



Water-Data Report 2011

491911094545101 LAKE OF THE WOODS, NORTH WEST ANGLE FLOWAGE NEAR NORTH WEST ANGLE, MN

Rainy Basin
Lake of the Woods Subbasin

LOCATION.--Lat 49°19'11", long 94°54'51" referenced to North American Datum of 1983, Lake of the Woods County, MN, Hydrologic Unit 09030009.

WATER-QUALITY RECORDS

REMARKS.--The USGS, in cooperation with the Minnesota Pollution Control Agency (MPCA), collected hydrologic and water-quality data from the primary U.S. inflows, main body, and outflow channels of Lake of the Woods. The data were collected to support the development of a water-quality model being developed by the MPCA.

The objectives of this study are to:(1) Collect water-quality samples and gage streamflow near the mouths of the Rainy and Warroad Rivers during the open water season of 2010, as part of the Nutrient-Sediment Loading Study, Phase I. Streamgaging would continue during the open-water season of 2011 to better develop index-velocity/discharge relations.(2) Collect water-quality samples at 10 sites in Lake of the Woods during the open-water season of 2010, as part of the In-Lake Nutrient Study, Phase I.(3) Measure streamflow velocities and cross-sectional areas of 5 channel constrictions in Lake of the Woods, as part of the Big Traverse Outlet Hydrology Study, Phase I. If velocities are sufficient. Channel locations near the Northwest Angle are Tug Channel, Canadian Channel, Sturgeon Channel, Flag Island Channel, and NW Angle Flowage.

**WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**

Part 1 of 5

[CaCO₃, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; SiO₂, silicon dioxide; ft, feet; ft³/s, cubic feet per second; m, meters; mg/L, milligrams per liter; mm Hg, millimeters of mercury; nm, nanometers; °C, degrees Celsius; μS/cm, microsiemens per centimeter; μg/L, micrograms per liter; <, less than; E, estimated]

Date	Sample start time	Medium name	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Color, water, filtered, platinum cobalt units (00080)	Discharge, instantaneous, ft ³ /s (00061)	Dissolved oxygen, unfiltered, water, mg/L (00300)	pH, water, unfiltered, field, standard units (00400)	pH, water, unfiltered, laboratory, standard units (00403)
10-24-2010	1115	Surface water	732	5.9	30	9,150	10.7	7.8	7.9

**WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**

Part 2 of 5

[CaCO₃, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; SiO₂, silicon dioxide; ft, feet; ft³/s, cubic feet per second; m, meters; mg/L, milligrams per liter; mm Hg, millimeters of mercury; nm, nanometers; °C, degrees Celsius; μS/cm, microsiemens per centimeter; μg/L, micrograms per liter; <, less than; E, estimated]

Date	Sample start time	Specific conductance, water, unfiltered, laboratory, μS/cm at 25 °C (90095)	Specific conductance, water, unfiltered, μS/cm at 25 °C (00095)	Temperature, water, °C (00010)	Transparency, water, in situ, Secchi disc, m (00078)	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Gage height, ft (00065)	Sampling depth, m (00098)	Stream width, ft (00004)
10-24-2010	1115	116	115	8.7	1.10	4.7	4.14	1.0	4,110

491911094545101 LAKE OF THE WOODS, NORTH WEST ANGLE FLOWAGE NEAR NORTH WEST ANGLE, MN—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 3 of 5

[CaCO₃, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; SiO₂, silicon dioxide; ft, feet; ft³/s, cubic feet per second; m, meters; mg/L, milligrams per liter; mm Hg, millimeters of mercury; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated]

Date	Sample start time	Number of sampling points, count (00063)	Sampler type (84164)	Sampling method (82398)	Loss on ignition of suspended solids, water, unfiltered, mg/L (00535)	Suspended solids, water, unfiltered, mg/L (00530)	Alkalinity, water, filtered, fixed endpoint titration, (pH 4.5) laboratory, mg/L as CaCO ₃ (29801)	Chloride, water, filtered, mg/L (00940)	Fluoride, water, filtered, mg/L (00950)
10-24-2010	1115	1	Kemmerer bottle	Thief sample	13	< 15	51	2.07	.06

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 4 of 5

[CaCO₃, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; SiO₂, silicon dioxide; ft, feet; ft³/s, cubic feet per second; m, meters; mg/L, milligrams per liter; mm Hg, millimeters of mercury; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated]

Date	Sample start time	Silica, water, filtered, mg/L as SiO ₂ (00955)	Sulfate, water, filtered, mg/L (00945)	Ammonia plus organic nitrogen, water, filtered, mg/L as N (00623)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrite, water, filtered, mg/L as N (00613)	Orthophosphate, water, filtered, mg/L as P (00671)	Phosphorus, water, filtered, mg/L as P (00666)
10-24-2010	1115	5.2	4.92	.47	.62	.013	.170	.003	.012	.019

491911094545101 LAKE OF THE WOODS, NORTH WEST ANGLE FLOWAGE NEAR NORTH WEST ANGLE, MN—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 5 of 5

[CaCO₃, calcium carbonate; FNU, Formazin nephelometric units; LED, light-emitting diode; N, nitrogen; P, phosphorus; SiO₂, silicon dioxide; ft, feet; ft³/s, cubic feet per second; m, meters; mg/L, milligrams per liter; mm Hg, millimeters of mercury; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated]

Date	Sample start time	Phosphorus, water, unfiltered, mg/L as P (00665)	Chlorophyll a, phytoplankton, chromatographic-fluorometric method, µg/L (70953)	Pheophytin a, phytoplankton, µg/L (62360)
10-24-2010	1115	.041	6.1	E 2.4