U.S. Department of the Interior
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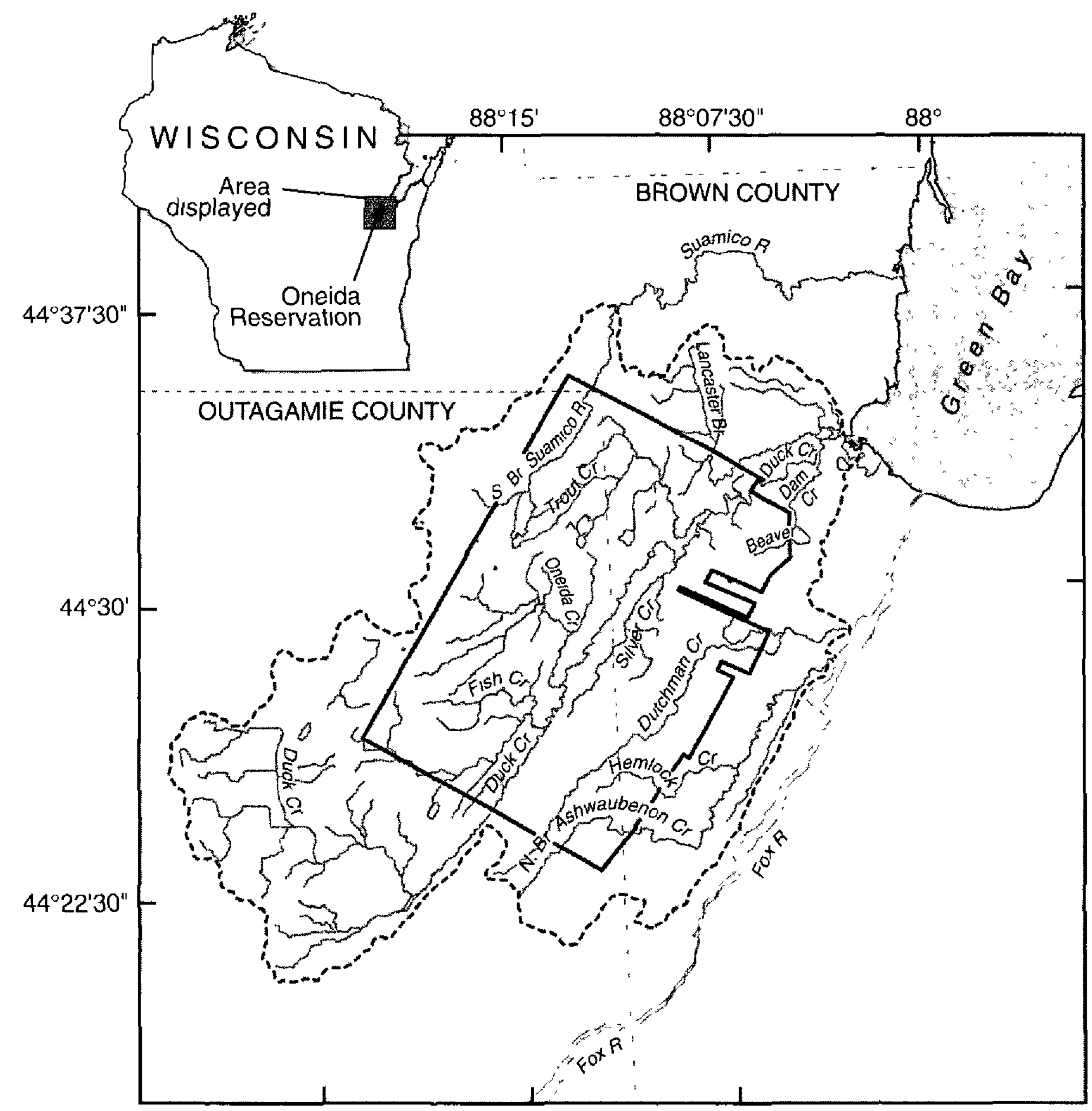
Water-Resources-Related Information for the Oneida Reservation and Vicinity, Wisconsin

Water-Resources Investigations Report 98–4266



Prepared in cooperation with the

Oneida Tribe of Indians of Wisconsin

USGS

science for a changing world

Water-Resources-Related Information for the Oneida Reservation and Vicinity, Wisconsin

By David A. Saad and Morgan A. Schmidt

U.S. GEOLOGICAL SURVEY
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Prepared in cooperation with the
ONEIDA TRIBE OF INDIANS OF WISCONSIN

Middleton, Wisconsin
1999

science for a changing world

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CONVERSION FACTORS, VERTICAL DATUM, AND MISCELLANEOUS ABBREVIATIONS

Multiply	By	To Obtain
feet (ft)	0.3048	meter (m)
square mile (mi^2)	2.59	square kilometer (km^2)
pound (lb)	453,600	milligram (mg)
gallon (gal)	3.785	liter (L)

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

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

Abbreviated water-quality units: 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 the same as for concentrations in parts per million.

Radioactivity is expressed in picocuries per liter (pCi/L). A picocurie is the amount of radioactivity that yields 2.22 radioactive disintegrations per minute.

MISCELLANEOUS ABBREVIATIONS

DATCP	Wisconsin Department of Agriculture, Trade, and Consumer Protection
DL	Detection limit
DNR	(Wisconsin) Department of Natural Resources
GLEAS	Great Lakes Environmental Assessment Score
GRN	Groundwater Retrieval Network
GIS	Geographic Information Systems
HBI	Hilsenhoff Biotic Index
IBI	Index of Biological Integrity
MCL	Maximum Contaminant Level
as N	quantified as measured nitrogen
NAWQA	National Water-Quality Assessment Program
NURE	National Uranium Resources Evaluation
PAH	Polyaromatic hydrocarbons
RASA	Regional Aquifer-System Analysis
SMCL	Secondary Maximum Contaminant Level
STAID	USGS station identification number
STORET	Storage and Retrieval System
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	Volatile organic compound
WATSTORE	Water Storage and Retrieval

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Water-Resources-Related Information for the Oneida Reservation and Vicinity, Wisconsin

By David A. Saad *and* Morgan A. Schmidt

Abstract

Water-resources information has been compiled from 82 studies in which data were collected from the Oneida Reservation and vicinity. Forty-seven studies addressed surface-water issues, 33 studies addressed ground-water issues, and 23 studies addressed aquatic-biology issues. Some multidisciplinary studies are included in more than one category.

Most of the surface-water studies summarized in this report included both water-quality and flow information. Several surface-water studies provided detailed short-term descriptions of surface-water quality and flow for parts of the Reservation and vicinity.

Surface-water and stream-sediment quality data from several data bases have been compiled for this report. Most of the compiled data come from two sites on Duck Creek. Data from Duck Creek were analyzed for trends in concentrations of suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine. No trends were detected for any of these constituents. Trends in concentration of most constituents in surface-water samples were not calculated because of the short period of data collection at nearly all of the sites.

Most of the ground-water reports that were identified included both quality and quantity and flow information. None of the ground-water studies provided a detailed description of ground-water quality for the Reservation as a whole. Several reports provide varied and detailed information for ground-water models that are useful for understanding hydrogeology and ground-water flow for the Reservation and vicinity.

Ground-water quality data from 180 wells, compiled from several data bases, provided an incomplete summary of the condition of the drinking-water resources of the Reservation. Only 12 constituents, from a small number of wells, exceeded a USEPA drinking-water limit. Most of the exceedences were for trace metals and organics. No exceedences for pesticides or nitrate were reported; however, pesticide data were collected from only a small number of wells.

Most of the aquatic biology studies described in this report include fish data, habitat data, or calculations of biotic index values, most of which comes from Duck Creek. Historical aquatic biology data for the Reservation and vicinity are limited. Most of the 23 studies described here were done since 1992. Most of the biota-quality data compiled for this report come from several sites on Duck Creek and represent a small number of samples.

Results of the community survey regarding the water resources of the Oneida Reservation indicate that water usage by Tribal members today has declined when compared to the past. The most common reason given for the decline in usage was pollution. Most of those surveyed perceived Duck Creek as being "polluted," but about 50 percent thought that water quality in the Reservation was improving.

INTRODUCTION

The Oneida Tribe of Indians of Wisconsin (Oneida Nation) is striving to restore the quality and quantity of water within the Oneida Reservation to more closely resemble pre-European settlement conditions. Information regarding past and present conditions of the water resources in the vicinity of the Reservation is needed for this effort. Water-quality, water-quantity, and aquatic-biology data collected in the vicinity of the Reservation will aid the Oneida Nation in determining their tribal water-quality standards and will also be used to help determine where the implementation of land-use-management practices and future data collection activities would provide the most benefit to the watersheds of the Reservation.

To respond to these needs, the Oneida Nation and the U.S. Geological Survey (USGS), entered into a cooperative agreement to (1) produce a retrospective summary and analysis of existing water-resources-related information and (2) collect and analyze baseline surface-water quality samples to augment historical data. This report constitutes the first item. Baseline water-quality data, the second item, are currently being collected by the USGS.

Purpose and Scope

The primary purpose of this report is to provide a summary of available information related to water resources for the Oneida Reservation and vicinity. A secondary purpose is to analyze the available data, where possible, to improve the current understanding of historical conditions and trends in selected water-resource-related characteristics. Also provided is a summary of a Tribal survey investigating past and present water-resources conditions as perceived by Tribal members.

The studies and data included in this report are based on a review of the literature and data bases that were readily available through standard literature searches and contacts with various local, state, and Federal agencies and academic institutions.

Description of Oneida Reservation and Vicinity

The Oneida Reservation encompasses about 102 mi^2 in parts of Outagamie and Brown Counties, Wis. (fig. 1). Land use/land cover within the Reservation is mainly agricultural (herbaceous/row crops) but includes some forest and urban areas (fig. 2). The population within the Reservation boundary, based on the 1990 Census, was 17,599 with most people living in the northeast part of the Reservation near the city of Green Bay. The 1998 Tribal population within the Reservation was 2,798 (Tina R. Pospychala, Oneida Nation Enrollment Office, written commun., 1998).

Four surface-water drainages, bearing numerous tributaries, are within the Oneida Reservation. Duck Creek, which includes the tributaries of Fish, Oneida, and Trout Creeks, is the principal stream and drains about 68.8 percent of the Reservation (fig. 1). Dutchman Creek drains about 19.4 percent, and the headwaters of Ashwaubenon Creek, mainly the North Branch of the Ashwaubenon Creek and Hemlock Creek, drain about 6.5 percent of the Reservation in the east. The South Branch of the Suamico River drains about 5.3 percent of the Reservation in the north.

Water use information for 1990 and 1995 are summarized in table 1 for the Duck-Pensaukee River Basin, which includes most of the Reservation (Ellefson and others, 1993 and 1997). Nearly all of the water used in the basin comes from ground water and the primary use is for domestic supplies.

The geology underlying the Reservation includes deeply buried Precambrian crystalline rock, Cambrian and Ordovician sandstones and dolomite, and unconsolidated deposits of Quaternary age (fig. 3). The unconsolidated deposits overlying bedrock in the Reservation range from sand and gravel to clay. A more detailed description of unconsolidated deposits for the Reservation and vicinity is provided by Need (1985). Where the unconsolidated deposits are sufficiently thick and permeable they comprise the sand and gravel aquifer, which supplies water to many homes in the area. The primary source of drinking water in the area is ground water from the sandstone aquifer, which is more than 500 ft thick and generally includes permeable Cambrian and Ordovician sandstones and dolomites below the Sinnipee Group (fig. 3). Most high-capacity wells in the area are open to the sandstone aquifer and are capable of producing several hundred gallons per minute.

Table 1. Water use, in million gallons per day, in the Duck-Pensaukee River Basin, Wisconsin

Year	Use category						Total	Percent ground water
	Domestic	Agriculture	Irrigation	Industrial	Commercial	Public		
1990	3.88	0.69	0.02	0.14	0.17	0.13	5.03	99
1995	3.74	0	0	.14	.39	.18	4.45	100

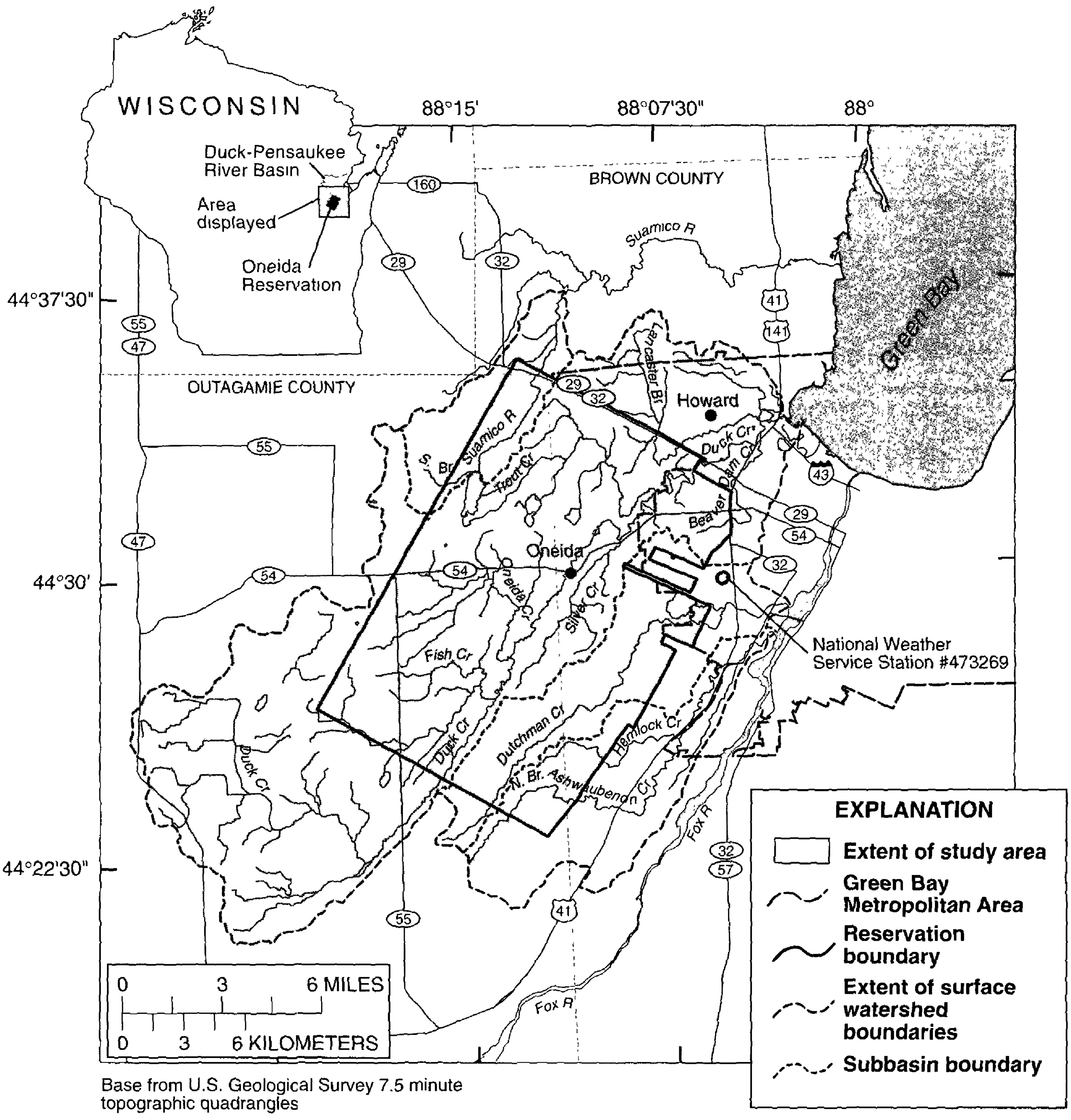
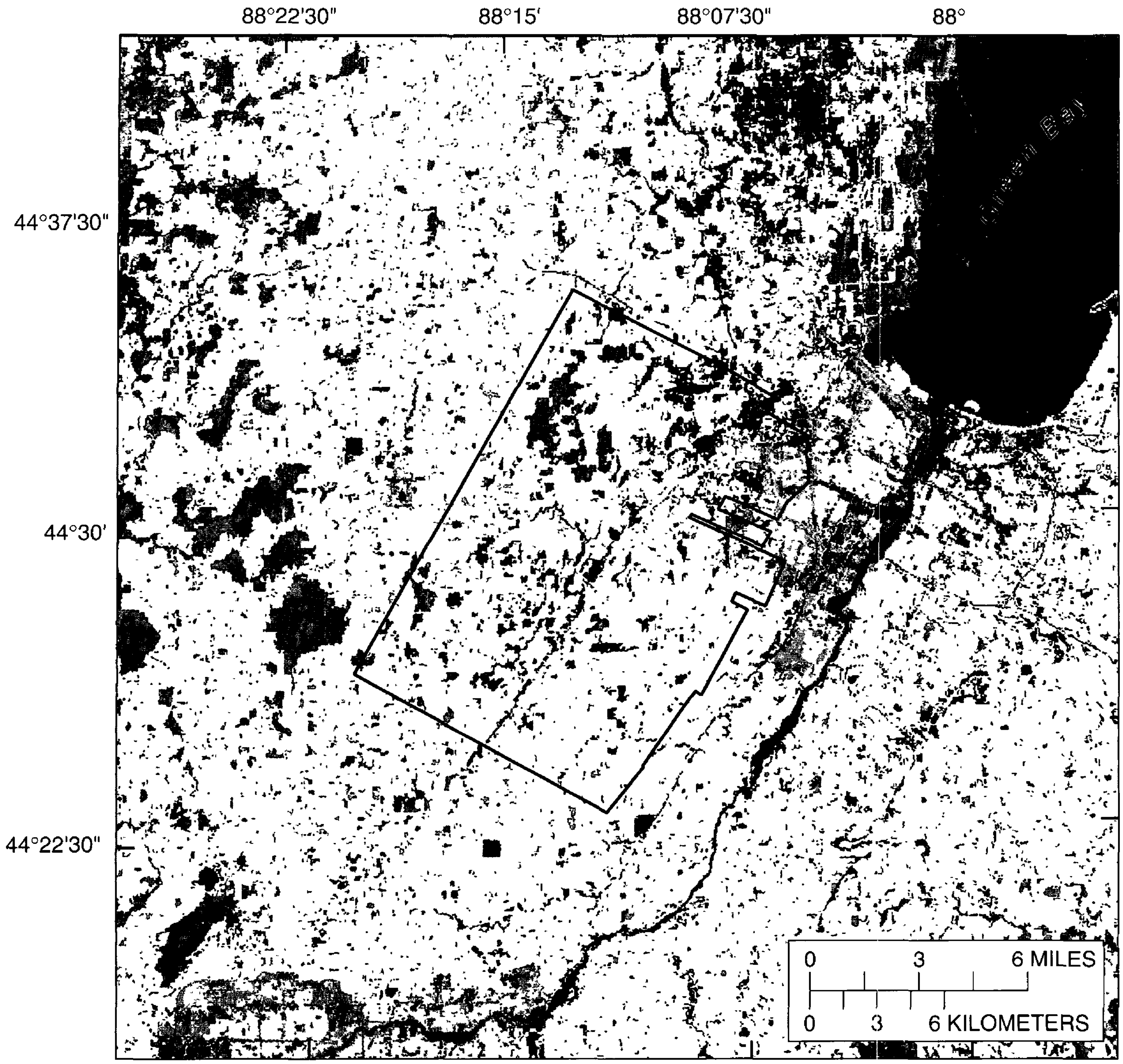


Figure 1. *Oneida Reservation and study area.*



Base from U.S. Geological Survey 7.5 minute topographic quadrangles

Modified from Wisconsin Department of Natural Resources, 1998

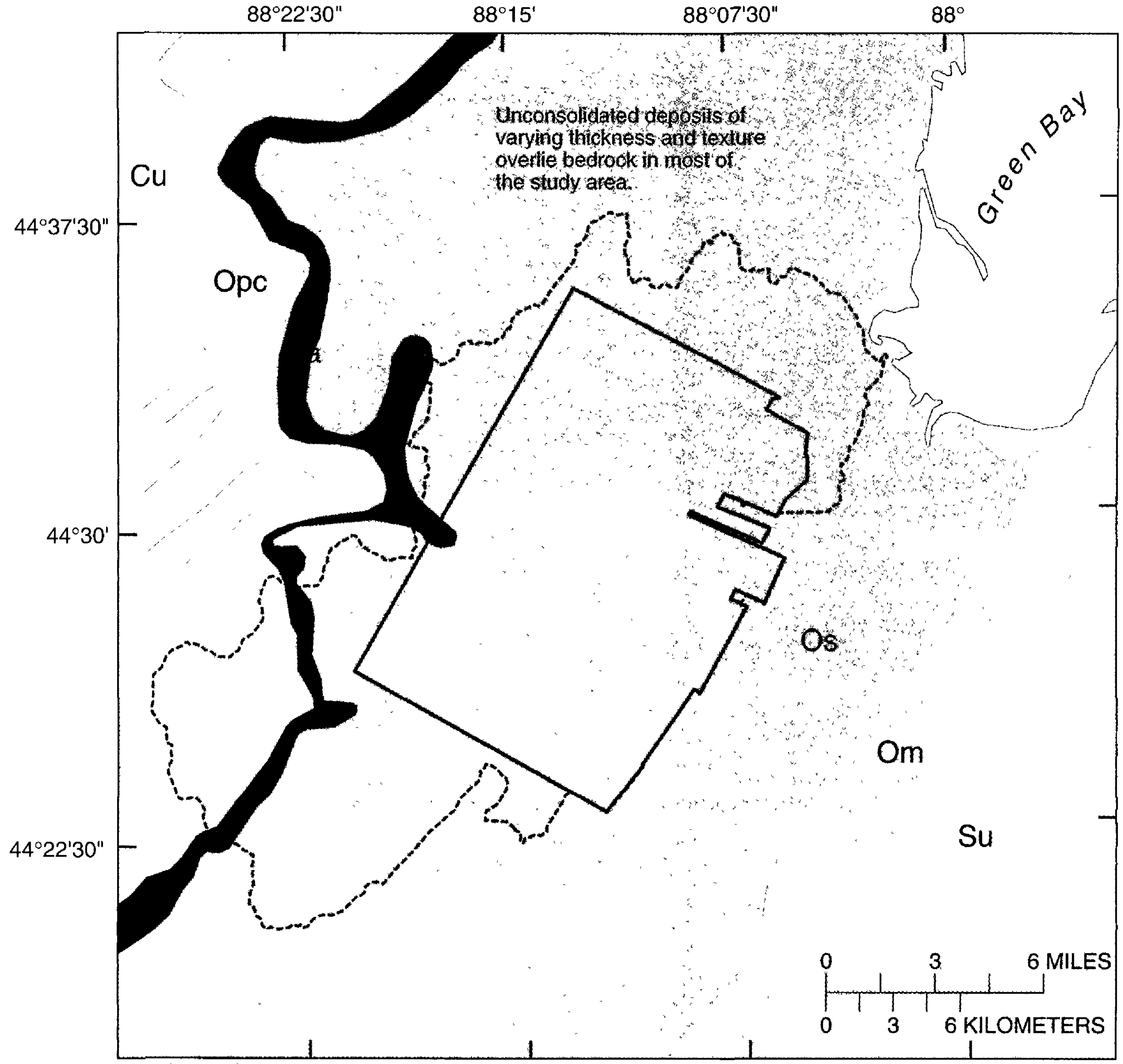
EXPLANATION

Land cover

- High intensity urban
- Low intensity urban
- Golf course
- Agriculture
- Herbaceous/Row crops
- Cranberry bog
- Grassland
- Coniferous forest
- Broad leaf deciduous forest
- Mixed deciduous/coniferous forest
- Open water
- Wetland, emergent/wet meadow
- Wetland, lowland shrub
- Wetland, forested
- Barren
- Shrubland

Reservation boundary

Figure 2. Distribution of land use/land cover for the Oneida Reservation and vicinity, Wisconsin.



Base from U.S. Geological Survey 7.5 minute topographic quadrangles

Modified from Mudrey and others, 1982

EXPLANATION

Sedimentary Rocks of Paleozoic Age

Silurian System

- Silurian undifferentiated, primarily dolomites (Su)

Ordovician System

- Maquoketa Shale, primarily shale (Om)
- Sinnipee Group, dolomite with some limestone and shale (Os)
- Ancell Group, sandstone with some limestone (Oa)
- Prairie du Chien Group, dolomite with some sandstone and shale (Opc)

Cambrian System

- Cambrian undifferentiated, sandstone with some dolomite and shale (Cu)

Reservation boundary

Extent of study area

Figure 3. Bedrock geology for the Oneida Reservation and vicinity, Wisconsin.

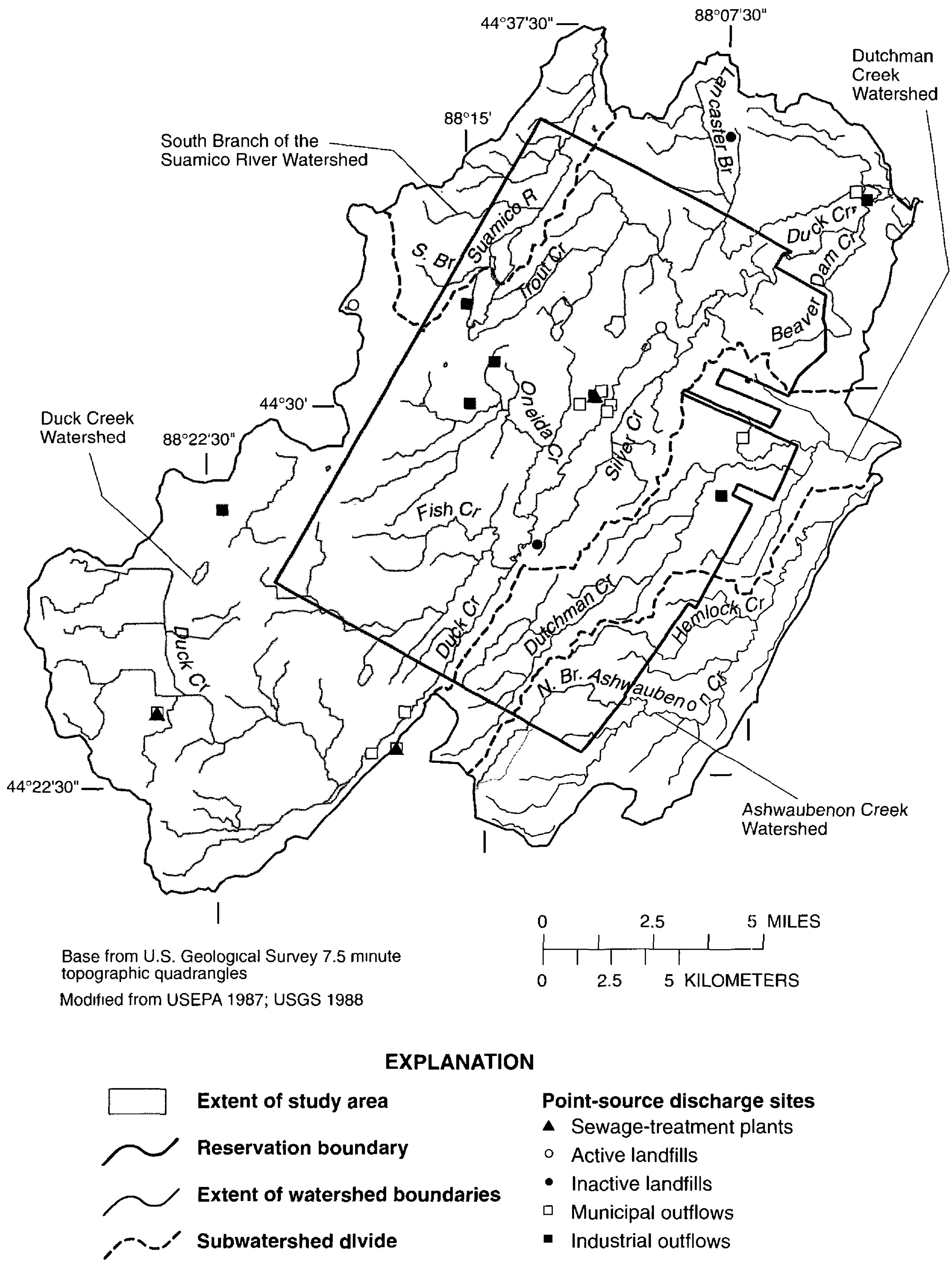


Figure 4. Point-source discharge sites located in the Oneida Reservation and vicinity, Wisconsin.

Ground-water withdrawals from the large concentration of high-capacity wells in the Green Bay metropolitan area to the east of the Reservation have resulted in declining ground-water levels in the sandstone aquifer (Krohelski, 1986).

Point-source discharge sites are a potential source of surface- and ground-water contamination for the Reservation and vicinity. These types of sites include sewage-treatment plants, landfills, and municipal and industrial outflows. Point-source discharge sites in and around the Reservation are shown in figure 4.

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WATER-RESOURCES-RELATED INFORMATION

Water-resources-related information described in this report has been divided into four categories: (1) surface-water studies, (2) ground-water studies, (3) aquatic-biology studies, and (4) additional data, which includes weather and digital thematic data. Some multidisciplinary studies are included in more than one category. Ground-water and surface-water investigations have been further separated into two categories: (1) those describing quality and (2) those describing quantity and flow. Digital thematic data coverage of the Reservation and vicinity is extensive. Only those data that are water-resources-related or could be useful for water-resources management decisions have been included in this report. Surface-water and aquatic-biology studies that are described in this report are those that include the surface-water drainages from the headwaters to the mouths of the major rivers such as Duck Creek, the South Branch of the Suamico River, Dutchman Creek, and the North Branch of Ashwaubenon Creek. Surface-water and aquatic data were compiled for the area covering the headwaters down to the mouths of Duck Creek and the South Branch of the Suamico River, and from the headwaters to the furthest extent of the Reservation boundary for the North Branch Ashwaubenon Creek and Dutchman Creek (fig. 1). Ground-water studies and data are included in this report only if a study area included part of the Reservation or if some of the data were collected within the Reservation boundary.

Surface-Water Studies and Data

Forty seven surface-water studies that addressed the Oneida Reservation and vicinity were identified (tables 2 and 3). Reports from 39 of the studies contained surface-water quality information (table 2), and reports from 28 contained quantity and flow information (table 3). Most of the studies reported both quality and quantity and flow information.

Surface-Water Quality

The surface-water-quality studies identified for this report included any investigation that contained descriptions of the physical or chemical characteristics of surface water or stream sediments. Several of the studies provided a fairly complete description of surface-water quality at specific locations on the Reservation and vicinity. Holmstrom and others (1990 through 1997), Sullivan and Richards (1996), and Richards and others (1998) give detailed descriptions of surface-water quality for the late 1980's and 1990's for two sites on Duck Creek (USGS station identification number 04072050, Duck Creek at Seminary Road, and 04072150, Duck Creek near Howard, Wis.). Descriptions of surface-water quality from the late 1970's and early 1980's is provided by Gruentzel (1979b) and Brosseau and Schaepe (1981). Surface-water quality for three sites on Duck Creek from the late 1960's was described in detail by the Northeastern Wisconsin Regional Planning Commission (1970). In general, sites on Duck Creek provided most of the data for the studies described in table 2.

Most of the studies listed in table 2 include nutrient data and field measurements. About one-third contain major ion/dissolved solids or sediment data. A smaller percentage of studies include data on pesticides, dissolved organic carbon/total organic carbon, trace elements/heavy metals, or bacteria. About two-thirds of the studies were statewide or regional, and about one-third were more localized.

Surface-water quality information for the Reservation and vicinity is included in the USGS WATSTORE (WATer STOrage and REtrieval) data base and the USEPA STORET (STOrage and RETrieval) data base. The STORET data base includes USGS and DNR data. The U.S. Department of Energy's NURE (National Uranium Resources Evaluation) data base also includes some surface-water and stream-sediment information for the study area. The DNR also has compiled a data base of field measurements (temperature, pH, specific conductance, and dissolved oxygen) for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project (Bradley Johnson, Wisconsin Department of Natural Resources, written commun., 1998). These data are not referenced in table 2.

Surface-water and stream-sediment data for the study area were compiled in an effort to provide a detailed description of surface-water quality for the watersheds of the Reservation. This summary includes only WATSTORE and DNR data, which were obtained from the STORET data base. The USGS data contained in STORET are the same data as in WATSTORE. Other data exist but were not included because they were not in digital form that could be easily compiled.

Data were compiled for 53 surface-water sites in the study area (fig. 5). The data includes more than 16,000 measurements, representing 400 surface-water and stream-sediment properties and constituents, and were collected between October 1970 and May 1997. Most of the data (nearly 80 percent) are from two sites on Duck Creek (04072050, Duck Creek at Seminary Road; and 04072150, Duck Creek near Howard). Many of the compiled properties and constituents were from a small number of sites that were sampled only a few times and therefore were not representative of the entire study area.

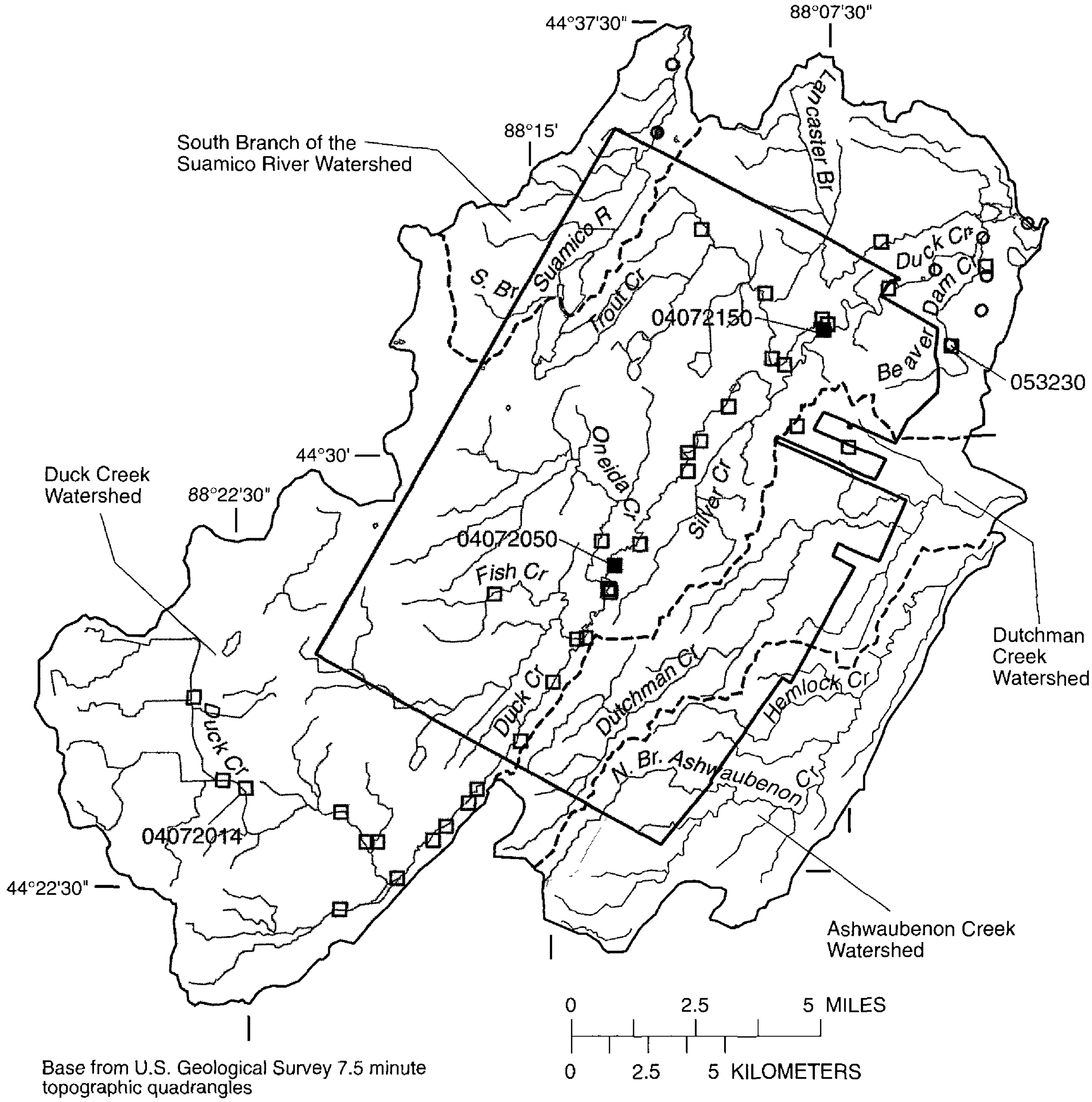
About 365 of the compiled measurements are surface-water and stream-sediment-quality characteristics that include major ions, nutrients, organics, radionuclides, trace metals, and field measurements and are summarized in table 4. Selected streambed-sediment data (mainly trace elements and synthetic organic compounds) summarized in table 4 are treated in more detail by Scudder and others (1997).

Surface sources are not used for drinking water in the study area, but drinking-water standards can nevertheless be used as reference points for understanding water quality of local streams. Most of the constituents listed in table 4 represent surface-water quality, as opposed to sediment quality. Only four of the surface-water quality constituents exceeded a Maximum Contaminant Level (MCL) for drinking water set by the USEPA: alachlor, atrazine, simazine, and nitrite plus nitrate. Of the 53 sites in the study area, exceedences were noted only at four, three of which were on Duck Creek (04072050, 04072150, and 04072014, Duck Creek at Highway EE) and one that was on Beaver Dam Creek (053230, Beaver Dam Creek at Taylor Street).

One purpose of this report was to evaluate, where possible, trends in water-quality data. Is stream-water quality in the Reservation getting better or worse? This question can be answered only if sufficient data for a particular constituent have been collected regularly over time from the streams in the Reservation. Most of the sites (29 of 53) were sampled only once. Only 9 of 53 sites were sampled for 2 years or longer. The stream with the most data and longest period of record was Duck Creek. Trend analysis was performed on water-quality data from Duck Creek. Data from two nearby sites (04072050 and 04072150) were combined to create of period of record from 1989 to 1998 (fig. 6). (Data from site 04072050 were collected from 1993 to 1995 and fill in the gap from site 04072150, when water-quality data were not collected.) Combining the data from these sites is feasible because their corresponding watersheds were similar in size and trend analysis was limited to concentration data, not loads.

Trend analyses were performed on streamflow and three constituents measured at the two sites on Duck Creek: suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine. Dissolved nitrite plus nitrate data spans the entire period of record (1989 to 1998), suspended sediment data were first collected in 1990, and atrazine data were first collected in 1993. Initially, linear regressions were used to test for trends in concentrations over time using a 95 percent confidence level (Iman and Conover, 1983, p. 374). Over the period of record, no significant trends in streamflow, concentration of suspended sediment, dissolved nitrite plus nitrate, or dissolved atrazine were detected.

For the analyses described above, all available streamflow and concentration data were used. This



EXPLANATION

- Extent of study area
- Reservation boundary
- Extent of watershed boundaries
- Subwatershed divide

Surface Water Sampling Sites

- □ U. S. Geological Survey (with site ID number)
- o Wisconsin Department of Natural Resources (with site ID number)

Biological Sampling Sites

- ■ U. S. Geological Survey (with site ID number)
- ○ Wisconsin Department of Natural Resources

Figure 5. Locations of selected surface-water and biological sampling sites in the Oneida Reservation and vicinity, Wisconsin.

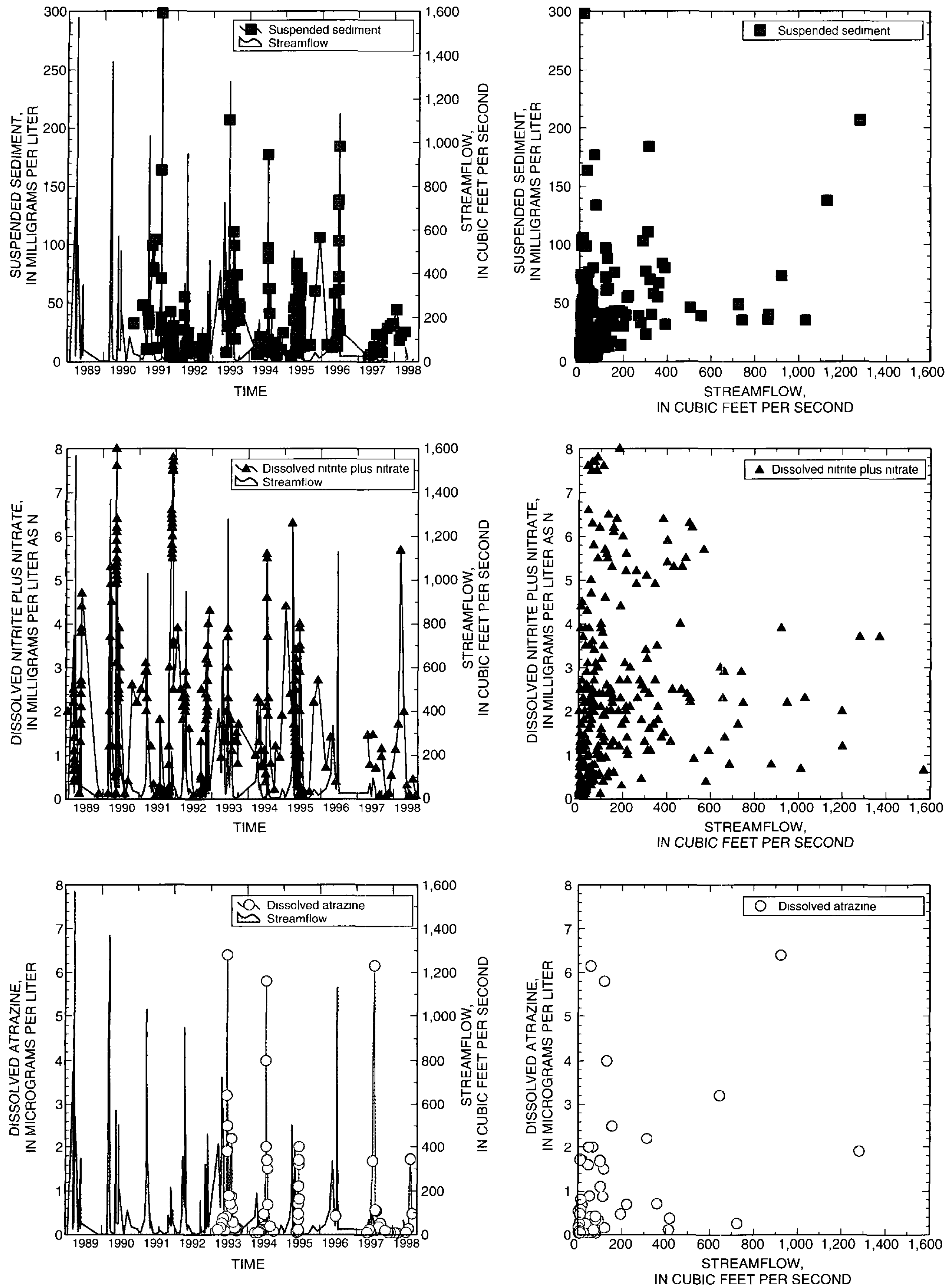


Figure 6. Concentrations of suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine in relation to time and streamflow for Duck Creek (combined data from 04072050 and 04072150) within the Oneida Reservation, Wisconsin.

included many samples collected during rising and falling stream stage for numerous storms. Although a relation was apparent between discharge and the concentration of a constituent for individual storms, this relation was variable from storm to storm (fig. 6). There was no consistent concentration/streamflow relation that fit all of the data for a constituent (fig. 6); therefore, concentration data were not flow adjusted. In an effort to remove the bias of numerous storm samples however, a subset of the streamflow and concentration data was created. Only the first sample of each month was included in this analysis. Again, regression analysis showed no significant trends in concentration over the period of record for any of the constituents. A slight downward trend was seen in streamflow based on the monthly subset, but this was still not significant at the 95-percent confidence level (p=0.053).

Some of the highest concentrations of suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine occur during storm events (fig. 6). Atrazine concentrations were highest in samples collected during late-spring and early-summer storm events following application (Sullivan and Richards, 1996) and indicates a seasonal bias in some of the data. In order to account for this seasonal bias, a Seasonal Kendall test for trend was applied to the three constituents (Hirsch and Slack, 1984). This nonparametric test uses ranked data to measure trends for each season and then combines seasonal results to determine the overall trend (or lack of trend) in the data. For the Duck Creek data, seasons were set at monthly and quarterly intervals, that is, 12 and four seasons per year, respectively. Results of these analyses indicated no detectable trends in concentrations of suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine.

In order to test for trends at other sites in the study area, or for other constituents of concern, data would need to be collected on a regular basis (for example monthly or quarterly) over a period longer than several years. Currently, only Duck Creek provides this kind of data set for a few constituents.

Surface-Water Quantity and Flow

Twenty-eight studies that addressed surface-water quantity or flow data for the Reservation and vicinity were identified (table 3). Most of the studies reported streamflow and extreme-flow data, and most of the extreme-flow data focused on low-flow conditions. Fourteen studies describe low-flow conditions on the Reservation and vicinity for as far back as 1960. Many of these studies indicate that most of the Duck and Dutchman's Creek Basins become dry during extended periods of no precipitation. Only three studies provided hydrologic budget information. Eight studies provided runoff calculations or included a modeling component. Most of the runoff calculations were estimates of low flow, and the modeling-studies generally focused on floods.

Most of the studies described in table 3 were regional or local. Several of the regional studies (Oakes and Hamilton, 1973; Olcott, 1968) provide generalized hydrologic budgets for the Reservation and vicinity. None of the studies provide a long-term continuous record of flow for any of the basins draining the Reservation. The longest record of continuous streamflow data (1989 to present) is provided by Holmstrom and others (1990 through 1997) for Duck Creek near Howard (04072150). Most of the other studies provide short-term records (1 or 2 years), single measurements, or estimates of streamflow. All of the USGS streamflow data is included in the WATSTORE data base and real-time streamflow data for Duck Creek near Howard can be found on the World Wide Web at http://wi.water.usgs.gov/index.html.

Ground-Water Studies and Data

Thirty-three ground-water studies that addressed the Oneida Reservation and vicinity were identified (tables 5 and 6). Reports from 24 of the studies contained ground-water quality information (table 5) and reports from 24 contained ground-water-quantity and flow information (table 6). Most of the studies reported both quality and quantity and flow information.

Ground-Water Quality

Ground-water-quality studies identified for this report included any investigation that described the physical or chemical characteristics of ground water. In general, the studies listed in table 5 include few wells from the Reservation and vicinity, and none provide a thorough description of the local ground-water quality. Most of the studies included major ion or dissolved solids data, and about one-third included field measurements or nutrient data. Several studies included pesticide, trace element, or radionuclide data. One study included volatile organic compound (VOC) data, and another included data for bacteria. Most of the studies were statewide or regional; only one or two were considered local (Finney and others, 1997; Roesler, 1986). Most of the water-quality studies were relatively recent (1984 or later). Several studies from the 1950's and 1960's were identified, but the reports typically contained information for field measurement and major ions only.

Ground-water quality information is also archived in several statewide data bases. The WATSTORE data base, the DNR GRN (Groundwater Retrieval Network) data base, the STORET data base, a data base maintained by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), and the NURE data base all include ground-water quality information for water samples collected from the Reservation and vicinity.

In an effort to document ground-water quality for the Reservation, information from the GRN, STORET, and NURE data bases was compiled. The STORET and WATSTORE data bases contained the same ground-water data. The STORET data base was used because the data were formatted comparably to the other data bases and therefore were easier to compile. Information from the DATCP data base was already part of the GRN data base.

Ground-water-quality data were obtained from a total of 308 wells or springs within the Reservation (fig. 7). Data from most of the sites (254 of 308) were stored in the GRN data base. STORET contained data for 31 USGS sites, and the NURE data base included information for 23 sites. A total of about 340 properties and constituents, in samples collected between September 1959 and March 1998, were included in the compiled data base.

The compiled ground-water-quality data for the Reservation are primarily from drinking-water wells and wells used for monitoring. Many of the monitoring wells are in landfills and other places where contamination is possible, so they do not necessarily represent the quality of ground water used for drinking. Of the 308 wells, 180 are used for drinking water (fig. 7); values for 314 ground-water properties and constituents from the drinking-water wells within the Reservation are summarized in table 7. The summarized data include major ions, nutrients, organics, radionuclides, trace metals, and field measurements. The distribution of drinking-water wells with water-quality data covers much of the Reservation (fig. 7); however, many of the constituents listed in table 7 were determined for samples from only a few wells, and the data probably are not representative of the entire Reservation. Moreover, the number of samples for each constituent listed in table 7 may represent more than one sample collected at a single well.

For some of the constituents listed in table 7, MCL's for drinking water have been set by the USEPA. In addition to MCL's, Secondary Maximum Contaminant Levels (SMCL's) and Proposed Maximum Contaminant Levels (PMCL's) have been developed for some constituents. MCL's and PMCL's are human health based drinking-water standards. SMCL's are for constituents that can affect the esthetic qualities of drinking water. Twelve of the constituents listed in table 7 equaled or exceeded an MCL or PMCL in at least one sample. Those constituents include arsenic, beryllium, thallium, nickel, benzo[*a*]pyrene, dichloromethane, pentachlorophenol, vinyl chloride, PCB-1242, hexachlorobenzene, radon, and nitrate plus nitrite. Most of the constituents that exceeded an MCL were found at high concentrations in three wells or fewer. Constituents that exceeded an SMCL include dissolved solids, chloride, sulfate, copper, iron, manganese, zinc, and aluminum.

Even though much of the land use within the Reservation is agriculture, MCL's for pesticides and nitrite plus nitrate were not exceeded at any drinking-water wells sampled in the Reservation. The maximum nitrite plus nitrate concentration was 10 mg/L, just at the MCL. The absence of exceedences, and even detections, for pesticides is likely due to the small number of ground-water samples analyzed for pesticides. Some of the most commonly used pesticides in the vicinity of the Reservation are alachlor, atrazine, cyanazine, dicamba, metolachlor, and pendimethaline (Wisconsin Agricultural Statistics Service, 1997); however, concentrations of these constituents were measured in water samples from only one drinking-water well within the Reservation.

To answer the question "Is drinking-water quality in the Reservation getting better or worse?" sufficient data for constituents of concern need to be collected over time at drinking-water supply wells throughout the Reservation. For most of the constituents listed in table 7 that are of drinking-water concern, samples were collected only a few times and typically over a period of a few years or less. One constituent that is a concern in drinking water, and was analyzed in samples collected from wells throughout the Reservation over a relatively long period of time, is dissolved nitrite plus nitrate. This constituent was measured in 80 samples collected from

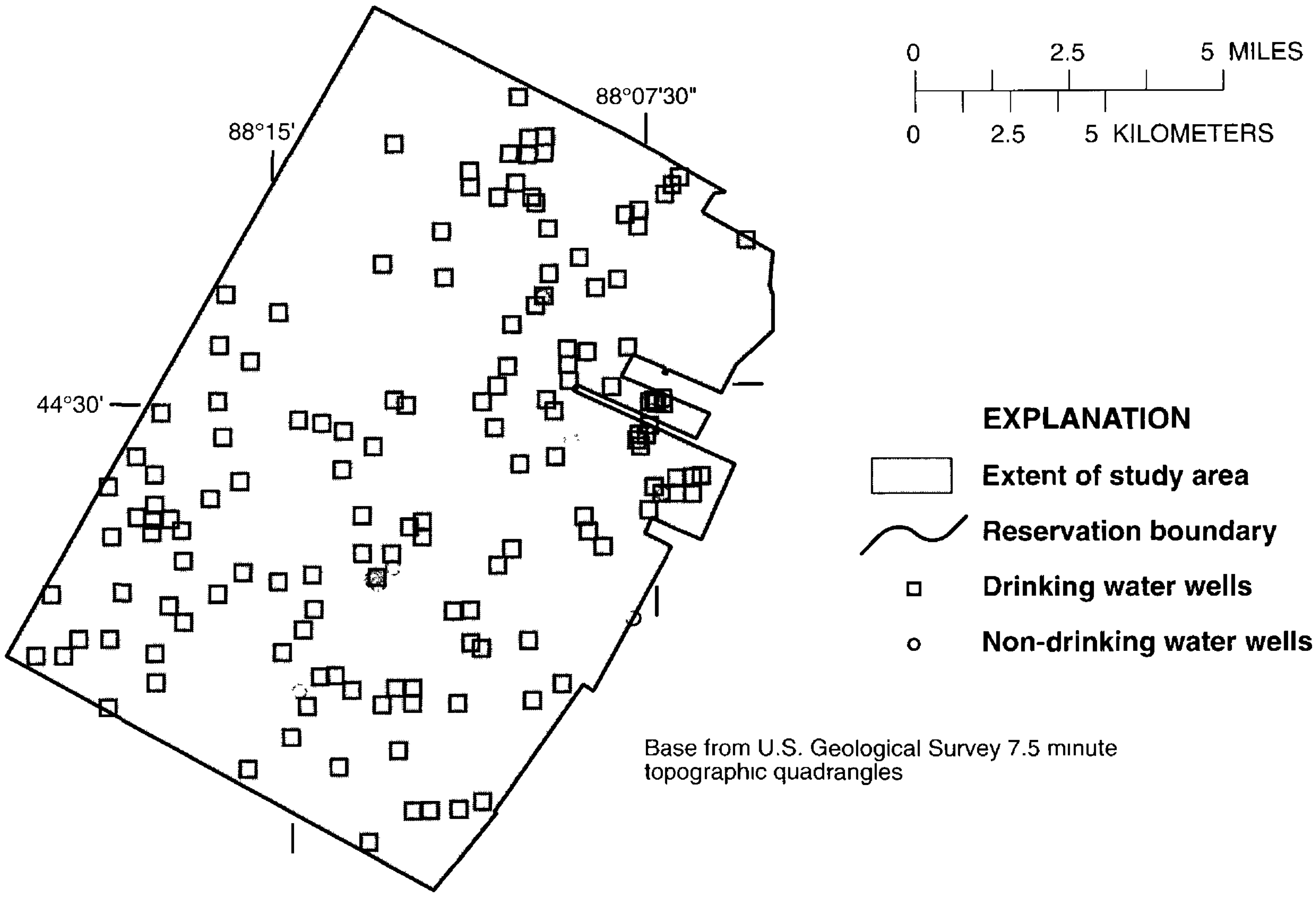


Figure 7. Locations of water wells within the Oneida Reservation, Wisconsin, for which water-quality data are available.

drinking-water wells within the Reservation between 1981 and 1990.

Initially, linear regression was used to test whether a significant trend in concentration of dissolved nitrite plus nitrate occurred over time using a 95-percent confidence level. Over the period, there was no significant trend in the concentration. A seasonal Kendall test for trend also was applied to the data. For the dissolved nitrite plus nitrate data, seasons were set at monthly and quarterly intervals; that is, 12 and four seasons per year, respectively. Results of this analysis also indicate no detectable trend in concentrations. Finally, data were grouped by year and tested for statistical differences using the nonparametric Kruskal-Wallis test (Iman and Conover, 1983, p. 418). The Tukey studentized range test (Neter and others, 1985) was then used to identify which years from the Kruskal-Wallis test were similar at the 95-percent confidence level. The nonparametric test was used because the number of samples by year was typically small. Results of statistical tests show that dissolved nitrite plus nitrate concentrations were significantly different only for the year 1981. Data from other years were not significantly different from each other.

On the basis of these results, no significant trend is apparent for dissolved nitrite plus nitrate concentrations in drinking water in the Reservation. Future tests for trends in ground-water quality would be aided by a more complete data base, spanning a longer period, for constituents of concern in drinking water on the Reservation. Establishing a long-term ground-water monitoring network within the Reservation would be one way of obtaining this information.

Ground-Water Quantity and Flow

Twenty-four ground-water studies that included quantity and flow information for the Reservation and vicinity were identified (table 6). All of the studies included geologic information, and most included information about aquifer characteristics. About half of the studies included recharge/discharge and water-use information. About half of the studies also included a ground-water modeling component.

Most of the studies were regional in scope and provide only general information for the Reservation and vicinity. Several of the studies were countywide or more localized and provide fairly detailed information. Feinstein (1986) and Krohelski (1986), in particular, provide a wide variety of detailed information and ground-water models that are useful for understanding ground-water quantity and flow for the Reservation and vicinity. Additionally, Olcott (1992) provides an informative regional summary of ground-water movement and aquifer characteristics. Several of the studies identified from the 1950's and 1960's also provide historical water-level and water-use information.

Aquatic-Biology Studies and Data

Reports from 23 studies containing aquatic-biology data for the Reservation and vicinity are listed in table 8. Most of the reports include fish data, habitat data, or biotic index values. Many of the reports also contain invertebrate or algae/macrophyte data, and several compare aquatic-biology data to water-chemistry data. Most of the studies were local, primarily from the Duck Creek Basin. Historical aquatic-biology data for the Reservation and vicinity are limited. Most of the studies described in table 8 were done since 1992. The few studies done prior to that collected primarily invertebrate data. One of the reports described in table 8 is a regional summary of biological investigations relating to water quality in the Western Lake Michigan Drainages (Scudder and others, 1996). This summary contains many additional statewide or regional aquatic-biology study references that may provide some general information for the Reservation and vicinity.

Most of the biotic information available for the Oneida Reservation focuses on aquatic macroinvertebrates. Many of the studies included biotic-index calculations based on benthic invertebrates collected from streams. Studies of benthic invertebrates have been done on several streams within the Reservation. One site, the South Branch of the Suamico River (fig. 5), was sampled in 1993 for benthic invertebrate communities by the Wisconsin DNR. Analyses were completed at the University of Wisconsin-Stevens Point, where the DNR benthic invertebrate data base also is maintained (Szczytko, 1989). An HBI (Hilsenhoff Biotic Integrity) score of 7.31, indicating "fairly poor" water quality, was calculated for the South Branch of the Suamico River (Lenz, 1997). Duck Creek was included in a program in which aquatic macroinvertebrate sampling methods used by three agencies (USGS, DNR, and U.S. Department of Agriculture-Forest Service) were compared. HBI values for Duck Creek for the three agencies ranged from 5.10 to 5.61, straddling the "good" and "fair" water-quality categories (Lenz and Miller, 1996). The same site on Duck Creek was also sampled as part of the National Water-Quality Assessment (NAWQA) program during 1993–97 (Barbara C. Scudder, USGS, oral commun., 1998). USGS aquatic-biology data are included in the WATSTORE data base.

Several reports describe algal communities within the Oneida Reservation, although few of the reports contain significant detail. Algae was sampled in Duck Creek at Seminary Road (station 04072050) as part of the USGS NAWQA program during 1993–97. Laboratory results from field sampling are currently being interpreted.

Nearly a dozen reports discuss fish communities in Reservation waters, including several reports from the U.S. Fish and Wildlife Service, the USGS NAWQA program, the Oneida Tribe and affiliated agencies, and various other entities. Reports span the late 1970's through the late 1990's although most have been written since 1992. Fish community sampling took place three times, once each year during 1993–95, as part of the NAWQA program at Duck Creek at Seminary Road (station 04072050). Details of the NAWQA fish surveys are explained in Sullivan (1997). Common species collected included creek chub (*Semotilus atromaculatus*) and johnny darter (*Etheostoma nigrum*). No coldwater species were found in the sampled reaches of Duck Creek. The Index of Biological Integrity (IBI, for warmwater streams in Wisconsin) was calculated for each year. IBI scores of "good" were calculated for 1993–94, and an IBI value of "fair" was determined for the Duck Creek site in 1995.

Habitat data for streams in the Oneida Reservation are limited. Several reports discuss habitat; however, only one report contains considerable detail for one site (Duck Creek at Seminary Road, station 04072050) within the Reservation. The habitat-surveying process was done as part of the USGS NAWQA program, with the results detailed in Fitzpatrick and Giddings (1997). Stream-habitat characteristics were surveyed once a year for the time period 1993–95. The habitat survey collected data on many characteristics including soil permeability, streambed-sediment size, and type and density of streambank vegetation. Soil permeability and stream gradient in the Duck Creek basin are low. Water levels are shallow, and bed-sediment size ranges from sand- to cobble-size particles. Streambank vegetation is unstable. Vegetation density is low, but many large trees provide a closed canopy to shade the stream. The 12 tree species noted in the survey provide 96 percent of the stream cover; the most common tree species is the box-elder (*Acer negundo*). The water-surface gradient is high enough to indicate that the stream has sufficient energy to erode streambanks. Two different habitat evaluation indexes were used to assess habitat quality. The Great Lakes Environmental Assessment Score (GLEAS) for the Duck Creek site indicated "fair" conditions, whereas the DNR assessment indicated that stream habitat conditions were "poor." A description of both habitat indexes is provided by Fitzpatrick and Giddings (1997).

Data on trace elements and organic chemicals in biota were collected from Duck Creek at Seminary Road (station 04072050, fig. 5) as part of the USGS NAWQA study. The data consist primarily of trace metals and synthetic organic compounds collected between 1992 and 1995. Biota collected as part of this study included caddisfly larvae, rock bass, and white suckers. Trace metals found in the highest concentrations in biota at this site were aluminum (maximum = 1,350 μg/g dry weight), iron (maximum = 2,430 μg/g dry weight), and manganese (maximum = 3,410 μg/g dry weight). The only synthetic organic compounds found in biota collected from the site include *p,p'*-DDE (maximum = 5.1 μg/kg wet weight) and PCB (maximum = 50 μg/kg wet weight). The biota-quality data collected from this site are described in detail by Scudder and others (1997).

Additional Data

Additional data that may be useful for understanding and evaluating the water resources of the Oneida Reservation and vicinity include weather data and digital thematic data.

Weather data are collected by the National Weather Service (station 473269) in Ashwaubenon, Wis., east of the Reservation (fig. 1). Data collected at the station include temperature and precipitation. Historical information from the station dates back to 1896. The average annual temperature for the station is about 53°F and the average annual precipitation is about 29 in. Current and historical data from this station are available through the National Weather Service Green Bay home page on the World Wide Web at http://www.crh.noaa.gov/grb/.

Digital thematic data, also called Geographic Information Systems (GIS) spatial coverages, contain important information for understanding the effects of natural and human factors on water resources, as well as provide the ability to model, analyze, and display thematic information. GIS coverages are available at many scales, from cities to nations. Quality of data also can vary from coarse data to very detailed, point-specific data. Many GIS coverages are available to the general public at no cost; however, others may be available for a fee or even may be restricted to a specific set of users. GIS themes include infrastructure (such as roads, railroads, sewerlines, and municipal boundaries), environmental data (such as geology, surficial deposits, land use, and pollution point sources), and many other types of information. GIS coverages are available from a variety of sources including the Wisconsin DNR, USGS, USEPA, county Land Conservation Districts, universities, municipal governments, and other county and Federal governmental agencies. The GIS coverages listed in table 9 detail some of the coverages available from the DNR as listed in Laedlein (1993). The DNR charges a fee for its data; however, some of the same coverages are available elsewhere for free, commonly over the Internet. The USGS Web site with downloadable GIS coverages related to water resources is http://water.usgs.gov/public/GIS/. Software such as ARC/INFO (Environmental Systems Research Institute, 1992), as well as hardware and instruction in the use of such software is needed to manipulate GIS coverages.

SUMMARY OF RESPONSES TO QUESTIONNAIRE ON WATER-RESOURCES ISSUES

During 1997, the Oneida Nation Environmental Health and Safety Department surveyed Oneida tribal members to gain input on Oneida Nation water-resources issues. The goal of the survey was to assess how the tribal community believes that the water resources of the Reservation should be managed. The focus of the survey was on surface waters within the Reservation; however, several questions related to the Lower Fox River and Green Bay. In all, 206 people participated in the survey, and they provided a fairly representative cross section of tribal members. Most of the surveys were done by way of an interview, which allowed the interviewer to confirm that the respondents were tribal members.

The survey was organized into four parts: (1) tribal water uses, (2) water quality and management, (3) outdoor activities, and (4) anecdotal questions about past and present perceptions of the water resources of the Reservation. The individual questions and a summary of answers for each part of the questionnaire follow. Note that some people did not provide a response to every question in the survey. Therefore, the number of responses to a question may not equal 206.

Part 1: Tribal Water Uses

1. **How do you use waters of the Reservation today (1997)? in the past?**

   Respondents were given a list of 20 water-use categories to choose from including: swimming, wading, fishing, trapping, boating/canoeing, hunting, collecting plants, gathering materials, cultural practices, ceremonial activities, picnicking, photography, esthetics (sightseeing), drinking water, hiking, camping, birdwatching, pumping for irrigation, livestock watering, and other. The most common responses to use of waters today were for esthetics (sightseeing), fishing, and ceremonial purposes. The most common responses to uses in the past were swimming, fishing, esthetics, and hunting. More respondents reported to have used waters more in the past than today for every use category.

2. **Oneida water-quality standards designate several Tribal water uses. How important is each designated water use to you?**

   Respondents were given a list of 9 water uses and asked to determine the importance of each on a scale of 1 to 5 (1=little importance, 5=very important). Below is a list of the water uses and the number of people that ranked the use as medium to very important (scale values of 3, 4, or 5).

Public water supply	191 of 197 respondents
Wildlife	189 of 196 respondents
Aquatic life	181 of 191 respondents
Subsistence fishing	164 of 190 respondents
Cultural	174 of 192 respondents
Recreation	176 of 191 respondents
Agricultural	167 of 193 respondents
Navigation	132 of 187 respondents
Industrial	105 of 185 respondents

3. **Has the way you use waters of the Reservation changed over time (Yes or No)? If you answered "Yes", why have your water uses changed and when did your water uses change?**

   Sixty-two percent (114 of 184) of the respondents to this question said that their water use has changed and the most common reason was pollution. Responses as to when their water uses changed ranged from 1925 to 1996.

Part 2: Water Quality and Management

1. **Which of the following do you feel are the greatest threats to the quality and integrity of waters of the Reservation? Rank them on a scale of 1 to 5 (1=little threat, 5=great threat).**

   - **Agricultural runoff (nonpoint sources of pollution)**
   - **Urban runoff (nonpoint sources of pollution)**
   - **Point discharges-directly to waters**
   - **Fox River/Green Bay**
   - **Suburban development**
   - **Tribal development**
   - **Wetlands destruction**
   - **Landfills and dumps**
   - **Quarries**
   - **Golf courses**
   - **Greenhouses**
   - **Acid rain**
   - **Land spreading of sludge**
   - **Exotic species, for example, carp or purple loosestrife**
   - **Fish stocking**
   - **Stream rerouting**
   - **Sewage-treatment plants**
   - **Flooding**
   - **Septic systems**
   - **Erosion**

   Point discharges directly to waters was the most commonly identified "great threat" to the quality and integrity of waters of the Reservation (122 of 173 respondents). Some of the other commonly identified "great threats" include landfills and dumps (120 of 173), land spreading of sludge (108 of 173), and Fox River/Green Bay (107 of 173).

2. **At this time do you feel the waters of the Reservation are improving in quality or declining?**

   Of the 161 responses to this question, 80 thought that water quality was improving whereas 81 thought that water quality was declining in the waters of the Reservation.

3. **Which of the following best describes Duck Creek water quality? Pick one: pristine water, good water quality, average water quality, polluted water, severely polluted water.**

   None of the respondents answered that Duck Creek water quality was "pristine" and only two said that it had "good water quality." Thirty-one respondents thought Duck Creek has "average water quality," whereas most respondents thought Duck Creek has "polluted water" (91) or "severely polluted water" (56).

4. **Do you think that the Tribe should spend additional money to improve water quality within the Reservation?**

   Response to this question was overwhelmingly "yes." Most (172 of 181) respondents thought that the Tribe should spend additional money to improve water quality within the Reservation.

5. **Are you satisfied with the way water resources are managed within the Reservation?**

   Of the 140 people responding to this question, 70 answered "yes" and 70 answered "no."

6. **Do you favor the development of the GBMSD (Green Bay's sewer district) within the Reservation, or should the Tribe construct additional sewage-treatment facilities that discharge to waters of the Reservation?**

   Of the 181 people that responded to the question, 54 percent thought that the Tribe should construct additional sewage treatment facilities compared to 34 percent that favored development by GBMSD.

Part 3. Outdoor Activities

1. **Do you fish? If you answered "yes," do you fish the waters of the Reservation? Do you fish the Fox River or Green Bay?**

   Most respondents (96 of 173) reported that they fish. Fifty-eight people reported that they do fish the waters of the Reservation, and 40 said they fished the Fox River or Green Bay.

2. **Do you eat fish?**

   Of the 169 responses to this question, 134 were "yes" and 35 were "no."

3. **Do you eat fish caught from waters of the Reservation?**

   Of the 130 people who responded to this question, only 58 said that they eat fish caught from waters of the Reservation. Comparison to question 2 indicates that even though many respondents do eat fish, most do not eat fish from the waters of the Reservation.

4. **Do you eat fish caught from Duck Creek?**

   Only 18 respondents said "yes" to this question.

5. **How often do you consume fish from waters of the Reservation (daily, weekly, monthly, twice per year, once per year, never)?**

   Most (79 of 124) of the respondents to this question said that they never consume fish from waters of the Reservation. Thirteen respondents indicated once per year, 17 said twice per year, 9 said monthly, and 6 said weekly. None of the respondents indicated that they consume fish from waters of the Reservation on a daily basis.

6. **What types/species of fish do you eat from Reservation waters?**

   The most common responses to this question were various sunfish species, yellow perch, white suckers, pike, bass, and walleye.

7. **Do you eat fish caught from the Fox River or Green Bay?**

   A small percentage (28 of 154) of respondents indicated that they do eat fish caught from the Fox River or Green Bay.

8. **How often do you consume fish caught from the Bay or Fox River?**

   Only a few of the 100 respondents to the question indicated that they consume fish from the Bay or Fox River on a daily (1 respondent) or weekly (3 respondents) basis. Eleven people said that they consume monthly, whereas 13 indicated consumption twice per year and 4 indicated consumption once per year. Sixty-eight respondents said that they never consume fish caught from the Bay or Fox River.

9. **What types of Great Lakes fish do you eat?**

   Seventy-nine people responded to this question, the most common answers being yellow perch, trout, walleye, salmon, pike, and smelt.

10. **Are you aware of fish consumption advisories for Fox River/Green Bay fish?**

Most (110 of 166) people reported that they were aware of the advisories.

11. **Do you hunt waterfowl (ducks and geese)?**

Twenty-one respondents said "yes" they hunt waterfowl, 146 said "no."

12. **Do you hunt waterfowl on waters of the Reservation?**

About 12 percent (16 of 133) of respondents said they hunt waterfowl on waters of the Reservation.

13. **Do you eat waterfowl from Reservation waters?**

Of the 155 responses to this question, 23 answered "yes" and 132 answered "no."

14. **Are you aware of consumption advisories for Green Bay waterfowl?**

Of the 159 respondents to this question, only 42 were aware of the consumption advisories.

15. **Do you trap furbearers from Reservation waters?**

Only 3 of 168 respondents answered "yes."

16. **Do you collect turtles from Reservation waters?**

Eight of 168 respondents said that they collect turtles.

17. **Do you eat turtles from Reservation waters?**

Only 3 of 167 respondents said that they eat the turtles.

18. **Do you collect plants (sweet grass, black ash, wild rice, etc.) along waters of the Reservation?**

Twenty-five of 170 respondents said that they collect plants along waters of the Reservation.

19. **Do you collect other aquatic life (crayfish, clams, frogs, etc.) from Reservation waters?**

Of the 168 respondents only 15 said "yes."

20. **Do you eat or drink plants or other aquatic life collected from waters of the Reservation?**

Twenty-two respondents answered "yes" to this question, whereas 138 answered "no."

21. **What types of collected plants or other aquatic life do you eat or drink?**

The most common response to this question was fish; however, other miscellaneous responses included bitterroot, red willow, ferns, leeks, herbs, tea, buttercup, blackberries, cattail, and pussywillow.

22. **Do you collect medicinal plants or animals from waters of the Reservation?**

Twenty six respondents answered "yes" and 130 answered "no."

23. **What types/species of medicinal plants or animals do you collect?**

Seventeen people responded to this question, and the most common answers were bitterroot and mint. Other responses given include turtles, frogs, catnip, winterroot, yellow root, milkweed, sage, sweetgrass, burgamot, cinnamon, elderflower, cedar, and nettles.

Part 4. Anecdotal questions of past and present perceptions

1. **Do you remember more fish using Reservation waters today, or in the past?**

Of the 131 respondents, 120 remember more fish in the past, whereas 11 have observed more fish in Reservation waters today.

2. **How has fishing changed over the years? Has the number or type of fish caught changed?**

Many respondents indicated that there were fewer fish in Reservation waters than in the past. Some people said the variety of fish caught has increased, suggesting that fish stocking by the DNR and clearer waters have allowed for less tolerant fish to survive. However, a few others indicated that the variety of fish caught has decreased, perhaps because of pollution, dams, and an increase in the number of people fishing.

3. **Has fish health (size, tumors, deformities, gills partly missing, external anomalies, etc.) changed noticeably?**

Of the respondents who noticed a change in fish health, the most common responses to type of changes were smaller size, deformities, and poor color.

4. **Do you remember more waterfowl (ducks and geese) using Reservation waters today or in the past?**

   Of the 102 responses, 81 remember more waterfowl in the past.

5. **Do you remember wild rice growing on or near the Reservation? If "yes," when and where was the wild rice growing?**

   Only two people remembered wild rice growing around the Reservation. One respondent recalled wild rice being grown in 1950.

6. **Has the color of Reservation waters changed over the years? How?**

   Many people indicated that Reservation waters have become darker and muddier, with a greenish to brownish tint.

7. **Have summer flows (amount) of Reservation waters changed over the years? How?**

   About three times as many people said that flows have changed over the years than those who said that there was no significant change in summer flows. Most respondents indicated that flows have decreased.

8. **Have fluctuations in flow (highest and lowest annual conditions) been more drastic in the past than today?**

   Nearly an equal number of people said that flow fluctuations have been more drastic recently as compared to those who indicated that there have not been drastic flow fluctuations in the past.

9. **Do you recall Reservation wetland areas being converted to agricultural lands? If you answered "yes," where and when were they converted? Was tiling used to drain these wetlands?**

   Thirty-six people remembered conversion of wetlands to agricultural lands. Many sites were named where wetlands were converted to agricultural land; however, the most often named site was the Little Bear Center. Of the dozen people who responded to the tiling question, half indicated that tiling was used and the other half did not recall use of tiling for draining wetlands.

10. **Do you recall channelization or dredging operations taking place within the Reservation? If you answered "yes," when and where did it take place?**

    Thirty-four people remembered dredging operations taking place within the Reservation. Locations of dredging operations included the Little Bear Center and the Turtle School.

11. **Has the nature (color, texture, size, etc.) of Reservation stream bottom materials changed over time?**

    Many of the 63 respondents indicated that streambed materials have become more mucky and slimy. A noticeable color change to stream bottom materials also was indicated.

12. **Have general streambank conditions (erosion, steepness, vegetation, etc.) changed over time? If you answered "yes," describe notable streambank changes.**

    Seventy-three respondents noticed changes in streambank conditions, whereas 23 people have not observed any noticeable changes over time.

13. **Are more trees falling into streams than in the past?**

    Fifty-eight people noticed more trees falling into Reservation waters than in the past, nearly twice the number of people who indicated they had not observed significantly more trees falling into streams.

14. **Are there more ponds from logjams than in the past?**

    Twice as many people indicated that there were not more ponds formed from logjams than in the past, however, a couple of people indicated activity by beavers on some streams.

15. **When was the largest flood on Duck Creek that you remember?**

    A wide range of dates were given as the largest flood recalled by respondents. Dates as early as 1930 and as recent as 1997 were given as the largest flood flows on Duck Creek.

16. **Do you know of any markers of how high the water was during the flood?**

    Nearly 30 people knew of markers indicating how high floodwaters rose during peak flows.

17. After the flood, did Duck Creek eventually return to how it used to look, or was it permanently changed? If it changed, describe in what way. Is there evidence of this change today?

Of 77 respondents, 61 indicated that Duck Creek had permanently changed after the largest flood. The most common evidence of major floods was a change in the channel shape of Duck Creek.

18. Are there any general observations regarding stream change over time that have not been captured in the previous questions and responses?

A variety of responses were given to the question of additional observations to changes in stream conditions over time. Comments included increasing algal blooms, decreasing flows, and finding fewer plants with medicinal properties along the streams in recent years.

19. Additional comments?

Final comments included a desire to learn more about addressing environmental concerns regarding Reservation waters, the need for better fishing conditions, details on areas that have flooded frequently in recent years, and observations of polluted Reservation waters.

SUMMARY AND CONCLUSIONS

Water-resources information has been compiled from 82 studies that include data collected from the Oneida Reservation and vicinity. Forty-seven studies addressed surface-water issues, 33 studies addressed ground-water issues, and 23 studies addressed aquatic-biology issues. Some multidisciplinary studies are included in more than one category. Digital data bases for surface-water, ground-water, and stream-sediment information have been compiled and summarized.

Reports from 39 studies contained surface-water-quality information, and reports from 28 studies contained surface-water-quantity and flow information. Most of the surface-water studies reported included both quality and quantity and flow information. Several surface-water studies provided a short-term description of surface-water quality for parts of the Reservation and vicinity. Most of the surface-water quality data were collected at sites on Duck Creek. Few of the surface-water studies involved long-term records of streamflow for the Reservation and vicinity. The longest period of streamflow record began in 1989 and continues, for one site on Duck Creek (station 04072150). Many of the surface-water reports include streamflow data, which indicate that streams in most of the Duck and Dutchman Creek Basins become dry during extended periods of no precipitation.

Surface-water and stream-sediment-quality data from several data bases were compiled for this report. Measurements from 53 sites, representing 365 properties and constituents, are summarized. Most of the compiled data come from two sites on Duck Creek. Only four surface-water-quality constituents from a total of four sites exceeded a USEPA drinking-water limit. The exceedences include three pesticides and nitrate. Data from two nearby sites on Duck Creek were combined and analyzed for trends in suspended sediment, dissolved nitrite plus nitrate, and dissolved atrazine concentrations. No trends were detected for any of these constituents.Trends in surface-water-quality data were not calculated elsewhere because of the short period of record at nearly all of the sites. Determination of trends in surface-water constituents at sites other than Duck Creek will be possible only if data are collected regularly over a period longer than several years.

Reports from 24 of the studies contained ground-water-quality information, and reports from 24 contained ground-water-quantity and flow information. Most of the ground-water studies reported both quality and quantity and flow information. None of the ground-water reports provide a detailed description of ground-water quality for the Reservation as a whole; however, several reports provide varied and detailed information for ground-water models that are useful for understanding the hydrogeology and ground-water flow for the Reservation and vicinity.

Ground-water quality data from several data bases, compiled for this report, provided an incomplete summary of the condition of the drinking-water resources of the Reservation. Water-quality measurements from 180 drinking-water wells representing 314 ground-water quality constituents have been summarized. Only 12 constituents, at 12 or fewer wells each, exceeded a USEPA drinking-water limit. Most of the exceedences were for trace metals and organics. No exceedences for pesticides or nitrate were reported; however, pesticide data were collected from only a small number of wells. Determination of trends in ground-water quality from drinking-water wells was not possible for most constituents because of the limited number of samples or a short period of record or both. Dissolved nitrite plus nitrate data were analyzed for trends, but none were detected. The data compiled for this report provide a starting point for continued collection and analysis of drinking-water-quality data within the Reservation. Future tests for trends in ground-water quality would be aided by a more complete data base, spanning a longer period, for constituents of concern in drinking water on the Reservation.

Most of the aquatic-biology studies described in this report include fish data, habitat data, or calculation of biotic index values; much of the data is for Duck Creek. Historical aquatic biology data for the Reservation and vicinity is limited. Most of the studies described here were done since 1992. Most of the biota-quality data compiled for this report come from several sites on Duck Creek and represent a small number of samples.

Results of the community survey regarding the water resources of the Oneida Reservation indicate that water usage by Tribal members today has declined when compared to the past. For example, over half of the survey respondents reported using Reservation waters for swimming and fishing in the past, but only 15- and 25-percent, respectively, report using the waters for these purposes today. The most common reason given for the decline in usage was pollution. Most of those surveyed perceived Duck Creek as being "polluted," but about 50 percent thought that water quality in the Reservation was improving. Most of those surveyed thought that there were more fish and waterfowl in the waters of the Reservation in the past than today. Most of those surveyed said that they fish (55 percent) and eat fish (80 percent). However, only 33 percent of respondents said they fish waters of the Reservation, and 64 percent said they never eat fish from there. Most of those that do eat fish from the Reservation consume it only once or twice per year. About 50 percent of those surveyed were satisfied with the way the waters of the Reservation were being managed, but 90 percent thought the Tribe should spend more to improve the quality of Reservation waters.

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Tables 2–9

Table 2. *Characteristics and description of studies pertaining to surface-water quality for the Oneida Reservation and vicinity, Wisconsin*

[X, study includes description of these characteristics relevant to the Reservation and vicinity; DOC, dissolved organic carbon; TOC, total organic carbon; NAWQA, National Water-Quality Assessment; PAH's, polyaromatic hydrocarbons; PCB's, polychlorinated biphenyls]

Literature citation	Characteristics										Description
	Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	DOC/TOC	Trace elements/ heavy metals	Bacteria	Sediment	Modeling	Other	
Archer and others (1995)							X				Statewide summary of *Cryptosporidium* and *Giardia* occurrence, concentrations, and distributions in Wisconsin. Includes data from Beaver Dam and Ashwaubenon Creeks. *Cryptosporidium* was not detected in either creek, however, *Giardia* was detected several times in both.
Brosseau and Schaepe (1981)	X	X	X		X		X			X	Local summary of benthic and chemical data for the Duck Creek Watershed collected between July 1980 and August 1981. Report includes summaries and detailed field notes of all data collected. Chemistry data includes field measurements, dissolved and total solids, nutrients, biochemical oxygen demand, and fecal coliform.
Finney and others (1997)			X			X				X	Summary of the nonpoint-source control plan for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project. Report contains surface-water-quality information for suspended solids, phosphorus, copper, zinc, and PAH's.
Fitzpatrick and Giddings (1997)	X		X								Regional summary of stream-habitat characteristics, streamflow, and water quality for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes a summary of statistical correlations between habitat evaluation scores, basin and reach characteristics, and water chemistry.
Fox Valley Water Quality Planning Agency (1983)			X					X		X	Regional estimates of annual pollutant loading for subwatersheds in Brown County, Wisconsin. Includes data for Ashwaubenon, Dutchman, and Duck Creeks.
Gansberg (1996)	X		X					X		X	Local assessment of nonpoint-source pollution for the Suamico and Little Suamico River Watershed. Stream habitat conditions, aquatic macroinvertebrates, water chemistry, and flow data were collected at three locations on the South Branch Suamico River near the northwest part of the Reservation. The habitat was rated as "poor."
Girvin (1996)				X							Local study designed to evaluate the effects of herbicides transported from the Duck Creek Basin to Green Bay and Lake Michigan. The report includes concentrations and loads for atrazine, alachlor, cyanazine, and metolachlor and an evaluation of potential toxicity to several aquatic organisms.
Gruentzel (1979b)	X	X	X				X	X		X	Local summary of physical and chemical characteristics for Duck and Trout Creeks for the period September 1978 to July 1979. Includes field measurements, chloride, nutrients, total and dissolved solids, volatile suspended solids, and fecal coliform.
Harris (1995a)			X					X			Local summary of concentrations and loads of phosphorus and suspended sediment for Ashwaubenon, Duck, and Dutchman Creeks. Data for this study were collected as part of the Environmental Science Practicum at the University of Wisconsin-Green Bay
Harris (1995b)			X					X			Local summary of concentrations and loads of phosphorus and suspended solids for three subwatersheds of Ashwaubenon Creek. Each subwatershed consists of different land uses including rural, industrial/commercial, and urban/residential Data for this study were collected as part of the Environmental Science Practicum at the University of Wisconsin-Green Bay.
Holmstrom and others (1990 through 1997)	X	X	X	X	X			X			Statewide summaries of streamflow and water-quality data for USGS-monitored sites in Wisconsin for water years 1989 through 1996. Includes data from two sites on Duck Creek. One site is near Howard, Wis., and the other is near Oneida, Wis.
House (1990)				X		X		X		X	Regional study of PCB's, dieldrin, lead, and cadmium in tributaries to Green Bay. Includes sediment and water-column data from three sites on Duck Creek

Table 2. Characteristics and description of studies pertaining to surface-water quality for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics										Description
	Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	DOC/TOC	Trace elements/ heavy metals	Bacteria	Sediment	Modeling	Other	
Jacobs (1996)			X					X	X		Local modeling study of nonpoint-source pollution management in the Ashwaubenon Creek Watershed. Report includes streamflow data and information on suspended-sediment and phosphorus concentrations.
Knowles and others (1964)	X	X	X								Regional summary of ground-water and surface-water resources in the Green Bay area, including parts of the Reservation and vicinity. Surface-water-quality data from Duck, Dutchman, Trout, and Ashwaubenon Creeks includes major ions, nitrate, dissolved solids, and field measurements.
Kohler (1997)	X										Local summary of fish-community characteristics and fish-habitat relations for 10 reaches of Duck Creek. Surface-water-quality data include temperature and dissolved oxygen.
Konrad (1992)						X				X	Regional summary of lead, cadmium, and PCB loads to the lower Fox River. Study area includes parts of the Ashwaubenon and Dutchman Creek Watersheds.
Koss (1998)										X	Local newspaper article summarizing a water-resources survey of over 200 members of the Oneida Tribal community who live on or near the Reservation The article includes information on trends in tribal water uses and how the community perceives the quality of water in Duck Creek.
Krohelski (1986)	X	X	X			X					Countywide summary of hydrogeology, ground-water use and quality including parts of the Reservation. Report also contains surface-water-quality data for Duck Creek, including field measurements, major ions, nutrients, trace metals, and dissolved solids.
Lenz (1997)			X						X		Regional study using benthic-macroinvertebrate community data to predict water quality in streams in the Western Lake Michigan Drainages. Analysis includes data collected from the Reservation and vicinity; however, site-specific data are not included in report.
Myers and others (1998)			X				X	X		X	Local study that addresses the potential of constructed wetlands to reduce nonpoint-source pollution in the Oneida Creek and Duck Creek Watersheds. Computer models for watershed hydrology and water quality were used to evaluate possible sites for constructed wetlands.
Nelson and Fassbender (1972a)	X	X								X	Countywide summary of surface-water resources of Brown County. The report includes limited water-quality data for Duck, Dutchman, Ashwaubenon, and Trout Creeks in the northern part of the Reservation. A general description of stream habitat and fishery conditions also is included.
Nelson and Fassbender (1972b)	X	X	X							X	Countywide summary of surface-water resources of Outagamie County. The report includes water-quality data for three sites on Duck Creek in the southern part of the Reservation. A general description of stream habitat and fishery conditions also is included
Northeastern Wisconsin Regional Planning Commission (1970)	X	X	X				X			X	Regional summary of water quality and flow for streams in northeastern Wisconsin. Report includes detailed tables and graphs of water-quality data, precipitation, and stream stage for three sites on Duck Creek for the period from December 1967 though July 1969.
Oakes and Hamilton (1973)		X									Regional hydrologic summary for northeast Wisconsin, which includes a wide variety of specific information for Duck Creek. Surface-water-quality information limited to major ions.
Olcott (1968)	X	X	X								Regional hydrologic summary for the Fox-Wolf River Basin, which includes general information for the area surrounding the Duck Creek Basin.
Peiris (1993)									X		Local modeling study of stormwater management in the Ashwaubenon Creek watershed. Model simulates use of wet and dry ponds to improve water quantity and quality.

Table 2. Characteristics and description of studies pertaining to surface-water quality for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics: Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	DOC/TOC	Trace elements/ heavy metals	Bacteria	Sediment	Modeling	Other	Description
Richards and others (1998)	X	X	X		X			X			Regional summary of surface-water quality at 11 sites in the Western Lake Michigan Drainages for the period 1993 through 1995 The report includes water-quality and streamflow data from monthly and storm-related samples from one site on Duck Creek in the Reservation.
Robertson (1996)			X	X				X	X		Regional analysis and estimation of loads of sediment, phosphorus, and PCB's to Lakes Michigan and Superior. Includes estimated loads for Duck Creek.
Robertson (1998)			X					X			Regional evaluation of the surface-water sampling design of the Western Lake Michigan Drainages NAWQA study unit The report includes streamflow, nutrient, and suspended-sediment data for three sites on Duck Creek sampled during low-flow conditions Also included are statistical correlations between water quality and basin characteristics.
Robertson and Saad (1996)			X					X			Regional summary of nutrients and suspended sediment for the Western Lake Michigan Drainages, which includes data from the Reservation and vicinity Site-specific water-quality information is not included in the report, however, maps showing locations of ground-water and surface-water sampling locations are included.
Scudder and others (1997)				X	X	X		X			Regional summary of trace elements and synthetic organic compounds in sediment and biota from streams in the Western Lake Michigan Drainages. Report includes data from Duck Creek. Biota samples from Duck Creek included caddisfly larvae, rock bass, and white sucker.
Sullivan and others (1995)	X										Regional summary of streamflow and field measurements for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report also includes a description of land use and habitat characteristics of each basin.
Sullivan and Richards (1996)				X							Regional summary of 78 pesticides for nine streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes detailed information for streamflow and concentrations of atrazine, cyanazine, and metolachlor in Duck Creek between March and September 1994
Thornberry Creek Country Club (1994)	X		X	X				X			Listing of some herbicides used at a golf course within the Reservation.
Union Carbide (1978)	X	X				X					Regional summary of trace-constituent data in ground water, surface water, and stream sediment collected as part of the U.S. Department of Energy NURE program. Report includes summary statistics and maps for 34 trace constituents and field measurements of pH, dissolved oxygen, alkalinity, and specific conductance.
U.S Environmental Protection Agency (1992)										X	Statewide documentation of risk evaluation of the environmental problems faced by Tribes in Wisconsin Water-resources-related problems described in the report and relevant to the Reservation include industrial, municipal and nonpoint-source discharge; drinking water and ground-water contamination; physical degradation of aquatic habitat; unintended releases of toxic substances; and pesticides.
Valvassori (1991)										X	Regional summary of a water-quality management plan for the Lower Fox River Basin Includes brief description of water-quality conditions for Duck, Trout, and Ashwaubenon Creek Watersheds. Report includes no actual data.

Table 2. Characteristics and description of studies pertaining to surface-water quality for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics										Description
	Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	DOC/TOC	Trace elements/ heavy metals	Bacteria	Sediment	Modeling	Other	
Wisconsin Department of Natural Resources (1971)	X						X			X	A local summary of water-quality conditions of the Duck Creek, Suamico River, and Pensaukee River Basins. This study area includes a large part of the Reservation. The report includes chemical and biological data and also lists wastewater sources, types of waste, and discharge rates in each basin.
Wisconsin Department of Natural Resources (1975)										X	Regional water-quality management plan for the rivers of the west shore of Green Bay. The report includes monthly effluent limits for suspended solids and biochemical oxygen demand for several municipal and industrial dischargers to Duck Creek.

Table 3. Characteristics and description of studies pertaining to surface-water quantity and flow for the Oneida Reservation and vicinity, Wisconsin

[X, study includes description of these characteristics relevant to the Reservation and vicinity]

Literature citation	Characteristics: Streamflow	Extreme flows	Hydrologic budget	Erosion/ sedimentation	Runoff calculations	Modeling	Precipitation	Reach characteristics	Description
Field (1978)	X	X			X				Statewide summary of low-flow characteristics of streams protected under the Watershed Protection and Flood Prevention Act of 1954 (Public Law 566). Duck Creek is included as a protected stream The report includes streamflow values and estimates of low flow for seven sites on Duck Creek and one site on Trout Creek.
Finney and others (1997)	X			X					Local summary of the nonpoint-source control plan for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project. Report contains very brief descriptions of flow for each watershed.
Fitzpatrick and Giddings (1997)	X	X				X		X	Regional summary of stream-habitat characteristics, streamflow, and water-quality for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes a summary of statistical correlations between habitat evaluation scores, basin and reach characteristics, and water chemistry.
Gansberg (1996)	X							X	Local assessment of nonpoint-source pollution for the Suamico and Little Suamico River Watershed Stream habitat conditions, aquatic macroinvertebrates, water chemistry, and flow data were collected at three locations on the South Branch Suamico River near the northwest part of the Reservation.
Gebert and Holmstrom (1974)	X	X			X				Statewide summary of low-flow characteristics of Wisconsin streams at sewage-treatment plants. Report includes streamflow values and estimates of low flow at four sites on Duck Creek.
Girvin (1996)	X								Local study designed to evaluate the effects of herbicides transported from the Duck Creek Basin to Green Bay and Lake Michigan. The report includes concentrations and loads for atrazine, alachlor, cyanazine, and metolachlor and an evaluation of potential toxicity to several aquatic organisms.
Harris (1995a)	X								Local summary of concentrations and loads of phosphorus and suspended sediment for Ashwaubenon, Duck, and Dutchman's Creeks. Data for this study were collected as part of the Environmental Science Practicum at the University of Wisconsin-Green Bay.
Harris (1995b)	X						X		Local summary of concentrations and loads of phosphorus and suspended solids for three subwatersheds of Ashwaubenon Creek. Each subwatershed consists of different land uses including rural, industrial/commercial, and urban/residential. Data for this study were collected as part of the Environmental Science Practicum at the University of Wisconsin-Green Bay.
Holmstrom (1979)	X	X			X				Statewide summary of low-flow characteristics of streams at sewage-treatment and industrial plants in Wisconsin. Includes four sites on Duck Creek and two sites on Dutchman Creek. Several measurements at the Duck Creek sites indicated zero flow.
Holmstrom (1980)	X	X			X				Regional summary of low-flow characteristics of streams in the Menominee-Oconto-Peshtigo River Basin. The study area includes Duck Creek and much of the Reservation. Report includes estimates of low flow for eight sites on Duck Creek and one site on Trout Creek.
Holmstrom and others (1990 through 1997)	X	X							Statewide summaries of streamflow and water-quality data for USGS-monitored sites in Wisconsin for water years 1989 through 1996. Includes data from two sites on Duck Creek. One site is near Howard, Wis., and the other is near Oneida, Wis.

Table 3. Characteristics and description of studies pertaining to surface-water quantity and flow for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics								Description
	Streamflow	Extreme flows	Hydrologic budget	Erosion/ sedimentation	Runoff calculations	Modeling	Precipitation	Reach characteristics	
L.B House, written commun., 1991	X	X							Local summary of summer low-flow conditions in Duck Creek from 1980 through 1991. This memo from the USGS to the Oneida Tribe indicates that Duck Creek has losing reaches and documents zero flow during dry periods.
Jacobs (1996)	X								Local modeling study of nonpoint source pollution management in the Ashwaubenon Creek Watershed. Report includes streamflow data and information on suspended sediment and phosphorus concentrations.
Knowles and others (1964)	X	X					X		Regional summary of ground-water and surface-water resources in the Green Bay area, including parts of the Reservation and vicinity. Report includes historical streamflow measurements for Duck, Dutchman, Ashwaubenon, and Trout Creeks. Report indicates that Duck, Dutchman, and Trout Creeks generally become dry during late summer.
Kohler (1997)	X								Local summary of fish community characteristics and fish-habitat relations for 10 reaches of Duck Creek. Discharge data are presented in hydrographs.
Krohelski (1986)	X	X							Countywide summary of hydrogeology, ground-water use and quality, including parts of the Reservation. Report also contains streamflow information for Duck Creek. Gaining and losing reaches of Duck Creek for August 1982 and October 1980 are shown on a page-sized map.
Myers and others (1998)	X	X			X	X			Local study that addresses the potential of constructed wetlands to reduce nonpoint-source pollution in the Oneida Creek and Duck Creek Watershed. Computer models for watershed hydrology and water quality were used to evaluated possible sites for constructed wetlands.
Northeastern Wisconsin Regional Planning Commission (1970)	X								Regional summary of water quality and flow for streams in northeastern Wisconsin. Report includes detailed tables and graphs of water-quality data, precipitation, and river stage for three sites on Duck Creek for the period December 1967 though July 1969.
Oakes and Hamilton (1973)	X	X	X				X		Regional hydrologic summary for northeast Wisconsin, which includes a wide variety of specific information for Duck Creek. Low-flow measurements at approximately 10 sites on Duck Creek from August 1969 indicate zero flow in much of the basin.
Olcott (1968)	X	X	X				X		Regional hydrologic summary for the Fox-Wolf River Basin, which includes information for the area surrounding the Duck Creek Basin.
Peiris (1993)		X				X	X		Local modeling study of stormwater management in the Ashwaubenon Creek Watershed. Model simulates use of wet and dry ponds to improve water quantity and quality.
Peters (1997)			X		X		X		Regional environmental summary for the Western Lake Michigan Drainages. Includes generalized maps showing precipitation, evapotranspiration, snowfall, mean annual air temperature, and runoff in the vicinity of the Reservation.
Richards and others (1998)	X	X							Regional summary of surface-water quality at 11 sites in the Western Lake Michigan Drainages for the period 1993 through 1995. The report includes water-quality and streamflow data from monthly and storm-related samples from one site on Duck Creek in the Reservation.
Robertson (1998)	X	X							Regional evaluation of the surface-water sampling design of the Western Lake Michigan Drainages NAWQA study unit. The report includes streamflow, nutrient, and suspended-sediment data for three sites on Duck Creek sampled during low-flow conditions. Also included are statistical correlations between water quality and basin characteristics.

Table 3. Characteristics and description of studies pertaining to surface-water quantity and flow for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics								Description
	Streamflow	Extreme flows	Hydrologic budget	Erosion/ sedimentation	Runoff calculations	Modeling	Precipitation	Reach characteristics	
Schaepe (1982)	X						X		Local study of discharge for the Duck Creek Watershed with emphasis on Duck and Trout Creeks. Report provides historical streamflow measurements and rating curves, as well as general watershed information for the Reservation.
Sullivan and others (1995)	X	X						X	Regional summary of streamflow and field measurements for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report also includes a description of land use and habitat characteristics of each basin.
Sullivan and Richards (1996)	X								Regional summary of 78 pesticides for nine streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes detailed information for streamflow and concentrations of atrazine, cyanazine, and metolachlor in Duck Creek between March and September 1994.
U.S. Army Corps of Engineers and Oneida Tribe (1996)		X			X	X	X		Small-scale surface-water modeling study of three tributaries to Duck Creek in the southwest part of the Reservation. Report summarized the information used in the models and results for 10-year, 50-year, 100-year, and 500-year storm events.

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin

[N, number of samples; Min, minimum value; Max, maximum value, <DL, less than the detection limit; °C, degrees Celsius; ft^3/s, cubic feet per second; FTU, formazin turbidity unit; µS/cm, microsiemens per centimeter; mL, milliliter; mm, millimeter; mg/L, milligrams per liter; mg/kg, milligrams per kilogram, g/m^2, grams per square meter; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; µm, micrometer; µg/g, micrograms per gram; MF, membrane filter; XXXXX, parameter code unknown]

Parameter	Constituent	N	Min	Max
00010	Water temperature, field, °C	264	0	29
00060	Streamflow, ft^3/s	40	0	1,200
00061	Streamflow, instantaneous, ft^3/s	438	0	1,570
00076	Turbidity, Hach, FTU	46	2.7	97
00078	Transparency, secchi disk, meters	1	1	1
00080	Color, platinum cobalt scale	10	20	100
00095	Specific conductance, µS/cm at 25°C	308	149	3,650
00300	Oxygen, dissolved, mg/L	165	1.17	19.61
00310	Biochemical oxygen demand, mg/L (5 day-20°C)	54	1.2	80
00312	Biochemical oxygen demand, mg/L (6 day-20°C)	27	4.5	25
00340	Chemical oxygen demand, unfiltered, mg/L	4	37	210
00400	pH, field	243	6.3	9
00403	pH, wholewater, lab	208	6.8	8.9
00405	Carbon dioxide, mg/L	1	9.4	9.4
00410	Alkalinity, total, mg/L as $CaCO_3$	20	170	342
00417	Alkalinity, fixed endpoint, lab, mg/L	1	174	174
00440	Bicarbonate, mg/L as HCO_3	3	282	302
00445	Carbonate, mg/L as CO_3	3	<DL	<DL
00452	Carbonate, field, mg/L as CO_3	45	<DL	17
00453	Bicarbonate, field, mg/L as HCO_3	84	85	552
00500	Residue, total, mg/L	35	240	1,420
00505	Residue, total volatile, mg/L	23	46	244
00530	Residue, total, nonfiltered, mg/L	139	<DL	2,376
00535	Residue, volatile, nonfiltered, mg/L	29	<DL	456
00556	Oil and grease, freon gravimetric, mg/L	7	<DL	2
00557	Oil and grease, mud, freon gravimetric, mg/kg	1	1,600	1,600
00572	Biomass, periphyton, g/m^2	1	265.1	265.1
00573	Biomass, periphyton, dry weight, g/m^2	1	291.8	291.8
00600	Nitrogen, total, mg/L	5	1	3.7
00602	Nitrogen, mg/L as N	4	.68	1.5
00605	Nitrogen, organic, mg/L as N	57	.19	15
00607	Nitrogen, organic, dissolved, mg/L as N	5	.27	.69
00608	Nitrogen, ammonia, dissolved, mg/L as N	439	<DL	4.2
00610	Nitrogen, ammonia, total, mg/L as N	194	<DL	3.4
00613	Nitrogen, nitrite, dissolved, mg/L as N	324	<DL	.36
00615	Nitrogen, nitrite, total, mg/L as N	66	<DL	.11
00618	Nitrogen, nitrate, dissolved, mg/L as N	5	.17	.89
00620	Nitrogen, nitrate, total, mg/L as N	5	.55	1.8
00623	Nitrogen, kjeldahl, dissolved, mg/L	134	<DL	5.4
00625	Nitrogen, kjeldahl, total, mg/L as N	406	<DL	8.9
00630	Nitrogen, nitrite plus nitrate, total, mg/L as N	84	<DL	8.1
00631	Nitrogen, nitrite plus nitrate, dissolved, mg/L as N	445	<DL	11
00665	Phosphorus, total, mg/L as P	554	<DL	4.6

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
00666	Phosphorus, dissolved, mg/L as P	327	<DL	2.2
00668	Phosphorus, bottom material, mg/kg	22	<DL	1,000
00671	Orthophosphorus, dissolved, mg/L as P	464	<DL	2
00680	Carbon, organic, total, mg/L as C	3	<DL	11
00681	Carbon, organic, dissolved, mg/L as C	57	5.5	87
00689	Carbon, organic, suspended, mg/L as C	53	.1	4
00900	Hardness, total, mg/L as $CaCO_3$	29	150	1,600
00902	Hardness, noncarbonate, mg/L as $CaCO_3$	8	19	75
00915	Calcium, dissolved, mg/L as Ca	163	13	150
00916	Calcium, total, mg/L as Ca	3	46	56
00925	Magnesium, dissolved, mg/L as Mg	163	4.7	310
00927	Magnesium, total, mg/L as Mg	3	21	29
00929	Sodium, total, mg/L as Na	1	2	2
00930	Sodium, dissolved, mg/L as Na	161	2.9	330
00931	Sodium adsorption ratio	13	.1	2.2
00932	Sodium, percent	13	4	31
00935	Potassium, dissolved, mg/L as K	156	.8	25
00937	Potassium, total, mg/L as K	1	2.2	2.2
00940	Chloride, dissolved, mg/L as CL	287	1	1,100
00945	Sulfate, dissolved, mg/L as SO_4	168	7	300
00950	Fluoride, dissolved, mg/L as F	157	<DL	.7
00955	Silica, dissolved, mg/L as SiO_2	157	.13	21
01000	Arsenic, dissolved, µg/L as As	6	<DL	1.8
01002	Arsenic, total, µg/L as As	1	<DL	<DL
01003	Arsenic, bottom material, µg/g as As	22	.3	2.4
01005	Barium, dissolved, µg/L as Ba	5	10	30
01008	Barium, sediment, mg/kg dry weight	23	58	850
01010	Beryllium, dissolved, µg/L as Be	5	<DL	<DL
01013	Beryllium, sediment, mg/kg dry weight	1	.5	.5
01020	Boron, dissolved, µg/L as B	5	26	75
01023	Boron, bottom material, µg/g as B	22	<20	60
01025	Cadmium, dissolved, µg/L as Cd	2	.01	.02
01027	Cadmium, total, µg/L as Cd	50	<DL	1
01029	Chromium, sediment, mg/kg dry weight	23	20	60
01030	Chromium, dissolved, µg/L as Cr	7	.19	37
01034	Chromium, total, µg/L as Cr	5	.3	10
01035	Cobalt, dissolved, µg/L as Co	5	<DL	<DL
01037	Cobalt, total, µg/L as Co	1	1	1
01038	Cobalt, bottom material, µg/g as Co	22	<DL	10
01040	Copper, dissolved, µg/L as Cu	7	1.92	2.01
01042	Copper, total, µg/L as Cu	3	1.78	4
01043	Copper, sediment, mg/kg dry weight as Cu	23	3	23
01044	Iron, suspended, µg/L as Fe	1	120	120
01045	Iron, total, µg/L as Fe	3	140	5,900
01046	Iron, dissolved, mg/L as Fe	103	9	430
01049	Lead, dissolved, µg/L as Pb	2	.04	.04
01051	Lead, total, µg/L as Pb	51	.07	150

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
01052	Lead, sediment, mg/kg dry weight as Pb	23	4	25
01053	Manganese, sediment, mg/kg dry weight as Mn	23	110	1,000
01054	Manganese, suspended, µg/L as Mn	1	50	50
01055	Manganese, total, µg/L as Mn	4	70	550
01056	Manganese, dissolved, µg/L as Mn	101	6	200
01060	Molybdenum, dissolved, µg/L as Mo	5	<DL	6
01065	Nickel, dissolved, µg/L as Ni	5	<DL	<DL
01075	Silver, dissolved, µg/L as Ag	5	<DL	<DL
01078	Silver, sediment, mg/kg dry weight as Ag	23	<DL	2.5
01080	Strontium, dissolved, µg/L as Sr	5	110	510
01090	Zinc, dissolved, µg/L as Zn	7	1.2	48
01092	Zinc, total, µg/L as Zn	3	1.09	20
01105	Aluminum, total, µg/L as Al	3	20	207
01106	Aluminum, dissolved, µg/L as Al	7	5.56	12.4
01130	Lithium, dissolved, µg/L as Li	5	3	9
01145	Selenium, dissolved, µg/L as Se	5	<DL	3
01147	Selenium, total, µg/L as Se	1	<DL	<DL
01157	Thallium, dissolved, µg/L as Tl	5	<DL	<DL
01160	Zirconium, dissolved, µg/L as Zr	5	<DL	<DL
01170	Iron, sediment, mg/kg dry weight as Fe	1	12,000	12,000
01185	Vanadium. dissolved, µg/L as V	5	<DL	6
01187	Scandium, dissolved, µg/L as Sc	5	<DL	<DL
04024	Propachlor, dissolved, µg/L	64	<DL	<DL
04028	Butylate, dissolved, µg/L	64	<DL	<DL
04029	Bromacil, dissolved, µg/L	40	<DL	<DL
04035	Simazine, dissolved, µg/L	64	<DL	10
04036	Prometryn, dissolved, µg/L	1	<DL	<DL
04037	Prometon, dissolved, µg/L	64	<DL	.05
04038	Deisopropyl atrazine, dissolved, µg/L	1	<DL	<DL
04040	Deethyl atrazine, dissolved, µg/L	64	<DL	29
04041	Cyanazine, dissolved, µg/L	64	<DL	4.7
04095	Fonofos, dissolved, µg/L	64	<DL	.04
22703	Uranium, dissolved, µg/L	5	.6	1.5
30274	Lithium, sediment, µg/g	22	4	20
30283	Molybdenum, sediment, µg/g	22	<DL	<DL
30287	Nickel, sediment, µg/g	22	4	20
30289	Niobium, sediment, µg/g	22	<DL	<DL
30297	Scandium, sediment, µg/g	22	4	15
30299	Selenium, sediment, µg/g	22	<DL	1.2
30312	Thorium, sediment, µg/g	22	<DL	<DL
30320	Uranium, sediment, µg/g	22	.79	2.59
30322	Vanadium, sediment, µg/g	22	20	100
30327	Yttrium, sediment, µg/g	22	<DL	30
30329	Zinc, sediment, µg/g	22	<DL	<DL
30331	Zirconium, sediment, µg/g	22	50	600
31613	Fecal coliform, MF M-FC agar, calories/100 mL	24	<DL	2,700
31679	Fecal streptococci, MF M-Ent agar, calories/100 mL	13	<DL	900

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
32210	Chlorophyll *a*, µg/L	2	5	5
34253	alpha-BHC, dissolved, mg/L	64	<DL	<DL
34480	Thallium, sediment, mg/kg dry weight as Tl	23	25	8,000
34653	*p,p'*-DE, dissolved, µg/L	64	<DL	<DL
34671	PCB, total, µg/L	1	<DL	<DL
34790	Aluminum, bottom material, <63µm, percent	3	5.3	6
34795	Antimony, bottom material, <63µm, µg/g	3	.5	1
34800	Arsenic, bottom material, <63µm, µg/g	3	3.7	8.9
34805	Barium, bottom material, <63µm, µg/g	2	220	500
34810	Beryllium, bottom material, <63µm, µg/g	3	1	2
34816	Bismuth, bottom material, <180 µm, µg/g	3	<DL	<DL
34825	Cadmium, bottom material, <63µm, µg/g	3	.3	.5
34830	Boron, bottom material, <63µm, percent	3	3	16
34835	Cerium, bottom material, <63µm, µg/g	3	55	68
34840	Cerium, bottom material, <63 µm, µg/g	3	55	64
34845	Cobalt, bottom material, <63µm, µg/g	3	12	16
34850	Copper, bottom material, <63µm, µg/g	3	19	31
34855	Europium, bottom material, <63µm, µg/g	3	<DL	29
34860	Gallium, bottom material, <63µm, µg/g	3	12	14
34870	Gold, bottom material, <63µm, µg/g	3	<DL	<DL
34875	Holmium, bottom material, <63µm, µg/g	3	<DL	<DL
34880	Iron, bottom material, <63µm, percent	3	2.5	3.6
34885	Lanthanum, bottom material, <63µm, µg/g	3	29	40
34890	Lead, bottom material, <63µm, µg/g	3	14	19
34895	Lithium, bottom material, <63µm, µg/g	3	20	30
34900	Magnesium, bottom material, <63µm, percent	3	.57	1.7
34905	Manganese, bottom material, <63µm, µg/g	3	780	860
34910	Mercury, bottom material, <63µm, µg/g	3	<DL	.06
34915	Molybdenum, bottom material, <63µm, µg/g	3	<DL	<DL
34920	Neodymium, bottom material, <63µm, µg/g	3	23	29
34925	Nickel, bottom material, <63µm, µg/g	3	26	31
34930	Niobium, bottom material, <63µm, µg/g	3	5	19
34935	Phosphorus, bottom material, <63µm, percent	3	.08	.18
34940	Potassium, bottom material, <63µm, percent	3	1.2	2.9
34945	Scandium, bottom material, <63µm, µg/g	3	8	11
34950	Selenium, bottom material, <63µm, µg/g	3	.8	.9
34955	Silver, bottom material, <63µm, µg/g	3	<DL	.2
34960	Sodium, bottom material, <63µm, percent	3	.13	.7
34965	Strontium, bottom material, <63µm, µg/g	3	160	400
34970	Sulfur, bottom material, <63µm, µg/g	3	.07	.2
34975	Tantalum, bottom material, <63µm, µg/g	3	<DL	<DL
34980	Thorium, bottom material, <63µm, µg/g	3	8.7	9.7
34985	Tin, bottom material, <63µm, µg/g	3	<DL	<DL
35000	Uranium, bottom material, <63µm, µg/g	3	2.3	2.9
35005	Vanadium, bottom material, <63µm, µg/g	3	69	120
35010	Yttrium, bottom material, <63µm, µg/g	3	19	21
35015	Ytterbium, bottom material, <63µm, µg/g	3	2	2

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
35020	Zinc, bottom material, <63µm, µg/g	3	87	96
38401	Ametryn, dissolved, µg/L	1	<DL	<DL
38442	Dicamba, dissolved, µg/L	40	<DL	<DL
38478	Linuron, dissolved, µg/L	40	<DL	<DL
38482	MCPA, dissolved, µg/L	40	<DL	<DL
38487	MCPB, dissolved, µg/L	40	<DL	<DL
38501	Methiocarb, dissolved, µg/L	40	<DL	<DL
38535	Propazine, dissolved, µg/L	1	<DL	<DL
38538	Propoxur, dissolved, µg/L	40	<DL	<DL
38711	Bentazon, dissolved, µg/L	40	<DL	.59
38746	2,4-DB, dissolved, µg/L	40	<DL	<DL
38811	Fluometuron, dissolved, µg/L	40	<DL	<DL
38866	Oxamyl, dissolved, µg/L	40	<DL	<DL
38933	Chlorpyrifos, dissolved, µg/L	64	<DL	.01
39036	Alkalinity, total filtered, fixed endpont, mg/L as $CaCO_3$	13	72	342
39086	Alkalinity, total filtered, incremental, mg/L as $CaCO_3$	84	70	452
39251	PCN, sediment, µg/kg dry weight	15	<DL	<DL
39333	Aldrin, sediment, µg/kg dry weight	15	<DL	1
39341	Lindane, dissolved, µg/L	63	<DL	<DL
39343	Lindane, sediment, µg/kg dry weight	15	<DL	2
39351	Chlordane, sediment, µg/kg dry weight	15	<DL	1
39363	DDD, sediment, µg/kg	15	<DL	7
39368	DDE, sediment, µg/kg	15	<DL	.6
39373	DDT, sediment, µg/kg	15	<DL	.2
39381	Dieldrin, dissolved, µg/L	64	<DL	<DL
39383	Dieldin, sediment, µg/kg dry weight	15	<DL	.3
39389	Endosulfane, sediment, µg/kg dry weight	15	<DL	<DL
39393	Endrin, sediment, µg/kg dry weight	15	<DL	<DL
39403	Toxaphene, sediment, µg/kg dry weight	15	<DL	<DL
39413	Heptachlor, sediment, µg/kg dry weight	15	<DL	<DL
39415	Metolachlor, dissolved, µg/L	64	.02	20
39423	Heptachlor, epoxide, sediment, µg/kg, dry weight	15	<DL	1
39481	Methoxychlor, sediment, µg/kg dry weight	15	<DL	<DL
39488	PCB-1221, total, µg/L	1	<DL	<DL
39492	PCB-1232, total, µg/L	1	<DL	<DL
39496	PCB-1242, total, µg/L	2	<DL	.3
39500	PCB-1248, total, µg/L	1	<DL	<DL
39504	PCB-1254, total, µg/L	1	<DL	<DL
39508	PCB-1260, total, µg/L	1	<DL	<DL
39516	PCB congener, total, in water, µg/L	5	<DL	3
39519	PCB, sediment, µg/kg	15	<DL	3
39532	Malathion, dissolved µg/L	64	<DL	.01
39542	Parathion, dissolved, µg/L	64	<DL	<DL
39572	Diazinon, dissolved µg/L	64	<DL	.02
39632	Atrazine, dissolved µg/L	64	.04	6.4
39732	2,4-D, dissolved, µg/L	40	<DL	.16
39742	2,4,5-T, dissolved, µg/L	40	<DL	<DL

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
39758	Mirex, sediment, µg/kg	15	<DL	<DL
39762	Silvex, dissolved, µg/L	40	<DL	<DL
46342	Alachlor, dissolved µg/L	64	<DL	4.9
49235	Triclopyr, dissolved, µg/L	40	<DL	<DL
49236	Propham, dissolved, µg/L	40	<DL	<DL
49260	Acetochlor, dissolved, µg/L	39	<DL	1.9
49266	Carbon, organic, sediment, <63µm, percent recovery	3	1.7	5.21
49267	Carbon, organic plus inorganic, sediment, <63µm, percent recovery	3	4.55	6.4
49269	Carbon, inorganic, sediment, <63µm, percent recovery	3	.88	4.7
49270	Carbon, inorganic, sediment, <2mm, g/kg dry weight	1	7.7	7.7
49271	Carbon, organic, sediment, <2mm g/kg dry weight	1	17	17
49272	Carbon, organic plus inorganic, sediment, <2mm, g/kg dry weight	1	24	24
49274	Titanium, sediment, <63µm, percent recovery	3	26	.35
49291	Picloram, dissolved, µg/L	40	<DL	<DL
49292	Oryzalin, dissolved, µg/L	40	<DL	<DL
49293	Norflurazon, dissolved, µg/L	40	<DL	<DL
49294	Neburon, dissolved, µg/L	40	<DL	<DL
49295	1-Naphthol, dissolved, µg/L	40	<DL	<DL
49296	Methomyl, dissolved, µg/L	40	<DL	<DL
49297	Fenuron, dissolved, µg/L	40	<DL	<DL
49298	Esfenvalerate, dissolved, µg/L	40	<DL	<DL
49299	*o*-Creosol, dissolved, µg/L	40	<DL	<DL
49300	Diuron, dissolved, µg/L	40	<DL	.33
49301	Dinoseb, dissolved, µg/L	40	<DL	<DL
49302	Dichlorprop, dissolved, µg/L	40	<DL	<DL
49303	Dichlobenil, dissolved, µg/L	40	<DL	<DL
49304	Dacthal, dissolved, µg/L	40	<DL	.04
49305	Clopyralid, dissolved, µg/L	40	<DL	<DL
49306	Chlorothalonil, dissolved, µg/L	40	<DL	<DL
49307	Choramben, dissolved, µg/L	40	<DL	<DL
49308	Hydroxycarbofuran, dissolved, µg/L	40	<DL	<DL
49309	Carbofuran, dissolved, µg/L	40	<DL	<DL
49310	Carbaryl, dissolved, µg/L	40	<DL	<DL
49311	Bromoxynil, dissolved, µg/L	40	<DL	<DL
49312	Aldicarb, dissolved, µg/L	40	<DL	<DL
49313	Aldicarb sulfone, dissolved, µg/L	40	<DL	<DL
49314	Aldicarb sulfoxide, dissolved, µg/L	40	<DL	<DL
49315	Acifluorfen, dissolved, µg/L	40	<DL	<DL
49316	*cis*-Nonachlor, sediment, <2mm, µg/kg	1	<DL	<DL
49317	*trans*-Nonachlor, sediment, <2mm, µg/kg	1	<DL	<DL
49318	Oxychlordane, sediment, <2mm, µg/kg	1	<DL	<DL
49319	Aldrin, sediment, <2mm, µg/kg	1	<DL	<DL
49320	*cis*-Chlordane, sediment, <2mm, µg/kg	1	<DL	<DL
49321	*trans*-Chlordane, sediment, <2mm, µg/kg	1	<DL	<DL
49322	Chloroneb, sediment, <2mm, µg/kg	1	<DL	<DL
49324	DCPA, sediment, <2mm, µg/kg	1	<DL	<DL

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
49327	*o,p'*-DDE, sediment, <2mm, µg/kg	1	<DL	<DL
49328	*p,p'*-DDE, sediment, <2mm, µg/kg	1	<DL	<DL
49331	Dieldrin, sediment, <2mm, µg/kg	1	<DL	<DL
49332	Endosulfan I, sediment, <2mm, µg/kg	1	<DL	<DL
49335	Endrin, sediment, <2mm, µg/kg	1	<DL	<DL
49338	alpha-BHC, sediment, <2mm, µg/kg	1	<DL	<DL
49339	beta-BHC, sediment, <2mm, µg/kg	1	<DL	<DL
49341	Heptachlor, sediment, <2mm, µg/kg	1	<DL	<DL
49342	Heptachlor epoxide, sediment, <2mm, µg/kg	1	<DL	<DL
49343	Hexachlorobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49344	Isodrin, sediment, <2mm, µg/kg	1	<DL	<DL
49345	Lindane, sediment, <2mm, µg/kg	1	<DL	<DL
49348	Mirex, sediment, <2mm, µg/kg	1	<DL	<DL
49349	*cis*-Permethrin, sediment, <2mm, µg/kg	1	<DL	<DL
49350	*trans*-Permethrin, sediment, <2mm, µg/kg	1	<DL	<DL
49351	Toxaphene, sediment, <2mm, µg/kg	1	<DL	<DL
49381	Dibutyl phthalate, sediment, <2mm, µg/kg	1	80	80
49382	Dioctyl phthalate, sediment, <2mm, µg/kg	1	<DL	<DL
49383	Diethyl phthalate, sediment, <2mm, µg/kg	1	11	11
49384	Dimethyl phthalate, sediment, <2mm, µg/kg	1	<DL	<DL
49387	Pyrene, sediment, <2mm, µg/kg	1	<DL	<DL
49388	1-methylpyrene, sediment, <2mm, µg/kg	1	<DL	<DL
49389	Benzo(A)pyrene, sediment, <2mm, µg/kg	1	<DL	<DL
49390	Indeno(1,2,3-CD)pyrene, sediment, <2mm, µg/kg	1	<DL	<DL
49391	2,2'-Biquinoline, sediment, <2mm, µg/kg	1	<DL	<DL
49392	Quinoline, sediment, <2mm, µg/kg	1	<DL	<DL
49393	Phenanthridine, sediment, <2mm, µg/kg	1	<DL	<DL
49394	Isoquinoline, sediment, <2mm, µg/kg	1	<DL	<DL
49395	2,4-Dinitrotoluene, sediment, <2mm, µg/kg	1	<DL	<DL
49396	2,6-Dinitrotoluene, sediment, <2mm µg/kg	1	<DL	<DL
49397	Benzo(K)fluoranthene, sediment, <2mm, µg/kg	1	<DL	<DL
49398	1-methyl-9H-fluorene, sediment, <2mm, µg/kg	1	<DL	<DL
49399	Fluorene. sediment, <2mm, µg/kg	1	<DL	<DL
49400	Isophorone, sediment, <2mm, µg/kg	1	<DL	<DL
49401	Bis(2-chloro ethoxy)methane, sediment, µg/kg	1	<DL	<DL
49402	Naphthalene, sediment, <2mm, µg/kg	1	<DL	<DL
49403	1,2-Dimethylnaphthalene, sediment, <2mm, µg/kg	1	<DL	<DL
49404	1,6-Dimethylnaphthalene, sediment, <2mm, µg/kg	1	<DL	<DL
49405	2,3,6-Trimethylnaphthalene, sediment, <2mm, µg/kg	1	<DL	<DL
49406	2,6-Dimethylnaphthalene, sediment, <2mm, µg/kg	1	47	47
49407	2-Chloronaphthalene, sediment, <2mm, µg/kg	1	<DL	<DL
49408	Benzo(G,H,I)perylene, sediment, <2mm, µg/kg	1	<DL	<DL
49409	Phenanthrene, sediment, <2mm, µg/kg	1	<DL	<DL
49410	1-ethylphenanthrene, sediment, <2mm, µg/kg	1	<DL	<DL
49411	4H-Cyclopenta(DEF)phenanthrene, sediment, <2mm, µg/kg	1	<DL	<DL
49413	Phenol, sediment, <2mm, µg/kg	1	44	44

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
49421	3,5-Xylenol, sediment, <2mm, µg/kg	1	<DL	<DL
49422	4-Chloro-*m*-cresol, sediment, <2mm, µg/kg	1	<DL	<DL
49424	C8-Alkylphenol, sediment, <2mm, µg/kg	1	<DL	<DL
49426	Bis(2-ethylhexyl)phthalate, sediment, <2mm, µg/kg	1	210	210
49427	Butyl benzyl phthalate, sediment, <2mm, µg/kg	1	38	38
49428	Acenaphthylene, sediment, <2mm, µg/kg	1	<DL	<DL
49429	Acenaphthene, sediment, <2mm, µg/kg	1	<DL	<DL
49430	Acridine, sediment, <2mm, µg/kg	1	<DL	<DL
49431	*n*-Nitrosodipropylamine, sediment, <2mm, µg/kg	1	<DL	<DL
49433	*n*-Nitrosodiphenylamine, sediment, <2mm, µg/kg	1	<DL	<DL
49434	Anthracene, sediment, <2mm, µg/kg	1	<DL	<DL
49435	2-Methylanthracene, sediment, <2mm, µg/kg	1	<DL	<DL
49436	Benz(A)anthracene, sediment, <2mm, µg/kg	1	<DL	<DL
49437	9,10-Anthroquinone, sediment, <2mm, µg/kg	1	<DL	<DL
49438	1,2,4-Trichlorobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49439	*o*-Dichlorobenzene, sediment, <2mm µg/kg	1	<DL	<DL
49441	*m*-Dichlorobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49442	*p*-Dichlorobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49443	Azobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49444	Nitrobenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49446	Pentachlorbenzene, sediment, <2mm, µg/kg	1	<DL	<DL
49449	Carbazole, sediment, <2mm, µg/kg	1	<DL	<DL
49450	Chrysene, sediment, <2mm, µg/kg	1	<DL	<DL
49451	*p*-Cresol, sediment, <2mm, µg/kg	1	130	130
49452	Dibenzothiophene, sediment, <2mm, µg/kg	1	<DL	<DL
49454	4-Bromophenyl phenyl ether, sediment, <2mm, µg/kg	1	<DL	<DL
49455	4-Chlorophenyl phenyl ether, sediment, <2mm, µg/kg	1	<DL	<DL
49458	Benzo(B)fluoranthene, sediment, <2mm, µg/kg	1	<DL	<DL
49459	PCB, sediment, <2mm, µg/kg	1	<DL	<DL
49460	Pentachloroanisole, sediment, <2mm, µg/kg	1	<DL	<DL
49461	Dibenz(A,H)anthracene, sediment, <2mm, µg/kg	1	<DL	<DL
49466	Fluoranthene, sediment, <2mm, µg/kg	1	<DL	<DL
49467	*o*-Chlorophenol, sediment, <2mm, µg/kg	1	<DL	<DL
49468	Benzo(C)cinnoline, sediment, <2mm, µg/kg	1	<DL	<DL
61509	Zinc, sludge, mg/kg	1	46	46
61515	Nickel, sludge, mg/kg	1	18	18
61521	Arsenic, sludge, mg/kg	1	3.2	3.2
61527	Cadmium, sludge, mg/kg	1	<DL	<DL
70300	Dissolved residue, mg/L at 180°C	97	165	3,100
70301	Dissolved solids, sum, mg/L	11	164	545
70303	Solids, dissolved, tons per acre	11	.42	.74
70320	Moisture content, percent	1	68.1	68 1
70322	Residue, total, volume percent	1	20	20
70331	Suspended sediment, percent <.062mm	127	19	100
70507	Orthophosphorus, total, mg/L as P	61	.03	.43
71845	Ammonia, total, mg/L	5	.07	.08

Table 4. Summary of selected surface-water and sediment-quality data for samples from the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter	Constituent	N	Min	Max
71846	Ammonia, dissolved, mg/L	6	.01	.13
71851	Nitrate, dissolved, mg/L as NO_3	7	.8	7.1
71856	Nitrite, dissolved, mg/L as NO_2	4	.03	.26
71883	Manganese, elemental, µg/L as Mn	2	<DL	<DL
71886	Phosphorus, total, mg/L as PO_4	6	.12	.49
71887	Nitrogen, total, mg/L as NO_3	5	4.6	16
71890	Mercury, dissolved, µg/L as Hg	2	<DL	<DL
71900	Mercury, total, µg/L as Hg	5	<DL	.9
71921	Mercury, sediment, mg/kg dry weight	1	.08	.08
74010	Iron, total, mg/L as Fe	1	75	75
80154	Suspended sediment, mg/L	185	3	298 3
81886	Perthane, sediment, µg/kg dry weight	15	<DL	<DL
81951	Total organic carbon, sediment, µg/kg dry weight	1	112,000	112,000
82365	Thorium, dissolved, µg/L as Th	5	<DL	<DL
82630	Metribuzin, dissolved, µg/L	64	<DL	.08
82660	2,6-Diethylaniline, dissolved, µg/L	64	<DL	<DL
82661	Trifluralin, dissolved, µg/L	64	<DL	.01
82662	Dimethoate, dissolved, µg/L	40	<DL	<DL
82663	Ethalfluralin, dissolved, µg/L	64	<DL	<DL
82664	Phorate, dissolved, µg/L	64	<DL	.06
82665	Terbacil, dissolved, µg/L	64	<DL	<DL
82666	Linuron, dissolved, µg/L	64	<DL	<DL
82667	Methyl Parathion, dissolved, µg/L	64	<DL	<DL
82668	EPTC, dissolved, µg/L	64	<DL	.51
82669	Pebulate, dissolved, µg/L	64	<DL	.01
82670	Tebuthiuron, dissolved, µg/L	64	<DL	<DL
82671	Molinate, dissolved, µg/L	64	<DL	<DL
82672	Ethoprop, dissolved, µg/L	64	<DL	<DL
82673	Benfluralin, dissolved, µg/L	64	<DL	<DL
82674	Carbofuran, dissolved, µg/L	64	<DL	.1
82675	Terbufos, dissolved, µg/L	64	<DL	<DL
82676	Pronamide, dissolved, µg/L	64	<DL	<DL
82677	Disulfoton, dissolved, µg/L	64	<DL	<DL
82678	Triallate, dissolved, µg/L	64	<DL	<DL
82679	Propanil, dissolved, µg/L	64	<DL	<DL
82680	Carbaryl, dissolved, µg/L	64	<DL	02
82681	Thiobencarb, dissolved, µg/L	64	<DL	<DL
82682	DCPA, dissolved, µg/L	64	<DL	<DL
82683	Pendimethalin, dissolved, µg/L	64	<DL	05
82684	Napropamide, dissolved, µg/L	64	<DL	<DL
82685	Propargite, dissolved, µg/L	64	<DL	<DL
82686	Methyl azinphos, dissolved, µg/L	64	<DL	<DL
82687	*cis*-Permethric, dissolved, µg/L	64	<DL	<DL
XXXXX	Niobium, dissolved, µg/L as Nb	5	<DL	<DL
XXXXX	Yttrium, dissolved, µg/L as Y	5	1	1
XXXXX	Platinum, sediment, µg/g	22	<DL	<DL

Table 5. Characteristics and description of studies pertaining to ground-water quality for the Oneida Reservation and vicinity, Wisconsin

[X, study includes description of these characteristics relevant to Reservation and vicinity; VOC's, volatile organic compounds; pCi/L, picocuries per liter]

Literature citation	Characteristics: Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	Trace elements	Radionuclides	VOC's	Bacteria	Other	Description
Bohrer and others (1981)		X								A regional study of ground-water contamination potential in the Fox Valley, including the Reservation and vicinity. Ground-water information included in the report is generalized. Water-quality data include state-wide contour maps of dissolved solids, chloride, and sulfate concentrations. Report also includes a large ground-water contamination potential map that also shows landfill sites in the study area.
DeWild and Krohelski (1995)	X					X				Regional study summarizing 29 ground-water samples and 29 soil-gas samples collected and analyzed for radon-222 from Reservations in Wisconsin. At two sites on Oneida Reservation ground-water concentrations ranged from 390 to 440 pCi/L and soil-gas concentrations ranged from 800 to 1,480 pCi/L
Donohue and Associates, Inc. (1976)		X								Countywide study, including a ground-water model, designed to develop intermediate and long-range water-supply plans for Brown County. Report includes detailed geology and some ground-water-quality information for part of the Reservation Concentrations of dissolved solids and fluoride in ground water are presented in contour maps of the county.
Drescher (1953)		X								Countywide study focusing mainly on information for the Green Bay area, including part of the Reservation. Report includes historical water level and ground-water-quality information. Several hydrogeologic sections presented in the report include parts of the Reservation and Duck Creek.
Finney and others (1997)			X		X					Local summary of the nonpoint-source control plan for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project. Report contains minimal ground-water-quality information for nitrate and arsenic.
Kammerer (1984)		X	X						X	Statewide summary of water-quality data from the USGS WATSTORE data base by aquifer and ground-water province. Constituents include major ions, dissolved solids, iron, manganese, and nitrate. Includes information from wells in the vicinity of the Reservation and several maps showing potential sources of ground-water contamination.
Kammerer (1995)		X	X						X	Statewide summary of shallow ground-water flow and quality data from the USGS WATSTORE data base, presented as contoured concentration maps. Constituents include major ions, dissolved solids, sulfide, fluoride, iron, manganese, and nitrate.
Knowles (1964)	X	X	X							Regional summary of ground-water conditions in the Green Bay, area including parts of the Reservation and vicinity. Report includes water-level, ground-water-quality, and geology information from several wells on the Reservation. Water-quality information includes field measurements, major ions, dissolved solids, and nitrate.
Knowles and others (1964)	X	X								Regional summary of ground-water and surface-water resources in the Green Bay area, including parts of the Reservation and vicinity. The ground-water information presented in the report is similar to that from Knowles (1964).
Krohelski (1986)	X									Countywide summary of hydrogeology, ground-water use and quality, including parts of the Reservation. Ground-water quality information from the Reservation and vicinity is limited. Several maps showing specific conductance by aquifer are included.
LeRoux (1957)	X	X								Countywide summary of geology and ground-water resources including parts of the Reservation and vicinity. Report includes ground-water-quality information Measured characteristics include pH, dissolved solids, and major ions.
Matzen and Saad (1996)				X						Regional summary of pesticide data from ground-water samples collected in the Western Lake Michigan Drainages between 1983 and 1995, including wells from the Reservation and vicinity. Few pesticides were detected in samples from wells near the Reservation.

Table 5. Characteristics and description of studies pertaining to ground-water quality for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics									Description
	Field measurements	Major ions/ dissolved solids	Nutrients	Pesticides	Trace elements	Radionuclides	VOC's	Bacteria	Other	
Mudrey and Bradbury (1992)	X	X			X	X				Statewide summary of trace constituent data in ground water that was collected as part of the U.S. Department of Energy NURE program. Includes wells in and near the Reservation. Report includes summary statistics and maps for 34 trace constituents and field measurements of pH, dissolved oxygen, alkalinity, and specific conductance.
Oakes and Hamilton (1973)		X								Regional hydrologic summary for northeast Wisconsin, which includes a wide variety of specific information for Duck Creek. Ground-water-quality information limited to dissolved solids.
Olcott (1968)		X								Regional hydrologic summary for the Fox-Wolf River Basin, which includes information for the area surrounding the Duck Creek Basin. Ground-water-quality information limited to dissolved solids.
Robertson and Saad (1996)			X							Regional summary of nutrients and suspended sediment for the Western Lake Michigan Drainages, which includes data from the Reservation and vicinity. Site-specific water-quality information is not included in the report; however, maps showing locations of ground-water and surface-water sampling locations are included.
Roesler (1986)		X								Countywide study designed to evaluate ground-water protection needs and recommend management actions. Report provides very little ground-water-quality information for the Reservation and vicinity but does provide a detailed map showing several potential sources of ground-water contamination and other areas of concern.
Ryling (1961)		X								Regional study designed to delimit the extent of saline ground water in eastern Wisconsin Includes maps of dissolved sulfate, chloride, and solids concentrations. Reservation and vicinity is included in mapped area.
Siegel (1989)		X			X	X			X	Regional summary of available geochemical information for the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the U.S. Geological Survey's Regional Aquifer-Systems Analysis (RASA) program and includes the Reservation and vicinity Report includes generalized contour maps of ground-water-quality including dissolved solids, hydrochemical facies, sulfate, chloride, iron, manganese, and trace metals. Also included are concentrations maps of oxygen, hydrogen, and carbon isotopic ratios.
Union Carbide (1978)	X	X			X	X				Regional summary of trace-constituent data in ground water, surface water, and stream sediment collected as part of the U.S. Department of Energy NURE program. Includes wells in and near the Reservation. Report includes summary statistics and maps for 34 trace constituents and field measurements of pH, dissolved oxygen, alkalinity, and specific conductance
U.S Environmental Protection Agency (1992)									X	Statewide documentation of risk evaluation of the environmental problems faced by Tribes in Wisconsin. Water-resources-related problems described in the report and relevant to the Reservation include industrial, municipal and nonpoint-source discharges; drinking water and ground-water contamination; physical degradation of aquatic habitat; unintended releases of toxic substances; and pesticides.
Warzecha and others (1995)		X	X	X	X	X		X		Statistically designed statewide survey of 538 wells in Wisconsin Includes wells in the vicinity of the Reservation. Most of the wells near the Reservation were below standards for the measured constituents, which include nitrate, sulfate, atrazine, arsenic, radon, and bacteria
Young (1992a)		X							X	Regional summary of available hydrogeologic information for the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the USGS RASA program and includes the Reservation and vicinity. Report includes generalized contour maps of ground-water quality including dissolved solids and hydrochemical facies.
Young (1992b)		X							X	Regional summary of a study of the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the USGS RASA program and includes the Reservation and vicinity. Report includes generalized contour maps of ground-water quality, including dissolved solids, boron, oxygen-18/oxygen-16 isotopic ratio, and hydrochemical facies.

Table 6. Characteristics and description of studies pertaining to ground-water quantity and flow for the Oneida Reservation and vicinity, Wisconsin

[X, study includes description of these characteristics relevant to Reservation and vicinity]

Literature citation	Characteristics								Description
	Quantity	Flow or movement	Water use	Aquifer characteristics	Modeling	Recharge/ discharge	Geology	Management Issues	
Bohrer and others (1981)		X		X			X		A regional study of ground-water contamination potential in the Fox Valley, including the Reservation and vicinity. Ground-water information included in the report is generalized. Report does include a large ground-water contamination potential map that also shows landfill sites in the study area.
Conlon (1998)	X	X	X	X	X	X	X	X	A regional ground-water model set up for the Fox Cities area and the Lower Fox River Valley as a tool in assessing the water resources of the sandstone aquifer. Model area includes the Reservation and vicinity.
Donohue and Associates, Inc. (1976)	X	X	X	X	X	X	X	X	Countywide study, including a ground-water model, designed to develop intermediate and long-range water-supply plans for Brown County. Report includes detailed geology and some ground-water quality information for part of the Reservation Ground-water model grid is fairly coarse (20 cells by 20 cells) and includes only several cells for the Reservation area.
Donohue and Associates, Inc. (1977)	X	X	X		X			X	This report is an update to Donohue and Associates, Inc. (1976). The report includes revised projected water-use data and ground-water modeling results.
Drescher (1953)	X	X	X	X	X	X	X	X	Countywide study focusing mainly on information for the Green Bay area, including part of the Reservation. Report includes historical water-level and ground-water quality information. Several hydrogeologic sections presented in the report include parts of the Reservation and Duck Creek.
Emmons (1987)	X	X	X	X	X	X	X		A regional ground-water model designed to evaluate the bedrock aquifer system in northeastern Wisconsin. This study was a subproject of the USGS RASA program. The model area includes the Reservation and vicinity.
Feinstein (1986)	X	X	X	X	X	X	X	X	A local ground-water flow model designed to characterize the flow properties of the shallow ground-water system and delineate land areas that are important sources of water to the aquifer system The report provides a variety of detailed hydrogeologic information for much of the Reservation and vicinity.
Feinstein and Anderson (1987)	X	X	X	X	X	X	X	X	A local study that used a ground-water flow model to evaluate recharge and potential for contamination of the sandstone aquifer in northeastern Wisconsin. The model was developed by Feinstein (1986) and includes the northern part of the Reservation and Duck Creek. The report includes a map of contamination potential for the study area.
Finney and others (1997)	X	X					X		Local summary of the nonpoint-source control plan for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project. Ground-water information in the report is minimal but includes brief descriptions of aquifer characteristics, geology, and ground-water flow.
H.S. Garn, U.S. Geological Survey, written commun., 1998		X							Local summary of water-level data collected from three shallow observation wells installed at various depths directly adjacent to the USGS Duck Creek gaging station. This memo from the USGS to the Oneida Tribe includes data collected from April 1996 to November 1997.
Kammerer (1995)		X		X		X	X		Statewide summary of shallow ground-water flow and quality data from the USGS WATSTORE data base. Includes detailed water-table map of the State with arrows showing direction of flow in the vicinity of the Reservation.
Knowles (1964)	X	X	X	X	X	X	X	X	Regional summary of ground-water conditions in the Green Bay area, including parts of the Reservation and vicinity. Report includes water-level, ground-water-quality, and geologic information from several wells on the Reservation. Report also documents the regional recovery of water levels in the sandstone aquifer after the city of Green Bay switched to Lake Michigan for its public supplies beginning in 1957.

Table 6. Characteristics and description of studies pertaining to ground-water quantity and flow for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics								Description
	Quantity	Flow or movement	Water use	Aquifer characteristics	Modeling	Recharge/ discharge	Geology	Management issues	
Knowles and others (1964)	X	X	X	X			X		Regional summary of ground-water and surface-water resources in the Green Bay area, including parts of the Reservation and vicinity. The ground-water information presented in this report is similar to the information from Knowles (1964).
Krohelski (1986)	X	X	X	X	X	X	X		Countywide summary of hydrogeology, ground-water use and quality, including part of the Reservation. Report includes descriptions of geology, aquifer characteristics, and a ground-water flow model of the study area.
LeRoux (1957)	X	X	X	X		X	X		Countywide summary of geology and ground-water resources, including parts of the Reservation and vicinity. Report includes geology, aquifer characteristics, and historical water levels.
Mandle and Kontis (1992)	X	X		X	X	X	X		Regional summary of a ground-water flow model for the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the USGS RASA program and includes the Reservation and vicinity. The model contains 5 layers; rows and columns are 16 miles wide. The report includes descriptions of model boundary conditions and generalized maps of aquifer characteristics used for model input. The report includes generalized contour maps of simulated potentiometric surfaces and drawdowns for modeled aquifers.
Oakes and Hamilton (1973)	X	X		X			X		Regional hydrologic summary for northeast Wisconsin, which includes a wide variety of specific information for Duck Creek. Aquifer-thickness, geology, water-table, and potentiometric-surface maps include the Reservation and vicinity.
Olcott (1968)	X	X		X			X		Regional hydrologic summary for the Fox-Wolf River Basin, which includes information for the area surrounding the Duck Creek Basin. Includes aquifer-thickness, geology, and potentiometric-surface maps.
Olcott (1992)	X	X	X	X			X		Regional summary of aquifer systems in Iowa, Michigan, Minnesota, and Wisconsin. Includes maps of geology, aquifers, and aquifer characteristics. Large-scale maps show fairly good detail in the vicinity of the Reservation.
Roesler (1986)		X	X	X			X	X	Countywide study designed to evaluate ground-water protection needs and recommend management actions. Report reiterates much of LeRoux (1957) and provides only general ground-water information for the Reservation and vicinity.
Ryling (1961)		X					X		Regional study designed to delimit the extent of saline ground water in eastern Wisconsin. Includes description of geology and ground-water flow in the vicinity of the Reservation.
Walker and others (1998)	X	X	X		X		X	X	A regional study utilizing optimization techniques to evaluate specific management plans for minimizing drawdown while optimizing well yield near the Fox Cities and Green Bay Metropolitan area. Uses regional ground-water model developed by Conlon (1998) and includes Oneida public-supply well in several management scenarios.
Young (1992a)	X	X		X	X		X		Regional summary of available hydrogeologic information for the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the USGS RASA program and includes the Reservation and vicinity. Report includes geology and generalized contour maps of aquifer characteristics. Also included are summary tables of sources of information for aquifer characteristics for the region, as well as in the vicinity of the Reservation.
Young (1992b)	X	X		X	X		X		Summary of a regional study of the Cambrian-Ordovician aquifer in the northern Midwest. The study was part of the USGS RASA program and includes the Reservation and vicinity. Report includes geology maps and generalized contour maps of aquifer characteristics.

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin

[N, number of samples; Min, minimum value,; Max, maximum value; <DL, less than the detection limit; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; mg/kg, milligrams per kilogram; pCi/L, picocuries per liter; MPN, most probable number; MUG, 4-methylumbelliferyl-D-galactopyranoside; ONPG, ortho-nitrophenyl-*B*-galactoside; XXXXX, parameter code unknown]

Parameter code	Constituent	N	Min	Max
00010	Water temperature, field, °C	177	4	18
00080	Color, platinum cobalt scale	4	3	3
00094	Specific conductance, field, µS/cm at 25°C	190	97	9,310
00095	Specific conductance, µS/cm at 25°C	216	190	6,850
00134	Solids, total dissolved, at 180°C	43	244	1,180
00300	Oxygen, dissolved, mg/L	3	<DL	1.3
00310	Biochemical oxygen demand, mg/L (5 day-20°C)	5	<DL	9.3
00335	Chemical oxygen demand, low level	2	<DL	5
00340	Chemical oxygen demand, unfiltered, mg/L	267	<DL	7,600
00400	pH, field	369	2	8.9
00403	pH, lab	192	2.04	8.5
00410	Alkalinity, total, mg/L as $CaCO_3$	232	<DL	410
00435	Acidity, total, mg/L as $CaCO_3$	1	<DL	<DL
00440	Bicarbonate, mg/L as HCO_3	1	298	298
00445	Carbonate, mg/L as CO_3	1	<DL	<DL
00500	Residue, total, mg/L	25	180	4,650
00602	Nitrogen, mg/L as N	2	.28	.56
00607	Nitrogen, organic, dissolved, mg/L as N	5	.18	.34
00608	Nitrogen, ammonia, dissolved, mg/L as N	5	<DL	.17
00610	Nitrogen, ammonia, total, mg/L as N	25	<DL	.29
00613	Nitrogen, nitrite, dissolved, mg/L as N	80	<DL	.02
00615	Nitrogen, nitrite, total, mg/L as N	5	<DL	<DL
00618	Nitrogen, nitrate, dissolved, mg/L as N	12	<DL	0 12
00620	Nitrogen, nitrate, total, mg/L as N	5	<DL	.05
00623	Nitrogen, kjeldahl, dissolved, mg/L	5	19	.46
00625	Nitrogen, kjeldahl, total, mg/L as N	5	0.4	1.3
00630	Nitrogen, nitrite plus nitrate, total, mg/L as N	105	<DL	1.06
00631	Nitrogen, nitrite plus nitrate, dissolved, mg/L as N	80	<DL	10
00666	Phosphorus, dissolved, mg/L as P	27	.01	.05
00680	Carbon, organic, total, mg/L as C	2	2	3
00681	Carbon, organic, dissolved, mg/L as C	91	1	2,000
00720	Cyanide, total, mg/L	12	<DL	.01
00900	Hardness, total, mg/L as $CaCO_3$	245	65	1,400
00902	Hardness, noncarbonate, mg/L as $CaCO_3$	1	26	26
00915	Calcium, dissolved, mg/L	138	12	280
00916	Calcium, total, mg/L as Ca	44	11	120
00925	Magnesium, dissolved, mg/L as Mg	138	8.8	210
00927	Magnesium, total, mg/L as Mg	44	12	97
00929	Sodium, total, mg/L as Na	46	3	31
00930	Sodium, dissolved, mg/L as Na	110	4.2	240
00931	Sodium adsorption ratio	53	.1	3.9
00932	Sodium, percent	18	2	39
00935	Potassium, dissolved, mg/L as K	24	.6	8.6

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
00937	Potassium, total, mg/L as K	2	19.1	19 6
00940	Chloride, dissolved, mg/L as Cl	284	<DL	680
00945	Sulfate, dissolved, mg/L as SO_4	234	<DL	3,300
00950	Fluoride, dissolved, mg/L as F	5	4	1.9
00951	Fluoride, total, mg/L as F	40	0.14	2.92
00955	Silica, dissolved, mg/L	23	7.7	31
01000	Arsenic, dissolved, µg/L as As	39	<DL	10
01002	Arsenic, total, µg/L	119	<DL	4,300
01005	Barium, dissolved, µg/L as Ba	25	30	539
01007	Barium, total, µg/L as Ba	22	<DL	190
01010	Beryllium, dissolved, µg/L as Be	38	< 5	10
01012	Beryllium, total, µg/L	15	<DL	10
01013	Beryllium, sediment, mg/kg dry weight	4	10	10
01020	Boron, dissolved, mg/L as B	23	35	311
01022	Boron, total, mg/L as B	20	.14	32
01025	Cadmium, dissolved, µg/L as Cd	21	<DL	1
01027	Cadmium, total, µg/L	40	<DL	220
01030	Chromium, dissolved, µg/L as Cr	40	1	13
01034	Chromium, total, µg/L	63	<DL	94
01035	Cobalt, dissolved, µg/L as Co	23	<2	18
01037	Cobalt, total, µg/L as Co	26	<DL	5,500
01040	Copper, dissolved, µg/L as Cu	38	1	14
01042	Copper, total, µg/L	79	<DL	1,500
01045	Iron, total, µg/L	51	<DL	190
01046	Iron, dissolved, mg/L as Fe	108	<DL	4,900
01049	Lead, dissolved, µg/L as Pb	17	<DL	10
01051	Lead, total, µg/L as Pb	79	<DL	400
01052	Lead, total, in bottom material, µg/g	10	<DL	15
01055	Manganese, total, µg/L as Mn	73	<DL	6,800
01056	Manganese, dissolved, µg/L as Mn	41	2	3,000
01057	Thallium, dissolved, µg/L as Tl	23	<2	4
01059	Thallium, total, µg/L as Tl	3	<DL	13
01060	Molybdenum, dissolved, µg/L	38	1	26
01065	Nickel, dissolved, µg/L as Ni	38	1	26
01067	Nickel, total, µg/L as Ni	58	0	11,000
01075	Silver, dissolved, µg/L as Ag	23	<DL	3
01077	Silver, total, µg/L as Ag	12	<DL	1
01080	Strontium, dissolved, µg/L	4	10	2,900
01085	Vanadium, dissolved, µg/L as V	38	<DL	21
01087	Vanadium, total, µg/L as V	2	92	100
01090	Zinc, dissolved, µg/L as Zn	38	8	398
01092	Zinc, total, µg/L as Zn	46	<DL	90,000
01094	Zinc, total recoverable, µg/L as Zn	15	<DL	2,700
01097	Antimony, total, µg/L as Sb	14	<DL	1
01099	Zinc, total, µg/L as Zn	5	<DL	62
01105	Aluminum, total, µg/L as Al	3	<DL	17,000

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
01106	Aluminum, dissolved, µg/L as Al	38	10	70
01130	Lithium, dissovled, µg/L as Li	38	5	29
01132	Lithium, total, µg/L as Li	3	<DL	<DL
01145	Selenium, dissolved, µg/L as Se	39	<DL	1
01147	Selenium, total, µg/L as Se	30	<DL	50
01160	Zirconium, dissolved, µg/L	23	<DL	5
01187	Scandium, dissolved, µg/L	23	<DL	1
22703	Uranium, dissolved, µg/L	23	<DL	2.26
31508	Coliform, total, 5 tube MPN	8	<DL	<DL
31855	Bacteria, sulfate reducing	1	<DL	<DL
32101	Bromodichloromethane, total, µg/L	91	<DL	3
32102	Carbon tetrachloride, total, µg/L	91	<DL	3
32103	1,2-Dichloroethane, total, µg/L	72	<DL	3
32104	Bromoform, total, µg/L	91	<DL	3
32105	Dibromochloromethane, total, µg/L	91	<DL	3
32106	Chloroform, total, µg/L	91	<DL	11
32240	Tannin, lignin, mg/L	9	.6	2.8
34010	Toluene, total, µg/L	86	<DL	6
34030	Benzene, total, µg/L	86	<DL	3
34043	Phenolics, total, µg/L	4	<DL	1,000
34200	Acenaphthylene, total, µg/L	23	5	5
34205	Acenaphthene, total, µg/L	23	5	5
34210	Acrolein, total, µg/L	2	<DL	<DL
34215	Acrylonitrile, total, µg/L	2	<DL	<DL
34220	Anthracene, total, µg/L	23	5	5
34230	Benzo(B)fluoranthene, total, µg/L	23	10	10
34235	Benzene, dissolved	10	<DL	<DL
34242	Benzo(K)fluoranthene, total, µg/L	23	10	10
34247	Benzo(A)pyrene, total, µg/L	24	<DL	10
34273	Bis(2-chloroethyl)ether, total, µg/L	23	5	5
34278	Bis(2-chloroethyl)methane, total, µg/L	23	5	5
34283	Bis(2-chloroisopropyl)ether, total, µg/L	23	5	5
34292	Butyl benzyl phthalate, total, µg/L	23	5	5
34301	Chlorobenzene, total, µg/L	91	<DL	3
34311	Chloroethane, total, µg/L	91	<DL	3
34320	Chrysene, total, µg/L	23	10	10
34336	Diethyl phthalate, total, µg/L	23	5	35
34341	Dimethyl phthalate, total, µg/L	23	5	11
34371	Ethylbenzene, total, µg/L	86	<DL	3
34376	Fluoranthene, total, µg/L	23	5	5
34381	Fluorene, total, µg/L	23	5	5
34386	Hexachlorocyclopentadiene, total, µg/L	24	<DL	5
34391	Hexachlorobutadiene, total, µg/L	12	<DL	<DL
34396	Hexachloroethane, total, µg/L	24	<DL	5
34403	Indeno[1,2,3-*cd*]pyrene, total, µg/L	23	10	10
34408	Isophorone, total, µg/L	23	5	5

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
34413	Bromomethane, total, µg/L	91	<DL	5.5
34418	Chloromethane, total, µg/L	69	<DL	2.8
34423	Dichloromethane, total, µg/L	89	<DL	11
34428	*N*-Nitrosodi-*n*-propylamine, total, µg/L	23	5	5
34433	*N*-Nitrosodiphenylamine, total, µg/L	23	5	5
34438	*N*-Nitrosodimethylamine, total, µg/L	23	5	5
34447	Nitrobenzene, total, µg/L	23	5	5
34452	4-Chloro-3-methyl phenol, total, µg/L	23	5	30
34461	Phenanthrene, total, µg/L	23	5	5
34469	Pyrene, total, µg/L	23	5	5
34475	Tetrachloroethylene, total, µg/L	87	<DL	3
34478	Tetrachloroethylene, bottom material, µg/kg	4	<DL	<DL
34481	Toluene, dissolved, µg/L	12	<DL	<DL
34488	Trichlorofluoromethane, total, µg/L	85	<DL	3
34496	1,1-Dichloroethane, total, µg/L	91	<DL	3
34501	1,1-Dichloroethylene, total, µg/L	91	<DL	3
34506	1,1,1-Trichloroethane, total, µg/	92	<DL	3
34511	1,1,2-Trichloroethane, total, µg/L	91	<DL	3
34516	1,1,2,2-Tetrachloroethane, total, µg/L	91	<DL	4.4
34521	Benzo(G,H,I)perlyene, total, µg/L	23	10	10
34526	Benzo(A)anthracene, total, µg/L	23	5	10
34531	1,2-Dichloroethane, total, µg/L	19	<DL	<DL
34536	1,2-Dichlorobenzene, total, µg/L	80	<DL	5
34541	1,2-Dichloropropane, total, µg/L	82	<DL	3
34546	1,2-Dichloroethylene, total, µg/L	91	<DL	4.5
34551	1,2,4-Trichlorobenzene, total, µg/L	49	<DL	5
34556	Dibenzo(A,H)anthracene, total, µg/L	23	10	10
34561	1,3-Dichloropropene, total, µg/L	63	<DL	3
34566	1,3-Dichlorobenzene, total, µg/L	80	<DL	5
34571	1,4-Dichlorobenzene, total, µg/L	80	<DL	5
34576	2-Chloroethyl vinyl ether, total, µg/L	74	<DL	3
34581	2-Chloronaphthalene, total, µg/L	23	5	5
34586	2-Chlorophenol, total, µg/L	23	5	6
34591	2-Nitrophenol, total, µg/L	23	5	6
34596	Dioctyl phthalate, total, µg/L	23	10	10
34601	2,4-Dichlorophenol, total, µg/L	23	5	6
34606	2,4-Dimethylphenol, total, µg/L	23	5	6
34611	2,4-Dinitrotoluene, total, µg/L	23	5	5
34616	2,4-Dinitrophenol, total, µg/L	23	20	20
34621	2,4,6-Trichlorophenol, total, µg/L	23	5	20
34626	2,6-Dinitrotoluene, total, µg/L	23	5	5
34636	4-Bromophenyl phenyl ether, total, µg/L	23	5	5
34641	4-Chlorophenyl phenyl ether, total, µg/L	23	5	5
34646	4-Nitrophenol, total, µg/L	23	30	30
34657	2-Methyl-4,6-dinitrophenol, total, µg/L	23	30	30
34668	Dichlorodifluoromethane, total, µg/L	74	<DL	3

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
34671	Polychorinated biphenyl, total, µg/L	7	.1	.1
34680	Aldrin, µg/L	1	<DL	<DL
34688	Hexachlorobenzene, µg/L	1	<DL	<DL
34694	Phenol, total, µg/L	23	5	6
34696	Naphthalene, total, µg/L	35	<DL	5
34699	*trans*-1,3-Dichloropropene, total, µg/L	72	<DL	2.8
34704	*cis*-1,3-Dichloropropene, total, µg/L	72	<DL	.2
38432	Dalapon, µg/L	1	<DL	<DL
38437	1,2-Dibromo-3-chloropropane, total, µg/L	18	<DL	<DL
38692	Leptothrix, count per mL	2	<DL	3
38694	Gallionella, count per mL	2	<DL	<DL
38695	Crenothrix, count per mL	2	<DL	3
38865	Oxamyl, µg/L	1	<DL	<DL
38926	Endothall, µg/L	1	<DL	<DL
39032	Pentachlorophenol, total, µg/L	24	<DL	30
39033	Atrazine, µg/L	1	<DL	<DL
39051	Methomyl, µg/L	1	<DL	<DL
39053	Aldicarb, µg/L	1	<DL	<DL
39055	Simazine, µg/L	1	<DL	<DL
39061	PCP, sediment, µg/kg dry weight	2	20	20
39082	1,2-Dibromoethylene, total, µg/L	45	<DL	.5
39100	Bis(2-ethylhexyl)phthalate, total, µg/L	23	5	5
39110	Di-*n*-butyl phthalate, total, µg/L	23	5	95
39175	Vinyl chloride, total, µg/L	91	<DL	3
39180	Trichloroethylene, total, µg/L	91	<DL	3
39340	BHC Gamma (Lindane), µg/L	1	<DL	<DL
39348	alpha-Chlordane, µg/L	1	<DL	<DL
39350	Chlordane, µg/L	1	<DL	<DL
39356	Dual, µg/L	1	<DL	<DL
39380	Dieldrin, µg/L	1	<DL	<DL
39390	Endrin, µg/L	1	<DL	<DL
39400	Toxaphene, µg/L	1	<DL	<DL
39410	Heptachlor, µg/L	1	<DL	<DL
39420	Heptachlor epoxide, µg/L	1	<DL	<DL
39480	Methoxychlor, µg/L	1	<DL	<DL
39488	PCB-1221, total, µg/L	7	1	.1
39492	PCB-1232, total, µg/L	7	.1	.1
39496	PCB-1242, total, µg/L	8	.1	1.5
39500	PCB-1248, total, µg/L	7	.1	.1
39504	PCB-1254, total, µg/L	7	.1	.1
39508	PCB-1260, total, µg/L	7	1	.1
39515	PCB, total, µg/L	1	<DL	<DL
39516	PCB congener, total in water, µg/L	2	<DL	<DL
39700	Hexachlorobenzene, total, µg/L	23	5	5
39702	Hexachlorobenezne D, total, µg/L	23	5	5
39720	Picloram, µg/L	1	<DL	<DL

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
39730	2, 4-D, µg/L	1	<DL	<DL
39760	Silvex, total, µg/L	1	<DL	<DL
39810	gamma-Chlordane, µg/L	1	<DL	<DL
39941	Glyphosate, µg/L	1	<DL	<DL
46317	Alachlor, µg/L	1	<DL	<DL
46373	Deethylatrazine, µg/L	1	<DL	<DL
46374	Deisopropylatrazine, µg/L	1	<DL	<DL
46492	Triazine screen, µg/L	8	<DL	<DL
70295	Dissolved solids, mg/L	6	82	359
70300	Dissolved residue, mg/L at 180°C	98	129	1,840
70301	Dissolved solids, sum, mg/L	18	165	1,610
71825	Acidity, total, mg/L as H	2	.1	7
71846	Ammonia, dissolved, mg/L	5	.01	22
71851	Nitrate, dissolved, mg/L	1	.4	.4
71856	Nitrite, dissolved, mg/L	1	.03	.03
71883	Manganese, elemental, µg/L	1	<DL	<DL
71885	Iron, µg/L	1	600	600
71890	Mercury, dissolved, µg/L as Hg	16	.1	.1
71900	Mercury, total, µg/L	26	<DL	.24
74010	Iron, total, mg/L as Fe	122	<DL	880
76002	Radon-222, pCi/L	3	47	48
77041	Carbon disulfide, µg/L	11	<DL	<DL
77057	Vinyl acetate, µg/L	1	<DL	<DL
77093	*cis*-1,2-Dichloroethylene, total, µg/L	26	<DL	<DL
77103	2-Hexanone, µg/L	1	<DL	<DL
77117	Isopropylether, µg/L	1	<DL	<DL
77128	Styrene, total, µg/L	84	<DL	2
77135	*o*-Xylene, µg/L	2	<DL	<DL
77161	1,2-Dichloropropene, µg/L	9	<DL	<DL
77168	1,1-Dichloropropene, µg/L	26	<DL	<DL
77170	2,2-Dichloropropane, µg/L	26	<DL	<DL
77173	1,3-Dichloropropane, µg/L	26	<DL	<DL
77189	Butyl acetate, µg/L	2	<DL	<DL
77222	1,2,4-Trimethylbenzene, total, µg/L	12	<DL	<DL
77223	Isopropylbenzene, total, µg/L	14	<DL	<DL
77224	*n*-Propylbenzene, µg/L	12	<DL	<DL
77226	1,3,5-Trimethylbenzene, total, µg/L	12	<DL	<DL
77275	*o*-Chlorotoluene, µg/L	28	<DL	<DL
77277	*p*-Chlorotoluene, µg/L	27	<DL	<DL
77297	Bromochloromethane, µg/L	11	<DL	<DL
77342	*n*-Butylbenzene, µg/L	12	<DL	<DL
77350	sec-Butylbenzene, µg/L	12	<DL	<DL
77353	tert-Butylbenzene, µg/L	12	<DL	<DL
77356	*p*-Isopropyl toluene, µg/L	12	<DL	<DL
77424	Iodomethane, µg/L	1	<DL	<DL
77443	1,2,3-Trichloropropane, total, µg/L	26	<DL	<DL

Table 7. Summary of selected ground-water-quality data for samples from drinking-water wells near the Oneida Reservation and vicinity, Wisconsin—Continued

Parameter code	Constituent	N	Min	Max
77562	1,1,1,2-Tetrachloroethane, total, µg/L	28	<DL	<DL
77596	Dibromomethane, µg/L	26	<DL	<DL
77613	1,2,3-Trichlorobenzene, µg/L	11	<DL	<DL
77651	1,2-Dibromoethane (EDB), total, µg/L	26	<DL	.2
77700	Carbaryl, µg/L	1	<DL	<DL
77860	Butachlor, µg/L	1	<DL	<DL
78032	Methyl tert-butyl ether (MTBE), total, µg/L	17	<DL	<DL
78109	Allyl chloride, µg/L	1	<DL	<DL
78113	Ethylbenzene, total, µg/L	9	<DL	<DL
78133	Methyl isobutyl ketone, µg/L	1	<DL	<DL
78885	Diquat, µg/L	1	<DL	<DL
78918	Kerosene, µg/L	2	<DL	<DL
78919	Fuel oil, µg/L	2	<DL	<DL
78920	Gasoline, purge and trap, µg/L	4	<DL	<DL
79724	Xylene, total, µg/L	8	<DL	<DL
81287	Dinoseb, µg/L	1	<DL	<DL
81405	Carbofuran, µg/L	1	<DL	<DL
81408	Metribuzin, µg/L	1	<DL	<DL
81551	Xylene, total, µg/L	48	<DL	.2
81552	Acetone, µg/L	1	<DL	<DL
81555	Bromobenzene, total, µg/L	32	<DL	<DL
81575	Dichloroiodomethane, µg/L	2	<DL	<DL
81595	Methyl ethyl ketone, µg/L	11	<DL	<DL
81597	Methyl methacrylate, µg/L	1	<DL	<DL
81607	Tetrahydrofuran, µg/L	11	<DL	<DL
81611	Trichlortrifluoroethane, total, µg/L	11	<DL	<DL
82052	Dicamba, total, µg/L	1	<DL	<DL
82068	Potassium-40, dissolved, pCi/L	4	1.3	6.4
82080	Trihalomethane, total, µg/L	9	<DL	<DL
82303	Radon-222, total, pCi/L	5	290	440
82365	Thorium, dissolved, µg/L	23	<DL	98
82576	Aldicarb sulfoxide, µg/L	1	<DL	<DL
82587	Aldicarb sulfone, µg/L	1	<DL	<DL
85795	Xylene *m/p*, total, µg/L	2	<DL	<DL
99060	Coliform, total, ONPG, colonies/100 mL	14	<DL	1
99129	ONPG tubes positive	1	0	0
99130	MUG tubes positive	1	0	0
99131	Coliform, total, 10 tube MMO-MUG MPN index/100 mL	1	<DL	<DL
99132	E. coli, 10 tube MMO-MUG MPN index/100 mL	1	<DL	<DL
XXXXX	Niobium, dissolved, µg/L as Nb	23	<DL	15
XXXXX	Yttrium, dissolved, µg/L as Y	23	<DL	4

Table 8. Characteristics and description of studies pertaining to aquatic biology for the Oneida Reservation and vicinity, Wisconsin
[X, study includes description of these characteristics relevant to the Reservation and vicinity]

Literature citation	Characteristics											Description
	Invertebrates	Fish	Amphibian/reptile	Birds	Endangered/ threatened species	Algae/macrophytes	Biotic index values	Biology and water-chemistry comparisons	Habitat	Human effects	Management issues	
Brosseau and Schaepe (1981)	X	X				X	X					Local summary of biologic and chemical data for the Duck Creek Watershed, collected between July 1980 and August 1981. The report includes lists and numbers of invertebrates collected and biotic index values. Fish, macrophytes, and algae at each site are included in the published field notes.
Cogswell (1997)		X							X		X	Local summary of fisheries survey and management recommendations for Decaster Lake in the Reservation. Report includes lists and numbers of fish species caught during the study.
Cogswell (1998)		X					X		X			Local summary of fish surveys on Dutchman Creek, Lancaster Brook, South Branch Suamico River, Hemlock Creek, and the North Branch Ashwaubenon Creek in the Reservation Report includes lists and numbers of species caught and index of biotic integrity scores for each site, by season.
Cogswell and Bougie (1996)		X					X					Local summary of a fish-community study of Duck Creek Report includes lists and numbers of species collected in three zones of the stream during spring, summer, and fall. Also included are Index of Biotic Integrity (IBI) scores for each zone by season.
Finney and others (1997)	X	X	X		X		X		X			Local summary of the nonpoint-source control plan for the Duck, Apple, and Ashwaubenon Creeks Priority Watershed project. Biologic information includes habitat ratings and lists of endangered or threatened species present
Fitzpatrick and Giddings (1997)						X		X	X	X		Regional summary of stream-habitat characteristics, streamflow, and water-quality for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes a description of riparian vegetation along three reaches of Duck Creek.
Gansberg (1996)	X						X		X	X		Local assessment of nonpoint-source pollution for the Suamico and Little Suamico River Watershed. Stream-habitat conditions, aquatic macroinvertebrates, and water-chemistry and flow data were collected at three locations on the South Branch Suamico River near the northwest part of the Reservation The habitat was rated as "poor."
Girvin (1996)						X						Local study designed to evaluate the effects of herbicides transported from the Duck Creek Basin to Green Bay and Lake Michigan. The report includes concentrations and loads for atrazine, alachlor, cyanazine, and metolachlor and an evaluation of potential toxicity to several aquatic organisms.
Gruentzel (1979a)	X											Local summary of invertebrates found during a benthic study of 12 sites on Duck and Trout Creeks from fall 1978 to spring 1979.
Hill (1992)		X									X	Local summary of fisheries survey and management recommendations for Quarry Lake in the Reservation. Report includes lists and numbers of fish species caught during the study
M.E. Holey, written, commun., 1994		X								X		Local summary of tissue analyses of 29 fish samples collected from Duck Creek in 1994. This memo from the U.S. Fish and Wildlife Service to the Oneida Tribe includes pesticide and PCB results for each sample.
Kohler (1997)		X					X		X			Local summary of fish-community characteristics and fish-habitat relations for 10 reaches of Duck Creek. Report includes lists of species present in Duck and Trout Creeks and an analysis of fisheries potential using several habitat and biotic indexes, as well as regression-based models.

Table 8. Characteristics and description of studies pertaining to aquatic biology for the Oneida Reservation and vicinity, Wisconsin—Continued

Literature citation	Characteristics											Description
	Invertebrates	Fish	Amphibian/reptile	Birds	Endangered/ threatened species	Algae/macrophytes	Biotic index values	Biology and water-chemistry comparisons	Habitat	Human effects	Management issues	
Korb (1980)			X							X		Local summary of wood turtle tagging project on Trout and Duck Creeks. Report includes descriptions of the turtles tagged and locations where they were found.
Koss (1998)		X				X				X		Local newspaper article summarizing a water-resources survey of over 200 members of the Oneida Tribal community who live on or near the Reservation. The article includes information on trends in tribal water uses and how the community perceives the quality of water in Duck Creek.
Lenz (1997)	X						X	X				Regional study using benthic-macroinvertebrate community data to predict water quality in streams in the Western Lake Michigan Drainages. Analysis includes data collected from the Reservation and vicinity; however, site-specific data are not included in report.
Lenz and Miller (1996)	X						X					Regional study of three macroinvertebrate sampling methods employed at six streams, including Duck Creek, in the Western Lake Michigan Drainages. Includes a list of eight different biotic index values that relate to water quality for Duck Creek.
Scudder and others (1996)	X	X	X	X	X	X	X		X			Regional summary of 470 biological investigations relating to water quality in the Western Lake Michigan Drainages, which includes the Reservation. Report includes a list of fish, aquatic birds, and endangered aquatic biota found in the study area and general areas of occurrence.
Scudder and others (1997)	X	X										Regional summary of trace elements and synthetic organic compounds in sediment and biota from streams in the Western Lake Michigan Drainages. Report includes data from Duck Creek Biota samples from Duck Creek included caddisfly larvae, rock bass, and white sucker.
Sullivan (1997)		X					X		X			Regional summary of fish communities at 20 streams, including Duck Creek, in the Western Lake Michigan Drainages. Report includes lists and numbers of species collected, habitat evaluation, and index of biotic integrity scores for each stream. A comparison of fish-species composition between streams and relation between fish-species composition and environmental factors of each stream also are presented
Sullivan and others (1995)						X			X			Regional summary of streamflow and field measurements for 11 streams, including Duck Creek, monitored as part of the Western Lake Michigan Drainages NAWQA study. Report includes a description of flood-plain vegetation in the Duck Creek Basin.
U.S. Environmental Protection Agency (1991)	X					X	X		X			Local summary of benthic-macroinvertebrate rapid bioassessments done at four sites on Duck Creek. The report includes habitat descriptions and several different macroinvertebrate biotic index values for each site.
U S Environmental Protection Agency (1992)										X	X	Statewide documentation of risk evaluation of the environmental problems faced by Tribes in Wisconsin. Water-resources-related problems described in the report and relevant to the Reservation include industrial, municipal and nonpoint-source discharge; drinking-water and ground-water contamination; physical degradation of aquatic habitat; unintended releases of toxic substances; and pesticides.
Wisconsin Department of Natural Resources (1971)							X		X			A local summary of water-quality conditions of the Duck Creek, Suamico River, and Pensaukee River Basins. This study area includes a large part of the Reservation. The report includes chemical and biological data, as well as lists of wastewater sources, types of waste, and discharge rates in each basin.

Table 9. Examples of digital thematic data available from the Wisconsin Department of Natural Resources

[MB, megabytes; APL, (University of Wisconsin - Madison) Applied Population Laboratory; LICGF, (University of Wisconsin - Madison) Land Information and Computer Graphics Facility, DNR, (Wisconsin) Department of Natural Resources; WRZ, (DNR) Water Regulation and Zoning; WRM, (DNR) Water Resources Management, GCSM, Groundwater Contamination Susceptibility Model; IM, (DNR) Information Management; USDA, U.S. Department of Agriculture, NRCS, (USDA) Natural Resources Conservation Service, TRI, Toxic Release Inventory, USEPA, U.S. Environmental Protection Agency; USGS, U.S. Geological Survey; N/A, not available; TBD, to be determined]

Name (DNR filename)	Source	Source date	Scale	Resolution	Copyright (custodian)	Size (MB)	Description
Census Geography: Census Blocks (BLKPY100); Census Block Groups (BGPPY100)	TIGER/Line files from the 1990 Census, U.S Census Bureau	1990	1:100,000; 1:100,000	Unknown; unknown	Public domain (APL and LICGF); public domain (APL and LICGF)	600; 50	This data layer includes spatial geographic information only. For the demographic census data, contact U.S Census Bureau, the DNR Geographic Services Section, or the UW-Madison Applied Population Laboratory.
Dams (DAMPTXXX)	Wisconsin Dam Inventory; DNR Bureau of Water Regulation and Zoning, Dam Safety, and Floodplain Mgt. Section	1992	N/A	N/A	DNR (DNR WRZ)	Varies	Large and small dams (but not detention ponds or dams not located immediately adjacent to a waterway) are included in this point coverage. For additional information on individual dams, contact the Dam Safety/Floodplain Mgt Section of the DNR
Hydrologic Units (HUCPY250)	USGS and USEPA	1971–82	1:250,000	Unknown	Public domain (USEPA)	0.5	Hydrologic Units are large scale drainage basins that are assigned a hydrologic unit code, a number by which agencies such as the USGS, USEPA, USDA NRCS and others can use in hydrologic planning and management.
Hydrography - Rivers and Water Bodies (HYDNT2ML, HYDNT100, and HYDPT100)	USGS Digital Line Graphs	1979–80; 1979–89; 1979–89;	1:2,000,000; 1:100,000; 1:100,000;	Line 50 8 m, polygon 8,795 m^2; line 2.5 m, polygon 5 acres; N/A	Public domain (DNR WRM); public domain (DNR WRM)	6; 55; .07	Line and polygon coverages show rivers and water bodies such as lakes as derived from USGS digital line graphs. HYDNT100 includes an attribute to determine flow in rivers. HYDPT100 includes wells mapped as points separate from rivers.
Wetlands (WETPY024 and WETPT024)	DNR WRZ	1990–92; 1990–92	1:24,000; 1:24,000	2–5 acres: N/A	DNR (DNR WRZ); DNR (DNR WRZ)	Varies; varies	These coverages shows wetland locations. Depending on the county, WETPT024 has data for wetlands smaller than 2–5 acres.
Ecoregions (ECOPY2ML)	Map of Ecoregions of the United States, by J.M. Omernik	1987	1:2,000,000	Unknown	Public domain (USEPA)	.1	Part of a national coverage, the state of Wisconsin is broken into blocks with homogeneous features of land use, land-surface form, potential natural vegetation, and soils.
Land Surface Elevations (DEMGR500 and DEMGR075)	USGS Digital Elevation Models	1971–82; 1971–82	1640 ft; 246 ft	500 m, 75 m	Public domain (none); public domain (none)	1.0; 25	*Digital elevation models reproduce surficial* topography.
Land Use/Land Cover (LUCPY250)	USGS Land Use and Land Cover (LULC) Digital Data	1971–82	1:250,000	10-40 acres	DNR (DNR IM and Geo Services)	28	Detailed land use/land cover reproduced from NASA high-altitude aerial photographs taken during 1971–82.

Table 9. Examples of digital thematic data available from the Wisconsin Department of Natural Resources—Continued

Name (DNR filename)	Source	Source date	Scale	Resolution	Copyright (custodian)	Size (MB)	Description
Natural Divisions (NDVPY1ML)	Map of Natural Divisions of Wisconsin, by Clifford Germain and Francis Hole	1993	1:1,000,000	Unknown	Public domain (none)	.4	Regions of the State that share specific similar features of forest cover (actual or potential), soils, and topography.
Original Vegetation Cover (OVGPY500)	Map of Original Vegetation Cover of Wisconsin, by Robert Finley	1976	1:500,000	640 acres	Public domain (none)	7.0	Finley's map was created using land-survey notes from a mid- 1880's land survey, the first of Wisconsin. This coverage gives an approximation of the pre-European settlement vegetative cover of Wisconsin.
Groundwater Wells	DNR WRM and IM/ Geo Services Section groundwater retrieval network, GRN	1993	N/A	N/A	DNR (DNR WRM)	Varies	An attribute of the coverage ties each well to data collected by the DNR WRM, Groundwater section such as well type, chemical constituents, and location.
Superfund National Priority List Sites (NPLPY024)	USEPA Superfund National Priority List (NPL) sites derived from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) data base	1988–TBD	1:24,000	Unknown	Public domain (USEPA)	.3	Forty Superfund sites on the National Priority List in Wisconsin. These are sites where releases of hazardous substances may occur or have already occurred.
Toxic Release Inventory (TRI) Sites (TRIPTXXX)	USEPA TRI data base	1987–90	Various	N/A	Public domain (USEPA)	2	TRI sites are facilities that must report to the USEPA their annual releases and/or offsite transfers of all of 300-plus toxic substances they may be using or producing at a level above a certain threshold quantity
Bedrock Depth (BRDPY250)	Map of Depth to Bedrock of Wisconsin, WGNHS and USGS	1973, 1984–85 updates	1:250,000	10 acres	Public domain (none)	1.2	Depth to bedrock is the distance from the land surface to the top of the bedrock and is used in the Groundwater Contamination Susceptibility Model
Bedrock Type (BRTPY500)	Compilation sheets for map of Bedrock Geology of Wisconsin, WGNHS	1981	1:500,000	308,895 m^2	Public domain (none)	4	Bedrock type is the lithology of the uppermost rock layer. Categories are carbonate, sandstone, igneous/metamorphic/volcanic, and shale.
Groundwater Contamination Susceptibility Model (GCSM) (GCSPY500)	Analytical model of Groundwater Contamination Susceptibility, USGS and DNR	1984–95	1:500,000	Unknown	DNR (DNR WRM)	15	The GCSM Model was created by the DNR, USGS, WGNHS, and UW-Madison, and results were published in 1987 on a map at the scale of 1:1,000,000. Five layers were used in the model to determine the susceptibility of ground water contamination: bedrock depth, bedrock type, soil characteristics, surficial deposits, and water-table depth.

Table 9. Examples of digital thematic data available from the Wisconsin Department of Natural Resources—Continued

Name (DNR filename)	Source	Source date	Scale	Resolution	Copyright (custodian)	Size (MB)	Description
GCSM Soil Associations (SASPY250); Soil Characteristics (SCHPY250)	Map of Soil Associations in Wisconsin by Francis Hole	1968; 1968	1:250,000; 1:250,000	320,449 m^2; 320,504 m^2	Public domain (none); public domain (none)	.9; 1.7	Soil associations (SASPY250) are made up of one or more major soils units as well as at least one minor soil unit SCHPY250 consists of four categories of soil characteristics as grouped from the SASPY250 data and then used in the GCSM model.
STATSGO, State Soil *Geographic Database* (SGDPY250)	STATSGO (State Soil *Geographic Data* Base), USDA NRCS, *Soils section*	TBD	1:250,000	1,500 acres	Public domain (USDA NRCS)	3.5	There are 125 soils mapping units in the *state of Wisconsin, each of which contain* 3–21 components and up to 6 layers, each *representing a different soil horizon*
Surficial Deposits (SDPPY500)	Maps of Quaternary Geology (Surficial Deposits) in Wisconsin, USGS	1983–84	1:500,000	22,260 m^2	Public domain (none)	.6	Surficial deposits are the unconsolidated material that lies directly below the soil (approximately the first 5 ft from surface) and above the bedrock. Surficial deposits often have primary control on the susceptibility of ground water to contamination.
Water Table Depth (WTDPY250)	Map of Depth to Water Table in Wisconsin, USGS	1984–85	1:250,000	30,294 m^2	Public domain (none)	1.3	Depth to the water table is the distance between the land surface and the top of the water table

Water-Resources-Related Information for the Oneida Reservation and Vicinity, Wisconsin

WRIR 98–4266