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DIVISION OF WATERS, SOILS, AND MINERALS

MINNESOTA CONSERVATION DEPARTMENT

AN INVENTORY OF MINNESOTA LAKES

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Division of Waters, Soils, and Minerals.

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In this report all lakes, 10 acres or more in area, are listed. It includes the lakes along the borders of the state which are partly in Minnesota and partly in adjoining states or Canada. Reservoirs and artificial impoundments for improvement of wildlife habitat and for other recreational purposes are also included.

Names

It is not unusual to find two or more names applied to the same lake on different maps. Variations in spelling are also not uncommon. In determining the names to be used in this publication, official names and spellings established by decisions of the U.S. Board on Geographic Names or of the Minnesota Geographic Board have been used wherever such decisions have been made. In other cases, all reliable sources of information such as maps, official documents and historical publications have been consulted. Where multiple names occur, the official or selected name only is used in the county lists. Alternate names are however included in the alphabetical list at the end of the volume.

Numbers

For identification and data processing purposes every lake in the list has been assigned a number. The first part of this number identifies the county. A lake in more than one county is assigned a number in the county which contains the largest part of the lake. Its name also appears, with the same identification number, in the lists for the other counties involved. In the summaries showing the total number of lakes the lake is counted only in the county in which it is numbered.

Determination of Areas

Most of the lake areas were obtained by measurements made of aerial photographs. Table 1 lists the dates of aerial photographs used in determining lake areas. In a few instances aerial photos were not available for portions of counties. In these counties U.S. Geological Survey topographic maps and U.S. Forest Service and other planimetric maps were used. Lake areas were checked by reference to topographic maps throughout the state, even when aerial photographs were available.

Some of the aerial photographs used in preparing these quadrangle maps are on file with the Division of Waters, Soils and Minerals.

Areas of federal reservoirs were obtained from records of the U.S. Corps of Engineers. Areas of lakes on the Canada-Minnesota border were obtained by planimetering charts of Minnesota-Ontario border lakes, prepared by the U.S. Lake Survey in 1945 and 1950.

Meandered Lakes

The meandered area of a lake includes all the portion of property lying within the meander lines shown on plats made by the United States General Land Office. A meander line is a series of courses and distances to delineate the area of a body of water. It is not a boundary line but may be considered to be the limit of taxation. It did enable the General Land Office to plot fractional sections and compute their areas. The instructions governing the Land Office survey stated that all lakes, ponds and bayous with an area of 25 acres or more were to be meandered, but this policy was varied at the discretion of the surveyors. The Gazetteer of Meandered Lakes of Minnesota, published in 1928 by the State Department of Drainage and Waters, listed 4,480 meandered lakes in Minnesota, including meandered boundary waters. This list was completed from the original township plats prepared by the United States General Land Office..

What Is a Lake?

An enclosed basin filled or partly filled with water may be defined as a lake. The lake may have inlets and an outlet stream, it may have only an inlet or outlet, or it may be completely enclosed.

All lakes have a natural fluctuation in water levels. Some lakes in completely enclosed basins with intermittent surface water inflow and little ground water inflow fluctuate through great ranges in levels from very low to extremely high. Other lakes located in basins which have perennial streams as inlets and outlets may fluctuate within a narrow range. Lakes which receive a major portion of their water supply from ground water springs and seeps will generally have fairly uniform levels as long as the ground water supply to the basin remains somewhat constant.

Many of Minnesota's lakes have been drained or partly drained by the construction of artificial ditches or by the deepening of natural channels. To make this inventory complete all such lake basins have been included wherever they can be positively identified. They are described in the county lists as "affected by" a ditch, or "bed exposed" as the actual extent of drainage or the cause of extremely low lake levels is not always known with certainty. Lakes, for the purposes of this inventory, include all natural enclosed depressions, 10 acres or more in area, which have substantial banks capable of containing water and which are discernible on aerial photographs. The inventory also includes all bodies of water, except streams, which are shown within the meander lines on plats of the General Land Office surveys.

Lakes are constantly undergoing changes in size, depth, and shape. The rate and type of change in a given lake is dependent upon several factors including: the climatic and topographic conditions; the nature of the soil or rock materials which underlie the lake basin and cover the basin watershed; the biological environment; the physical configuration of the basin; and the nature and extent of artificial and natural drainage within the watershed of the lake.

Factors Affecting Lakes

Climate and topography

The ultimate source of the water necessary to fill basins and create lakes is precipitation. Much of the precipitation which falls on the land and water surfaces is lost through evaporation and transpiration and is returned to the atmosphere. Some of the rain, melted snow and ice infiltrates the ground to replenish the underground water supply which may discharge into the lake basin when ground water levels are sufficiently high. The remainder moves laterally along the land surface and drains into the basins or streams.

Each natural lake basin has a catchment area or watershed. The amount of surface runoff which will be available to a lake depends on the size and topography of the watershed and the amount of precipitation falling on it. Steep watershed slopes accelerate runoff and reduce the amount of water available to recharge ground water reservoirs. The ratio of lake basin area to watershed area is a major factor affecting the water supply available to a lake.

The annual precipitation over the entire State of Minnesota averages 25 inches. This is the lowest annual rainfall of any of the states bordering the Mississippi River and is less than the average annual precipitation in 38 of the 50 states. Fortunately, about a half of the year's total rainfall occurs during May to August. This, combined with lower evaporation rates due to the generally moderate summer temperatures of most of the state, accounts for the fact that Minnesota's lakes usually have ample water supplies. Supplemental supplies of water are available from the generally adequate ground water supplies of most lake areas of Minnesota.

The climate and topography of the state vary greatly. Annual precipitation increases rather uniformly from 19 to 20 inches in the northwest corner of the state to 32 inches in the southeast.

Topography varies from 602 feet above sea level along Lake Superior to 2,301 feet at Eagle Mountain in Cook County; both areas are in northeastern Minnesota. Most of the state, however, may be considered as a low plateau at the head of the Mississippi River with an elevation of about 1,200 feet above sea level. In addition to the rocky ridges along Lake Superior, high areas exist near the headwaters of the Mississippi River in the north-central part of the state and in the southwestern corner where elevations approach 2,000 feet. Low areas are found along the Mississippi River and the Red River of the North. A large area in east-central Minnesota, including the Twin Cities area, is mostly below 1,000 feet.

The state can be divided into six major physiographic provinces on the basis of climate and topography.

The Arrowhead region has many lake basins and is predominantly rocky with steep slopes. Average annual precipitation ranges from about 24 inches to about 29 inches, annual runoff is 8 inches to 10 inches, and evaporation rates are low.

The Central Lake region has an abundance of lakes. Topography is variable but much of the region is hilly. Precipitation averages 22 to 24 inches annually and runoff averages 4 to 6 inches per year.

The Northwest has generally flat slopes and contains few natural lake basins. Precipitation and runoff are normally low, but when heavy spring rains and rapid snowmelt occur, floods often result.

The Central region has varying topography. It is not as hilly as the lake region but has good precipitation and fair runoff. The area contains quite a few lake basins, but some contain only small amounts of water.

The Southwest has low rainfall and low runoff. Much of the region is devoid of lakes although there are many small shallow lake basins which hold water during the spring of the year and for short periods of time after heavy summer rains. Evaporation is usually high in the area.

The Southeast has the highest average annual rainfall in the state. The land is predominantly steeply sloping and runoff is about 6 to 8 inches per year. The area is only lightly glaciated and contains few lakes.

Soil and Rock Materials

Bedrock basins formed in predominantly rocky terrain are often deep and are generally long lived. They receive little sedimentation and the banks forming the basin are usually resistant to erosion. As a result, the depths and shapes of these lakes remain relatively unchanged over long periods of time.

Basins formed in predominantly silty and clayey terrain may be shallow and the surrounding watershed is often poorly drained and marshy. "Perched lakes" are found frequently in relatively impervious materials that receive little or no recharge from ground water supplies.

Basins formed in sandy and gravelly terrain are often fairly deep. The lakes in these areas have a constant interchange between surface and ground water due to the high permeability of the sandy soils and are rarely dry except during periods of prolonged drouth.

Biological Environment

Dr. John B. Moyle of the Division of Game and Fish, Minnesota Conservation Department, has divided the lakes of Minnesota into several general groups based on carbonate hardness of the lake waters. Water from lakes in Precambrian bedrock has hardness values of less than 40 parts per million. Water from lakes in hilly glaciated regions of central, northern, and western Minnesota has a carbonate hardness content ranging from 40 to 200 parts per million. Water from lakes in shallow basins in southern Minnesota, south and west of the Minnesota River and in the bed of Glacial Lake Agassiz in western Minnesota has calcium carbonate concentrations as high as 225 parts per million due to the calcareous nature of the glacial drift found uniformly throughout this area.

A chief chemical deposit in lakes is marl, a soft earthy material consisting mainly of calcium carbonate. Calcium carbonate is derived from the soil and rock materials at and below the surface and is carried into the basin primarily in solution in the ground water which discharges into the basin. As this carbonate precipitates out of the water in the basin, marl forms and may accumulate to great thicknesses partly filling the basins.

Rapid changes in lake character may occur as a result of the accumulation of organic sediments. Minute plants and animals can accumulate inthe bottom of a lake in the form of "sludge", a black organic ooze. A mixture of "sludge" and calcium carbonate forms muck, which can be found in many shallow lakes in Minnesota. The decay of organic materials greatly increases the fertility of lake waters which become rich in nutrients and promote rapid growth of vegetation, especially along the margins of a lake. The accelerated growth of the vegetation decreases the areal extent of the lake by filling in the shallow areas and increases water loss through transpiration.

As a lake becomes shallower, a succession of different plants begins around the lake margin. The cycle of vegetative growth, decay, and replacement by a new succession fills the lake basin with accumulated organic debris. Eventually the basin may become filled with this material and all traces of the former lake basin disappear. The rate of growth and advance of the plant succession is controlled by climatic conditions, soils, and water levels in the lakes. Very shallow lakes, having restricted surface and ground water inflow, may rapidly fill with organic materials, but deeper lakes which undergo periodic fluctuations in water levels may not become filled for many years.

Another type of plant succession may occur during the late stages of vegetative encroachment on a lake when the decayed materials at the lake margin form a bog. A floating sedge mat may grow out from this bog over the remaining open water surface. This floating mat eventually covers the entire lake and becomes a quaking bog that gradually becomes thicker. In time the sedge mat is succeeded by willows or swamp conifers and finally by swamp hardwood trees.

Physical Configuration of the Basin

Some of the factors involving the size, depth, and shape of the basin have been covered in the discussion of other processes affecting changes in lakes. Small shallow saucer-shaped basins will generally fill with sediment faster and will lose water more rapidly through evaporation. Deeper basins will not undergo changes as rapidly and will generally remain water-filled for longer periods of time. Narrow elongated basins are usually located in stream valleys and water levels within these basins are generally maintained by the streams passing through them. Large basins often undergo changes in shape and size due to the action of wind and ice.

Natural and Artificial Drainage

The surface and underground drainage of the watershed area surrounding a lake affects its supply of water. Natural drainage within a basin watershed may be highly developed so that practically all of the water falling on the land surface runs off into well integrated streams which carry the water into and away from the lake. Artificial drainage systems consisting of open ditches and subsurface tile drains have been constructed in many parts of the state. Of the 15,291 lake basins in Minnesota there are 3,257 which are classified as partly or completely dry. (See table 2.) About 90 percent of these are affected to some extent by artificial drainage systems. Some systems are directly connected to the basin itself; others divert water from the natural watershed and cause lowering of water levels in the lake by decreasing the amount of runoff which would be available to sustain the lake under natural conditions. Tile drains and some large deep ditch systems may lower shallow ground water levels in local areas and result in additional water loss from lakes. Some lakes are located in basins consisting of glacial materials which are very permeable. The lakes will generally have satisfactory levels of standing water as long as the water table is near the land surface, but as ground water levels recede during the dry periods of mid-summer, the levels of the lakes will recede as a result of lowering of the ground water table and from increased evaporation of the water from the lake surface.

Supplementing the water supply of lakes by pumping from wells can be a successful operation, depending on the size of the lake, local climatic conditions, the nature of the lake basin materials, the availability of adequate ground water supplies, and the cost of constructing, maintaining and operating the system.

Origin of Lake Basins

The discussion of the origin of lake basins, in each county section, is based on information contained in Minnesota Geological Survey Bulletin 35, "The Lakes of Minnesota – Their Origin and Classification," by James H. Zumberge. As most of the basins were formed by geologic processes, the classification involves geologic terminology. The glossary on page 24 explains the geologic terms used.

General Geologic History

The present topography of Minnesota reflects a unique glacial history that probably represents the most complex occurrence of glaciation in the entire world. It is primarily the result of the invasion by four continental ice sheets which advanced and retreated across the state from at least three different directions during the Pleistocene age.

Throughout the ice age a wide variety of surface depressions was created by glacial erosion and deposition. Many of these depressions now constitute Minnesota's thousands of lakes, most of which were formed by the youngest ice sheet that occurred approximately 10,000 years ago.

As the ice sheets moved across the land they picked up and carried everything from huge boulders to fine dust. In the elevated rocky regions of the northeast the glaciers scoured and striated the rocks and actually plucked huge blocks out of the softer rock formations. Many of the rocky lake basins near the Canadian border were formed in this manner. The excavated material was gradually broken down by the glacier into a debris of soil and rock called "drift" which was transported to other areas. Climatic changes caused the glaciers to melt and recede northward, and the drift was deposited in various land forms. The drift near the base of the ice formed gently rolling ground moraine which covers most of the southern part of the state. In other regions, where the ice terminated, the drift was piled up at the edges of the glacier to form moraines or belts of hills of varying size and shape. Some of the drift material was deposited in preglacial stream valleys or filled depressions left by previous glaciers.

At times the frontal margins of the glaciers remained stationary and meltwater flowing from glacial streams re-sorted the drift into sand and gravel deposits which often merged together, forming smooth outwash plains. In many areas isolated blocks of ice were buried in the outwash plains, and as the ice melted, it left depressions or pits which later filled with water and became lakes. Areas of outwash containing many ice block basins are called pitted outwash plains. The outwash deposits of sand and gravel often were covered with glacial material deposited by later overriding ice sheets or by deposits which accumulated during warmer periods between glacial advances.

The melting glaciers released large quantities of water which filled low basins forming at least six temporary glacial lakes in Minnesota. Lake Agassiz, the largest of the glacial lakes, was formed as a glacier retreated northward from the divide between Traverse and Big Stone Lakes along the boundary between South Dakota and Minnesota. As the glacier receded farther north, the lake formed by its meltwater expanded until it filled large areas in the Dakotas, northwestern Minnesota, and Canada. Many old beaches mark the successive lowering of the lake level as the ice gradually retreated. The initial outflow from Lake Agassiz flowed southeastward eroding the wide, deep valley of glacial River Warren which is today the valley of our present Minnesota River. In the final phase, all support by the receding ice front was lost, and a new outlet to Lake Agassiz was found towards Hudsons Bay along the present course of the Red River of the North. After Lake Agassiz was completely drained, it left the present flat lake plain surface which is typical of northwestern Minnesota. Lake clays and silts and recessional beach ridges are now the only remnant features giving evidence of this ancient body of water.

Classifications of Lake Basins

There are four major categories used in classifying lake basins in Zumberge's report. Examples of most of the types of basins discussed in this section may be found in the individual county histories accompanying the maps and tables.

I. Basins formed by geologic processes.
  A. Basins produced by glacial deposition.
    1. Irregular deposition of till. Basins formed in this manner are located in natural depressions and consist of material deposited directly by the glacial ice as it moved across the land. Most of these basins are shallow, especially in areas of ground moraine topography.
    2. Moraine dam basins. These basins are formed by the damming action of a morainal ridge which ponds water in regions where the land surface slopes toward the moraine.
    3. Ice block basins. There are many of these in Minnesota. They were formed from stagnant blocks of ice which remained partly buried in glacial debris after glaciers retreated. Six different classes of ice block basins are based on the nature of the glacial materials and the manner in which the ice blocks were deposited.
      a. Ice block basins in till. These basins were formed by the melting of ice blocks deposited in till, followed by the collapse of the overlying material. They are usually surrounded by hills and knolls, with steep slopes towards the lake basin where the ice collapse occurred.
      b. Ice block basins in till located along preglacial valleys. These basins are recognizable by the pronounced alignment of a series of basins forming a pattern that may extend for many miles. In many instances the basins are not aligned with the existing drainage and they may cross present stream valleys.

The ice blocks forming these basins accumulated in preglacial valleys that were partly buried by a later re-advance of ice or by debris accumulating from the downward melting of ice.

c. Ice block basins in outwash plains. This type of lake basin was formed where isolated ice blocks were buried by sand and gravel outwash deposits which later collapsed, leaving a steep sided basin surrounded by level terrain. In areas of extensive outwash deposits there may be many of these partly buried ice blocks and the region is called a pitted outwash plain. The pits are commonly circular or elliptical in shape but this is the result of wind and wave action and is not primarily due to the shape of the ice block.

d. Ice block basins in outwash located along preglacial valleys. These basins are similar to the basins produced by ice blocks in till along preglacial valleys except that they are found in the stratified sand and gravel deposits.

e. Esker trough basins. These basins are usually elongated and parallel to the adjacent esker. It is believed they were formed by buried lenses of ice deposited within the channel of the stream which formed the esker. There are probably many more esker trough basins in Minnesota than are noted in this report.

f. Ice block basins in till and outwash. These basins are formed when ice blocks are deposited along the margin between an outwash plain and till deposits of an end moraine where a part of the ice sheet separated from the main glacial mass. The basin can be distinguished by the steep ice contact slope along that part of the rim of the depression which faces the flat outwash terrain, in contrast to the opposite side, which displays a more rugged moraine topography.

B. Basins produced by glacial erosion.

1. Bedrock basins. These basins were formed by the erosive action of the glacial ice sheets, many of them in regions where the bedrock is elevated. The basin produced by the scouring action of the glaciers is often the result of differential erosion of the bedrock surface by the large rocks at the front and base of the ice sheets. The harder, more resistant bedrock remained as ridges and the softer bedrock was gouged and plucked out along joint planes and fault lines as the glacier moved across the land.

2. Bedrock basins located along preglacial valleys. These are basins produced by the scouring erosive action of the ice sheet along preglacial drainageways which were controlled by the bedrock structure. Some of these basins are located along joints and fissures in the bedrock which were enlarged by glacial action. Many basins of this type are located along preglacial valleys which were oriented at angles favorable to concentrated erosion by the ice.

C. Basins produced by glacial erosion and glacial deposition.

Basins formed by these two processes are essentially bedrock basins in which the basin capacities have been increased by the deposition of glacial materials which form a dam across the basin rim and enlarge the closure of the basin.

II. Lake basins formed by stream processes.

A. Basins produced by stream deposition.

1. Flood plain basins. These include the depressions located along river valleys which form as a result of aggradation of the materials of the valley by flood waters. Most of these basins are short lived and are shallow. Another type of flood plain basin is related to natural levees which are built up along the stream valley as material is deposited by floods. The levee acts as a type of dam which impounds flood water in the low areas behind it.

2. Basins produced by damming action of streams. These basins are formed along stream valleys when one major stream or its tributary deposits sediment across another stream to form an alluvial fan which, when sufficiently enlarged, ponds water behind it and restricts streamflow.

3. Basins produced by deltas. These are similar to the larger basins produced by alluvial dams except that they are located in isolated areas along minor channels of the main stream which flow across the alluvial delta.

B. Basins produced by stream erosion and stream deposition.

These include the basins which mark

the position of former channels of a meandering stream. Oxbow lakes, which are remnants of meander loops of a stream that has been closed off by alluvial deposition at the ends of the loops, are the most common type.

III. Basins formed by the modification of larger basins. These include all basins that were once part of a large basin but were separated from it by sand bars and spits formed by the action of wind, waves, and ice and by vegetative growth.

IV. Basins formed by minor geologic processes and by artificial means. These basins include those formed by the chemical action of ground water on carbonate rocks which may cause collapse of underground formations creating "sinkholes." "Sinkholes" are closed depressions formed by collapse of the roofs of caves in carbonate rocks when these rocks are located near the surface.
Another type of basin is produced by "blowouts" which are usually shallow depressions in fine sandy materials created by wind action. Neither of these two types of basins are common in Minnesota although a few basins formed by these minor geologic processes may be present.
Basins produced by artificial means include those formed by the construction of impoundments across streams and by the excavation of materials during various mining activities to form open pits which store both surface and underground waters.

Fish and Wildlife

Minnesota's lakes are of many ecological types and no two lakes are exactly alike. Some are best suited to fish, some to waterfowl, and some to wild rice and other aquatic life but all provide scenic and recreational values.

The suitability of a certain lake for fish, waterfowl or wild rice depends upon the size, shape and depth of the lake and the chemistry and basic fertility of the lake water. Many lakes of the northeast have soft, clear water and are much less productive of fish and wildlife than are the fertile waters of the prairie country. Each lake has particular kinds of plants and animals and recreational uses to which it is best suited and because of this, those who use and enjoy our waters have many recreational choices.

There are four major types of game fish lakes, each characterized by a particular society of fishes. Lake trout lakes, most of which are in the northeast, are deep, rock-shored, clear and cold, and are well suited to trout and such associated fishes as tullibee. These lakes provide quality fishing but total yield of trout to the angler is quite low. The best walleye lakes are typically large, have extensive shoal areas of sand and gravel and wide expanses of water usually less than 50 feet deep. Here the walleye is often associated with northern pike and sometimes with muskellunge. The big lakes of the Mississippi headwaters are of this type. The bass-panfish-walleye lakes are usually smaller than the typical walleye lakes, often between 1,000 and 5,000 acres in size, and in addition to large expanses of open wind-swept water, have weedy bays and shorelines well suited to nest-spawning bass, sunfishes and crappies. They are typically hard (high in carbonates) fertile waters and are especially common in the north-central and west-central parts of the state. The fourth common lake type, the bass-panfish lake, is a smaller, highly productive lake with weedy shorelines that produces an abundance of panfishes and large-mouth bass. Usually there are also northern pike.

There are, in addition, many shallower lakes, especially in southern Minnesota that supply much bullhead and crappie fishing but are subject to occasional freeze outs. Thousands of shallow, weedy waters are used by breeding and migrating waterfowl. In the north, many small, deep lakes are suitable for trout management and have been reclaimed by removing stunted, unwanted species of fish which offered little or no sport fishing.

Minnesota also has the largest number of wild rice lakes in the nation. Wild rice is only found in those lakes and streams having a delicate balance between waterflow, water levels, and water quality. These lakes offer the best northern pike fishing in Minnesota primarily because the dense stands of wild rice protect the young fingerlings and prevent them from devouring one another.

Many kinds of waterbirds frequent Minnesota's lakes – ducks, geese and shorebirds – and in the north the loon, our State bird, can be seen and heard on wilderness waters. The prairie lakes, now mostly in corn country, together with smaller wetlands and potholes, are among the best waterfowl producing areas on the continent. On many northern waters there are beaver and otter and in the evening the canoeist paddling quietly along the shore can see deer, bear and even moose.

Preservation of our lakes, the purity of their water, their watersheds, and their fish and wildlife is most important in this time of an expanding human population and increasingly intensive use of lands and waters. It is a job on which much of the future of Minnesota's important recreational resource depends.

Glossary of Geologic Terms

Glacier .... A body of ice formed by the accumulation and recrystalization of snow, lying wholly or largely on land, showing evidence of present or former flow.

Glacial Drift....... A general term that includes all materials moved or deposited by ice even though subsequently affected by wind and water.

Till .... Unsorted and unstratified material deposited directly by a glacier without subsequent movement by wind or water. Materials comprising till may range from clay particles to sand and boulders.

Outwash .... Sorted and stratified material deposited by streams derived from the melting of a glacier. The material usually consists of sandy gravel and small boulders. Outwash may be deposited by streams issuing from the front or sides of an ice sheet.

Esker............. A ridge of gravelly materials deposited by streams that flowed underneath the ice sheet.

Moraine........... A ridge or series of hills composed of glacial till.

End Moraines or.... Terminal Moraines Ridges of till formed at the end of an ice sheet.

Ground Moraines ... Essentially unridged deposits left in the bed of a glacier.

Ice Contact Slope.. Formed by material supported by ice near the margin of a glacier. When the ice melted, the material slumped forming a slope.

Size of Lakes

Each county history contains a table which lists the lakes by range in size. The following table summarizes the total number of lakes of each size classification for the entire state. The areas used in this tabulation include the part of the basin area in Minnesota as well as the part in adjoining states and Canada. For example, U.S. Lock and Dam No. 9 pool, 28-1, has an area of only 450 acres in Houston County, Minnesota. The total area of the pool, however, is 29,250 acres as 28,800 acres are in Wisconsin and Iowa. This pool consequently is listed among those having an area in the range of 5,000 acres or more in the tabulation.

Lakes classified by area

	Total lake area, acres												
	10 to 25	25 to 50	50 to 75	75 to 100	100 to 125	125 to 150	150 to 200	200 to 500	500 to 1000	1000 to 2500	2500 to 5000	5000 and larger	Total
Number of lakes	4482	3728	1892	1167	765	546	689	1262	400	225	63	62	15,291
Percentage	29.3	24.4	12.4	7.6	5.0	3.6	4.5	8.3	2.6	1.5	0.4	0.4	100

Table 3 lists all natural lakes and reservoirs which have areas of 5,000 acres or more in Minnesota. In addition to these, there are 64 smaller reservoirs and artificial lake basins which have areas of less than 5,000 acres in Minnesota.

Distribution Patterns of Lake Basins

The information contained in this inventory can be applied to many aspects of natural resource management. The discussion of lake basin distribution which follows is presented to illustrate one application of these data.

The abundance of Minnesota's surface waters, and the state's favorable location, has long made it a prominent waterfowling state. Located in the northern end of the Mississippi Flyway, millions of ducks and geese migrate through the state in spring and fall, using the many lakes and wetlands for resting, feeding, and rearing of young.

Minnesota is a duck breeding area, rearing more waterfowl than any of the other states in the Mississippi Flyway. A knowledge of the welfare and abundance of these locally-reared ducks is of considerable importance in the management of this resource.

Early efforts to tally the numbers and kinds of ducks breeding in the state utilized systematic sampling routes which were flown by aircraft in the spring of the year when birds were dispersed on the many smaller water areas. It was known for some time that improved census routes could be selected, but a suitable statewide basis for their selection was not available. A detailed knowledge of location and density of breeding areas was needed to devise a more effective and efficient use of time in conducting censuses.

Fortunately, the recent compilation of lake basins has provided such a basis for selective sampling of breeding areas according to their density. Lake basins in the state have been delineated according to density by township. The resulting distribution pattern of lake basins is shown in Figure 1, where areas having 0-1 basin per township, 2-10, 11-20, and more than 20 per township have been grouped.

Agricultural drainage, however, has converted many lakes to farmland. Thus, the historical density of lake basins in the state has been further revised as shown in Figure 2 to reflect current status. This revision indicates that the number of lakes has declined markedly in the southern portion of the state.

By combining the inventory of lake basins with the records of lake drainage, a sampling pattern has been devised which results in increased precision in estimates of duck numbers in Minnesota.

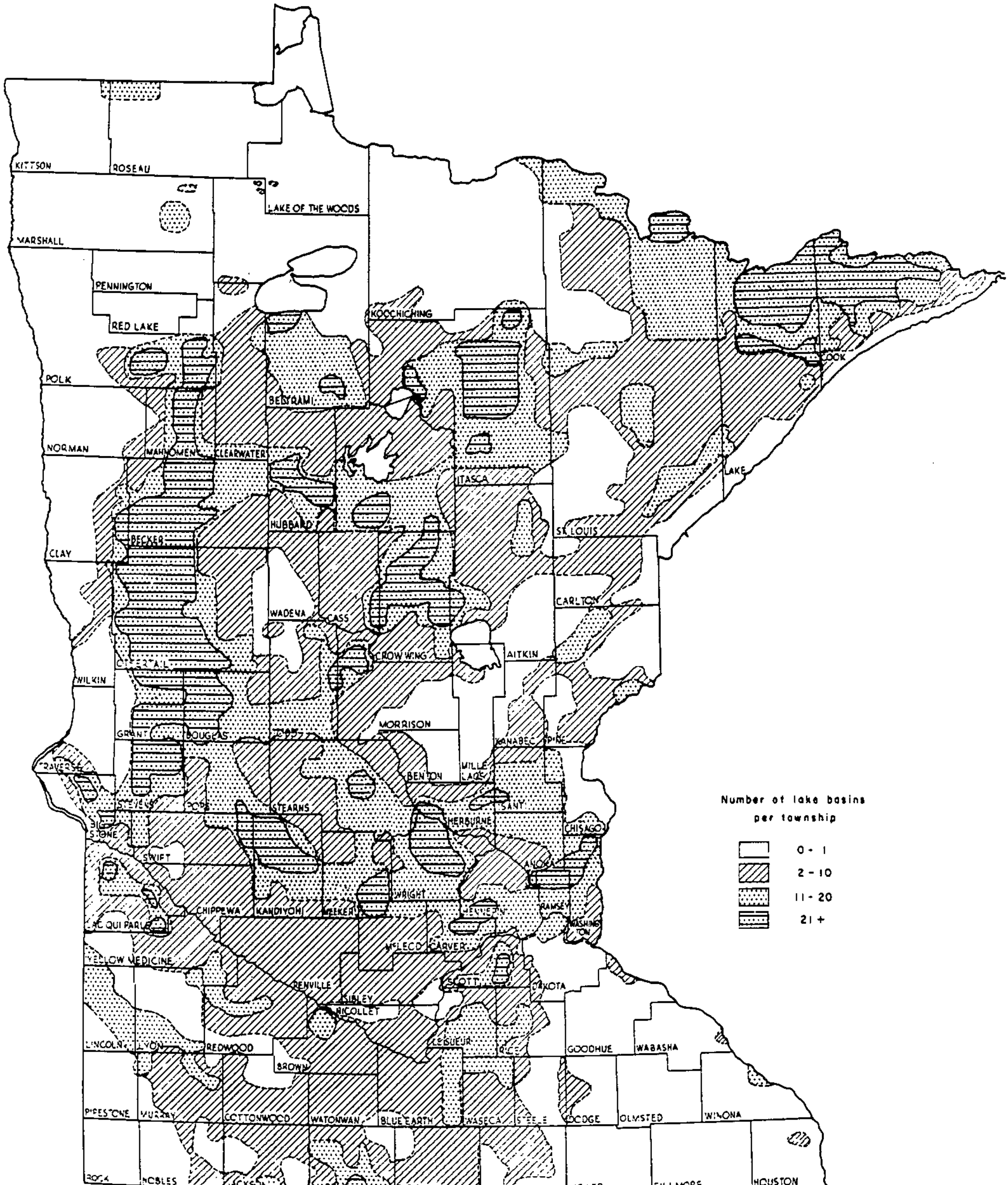
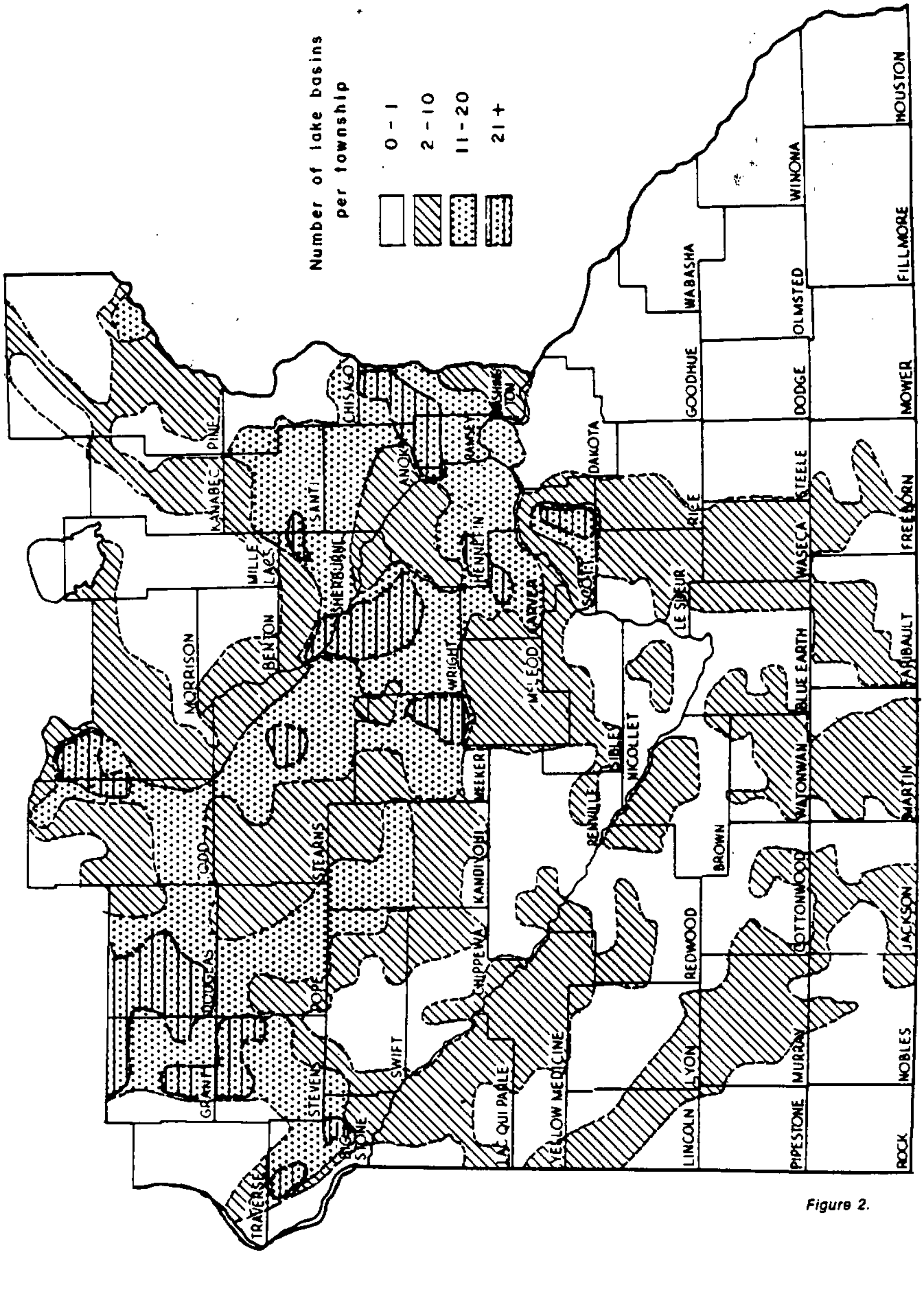


Figure 1. Historical density of lake basins in Minnesota



Approximate lake density in southern portion of Minnesota

Figure 2.

Table 1. – Aerial photographs used in determining lake areas.

(Does not include aerial photographs used by U.S. Geological Survey in preparing topographic quadrangle maps.)

	County	Date of aerial photos used
1	Aitkin	September, October 1955.
2	Anoka	October, November 1953.
3	Becker	June-November 1939; July-September 1953.
4	Beltrami	November 1939; July-September 1940; June-August 1947; June-September 1949.
5	Benton	October-November 1953.
6	Big Stone	June-August 1955.
7	Blue Earth	July, September. October 1938; May 1939; August, September 1950.
8	Brown	September 1955.
9	Carlton	1948.
10	Carver	July 1951.
11	Cass	August, September 1939; June-August 1947; September 1949.
12	Chippewa	August, September 1955.
13	Chisago	1948.
14	Clay	July 1939; July, August 1954.
15	Clearwater	August, September 1939.
16	Cook	August, September 1948.
17	Cottonwood	July, August 1938; June, August, September 1950.
18	Crow Wing	September 1955.
19	Dakota	July, August 1951.
20	Dodge	July 1951.
21	Douglas	September 1938; May, June 1951.
22	Faribault	June, July, September, October 1938; October 1954.
23	Fillmore	June, July, October, November 1954.
24	Freeborn	March, August, September 1938; August, October 1954.
25	Goodhue	May-July 1951.
26	Grant	June, July 1951.
27	Hennepin	October 1953.
28	Houston	June, July, October, November 1954.
29	Hubbard	August, October 1939; September 1949.
30	Isanti	October, November 1953.
31	Itasca	October, November 1939; August-October 1940; June-September 1947.
32	Jackson	August, October, November 1954.
33	Kanabec	September, October 1939.
34	Kandiyohi	September 1938; May, June, August 1955.
35	Kittson	July, August 1954.
36	Koochiching	September 1949; September 1950; September, October 1951; October 1952.
37	Lac Qui Parle	August, September 1955.
38	Lake	August, September 1948.
39	Lake of the Woods	September, October 1940; May, June 1941.
40	LeSueur	June, July 1940; July 1951.
41	Lincoln	August 1955.
42	Lyon	August 1955.
43	McLeod	July, September 1940; June, July, September 1955.
44	Mahnomen	June 1939; June 1953.
45	Marshall	July-September 1954; July, August 1939.
46	Martin	July 1938; August, October, November 1954.
47	Meeker	September 1938; May, June, August 1955.
48	Mille Lacs	September 1939.
49	Morrison	May, June 1955.
50	Mower	June-August 1954.
51	Murray	August 1955.
52	Nicollet	July, August 1938; July, August, October 1955.
53	Nobles	August-October 1954.
54	Norman	July 1954.
55	Olmsted	July 1951.
56	Otter Tail	August, September 1953.
57	Pennington	August 1953.
58	Pine	September, October 1939; 1950.
59	Pipestone	August 1955.
60	Polk	June, July, September 1939; June, August 1954.

Table 1. – Aerial photographs used in determining lake areas – Continued.

	County	Date of aerial photos used
61	Pope	June, July 1951.
62	Ramsey	1949.
63	Red Lake	July, August 1953.
64	Redwood	September 1955.
65	Renville	July-September 1955.
66	Rice	June, July 1940; July 1951.
67	Rock	August, October 1954.
68	Roseau	July-September 1953.
69	St. Louis	August, September 1948; September 1949; July, August 1950.
70	Scott	July, August 1951.
71	Sherburne	October, November 1953.
72	Sibley	August, September 1938; September 1950.
73	Stearns	September-November 1938; May-July 1951.
74	Steele	July 1951.
75	Stevens	June, July 1951.
76	Swift	August 1955.
77	Todd	September, October 1953.
78	Traverse	May, June 1951.
79	Wabasha	July 1951.
80	Wadena	July-September 1939.
81	Waseca	June, August 1938; July, August 1951.
82	Washington	1949.
83	Watonwan	June, August, September 1950.
84	Wilkin	May 1951.
85	Winona	June-August 1954.
86	Wright	October 1953.
87	Yellow Medicine	August 1955.

Table 2. – Summary of lakes of 10 acres or more, excluding Lake Superior.

	County	Number of lakes listed in county	Number of lakes partly or completely dry	Lake area in county, acres	Total county area, acres	Percentage of county in lakes of 10 acres or more
1	Aitkin	213	14	113,929	1,272,960	8.9
2	Anoka	143	57	16,168	283,520	5.7
3	Becker	662	72	94,578	914,560	10.3
4	Beltrami	346	14	345,965	1,955,200	17.7
5	Benton	15	4	2,067	260,480	0.8
6	Big Stone	195	27	25,448	334,080	7.6
7	Blue Earth	133	103	19,319	481,920	4.0
8	Brown	99	79	9,951	395,520	2.5
9	Carlton	74	11	9,142	559,360	1.6
10	Carver	128	73	20,290	239,360	8.5
11	Cass	514	36	258,217	1,523,200	17.0
12	Chippewa	79	44	9,158	374,400	2.4
13	Chisago	91	9	17,855	284,160	6.2
14	Clay	107	3	4,650	673,280	0.7
15	Clearwater	164	17	40,829	659,200	6.2
16	Cook	812	0	101,152	990,720	10.2
17	Cottonwood	60	31	9,154	412,800	2.2
18	Crow Wing	416	15	101,769	731,520	13.9
19	Dakota	83	8	10,255	376,320	2.7
20	Dodge	12	11	1,716	278,400	0.6
21	Douglas	375	59	65,519	462,720	14.2
22	Faribault	91	78	12,240	459,520	2.7
23	Fillmore	2	2	112	549,760	<
24	Freeborn	49	27	20,852	459,520	4.5
25	Goodhue	23	2	16,375	493,440	3.3
26	Grant	307	89	24,582	367,360	6.7
27	Hennepin	200	39	36,814	389,760	9.4
28	Houston	15	1	12,545	364,800	3.4
29	Hubbard	313	18	48,318	637,440	7.6
30	Isanti	145	38	12,164	288,640	4.2

Table 2. – Summary of lakes of 10 acres or more, excluding Lake Superior. – Continued

County	Number of lakes listed in county	Number of lakes partly or completely dry	Lake area in county, acres	Total county area, acres	Percentage of county in lakes of 10 acres or more
31 Itasca	945	19	183,768	1,856,000	8.8
32 Jackson	84	50	17,042	458,880	3.7
33 Kanabec	42	8	4,837	339,200	1.4
34 Kandiyohi	361	167	61,637	551,680	11.2
35 Kittson	5	0	829	719,360	0.1
36 Koochiching	24	1	32,003	2,030,720	1.6
37 Lac Qui Parle	229	175	16,770	496,000	3.4
38 Lake	~~817~~	0	118,038	1,472,640	8.0
39 Lake of the Woods	5	0	317,297	1,147,520	27.7
40 LeSueur	128	75	22,172	298,880	7.4
41 Lincoln	110	76	14,958	346,240	4.3
42 Lyon	99	53	9,261	458,240	2.0
43 McLeod	117	80	17,092	321,920	5.3
44 Mahnomen	264	17	19,110	375,680	5.1
45 Marshall	7	1	32,015	1,152,000	2.8
46 Martin	149	62	19,218	465,280	4.1
47 Meeker	208	91	34,633	409,600	8.5
48 Mille Lacs	19	2	73,609	432,000	17.0
49 Morrison	140	9	15,204	740,480	2.0
50 Mower	4	0	143	449,920	<
51 Murray	100	62	17,634	461,440	3.8
52 Nicollet	51	32	17,014	293,760	5.8
53 Nobles	44	36	7,222	460,160	1.6
54 Norman	18	2	415	566,400	<
55 Olmsted	5	0	776	419,840	0.2
56 Otter Tail	1,048	87	173,851	1,416,320	12.3
57 Pennington	1	0	35	398,080	<
58 Pine	142	3	11,596	913,280	1.3
59 Pipestone	1	0	80	296,960	<
60 Polk	332	15	18,242	1,297,920	1.4
61 Pope	216	16	34,731	459,520	7.6
62 Ramsey	83	21	10,871	109,440	9.9
63 Red Lake	2	0	68	276,480	<
64 Redwood	133	120	7,206	559,360	1.3
65 Renville	144	118	10,592	628,480	1.7
66 Rice	65	34	13,448	327,040	4.1
67 Rock	2	0	29	310,400	<
68 Roseau	3	2	6,924	1,073,280	<
69 St. Louis	939	7	337,632	4,295,040	7.9
70 Scott	144	92	15,407	232,960	6.6
71 Sherburne	168	34	11,443	286,080	4.0
72 Sibley	101	68	16,062	377,600	4.2
73 Stearns	294	62	34,345	892,160	3.9
74 Steele	37	32	5,488	273,280	0.2
75 Stevens	313	152	19,394	366,720	5.3
76 Swift	169	84	12,393	478,720	2.6
77 Todd	215	29	27,901	627,200	4.4
78 Traverse	68	2	9,991	371,840	0.3
79 Wabasha	6	1	15,377	342,400	4.4
80 Wadena	39	28	3,802	346,240	1.1
81 Waseca	95	76	11,743	272,000	4.3
82 Washington	168	6	20,605	268,160	7.7
83 Watonwan	61	23	5,166	279,680	0.2
84 Wilkin	25	4	675	481,280	0.1
85 Winona	13	1	9,878	404,480	0.2
86 Wright	298	66	44,384	458,240	9.8
87 Yellow Medicine	126	75	7,274	485,120	0.1
TOTAL	15,291	3,257	3,411,200	53,803,520	

Table 3. – Lakes and reservoirs having areas of 5,000 acres or more in Minnesota, excluding Minnesota portion of Lake Superior.

Ident. Number	Name	Area, acres [1]	Remarks
39-2	Lake of the Woods - R[2]	307,010 (950,400c)	
4-35	Red - R	288,800	
48-2	Mille Lacs	132,510	
11-203	Leech - R	109,415	
11-147	Winnibigoshish - R	69,821	
69-694	Rainy - R	54,140 (200,800c)	
69-378	Vermilion	49,110	
4-30	Cass - R	29,775	
69-845	Kabetogama - R	25,760	Part of Namakan Reservoir system.
45-2	Mud - R	23,700	
69-224	LaCroix	19,820 (34,070c)	
31-532	Pokegama - R	15,600	
38-465	Basswood	14,610 (29,400c)	
27-133	Minnetonka	14,310	
69-693	Namakan - R	14,050 (28,260c)	Includes only area of Namakan Lake.
56-242	Otter Tail	13,845	
18-312	Pine River - R	13,610	Includes area of 14 lakes which are part of system. No. refers to Cross Lake which has control structure for reservoir system.
18-305	Gull - R	13,020	Includes areas of 7 lakes which are part of system. No. refers to Gull Lake which has control structure for reservoir system.
25-1	Pepin - R	12,540 (25,060w)	Part of U.S. Lock & Dam no. 4 pool.
69-841	Pelican	11,944	
25-17	U.S. Lock & Dam no. 3 pool - R	11,790 (17,950w)	Includes area of St. Croix lake and several smaller lakes.
28-5	U.S. Lock & Dam no. 8 pool - R	10,690 (21,910w)	
69-118	Burntside	10,236	
1-62	Big Sandy - R	9,380	
52-34	Swan	9,346	
69-498	Trout	9,237	
31-813	Bowstring	8,900	
18-308	Pelican	8,468	
37-46	Lac Qui Parle - R	8,400	
69-372	Island - R	8,280	
32-57	Heron	8,251	
16-633	Saganaga	7,800 (19,610c)	
56-383	Dead	7,827	
61-130	Minnewaska	7,770	
69-3	Birch - R	7,628	
45-1	Thief - R	7,430	
36-1	Nett	7,369	
56-747	Lida	7,277	
4-130	Bemidji - R	6,920	
77-215	Osakis	6,768	
68-3	Roseau	6,650	
38-738	Garden - R	6,427	Includes areas of 4 large and several small lakes.
18-372	Long	6,178	
6-1	Marsh - R	6,100	
6-152	Big Stone - R	6,028 (11,185s)	
21-83	Miltona	5,924	
19-5	U.S. Lock & Dam no. 2 pool - R	5,910	
34-79	Green	5,821	
78-25	Traverse - R	5,780 (11,600s)	
69-617	Sand Point - R	5,680 (8,890c)	Part of Namakan Reservoir system.
56-239	West Battle	5,672	
79-5	U.S. Lock & Dam no. 4 pool - R	5,660 (13,760w)	Does not include Lake Pepin which is part of pool but listed separately.
79-1	U.S. Lock & Dam no. 5 pool - R	5,650 (12,800w)	
38-817	Crooked	5,581 (10,904c)	
56-141	Rush	5,340	
85-13	U.S. Lock & Dam no. 5A Pool - R	5,140 (7,000w)	Includes 15 smaller lakes.

[1] Figure in parentheses ( ) indicate total area of lake or reservoir if part of it is located in an adjoining state or Canada. Letter following figure indicates that basin is also in: c, Canada; s, South Dakota; w, Wisconsin.

[2] R following lake name indicates reservoir.