



Minnesota Department of Natural Resources (DNR)

Commissioner's Order [13-01]

[Motor restriction on Big Rice Lake 69-669]

Date:

Statutory authority: *Minnesota Statutes*, section 97A.101, subd.4

Supersedes [describe with reference information]

Supplements [describe with reference information]

BACKGROUND

Big Rice Lake is a Designated Wildlife Lake under M.S. 97A.101. The commissioner has the authority to restrict motorized surface use for the benefit of wildlife and wildlife habitat. Restricting motor use for this part of the year will protect stands of wild rice, a plant beneficial for water fowl food and habitat. Reduced disturbance during the waterfowl season will also benefit migrating waterfowl.

ORDER

NOW, THEREFORE, IT IS HEREBY ORDERED, pursuant to authority vested in me by law, including but not limited to *Minnesota Statutes*, section 97A.101, subdivision 4, that the following surface use restrictions apply to Big Rice Lake (69-669), Township 60 N, Range 17 W, Sections 2, 3, 9, 10, 11, 14, 15, 16 and 17, Saint Louis County:

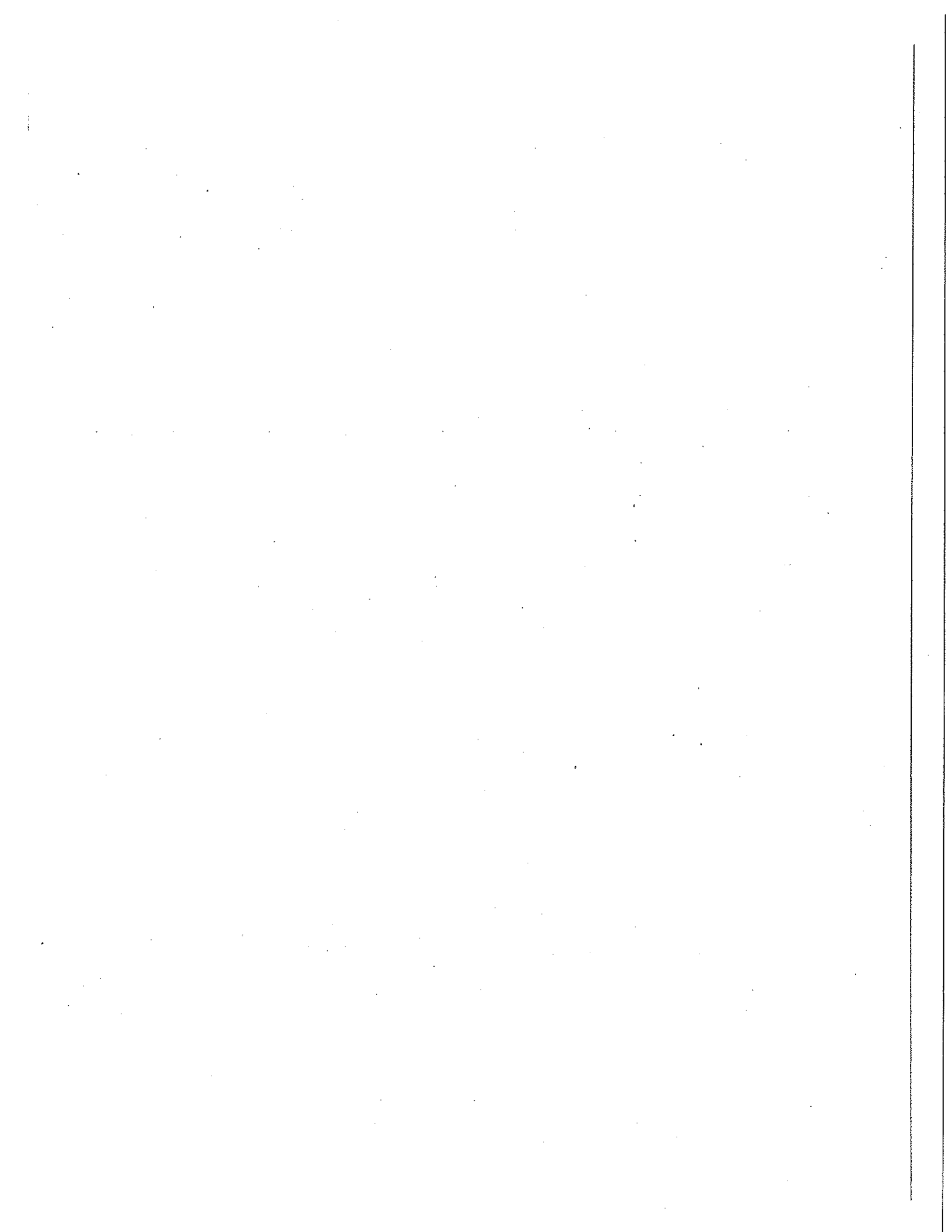
From June 15th through November 25th, motorized surface use will be restricted to watercraft with electric trolling motors only. Motorized access will be unrestricted the remainder of the year.

[Tom Landwehr]

Commissioner

Date: Sept. 3, 2013

MANAGEMENT PLAN



Management Plan Revision for

BIG RICE LAKE

St. Louis County
Township 60 North, Range 17 West,
Sections 2, 3, 9, 10, 11, 14, 15, 16, and 17
ID# 69066900



Minnesota Department of Natural Resources
Section of Wildlife

15 January 2013

Summary and Background Information

This revised management plan was prepared by the following team of individuals, representing the Minnesota Department of Natural Resources (DNR) and other stakeholders:

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Big Rice Lake (ID# 69066900), St. Louis County, is a designated Wildlife Management Lake. Designation was authorized on September 2, 1992 by Commissioner Sando under Minnesota Statute 97A.101 Subd. 2. Big Rice Lake was designated because of its outstanding value to wildlife. Designation authorizes the DNR Section of Wildlife to manage water levels for the benefit of wildlife. Big Rice Lake contains wild rice and currently provides wildlife habitat and recreational opportunities; these opportunities could be improved with more consistent wild rice crops. The original management plan was completed in 1992 and needs to be updated because of its age and management concerns. This committee was brought together to provide input from a variety of stakeholders that have an interest in the management of the lake. The committee recognizes that there has been a decline in waterfowl use and the amount of wild rice on the lake and this plan is intended to address these issues.

Big Rice Lake is an important natural wild rice lake in St. Louis County. In the past years, has been dominated by wild rice which provided high quality waterfowl and wildlife habitat and opportunity for wild rice harvesting. The lake has also experienced years with little or no wild rice production. Big Rice Lake is culturally and historically important to local Ojibwe Bands who have utilized the lake for centuries and continue to exercise treaty rights there today. State residents also have strong ties to Big Rice Lake for wild rice harvesting, waterfowl hunting and fur trapping.

A rock rapids is found approximately one mile downstream from the outlet of the lake. The rock rapids are a natural feature that was modified in 1995 when a weir was established at this site to reduce water levels on the lake. Beaver dams and debris in association with the weir have contributed to restriction of water flow and may have reduced abundance of wild rice. The committee believes dense clumps of pickerelweed compete with wild rice and historically may have contributed to restriction of the outlet and a general decline of wild rice. The advisory committee believes that the acreage of pickerelweed has increased over the past ten years due to high and relatively stable water levels; although data documenting an increase in acreage is difficult to obtain.

Management of Big Rice Lake will fit into two of the DNR Section of Wildlife's plans – the Long Range Duck Recovery Plan and the Shallow Lakes Program Plan – through the restoration of more consistent wild rice crops and maintenance of adjacent habitat for waterfowl nesting. Monitoring of waterfowl use will also gauge the success of management both locally and in the larger statewide efforts. Maintenance of existing access areas will continue to provide recreational opportunities on the lake.

General Information

Big Rice Lake is located within the Superior National Forest approximately 10 miles NE of Virginia in St. Louis County, in northern Minnesota (Sections 2, 3, 9, 10, 11, 14, 15, 16, and 17, Township 60 North, Range 17 West). Ecologically it is located within the Nashwauk Uplands Subsection and the Big Rice Lake Moraine and Pike-Sandy River Sand Plain Land Type Associations.

A public access is provided by the U.S. Forest Service on the north side of the lake one mile south of Forest Road 256 (Pfeiffer Lake Road). A private access is also present on the southeast side of the lake via County Road 366 and the Hovis Road.

Big Rice Lake is approximately 2,072 acres in size. The 5.9 miles of shoreline surrounding the lake are primarily lowland spruce/tamarack forest. Approximately 85% of the shoreline is publicly administered. Administration breakdown of the shoreline is as follows: U.S. Forest Service 44%; Department of Natural Resources 41% and 15% is privately administered. Public ownership is a mix of upland and lowland forest types. The private lands south of the lake are a mix of small farms and woodlands.

Big Rice Lake has a median depth of 3.2 feet and a maximum depth of 4.5 feet. The water is bog stained and has an average Secchi disc reading of 2.75 feet. The bottom is over 90% muck. A rocky island approximately 1/2 acre in size is located in the south central portion of the lake. The island is vegetated with grass and brush species. (Minnesota Department of Conservation, 1966)

Big Rice Lake (DOW 69-669), St. Louis County, is already designated as a Wildlife Management Lake. Lake designation was authorized on September 2, 1992 by Commissioner Sando under Minnesota Statute 97A.101 Subd. 2 after the October 28, 1991 hearing which recorded support and comments from the public. Big Rice Lake was designated because of its outstanding value to wildlife. Designation authorizes the DNR, Section of Wildlife to manage the lake for wildlife and allows funding through the State Waterfowl Stamp to carry out management practices that benefit waterfowl.

Hydrologic Information

Big Rice Lake is in the Rice River minor watershed and the Little Fork River major watershed. The outlet is on the west side of the lake and flows into the Rice River. This river flows to the Little Fork River west of Cook, Minnesota. The Little Fork River ultimately drains into the Rainy River Watershed and eventually flows to Hudson Bay.

Big Rice Lake has a total watershed of approximately 18 square miles, providing a watershed to lake ratio of 6 to 1. Fifty nine percent of the total watershed is classified as wetlands giving it a watershed to wetland ratio of 1.7 to 1. (Vaughn, 2010) The watershed to wetland ratio is an important indicator of the amount of water potentially stored within a watershed.

The ordinary high water level (OHW) for the lake is 1436.7 feet (vertical datum NGVD 29), and the run-out elevation at the outlet structure is 1434.04, according to the Division of Ecological and Water Resources.

Inlet

There are two primary inlets into the lake. One, originates from Little Rice Lake, located 1 mile east and flows into the east side of Big Rice Lake. The other is a significant spring along the south shore of the lake. There are also several small flowages that come into the lake from surrounding lowland forest types and bogs.

Outlet

The outlet channel leaves the lake on the west side via the Rice River and meanders about 6,000 feet in a westerly direction through a bog to a rock weir. The channel through the bog is 30 - 50 feet wide and 2 - 8 feet deep. The weir, associated beaver dams and debris presently control the lake level. The weir is approximately 35 feet wide and is the entire width of the outlet channel and is configured to allow fish passage. In the fall of 2010, the weir and associated beaver dam were holding back approximately a three-foot head of water.

Water Surface Elevation

Since February 21, 1990 water surface gauge readings have been recorded for Big Rice Lake. These gauge readings have provided a permanent and credible record of water levels. This information has aided in documenting changes that have occurred to the lake as a result of past management practices.

Water level readings are stored in the Lakes Database maintained by DNR Waters, from which they can be retrieved easily by staff. Volunteer observers receive a graph of the annual water levels of the lake. The public can access the data at the DNR website under Lake Finder: <http://www.dnr.state.mn.us/lakefind/index.html>.

A Lake Finder user can view and retrieve all reported lake levels by downloading lake level data in the center of the Lake Water Level Report screen. This site is updated frequently and includes a graph of the past 10 years of the recorded water levels. Appendix E displays water level information for Big Rice Lake.

Historic and Current Human Use

Archaeological evidence on sites adjacent to the lake indicates human use for hundreds and perhaps thousands of years for rice, sugar bush and hunting related activities. Artifacts have been recovered dating from the Woodland and Fur Trading eras (approximately 500 B.C. to 1850 A.D.) The Bands indicate a long history of utilizing the resources of Big Rice Lake, and its use continues to be important today. The Bois Forte Band of Chippewa in particular maintains a strong cultural tie to the lake. Past efforts to reduce lake levels were identified by archeologists as important to reduce erosion at important sites near the lake.

Big Rice Lake receives light fishing pressure, and it occurs primarily during the winter months when people angle or spear northern pike. The lake receives heavy use from waterfowl hunters during the early part of the waterfowl season and by tribal and state ricers during years of good rice crops.

Management History

It is not clear when initial interest in active management of Big Rice Lake for waterfowl and wild rice began, however the first known record of monitoring the lake was a contour, cover type, lake bottom and aquatic vegetation map produced in 1938 by the U.S. Forest Service. Historical documentation indicates that the lake produced good wild rice crops through the drought years of the 1930s. Some intermittent fish stocking occurred into Big Rice Lake between 1912 and 1964 of bass, walleye, rock bass, sunfish and fathead minnows. Beginning in 1955, winter oxygen levels were monitored annually until the late 1980's or early 1990's. No other monitoring of the lake occurred for a number of years until September 3, 1966 when a Game Lake Survey and an outlet survey was completed. Other information from 1966 indicated that the most recent year of a good rice crop was 1961 or 1962, with the preceding 20 years of rice production described as mediocre except for some bays. A Project Proposal followed from the Virginia Area Game Manager to modify the outlet and lower the lake by four feet on December 10, 1966 to address public concerns over lack of rice during this time period and the lakes value for waterfowl hunting. This proposal eventually became the rock weir that was established in 1995. (Fisheries Lake Surveys were conducted in 1979 and 1982. Winter northern pike rescues occurred in several winters beginning in the 1960's and ending in 1977. The lake has a long history of winter fish kills.) Big Rice is designated as a Wildlife Management Lake and the Section of Fisheries has no plans to actively manage the lake for game fish in the future.

Little active management is noted to have occurred for a number of years until 1976 when the Virginia Area Conservation Officer removed the first beaver dam to reduce lake levels. Efforts to both control beaver populations and remove beaver dams began in the late 1970's to reduce lake levels and have continued intermittently until 2005. Anecdotal information suggests these efforts were not very successful and there was no consistent monitoring during this time period of wild rice crops (Lightfoot, pers. comm.).

Efforts to control beaver were followed by a number of steps to follow through with the initial 1966 Project Proposal to modify the outlet of Big Rice Lake. These efforts began with a Requisition for Engineering Services in 1985 with the survey completed in 1988. A new Project Proposal to modify the outlet was submitted in 1987 by the Virginia Area Wildlife Manager followed by several actions that needed to occur before outlet modification could occur. These actions included an archeological survey of the weir site in 1991, formal hearings and designations of Big and Little Rice Lakes in 1991 & 1992 as Wildlife Management Lakes, completion of a management plan for Big Rice Lake in 1992, completion of Environmental Assessment Worksheets and obtaining permits from the Division of Waters in 1993, obtaining access easements from DNR-Forestry, St. Louis County and the U. S. Forest Service in 1993 & 1994 and flowage easements from Jerry R. Hovi in 1994. Once these efforts were completed, final outlet modification occurred in April of 1995. Outlet modification involved clearing woody material, organic debris and rocks from the rapids; excavating 365 linear feet of the rapids to a bottom elevation of 1431.5 MSL (Mean Sea Level, vertical datum NGVD 29); and constructing a 50 foot wide rock weir with an elevation of 1434.0 MSL (vertical datum NGVD 29) (Manninen 1995). The outlet modification was completed to increase water flow out of the lake and reduce rapid water level changes that can negatively impact wild rice growth.

Additional management actions have also occurred on Big Rice Lake. These include, using a cookie cutter in 1996 to chop vegetation in the outlet in an effort to control pickerelweed and improve the lakes discharge capacity. In 2001, the weir was raised to 1435.0 MSL to address pickerelweed expansion and hunter access concerns. (Wallace, 2002), (Retka, 2002) Winter plowing of select pickerelweed beds was conducted in 2007 to freeze bottom soils as a control measure of pickerelweed. This practice successfully reduced pickerelweed in the plowed areas.

One hundred acres of trees and brush were felled in 1995 in adjacent bog and upland areas along with prescribed burns in 2005 and 2007 to maintain and improve waterfowl nesting habitat. Lastly, the weir elevation was lowered in the fall of 2005 to drawdown the lake over winter in hopes of reducing the coverage of pickerelweed. The effects of the drawdown were successful in winter 2006-2007 with little snow cover and good frost penetration. In the spring of 2007, the weir was re-established to the elevation of 1435.0 feet. Observations indicated the drawdown appeared to reduce pickerelweed coverage in some locations of the lake in 2007.

A time line of project activities on Big Rice Lake is found in Appendix A.

Waterfowl and Other Wildlife Use

Big Rice Lake is an important feeding and resting area for migrating waterfowl. In years of good wild rice production the lake is heavily used by mallards, goldeneyes, wood ducks, blue winged teal, and ring-necked ducks. These same species occur in smaller numbers as resident breeding birds. Juvenile Canada geese were transplanted from the Twin Cities area in 1988. Breeding geese from this transplant were thought to return to Big Rice Lake in 1991. Either transplant appears to have been successful or geese from the Virginia population have pioneered to Big Rice Lake. Canada geese have become an important resident breeding bird.

A bald eagle nesting territory is located on Big Rice Lake and they have been successful in producing young during the last several years. Muskrats, mink, beaver, otter, great blue herons, trumpeter swans are known to occur in the area.

Opening day bag checks of waterfowl hunters have been conducted on Big and Little Rice Lakes since the 1970's and have occurred most years through 2009. Survey information since 1991 show a consistent drop in hunter numbers and the number of ducks harvested per hunter. In looking at harvest of individual species or groups of species there is a similar downward trend in harvest. Harvest of mallards; ring-necks and scaup; and teal and wood ducks all show a consistent downward trend. Appendix B shows opening day hunter use and waterfowl harvest trends.

Survey Information

1938 Forest Service Survey

The first survey of Big Rice Lake occurred in 1938. (U. S. Forest Service, 1938) This survey documented the lake contour, bottom soils, surrounding cover types and aquatic vegetation. The contour information is very vague and only documents a five foot depth contour. Bottom soil information is similar to information documented on later surveys with one notable exception of a gravel and rock area just off shore of where the inlet from Little Rice Lake flows into Big Rice Lake. Surrounding cover types documented are similar to what is found on the lake today.

The aquatic vegetation map documented emergent and floating leaved plant species only. Vegetation noted on the survey map by frequency of listing during this survey is as follows: Large Yellow Water Lily, Wild Rice, Bulrush, Pickerelweed, Duck Potato, Small Yellow Water Lily, Burreed, Large White Water Lily and Horsetail. Most of the aquatic vegetation was noted around the perimeter of the lake with some islands of vegetation noted out in the lake. Vegetation include several bulrush stands found in similar locations as today, two areas of mixed wild rice and small yellow water lily and eight small stands of pickerelweed. Wild rice and small yellow water lily was noted as scattered lightly across the entire lake. The stands of pickerelweed were found on the east end, north of Hovi's point approximately mid-lake, and northeast from the outlet.

1966 DNR Game Lake Survey

This survey was conducted to gather general information for possible management. The survey noted a

maximum depth of 4.5 feet and a median depth of 3.2 feet; the survey noted that the water was high at the time of the survey. Emergent aquatic vegetation noted during the survey included the following and their relative abundance: wild rice and pickerelweed common; three square, hard stem bulrush, stiff wapato and spike rush scarce. Floating-leaved and submerged aquatic vegetation noted during the survey included the following: Floating leaf pondweed, yellow water lily and variable pondweed lush; clasping leaf pondweed and white water lily moderate; little yellow water lily and lesser bladderwort scarce; greater bladderwort scattered. The survey noted that wild rice was "general in distribution, but a very sparse, thin and scattered stand and the plants were in good condition." Pickerelweed was noted as being "common on the margin of the lake." The west end of the lake was noted as "having a greater variety and quantity of submerged vegetation than the remainder of the lake" (Minnesota Department of Conservation, 1966).

DNR Fisheries Surveys

Fisheries Lake Surveys were completed on Big Rice Lake in 1979 and 1983. These surveys documented the presence of northern pike, white suckers and yellow perch in the lake. (Minnesota DNR D. o., 1979 & 1983) Big Rice Lake is subject to frequent fish winterkills.

Modern DNR Wildlife Lake Habitat Survey Reports

After the 1966 Game Lake Survey, no wildlife surveys were completed until 1989 when a Wildlife Lake Survey was completed. In 1997 a Wildlife Lake Habitat Survey was completed, and since this time, six DNR surveys have been completed in 2001, 2003, 2004, 2006, 2007, and 2009. These surveys found a depth range of 0.3 – 4.5 feet. Secchi disk readings were generally to the lake bottom and ranged from 0.3 – 4.5 feet. During these surveys, 20 different species of aquatic vegetation were observed. The five most common species of aquatic vegetation observed were wild rice, pickerelweed, greater bladderwort, floating leaf bur-reed and chara (Minnesota DNR, 1997, 2001, 2003, 2004, 2006, 2007, 2009). A complete list of aquatic vegetation species sampled during all of these surveys is found in Appendix C.

1854 Treaty Authority Wild Rice Abundance Surveys

The 1854 Treaty Authority has completed a wild rice abundance survey on Big Rice Lake each year since 1998. The survey consists of estimating wild rice acreage, average number of wild rice stalks per plot in areas of rice beds, the calculated abundance index (acreage multiplied by average number of stalks), and average water depth for each year of the survey. Survey plots are completed on the same grid of sampling points established for the DNR Wildlife Lake Habitat Survey of Big Rice Lake.

Survey results show a general decline in all rice parameters measured since 1998. Wild rice acreage has varied from a high of 1,698 acres in 2005 to a low of 767 acres in 2008; average number of stalks per ½ square meters has declined from a high of 56 in 1998 to a low of 4 in 2009; the calculated abundance index has also declined from a high of 79576 in 1998 to a low of 3740 in 2009. The average water depth at the time of survey during this same time period has shown a steady increase from 27 inches in 1998 to 52 inches in 2010 (Vogt, 2010). Figure 2 shows 1854 Treaty Authority wild rice monitoring information.

Sulfate Chemistry Data

Scientific literature suggests that for optimum wild rice growth, water sulfate levels need to be 10 mg/L or less. It is suspected that sulfate levels higher than 10 mg/L may negatively impact wild rice. The 1854 Treaty Authority collected water samples from Big Rice Lake for sulfate testing in 2007, 2011, and 2012. All sulfate measurements ranged from 0.8 to 2.6 mg/L, well below the 10 mg/L threshold.

Problems and Specific Management Needs

Big Rice Lake is a typical natural wild rice lake. When water levels are low the lake can produce an excellent stand of wild rice, however when water levels are abnormally high or undergo rapid increases during spring and early summer it produces very little rice. Wild rice abundance and distribution have appeared to decrease based on a number of surveys, observations by natural resource managers and anecdotal reports from the public. Decreased wild rice abundance is not a new concern on Big Rice Lake and is noted in Minnesota Department of Conservation memos from the late 1960's (Wettersten & Stenlund 1967).

Information from past surveys suggests that pickerelweed has increased in coverage in parts of the lake; this may be a symptom of changes in lake condition. It appears that pickerelweed is out competing wild rice in parts of the lake; however, in other parts of the lake, stands of wild rice have decreased, in the absence of pickerelweed. It appears that a combination of higher water levels and competition from other aquatic vegetation are creating conditions less favorable for wild rice abundance. Literature suggests that annuals like wild rice are most benefited by disturbance, such as low and variable water levels over time (Meeker, 1999) (Meeker 1999, Aiken et al 1988)(Aiken et al, 1988). Perennials like pickerelweed, are favored by high and stable water levels and do not tolerate freezing of their rhizomes (New Hampshire Department of Environmental Services 2010, Holt et al year unknown, Cooke 2007).

Big Rice Lake is susceptible to water level fluctuations because the existing outlet condition does not have the discharge capacity to produce long term conditions favorable for wild rice crops. It is possible that the present weir configuration and beaver activity contribute to excessive water levels during the critical period of May 15 to July 1. This has produced numerous wild rice failures due to retarded germination and up-rooting of immature plants. The excessive water levels have resulted in a trend in the last ten to twelve years of poor wild rice crops as documented by the 1854 Treaty Authority. In addition, higher water levels have likely contributed to better over winter survival of pickerelweed and an increase in overall abundance on the lake.

Beaver dams and debris resulting from beaver activity slows water discharge from the lake and affects wild rice growth. As of September of 2010, the weir was blocked by a beaver dam and was holding the lake at a very high water level of 1436.16 MSL and slowing lake runoff. This level is just below the ordinary high water mark which typically occurs in spring.

The current elevation of the weir and the outlet is not clear and needs to be surveyed to determine the present elevation. The final outlet configuration was never surveyed after the original weir modification occurred in 1995, and it has been modified at least two times since installation. An updated topographic survey will provide a more clear understanding of what may be contributing to wild rice decline in wild rice production.

Management Goal

Manage and protect habitat in Big Rice Lake to promote wild rice production for the benefit of waterfowl and wild rice harvesters.

Management Objectives

Following are the objectives that are intended to improve habitat conditions on Big Rice Lake.

1. Increase and maintain the average density, distribution and sustainability of wild rice for the benefit of waterfowl and wild rice harvest.
2. Increase use of the lake by migratory and resident waterfowl.
3. Maintain existing access opportunities for waterfowl hunting, wild rice harvesting, wildlife observation, and furbearer trapping.
4. Maintain a relatively undeveloped shoreline.

Objective 1: Increase and maintain the average density, distribution and sustainability of wild rice for the benefit of waterfowl and wild rice harvest.

Proposed Management Actions

- 1A) Complete a topographic survey of the outlet and weir to establish its present level and impacts on lake levels.
- 1B) Manage water levels by managing beaver and beaver dams in the lake and the outlet eight out of the next ten years.
- 1C) Reduce abundance of pickerelweed by cutting, winter plowing, and/or winter drawdowns to freeze bottom soils.

- 1D) Research other options for pickerelweed control.
- 1F) Install a water level data logger.
- 1G) Collect and analyze water samples for sulfate at least once a year during the growing season.
- 1H) Evaluate the need for posting the opening date for wild rice harvest and implement when appropriate. (*Note – the DNR does not currently have the authority to post wild rice lakes open for harvest. If that authority is granted in the future, this action item will be addressed at that time.)

A topographic survey of the Big Rice Lake outlet and weir was completed in June 2011. The survey determined that the average elevation of the upstream end of the weir was 1434.8, almost 1 foot above the desired elevation of 1434.0 MSL as established in the previous management plan for Big Rice Lake. In November 2012, the weir elevation at the upstream end was reduced to an average elevation of 1433.85 ft. MSL. Setting the weir at this elevation should improve the discharge capacity and reduce the average depth of the lake from current conditions to a more natural level. Temporary drawdowns may also be used on an irregular basis as part of management efforts to mimic drought conditions. The natural setting presently found at the weir will be maintained in order to allow fish passage up and downstream.

The capacity of the outlet must be monitored. As restrictions develop, they must be addressed if the lake is to provide quality habitat for wildlife and opportunities for wild rice harvesting. A large beaver dam was removed from the weir in November 2011, and 2 old dams between the lake and the weir were removed in 2012. A trapper was contracted during the fall of 2011 and the spring of 2012 to remove beaver. To discourage beaver over the long-term, vegetation along the shoreline will be managed to discourage aspen and other deciduous species favored by beaver for food. Beaver population management and beaver dam removal will be continued; however, beaver control and dam removal should not occur every year. Lake water levels should be allowed to rise significantly at least one year in every five to allow the lake to rest, replicate conditions that occurred historically and maintain the long-term health of wild rice. Additionally, the outlet channel and mouth will be monitored, and any debris or restrictive material will be removed.

To reduce the acreage of pickerelweed, several options will be employed. Literature, as cited earlier, and observations by resource managers suggest that pickerelweed is not tolerant of freezing of its root system. Initially, beaver dams will be removed and the weir height will be adjusted; this should not favor pickerelweed and reduce further expansion. If pickerelweed is found with greater than 40% frequency on any DNR Wildlife Lake Habitat Surveys, the weir will be temporarily pulled over winter to further stress pickerelweed. This reduction in water levels over winter will encourage the freezing of the lake bottom and pickerelweed rhizomes. In addition, snow will be plowed over individual pickerelweed beds to remove the insulating layer and further encourage freezing to the lake bottom. Along with the winter drawdown and plowing, areas of pickerelweed will be cut or mowed during active growing periods in an effort to further reduce its frequency. Also areas of heavy pickerelweed stands in the mouth of the outlet will be monitored and removed if they begin to impair water flow.

Monitoring of lake levels and plant frequency will determine the effectiveness of the elevation change at the weir, the removal of beavers and dams, and the pickerelweed reduction efforts. The 1854 Treaty Authority purchased and installed a water data logger to aid in monitoring the lake levels. With lake levels mimicking natural fluctuations wild rice crops should be more dependable over time, although there likely will be considerable variation in year to year rice crops. The diversity and abundance of other aquatic plants should also be similar to present conditions. The attractiveness of Big Rice Lake should increase for breeding and migratory waterfowl as well as for aquatic furbearers and nongame wetland wildlife. Recreational opportunities for hunting, icing, trapping, and wildlife observation will improve.

Management Thresholds -- Objective 1

1. The weir and outlet will be monitored for beaver activity and dam building. Trapping and dam removal will be conducted if beaver activity is observed most years during the critical time period of May 1st – July 1st. Some fall trapping and dam removal will also occur as needed. One year in five, the lake will be rested, and trapping and dam removal will not occur.
2. The weir elevation will be maintained at approximately 1434.0 ft MSL, and lake levels will be monitored from ice out until freeze up. If lake levels average more than 1435.5 from gauge readings and average water depths exceed 30 inches from 1854 Treaty Authority lake monitoring for two consecutive years, then the DNR will re-convene the agencies that developed this plan and evaluate the reasons for this condition and make recommendations to address these conditions.

3. Frequency and abundance of wild rice will be monitored with DNR Wildlife Lake Habitat Surveys and 1854 Treaty Authority lake monitoring. If frequency of wild rice drops below 90% on two consecutive DNR Wildlife Lake Habitat Surveys and the average number of rice stems per ½ square meter drops below 25 and the rice abundance index drops below 40,000 during three years out of five, then the DNR will re-convene the agencies that developed this plan and evaluate the reasons for this condition and make recommendations to address these conditions. Other management actions will be considered including, changes in water level management strategies, changes in pickerelweed management strategies, wild rice seeding and wild rice harvest restrictions.
4. Water samples will be collected and analyzed for sulfate at least once a year during the growing season. If sulfate levels significantly increase, water sampling will increase in frequency, and the DNR will re-convene the agencies that developed this plan to address the increasing sulfate level.
5. In years with an established opening day for wild rice harvest, a vehicle count will occur at both the Forest Service landing and Hovi's landing at between noon and 1 p.m.
6. Annual aerial photographs will be taken, and the need and possible location of photo points on the water or from shore will be evaluated.
7. Continue with an annual interagency rice managers meeting in mid-summer to monitor progress of this plan and condition of other rice lakes in the area.

Desired Outcomes – Objective 1

1. Lake surveys will document high water quality and diverse and abundant aquatic vegetation attractive to waterfowl and wild rice harvesters. DNR Wildlife Lake Habitat Survey plots will document species frequency of occurrence of 90% or higher for wild rice and 40% or lower for pickerelweed.
2. In three years out of five, 1854 Treaty Authority lake monitoring will document an average of >25 rice stems per ½ square meter, and a wild rice abundance index above 40,000.

Objective 2: Increase use of the lake by migratory and resident waterfowl.

Proposed Management Actions

- 2A) Manage for long-lived conifers and mature trees in adjacent terrestrial habitat to discourage beaver and provide cavity-nesting trees.
- 2B) Encourage areas of lowland grass and sedge through prescribed burning and mechanical treatments to improve waterfowl nesting cover.
- 2C) Complete habitat improvement projects on the lake and adjacent public land such as the installation of loafing sites, over water nesting structures and wood duck/goldeneye nest boxes, improvement of island vegetation, control of woody vegetation on bog edges and the development of satellite wetlands as opportunities arise.
- 2D) Evaluate the need for establishment of a waterfowl refuge in the area.
- 2E) Establish motor restrictions on the lake from June 15th through November 25th.

Adjacent areas of lowland sedge and grass will be maintained for waterfowl nesting by the use of prescribed fire and mechanical treatments. Artificial nesting structure will be installed and maintained and satellite wetlands will be developed as opportunities are identified.

With lake levels mimicking natural fluctuations wild rice crops should be more dependable over time, although there likely will be considerable variation in year to year rice crops. The diversity and abundance of other aquatic plants should also be similar to present conditions. The attractiveness of Big Rice Lake should increase for breeding and migratory waterfowl as well as for aquatic furbearers and nongame wetland wildlife. Recreational opportunities for hunting, icing, trapping, and wildlife observation will improve.

From June 15th through November 25th, motorized surface use will be restricted to watercraft with electric trolling motors only. Motorized access will be unrestricted the remainder of the year.

Motorized boat traffic can significantly disturb waterfowl. According to Korschgen and Dahlgren, the highest-degree of disturbance to waterfowl is caused by "rapid overwater movement and loud noise" (1992), and boating was documented as the leading source of waterfowl disturbance in one study (Havera et al, 1992). Disturbance can negatively affect waterfowl during nesting, brood-rearing, and migration (Korschgen and Dahlgren, 1992),

though ducks appear more sensitive to disturbance in autumn (Havera et al, 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed sites and go elsewhere (Korschgen and Dahlgren, 1992)

Motorized boat traffic has been a concern of some duck hunters for many years on Big Rice Lake. Implementing the motor restriction should reduce disturbance to waterfowl and help hold ducks on the lake later into the fall.

Protecting aquatic plants, particularly wild rice, is an additional reason for restricting motorized use on the lake. Studies have shown that boat motors can negatively impact aquatic vegetation (Asplund, 2000; Liddle and Scorgie, 1980). These negative impacts are directly caused by motors uprooting plants, and indirectly through increases in turbidity caused by motors in shallow water (Asplund, 2000; Liddle and Scorgie, 1980). Wild rice can be especially vulnerable to motor damage, since it can very easily be uprooted during the floating-leaf stage. By restricting motors from June 15th, when wild rice is usually in the floating-leaf stage, through the remainder of the growing season, damage to wild rice and other aquatic vegetation will be minimized.

The motor restriction will not be in effect from the November 26th through June 14th. This will allow for motorized access both during the winter early spring for ice fishing, trapping, open-water fishing, and other recreational activities. The motor restriction will apply to recreational access, and will not apply to authorized personnel conducting management and/or monitoring activities.

It should be noted that the 1854 Treaty Authority was part of the technical team that developed this plan, but does not support a restriction on motorized use by band members. See Appendix D.

Management Thresholds – Objective 2

1. Opening day waterfowl bag checks will occur at both Hovl's landing and the Forest Service landing on the north side of the lake.

Desired Outcomes – Objective 2

1. Fall waterfowl use surveys will document abundant waterfowl use of the lake until freeze up.
2. Opening day hunter bag checks will document an average of 1.5 ducks per hunter.

Objective 3: Maintain existing access opportunities for waterfowl hunting, wild rice harvesting, wildlife observation, and furbearer trapping.

Proposed Management Action

- 3A) Work with DNR, U.S. Forest Service and private landowners to maintain existing camping areas, access points, and undeveloped shoreline characteristics.

Desired Outcomes – Objective #3

1. Existing camping areas and boat access sites will be maintained. New access sites and camping areas will be developed as opportunities arise.
2. Shoreline will remain in its current state.

Objective 4: Maintain a relatively undeveloped shoreline.

Proposed Management Actions

- 4A) Investigate establishing conservation easements or purchase of existing private land on the lake.

Desired Outcomes – Objective #4

- 1 The shoreline surrounding the lake will remain as undeveloped as it is presently.
- 2 Cultural resource sites will continue to be protected from disturbance.

Management Plan Revisions

The management plan will be revisited every 10 years to assess effectiveness and determine if changes or updates need to be made. Landowners and stakeholders would be included in the revision process through notification by letter.

Summary

Big Rice Lake will continue to be managed by the Department of Natural Resources for wildlife use and natural wild rice production. Immediate management steps include increasing the capacity of the outlet channel through removal of beaver, beaver dams and debris and weir modification. Additional immediate management steps also include management of pickerelweed to decrease its surface coverage. Long term management actions include installation of waterfowl nesting structures, vegetation management, and monitoring wildlife use.

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SIGNATURE/APPROVAL SHEET

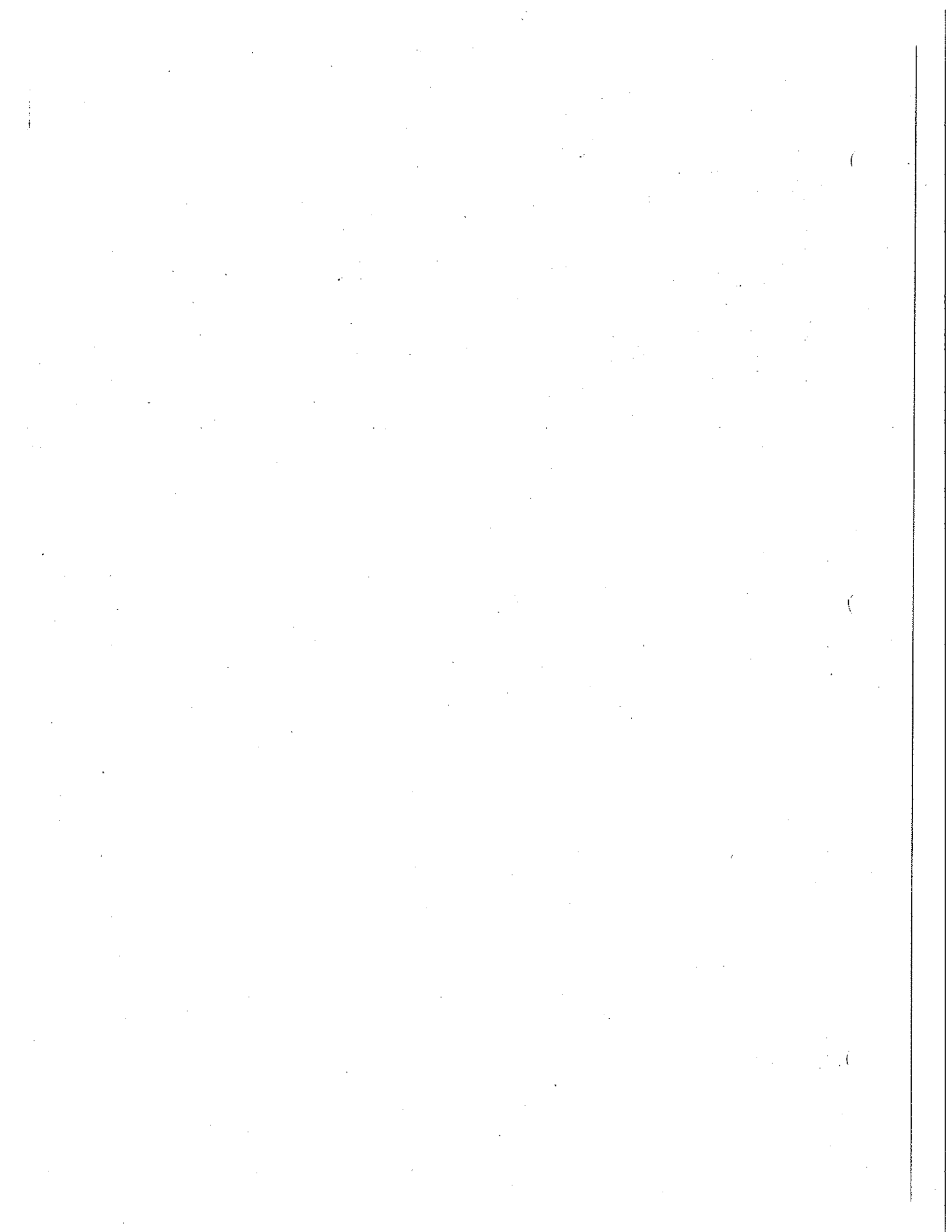
Management Plan
Big Rice Lake
St. Louis Co., MN
DOW# 69066900

Thomas Rusch Date 5/9/2013
Area Wildlife Manager

[Signature] Date 5/9/2013
Regional Wildlife Manager

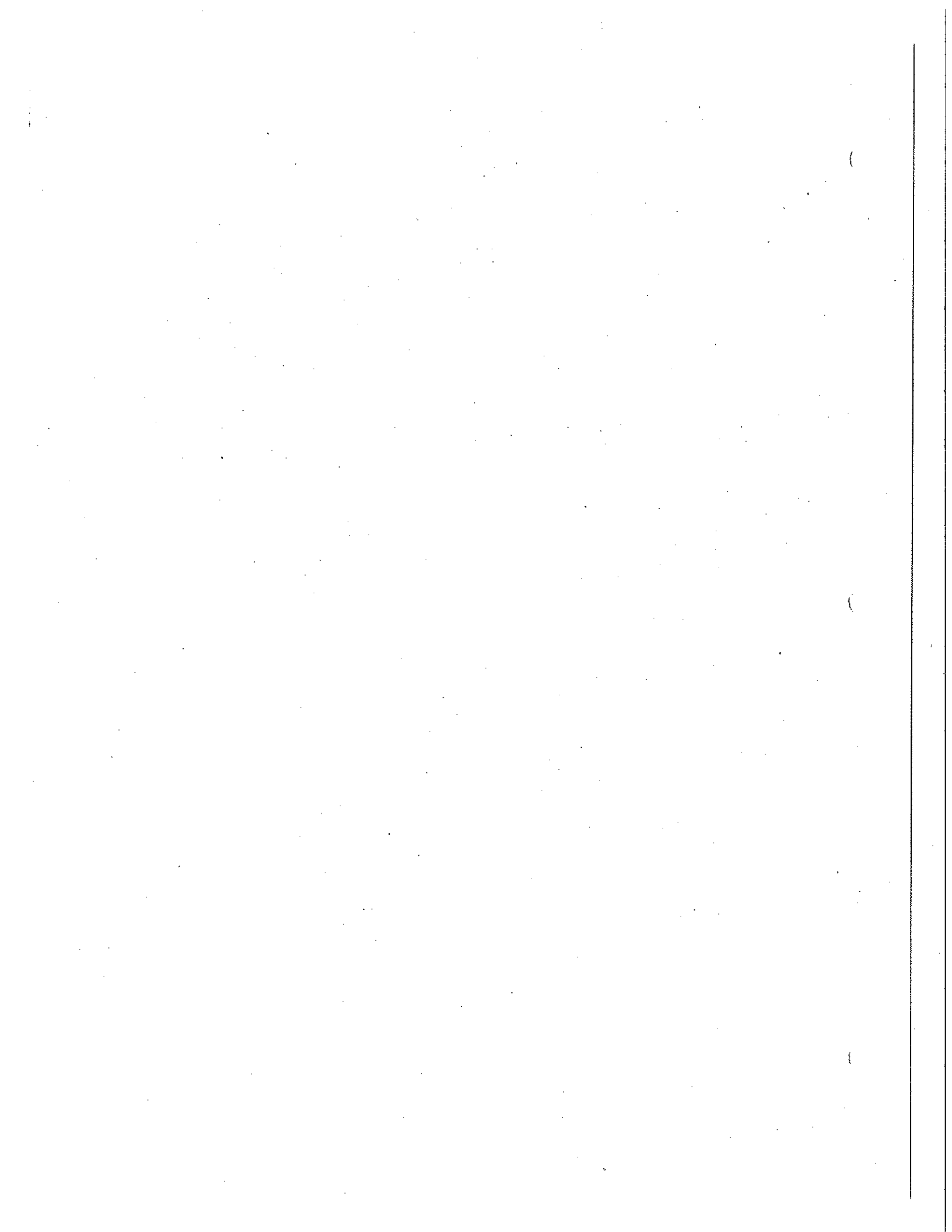
Paul B. Wanda Date 8/9/13
Section Chief

[Signature] Date 9/13/13
Division Director



Appendices and Attachments

- Appendix A -- Timeline of Management Activities on Big Rice Lake
- Appendix B -- List of Aquatic Vegetation Species Sampled During Various Lake Surveys
- Appendix C -- Minnesota Statute 97A.101 -- Public water reserves and management designation
- Appendix D -- Statement from the 1854 Treaty Authority opposing the proposed motor restriction
- Figure 1 -- Opening day waterfowl hunter use and harvest
- Figure 2 -- 1854 Treaty Authority wild rice survey results
- Figure 3 -- Water level data for Big Rice Lake
- Figure 4 -- 1938 depth contour map of Big Rice Lake
- Figure 5 -- 1938 aquatic vegetation map of Big Rice Lake
- Figure 6 -- 1938 cover type and lake bottom type map of Big Rice Lake
- Figure 7 -- Legend A for the 1938 survey maps of Big Rice Lake
- Figure 8 -- Legend B for the 1938 survey maps of Big Rice Lake
- Figure 9 -- 1966 game lake survey map of Big Rice Lake
- Figure 10 -- 2007 wildlife lake habitat survey map of Big Rice Lake
- Figure 11 -- Big Rice Lake watershed map



Appendix A – Timeline of Management Activities on Big Rice Lake

- 1912-1939 – 500 bass fingerlings were stocked (precise year unclear).
- 1912-1939 – Five cans of walleye were stocked (precise year unclear).
- 1938 – Lake contour, cover type, bottom soil and aquatic vegetation map completed.
- 1945 – 80 rock bass and 1050 sunfish fingerlings were stocked.
- 1955-1980's – Winter oxygen monitoring completed annually.
- 1950's-1977 – Northern Pike winter rescues completed. 7,117 northern pike were rescued in the years 1968, 1973, 1974 and 1977.
- 1964 – 30,000 adult fatheads were stocked.
- September 1966 – Initial Game Lake Survey completed.
- December 1966 – Outlet survey completed.
- December 1966 – First Project Proposal submitted for outlet modification.
- 1979 & 1982 – Fisheries Lake Surveys completed.
- 1976 – Initial beaver dam removal.
- Late 1970's – 2005 – Beaver control with dam removal most years.
- 1985 – Requisition for Engineering Services submitted.
- 1987 – Project proposal submitted for outlet modification.
- 1988 – Outlet survey completed.
- 1988 – Wild rice air boat harvested for seeding in other area lakes.
- 1991 – Archeological survey of weir site completed.
- 1991 & 1992 – Formal hearing completed and designation of Big and Little Rice Lakes as Wildlife Management Lakes.
- 1992 – Lake management plan completed for Big Rice Lake.
- 1993 – Environmental Assessment Worksheet completed, permits issued for outlet modification.
- 1993 – 1994 – Access easements obtained from DNR-Forestry, St. Louis County and U.S. Forest Service.
- 1994 – Flowage easement obtained from Jerry R. Hovi.
- 1995 – Outlet modification completed, rock weir established at 1434.0 MSL.
- 1995 – 100 acres of trees and brush felled to improve nesting cover.
- 1996 – Cookie cutter used to clear pickerel weed around outlet.
- 1997 – Wildlife Lake Habitat Survey completed.
- 2001 – Weir height raised to 1435.0 MSL.
- 2001 – Wildlife Lake Habitat Survey completed.
- 2003 – Wildlife Lake Habitat Survey completed.
- 2004 – Wildlife Lake Habitat Survey completed.
- 2005 & 2007 – Prescribed burns completed to improve nesting cover.
- 2005 – Weir pulled to drawdown the lake.
- 2006 – Winter oxygen checked during drawdown.
- 2006 – Wildlife Lake Habitat Survey completed.
- 2006-2007 – Winter drawdown and successful freeze of some bottom soils; some impact on pickerelweed.
- 2007 – Winter plowing of select pickerelweed beds, pickerel weed impacted in areas plowed.
- 2007 – Weir re-established.
- 2007 – Wildlife Lake Habitat Survey completed.
- 2009 – Wildlife Lake Habitat Survey completed.
- 2010 – Committee formed to review and update the lake management plan.
- 2011 – Wildlife Lake Habitat Survey completed.
- 1998-2010 - Annual 1854 Treaty Authority wild rice surveys.

Appendix B – List of Aquatic Vegetation Species Sampled During Various Lake Surveys
(scientific & common names are the same as listed in the various surveys)

1938 Survey

Nymphaea advena - Large Yellow Pond Lily
Zizania aquatic - Wild Rice
Scirpus sp. - Bulrush
Pontederia cordata - Pickerel Weed
Sagittaria sp. - Duck Potato
Nymphaea microphylla - Small Yellow Pond Lily
Xanthium sp. - Bur-weed
Castalia tuberosa - White Water Lily

1966 Game Lake Survey

Zizania aquatic - Wild rice
Pontederia chordata - Pickerelweed
Scirpus americanus - Threesquare
Scirpus acutus - Hardstem bulrush
Sagittaria rigida - Stiff wapato
Eleocharis palustris - Spikerush
Sparganium flustuans - Floatingleaf burred
Nuphar variegatum - Yellow waterlily
Potamogeton gramineus - Variable pondweed
Potamogeton Richardsonii - Claspingleaf pondweed
Nymphaea tuberosa - White waterlily
Utricularia vulgaris - Greater bladderwort
Nuphar microphyllum - Little yellow waterlily
Utricularia minor - Lesser bladderwort

2001 Wildlife Lake Habitat Survey Report

Zizania palustris - Wild Rice
Utricularis vulgaris - Greater Bladderwort
Pontederia cordata - Pickerelweed
Sparganium FL spp. - Floatingleaf Bur-reed Group
Nuphar spp. - Yellow Waterlily Group
Scirpus pungens (americanus) - Three-square
Scirpus acutus - Hardstem Bulrush
Potamogeton natans - Floating-leaf Pondweed
Nymphaea odorata - White Waterlily
Sparganium EM spp. - Emergent Bur-reed Group
Potamogeton richarsonii - Claspingleaf Pondweed
Potamogeton BL spp. - Broadleaf Pondweed Group
Drepanocladus or Fontinalis - Watermoss Group
Chara spp. - Muskgrass spp.

2003 Wildlife Lake Habitat Survey Report

Zizania palustris - Wild Rice
Pontederia cordata - Pickerelweed
Utricularis vulgaris - Greater Bladderwort
Chara spp. - Muskgrass spp.
Sparganium FL spp. - Floatingleaf Bur-reed Group
Sparganium fluctuans - Floating-leaf Bur-reed
Nymphaea odorata - White Waterlily
Nuphar variegata - Common Yellow Waterlily
Scirpus acutus - Hardstem Bulrush

2004 Wildlife Habitat Survey Report

Zizania palustris - Wild Rice
Pontederia cordata - Pickerelweed

Utricularis vulgaris – Greater Bladderwort
Sparganium fluctuans – Floating-leaf Bur-reed
Nymphaea odorata – White Waterlily
Potamogeton amplifolius – Large-leaf Pondweed
Potamogeton richarsonii – Clasping-leaf Pondweed
Chara spp. – Muskgrass spp.
Potamogeton BL spp. – Broadleaf Pondweed Group
Scirpus subterminalis – Water Bulrush
Scirpus pungens (americanus) – Three-square
Scirpus acutus – Hardstem Bulrush
Nuphar variegata – Common Yellow Waterlily
Bidens beckii – Water marigold
Polygonum spp. – Smartweed
Potamogeton robbinsii – Robbins Pondweed
Zosterella dubia – Water Stargrass
Scirpus validus – Softstem Bulrush
Potamogeton natans – Floating-leaf Pondweed

2006 Wildlife Lake Habitat Survey Report

Zizania palustris – Wild Rice
Pontederia cordata – Pickerelweed
Sparganium FL spp. – Floatingleaf Bur-reed Group
Bidens beckii – Water marigold
Utricularis vulgaris – Greater Bladderwort
Nuphar variegata – Common Yellow Waterlily
Potamogeton zosteriformis – Flat-stem Pondweed
Potamogeton richarsonii – Clasping-leaf Pondweed
Potamogeton amplifolius – Large-leaf Pondweed
Potamogeton natans – Floating-leaf Pondweed
Scirpus acutus – Hardstem Bulrush
Scirpus pungens or *torreyi* – Three-Square Bulrush Group
Nymphaea odorata – White Waterlily
Valisneria americana – Wild Celery
Nitella – Stonewort
Najas flexilis – Bushy Pondweed
Eleocharis spp. – Spikerush Group
Chara spp. – Muskgrass spp.
Carex spp. – Sedge Group
Phragmites australis – Cane

2007 Wildlife Lake Habitat Survey Report

Zizania palustris – Wild Rice
Utricularis vulgaris – Greater Bladderwort
Pontederia cordata – Pickerelweed
Sparganium FL spp. – Floatingleaf Bur-reed Group
Chara spp. – Muskgrass spp.
Nymphaea odorata – White Waterlily
Potamogeton amplifolius – Large-leaf Pondweed
Ceratophyllum demersum – Coontail
Nuphar variegata – Common Yellow Waterlily
Scirpus pungens (americanus) – Three-square
Valisneria americana – Wild Celery
Potamogeton robbinsii – Robbins Pondweed
Potamogeton richarsonii – Clasping-leaf Pondweed
Potamogeton natans – Floating-leaf Pondweed
Elodea Canadensis – Canada Waterweed

Appendix C

Minnesota Statutes—97A.101 Public water reserves and management designation

Subdivision 1. **Reserves.** The commissioner may designate and reserve public waters of the state to propagate and protect wild animals.

Subd. 2. **Management designation.**

(a) The commissioner may designate, reserve, and manage public waters for wildlife after giving notice and holding a public hearing. The hearing must be held in the county where the major portion of the waters is located. Notice of the hearing must be published in a legal newspaper within each county where the waters are located at least seven days before the hearing. The designation by the commissioner shall be by written order published in the State Register. Designations are not subject to the rulemaking provisions of chapter 14 and section 14.386 does not apply.

(b) The commissioner may contract with riparian owners for water projects under section 103G.121, subdivision 3, and may acquire land, accept local funding, and construct, maintain, and operate structures to control water levels under section 103G.505 to manage designated waters.

Subd. 3. **Fishing may not be restricted.** Seasons or methods of taking fish may not be restricted under this section.

Subd. 4. **Restrictions on airboats, watercraft, and recreational vehicles.**

(a) The use of airboats is prohibited at all times on lakes designated for wildlife management purposes under this section unless otherwise authorized by the commissioner.

(b) The commissioner may restrict the use of motorized watercraft and recreational vehicles on lakes designated for wildlife management purposes by posting all public access points on the designated lake. To minimize disturbance to wildlife or to protect wildlife habitat, the commissioner may restrict the type of allowable motorized watercraft or recreational vehicle, horsepower or thrust of motor, speed of operation, and season or area of use. Designation of areas, times, and types of restrictions to be posted shall be by written order published in the State Register. Posting of the restrictions is not subject to the rulemaking provisions of chapter 14 and section 14.386 does not apply.

(c) Before the commissioner establishes perpetual restrictions under paragraph (b), public comment must be received and a public meeting must be held in the county where the largest portion of the lake is located. Notice of the meeting must be published in a news release issued by the commissioner and in a newspaper of general circulation in the area where the waters are located. The notice must be published at least once between 30 and 60 days before the public meeting and at least once between seven and 30 days before the meeting. The notices required in this paragraph must summarize the proposed action, invite public comment, and specify a deadline for the receipt of public comments. The commissioner shall mail a copy of each required notice to persons who have registered their names with the commissioner for this purpose. The commissioner shall consider any public comments received in making a final decision. This paragraph does not apply to temporary restrictions that expire within 90 days of the effective date of the restrictions.

Appendix D – Statement from the 1854 Treaty Authority opposing the proposed motor restriction on Big Rice Lake

June 8, 2012

The 1854 Treaty Authority Board of Directors (the elected tribal councils of the Bois Forte Band and Grand Portage Band) discussed the proposed management of Big Rice Lake to include a motorized restriction. It was their decision not to support a restriction on motorized use by band members. Concern was raised that such a restriction may impede the exercise of treaty rights.

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Figure 1 – Opening day waterfowl hunter use and harvest

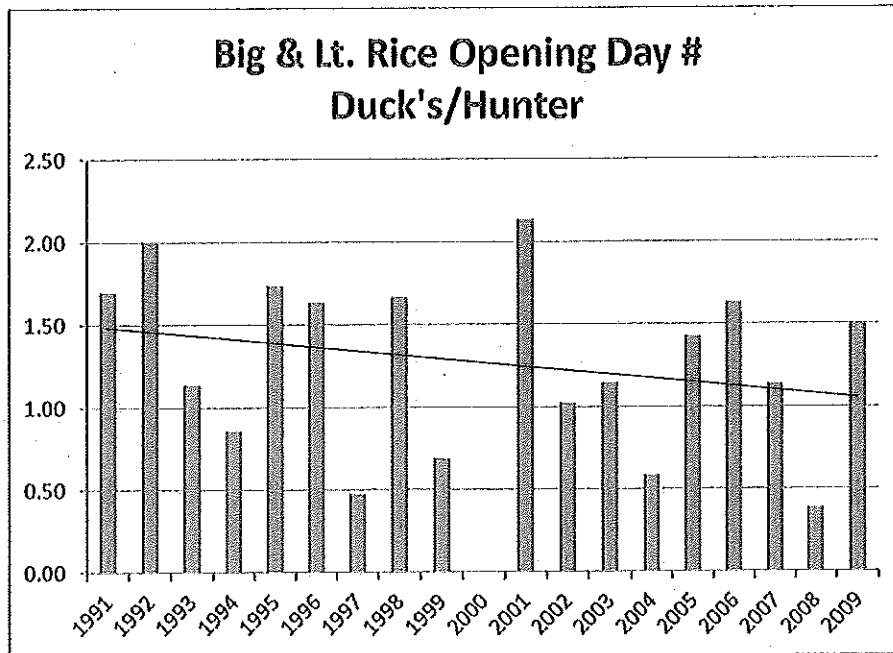
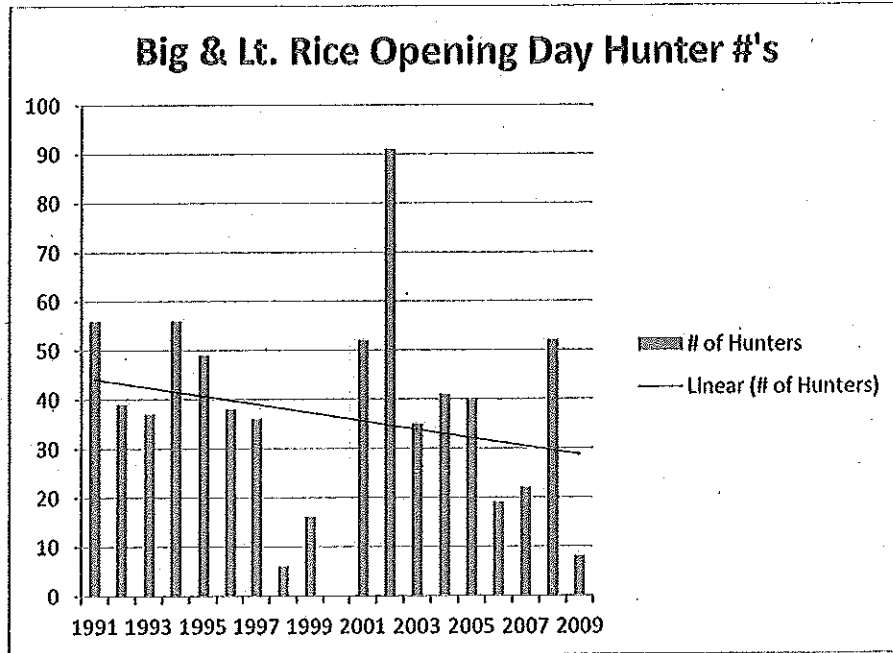
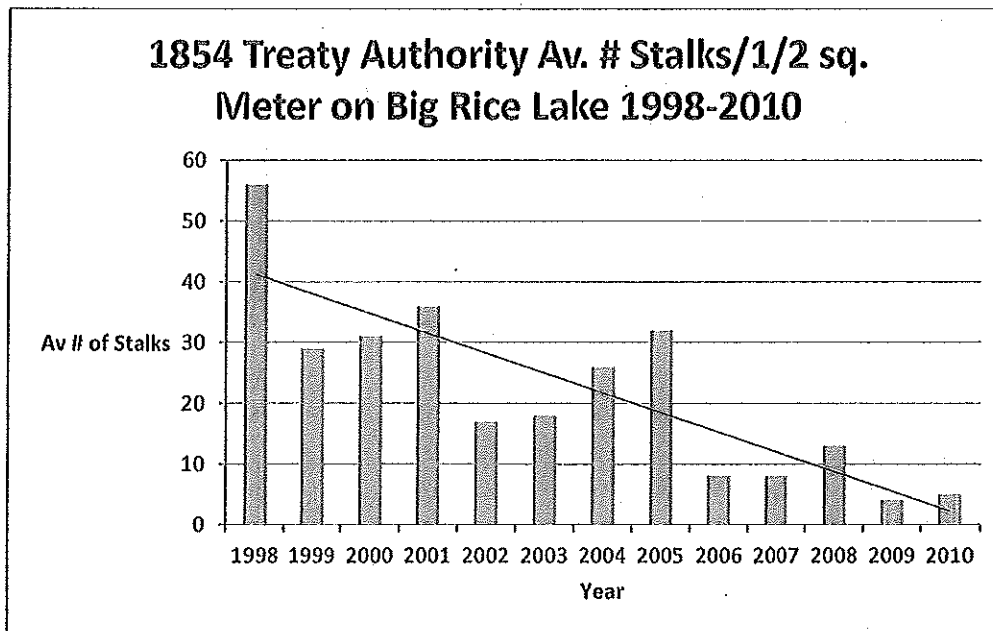
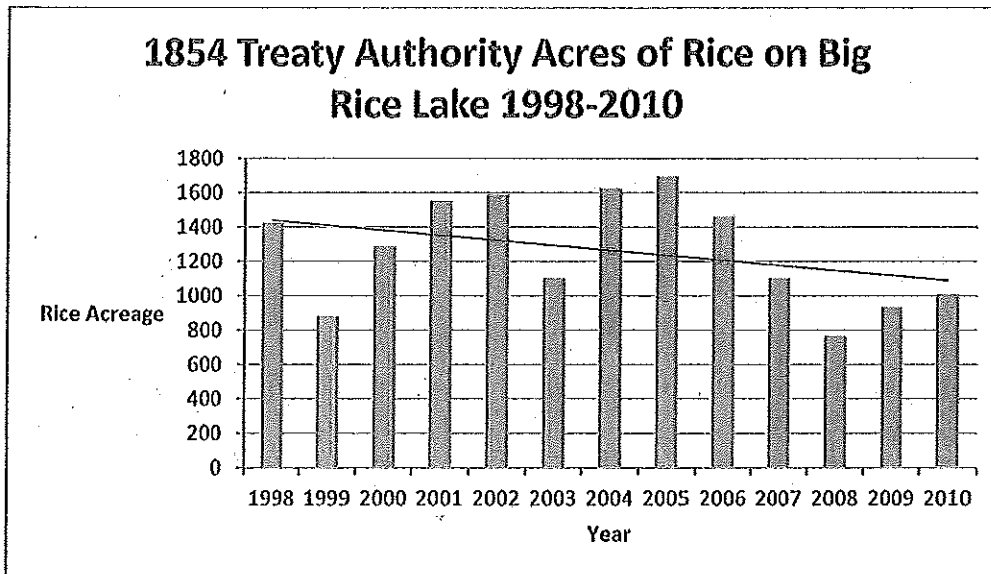
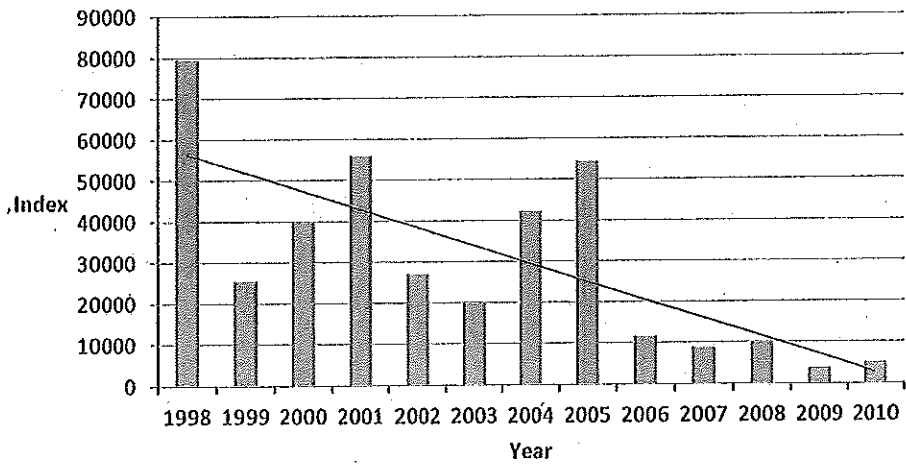


Figure 2 – 1854 Treaty Authority wild rice survey results



1854 Treaty Authority Rice Abundance Index on Big Rice Lake 1998-2010



1854 Treaty Authority Average Water Depth on Big Rice Lake 1998-2010

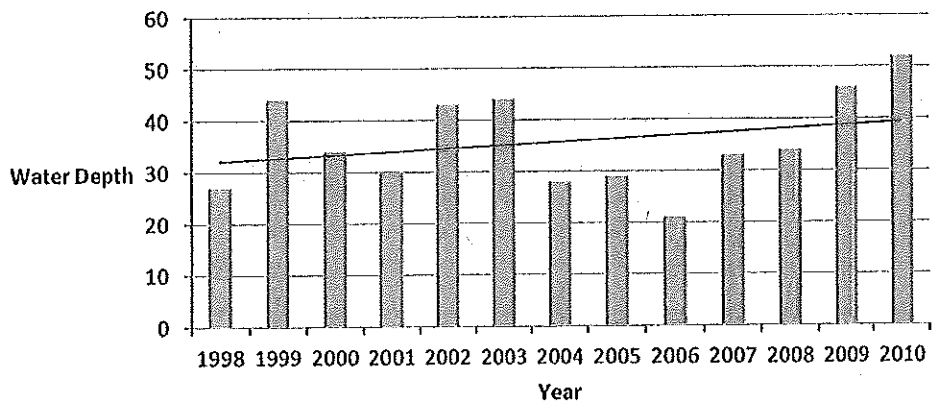
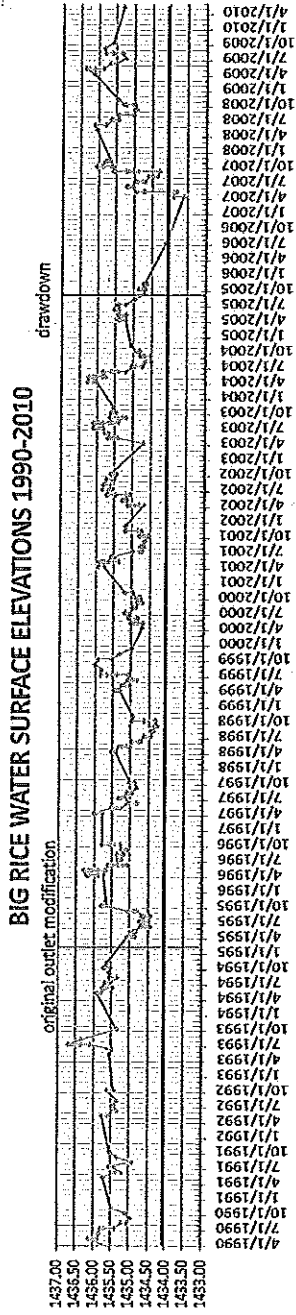


Figure 3 – Water level data for Big Rice Lake



Water Levels	Pre-outlet modification (pre 1995 data)	Post-outlet modification (1995 to present)	Difference (ft)
Runout elevation	1433.7 (?) data from 1991 design report	1434.04? DOW database 1433.6 (2001 DOW memo)	
Average	1435.59	1435.23	0.35
Maximum	1436.69	1436.38	0.31
Minimum	1434.93	1433.61	1.32
Range	1.76	2.77	

Figure 4 - 1938 depth contour map of Big Rice Lake

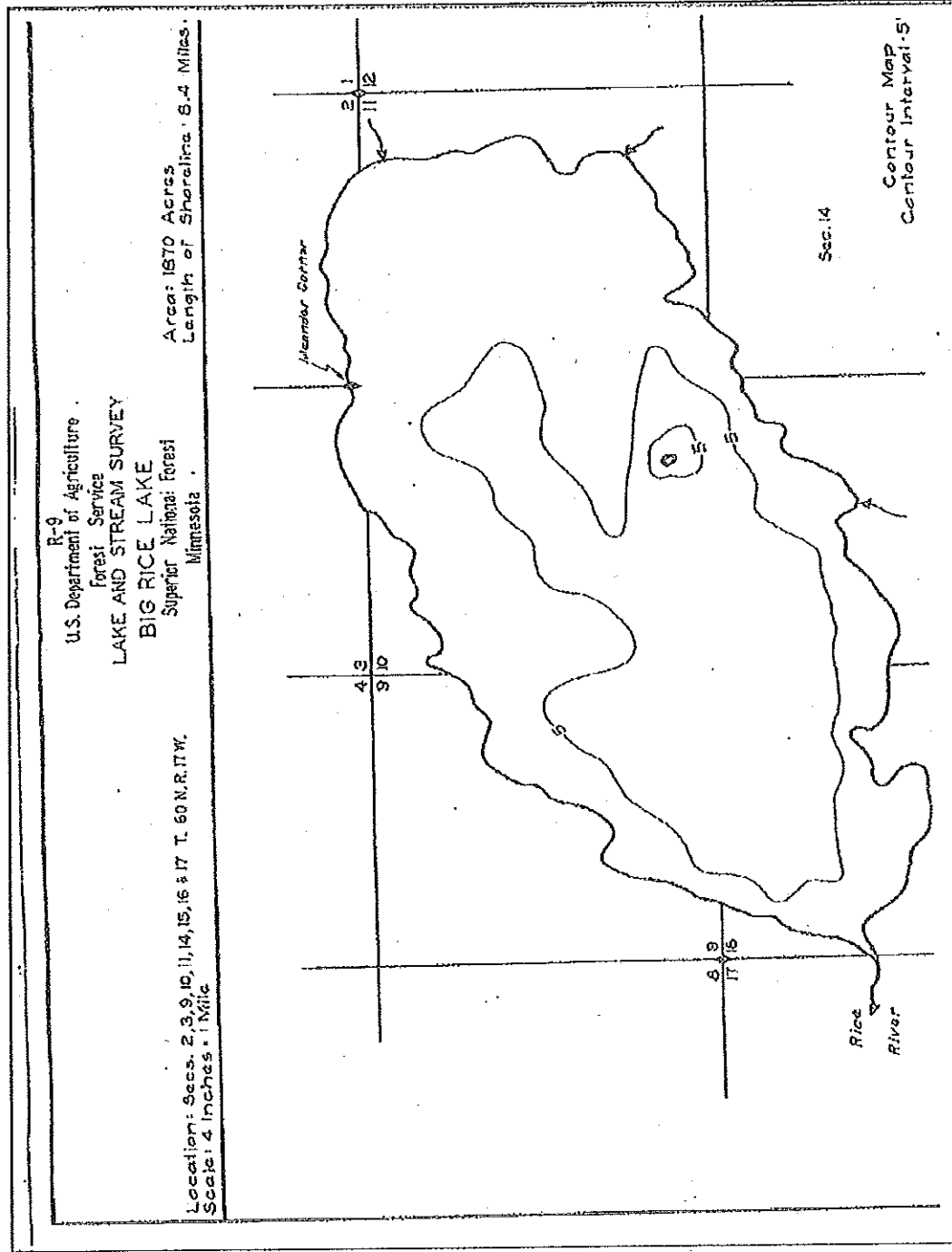


Figure 5 - 1938 aquatic vegetation map of Big Rice Lake

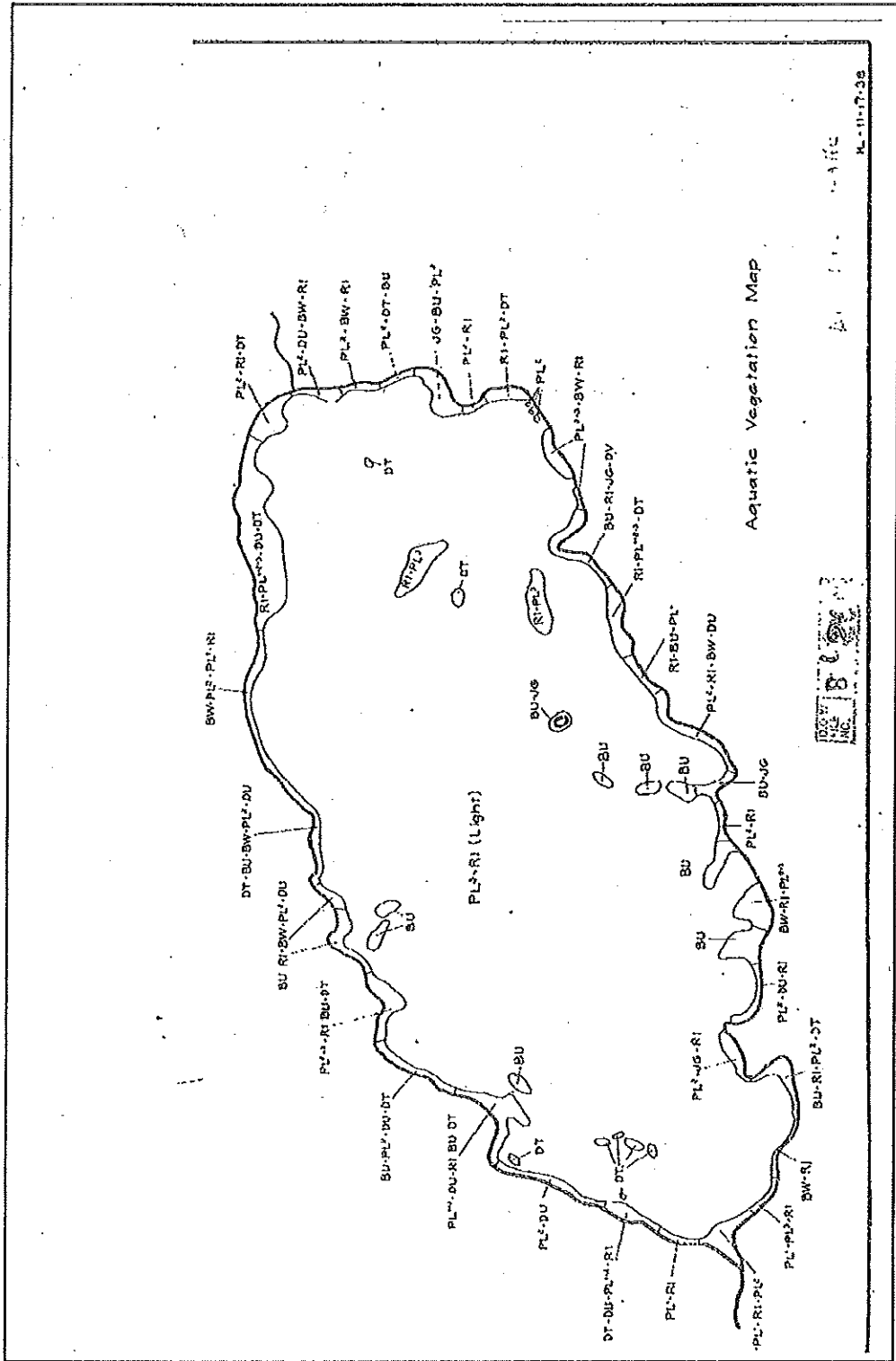


Figure 6 — 1938 cover type and lake bottom type map of Big Rice Lake

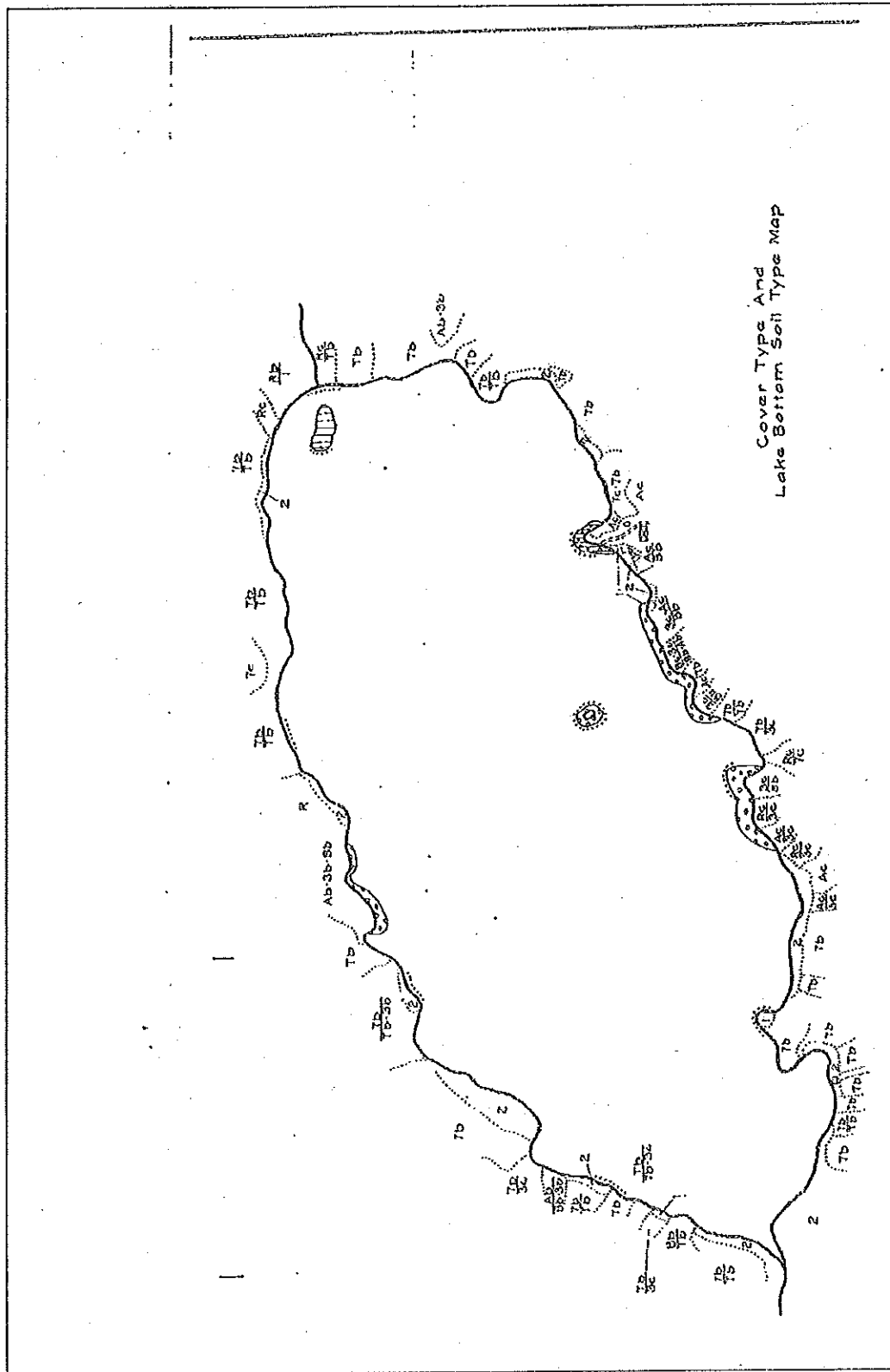


Figure 9 - 1966 game lake survey map of Big Rice Lake

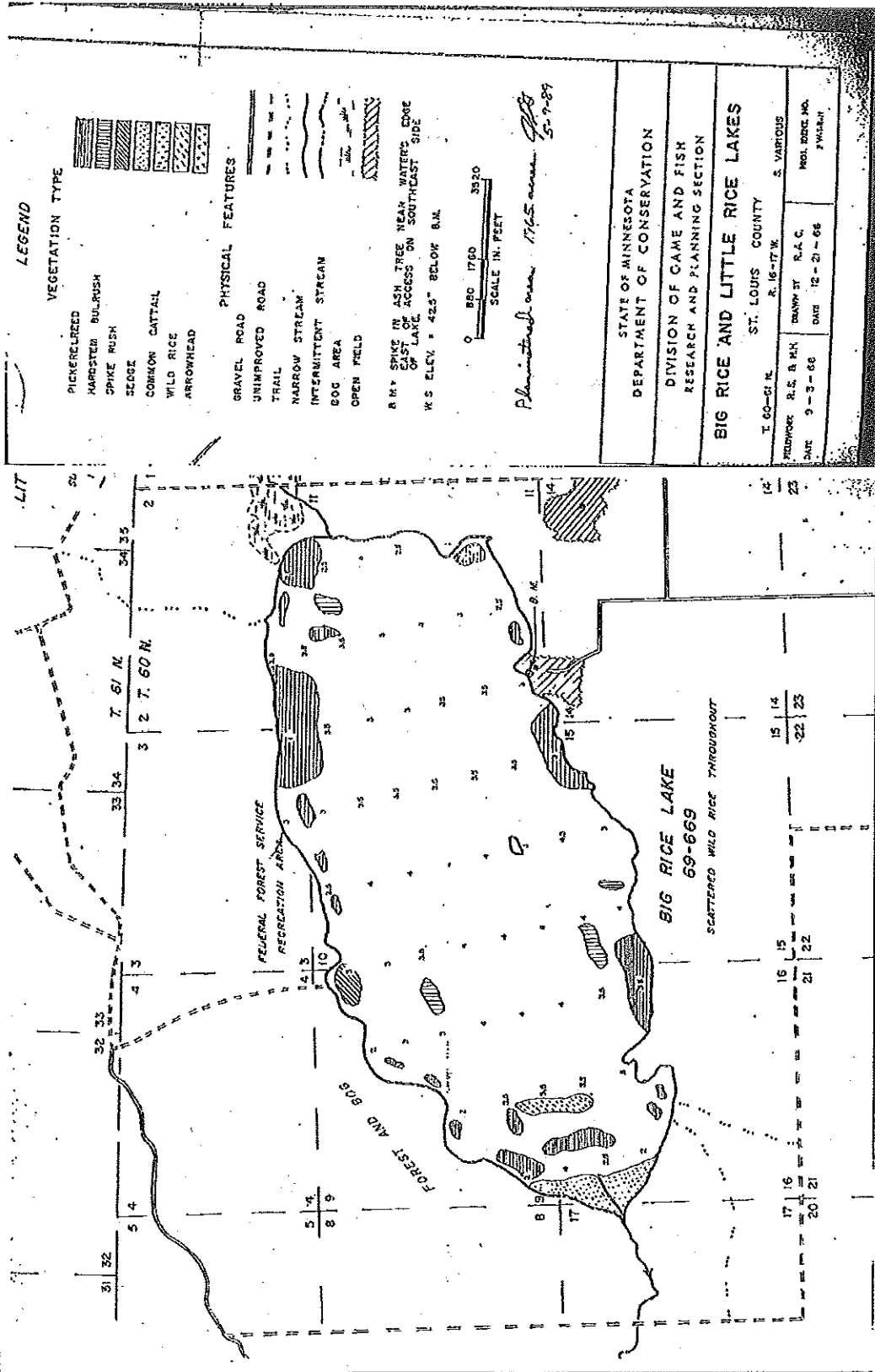


Figure 10 – 2007 wildlife lake habitat survey map of Big Rice Lake

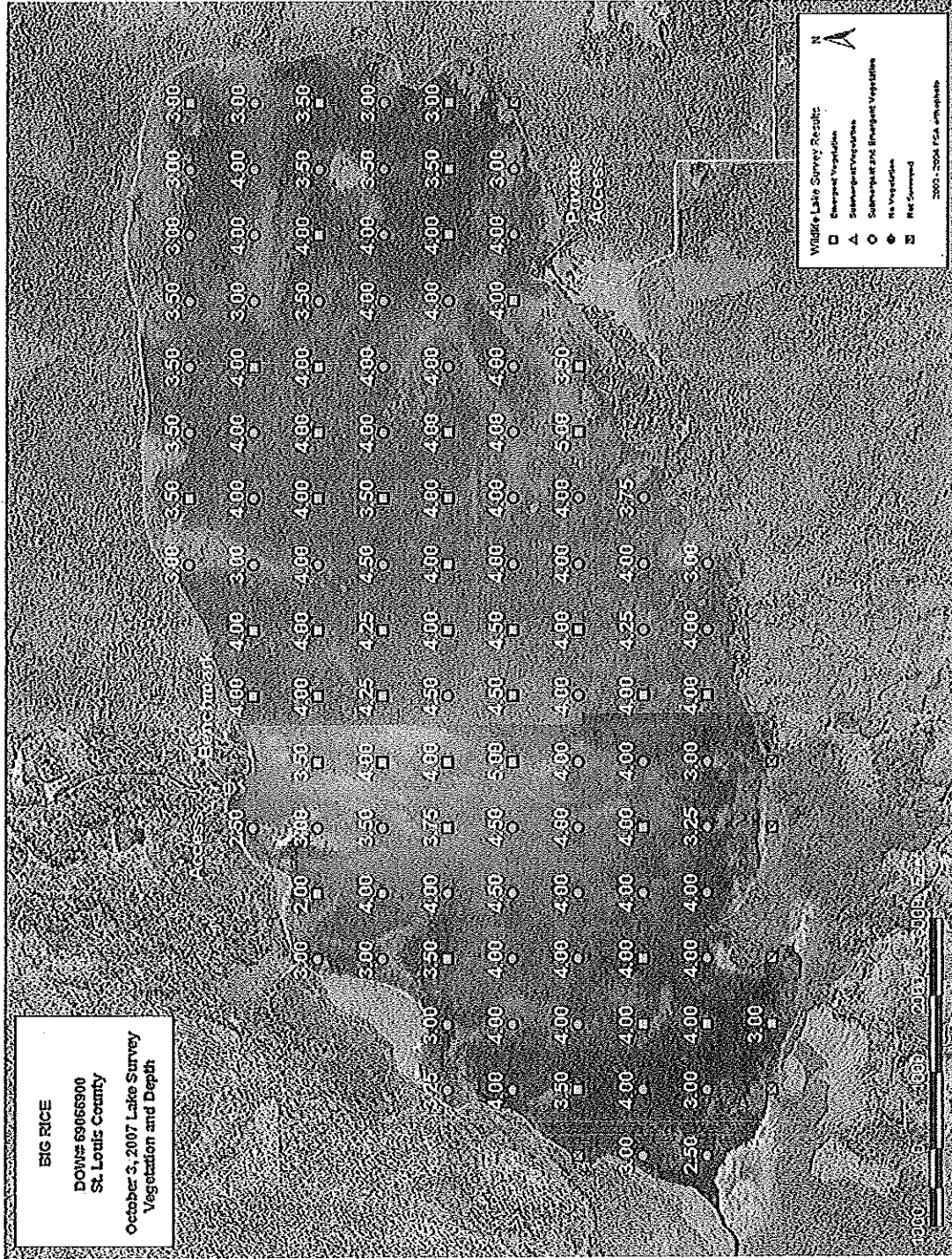


Figure 11 – Big Rice Lake watershed map

