) (00625)	Nitrogen, nitrite plus nitrate, dissolved (mg/L as N) (00631)	Phos-phorus, ortho-phosphate, dissolved (mg/ as P) (00671)	Phos-phorus, total (mg/L as P) (00665)	2,6-Diethyl-anilIne, water, filtered (µg/L) (82660)	Aceto-chlor (µg/L) (49260)
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	248	.400	2.2	6.79	.157	.453	<.002	1.98
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	93	.829	2.7	17.3	.044	.333	<.002	.752
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	79	1.55	3.5	32.4	.144	.517	<.002	15.8
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	117	.702	2.6	16.2	.150	.467	<.002	e3.43
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	82	.633	2.5	17.9	.122	.423	<.002	2.16
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	101	.702	2.7	18.4	.111	.494	<.002	3.94
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	125	.258	2.4	16.5	.051	.422	<.002	4.66
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	107	.634	2.6	18.2	.145	.483	<.002	3.98
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	117	.467	2.1	10.6	.111	.455	<.002	.853
			405913084123399 BLANK SAMPLE					
May 15	--	e.044	.15	<.037	<.018	.005	--	--
16	--	e.040	<.08	<.037	<.018	<.004	--	--
16	--	<.049	<.08	<.037	<.018	<.004	--	--

Date	Alachlor (µg/L) (46342)	alpha-BHC (µg/L) (34253)	Atrazine (µg/L) (39632)	Benfluralin (µg/L) (82673)	Butylate (µg/L) (04028)	Carbaryl (µg/L) (82680)	Carbofuran (µg/L) (82674)	Chlor-pyrifos (µg/L) (38933)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	.039	<.005	2.42	<.010	<.002	<.041	<.020	<.005
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	.019	<.005	2.38	<.010	<.002	<.041	<.020	<.005
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	.007	<.005	1.85	<.010	<.002	<.041	<.020	<.005
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	.007	<.005	12.2	<.010	<.002	e.005	<.020	<.010

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Alachlor (µg/L) (46342)	alpha-BHC (µg/L) (34253)	Atrazine (µg/L) (39632)	Benfluralin (µg/L) (82673)	Butylate (µg/L) (04028)	Carbaryl (µg/L) (82680)	Carbofuran (µg/L) (82674)	Chlor-pyrifos (µg/L) (38933)
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	.014	<.005	9.64	<.010	<.002	e.009	<.020	<.005
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	.023	<.005	e28.2	<.010	<.002	e.023	<.020	.025
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	.014	<.005	.370	<.010	<.002	e.021	<.020	<.005
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	.015	<.005	.446	<.010	<.002	e.020	<.020	<.005
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	.006	<.005	e29.5	<.010	<.002	e.020	<.020	<.010
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	.015	<.005	1.57	<.010	<.002	e.057	<.020	<.005
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	.011	<.005	8.93	<.010	<.002	e.015	<.020	<.005
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	.016	<.005	15.2	<.010	<.002	e.012	<.020	<.010
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	.147	<.005	e44.8	<.010	<.002	<.041	<.020	e.005
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	.026	<.005	e34.2	<.010	<.002	e.037	<.020	.016
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	<.010	<.005	9.28	<.010	<.002	e.020	<.020	<.010
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	.179	<.005	16.2	<.010	<.002	e.011	<.020	.009
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	.035	<.005	12.3	<.010	<.002	<.041	<.020	e.004
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	.152	<.005	14.7	<.010	<.002	e.009	<.020	.011
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	.013	<.005	4.65	<.010	<.002	<.041	<.020	<.005
			405913084123399 BLANK SAMPLE					
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Cyanazine (µg/L) (04041)	DCPA (µg/L) (82682)	Deethyl-atrazine (µg/L) (04040)	Diazinon, D10, (µg/L) (91063)	Diazinon (µg/L) (39572)	Dieldrin (µg/L) (39381)	Disulfoton (µg/L) (82677)	EPTC (µg/L) (82668)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	.023	<.003	e.149	129	.060	<.005	<.021	<.002
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	e.015	<.003	e.144	104	.022	<.005	<.021	<.002
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	e.006	<.003	e.098	124	e.003	<.005	<.021	<.002
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	<.018	<.003	e.562	103	<.005	<.005	<.021	<.002
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	<.018	<.003	e.285	109	.008	<.005	<.021	<.002
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	e.013	<.003	e1.6	103	.031	<.005	<.021	<.002
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	<.018	<.003	e.126	109	.055	<.005	<.021	<.002
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	<.018	<.003	e.100	117	.045	<.005	<.021	<.002
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	e.008	<.003	e1.5	107	.025	<.005	<.021	<.002
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	<.018	<.003	e.155	117	e.035	<.005	<.021	<.005
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	<.018	<.003	e.428	106	.038	<.005	<.021	<.002
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	<.018	<.003	e.515	104	.019	<.005	<.021	<.002
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	<.018	.006	e1.5	115	.009	<.005	<.021	<.002
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	e.010	e.002	e.658	122	e.029	<.005	<.021	<.002
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	<.018	<.003	e.153	107	.040	<.005	<.021	<.002
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	e.007	<.003	e.715	111	.022	<.005	<.021	<.002
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	<.018	<.003	e.386	118	.026	<.005	<.021	<.002
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	e.012	<.003	e.689	104	.025	<.005	<.021	<.002

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Cyanazine (µg/L) (04041)	DCPA (µg/L) (82682)	Deethyl-atrazine (µg/L) (04040)	Diazinon, D10, (µg/L) (91063)	Diazinon (µg/L) (39572)	Dieldrin (µg/L) (39381)	Disulfoton (µg/L) (82677)	EPTC (µg/L) (82668)
405913084123300 PLUM CREEK AT KALIDA, OHIO								
May 15	<.018	<.003	e.254	101	<.005	<.005	<.021	<.002
405913084123399 BLANK SAMPLE								
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--

Date	Ethal-fluralin (µg/L) (82663)	Ethoprop (µg/L) (82672)	Fonofos (µg/L) (04095)	Lindane (µg/L) (39341)	Linuron (µg/L) (82666)	Malathion (µg/L) (39532)	Methyl-azinphos (µg/L) (82686)	Methyl-parathion (µg/L) (82667)
404728083475300 GRASS CREEK NEAR ADA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404746083492400 HOG CREEK NEAR ADA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404616083564200 HOG CREEK AT LAFAYETTE, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	e.004	<.050	<.006
404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO								
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404448084034000 LOST CREEK NEAR LIMA, OHIO								
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
04187100 OTTAWA RIVER AT LIMA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO								
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.013	<.050	<.006
404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO								
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
404839084121400 DUG RUN NEAR ELIDA, OHIO								
May 16	<.009	<.005	<.003	<.004	<.035	e.012	<.050	<.006
404826084130400 HONEY RUN NEAR ELIDA, OHIO								
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Ethal-fluralin (µg/L) (82663)	Ethoprop (µg/L) (82672)	Fonofos (µg/L) (04095)	Lindane (µg/L) (39341)	Linuron (µg/L) (82666)	Malathion (µg/L) (39532)	Methyl-azinphos (µg/L) (82686)	Methyl-parathion (µg/L) (82667)
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	<.009	<.005	<.003	<.004	<.035	<.027	<.050	<.006
			405913084123399 BLANK SAMPLE					
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--

Date	Metolachlor (µg/L) (39415)	Metribuzin (µg/L) (82630)	Molinate (µg/L) (82671	Naprop-amide (µg/L) (82684)	*p,p'*-DDE (µg/L) (34653)	Parathion (µg/L) (39542)	Pebulate (µg/L) (82669)	Pendi-methalin (µg/L) (82683)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	.058	.012	<.002	<.007	<.003	<.007	<.002	e.009
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	.092	.041	<.002	<.007	<.003	<.007	<.002	<.010
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	.092	<.006	<.002	<.007	<.003	<.007	<.002	<.010
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	1.48	<.006	<.002	<.007	<.003	<.007	<.002	<.010
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	.551	<.020	<.002	<.007	<.003	<.007	<.002	<.010
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	16.8	.042	<.002	<.007	<.003	<.007	<.002	<.010
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	.099	<.006	<.002	<.007	<.003	<.007	<.002	.127
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	.128	<.006	<.002	<.007	<.003	<.007	<.002	.037

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Metolachlor (µg/L) (39415)	Metribuzin (µg/L) (82630)	Molinate (µg/L) (82671	Napropamide (µg/L) (82684)	*p,p'*-DDE (µg/L) (34653)	Parathion (µg/L) (39542)	Pebulate (µg/L) (82669)	Pendimethalin (µg/L) (82683)
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	13.9	.024	<.002	<.007	<.003	<.007	<.002	<.010
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	.887	<.006	<.002	<.007	<.003	<.007	<.002	.054
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	2.64	.272	<.002	<.007	<.003	<.007	<.002	<.010
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	9.83	1.83	<.002	<.007	<.003	<.007	<.002	<.030
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	10.4	.674	<.002	<.007	<.003	<.007	<.002	<.010
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	7.26	.582	<.002	<.007	<.003	<.007	<.002	.040
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	4.42	.706	<.002	<.007	<.003	<.007	<.002	<.010
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	4.83	1.30	<.002	<.007	<.003	<.007	<.002	<.010
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	6.05	2.23	<.002	<.007	<.003	<.007	<.002	<.010
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	4.26	1.12	<.002	<.007	<.003	<.007	<.002	<.010
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	.280	.014	<.002	<.007	<.003	<.007	<.002	<.010
			405913084123399 BLANK SAMPLE					
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--

Date	*cis*-Permethrin, (µg/L) (82687)	Phorate (µg/L) (82664)	Prometon (µg/L) (04037)	Pronamide (µg/L) (82676)	Propachlor (µg/L) (04024)	Propanil (µg/L) (82679)	Propargite (µg/L) (82685)	Simazine (µg/L) (04035)
			404728083475300 GRASS CREEK NEAR ADA, OHIO					
May 15	<.006	<.011	.019	<.004	<.010	<.011	<.023	.257
			404746083492400 HOG CREEK NEAR ADA, OHIO					
May 15	<.006	<.011	e.010	<.004	<.010	<.011	<.023	.366
			404616083564200 HOG CREEK AT LAFAYETTE, OHIO					
May 15	<.006	<.011	e.012	<.004	<.010	<.011	<.023	.362

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	*cis*-Permethrin, (µg/L) (82687)	Phorate (µg/L) (82664)	Prometon (µg/L) (04037)	Pronamide (µg/L) (82676)	Propachlor (µg/L) (04024)	Propanil (µg/L) (82679)	Propargite (µg/L) (82685)	
			404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO					
May 15	<.006	<.011	.027	<.004	<.010	<.011	<.023	1.89
			404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO					
May 16	<.006	<.011	.022	<.004	<.010	<.011	<.023	1.65
			404448084034000 LOST CREEK NEAR LIMA, OHIO					
May 16	<.006	<.011	.040	<.004	<.010	<.011	<.023	1.41
			04187100 OTTAWA RIVER AT LIMA, OHIO					
May 15	<.006	<.011	.054	<.004	<.010	<.011	<.023	.035
			404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO					
May 15	<.006	<.011	.085	<.004	<.010	<.011	<.023	.044
			404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO					
May 16	<.006	<.011	.024	<.004	<.010	<.011	<.023	.768
			404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO					
May 15	<.006	<.011	.096	<.004	<.010	<.011	<.023	.547
			404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO					
May 15	<.006	<.011	.041	<.004	<.010	<.011	<.023	1.58
			404839084121400 DUG RUN NEAR ELIDA, OHIO					
May 16	<.006	<.011	.300	<.004	<.010	<.011	<.023	2.65
			404826084130400 HONEY RUN NEAR ELIDA, OHIO					
May 16	<.006	<.011	<.015	<.004	<.010	<.011	<.023	13.3
			405051084114000 OTTAWA RIVER AT GOMER, OHIO					
May 16	<.006	<.011	.054	<.004	<.010	<.011	<.023	2.46
			405048084111000 PIKE RUN AT GOMER, OHIO					
May 15	<.006	<.011	.124	<.004	<.010	<.011	<.023	.907
			405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO					
May 16	<.006	<.011	.058	<.004	<.010	<.011	<.023	2.55
			04187995 SUGAR CREEK NEAR KALIDA, OHIO					
May 15	<.006	<.011	.260	<.004	<.010	<.011	<.023	.130
			405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO					
May 16	<.006	<.011	.068	<.004	<.010	<.011	<.023	2.18
			405913084123300 PLUM CREEK AT KALIDA, OHIO					
May 15	<.006	<.011	.022	<.004	<.010	<.011	<.023	.460
			405913084123399 BLANK SAMPLE					
May 15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--		--
16	--	--	--	--	--	--	--	--

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Tebuthiuron (µg/L) (82670)	Terbacil (µg/L) (82665)	Terbufos (µg/L) (82675)	Terbuthyl-azine (µg/L) (04022)	Thio-bencarb (µg/L) (82681)	Triallate (µg/L) (82678)	Trifluralin (µg/L) (82661)
404728083475300 GRASS CREEK NEAR ADA, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404746083492400 HOG CREEK NEAR ADA, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404616083564200 HOG CREEK AT LAFAYETTE, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404602083571700 LITTLE HOG CREEK AT LAFAYETTE, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404504084030300 OTTAWA RIVER AT METZGER ROAD AT LIMA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	<.009
404448084034000 LOST CREEK NEAR LIMA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	e.006
04187100 OTTAWA RIVER AT LIMA, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404224084090500 OTTAWA RIVER AT SHAWNEE ROAD NEAR LIMA, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404221084091500 LITTLE OTTAWA RIVER NEAR LIMA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	<.009
404322084102600 OTTAWA RIVER AT STATE ROUTE 117 NEAR LIMA, OHIO							
May 15	.023	<.034	<.017	--	<.005	<.002	<.009
404808084121700 OTTAWA RIVER NEAR ELIDA, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
404839084121400 DUG RUN NEAR ELIDA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	<.009
404826084130400 HONEY RUN NEAR ELIDA, OHIO							
May 16	<.016	<.034	<.017	e.026	<.005	<.002	<.009
405051084114000 OTTAWA RIVER AT GOMER, OHIO							
May 16	e.014	<.034	<.017	--	<.005	<.002	<.009
405048084111000 PIKE RUN AT GOMER, OHIO							
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
405700084113600 OTTAWA RIVER NEAR KALIDA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	<.009
04187995 SUGAR CREEK NEAR KALIDA, OHIO							
May 15	.026	<.034	<.017	e.002	<.005	<.002	<.009
405901084124600 OTTAWA RIVER (ST. MICHAELS CEMETERY) AT KALIDA, OHIO							
May 16	<.016	<.034	<.017	--	<.005	<.002	<.009

Table A-2. Water-quality data for the Ottawa River and selected tributaries in Ohio, May 15-16, 2001 —Continued

[ft^3/s, cubic feet per second; (00061), USGS National Water Information System parameter code; mm of Hg, millimeters of mercury; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; deg C, degrees Celsius; µg/L, micrograms per liter; <, concentration or value reportedis less than that indicated; --, no data; e, estimated; IT, incremental titration.]

Date	Tebuthiuron (µg/L) (82670)	Terbacil (µg/L) (82665)	Terbufos (µg/L) (82675)	Terbuthyl-azine (µg/L) (04022)	Thio-bencarb (µg/L) (82681)	Triallate (µg/L) (82678)	Trifluralin (µg/L) (82661)
			405913084123300 PLUM CREEK AT KALIDA, OHIO				
May 15	<.016	<.034	<.017	--	<.005	<.002	<.009
			405913084123399 BLANK SAMPLE				
May 15	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--