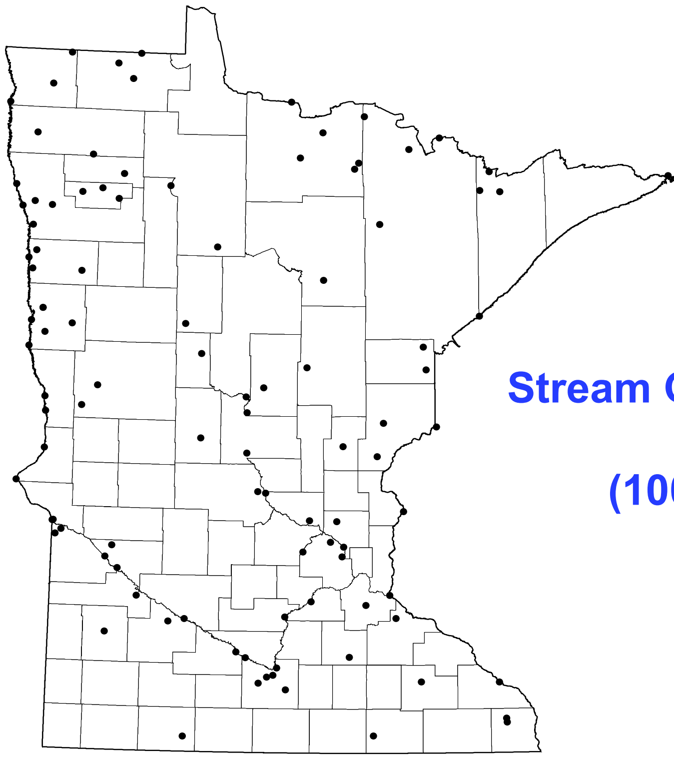
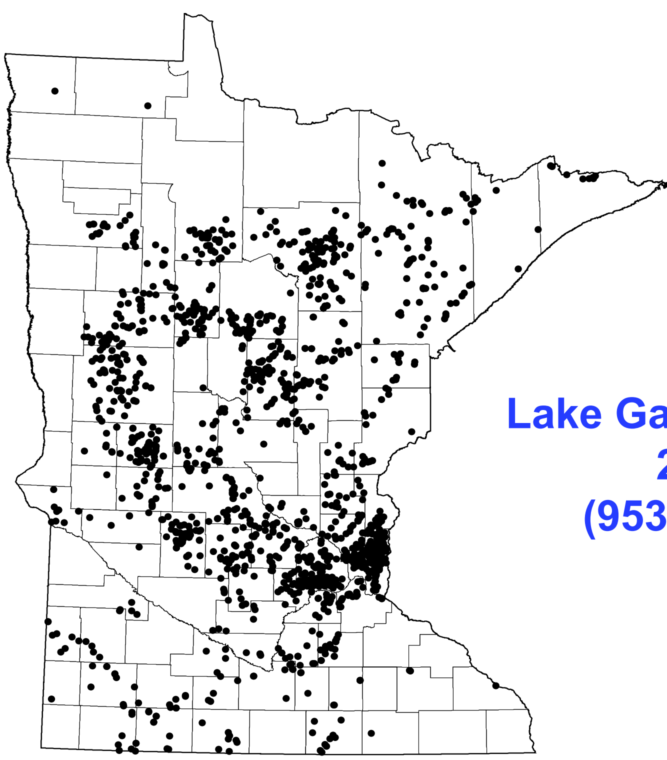
chapter two

surface water



Stream Gage Network
2002
(100 Gages)



Lake Gage Network
2002
(953 Gages)

Stream Flow

Introduction

The Stream Hydrology Unit is responsible for collecting, analyzing and distributing flow data for rivers and streams in Minnesota. Data for these activities comes from a network of stream gages located throughout Minnesota. Figure 1 shows the 81 major watersheds of the state and the location of the continuous recording gages that the DNR uses to monitor statewide watershed stream flow conditions. These gages are used to gather data including historic high and low flows, and information for computing statistics such as flood frequencies and exceedence values (see sidebar).

Engineers use stream flow data to design the hydraulic capacity of bridges, culverts and control structures. Planners use stream flow data for land use development and to determine water availability for industrial, domestic and agricultural consumption. Biologists use stream flow data to assist in evaluating aquatic habitat potential in streams. Knowing how much water is flowing or available in a stream is very important for flood and drought planning, as well as for the development of municipal and industrial works.

Stream Drainage Systems

There are many types of rivers and streams in Minnesota. Along the North Shore of Lake Superior, and along the Mississippi River blufflands in the southeast, are high gradient streams that have scoured channels into bedrock. In the northwest are highly meandered streams that are situated in an ancient lake bed and are prone to flooding. In the southern third of the state, streams are often entrenched with well developed channels and are largely impacted by agricultural practices. North central streams can be impacted by both agricultural and forest land uses.

Minnesota is unique in that two of the three continental divides in North America pass through it. These two continental divides separate river flows into three major drainage basins: the Hudson Bay/Arctic Ocean, the Great Lakes/Atlantic Ocean and the Mississippi River/Gulf of Mexico. Within these three basins are nine major river basins: the Red River of the North, Rainy River, Lake Superior, Upper and Lower Mississippi River, St. Croix River, Minnesota River, Missouri River and the Des Moines - Cedar River (Figure 2).

EXCEEDENCE VALUE

An exceedence value is a statistical parameter, based upon historical discharge records, and is the probability of stream flow *exceeding* a certain value. A 50% exceedence value (Q50) indicates that the discharge at that reporting station has been *equalled* or *exceeded* 50% of the time during a specific period. Exceedence values can be calculated on a daily, monthly or annual basis.

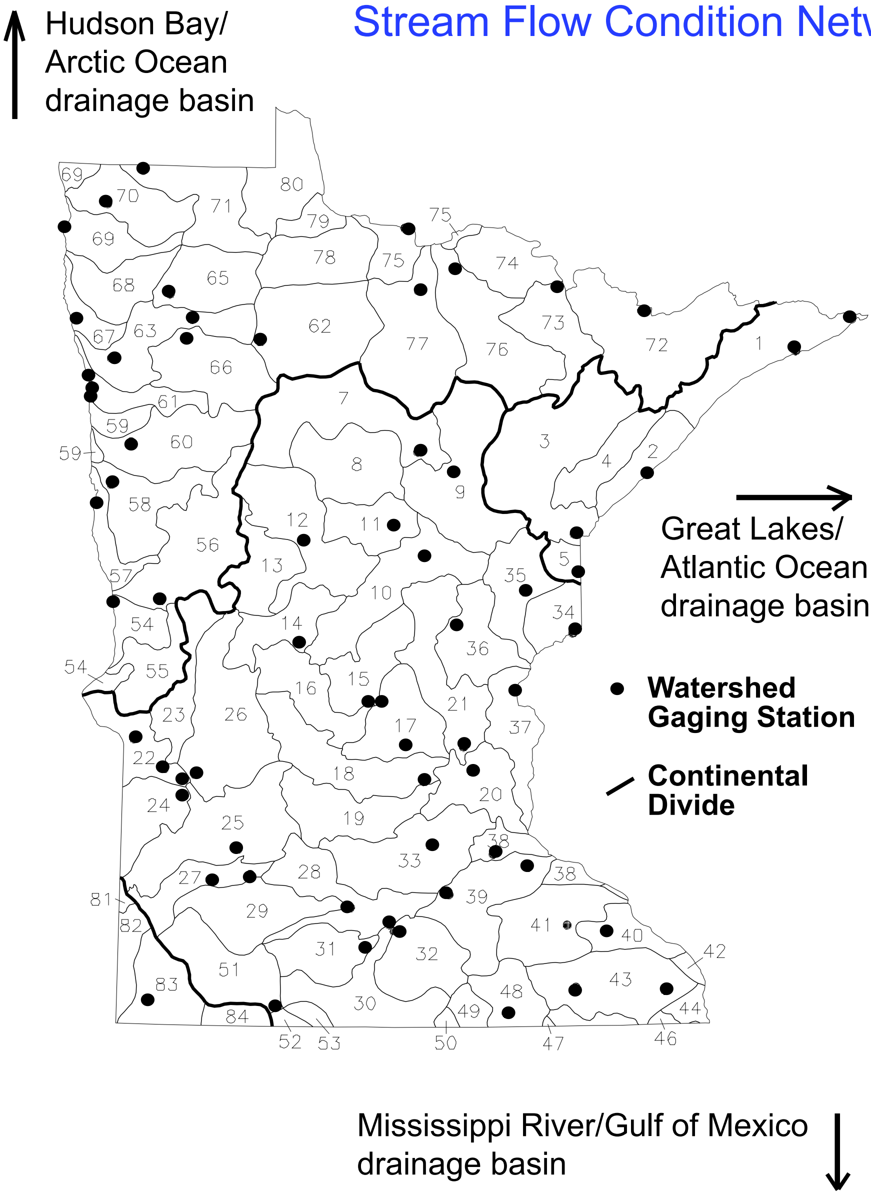
Stream flow reports are based upon the following exceedence values during the open water season.

Critical Flow = < annual Q90
Low Flow = < monthly Q75
Normal Flow = monthly Q75 to Q25
High Flow = > monthly Q25
Flood Flow = > NWS* flood stage
(or highest monthly Q10)

*** National Weather Service**

Figure 1

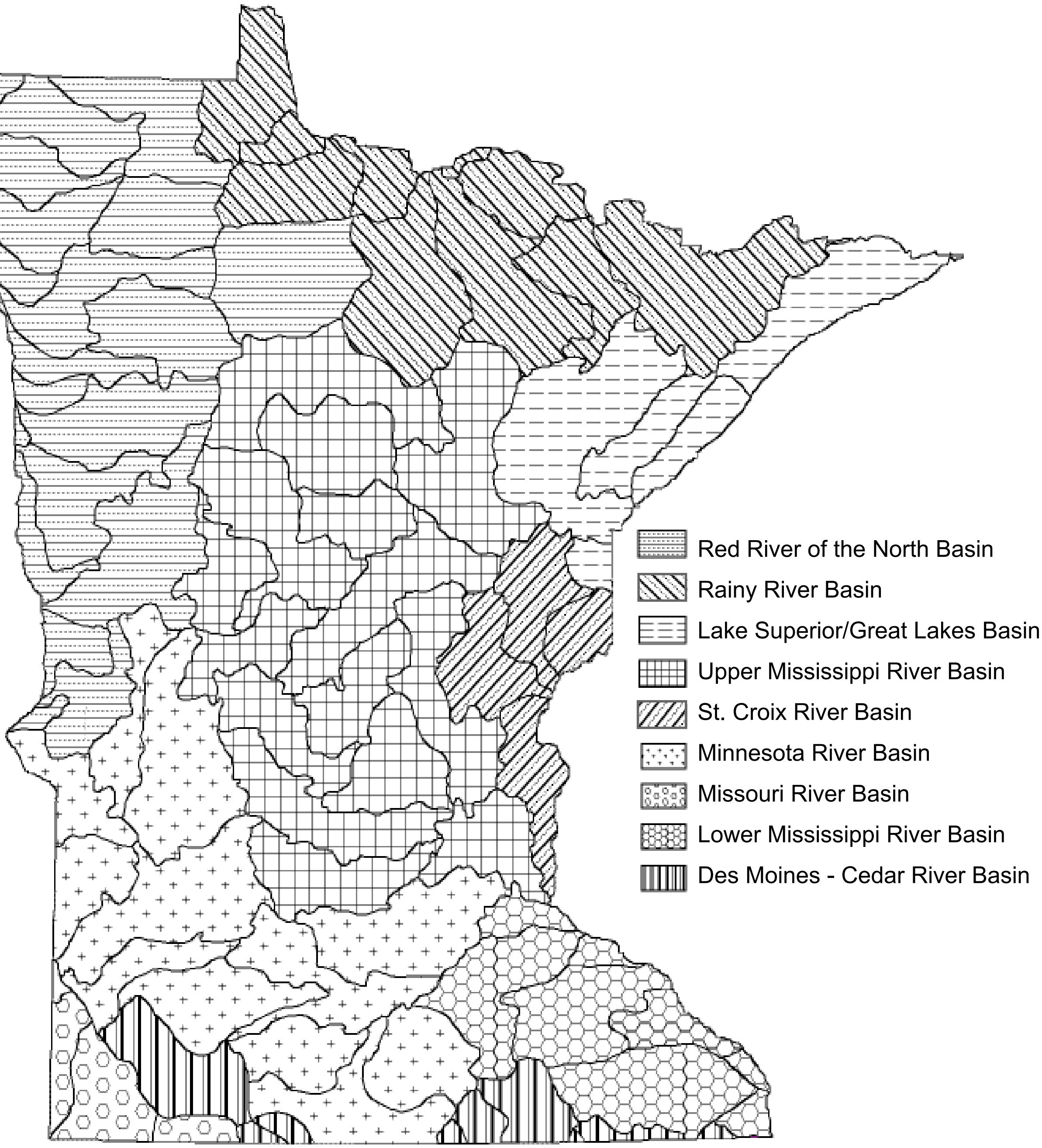
81 Major Watersheds
Stream Flow Condition Network



1 Lake Superior (north) ●
2 Lake Superior (south) ●
3 St. Louis River ●
4 Cloquet River
5 Nemadji River ●
*
7 Mississippi River (Headwaters, Lake Winnibigoshish) ●
8 Leech Lake River
9 Mississippi River (Grand Rapids)
10 Mississippi River (Brainerd) ●
11 Pine River ●
12 Crow Wing River ●
13 Redeye River (Leaf River)
14 Long Prairie River ●
15 Mississippi River (St. Cloud)
16 Sauk River ●
17 Elk River (Elk River) ●
18 North Fork Crow River ●
19 South Fork Crow River
20 Mississippi River (Metro) ●
21 Rum River ●
22 Minnesota River (Headwaters)
23 Pomme de Terre River ●
24 Lac qui Parle River ●
25 Minnesota River (Montevideo) ●
26 Chippewa River ●
27 Redwood River ●
28 Minnesota River (Mankato) ●
29 Cottonwood River ●
30 Blue Earth River ●
31 Watonwan River ●
32 Le Sueur River ●
33 Minnesota River (Shakopee) ●
34 St. Croix River (Upper)
35 Kettle River
36 Snake River
37 St. Croix River (St. Croix Falls) ●
38 Vermillion River (Empire) ●
39 Cannon River ●
40 Mississippi River (Winona) ●
41 Zumbro River ●
42 Mississippi River (La Crescent)
43 Root River ●
44 Mississippi River (Nevo)
*
46 Upper Iowa River
47 Wapsipinican River (Headwaters)
48 Cedar River ●
49 Shell Rock River
50 Winnebago River (Lime Creek)
51 West Fork Des Moines River (Headwaters) ●
52 West Fork Des Moines River (Lower)
53 East Fork Des Moines River
54 Bois de Sioux River ●
55 Mustinka River
56 Otter Tail River ●
57 Red River of the North (Headwaters) ●
58 Buffalo River ●
59 Marsh River ●
60 Wild Rice River ●
61 Sandhill River ●
62 Upper and Lower Red Lake ●
63 Red Lake River ●
*
65 Thief River ●
66 Clearwater River ●
67 Grand Marais Creek (Red River of the North) ●
68 Snake River
69 Tamarack River (Red River of the North) ●
70 Two River ●
71 Roseau River ●
72 Rainy River (Headwaters) ●
73 Vermillion River ●
74 Rainy River (Rainy Lake)
75 Rainy River (Manitou) ●
76 Little Fork River ●
77 Big Fork River ●
78 Rapid River
79 Rainy River (Baudette)
80 Lake of the Woods
81 Big Sioux River (Medary Creek)
82 Big Sioux River (Pipestone)
83 Rock River
84 Little Sioux River

Figure 2

Nine Major Stream Basins



Minnesota is further unique in that very little water flows into the state. Only two rivers receive out-of-state water: the headwaters of the Minnesota River from South Dakota and the Blue Earth River from Iowa. Minnesota exports large volumes of water via the Red, Rainy, Mississippi, (including the Minnesota and St. Croix Rivers), and through the numerous North Shore streams and streams in the southeast blufflands.

Stream Gaging in Minnesota

Gaging is an essential tool in analyzing stream flows in Minnesota. A stream gage is used to record the water elevation of a stream at a specific location. Measurements of stream discharge must be made periodically at the gage location to develop the relationship between stream elevation and the quantity of flow in the stream. If this relationship is developed, recorded stream elevations can be converted to discharge in cubic feet per second (cfs). State-of-the-art gages in Minnesota record stream elevations continuously and transmit the data to a central location for conversion to discharge and use in hydrologic analysis.

Most continuous recording stream gages in Minnesota are operated by the United States Geological Survey. DNR Waters supports about one third of these network gages through the USGS's Cooperative Water Resource Data program. In addition, the DNR maintains approximately forty flood warning gages. The USGS has been gaging Minnesota streams for over 100 years.

Currently, there are nearly 100 continuous recording stream gages maintained by the USGS. Additional stream gages are operated and maintained by the Corps of Engineers, the Department of Natural Resources, the Department of Transportation, the Pollution Control Agency, the Metropolitan Council and other state and local agencies, including watershed districts and lake associations.

Unfortunately, at least five stream gages were eliminated in 2000 due to budget constraints and another was destroyed by flooding. The loss of a stream gage can significantly impact flood prediction and low flow protection. The loss of a stream gage with a long-term record also can seriously degrade the historical record of the stream. It is this long-term record that is important in determining stream flow trends, drought and flood frequency calculations and other historical parameters.

Water Year 2001

Stream flow conditions at the end of Water Year 2000 consisted of high to very high flows for the Red River basin and in the southeast, with near normal flows for the remainder of the state. The following winter brought high to near-record snow-falls, creating an exceptional snow pack.

In April 2001, snow melt and heavy rains produced very high stream flow conditions throughout the state. On the Red River of the North, major flooding occurred from the headwaters well into Canada. Based on the Federal Emergency Management Agency's [FEMA] Flood Frequency Analysis, 50-year flood events were common through out the basin. In the Minnesota River basin, stages commonly exceeded the 100-year flood event at gages near the headwaters of the basin. However, by the time these events arrived at gages in the lower portion of the basin, the peak stages had attenuated to approximately a 50-year flood event. At St. Paul, the 50-year flood event from the Mississippi River combined with the 50-year flood event from the Minnesota River, resulting in a 100-year flood event. Downstream of St. Paul, a 100-year flood event on the St. Croix River merged into the Mississippi River and, with several tributary streams from Wisconsin, created a 100-year flood event past Winona.

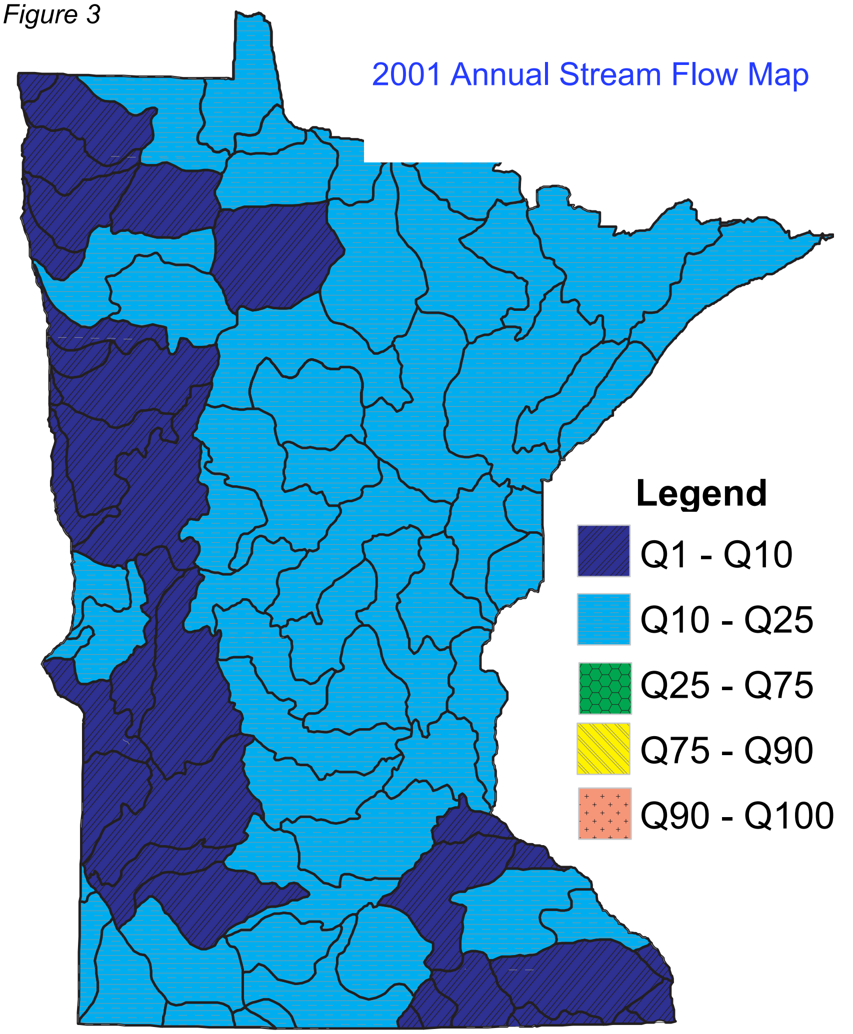
Flooding continued throughout May and June over much of Minnesota as a result of continued heavy spring rains falling on already saturated soils, swollen lakes and streams. However, most of the stages during the May and June flooding were significantly lower than the April flood events. Flooding caused by localized storms could be found well into August.

By July, most regional flooding had ended as precipitation amounts receded significantly from earlier months. Near normal stream flow conditions could be found in the Arrowhead region, in the south and in the west. By late July, flows in the Arrowhead fell into the low range , with normal flows common in the central part of the state. High flows remained only in the west in the Red River headwaters and Minnesota River headwaters.

Precipitation continued to be below normal in August and early September, causing stream flow levels to continue to fall, although flows remained above normal for much of northern Minnesota and the Red River basin. By late September, increasing precipitation and a slowing of evaporation and transpiration, resulted in a slight increase in stream flows.

Figure 3 is the annual stream flow map for Water Year 2001. The very wet conditions found in April, especially in the Red River basin and the Minnesota River basin, have significantly skewed the annual map. The average annual discharges for Water Year 2001 were in the top 15% of stream flow for much of the state and in the top 5% for the Red River and the Minnesota River basins.

Figure 3



Water Year 2002

Stream flow conditions during the spring of 2002 were very different than those of 2001. The winter snow pack was significantly less than the prior winter, April precipitation was also much less and, as a result, there was very little spring flooding in 2002.

In April, normal stream flow conditions could be found throughout most of the state. The St. Croix River basin experienced localized minor flooding due to heavy rain. High flows also existed in the eastern portion of the upper Mississippi River basin and the St. Louis River basin related to this same storm event. Localized low flows could be found around the state, especially in the Arrowhead region.

For the month of May, stream flow conditions were mostly normal throughout the state. Stream flows climbed into the high flow range in the St. Croix River basin and the upper Minnesota River basin in mid May, but quickly returned to normal. Low flows in the Arrowhead region persisted and expanded into parts of the Rainy River basin.

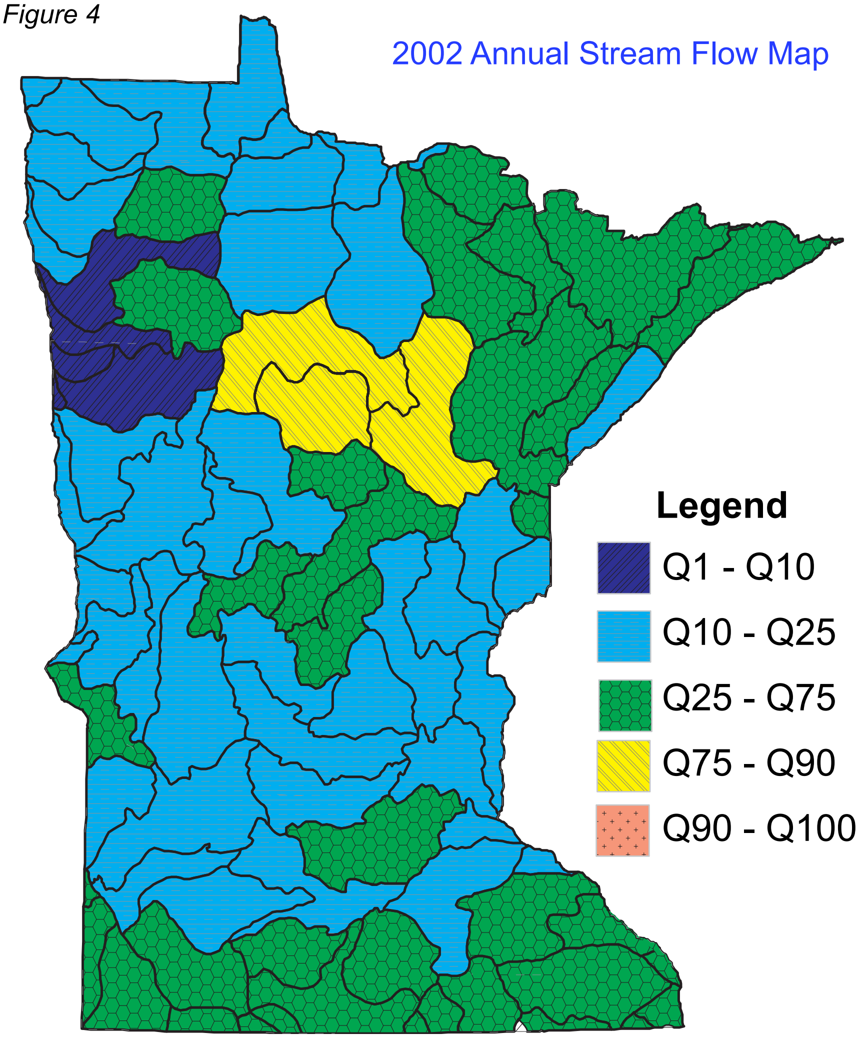
In early June, a series of large storms tracked across northwestern Minnesota and produced 100-year flood events on the Roseau and Wild Rice Rivers in the northern half of the Red River basin (see page 11). These 100-year flood events lead to significant property damage in the communities of Ada and Roseau, and caused the failure of a dam on the Wild Rice River. Concurrently, low flow conditions expanded from the Arrowhead region into the Upper Mississippi River basin, near normal conditions existed in the southwest and high flow conditions existed in the southeast.

July rains over much of the northern two-thirds of the state, pushed stream flows from the low range back to the high range. In the south, near normal conditions prevailed with low flows developing in the Missouri River basin and other watersheds adjacent to Iowa.

Throughout August and September, high flow conditions in the north gradually fell into the normal range, while flows in the south remained in the normal range. An occasional low flow could be found in the southern part of the state as low flow conditions developed in the Arrowhead region and extended into the Rainy River basin. By the end of September, critical flows could be found along much of the Canadian border.

Figure 4 is the annual stream flow map for Water Year 2002. The average annual discharges were in the top 15% of stream flow for much of the state and exceeded the top 5% for the Wild Rice and the Red Lake River watersheds. Flows in the Roseau River watershed fell to just below the 5% range. The upper Mississippi River ended in the lower 25% range, while flows in the Arrowhead barely managed to reach into the normal range.

Figure 4



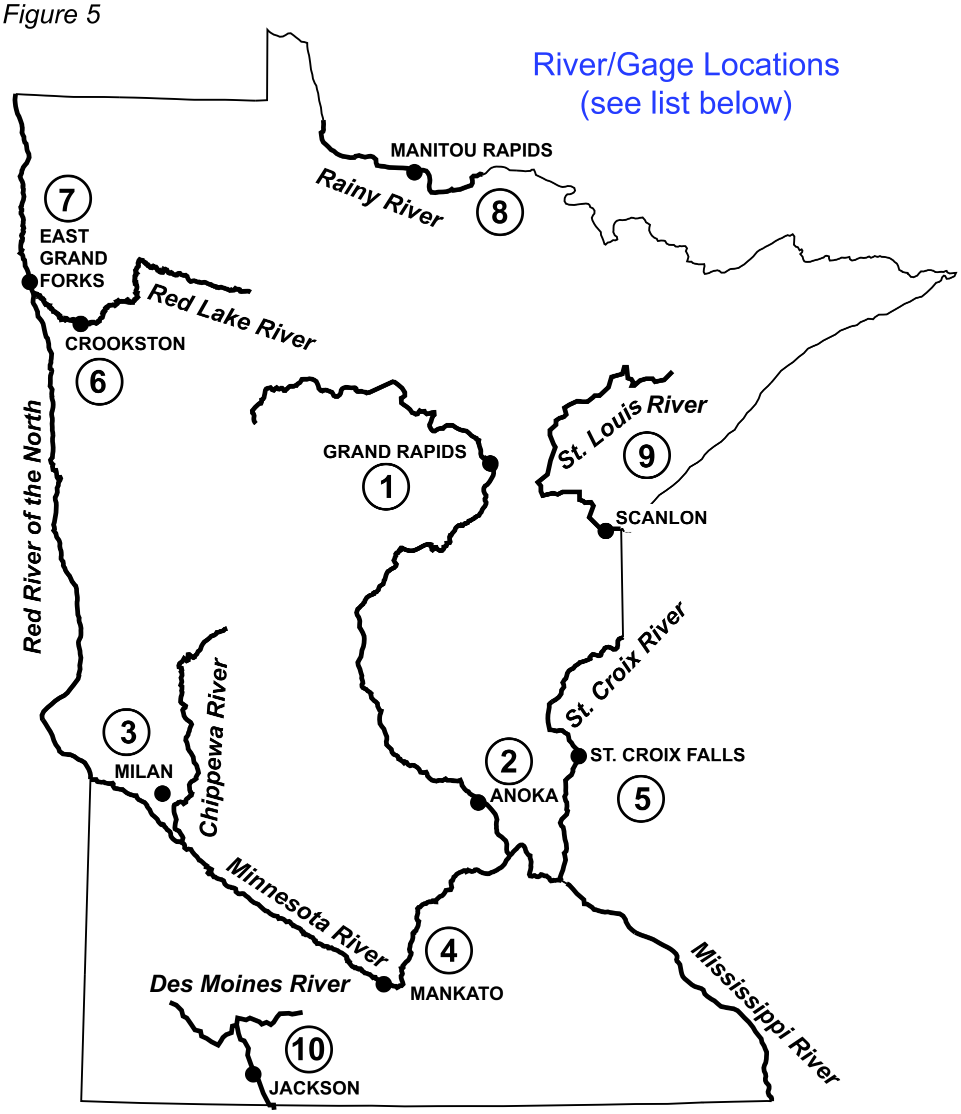
Hydrographs

Stream hydrographs show the volume of water discharged during a specific time period. Figure 5 shows the location of ten rivers and stream gaging stations where discharge hydrographs have been created.

Figures 6 and 8 show two-year hydrographs for the ten selected sites. In addition to the mean daily discharge, the daily Q25 and Q75 exceedence levels are shown.

Figures 7 and 9 are period of record hydrographs for the same ten sites. The hydrographs show the average annual volume of water discharged during the water year, the annual Q25 and Q75 exceedence values and a 30-year moving average of the annual discharges. The 30-year moving average shows the trend in the volume of water flowing in a stream.

Figure 5



1) Mississippi River at Grand Rapids
2) Miisissippi River at Anoka
3) Chippewa River near Milan
4) Minnesota River at Mankato
5) St. Croix River at Taylors Falls
6) Red Lake River at Crookston
7) Red River of the North at East Grand Forks
8) Rainy River at Manitou Rapids
9) St. Louis River at Scanlon
10) Des Moines River at Jackson

Figure 6

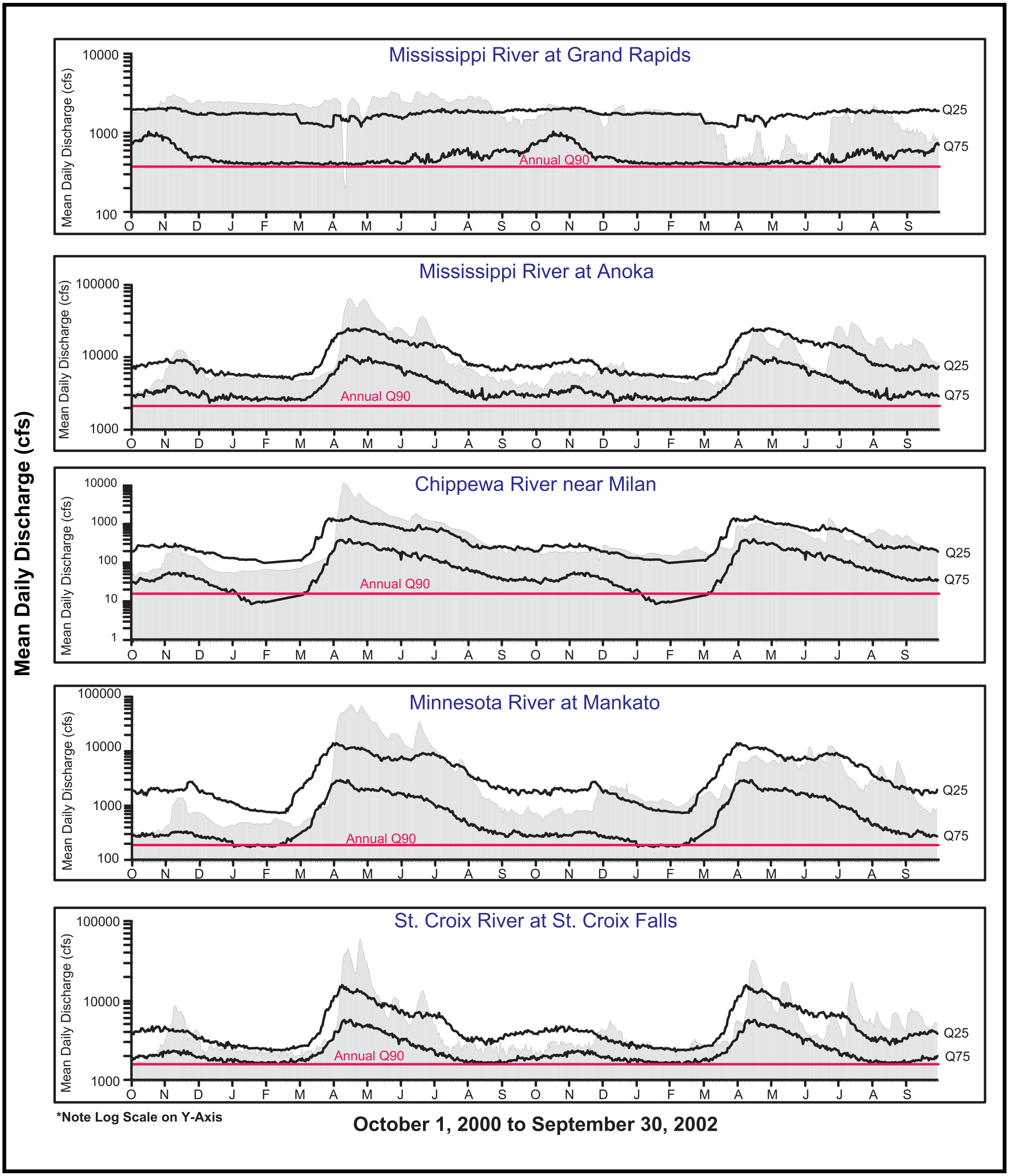

Mean Daily Discharge (cfs)
Mississippi River at Grand Rapids
10000
1000
100
Q25
Q75
Annual Q90
O N D J F M A M J J A S O N D J F M A M J J A S
Mississippi River at Anoka
100000
10000
1000
Chippewa River near Milan
10000
1000
100
10
1
Minnesota River at Mankato
St. Croix River at St. Croix Falls
*Note Log Scale on Y-Axis
October 1, 2000 to September 30, 2002

Figure 7

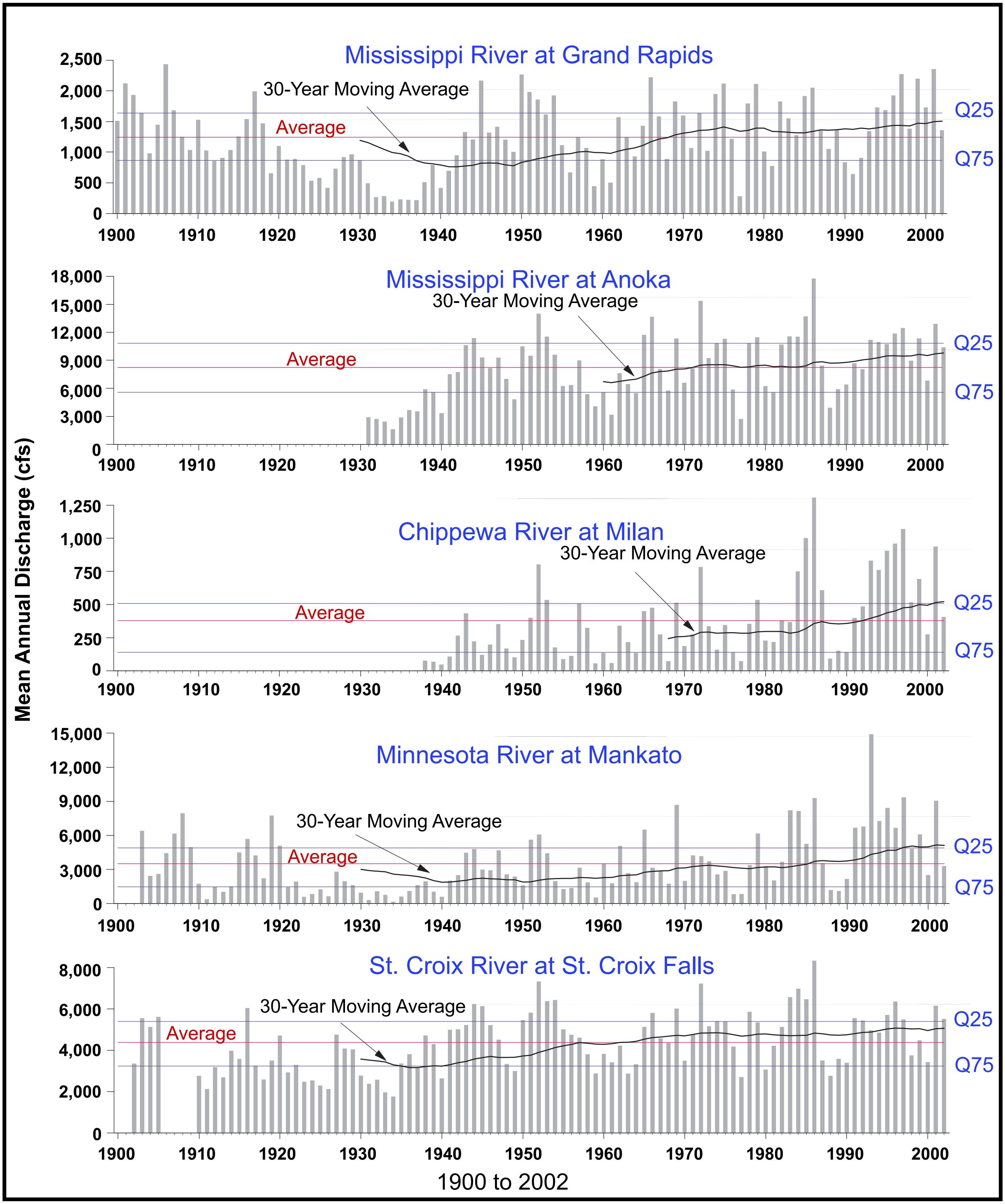
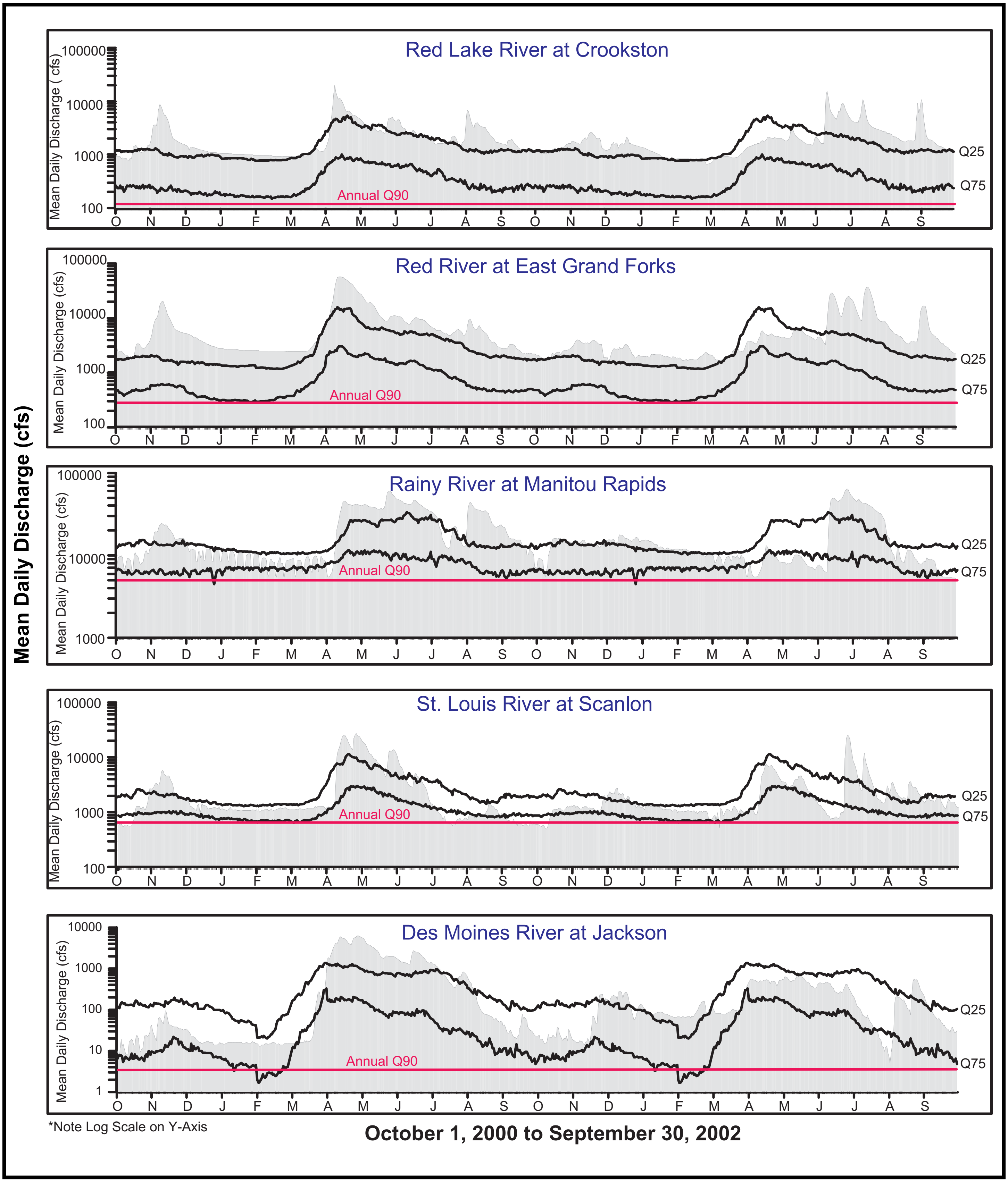
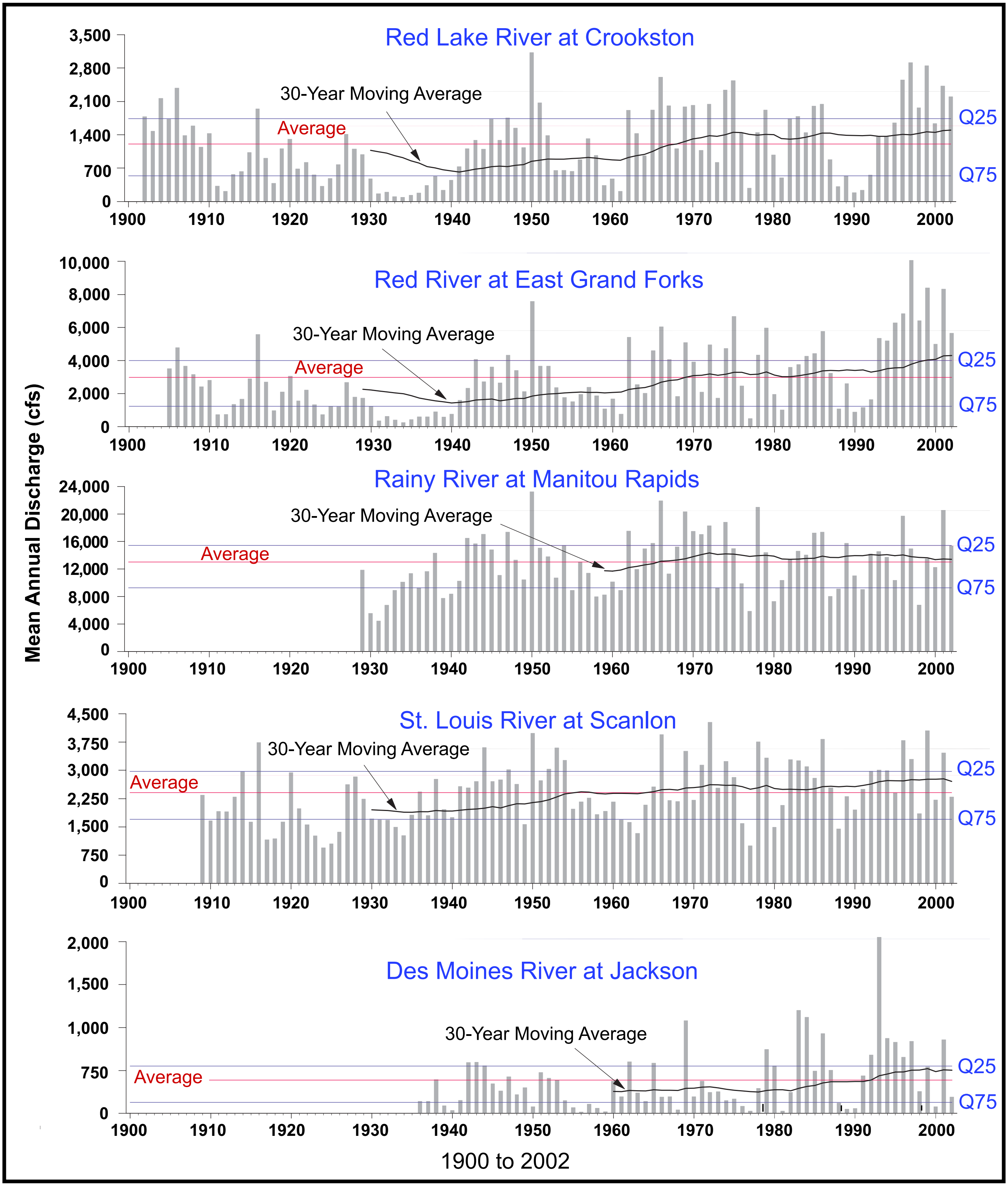

Mississippi River at Grand Rapids
30-Year Moving Average
Average
Q25
Q75
2,500
2,000
1,500
1,000
500
0
1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000
Mississippi River at Anoka
30-Year Moving Average
Average
Q25
Q75
18,000
15,000
12,000
9,000
6,000
3,000
0
Chippewa River at Milan
30-Year Moving Average
Average
Q25
Q75
1,250
1,000
750
500
250
0
Minnesota River at Mankato
30-Year Moving Average
Average
Q25
Q75
15,000
12,000
9,000
6,000
3,000
0
St. Croix River at St. Croix Falls
30-Year Moving Average
Average
Q25
Q75
8,000
6,000
4,000
2,000
0
Mean Annual Discharge (cfs)
1900 to 2002

Figure 8



Mean Daily Discharge (cfs)
Red Lake River at Crookston
Red River at East Grand Forks
Rainy River at Manitou Rapids
St. Louis River at Scanlon
Des Moines River at Jackson
Mean Daily Discharge (cfs)
Q25
Q75
Annual Q90
100000
10000
1000
100
10
1
O N D J F M A M J J A S O N D J F M A M J J A S
*Note Log Scale on Y-Axis
October 1, 2000 to September 30, 2002

Figure 9

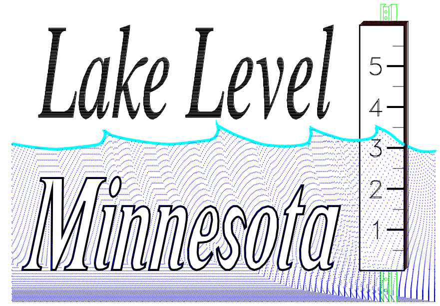

Red Lake River at Crookston
30-Year Moving Average
Average
Q25
Q75
Red River at East Grand Forks
30-Year Moving Average
Average
Q25
Q75
Rainy River at Manitou Rapids
30-Year Moving Average
Average
Q25
Q75
St. Louis River at Scanlon
30-Year Moving Average
Average
Q25
Q75
Des Moines River at Jackson
30-Year Moving Average
Average
Q25
Q75
Mean Annual Discharge (cfs)
1900 to 2002

Lake Levels

The water levels of all lakes fluctuate, some more than others. The primary factor that affects water level changes is the quantity and distribution of precipitation (rain & snow). Other factors that contribute to water level changes are outlet conditions, beaver dams, ground water movement and watershed characteristics. Knowing and understanding the history of water level fluctuations can help lake users deal with problems associated with the changing levels.

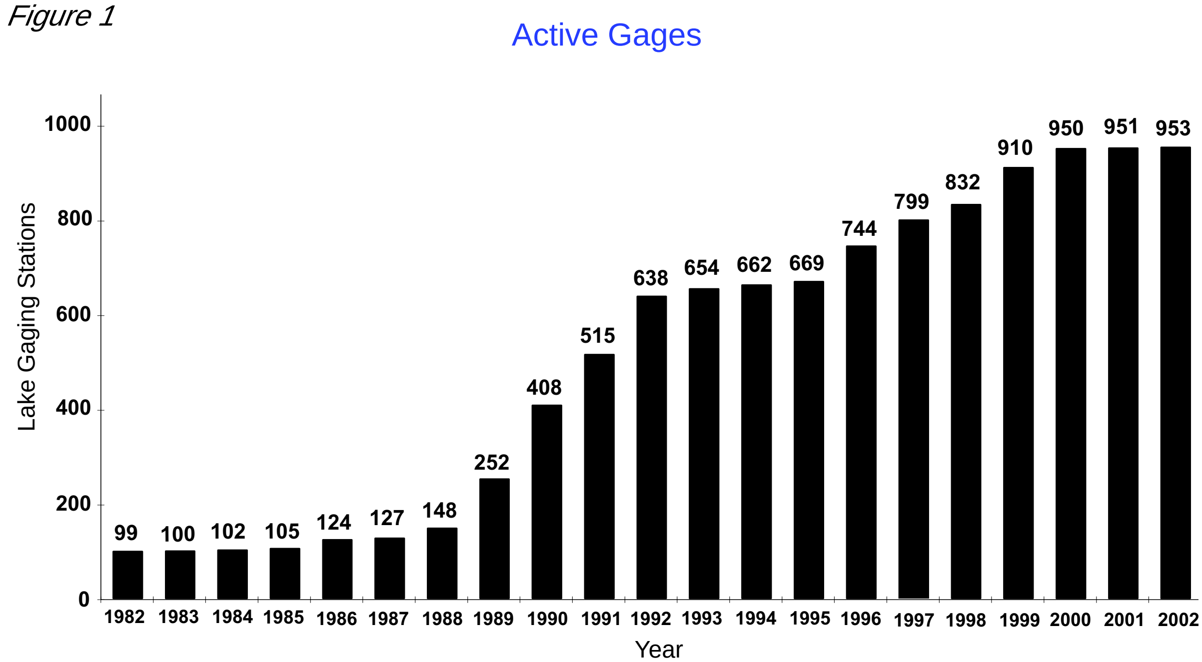
Historical water level data are useful in calibrating hydrologic and hydraulic computer models. These data also benefit watershed management authorities and other governmental units in preparing local water management plans and to locate building and sewage treatment sites.

The success of monitoring water levels is greatly dependent on citizen volunteers and cooperating organizations who participate in the DNR Waters Lake Level Minnesota (LLM) program. Lake levels were actively monitored at nearly 1000 sites in 2002 by citizen volunteers and cooperative organizations (Figure 1). Volunteer observers usually live on or near a lake, which



makes it convenient to obtain weekly or more frequent readings. There is no cost to the volunteers to be in this program as the gage and installation are provided by DNR Waters. Each year the volunteer receives an updated water level graph and summary sheet that contains the information they provided.

Figure 1



Lake level monitoring has also been accomplished in cooperation with various public and private organizations including:

- Federal (USGS, COE, NRCS)
- State (DNR)
- Counties
- Cities
- Soil & Water Conservation Districts
- Watershed Districts
- Consulting Land Surveyors and Engineers
- Power and Mining Companies

In order to improve geographic coverage, pull together all available data and eliminate possible duplication of efforts, DNR Waters has initiated cooperative programs with these organizations. This component of LLM accounts for approximately 300 lakes, up slightly from Water Year 2000.

All lake level readings received are entered into Lakes-DB©, a database program for easy management and access of recorded lake levels and other useful information. This information is now available on the internet (see “Lake Finder” sidebar on next page).

Lake Level Trends

In the fall of 2000, many lakes in the state were at moderately low water levels. Others were at their all-time recorded low water levels, including many in central Minnesota (see page 31).

However, spring 2001 precipitation events raised many lakes above their all-time recorded high levels. For example, Lake Belle Taine in Hubbard County attained its highest level in 67 years of lake level readings. But as quickly as lake levels recovered in spring, a very dry period, extending nearly statewide from summer through fall, caused many of these same lakes to recede to average or below average water levels at years end.

During the summer of 2002, many lakes again rose to near or above all-time recorded high water levels in response to several significant precipitation events. White Bear Lake and Mille Lacs Lake experienced very high water level conditions, with Lake Minnetonka registering its highest ever water level in 96 years of monitoring. The 2002 storm events were more isolated than during the spring of 2001, with the central and east central portion of Minnesota receiving the highest rainfall amounts. Concurrently, the northeast and southwest remained relatively dry and corresponding lake levels in those areas reflected the lack of precipitation.

Lake Level Data on the DNR Website

Storing and Retrieving Data

Lake level readings received from volunteers and organizations are entered into Lakes-DB©, a data base program for easy management and access of recorded lake levels and other useful information.

“Lake Finder” is a feature of both the DNR website (www.dnr.state.mn.us) and the DNR Waters website (www.dnr.state.mn.us/waters). Lake Finder provides access to DNR Fisheries lake surveys and lake maps, Pollution Control Agency water quality and clarity data and the Health Department fish consumption advisory.

In 2000, DNR Waters added a new option titled “lake water levels”. A single click on the checkmark below “lake water levels” will display a concise summary of recorded lake levels for the indicated period of record, a lake level graph for the last ten years (if enough data points are available), the ordinary high water (OHW) elevation, datum adjustment and reference benchmark (see Figure 3).

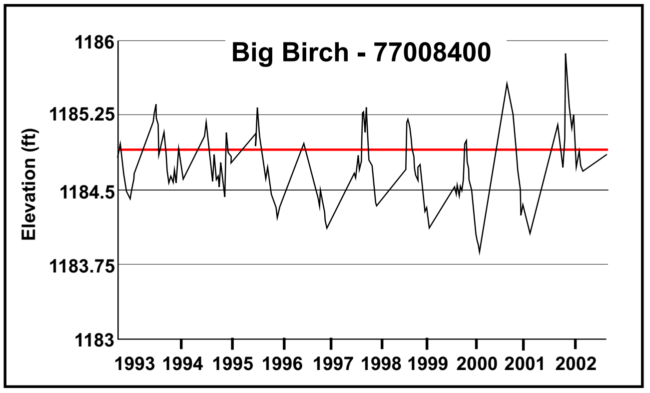
Most of the recorded water levels for each lake are collected by volunteers involved with the Lake Level Minnesota program. DNR Waters presently has water level information for approximately 3300 lakes.

Lake Name: Big Birch Lake

County: Todd/Stearns

Water Level Data

Period of record: 08/13/1937 to 11/04/2002
# of readings: 1188
Highest recorded: 1185.87 ft (07/12/2002)
Highest known: 1185.87 ft (07/12/02)
Lowest recorded: 1182.64 ft (07/19/1988)
Recorded range: 3.23 ft
Average Water Level: 1184.64 ft
Last reading: 1184.69 ft (11/04/2002)
OHW elevation: 1184.9 ft
Datum: 1929 (ft)



Last 10 years of data, click to enlarge.

Download lake level data as: [dBase] [ASCII] (If you have trouble, try right clicking on the appropriate link and choosing the “Save...As” option.)

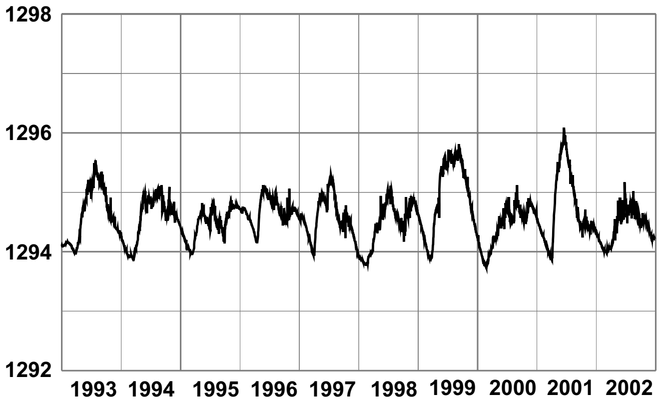
Benchmarks

Elevation: 1189.96 ft **Date Set:** 01/03/1990
Datum: 1929 ft

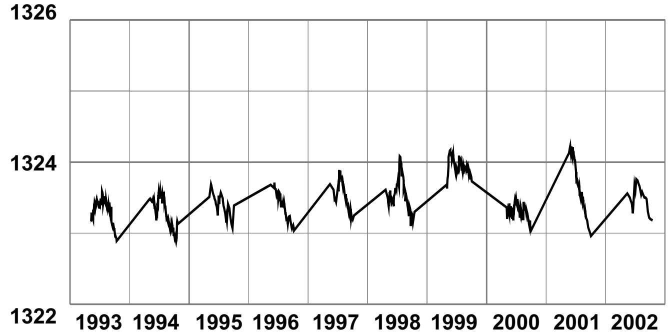
Benchmark Location
Township: 127 Range: 32 Section: 17

Description: A 3/8”x8” vert.spk. in the E-NE root of a 4.5’ cottonwood, 87’ west of an inlet culvert and 36’ south of centerline of road at west fenceline.

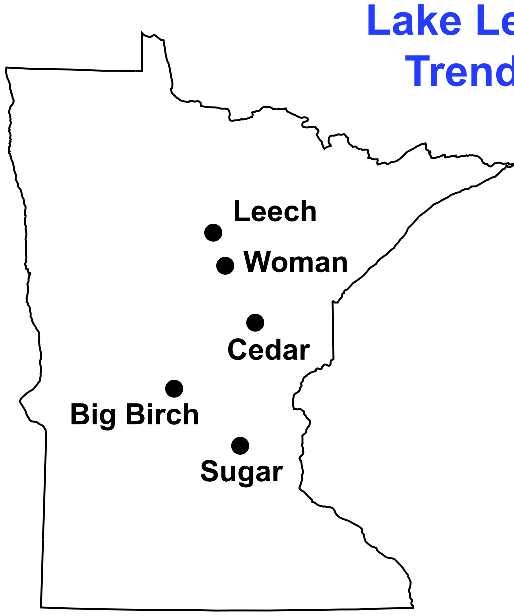
Leech Lake (11-203) Cass County



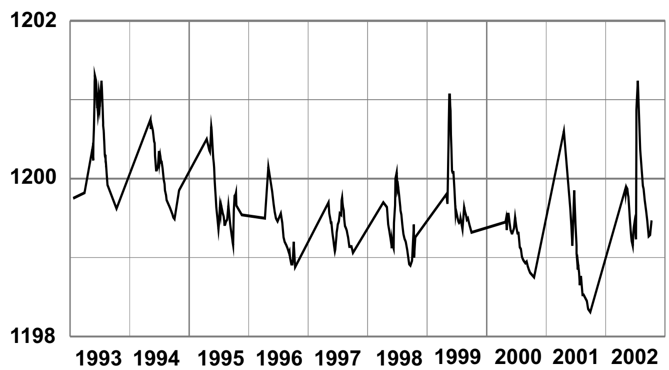
Woman Lake (11-201) Cass County



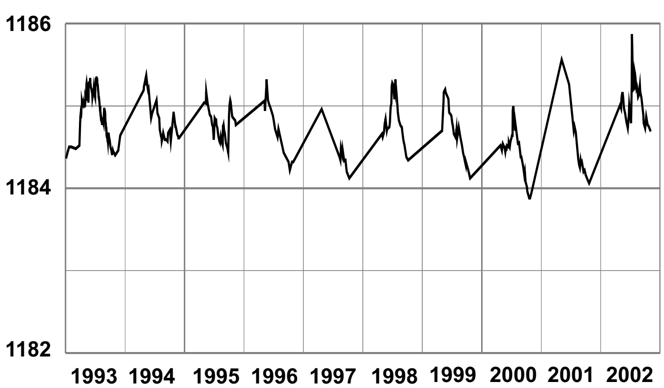
Lake Level Trends



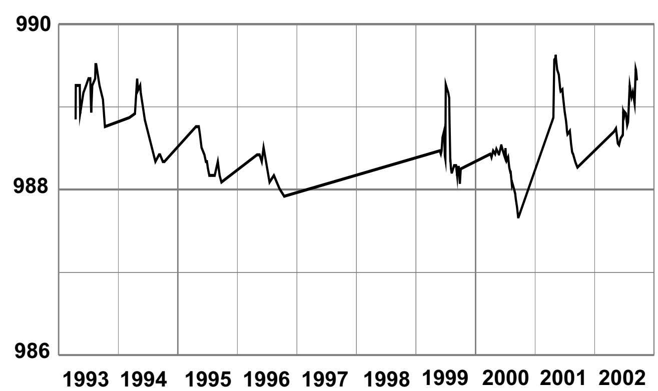
Cedar Lake (1-209) Aitkin County



Big Birch Lake (77-84) Todd County



Sugar Lake (86-233) Wright County



Landlocked Basins

A landlocked lake has no regularly-functioning surface outlet channel, a small watershed and typically experiences large, long-term water level fluctuations. The importance of ground water contributions to landlocked lakes can make them a good indicator of local ground water levels and movement.

The graphs on page 33 represent water levels for five landlocked basins that have experienced their highest levels in recent years.

Ten-Year Trends

For many lakes that are presently monitored, reliable information has been collected for more than ten years. A ten-year average is used as a reference mark when comparing water year data to a longer-term average, and is useful in locating trends in a particular basin. Lakes graphed on pages 34 and 35 show above average levels in Water Year 2001 in response to above average precipitation (see Figure 7 on page 7). With sharp geographical differences in precipitation in Water Year 2002 (see Figure 15 on page 14), lakes in the center of the state continued to be above their ten-year average while lakes in northeast and southwest Minnesota were below average.

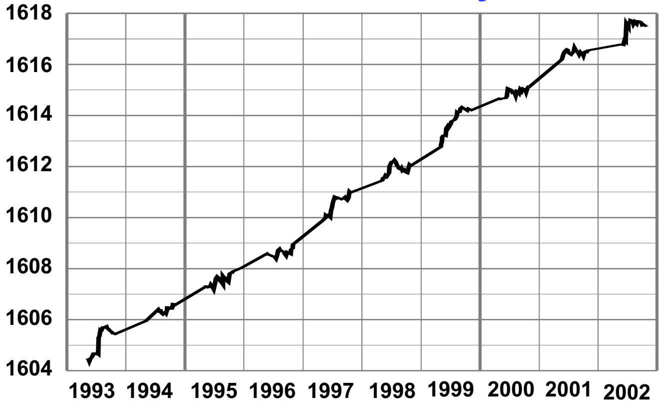
Annual Lake Level Fluctuation

Minnesota lakes typically fluctuate one to two vertical feet in a given year, but historical fluctuations have been recorded in excess of ten feet. Statewide average fluctuation for Water Year 2001 was 1.97 feet, which corresponds to the above-normal precipitation received during the year. Average fluctuation during Water Year 2002 was 1.33 feet (averages for the past eight years are shown in Figure 2). The tables on pages 36 to 42 display fluctuations for Water Year 2001, Water Year 2002, an average fluctuation for the indicated period of record and the range between the historical high and low.

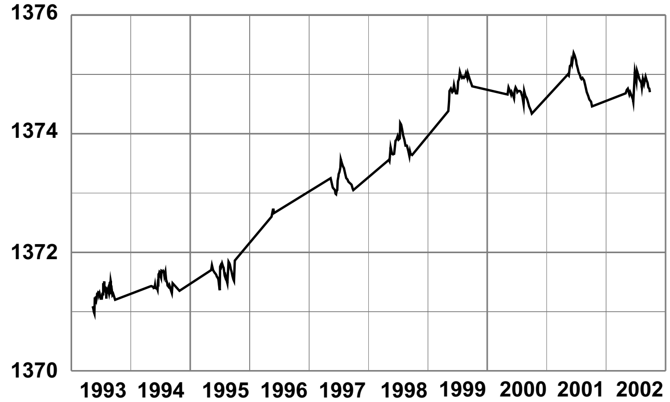
Figure 2

Water Year	Average Fluctuation Statewide (ft)
1995	1.03
1996	1.24
1997	1.55
1998	1.04
1999	1.24
2000	1.05
2001	1.97
2002	1.33

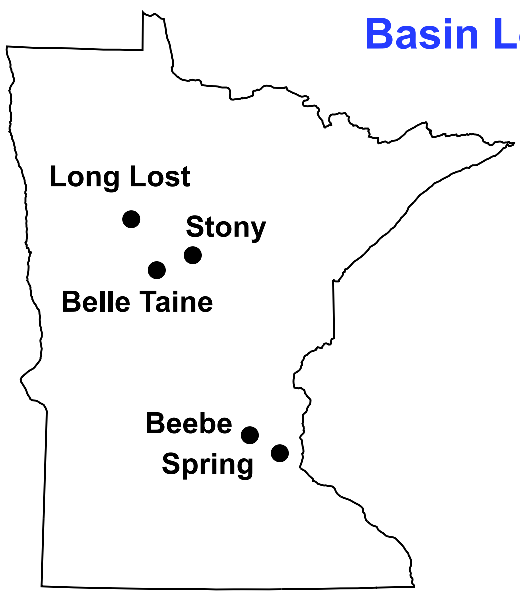
Long Lost Lake (15-68) Clearwater County



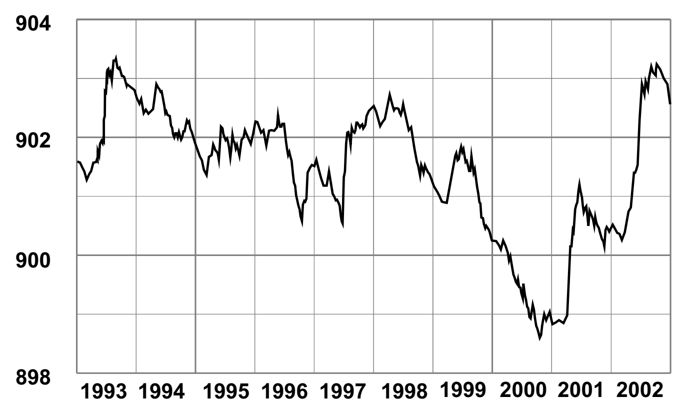
Stony Lake (11-371) Cass County



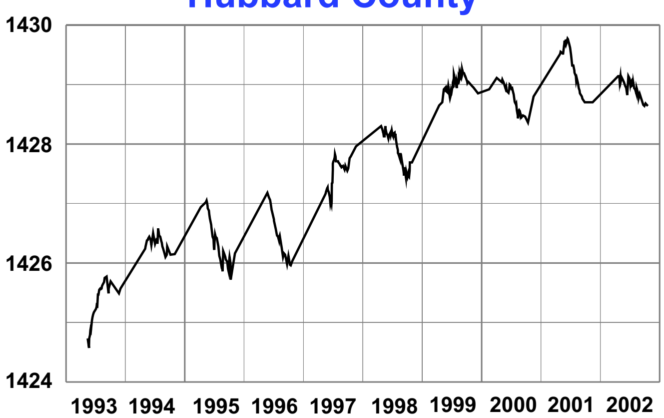
Landlocked Basin Levels



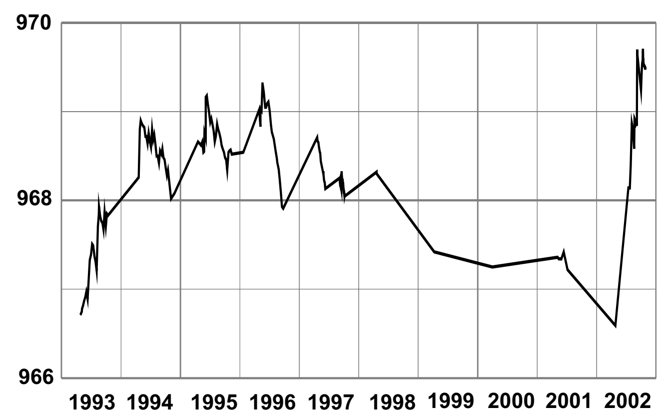
Spring Lake (2-71) Anoka County



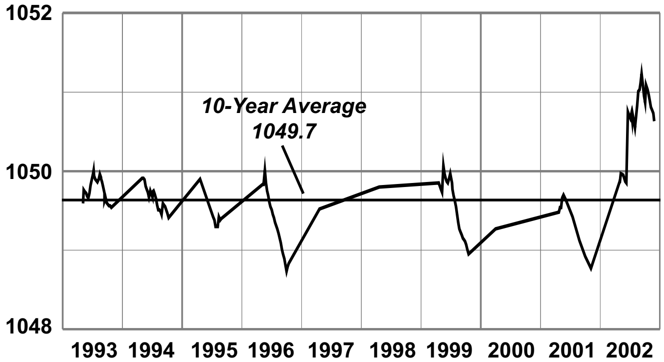
Belle Taine Lake (29-146) Hubbard County



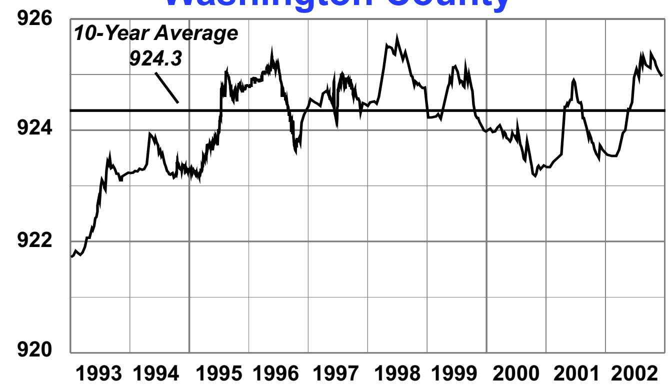
Beebe Lake (86-23) Wright County



Sylvia Lake (86-289) Wright County

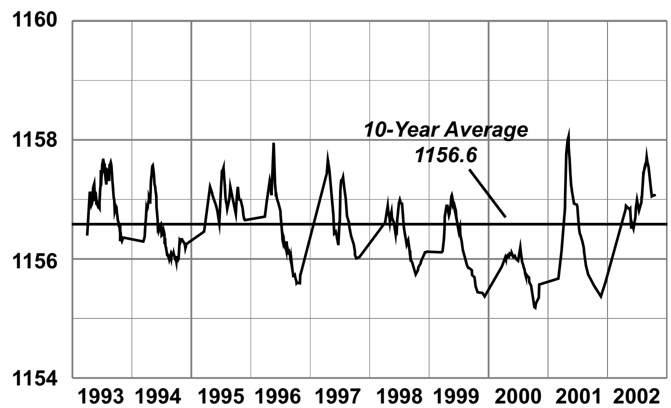


White Bear Lake (82-167) Washington County

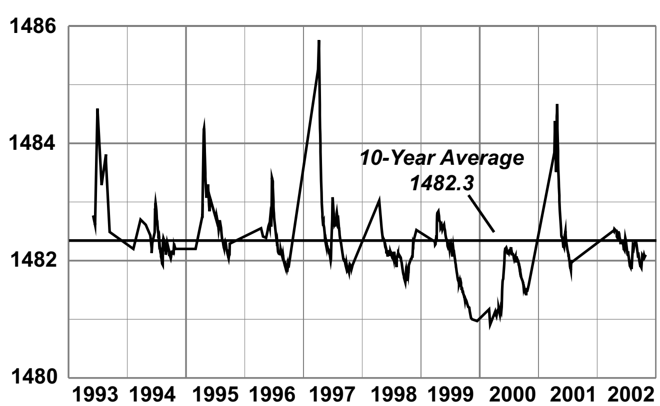


Ten-Year Trends

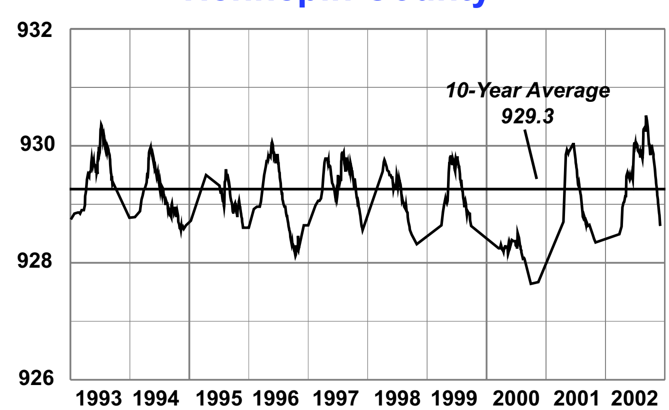
Green Lake (34-79) Kandiyohi County



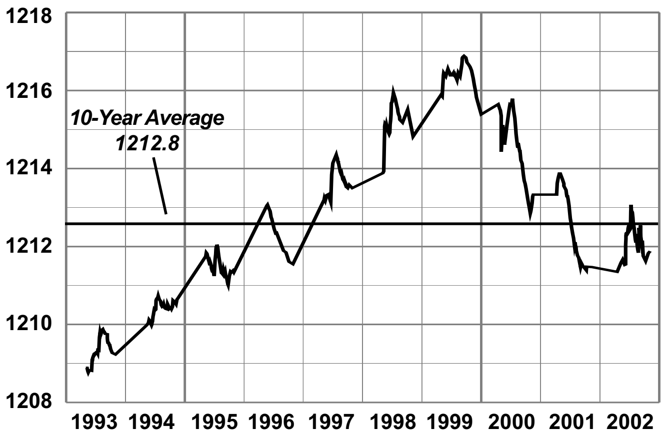
Shetek Lake (51-46) Murray County



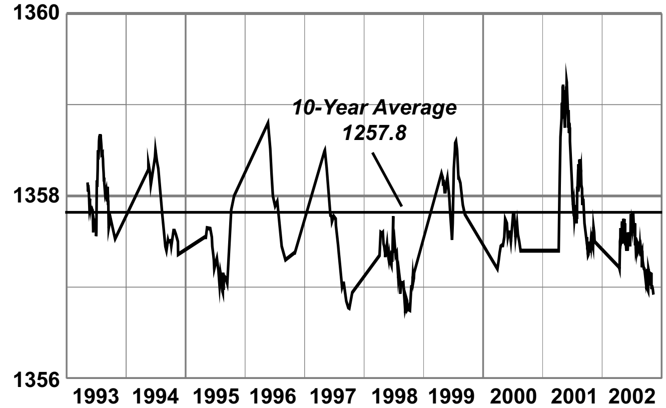
Lake Minnetonka (27-133) Hennepin County



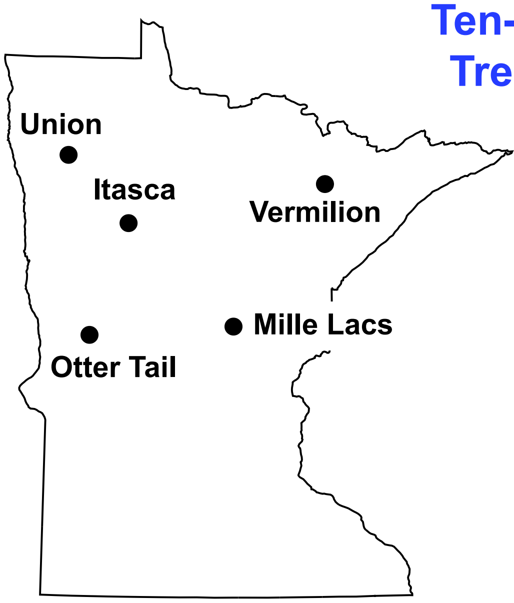
Union Lake (60-217) Polk County



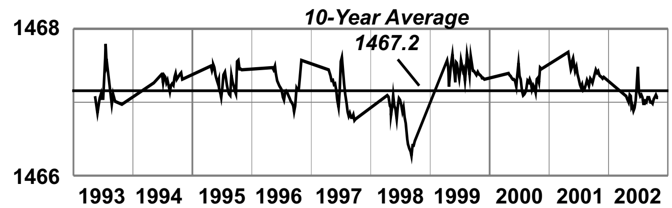
Vermilion Lake (69-378) St. Louis County



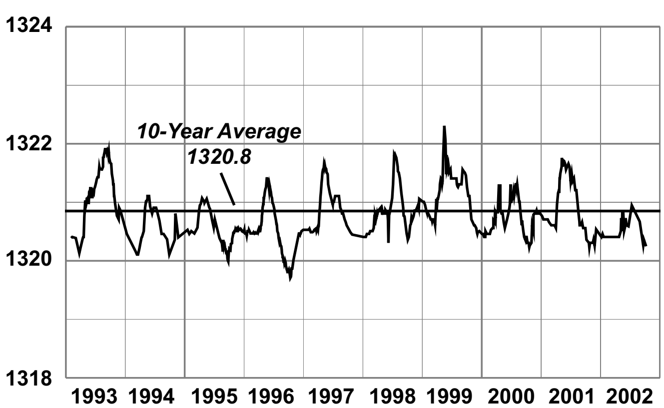
Ten-Year Trends



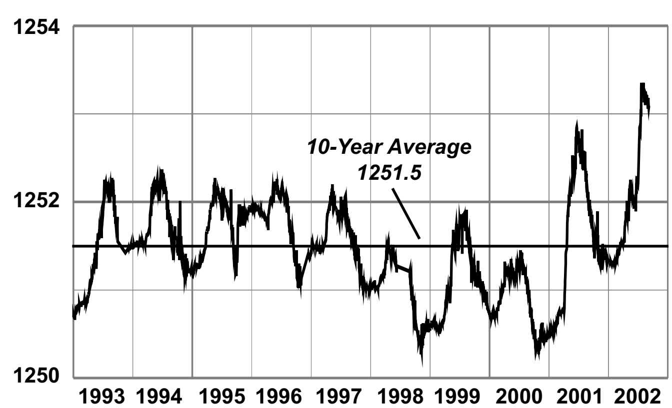
Lake Itasca (15-16) Clearwater County



Otter Tail Lake (56-242) Otter Tail County



Mille Lacs Lake (48-2) Mille Lacs County



Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
AITKIN COUNTY					
Big Sandy (1-62)	7.40	2.49	5.31	(104 yrs.)	16.83
Blackface (1-45)	0.99	0.53	0.75	(11 yrs.)	1.25
Cedar (1-209)	2.29	2.09	1.65	(51 yrs.)	4.02
Clear (1-93)	1.67	0.69	0.87	(32 yrs.)	4.39
Dam (1-96)	1.95	1.45	1.28	(19 yrs.)	2.66
Elm Island (1-123)	2.76	2.84	1.65	(9 yrs.)	3.57
Farm Island (1-159)	2.34	1.88	1.10	(25 yrs.)	3.64
Fleming (1-105)	1.66	0.94	0.84	(11 yrs.)	1.93
Gun (1-99)	1.53	0.55	0.74	(13 yrs.)	1.71
Hanging Kettle (1-170)	1.58	2.43	1.53	(17 yrs.)	3.75
Horseshoe (1-34)	1.48	0.84	0.82	(8 yrs.)	1.48
Little Pine (1-176)	0.88	1.13	0.95	(37 yrs.)	3.67
Lone (1-125)	1.64	0.75	0.73	(12 yrs.)	4.65
Long (1-101)	0.74	0.66	0.55	(10 yrs.)	1.40
Minnewawa (1-33)	1.35	0.75	0.85	(20 yrs.)	1.82
Rabbit (1-91)	1.40	0.99	0.95	(11 yrs.)	1.72
Rat (1-77)	0.75	1.36	1.08	(10 yrs.)	3.99
Rock (1-72)	1.44	0.68	0.83	(9 yrs.)	2.05
Round (1-23)	1.06	0.42	0.66	(10 yrs.)	1.43
Round (1-204)	1.04	1.04	0.96	(12 yrs.)	2.41
Spirit (1-178)	0.59	0.58	0.53	(22 yrs.)	3.03
Sugar (1-87)	0.99	0.42	0.73	(32 yrs.)	2.65
Waukenabo (1-136)	1.73	1.92	1.40	(21 yrs.)	4.34
Wilkins (1-102)	2.23	1.03	1.00	(6 yrs.)	2.51
ANOKA COUNTY					
Baldwin (2-13)	6.06	4.20	3.13	(28 yrs.)	6.86
Bunker (2-90)	4.01	2.64	1.88	(17 yrs.)	7.87
Coon (2-42)	2.33	1.28	1.12	(34 yrs.)	4.84
Crooked (2-84)	2.25	0.46	0.99	(18 yrs.)	3.40
Fawn (2-35)	1.24	1.66	1.06	(14 yrs.)	4.64
George (2-91)	1.02	0.98	1.23	(17 yrs.)	6.14
Golden (2-45)	1.06	0.93	0.88	(14 yrs.)	2.44
Ham (2-53)	3.75	1.69	1.26	(18 yrs.)	4.78
Howard (2-16)	1.64	1.30	1.03	(13 yrs.)	2.46
Itasca (2-110)	3.79	1.42	1.73	(13 yrs.)	8.25
Laddie (2-72)	2.84	0.91	1.18	(11 yrs.)	4.19
Linwood (2-26)	1.08	0.50	0.73	(26 yrs.)	2.29
Martin (2-34)	2.28	1.38	1.20	(24 yrs.)	4.08
Moore (2-75)	1.08	1.28	0.97	(14 yrs.)	1.98
Netta (2-52)	3.31	2.04	1.27	(19 yrs.)	5.56
Otter (2-3)	2.02	1.73	1.63	(80 yrs.)	6.72
Pet (2-36)	2.03	1.72	1.22	(7 yrs.)	3.41
Reshanau (2-9)	3.75	1.61	2.00	(13 yrs.)	4.54
Rice (2-8)	6.06	4.20	3.37	(14 yrs.)	6.64
Rogers (2-104)	3.62	1.71	1.61	(14 yrs.)	5.35
Rondeau (2-15)	1.86	1.34	1.00	(11 yrs.)	1.94
Round (2-89)	2.07	1.16	1.26	(18 yrs.)	5.93
Sand Shore (2-102)	2.03	1.21	1.04	(11 yrs.)	2.32
Sandy (2-80)	2.20	2.40	1.53	(11 yrs.)	2.98
Spring (2-71)	2.60	3.05	1.64	(48 yrs.)	6.60
BECKER COUNTY					
Bad Medicine (3-85)	1.06	0.77	0.90	(16 yrs.)	6.99
Big Cormorant (3-576)	1.02	0.64	1.08	(37 yrs.)	10.30
Big Sugar Bush (3-304)	0.70	0.70	1.02	(8 yrs.)	4.76
Buffalo (3-350)	0.54	0.26	1.09	(21 yrs.)	5.12
Cotton (3-286)	1.09	0.72	0.98	(36 yrs.)	5.15
Detroit (3-381)	0.90	0.60	0.94	(24 yrs.)	2.44
Elbow (3-159)	0.73	0.98	1.16	(11 yrs.)	3.42
Eunice (3-503)	0.54	0.64	0.58	(12 yrs.)	1.87
Floyd (3-387)	1.16	0.77	1.09	(11 yrs.)	2.89

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Becker County continued)					
Fox (3-358)	0.49	0.59	0.33	(9 yrs.)	0.79
Height of Land (3-195)	1.88	1.14	1.52	(45 yrs.)	4.45
Ice Cracking (3-156)	0.90	1.01	1.09	(13 yrs.)	4.64
Ida (3-582)	0.90	0.78	0.96	(15 yrs.)	4.50
Island (3-153)	0.75	0.44	0.58	(7 yrs.)	1.05
Juggler (3-136)	0.74	0.90	0.79	(10 yrs.)	5.62
Little Toad (3-189)	0.40	0.64	0.65	(9 yrs.)	1.81
Long (3-383)	0.24	0.30	0.50	(16 yrs.)	1.64
Maud (3-500)	0.90	0.96	0.77	(11 yrs.)	1.86
Melissa (3-475)	1.30	0.40	1.07	(27 yrs.)	6.30
Middle Cormorant (3-602)	1.04	0.90	0.74	(7 yrs.)	4.27
Pickerel (3-287)	0.84	0.91	0.98	(11 yrs.)	5.83
Rock (3-293)	1.40	0.66	1.21	(8 yrs.)	2.15
Round (3-155)	2.48	0.97	1.24	(20 yrs.)	2.97
Straight (3-10)	0.25	0.47	0.50	(17 yrs.)	6.16
Talac (3-619)	1.26	1.10	1.27	(10 yrs.)	9.72
Toad (3-107)	1.62	0.65	1.20	(22 yrs.)	5.20
Turtle (3-657)	1.70	0.70	1.37	(6 yrs.)	6.53
Two Inlets (3-17)	0.72	1.50	1.22	(21 yrs.)	3.91
Upper Cormorant (3-588)	1.01	0.89	1.05	(27 yrs.)	3.89
BELTRAMI COUNTY					
Bemidji (4-130)	2.54	2.58	1.86	(19 yrs.)	4.25
Cass (4-30)	2.85	1.70	1.93	(56 yrs.)	4.83
Long (4-76)	0.72	0.55	0.74	(16 yrs.)	2.85
Movil (4-152)	0.94	0.68	0.76	(18 yrs.)	1.91
Pimushe (4-32)	2.63	0.84	1.83	(6 yrs.)	3.22
Red (4-35)	2.21	0.85	1.62	(57 yrs.)	6.93
Stump (4-130)	3.03	1.84	2.26	(19 yrs.)	5.70
Turtle (4-159)	0.92	0.34	0.95	(6 yrs.)	1.90
Turtle River (4-111)	1.58	1.32	1.80	(30 yrs.)	6.15
BENTON COUNTY					
Little Rock (5-13)	3.73	1.88	1.12	(9 yrs.)	4.79
BIG STONE COUNTY					
Big Stone (6-152)	5.75	1.70	2.45	(33 yrs.)	10.83
East Toqua (6-138)	1.46	0.87	1.50	(12 yrs.)	4.90
BLUE EARTH COUNTY					
Duck (7-53)	1.86	1.52	1.18	(12 yrs.)	3.21
Madison (7-44)	2.30	1.46	1.68	(45 yrs.)	15.98
BROWN COUNTY					
Hanska (8-26)	4.74	2.14	2.10	(10 yrs.)	5.79
Sleepy Eye (8-45)	1.62	0.90	1.46	(15 yrs.)	5.54
Somsen (8-18)	6.96	2.72	3.38	(12 yrs.)	8.93
CARLTON COUNTY					
Big (9-32)	1.50	0.41	0.66	(10 yrs.)	1.99
Chub (9-8)	1.21	0.46	0.95	(16 yrs.)	3.47
Eagle (9-57)	0.66	0.54	0.75	(10 yrs.)	1.88
Eddy (9-39)	4.49	2.92	2.83	(9 yrs.)	4.55
Little Hanging Horn (9-35)	1.66	2.02	2.14	(12 yrs.)	3.53
Park (9-29)	1.02	1.03	0.75	(12 yrs.)	2.02
Torch Light (9-25)	1.43	0.52	0.94	(10 yrs.)	1.92
CARVER COUNTY					
Ann (10-12)	1.64	0.24	1.26	(32 yrs.)	5.13
Berliner (10-103)	1.75	2.79	1.37	(12 yrs.)	3.95
Hydes (10-88)	2.17	1.33	0.98	(9 yrs.)	4.31
Lotus (10-6)	2.10	1.59	1.36	(32 yrs.)	3.90

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Carver County continued)					
Lucy (10-7)	2.24	0.45	1.28	(32 yrs.)	4.00
Minnewashta (10-9)	2.14	1.06	1.34	(17 yrs.)	3.46
Oak (10-93)	2.09	2.66	1.41	(8 yrs.)	3.85
Parley (10-42)	1.62	2.25	1.55	(19 yrs.)	4.87
Patterson (10-86)	2.20	1.75	1.34	(13 yrs.)	3.40
Rice Marsh (10-1)	2.27	0.99	1.46	(23 yrs.)	4.81
Riley (10-2)	1.91	1.50	1.45	(32 yrs.)	4.74
Susan (10-13)	2.49	0.95	1.35	(32 yrs.)	3.76
Swede (10-95)	1.74	1.42	1.20	(7 yrs.)	6.06
Waconia (10-59)	2.50	1.94	1.19	(34 yrs.)	5.90
Zumbra-Sunny (10-41)	1.60	1.84	1.98	(18 yrs.)	7.28
CASS COUNTY					
Ada (11-250)	1.22	1.04	0.83	(13 yrs.)	2.36
Agate (11-216)	1.41	1.04	0.77	(12 yrs.)	3.62
Barnum (11-281)	0.84	0.44	0.68	(9 yrs.)	2.12
Bass (11-69)	0.60	0.36	0.70	(7 yrs.)	1.82
Big Rice (11-73)	4.33	1.80	2.22	(35 yrs.)	5.00
Birch (11-412)	1.46	0.72	0.94	(12 yrs.)	2.18
Blackwater (11-274)	0.36	0.37	0.52	(8 yrs.)	3.93
Child (11-263)	1.37	1.03	0.96	(13 yrs.)	1.98
Five Point (11-351)	0.18	0.28	0.34	(9 yrs.)	1.09
Gull (11-305)	1.42	1.27	1.10	(21 yrs.)	1.99
Hand (11-242)	1.90	0.60	0.85	(19 yrs.)	4.90
Hay (11-199)	0.91	0.60	0.86	(12 yrs.)	3.32
Horseshoe (11-358)	0.60	0.42	0.53	(12 yrs.)	3.09
Laura (11-104)	1.00	0.70	0.74	(17 yrs.)	1.85
Leech (11-203)	2.21	1.18	1.41	(38 yrs.)	3.40
Little Boy (11-167)	1.54	0.92	1.12	(10 yrs.)	2.50
Long (11-142)	1.30	0.32	0.94	(12 yrs.)	5.16
Lower Trelipe (11-129)	0.96	0.63	1.08	(23 yrs.)	4.63
Mud (11-100)	3.80	2.60	2.65	(28 yrs.)	6.70
Norway (11-307)	0.76	0.38	0.50	(6 yrs.)	0.94
Paquet (11-381)	0.95	0.80	1.04	(10 yrs.)	2.32
Pleasant (11-383)	0.95	0.49	0.74	(6 yrs.)	2.65
Portage (11-476)	1.36	0.40	0.95	(12 yrs.)	4.62
Stony (11-371)	0.82	0.60	0.58	(11 yrs.)	4.43
Sylvan (11-304)	1.28	0.81	0.86	(21 yrs.)	3.21
Ten Mile (11-413)	1.01	0.59	0.78	(28 yrs.)	2.74
Vermillion (11-29)	1.63	2.06	1.95	(9 yrs.)	5.25
Winnibigoshish (11-147)	3.20	1.74	2.02	(43 yrs.)	3.90
Woman (11-201)	1.20	0.80	0.86	(13 yrs.)	1.77
CHISAGO COUNTY					
Comfort (13-53)	1.94	1.49	1.18	(29 yrs.)	3.52
Ellen (13-47)	1.34	1.44	0.89	(6 yrs.)	2.02
Goose (13-83)	3.00	2.35	1.70	(15 yrs.)	3.47
Green (13-41)	0.92	1.61	1.07	(25 yrs.)	9.10
Kroon (13-13)	1.80	1.08	1.08	(7 yrs.)	2.63
North Center (13-32)	3.30	2.10	1.66	(30 yrs.)	7.26
North Lindstrom (13-35)	3.44	1.93	1.77	(26 yrs.)	11.42
Rush (13-69)	2.52	1.23	1.42	(36 yrs.)	3.28
South Lindstrom (13-28)	3.73	1.96	1.64	(21 yrs.)	14.13
Sunrise (13-31)	1.87	0.90	1.02	(15 yrs.)	4.00
Wallmark (13-29)	1.56	1.29	0.89	(7 yrs.)	2.12
CLEARWATER COUNTY					
Itasca (15-16)	0.55	0.60	0.70	(35 yrs.)	2.21
Long Lost (15-68)	1.73	1.39	1.42	(11 yrs.)	13.37
Minerva (15-79)	1.47	1.50	1.00	(7 yrs.)	2.41

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
COOK COUNTY					
Clearwater (16-139)	1.31	0.70	1.08	(8 yrs.)	1.57
Flour (16-147)	0.86	0.47	0.64	(13 yrs.)	1.88
Saganaga (16-633)	3.21	1.19	1.86	(12 yrs.)	5.26
Sea Gull (16-629)	3.98	1.70	1.92	(11 yrs.)	4.92
COTTONWOOD COUNTY					
Cottonwood (17-22)	6.65	1.06	2.20	(15 yrs.)	9.90
Mountain (17-3)	1.18	0.46	1.53	(19 yrs.)	5.00
CROW WING COUNTY					
Bass (18-256)	0.87	0.42	0.67	(14 yrs.)	3.21
Bonnie (18-259)	0.90	0.36	0.65	(13 yrs.)	3.10
Clark (18-374)	0.92	0.53	0.81	(14 yrs.)	1.73
Crooked (18-41)	1.68	0.98	0.86	(13 yrs.)	2.39
Crow Wing (18-155)	2.04	0.70	1.42	(11 yrs.)	3.85
East Fox (18-298)	0.53	0.55	0.58	(22 yrs.)	2.32
East Twin (18-407)	0.99	1.20	0.70	(12 yrs.)	2.57
Edward (18-305)	1.29	0.40	0.89	(35 yrs.)	7.18
Garden (18-329)	0.76	0.50	0.50	(14 yrs.)	1.29
Gilbert (18-320)	1.74	1.20	1.18	(13 yrs.)	4.71
Gladstone (18-338)	0.63	0.54	0.64	(14 yrs.)	1.21
Goodrich (18-226)	0.75	0.47	0.54	(10 yrs.)	1.30
Hamlet (18-70)	1.59	1.25	1.05	(39 yrs.)	6.70
Hartley (18-392)	0.97	0.80	0.71	(14 yrs.)	3.28
Horseshoe (18-251)	0.89	0.52	0.70	(14 yrs.)	2.49
Hubert (18-375)	1.61	0.64	0.98	(22 yrs.)	3.56
Island (18-183)	1.74	2.04	1.52	(14 yrs.)	2.98
Little Hubert (18-340)	0.94	0.81	0.95	(14 yrs.)	3.29
Little Pelican (18-351)	1.08	0.40	0.69	(14 yrs.)	**.**
Lougee (18-342)	1.27	0.36	0.74	(14 yrs.)	2.40
Portage (18-50)	1.37	1.34	0.97	(12 yrs.)	3.11
Rabbit (18-93)	1.00	0.65	0.95	(45 yrs.)	3.24
Rogers (18-184)	1.25	0.68	0.83	(15 yrs.)	2.30
Ross (18-165)	1.60	1.32	1.42	(19 yrs.)	3.05
Ruth (18-212)	0.95	0.60	0.85	(36 yrs.)	6.31
Shaffer (18-348)	1.17	0.40	0.74	(15 yrs.)	2.84
Sorenson (18-323)	1.11	0.94	0.96	(14 yrs.)	3.17
South Long (18-136)	2.61	1.75	1.18	(37 yrs.)	3.24
Stevens (18-325)	1.30	0.46	0.86	(6 yrs.)	1.32
Upper South Long (18-96)	3.31	1.86	1.20	(33 yrs.)	4.13
West Twin (18-409)	1.06	0.46	0.64	(12 yrs.)	2.28
Whitefish (18-1)	2.31	1.56	1.30	(11 yrs.)	3.75
Young (18-252)	1.45	0.42	0.80	(14 yrs.)	2.48
DAKOTA COUNTY					
Marion (19-26)	2.70	2.22	2.11	(44 yrs.)	13.22
Orchard (19-31)	1.02	0.94	0.81	(11 yrs.)	1.51
Sunfish (19-50)	1.27	1.23	1.04	(12 yrs.)	3.42
Unnamed (Building A Lake) (19-190)	2.52	0.80	1.32	(12 yrs.)	3.62
Unnamed (Horse/Camel) (19-205)	3.77	2.62	1.79	(11 yrs.)	5.60
Unnamed (Main Lake) (19-203)	2.56	2.36	2.21	(11 yrs.)	3.70
Unnamed (Musk Ox Lake) (19-204)	2.87	1.00	1.13	(11 yrs.)	4.79
Unnamed (Musk Ox Marsh) (19-207)	2.00	1.38	1.30	(11 yrs.)	3.89
Unnamed (Reflection Pond) (19-199)	0.98	0.73	0.84	(12 yrs.)	2.88
Young (19-203)	1.48	0.92	2.06	(11 yrs.)	6.38

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
DOUGLAS COUNTY					
Andrew (21-85)	1.88	0.40	0.98	(11 yrs.)	3.87
Burgen (21-49)	1.30	0.80	0.83	(10 yrs.)	3.23
Carlos (21-57)	1.18	0.54	0.98	(22 yrs.)	5.83
Chippewa (21-145)	2.08	0.92	1.23	(19 yrs.)	3.81
Devils (21-213)	1.80	0.70	1.02	(7 yrs.)	2.77
Geneva (21-52)	2.06	0.65	1.03	(9 yrs.)	2.39
Ida (21-123)	1.20	0.80	1.07	(20 yrs.)	7.94
Irene (21-76)	1.16	0.74	0.73	(13 yrs.)	1.54
Latoka (21-106)	1.10	0.48	0.60	(10 yrs.)	5.98
Le Homme Dieu (21-56)	1.99	0.58	1.02	(12 yrs.)	2.16
Little Chippewa (21-212)	1.92	0.63	1.44	(17 yrs.)	9.09
Lobster (21-144)	2.46	0.85	1.21	(30 yrs.)	11.20
Louise (21-94)	3.21	1.24	1.58	(16 yrs.)	5.94
Maple (21-79)	0.99	0.55	0.76	(9 yrs.)	2.93
Mary (21-92)	2.32	1.68	1.44	(12 yrs.)	5.31
Miltona (21-83)	1.68	0.84	1.09	(27 yrs.)	4.77
Moon (21-226)	1.80	0.92	1.27	(18 yrs.)	10.59
Pocket (21-140)	2.07	1.46	0.91	(6 yrs.)	2.33
Red Rock (21-291)	2.30	0.52	1.45	(12 yrs.)	4.21
Unnamed (21-467)	1.48	0.32	0.96	(6 yrs.)	2.57
Vermont (21-73)	1.63	1.26	1.11	(6 yrs.)	2.98
Victoria (21-54)	1.91	0.88	1.18	(21 yrs.)	3.48
Winona (21-81)	0.90	0.93	0.74	(9 yrs.)	1.66
FREEBORN COUNTY					
Bear (24-28)	2.60	0.50	1.22	(19 yrs.)	5.58
GRANT COUNTY					
Elk (26-40)	2.26	0.58	0.92	(8 yrs.)	3.85
Pomme de Terre (26-97)	1.30	0.56	1.09	(14 yrs.)	3.20
HENNEPIN COUNTY					
Arrowhead (27-45)	2.92	1.05	2.04	(39 yrs.)	7.23
Birch Island (27-81)	2.77	0.44	1.89	(38 yrs.)	13.37
Bryant (27-67)	1.45	0.56	1.10	(39 yrs.)	5.50
Bush (27-47)	1.78	0.15	1.32	(40 yrs.)	10.90
Cedar Island (27-119)	2.15	0.86	1.18	(16 yrs.)	6.50
Cornelia (27-28)	2.35	0.15	0.70	(38 yrs.)	6.00
Duck (27-69)	2.99	0.50	1.55	(32 yrs.)	4.64
Eagle/Pike (27-111)	1.66	1.10	1.06	(16 yrs.)	3.27
Edina (27-29)	0.90	0.62	1.66	(38 yrs.)	7.58
Edward (27-121)	1.04	1.36	1.02	(15 yrs.)	3.75
Fish (27-118)	2.18	1.63	1.53	(15 yrs.)	2.87
Gleason (27-95)	1.72	3.68	1.73	(14 yrs.)	5.14
Glen (27-93)	1.88	0.29	1.43	(38 yrs.)	6.57
Hawkes (27-56)	2.80	0.79	2.37	(39 yrs.)	11.31
Hyland (27-48)	2.62	0.36	1.63	(31 yrs.)	7.02
Idlewild (27-74)	1.24	0.15	1.14	(31 yrs.)	7.68
Independence (27-176)	2.26	1.43	1.66	(22 yrs.)	7.88
Indianhead (27-44)	1.95	1.69	1.36	(10 yrs.)	3.19
Langdon (27-182)	1.99	0.60	1.30	(11 yrs.)	3.54
Lone (27-94)	1.82	0.16	1.26	(38 yrs.)	5.70
Long (27-160)	1.71	1.40	1.38	(17 yrs.)	3.35
Medicine (27-104)	1.50	1.57	1.56	(30 yrs.)	5.08
Minnetoga (27-88)	1.82	0.86	1.01	(29 yrs.)	3.00
Minnetonka (27-133)	2.38	2.17	1.45	(97 yrs.)	8.74
Mirror (27-55)	3.10	0.32	1.53	(39 yrs.)	7.47
Mitchell (27-70)	2.42	0.21	1.91	(32 yrs.)	8.13
Nancy (27-677)	0.46	0.14	0.43	(34 yrs.)	2.27
North Anderson (27-62)	1.30	0.21	1.30	(40 yrs.)	5.37
Ox Yoke (27-178)	5.47	1.59	3.50	(7 yrs.)	6.99
Oxboro (27-11)	5.63	0.99	2.39	(38 yrs.)	12.70
Parkers (27-107)	1.98	2.12	2.55	(30 yrs.)	11.65
(Hennepin County continued)					
Pauly's Pond (27-8)	3.39	0.56	1.92	(38 yrs.)	9.36
Penn (27-4)	2.72	0.87	2.18	(38 yrs.)	8.85
Red Rock (27-76)	1.45	0.23	1.35	(32 yrs.)	6.91
Rice (27-116)	1.74	1.30	1.80	(15 yrs.)	10.94
Rose (27-92)	3.49	0.45	2.10	(36 yrs.)	8.80
Round (27-71)	3.78	0.93	2.17	(32 yrs.)	8.97
Sarah (27-191)	3.25	3.27	1.93	(11 yrs.)	4.60
Shady Oak (27-89)	1.75	0.16	1.33	(39 yrs.)	6.65
Silver (27-136)	2.08	0.20	1.29	(15 yrs.)	5.50
Skriebakken Pond (27-1049)	1.57	0.31	1.58	(38 yrs.)	9.93
Smetana (27-73)	0.20	0.05	1.49	(29 yrs.)	10.40
Southeast Anderson (27-62)	1.29	0.16	1.47	(40 yrs.)	7.27
Southwest Anderson (27-62)	1.29	0.16	1.21	(40 yrs.)	5.60
Staring (27-78)	1.80	0.57	1.80	(32 yrs.)	7.16
Twin (27-42)	1.40	1.04	1.27	(12 yrs.)	3.56
Wanda Miller (27-7)	2.13	1.01	2.27	(38 yrs.)	9.32
Weaver (27-117)	0.97	1.12	0.95	(15 yrs.)	3.19
Wing (27-91)	2.21	0.43	1.63	(37 yrs.)	8.02
HUBBARD COUNTY					
Bad Axe (29-208)	0.47	0.40	0.51	(7 yrs.)	2.42
Belle Taine (29-146)	1.41	0.50	1.34	(49 yrs.)	14.36
Big Sand (29-185)	1.29	0.58	0.85	(12 yrs.)	2.91
Big Stony (29-143)	1.62	0.48	0.77	(9 yrs.)	2.31
Blue (29-184)	0.56	0.78	0.60	(8 yrs.)	1.07
Eagle (29-256)	1.71	2.34	1.63	(12 yrs.)	2.78
East Crooked (29-101)	0.77	0.63	0.81	(9 yrs.)	3.54
Eighth Crow Wing (29-72)	0.45	0.42	0.44	(7 yrs.)	0.70
Eleventh Crow Wing (29-36)	0.36	0.21	0.28	(6 yrs.)	0.56
Fifth Crow Wing (29-92)	0.62	0.74	0.72	(9 yrs.)	1.26
Fish Hook (29-242)	0.34	0.64	1.01	(12 yrs.)	2.12
Gilmore (29-188)	1.03	0.55	0.56	(9 yrs.)	1.41
Grace (29-71)	1.10	0.76	0.74	(12 yrs.)	2.75
Island (29-254)	2.06	1.82	2.11	(12 yrs.)	3.92
Little Mantrap (29-313)	0.94	1.17	0.94	(6 yrs.)	2.47
Little Sand (29-150)	1.01	0.55	0.71	(29 yrs.)	3.48
Long (29-161)	0.44	0.48	0.50	(16 yrs.)	1.18
Palmer (29-87)	1.12	0.60	0.84	(12 yrs.)	2.91
Plantagenet (29-156)	1.73	2.22	1.45	(21 yrs.)	3.47
Potato (29-243)	0.88	1.38	0.79	(11 yrs.)	1.71
Potato (HW at outlet dam) (29-243)	1.20	1.35	0.71	(23 yrs.)	1.72
Potato (TW at outlet dam) (29-243)	1.74	0.56	1.26	(12 yrs.)	2.78
Spider (29-117)	0.90	0.54	0.74	(12 yrs.)	2.61
Third Crow Wing (29-77)	0.65	1.60	1.01	(6 yrs.)	2.13
West Crooked (29-101)	0.88	0.60	0.70	(9 yrs.)	2.02
ISANTI COUNTY					
Green (30-136)	3.43	2.44	1.58	(20 yrs.)	4.93
Long (30-72)	0.28	0.82	0.53	(9 yrs.)	1.94
Skogman (30-22)	2.97	1.26	1.29	(24 yrs.)	4.29
Spectacle (30-135)	0.34	0.72	0.63	(10 yrs.)	2.80
ITASCA COUNTY					
Balsam (31-259)	1.71	1.64	1.18	(20 yrs.)	3.26
Bass (31-576)	0.54	0.97	0.81	(23 yrs.)	3.68
Beatrice (31-58)	1.41	0.58	0.88	(11 yrs.)	2.03
Bello (31-726)	0.78	0.80	0.77	(8 yrs.)	1.87
Bowstring (31-813)	2.64	2.32	1.69	(24 yrs.)	4.40
Buck (31-69)	0.78	1.32	0.58	(18 yrs.)	1.38
Burnt Shanty (31-424)	0.68	0.55	**.**	(13 yrs.)	**.**

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Itasca County continued)					
Burrows (31-413)	0.94	0.63	0.72	(13 yrs.)	2.18
Clearwater (31-214)	1.26	1.43	1.01	(7 yrs.)	1.51
Crooked (31-193)	8.14	8.68	6.49	(10 yrs.)	9.53
Deer (31-719)	0.88	0.79	0.59	(9 yrs.)	1.28
Dixon (31-921)	3.65	2.70	2.86	(9 yrs.)	4.43
Dora (31-882)	2.82	2.43	2.03	(22 yrs.)	4.35
Grave (31-624)	0.91	1.58	0.71	(10 yrs.)	1.62
Gunn (31-480)	1.39	0.84	1.11	(6 yrs.)	2.86
Hale (31-361)	1.66	1.20	1.11	(10 yrs.)	2.46
Hale (31-373)	1.03	0.61	0.83	(44 yrs.)	3.16
Island (31-913)	1.30	1.00	0.79	(7 yrs.)	1.82
Jessie (31-786)	1.58	2.55	1.30	(13 yrs.)	4.66
Johnson (31-586)	1.38	0.78	0.94	(13 yrs.)	3.01
Kelly (31-299)	1.36	0.52	0.93	(7 yrs.)	1.97
Lawrence (31-231)	7.87	8.28	5.57	(8 yrs.)	10.98
Link (31-304)	1.06	0.13	0.60	(7 yrs.)	1.90
Little Bowstring (31-758)	0.56	2.56	1.25	(9 yrs.)	2.56
Little Long (31-613)	1.19	0.80	0.80	(12 yrs.)	5.68
Long (31-570)	0.88	0.44	0.91	(37 yrs.)	3.39
Loon (31-571)	1.04	0.57	1.03	(38 yrs.)	3.62
McGuire (31-78)	3.27	4.78	2.89	(11 yrs.)	4.99
Moose (31-722)	0.78	0.72	0.76	(14 yrs.)	1.77
Owen (31-292)	1.31	0.68	0.77	(13 yrs.)	2.28
Pigeon Dam (31-894)	1.80	1.56	1.30	(15 yrs.)	3.30
Pokegama (31-532)	5.94	3.70	3.13	(49 yrs.)	8.89
Pughole (31-602)	1.14	0.73	0.93	(12 yrs.)	3.32
Ruby (31-422)	0.56	0.72	0.59	(13 yrs.)	2.21
Sand (31-438)	0.89	0.74	0.82	(11 yrs.)	3.14
Sand (31-826)	2.67	2.35	1.74	(20 yrs.)	4.40
Shallow (31-84)	0.70	0.65	0.62	(11 yrs.)	1.12
Shoal (31-141)	1.04	1.73	1.09	(9 yrs.)	1.92
Siseebakwet (31-554)	0.82	0.73	0.74	(54 yrs.)	2.19
Smith (31-650)	1.25	0.66	0.83	(13 yrs.)	3.17
Snaptail (31-255)	1.55	3.00	1.24	(11 yrs.)	3.08
Snowball (31-108)	0.64	2.07	1.00	(37 yrs.)	4.28
South Sturgeon (31-3)	1.96	1.75	1.47	(9 yrs.)	3.40
Spider (31-538)	0.98	0.74	0.80	(13 yrs.)	2.40
Split Hand (31-353)	1.50	1.10	1.53	(21 yrs.)	3.65
Swan (31-67)	2.03	2.30	1.54	(54 yrs.)	4.65
Trout (31-216)	1.39	0.85	1.10	(42 yrs.)	6.09
Turtle (31-725)	0.97	0.80	0.66	(11 yrs.)	2.07
White Swan (31-260)	1.39	0.63	0.65	(13 yrs.)	**.**
JACKSON COUNTY					
Heron (Duck) (32-57)	4.27	0.84	1.68	(12 yrs.)	7.00
Heron (North Marsh) (32-57)	7.94	3.20	4.31	(26 yrs.)	10.33
Heron (South Heron) (32-57)	7.81	2.00	3.62	(33 yrs.)	8.94
Heron (Tailwaters) (32-57)	9.84	2.42	4.58	(12 yrs.)	9.90
Loon (32-20)	1.97	0.81	1.43	(17 yrs.)	4.58
Pearl (32-33)	1.97	1.16	1.69	(12 yrs.)	4.21
KANABEC COUNTY					
Fish (33-36)	8.13	7.50	2.91	(11 yrs.)	8.26
Knife (33-28)	1.70	1.68	2.10	(35 yrs.)	11.99
KANDIYOHI COUNTY					
Andrew (34-206)	2.66	1.38	1.49	(36 yrs.)	13.60
Big Kandiyohi (34-86)	3.23	1.58	1.37	(38 yrs.)	5.81
Calhoun (34-62)	2.48	1.13	1.38	(31 yrs.)	3.85
Diamond (34-44)	1.76	1.56	1.06	(21 yrs.)	3.95
Eagle (34-171)	2.21	1.12	1.12	(33 yrs.)	5.22
East Solomon (34-246)	1.71	1.79	1.27	(14 yrs.)	4.50

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Kandiyohi County continued)					
Elizabeth (34-22)	2.43	1.89	1.20	(23 yrs.)	3.12
Elkhorn (34-119)	2.07	1.21	0.85	(21 yrs.)	3.34
Florida (34-217)	2.65	1.90	1.54	(22 yrs.)	5.22
Foot (34-181)	1.86	1.47	0.99	(19 yrs.)	3.41
Games (34-224)	1.76	1.20	1.03	(25 yrs.)	4.09
George (34-142)	1.59	1.39	1.07	(27 yrs.)	3.88
Green (34-79)	2.87	2.34	1.58	(47 yrs.)	4.91
Henderson (34-116)	1.86	1.26	1.10	(20 yrs.)	5.57
Lillian (34-72)	2.25	1.15	1.23	(14 yrs.)	5.23
Little Kandiyohi (34-96)	2.27	1.44	1.45	(31 yrs.)	5.08
Long (34-66)	0.92	0.76	0.50	(20 yrs.)	1.59
Long (34-192)	1.84	1.07	1.13	(22 yrs.)	12.31
Mud (34-158)	1.82	1.31	1.34	(35 yrs.)	3.64
Nest (34-154)	2.44	2.30	1.26	(34 yrs.)	3.96
Norway (34-251)	2.22	1.25	1.30	(20 yrs.)	4.29
Point (34-193)	1.75	1.43	1.06	(15 yrs.)	11.23
Ringo (34-172)	1.81	1.18	1.16	(18 yrs.)	7.64
Saint Johns (34-283)	1.24	0.75	1.13	(13 yrs.)	3.31
Skataas (34-196)	1.30	1.27	1.20	(15 yrs.)	4.81
Swenson (34-321)	1.75	0.76	1.15	(15 yrs.)	5.63
Unnamed (Golden Pond) (34-355)	0.54	0.39	0.85	(8 yrs.)	2.54
Wagonga (34-169)	3.41	2.26	1.72	(18 yrs.)	4.92
LAKE COUNTY					
Farm (38-779)	0.57	0.31	0.44	(10 yrs.)	0.96
Garden (38-782)	1.11	0.85	1.25	(11 yrs.)	3.67
LE SUEUR COUNTY					
Frances (40-57)	1.87	0.76	0.96	(11 yrs.)	13.14
German (40-63)	1.80	1.05	1.28	(27 yrs.)	6.20
Tetonka (40-31)	0.31	1.16	1.79	(38 yrs.)	5.50
Volney (40-33)	1.96	1.47	1.35	(12 yrs.)	3.60
Washington (40-117)	1.88	1.24	1.49	(24 yrs.)	5.35
West Jefferson (40-92)	1.92	1.03	1.40	(28 yrs.)	6.92
LINCOLN COUNTY					
Benton (41-43)	2.10	1.74	1.55	(28 yrs.)	5.98
Shaokotan (41-89)	1.52	0.92	1.42	(10 yrs.)	4.27
MCLEOD COUNTY					
Marion (43-84)	2.29	0.84	1.11	(13 yrs.)	3.05
Winsted (43-12)	1.75	2.51	1.67	(12 yrs.)	3.54
MAHNOMEN COUNTY					
Tulaby (44-3)	0.75	1.40	1.09	(10 yrs.)	2.44
MARTIN COUNTY					
Amber (46-34)	2.45	0.94	1.46	(10 yrs.)	3.89
Budd (46-30)	2.60	1.42	1.60	(9 yrs.)	5.32
George (46-24)	2.08	1.40	1.40	(10 yrs.)	8.84
MEEKER COUNTY					
Belle (47-49)	2.27	2.43	1.40	(11 yrs.)	11.84
Big Swan (47-38)	8.21	8.01	5.48	(8 yrs.)	9.86
Clear (47-95)	2.50	1.12	1.36	(13 yrs.)	4.21
Dunns (47-82)	1.42	2.94	1.60	(7 yrs.)	2.94
Francis (47-2)	0.93	1.58	0.91	(20 yrs.)	4.95
Jennie (47-15)	1.63	1.60	1.04	(11 yrs.)	9.04
Long (47-177)	4.05	1.90	1.96	(6 yrs.)	4.05
Minnie-Belle (47-119)	1.36	1.84	1.35	(14 yrs.)	5.92

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Meeker County continued)					
Richardson (47-88)	1.62	1.70	1.24	(7 yrs.)	2.59
Ripley (47-134)	2.46	0.75	1.05	(10 yrs.)	9.61
Stella (47-68)	1.97	1.78	1.12	(14 yrs.)	2.55
Washington (47-46)	1.34	1.30	0.75	(14 yrs.)	2.23
MILLE LACS COUNTY					
Mille Lacs (48-2)	2.58	2.12	1.36	(72 yrs.)	7.69
Onamia (48-9)	3.14	1.92	1.62	(37 yrs.)	6.12
Onamia (TW) (48-9)	3.64	2.50	2.00	(18 yrs.)	5.77
MORRISON COUNTY					
Fish Trap (49-137)	2.93	0.50	1.07	(20 yrs.)	4.36
Green Prairie Fish (49-35)	1.72	1.30	1.21	(7 yrs.)	2.09
Long (49-15)	0.62	0.66	0.67	(6 yrs.)	1.72
Round (49-56)	1.75	0.70	0.89	(8 yrs.)	1.75
Shamineau (49-127)	1.83	0.75	0.93	(9 yrs.)	5.11
Sullivan (49-16)	2.33	1.78	1.41	(24 yrs.)	3.79
MURRAY COUNTY					
Currant (51-82)	2.02	1.06	1.36	(10 yrs.)	4.56
Sarah (51-63)	2.43	1.16	1.30	(8 yrs.)	4.41
Shetek (51-46)	3.24	0.68	2.00	(53 yrs.)	7.67
NOBLES COUNTY					
Bella (53-45)	3.70	2.36	2.34	(13 yrs.)	9.68
East Graham (53-20)	3.33	0.28	1.45	(7 yrs.)	5.15
Indian (53-7)	1.73	1.56	1.71	(15 yrs.)	4.48
Ocheda (53-24)	2.48	1.34	1.41	(35 yrs.)	5.42
West Graham (53-21)	1.90	0.14	1.22	(6 yrs.)	5.12
OTTER TAIL COUNTY					
Big McDonald (56-386)	0.82	0.61	0.87	(8 yrs.)	1.60
Big McDonald(West McDonal (56-386)	0.88	0.62	0.85	(9 yrs.)	7.70
Big Pine (56-130)	1.15	0.85	1.51	(53 yrs.)	4.73
Blanche (56-240)	1.46	0.50	0.64	(10 yrs.)	1.77
Clitherall (56-238)	0.81	0.33	0.73	(9 yrs.)	2.11
Deer (56-298)	2.21	2.14	1.66	(6 yrs.)	3.07
Eagle (56-253)	1.72	0.60	0.88	(7 yrs.)	9.43
East Battle (56-138)	1.50	1.04	1.12	(16 yrs.)	4.21
East Leaf (56-116)	1.81	1.56	1.99	(8 yrs.)	3.22
East Lost (56-378)	2.47	1.58	2.02	(10 yrs.)	3.38
Jewett (56-877)	1.47	0.09	0.68	(8 yrs.)	3.80
Little McDonald (56-328)	1.41	0.78	1.06	(11 yrs.)	4.55
Little Pine (56-142)	1.34	0.58	1.06	(38 yrs.)	3.30
Lizzie (56-760)	1.18	0.42	1.17	(55 yrs.)	4.56
Long (56-388)	1.26	1.00	0.79	(19 yrs.)	5.78
Long (56-784)	1.58	0.82	1.19	(11 yrs.)	2.08
Middle Leaf (56-116)	1.94	1.64	1.82	(8 yrs.)	3.61
Orwell (56-945)	23.26	3.68	15.18	(33 yrs.)	25.79
Otter Tail (56-242)	1.53	0.72	1.42	(73 yrs.)	4.63
Otter Tail (TW) (56-242)	1.70	1.00	1.74	(13 yrs.)	3.78
Pelican (56-786)	1.34	0.94	1.28	(29 yrs.)	4.94
Pickerel (56-204)	1.58	0.70	1.15	(9 yrs.)	3.16
Pickerel (56-475)	0.78	0.46	0.69	(24 yrs.)	3.03
Prairie (56-915)	1.08	0.43	0.80	(22 yrs.)	4.70
Rush (56-141)	2.08	1.20	1.56	(63 yrs.)	3.87
Rush (TW) (56-141)	2.44	1.10	1.82	(18 yrs.)	5.08
Silver (56-302)	1.43	0.46	0.98	(6 yrs.)	3.10
Six (56-369)	0.51	0.38	0.46	(6 yrs.)	1.53
Star (56-385)	0.89	0.49	1.02	(26 yrs.)	3.79
Stuart (56-191)	2.29	0.62	1.28	(7 yrs.)	6.26

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
Otter Tail County continued)					
Swan (56-781)	1.00	0.48	0.97	(11 yrs.)	3.63
Sybil (56-387)	0.92	0.61	0.73	(7 yrs.)	3.04
Ten Mile (56-613)	1.19	0.59	1.21	(11 yrs.)	2.69
Wall (56-658)	0.32	0.22	0.37	(11 yrs.)	0.75
West Battle (56-239)	2.59	0.77	1.11	(30 yrs.)	8.42
West Lost (56-481)	2.62	1.11	1.78	(8 yrs.)	**.**
West McDonald (56-386)	0.84	0.61	0.87	(9 yrs.)	2.00
PINE COUNTY					
Grindstone (58-123)	3.73	1.84	1.19	(26 yrs.)	3.73
Pokegama (58-142)	3.11	4.79	3.73	(23 yrs.)	8.20
Sand (58-81)	2.38	2.37	1.48	(28 yrs.)	5.99
Upper Pine (58-130)	1.84	0.74	0.76	(10 yrs.)	2.04
POLK COUNTY					
Badger (60-214)	0.68	1.85	1.44	(15 yrs.)	2.95
Breeze (60-144)	1.90	0.13	0.96	(10 yrs.)	3.65
Cable (60-293)	1.02	1.13	0.92	(11 yrs.)	7.90
Cameron (60-189)	0.68	1.39	0.79	(10 yrs.)	3.08
Cross (60-27)	1.10	1.92	1.46	(14 yrs.)	3.46
Hill River (60-142)	0.68	1.16	0.98	(11 yrs.)	1.94
Maple (60-305)	0.95	0.93	1.14	(26 yrs.)	11.22
Poplar (60-6)	0.50	0.34	1.43	(11 yrs.)	3.55
Sarah (60-202)	2.77	2.89	2.91	(14 yrs.)	14.89
Spring (60-12)	0.60	0.96	0.84	(11 yrs.)	2.35
Turtle (60-32)	1.06	1.49	1.31	(15 yrs.)	4.18
Union (60-217)	2.40	1.72	1.59	(17 yrs.)	8.55
Whitefish (60-15)	0.75	1.10	0.98	(6 yrs.)	3.25
POPE COUNTY					
Gilchrist (61-72)	4.82	3.00	2.44	(12 yrs.)	5.50
Leven (61-66)	3.38	1.16	1.73	(9 yrs.)	3.38
Linka (61-37)	1.46	0.90	0.93	(9 yrs.)	2.07
Marlu (61-60)	2.70	1.04	1.15	(9 yrs.)	2.70
Minnewaska (61-130)	1.86	0.70	1.18	(58 yrs.)	10.01
Pelican (61-111)	4.34	1.62	1.40	(10 yrs.)	6.83
Signalness (61-149)	1.12	0.76	0.82	(6 yrs.)	1.68
Villard (61-67)	5.95	2.53	2.17	(9 yrs.)	6.03
RAMSEY COUNTY					
Bald Eagle (62-2)	1.30	1.25	1.25	(80 yrs.)	6.69
Beaver (62-16)	1.75	1.65	1.94	(48 yrs.)	7.10
Bennett (62-48)	2.53	2.23	2.79	(16 yrs.)	6.60
Birch (62-24)	1.73	1.44	1.33	(73 yrs.)	7.13
Como (62-55)	2.45	1.60	1.70	(25 yrs.)	4.19
Gervais (62-7)	2.23	1.34	2.14	(79 yrs.)	7.20
Grass (62-74)	7.46	5.52	3.57	(21 yrs.)	9.65
Island (62-75)	1.81	1.57	1.41	(57 yrs.)	9.32
Johanna (62-78)	1.07	1.25	1.98	(79 yrs.)	10.92
Josephine (62-57)	1.28	1.00	1.17	(79 yrs.)	4.20
Long (62-67)	2.85	2.15	1.74	(79 yrs.)	5.20
McCarron (62-54)	1.17	0.72	1.14	(79 yrs.)	4.45
Owasso (62-56)	1.83	1.63	1.17	(79 yrs.)	5.79
Phalen (62-13)	2.77	1.82	3.46	(79 yrs.)	12.32
Pike (62-69)	1.25	0.80	1.36	(34 yrs.)	4.57
Round (62-9)	2.93	2.16	2.02	(69 yrs.)	11.67
Silver (East) (62-1)	1.70	1.66	1.68	(78 yrs.)	10.05
Silver (West) (62-83)	1.17	0.90	1.70	(69 yrs.)	13.25
Snail (62-73)	1.97	2.13	1.61	(79 yrs.)	7.15
Turtle (62-61)	1.55	1.93	1.00	(80 yrs.)	4.40
Valentine (62-71)	2.47	1.39	1.82	(78 yrs.)	6.95
Wabasso (62-82)	2.99	3.02	1.45	(65 yrs.)	5.53
Wakefield (62-11)	2.01	1.34	2.27	(50 yrs.)	10.53
Willow (62-40)	0.97	1.12	1.01	(16 yrs.)	2.01

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
RENVILLE COUNTY					
Allie (65-6)	2.28	2.26	1.40	(13 yrs.)	8.56
Preston (65-2)	2.64	1.56	1.45	(10 yrs.)	3.74
RICE COUNTY					
Cedar (66-52)	1.53	1.09	1.11	(16 yrs.)	3.22
Roberds (66-18)	0.97	0.98	1.25	(18 yrs.)	2.42
ST. LOUIS COUNTY					
Aerie (69-701)	1.80	0.50	0.73	(6 yrs.)	1.80
Beaver (69-501)	2.15	0.89	0.93	(14 yrs.)	3.38
Big Rice (69-669)	1.30	1.30	1.14	(13 yrs.)	2.43
Boulder (69-373)	6.66	6.57	4.66	(6 yrs.)	6.69
Burntside (69-118)	1.33	0.71	0.99	(12 yrs.)	4.76
Cameron (69-545)	0.67	1.15	0.88	(7 yrs.)	1.87
Colby (69-249)	3.74	2.29	2.56	(37 yrs.)	7.02
Comstock (69-412)	1.03	2.32	1.59	(9 yrs.)	2.64
Crooked (69-703)	1.29	0.81	0.89	(6 yrs.)	1.37
Eagles Nest #1 (69-285)	0.72	0.36	0.76	(10 yrs.)	3.10
Eagles Nest #3 (69-285)	1.60	1.20	0.93	(11 yrs.)	1.61
Eagles Nest No. Four (69-218)	0.38	0.33	0.41	(10 yrs.)	0.97
Ely (69-660)	0.65	0.54	0.81	(49 yrs.)	2.80
Embarrass (69-496)	3.04	2.02	2.33	(44 yrs.)	6.29
Esquagama (69-565)	2.70	1.40	2.39	(28 yrs.)	8.10
Fish Lake Flowage (69-491)	3.24	2.37	2.28	(6 yrs.)	3.34
Fourteen (69-793)	1.01	0.56	0.56	(11 yrs.)	1.34
Horseshoe (69-232)	0.97	0.60	0.78	(6 yrs.)	3.42
Island Lake Reservoir (69-372)	11.84	10.62	18.30	(27 yrs.)	32.25
Jacobs (69-231)	1.46	0.64	0.82	(12 yrs.)	2.31
Janette (69-887)	0.72	1.78	0.78	(10 yrs.)	2.37
Leora (69-521)	1.48	1.03	0.86	(6 yrs.)	1.56
Lieung (69-123)	1.70	1.38	1.04	(7 yrs.)	2.53
Little Stone (69-28)	1.66	0.84	0.98	(11 yrs.)	2.99
Long (69-509)	0.14	0.65	0.89	(13 yrs.)	2.24
Long (69-653)	0.73	1.02	0.79	(11 yrs.)	1.47
Maple Leaf (69-700)	1.44	1.33	0.90	(12 yrs.)	1.78
Merrill (69-891)	0.86	1.47	0.77	(10 yrs.)	1.55
Nichols (69-627)	1.18	1.00	0.72	(14 yrs.)	1.71
Perch (69-932)	0.36	0.40	0.52	(12 yrs.)	2.35
Prairie (69-848)	1.54	1.20	1.24	(19 yrs.)	3.34
Sabin (69-434)	5.21	1.07	2.92	(7 yrs.)	5.71
Sand (69-736)	0.79	0.29	0.64	(11 yrs.)	2.13
Schubert (69-546)	1.80	1.80	1.20	(8 yrs.)	2.27
Shagawa (69-69)	1.74	0.90	1.58	(14 yrs.)	3.31
Stone (69-27)	1.51	0.52	0.83	(13 yrs.)	1.76
Stone (69-686)	1.04	0.76	1.12	(10 yrs.)	3.01
Sturgeon (69-939)	2.05	1.76	1.56	(19 yrs.)	3.00
Thirteen (69-794)	0.64	0.50	0.54	(6 yrs.)	1.25
Vermilion (69-378)	1.86	0.83	1.60	(52 yrs.)	3.19
White Iron (69-4)	2.20	1.36	1.58	(7 yrs.)	2.58
Whiteface Reservoir (69-375)	5.15	4.17	3.55	(6 yrs.)	5.44
Wild Rice (69-371)	3.15	1.55	1.82	(8 yrs.)	4.23
SCOTT COUNTY					
Cedar (70-91)	0.87	0.74	0.89	(9 yrs.)	2.42
Lower Prior (70-26)	3.08	1.59	2.36	(30 yrs.)	10.22
Markley (70-21)	3.16	2.91	3.13	(6 yrs.)	6.20
O'Dowd (70-95)	2.53	1.01	1.25	(10 yrs.)	5.08
Spring (70-54)	1.85	2.25	1.61	(13 yrs.)	2.98
Thole/Schneider (70-120)	2.68	1.06	1.69	(6 yrs.)	5.45
Upper Prior (70-72)	3.08	1.59	2.32	(31 yrs.)	12.20
SHERBURNE COUNTY					
Elk (71-141)	2.16	2.90	1.81	(8 yrs.)	4.87
Long (71-159)	2.37	1.92	1.33	(11 yrs.)	9.04
Mitchell (71-81)	1.32	1.93	1.53	(17 yrs.)	8.28
Rush (71-147)	5.72	4.42	2.08	(13 yrs.)	5.72
STEARNS COUNTY					
Big (73-159)	3.06	1.70	1.45	(13 yrs.)	5.20
Big Fish (73-106)	1.84	1.41	1.03	(26 yrs.)	4.06
Big Watab (73-102)	1.00	0.52	0.73	(18 yrs.)	1.90
Carnelian (73-38)	1.98	0.84	1.51	(11 yrs.)	10.56
Eden (73-150)	4.83	3.40	2.64	(15 yrs.)	10.38
Grand (73-55)	0.98	0.84	1.05	(22 yrs.)	3.21
Horseshoe (73-157)	4.92	2.80	1.96	(17 yrs.)	5.42
Knaus (73-86)	3.34	3.03	1.44	(8 yrs.)	4.66
Koronis (73-200)	3.68	0.76	2.06	(22 yrs.)	6.00
Kraemer (73-64)	1.90	2.00	1.29	(7 yrs.)	3.65
Long (73-4)	2.27	1.98	1.42	(10 yrs.)	3.38
Lower Spunk (73-123)	2.26	2.50	1.78	(6 yrs.)	2.51
North Brown's (73-147)	4.31	2.91	2.19	(11 yrs.)	4.93
Rice (73-196)	5.06	2.35	3.11	(17 yrs.)	6.94
School Section (73-35)	0.80	2.21	1.58	(6 yrs.)	9.28
Two Rivers (73-138)	5.94	3.48	3.34	(19 yrs.)	7.51
Willow (73-34)	2.26	0.84	1.24	(6 yrs.)	2.65
STEVENS COUNTY					
Page (75-19)	2.89	2.49	1.54	(23 yrs.)	8.08
Perkins (75-75)	1.42	0.56	1.24	(20 yrs.)	4.86
SWIFT COUNTY					
Camp (76-72)	2.63	0.81	1.76	(8 yrs.)	4.42
Oliver (east portion) (76-146)	3.35	0.71	1.77	(8 yrs.)	18.91
TODD COUNTY					
Beauty (77-35)	1.38	0.44	0.78	(9 yrs.)	2.55
Big (77-63)	1.92	0.77	0.98	(10 yrs.)	1.92
Big Birch (77-84)	1.68	1.81	1.07	(26 yrs.)	3.23
Big Birch (HW at outlet) (77-84)	1.38	0.90	0.76	(12 yrs.)	1.48
Fairy (77-154)	3.33	1.20	1.37	(14 yrs.)	9.91
Little Birch (77-89)	1.22	2.04	1.07	(23 yrs.)	3.42
Long (77-27)	1.70	0.86	0.84	(10 yrs.)	2.09
Long (77-149)	1.97	1.37	1.15	(6 yrs.)	6.44
Maple (77-181)	1.60	1.97	1.36	(14 yrs.)	3.02
Mound (77-7)	1.30	0.60	0.65	(10 yrs.)	1.30
Osakis (77-215)	3.90	2.17	1.60	(42 yrs.)	7.93
Sauk (77-150)	3.22	3.24	1.89	(20 yrs.)	5.47
TRAVERSE COUNTY					
Traverse (78-25)	7.04	1.25	2.83	(60 yrs.)	9.06
WADENA COUNTY					
Hazel (80-5)	1.34	0.68	0.93	(23 yrs.)	3.33
Stocking (80-37)	0.64	0.76	0.57	(15 yrs.)	1.58
WASHINGTON COUNTY					
Barker (82-76)	2.91	1.75	1.56	(6 yrs.)	3.96
Bass (82-35)	1.40	0.80	1.38	(8 yrs.)	3.75
Bass (82-123)	1.00	1.85	1.21	(6 yrs.)	8.50
Big Carnelian (82-49)	1.20	0.87	1.26	(26 yrs.)	14.26
Big Marine (82-52)	1.33	1.35	1.04	(29 yrs.)	7.10
Big Marine (Jellums) (82-52)	2.38	1.03	1.19	(6 yrs.)	2.38

Annual Lake Level Fluctuation (feet)

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Washington County continued)					
Carol (82-17)	1.22	0.68	1.17	(7 yrs.)	1.63
Clear (82-45)	3.86	2.25	2.53	(6 yrs.)	28.25
Cloverdale (82-9)	2.15	2.49	2.23	(9 yrs.)	9.21
DeMontreville (82-101)	1.32	1.30	1.46	(35 yrs.)	6.40
Downs (82-110)	4.09	2.62	2.60	(21 yrs.)	7.73
Eagle Point (82-109)	3.33	3.11	2.23	(28 yrs.)	7.40
Egg (82-147)	0.64	0.84	0.78	(13 yrs.)	3.41
Elmo (82-106)	1.12	0.50	1.22	(28 yrs.)	9.58
Forest (82-159)	1.00	0.55	0.75	(28 yrs.)	2.78
Goose (82-59)	5.41	1.92	1.89	(9 yrs.)	6.00
Halfbreed (82-80)	1.55	0.72	0.94	(13 yrs.)	3.05
Horseshoe (82-74)	0.82	1.10	1.66	(25 yrs.)	15.74
Jane (82-104)	1.23	1.04	1.53	(35 yrs.)	8.99
Lily (82-23)	2.70	2.30	1.70	(8 yrs.)	11.98
Little Carnelian (82-14)	4.20	1.59	3.60	(11 yrs.)	35.67
Long (82-21)	2.52	2.59	1.99	(7 yrs.)	2.88
Long (82-30)	1.40	1.55	0.90	(7 yrs.)	5.25
Long (82-118)	5.01	4.35	3.35	(29 yrs.)	10.34
Long (82-130)	2.55	2.39	1.71	(6 yrs.)	2.90
Loon (82-15)	2.30	2.22	1.34	(7 yrs.)	4.20
Louise (82-25)	1.76	1.78	1.23	(7 yrs.)	3.64
Masterman (82-126)	1.95	0.99	1.03	(6 yrs.)	1.95
McDonald (82-10)	1.13	1.28	1.07	(9 yrs.)	3.92
McKusick (82-20)	0.91	1.88	1.12	(7 yrs.)	5.13
Mud (82-26)	0.64	0.65	0.46	(8 yrs.)	0.87
Mud-wetland so of Co.4 (82-26)	0.96	0.89	0.92	(9 yrs.)	1.68
North Twin (82-18)	1.96	0.75	0.91	(7 yrs.)	2.18
Oneka (82-140)	1.40	1.30	0.98	(24 yrs.)	4.13
Pat (82-125)	1.60	1.94	1.31	(6 yrs.)	4.28
Sand (82-67)	3.93	3.05	2.31	(7 yrs.)	4.61
Shields (82-162)	1.81	2.05	1.25	(7 yrs.)	2.39
Silver (82-16)	2.25	1.48	1.57	(7 yrs.)	3.12
South School Section (82-151)	1.03	1.51	1.53	(7 yrs.)	4.91
South Twin (82-19)	2.55	1.12	1.64	(7 yrs.)	4.71
Square (82-46)	0.35	0.43	0.69	(26 yrs.)	5.34
Staples (82-28)	1.73	1.43	1.08	(6 yrs.)	3.33

Lake Name	WY01	WY02	WYAv.	#Yrs.	Range
(Washington County continued)					
Sunfish (82-107)	0.55	0.82	1.53	(28 yrs.)	18.15
Sunnybrook (82-133)	2.90	2.81	2.09	(10 yrs.)	3.40
Sunset (82-153)	1.10	1.79	1.20	(9 yrs.)	2.72
Turtle (82-36)	0.92	1.40	1.02	(9 yrs.)	3.52
Twin (82-48)	2.44	2.70	2.35	(6 yrs.)	3.26
Unnamed (82-334)	2.30	2.23	1.37	(7 yrs.)	4.82
Unnamed (Jackson WMA) (82-305)	2.76	2.69	2.10	(6 yrs.)	3.17
Unnamed (July Ave) (82-318)	5.31	3.94	3.41	(6 yrs.)	6.63
Unnamed (Maple Marsh) (82-38)	2.48	1.31	1.38	(6 yrs.)	2.61
Unnamed (May Ave.Wetland) (82-296)	1.62	0.86	0.93	(9 yrs.)	2.18
West Boot (82-44)	1.16	0.71	0.78	(8 yrs.)	2.13
White Bear (82-167)	1.72	1.82	1.21	(79 yrs.)	6.81
White Rock (82-72)	1.49	1.69	1.28	(6 yrs.)	3.50
Wood Pile (82-132)	1.75	2.39	1.36	(6 yrs.)	4.18
WATONWAN COUNTY					
Long (83-40)	0.88	1.49	1.48	(18 yrs.)	10.65
WRIGHT COUNTY					
Ann (86-190)	3.45	6.62	3.76	(7 yrs.)	7.33
Augusta (86-284)	0.91	2.38	1.13	(9 yrs.)	2.97
Beebe (86-23)	0.20	3.11	1.10	(11 yrs.)	7.20
Birch (86-66)	1.96	1.65	1.28	(10 yrs.)	6.19
Charlotte (86-11)	1.68	3.32	1.52	(18 yrs.)	8.68
Collinwood (86-293)	1.97	1.91	1.17	(8 yrs.)	3.88
Ida (86-146)	1.13	0.24	0.60	(7 yrs.)	3.59
Indian (86-223)	1.16	2.38	1.51	(17 yrs.)	9.76
Little Waverly (86-106)	1.43	2.04	1.39	(13 yrs.)	6.82
Maple (86-134)	1.40	2.39	1.28	(17 yrs.)	5.34
Mary (86-193)	1.91	1.87	1.21	(6 yrs.)	2.85
Pulaski (86-53)	1.65	4.03	1.54	(27 yrs.)	17.69
Sugar (86-233)	1.36	0.92	0.80	(26 yrs.)	4.43
Sylvia (86-289)	0.58	2.46	0.92	(24 yrs.)	4.03