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FINAL REPORT

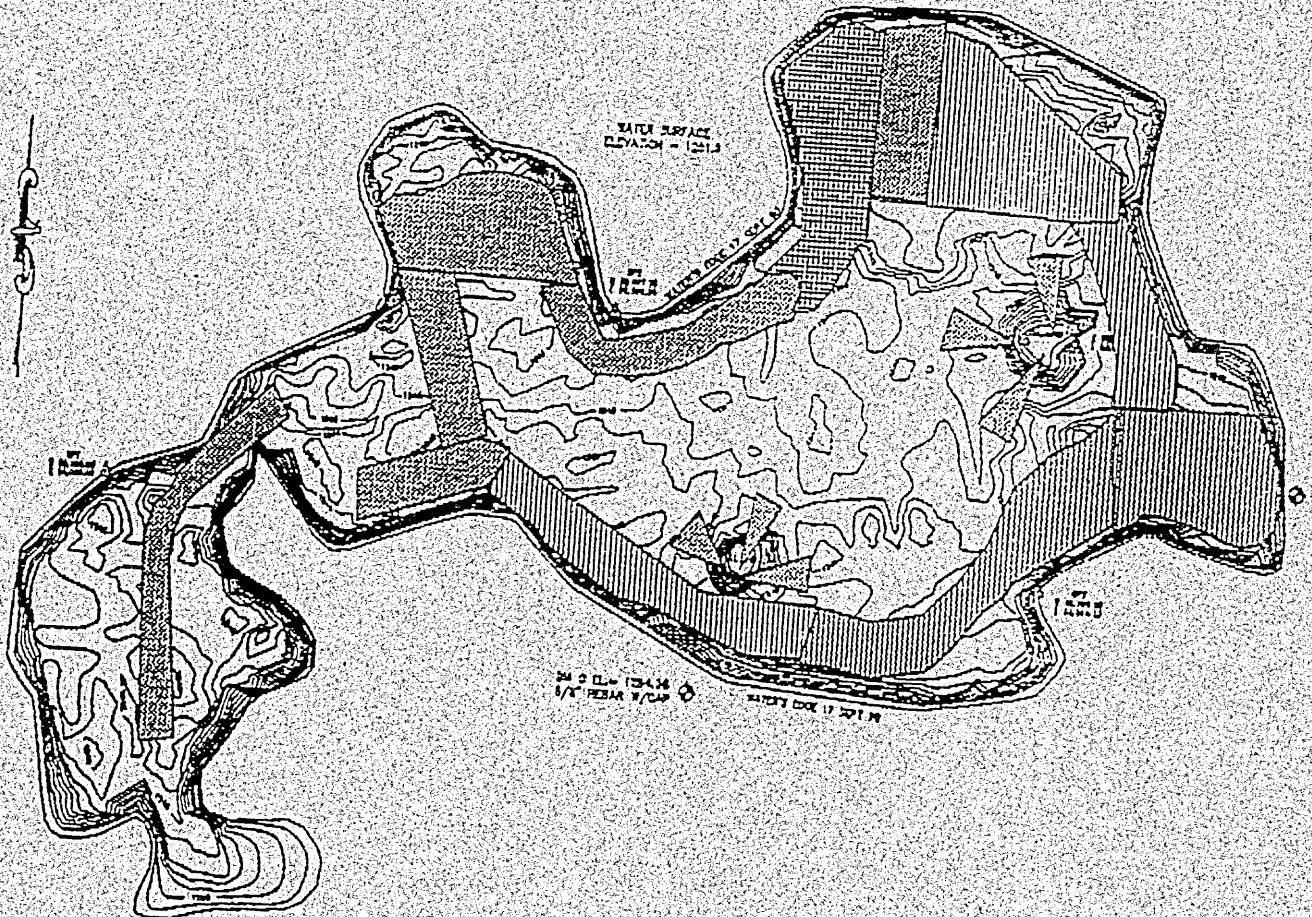
SWAN LAKE DREDGING AND RESTORATION PROJECT

PROJECT PERIOD

MARCH 30, 1994 THROUGH MAY 31, 1999

PROJECT SPONSOR

SWAN LAKE IMPROVEMENT ASSOCIATION, INC.



Report Prepared By

Lois Carlson, Project Coordinator

May, 1999

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I. EXECUTIVE SUMMARY

Swan lake is glacial natural lake, located in southwestern Turner County, approximately three and one-fourth miles north and one mile west of Viborg, South Dakota. The lake is used extensively by the community of Viborg and the surrounding area residents, along with the 80 in-state and out-of-state cabin owners for recreational purposes. During the past several decades this natural lake has experienced poor water clarity and sedimentation build up.

These problems prompted the local cabin owners to begin efforts to improve the water quality by in-lake dredging, and additional riparian. Funding for this project was provided by the U.S. Environmental Protection Agency (EPA), the South Dakota Department of Environment and Natural Resources (DENR), the Local Cabin Owners, Turkey Ridge Watershed, Vermillion Basin Water Development District and the City of Viborg.

In-kind support was received by the Swan Lake Cabin Owners (to include the local coordinator), Turner County Commission, Swan Lake Christian Camp and the turner county Natural Resources Conservation Service (NRCS). Game, Fish, and Parks provided a new boat ramp, and a handicapped accessible dock, and will soon be stocking the lake with game fish.

The major accomplishments of this project include:

1. Dredging - Removed 411,000 cubic yards of silt to improve the mean depth of the lake by three feet.
2. Riparian - Sloughing banks along the lake shoreline and island were riprapped with approximately 5100 feet of rock.
3. Inlet Closure - The ditch north of the inlet structure was filled with filter screen, fabric and pea gravel to enhance the quality of water entering the lake.

An information/education program was also implemented as part of the project. This included:

- installation of four information signs at high traffic areas around the lake;
- publication of a general informational brochure on BMP's sent to farmers along turkey creek and other interested persons;
- publication of quarterly newsletter to keep public informed of project progress;

-project tours to high school students and individuals from the area and out-of-state residents who were interested in viewing the site;

-periodic articles published in the Sioux Falls Argus Leader and the Viborg Enterprise to keep public informed on project progress;

-informational monthly meetings held to keep public and local citizens informed;

-annual luau held to keep citizens abreast of the project progress,

-documentation of the project through photos, videotape and slides;

-publication of annual progress report.

The project was assessed by using the following techniques.

-a general comparison of accomplishments versus original tasks;

-using a depth finder to assess the amount of sludge removed from the lake;

-monitoring the ponds;

-water testing to check water quality.

Based on these assessments and the cooperation of many organizations and volunteers, the project was considered a huge success.

II. GENERAL DESCRIPTION OF SWAN LAKE

Swan Lake is a glacial natural lake located in southwestern turner county, approximately three and one fourth miles north and one mile west of Viborg, South Dakota.

In 1914 a dam was constructed approximately one-half mile downstream from Swan Lake. A farmer donated a strip of land between Turkey Creek and Swan Lake to the Swan Lake Improvement Association, and a ditch and inlet structure were constructed. In the 1970's an additional inlet structure was constructed. This was built south of the original inlet structure. with a sediment holding pond between the two structures.

The lake is approximately 180 acres, and provides recreational activities to thousands of area residents. The lake is also home to fish and wildlife. Ducks, Geese and Pelicans visit the lake. and Beavers, Fish, Turtles, Mink and Muscrats find Swan Lake their home.

The State of South Dakota has assigned the following beneficial uses to Swan Lake:

1. Warmwater semipermanent fish life propagation
2. Immersion recreation :
3. Limited contact recreation
4. Wildlife propagation and stock watering

The Turkey Ridge Creek has the beneficial uses of:

1. Warmwater marginal fish life propagation
2. limited contact reccreation
3. Wildlife propagation and stock watering
4. Irrigation water

Swan lake is a high use lake with over 260,000 persons within a 50 mile radius, along with the 80 homes located on the lake. The majority of the topography of the Turkey Ridge Creek watershed is flat to undulating. Approximately 70% of the watershed is gently rolling glacial plain with slopes less than 3 percent. contrasting steeper slopes can be found on the western and southwestern boundaries of the watershed. This comprises about 30% of the watershed and has slopes that vary from 0 to 25%. The land usage in the watershed consists of 77% cropland, 14% pasture and 9% non-agricultural.

Swan Lake receives on average 24 inches of rain and has approximately 41 inches of evaporation per year, for a net loss of 17 inches of rain per year. Swan Lake has nine springs that makes up some of this loss.

The lake includes a public boat landing and dock, two public parks and a swimming beach. The lake also includes a Christian Camp and one private business.

III. PROJECT SUMMARY

Concern over Swan Lake's general water quality heightened in the mid 1970's. The decline was evidenced by poor water quality, and lake siltation. In 1975 a feasibility study was done to see what should be done to improve the lake. A small grant was obtained and the Swan Lake Improvement Association paid out \$15,000 as matching funds. In 1975 a dredge project initiated by the South Dakota Game, Fish and Parks removed approximately 325,000 cubic yards of sediment from Swan Lake. It seemed feasible, but funding was not available to continue. It was then, that the Swan Lake Association members vowed to secure funding and do whatever it would take to get another dredge in the lake to preserve our God given heritage.

During 1989 and 1990 a second feasibility study was done, and it was time for us to find a sponsor for our project. The Turner County Commissioners said they would be our sponsor until their attorney advised against it. The local coordinator along with Swan Lake's Attorney put the "wheels in motion" for the Swan Lake Association to become their own sponsor. We became incorporated and thus became our own sponsor.

In early 1993, we started fund raising. A local Artist contributed to this cause by painting a picture entitled "Swan Lake Retreat". We sold these prints along with numerous other items that friends of the lake would purchase. We took our cause to area fairs to promote our project and to inform the public of what we wanted to do. We attended meeting after meeting with the different local, federal and state agencies to secure funding for our project. Some of the agencies involved were U.S. Department of Agriculture, Turner County Commission, Corp of Engineers, Department of Environment and Natural Resources, Environmental Protection Agency, Turner County Natural Resource Conservation Service, Game, Fish and Parks, Fish and Wildlife, & State Water Congress.

In the fall of 1993 and with our matching funding in place, it was time to meet with a representative from NRCS and the local farmers to see if they would let us rent/purchase some of their land for the sediment holding ponds. Our biggest problem was the wetland issue. Some of the farmers said we could use all of their wetlands. One of the farmers and his spouse said they would consider either a rent or purchase agreement with us. Since there was 1.7 acres of wetlands on this property, we were told that we could mitigate the wetlands if we could find a suitable "trade", which we did, and then we were told that we could not mitigate the wetlands, and must stay away from them at all costs. We purchased 40 acres of land and built the ponds around the wetlands.

B&E engineering firm out of Yankton, SD was hired to engineer the project. Runge Enterprises from Sioux Falls, SD contracted to do the pond construction. Buskerud Construction of Dell Rapids, SD contracted to seed around the ponds and construct the trestle. We contracted with Lakes and Streams from South Shore, SD to do the dredging, and Soukop Construction from Sioux Falls, SD to riprap the shorelines and island, and also to close the inlet structure.

1995 Dredging Season

Dredging of the lake finally got started in the middle of July, 1995. The dredging was done by Lakes and Streams, and our goal for this year was the removal of 80,000 cu. yds. of silt. Due to the late start, and the fact that the lake froze over real fast on November 3, only 71,600 cu. yds of sediment was removed during this season. Several members of the Swan Lake Improvement Association constructed a fence around the sediment ponds and placed no trespassing signs around the area.

1996 Dredging Season

With permits, easements, water rights, grant applications, etc. once again in place several Swan Lake residents made their annual trip to Pierre for more funding. Due to the lack of sufficient water supply to run the dredge this season, the inlet was cleared of debris to let the water flow into the lake. The 8 inch dredge was put in and started pumping the latter part of April. After July 4, the 10 inch dredge was also put in the lake to pump mud. During this season, several work days were held with the Cabin Owners to seed oats on the berms, obtained, hauled and placed approximately 600 bales of hay around the holding ponds to keep the ponds from eroding. During August and September the Swan Lake Christian Camp personnel hired a local businessman and together they riprapped their shoreline as an in-kind match for the project. Our goal for this year was to remove 200,000 cu. yds. of sediment. Our goal was met on October 16, and both dredges were removed from the lake.

1997 Dredging Season

On February 1, Soukup Construction of Sioux Falls, SD delivered several large pieces of equipment to riprap the shoreline on the west end of the lake. Their first obstacle was to remove a lot of snow that had gathered on the west banks. They did an excellent job and finished the riprapping on February 27.

Again with permits, easements, water rights, grant applications, etc. in place several Swan Lake residents made our annual trip to Pierre to seek additional funding. We were fortunate that the state felt that our project was worthwhile, and we received all of our requested funds for this year. On May 1 the 8 inch dredge was put in the lake and dredging began in the Christian Camp area. On May 14, Rechnagel Construction, Hurley, SD contracted and hauled in eight loads of soil to build up the north end of Pond 1. As an in-kind match, an association member used his machinery to place and compact the soil to raise the dike. On May 14 the Swan Lake Board Members, along with three members of DENR from Pierre met to discuss the closing of the inlet structure. After much discussion, it was decided to fill in the ditch north of the old inlet structure with pea gravel. Lakes and Streams quit dredging on October 25 after removing 89,908 cu. yds. of silt from the lake this season. On November 6, four association members installed a new fence around the inlet area for the purpose of keeping cattle out of the settling pond, and on November 13 Soukup Construction of Sioux Falls, SD placed fabric, filter, pea gravel, soil and seed to close the inlet structure. On November 22, the Swan Lake Association Board of Directors, along with members from SD Lakes and Streams met to discuss the possibility of removing approximately 40,000 cu. yds. of sediment in 1998. This was agreed on by all parties involved with the project. To ensure pond capacity, on December 23, two association members met with the Turner County Commissioners for the purpose of them doing some in-kind work by building up pond #2. They agreed to do this, along with keeping the areas around the ponds mowed and cleaned.

1998 Dredging Season

On June 1, Turner County built up pond #2. On June 15, the 10 inch dredge was put in the lake, and Lakes and Streams began dredging for the final season. On August 15, Swan Lake Improvement Association sponsored a free catered meal for the public, association members and other agencies. This was done to inform them of the project, and to thank everyone for their support. Approximately 200 persons attended this meal which was served by Central Catering, Hawarden, IA. On September 2, Lakes and Streams had removed the 40,000 cu. yds. of sediment from the lake plus an additional 10,000 cu. yds. agreed on by Swan Lake and Lakes and Streams for a total of 50,000. This brought the total of silt removed for the project to 411,000 cu. yds.

Reclamation

This will be done in three to five years after the ponds have dried out and settled. At that time, the work will be put out for bid, and the land will be put back in a farmable condition.

IV. OBJECTIVE 1 - INFORMATION/EDUCATION PROGRAMS

Informing and educating the public about NPS pollution, its causes and its solutions was an important part of our project.

This project was an excellent opportunity for us to inform the public on what could be done to ensure proper and better management practices. We realized that we could only inform, and not force persons to participate. However; we felt that we did a good job of getting the information out there. The knowledge that we ourselves gained should also "make a difference."

Task 1 - IMPLEMENT I&E PROGRAMS

Product 1 - NPS News Articles

The Viborg Enterprise was selected as our official newspaper. Several articles and pictures of the project were printed each year in the Viborg Enterprise, along with the Sioux Falls Argus Leader. Fifteen to twenty articles were published during the duration of the project.

Product 2 - Media Project Updates

KELO from Sioux Falls was invited each year to attend at least one public function and to visit the site. They did not respond to our invitations. The Coordinator did one radio talk show during the second year of the project.

Product 3 - Agency Annual Meetings

Five plus meetings were held each year of the project (April, May, June, July and August.) These meetings were held at 7:00 p.m. the last Thursday of each month.

Product 4 - Implement an outdoor education program to target local high school students about the activities of the project.

One High School Field Day was held to demonstrate all aspects of our dredging operation, along with an overview of NPS pollution sources and practices (BMP's) which would reduce NPS.

Product 5 - Hold a Catered annual Meeting of all parties involved in the Project along with the local general public and landowners in the Turkey Ridge Creek Watershed.

Four annual meetings/catered meals were held during the summer (July and/or August) to update all interested parties on the status of the project, accomplishments and future activities.

Product 6 - Distribute 300 Printed Brochures and Questionnaires

We distributed over 200 printed brochures/questionnaires targeting the farmers along the Turkey Ridge Watershed. Another 100 brochures were distributed to area residents and interested parties. This was done by a collaborative effort between the Swan Lake Improvement Association and the Turner County NRCS office. Several farmers along the Turkey Ridge Watershed have made inquiries to the NRCS office.

Product 7 - Public Tours

One advertised tour was conducted, plus several group tours were given to interested persons from surrounding towns and states visiting/using the lake. Several individual tours were given every week by Swan Lake Association Members.

Product 8 - Project Signs

Four signs were placed within a one mile radius of the lake. Two by the highway entering the lake from both the north and south, one by the entrance to Swan Lake, and one by the boat ramp. These signs informed the public that a dredge was in operation on the lake, and also the names of each agency involved in the operation.

V. OBJECTIVE 2 - SEPTIC TANK ASSESSMENT

Task 1 - ASSESSMENT OF INDIVIDUAL SEPTIC TANKS

Product 1 - The survey will include the name of the property owner, legal description of property, type of facility being served, information regarding expected flows, date of system construction, and lot size.

Real Property Assessments were obtained from the Turner County Courthouse. Several members of the Swan Lake Improvement Association conducted a door to door survey of all the cabin owners. The survey included name and address of cabin owners, legal description of property, type of residence, total number of persons occupying resident, use of residence, water supply, existing water disposal system and date installed, diagram of lot showing dimensions, location of residence, locations of wells, septic systems, water and wastewater lines, other utilities; and estimated distances of the various items from each other and the lake, roads, streams, creeks, or other adjacent access area. The septic tanks were inspected to determine the structural condition of the tanks.

Product 2 - The surveys were sent to Pierre. Personnel from DENR assessed the survey results and found that no action was necessary.

VI. OBJECTIVE 3 - ELIMINATE NPS INPUTS FROM TURKEY RIDGE CREEK INTO SWAN LAKE

TASK 1. TEMPORARY CLOSURE OF INLET STRUCTURE

Product 1 - At the present time, the lake water level is approximately 1252.5 feet (high water mark.) However, during the process of filling the sediment retention ponds with lake water, the water level in the lake would be reduced by two feet. This will result in water depths of three feet or less in many parts of the lake. Therefore, it is recommended that all potential water inputs into the lake be sought in order to float the dredge and allow dredging activities to continue in order to maximize water input into the lake, the diversion structure will be kept open until the ponds are full. Upon water discharge from the ponds to the lake, the diversion structure will be welded closed. During the remainder of the project, the only time water will be allowed to be discharged from Turkey Ridge Creek into Swan Lake is when lake water levels start impacting the ability to dredge. If this condition is deemed to exist, the diversion structure will be opened to allow additional water inputs into the lake. This action will require the consent and concurrence of DENR, SDGF&P and TCC along with EPA notification. Once the dredging is completed, the diversion structure will be permanently closed. If it is found that that water input from the Turkey Ridge Creek watershed is needed in order to maintain adequate water level in the lake, then a water quality monitoring program to assess winter flows will be developed. This may lead to a 319 Turkey Ridge Creek Watershed Project. However, the diversion structure will remain closed until either the completion of a 319 Turkey Ridge Creek Watershed Project or the development of a DENR/EPA management plan for the diversion structure to insure that only high quality water is diverted into Swan Lake.

It was necessary to remove debris from the ditch leading to the inlet and open the inlet structure to allow water to flow into the lake in order to float the dredge(s). After the dredging was completed, we received the necessary permit from the Corps of Engineers, and hired Soukup Construction, Sioux Falls, SD to fill in the ditch between Turkey Ridge Creek and the inlet structure with pea gravel. This was covered with soil and seeded with grass. The inlet structure was then permanently closed.

TASK 2: DETERMINATION OF HYDROLOGIC SOURCES AND NEEDS FOR SWAN LAKE

Product 1 - During the project, a monitoring program will be implemented to track lake water level, groundwater height, and an estimated hydrologic balance. At the end of the dredging project a decision will be made if water from Turkey Ridge Creek is necessary to maintain an adequate lake level. The SDGF&P holds the water rights to the diversion structure and the lake.

A monitoring program was set up at the beginning of the project, and was monitored on a monthly basis. At the present time there is enough water supply in the lake. Each year is different, so we will need to monitor the water supply periodically to see if it is ample. If not, we will contact DENR to see what steps need to be taken.

TASK 3: FORMULATION OF A MONITORING PLAN TO ASSESS THE WATER QUALITY OF SEASONAL FLOWS AND DEVELOP A MANAGEMENT PLAN FOR THE DIVERSION STRUCTURE (IF NEEDED)

Product 1 - If it is found that water input from the Turkey Ridge Creek watershed is needed in order to maintain adequate water level in the lake, then a water quality monitoring program to assess seasonal flows will be developed. The water quality information obtained from this monitoring program will be used to develop a management plan for the diversion structure.

To date, none is needed.

VII. OBJECTIVE 4 - REMOVAL OF IN-LAKE SEDIMENT THROUGH A DREDGING PROGRAM

TASK 1: SECURE PERMITS AND SEDIMENT POND LOCATION AND DESIGNS

Product 1 - Completion of archaeological survey, along with the location, design and survey of the sediment retention ponds. Temporary water rights, a water quality standards variance and section 401 and 404 permits will be obtained,

An archaeology survey was completed. The location, design and survey of the sediment retention ponds were completed. Temporary water rights, a water quality standards variance and sections 401 and 404 permits were obtained.

TASK 2: CONSTRUCTION OF SEDIMENT RETENTION PONDS

Product 1 - Sediment Retention Ponds Constructed

After going out for bid, Runge Construction, Sioux Falls, SD was awarded the bid to construct the sediment retention ponds.

TASK 3: DREDGING OF SWAN LAKE TO REMOVE SEDIMENT

Product 1 - Associated dredge expenses incurred prior to the initiation of sediment removal. Activities included under this category are: dredge mobilization, startup costs (labor, pipe fusion), dredge preparation and dredge launch site preparation and launch.

We had some associated dredge expenses that were incurred prior to the actual dredging ie., mobilization, startup costs, dredge prep and launch. These expenses were paid to SD Lakes and Streams with state and local funds.

Product 2 - Phase 1 will involve the removal of 3 - 10 feet of sediment over an area equivalent to 45% of the lake surface area (approximately 340,000 cu. yds). A detailed 2.5 year dredging plan has been formulated. If it is determined that it is feasible to continue dredging activities beyond 340,000 cu. yds, then a phase II workplan will be developed and implemented. The phase II workplan will be comprised entirely of in-lake dredging and the activities associated with sediment retention ponds associated with this phase. Phase II will involve the removal of 3 - 10 feet of sediment over an area equivalent to 30% of the lake surface area (approximately 200,000 cu. yds).

A contract was made with SD Lakes and Streams to remove 340,000 cu. yds. of sediment during Phase I. After reaching this goal and with monies and pond capacity still available, we went into Phase II of the project. The necessary permits were obtained and we contracted with SD Lakes and Streams to remove an additional 71,000. On September 2, 1998 SD Lakes and Streams reached their goal of removing 411,000 cu. yds. of sediment during the entire project. This involved the removal of 3 -10 feet of sediment over an area equivalent to 65% of the lake surface area.

VIII. OBJECTIVE 5 - STABILIZATION OF SHORELINE TO MINIMIZE SOIL EROSION

TASK 1: SURVEY SHORELINE, COMPLETE ENGINEERING DESIGNS AND SPECS AND INSTALL RIP-RAP

As part of the Diagnostic/Feasibility Study, a preliminary assessment of shoreline stability was performed. The shorelines in the southwest bay were determined to be the most critical and therefore stabilization was recommended for this area. In 1978, critical areas along the north and east shorelines were rip-rapped as part of a shoreline stabilization project, while most of the south shoreline is maintained by the local residents who own the land. It is estimated that approximately 5,000 feet of shoreline is in need of repair with an average vertical height of 7 feet (includes below/above water line). The Swan Lake Improvement Association has contracted with a professional engineering firm to formulate specifications for shoreline stabilization techniques. SLIA will encourage their consultant to consider both hard and soft practices.

Product 1: - Complete shoreline survey, prioritize areas and complete engineering designs and specs.

We hired B&E Engineering, Yankton, SD to do a shoreline survey, prioritize areas and complete engineering designs and specs.

Product 2 - Install rip-rap on shoreline

The bid for 1600 feet of rip-rapping was awarded to Soukup Construction, Sioux Falls, SD. After the lake froze over in 1996, Soukup Construction began rip-rapping around the east island, and the west shoreline. This was quite a job, as they had to remove several feet of snow around the west end of the lake before they could lay fabric and do the actual rip-rapping. Both areas were rip-rapped before the February 28, 1997 deadline. As an in-kind project, the Swan Lake Christian Camp paid a local contractor to rip-rap an additional 3500 feet of shoreline. A total of 5100 feet of shoreline was rip-rapped. In addition to protecting the sloughing banks, the cove area is now a beautiful part of Swan Lake.

IX. OBJECTIVE 6 - IMPLEMENT BEST MANAGEMENT PRACTICES (BMP's) IN THE ORIGINAL 1000 ACRE WATERSHED.
BMP's WILL TARGET 432 ACRES (43% of WATERSHED)

TASK 1: IMPLEMENT BMP's TO REDUCE NPS POLLUTANTS

Product 1 - Work with cooperators to change management practices. The practices that will be targeted are:
Conservation cropping sequences - 430 acres
Cropping residue usage - 430 acres
Contour farming - 40 acres

According to Turner County NRCS personnel the following changes in management practices have been implemented.

Conservation cropping sequences - 15 acres
Cropping Residue Usage - 15 acres
Contour farming - 40 acres

This is an ongoing project. The targeted acres of Conservation cropping sequences and the Cropping residue usage is behind schedule, while the Contour farming target acres is completed.

Product 2 - Install BMP's in selected areas. The BMP's which will be targeted are:

Grassed waterways - 5 acres
Filter strips - 16 acres
Critical area planting - 2 acres

The following management practices have been implemented.

Grassed waterways - 5 acres
Filter strips - 8 acres
Critical area planting - 2 acres

Again, this is an ongoing project. The target acres of the Filter strips is only 50% completed while the Filter strip acres and the Critical area planting acres is 100% completed.

X. OBJECTIVE 7: SEDIMENT RETENTION PONDS RECLAMATION

TASK 1: DEVELOP A SEDIMENT POND RECLAMATION PLAN

Product 1 - Reclamation plan developed

The B&E Engineering Firm from Yankton, SD. will be developing a reclamation plan for us. This was a part of the original engineering bid package.

TASK 2: IMPLEMENT PLAN AND RECLAIM POND SITES. THIS WILL OCCUR 1-3 YEARS AFTER THE COMPLETION OF DREDGING ACTIVITIES DUE TO THE TIME NEEDED TO DEWATER THE SITES SUFFICIENTLY FOR HEAVY EQUIPMENT

Product 1 - Pond sites reclaimed

Our goal is to have the pond site reclaimed by the year 2001. This will depend on the time needed to dewater the pond sites in order to use heavy equipment to reclaim the land. This will be paid for from local and state funds.

X1. OBJECTIVE 8: ROUGH FISH CONTROL AND RESTOCK LAKE

TASK 1: SDGF&P WILL IMPLEMENT A FISHERY IMPROVEMENT PLAN. ALL COSTS INVOLVED IN ROUGH FISH CONTROL OR FISHERY IMPROVEMENTS WILL NOT BE USED AS MATCH SINCE THESE ITEMS ARE NOT DIRECTLY RELATED TO WATER QUALITY IMPROVEMENT ITEMS. MOST OF THE COSTS WILL BE BORNE BY SDGF&P WITH ANY ADDITIONAL FUNDING COMING FROM LOCAL OR STATE FUNDS.

Product 1 - Develop a fishery improvement plan

The South Dakota Game, Fish and Parks have implemented a plan to improve fishing at Swan Lake. Rough fish have been removed, and the lake will be stocked with game fish during 1999.

XII. OBJECTIVE 9: MONITORING PROGRAMS TO DOCUMENT WATER QUALITY CHANGES RESULTING FROM THE WATERSHED AND IN-LAKE RESTORATION ACTIVITIES

TASK 1: IN-LAKE MONITORING DURING DREDGING OPERATIONS. THE INTENT OF THIS MONITORING PROGRAM IS INTENDED TO FULFILL THE REQUIREMENTS OF THE SECTION 404 AND SECTION 401 CERTIFICATION.

Product 1 - Purchase of water quality monitoring equipment for in-lake monitoring during dredging operations. Equipment purchased will be pH, dissolved oxygen and conductivity meters. After the project is completed, this equipment will be used to monitor water quality changes at Swan lake as part of the Volunteer Citizens Monitoring Network.

In 1995, the Swan Lake Improvement Association purchased water quality monitoring equipment.

Product 2 - Monitor in-lake water quality along with the water quality near the cutter head and at the outfall of the discharge pipe from the sediment retention ponds.

The equipment purchased was used on a monthly basis to monitor the water quality in Swan Lake during the dredging operation. The samples were taken near the cutter head of the dredge and at the outfall of the discharge pipe from the sediment retention ponds. These samples were then sent to the State Laboratory for testing. Secchi disks were also used in the monitoring process to check water clarity.

TASK 2: DOCUMENTING WATERSHED (BMP'S) AND IN-LAKE RESTORATION ACTIVITIES THROUGH PHOTOPPOINTS. THE PROCEDURES WILL BE FOLLOWED. THE TOTAL NUMBER OF PHOTOPPOINTS AND PHOTOS TO BE TAKEN WILL BE DETERMINED WITHIN THE FIRST YEAR OF THE PROJECT.

Product 1 - Before, intermediate and after photographs

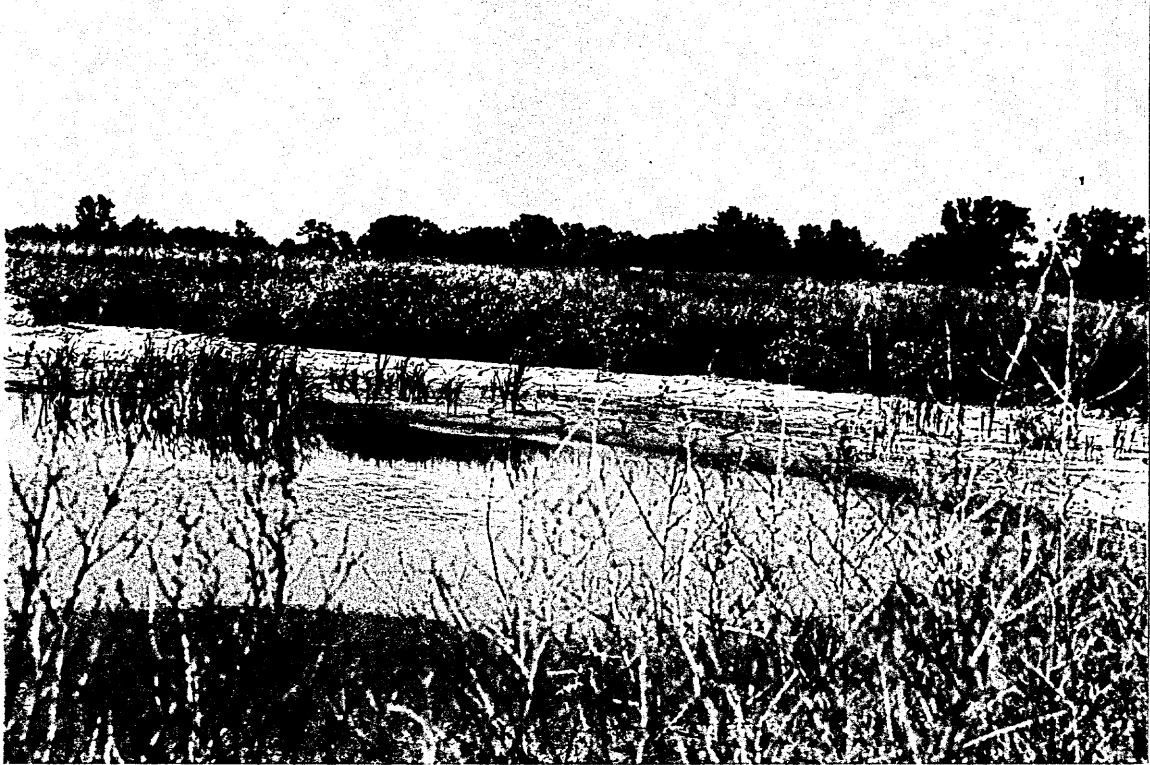
The Swan Lake Improvement identified five (5) photopoints. Photographs were taken from these points before and during the project. Additional photographs will be taken after the ponds are reclaimed possibly in the year 2001.

TASK 3: IF TREND ANALYSIS OR LEVEL OF SUCCESS OF THE PROJECT IMPLEMENTATION PRACTICES AND TASKS ARE TO BE DETERMINED, A WATER QUALITY MONITORING EFFORT WILL BE CONDUCTED THREE TO FIVE TIMES AFTER THE COMPLETION OF ALL THE PROJECT ACTIVITIES FOR A PERIOD OF NO LESS THAN ONE YEAR. THIS DATA WILL BE COMPARED TO THE 1990 LAKE ASSESSMENT BASELINE INFORMATION TO DERIVE AN ESTIMATION OF NPS REDUCTIONS AND WATER QUALITY IMPROVEMENTS.

This activity will be done by the Swan Lake Improvement Association as part of the Citizens Monitoring Program.



photograph 1 - Swan Lake Turner County
SD Lakes and Streams 8" Dredge



photograph 2 - Swan Lake Turner County
Pond #1 - Filled to Capacity

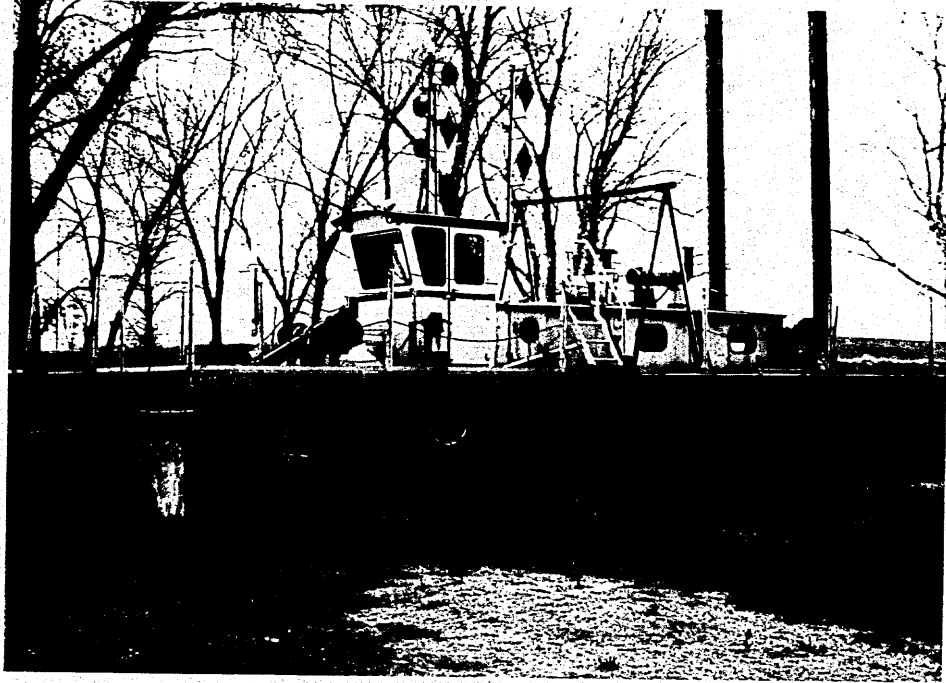


photograph 3 - Swan Lake Turner County
Pond # 2 Close to Max



photograph 4 - Swan Lake Turner County
Pond #3

note rope on road extending to bank - this supports
floats and fabric barrier to retard flow of silt into
overflow pipe going back to lake



photograph 5 - Swan Lake Turner County
SD Lakes and Streams 10" Dredge



photograph 6 - Swan Lake Turner County
photo point #1 (looking south from boat ramp parking ramp)



photograph 7 - Swan Lake Turner County
photo point #2 (east road leading to lake)



photograph 8 - Swan Lake Turner County
photo point #3 (south road looking north)

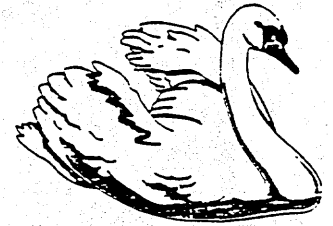
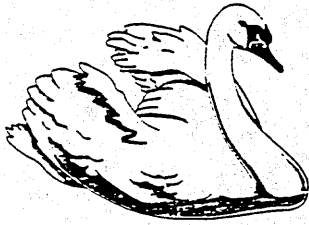


photograph 9 - Swan Lake Turner County
photo point #4 (christian camp parking area)



photograph 10 - Swan Lake Turner County
photo point #5 (christian camp road looking south)

HIGH SCHOOL TOUR OF SWAN LAKE PROJECT
SEPTEMBER 28, 1995
1:00 P.M. TO 3:00 P.M.



AGENDA

1. INTRODUCTION - LOIS CARLSON 1:00-1:05 PM
2. OVERVIEW OF THE PROJECT - STEVE SCHOLTES/
RICK SCHLECHTER 1:05-1:15 PM
3. TOUR OF DREDGE FACILITIES - RANDY BOUVETTE
GROUP #1 1:25-1:35 PM
GROUP #2 1:40-1:50 PM
GROUP #3 2:00-2:10 PM
GROUP #4 2:15-2:25 PM
4. TOUR OF WATER QUALITY SAMPLING - ED MANSFIELD/ALAN WITTMUSS
GROUP #2 1:25-1:35 PM
GROUP #1 1:40-1:50 PM
GROUP #4 2:00-2:10 PM
GROUP #3 2:15-2:25 PM
5. TOUR OF WATERSHED BMP'S - NYLE HERBENER
GROUP #3 1:25-1:35 PM
GROUP #4 1:40-1:50 PM
GROUP #1 2:00-2:10 PM
GROUP #2 2:15-2:25 PM
6. TOUR OF PONDS - VERNON ARENS
GROUP #4 1:25-1:35 PM
GROUP #3 1:40-1:50 PM
GROUP #2 2:00-2:10 PM
GROUP #1 2:15-2:25 PM
7. QUESTIONS/ANSWERS 2:35-2:50 PM
8. REFRESHMENTS 2:50-3:00 PM

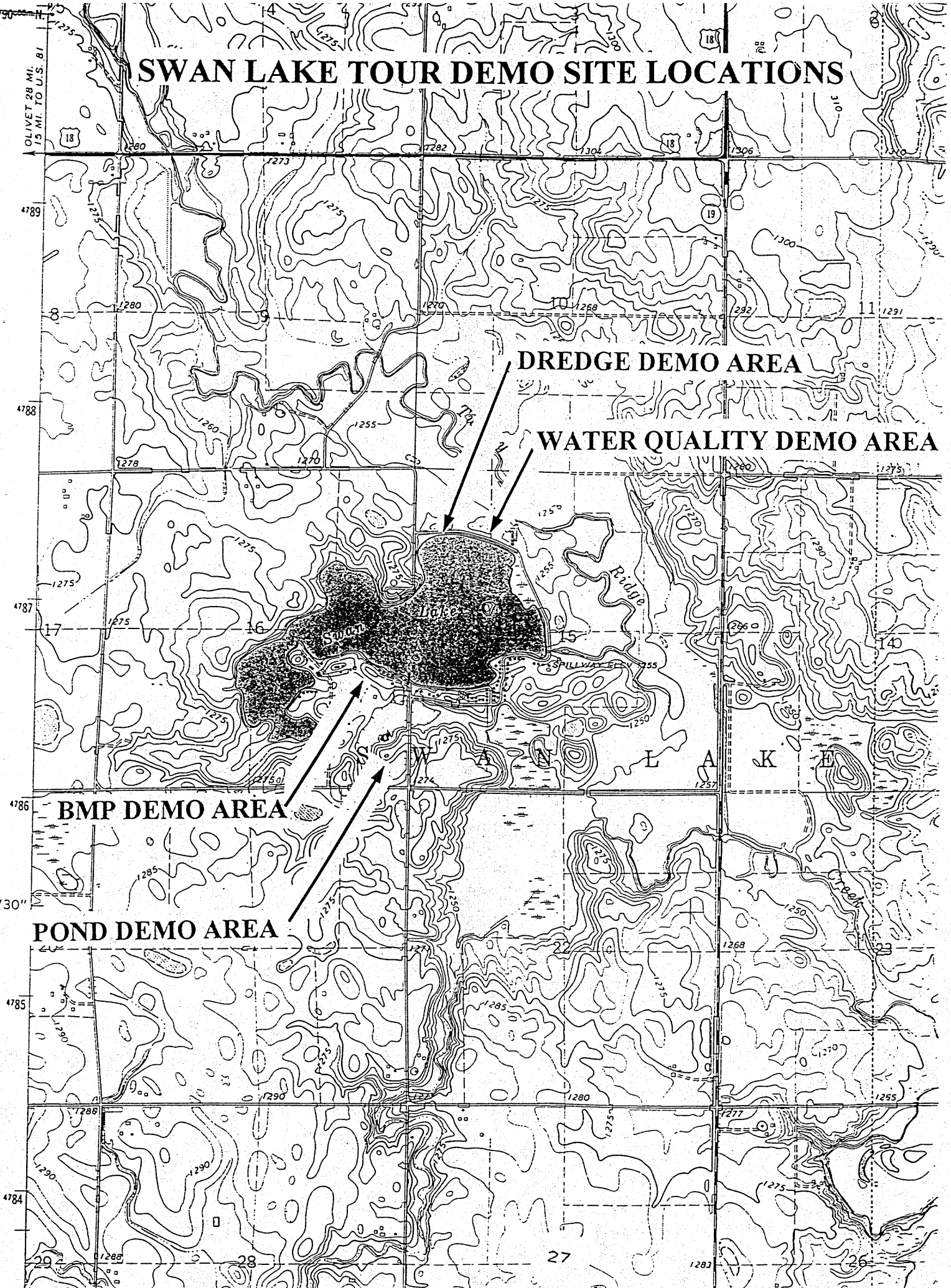
SWAN LAKE TOUR DEMO SITE LOCATIONS

DREDGE DEMO AREA

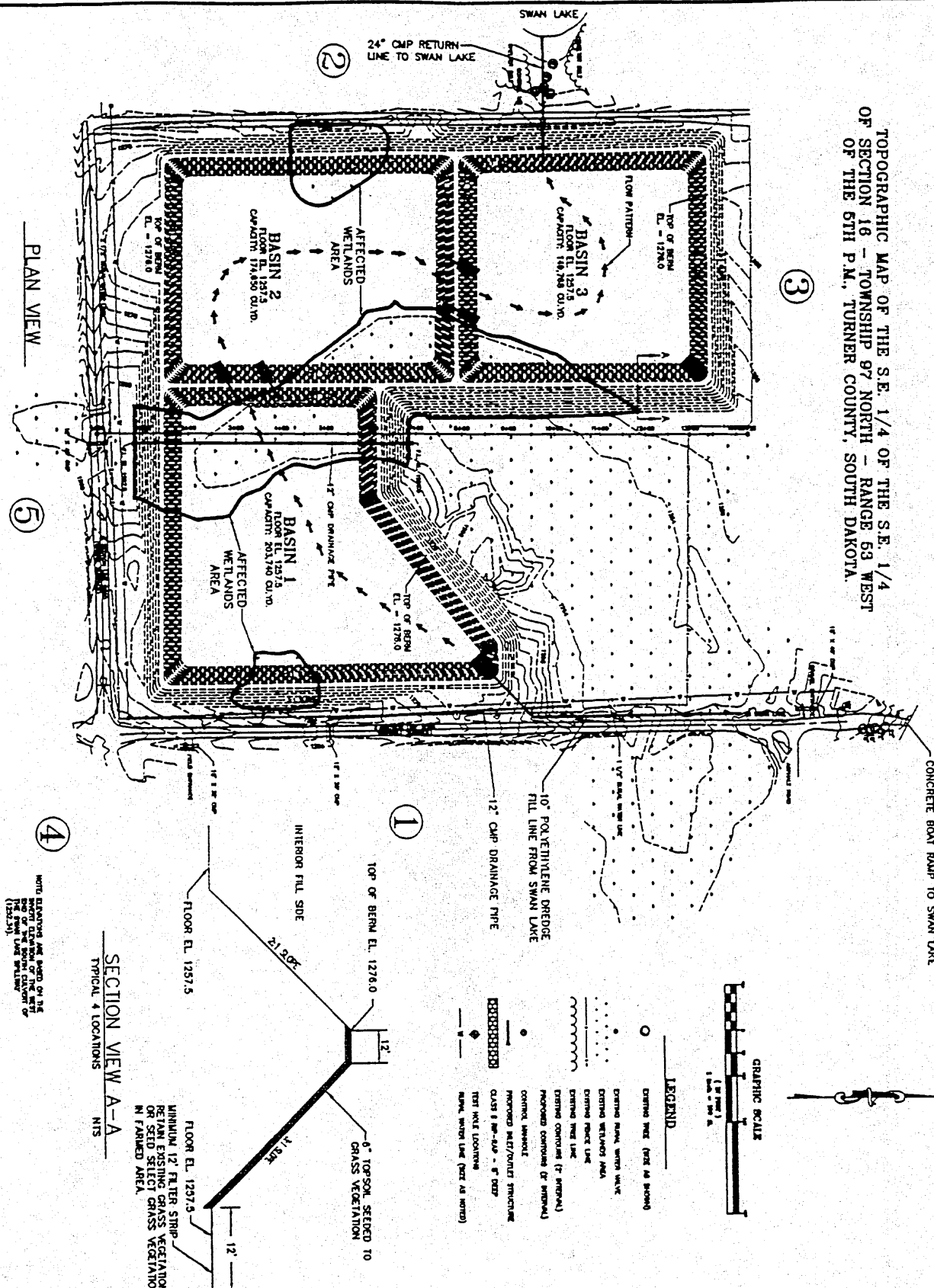
WATER QUALITY DEMO AREA

BMP DEMO AREA

POND DEMO AREA



TOPOGRAPHIC MAP OF THE S.E. 1/4 OF THE S.E. 1/4 OF SECTION 16 - TOWNSHIP 97 NORTH - RANGE 63 WEST OF THE 6TH P.M., TURNER COUNTY, SOUTH DAKOTA.



PURPOSE: SEDIMENT BASINS FOR SWAN LAKE DREDGING

DATUM: USGS

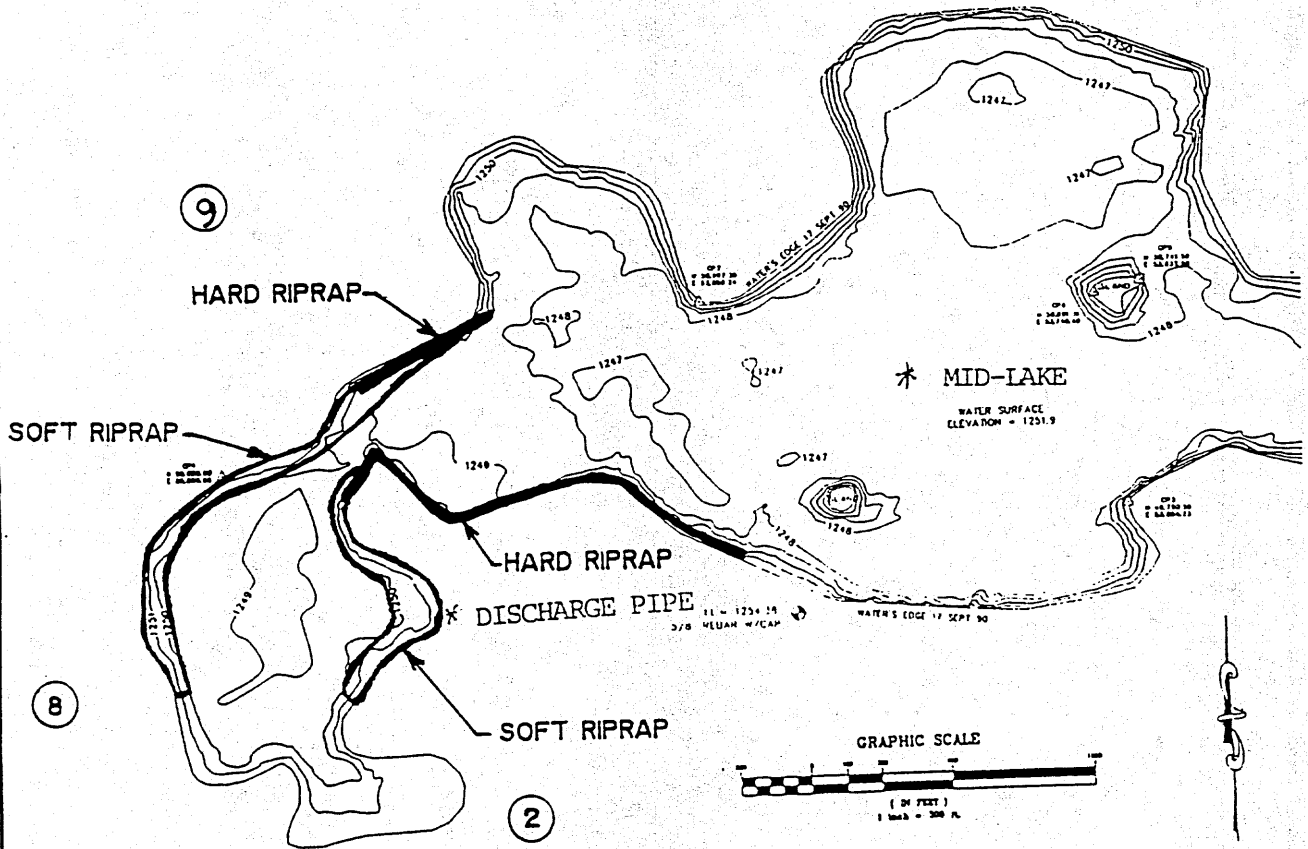
ADJACENT PROPERTY OWNERS:

- HOMER LARSON
- MENNONITE CHURCH
- SWAN LAKE ASSOCIATION
- MERLIN VANNORSDEL
- MERLIN VANNORSDEL

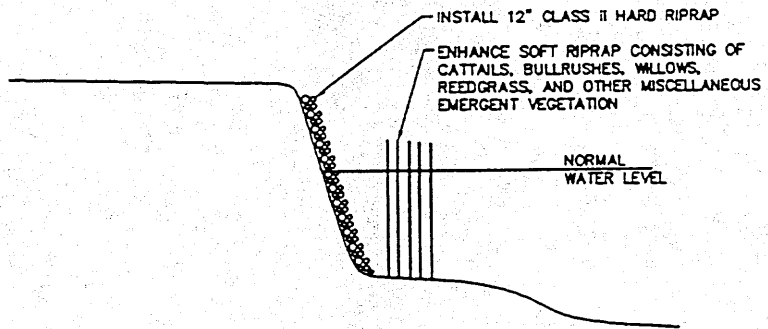
SWAN LAKE IMPROVEMENTS ASSOCIATION
BOX 72
VIBORG, SD 57070

PROPOSED DREDGING SEDIMENT BASINS
AT: SWAN LAKE
AT: VIBORG
COUNTY OF: TURNER STATE: SD
SHEET 3 OF 4 DATE: 6/30/94

SWAN LAKE
TOPOGRAPHIC MAP DEPICTING
TOP OF SEDIMENT LAYER



PLAN VIEW
 NOT TO SCALE



SECTION VIEW
 NOT TO SCALE

PURPOSE: PREVENT SHORELINE EROSION
 DATUM: USGS
 ADJACENT PROPERTY OWNERS:
 2. MENNONITE CHURCH
 3. SWAN LAKE ASSOCIATION
 8. EVELYN VANNORSDEL
 9. HOWARD BRIGHT

SWAN LAKE IMPROVEMENT ASSOCIATION
 BOX 72
 VIBORG, SD 57070

PROPOSED SHORELINE RIPRAP
 IN: SWAN LAKE
 AT: VIBORG
 COUNTY OF: TURNER STATE: SD
 APPLICATION BY: SWAN LAKE IMPROVEMENT ASSOCIATION
 SHEET 2 OF 4



DATE: March 12, 1997

Dear Landowner/Operator

I am pleased to see the Swan Lake dredging project coming along and they should be done with the dredging in 1997. Dredging is a long, costly process. The Federal and State Governments and many private individuals and groups provided funds for this project. The dredging is only a start to having a healthy lake for everyone to enjoy.

You, as a land owner or operator in the Swan Lake watershed, can have a lot of influence on how long Swan Lake will remain a healthy lake, not only for wildlife, but also recreation. There are many things that you can do to help increase the life of the lake. Many of these practices don't cost a lot of money to install. Among some of these are: increasing residue before planting (do you need that 3rd or 4th tillage trip?), planting a 40-100 foot filter strip along your creek or seeding grass or alfalfa on your land that erodes easy, contour tillage, crop rotation with small grains or grass and/or alfalfa. Soil tests should also be done on your fields to find out how much fertilizer you should apply. The same can be done with animal wastes. These tests can not only save you money by telling you how much you need, but can help you optimize your crop yields and also keep excess nutrients out of the lake and its watershed.

There have been many changes in the cost-share programs available. The biggest change was in eliminating ACP (annual cost-share and long-term agreements). ACP was replaced with the Environmental Quality Incentive Program (EQIP) which will be either 5 or 10 year contracts. CRP has also changed. There is a continuous sign up period for farm and field windbreaks, living snow fences, grassed waterways, filter strips and riparian buffer areas. There will also be general sign-ups as in the past. General sign up notices will be published when they occur.

There will also be other cost-share programs available to you for cost-share or land retirement. One of these programs is Wetlands Reserve Program (WRP) that will pay for restoration of wetlands. WRP contracts can be for lifetime easements, 30 year easements or just the restoration of the wetland. Another program will be Wildlife Habitat Incentive Program (WHIP). As of now, we don't have any information on this program.

Some of you may be interested in an ag waste facility. If you are, cost-share assistance may be available through EQIP. Waste facilities cost-shared through EQIP will need to meet NRCS specs. They can be designed by either our engineers or by private engineers. It can take up to two years to survey, design and construct, depending on current land use. There is a waiting list for our engineers, the sooner we know, the better for you.

If you have any questions about any of the new programs or conservation practices, please contact our office. Just think, if each of you saved one dime width of soil per acre, that would be about 400,000 tons!

Sincerely,

Todd L. Kuhlman,
District Conservationist

LET'S TALK LAKE MANAGEMENT

SWAN LAKE JOURNEY

I'm sure most of you are aware that we are in the last year of a three-year dredging project at Swan Lake.

This is a community effort and we want to invite others along as we continue our journey.

The journey is interesting and challenging, but we also have lots of fun along the way.

We need to travel with the NRCS staff to see what is available in terms of BMP's (Better Management Practices). In doing so we will better understand what we need to do to better manage the sediment input from Turkey Creek.

We would then like to travel somewhere for all of us to get together for an informational meeting. Perhaps we could meet sometime in the Spring of 1997.

This is truly an adventure for all of us and by working together we will be able to save our God given resources.

THE LAKE/WATERSHED LINK

If we want to be good stewards of our lake resources, a basic understanding of the lake and its relationship to the landscape around us is very important. A lake is the lowest point in the watershed and some of the water from surrounding land ends up in the lake.

We are very fortunate to have a controlled structure coming into the lake from Turkey Creek. This structure is also in need of some work, and we need experts like yourself to give us some advice. We are proud of our forefathers who built the dam on Turkey Creek by Swan Lake.

Imagine how they must have used shovels and other non-powered tools to build such a structure. If it were not for their perserverence in doing something about the silt coming into the lake, the lake would not be in use today.

Today, we have better equipment- and we must continue their hard work and work together to come up with a solution.

Video Tapes

The Dept. of Environmental and Natural Resources in Pierre has some excellent video tapes that they will lend to us. This helps us to come to grips with some of the things that are happening to our water supply in today's world. Perhaps we can view some of them at our meeting this Spring.



The Lake Ecosystem

The lake ecosystem, or the interactions of all living and nonliving components in the lake, is determined not only by the watershed characteristics but also by key processes that take place in the lake. The amount of water that flows in and out of the lake, the size and shape of the lake basin, and the amount of time it takes completely renew the water in the lake (hydraulic residence time) will all influence the lake ecosystem. Seasonal temperature variations or wind action can cause the lake to "turnover," churning up nutrients that may have settled on the bottom.

These processes, in addition to the lake and watershed relationship, will determine how much plant and animal life a lake will support. The biological productivity of a lake is referred to as the lake's "trophic condition" or trophic status.

The trophic condition can range from least productive (oligotrophic) to moderately productive (mesotrophic) to highly productive (eutrophic). Even without human input to a lake watershed, lakes will "age" naturally by becoming more productive--a process known as eutrophication. Human activities can speed up the aging process of a lake by tens or even hundreds of years. This human-induced, accelerated eutrophication is known as "cultural eutrophication."



Gather Information



Getting a clear image of the lake watershed is the first task for partners. Gather maps and information outlining watershed boundaries, geography, geology, land and recreational uses, fish and wildlife data, water quality data and demographic information.

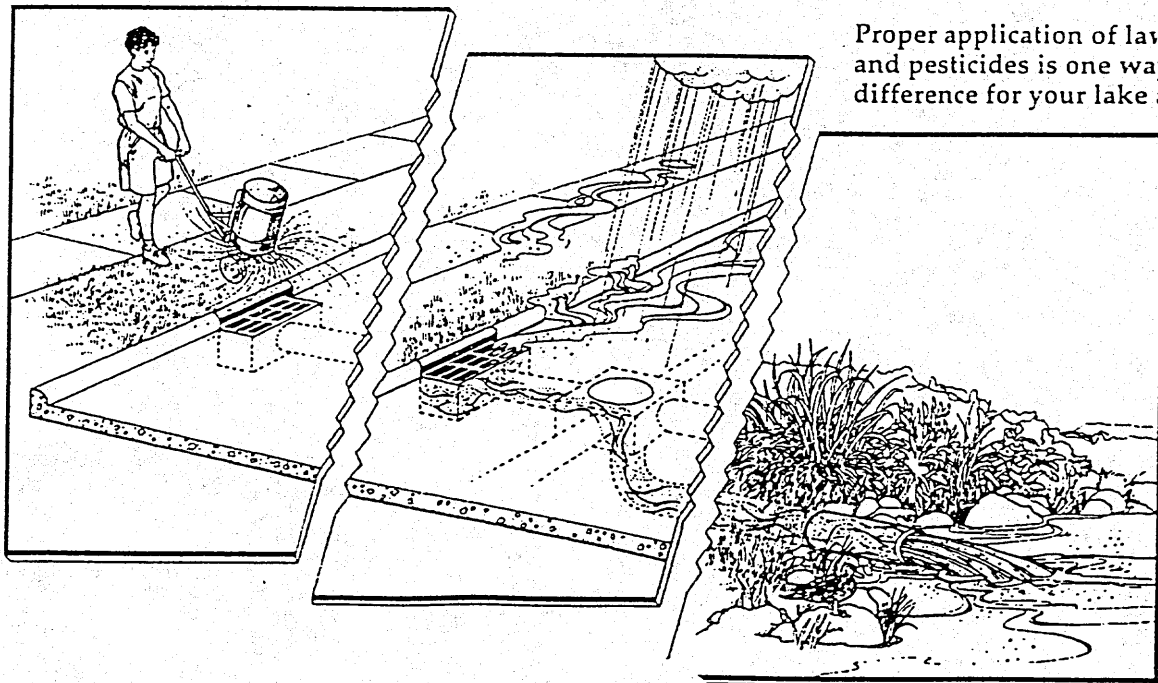
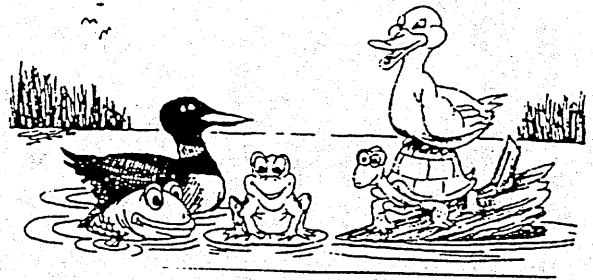
Equipped with most of this information we can begin to better identify and address all concerns about lake quality, as well as the local financial and social implications involved.



Threats to Lakes

Many of the day-to-day activities of humans promote eutrophication and other types of lake pollution. According to the 1992 National Water Quality Inventory, published by the U.S. Environmental Protection Agency, the primary source of pollution to lakes comes from agricultural operations, including plant nutrients phosphorus and nitrogen, and organic matter from animal wastes. Other major pollution sources to lakes are runoff from urban areas, storm sewers, sewage treatment plants, and runoff from construction sites and roadways. In some areas of the United States, acid rain and drainage from mining sites are major threats to lakes. In addition to the rather large-scale sources of pollution, the cumulative impacts from smaller scale activities can be equally detrimental to a lake's quality. Leaking septic tanks, oil and grease from cars and boats, home use of phosphorus detergents, misuse of lawn fertilizers and chemicals can all contribute to lake pollution.

What are the effects of pollutants from these sources? An overabundance of nutrients can cause algal blooms and excessive aquatic plant growth, and eventually deplete oxygen supplies in lakes, causing fish kills. Organic wastes can also cause a lack of oxygen needed by fish for survival. Sediment loads from land erosion can fill in lakes and destroy habitat for plants and animals as well as clog fish gills and smother fish eggs. Organic chemicals and metals such as mercury can contaminate fish and shellfish, making them unacceptable for humans to eat.

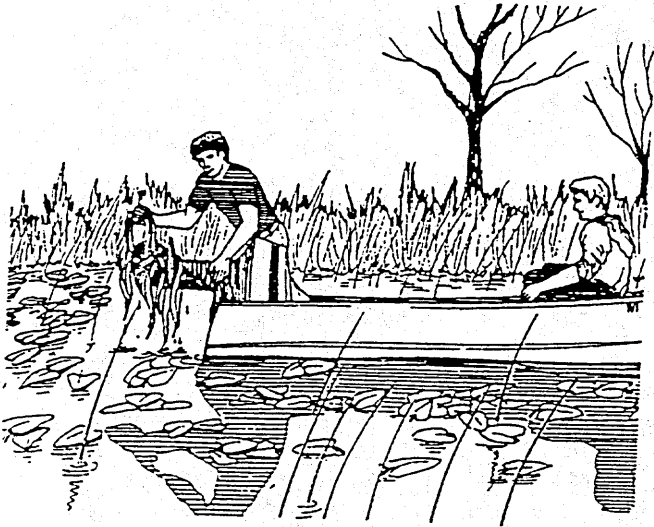


Proper application of lawn fertilizers and pesticides is one way to make a difference for your lake and watershed.

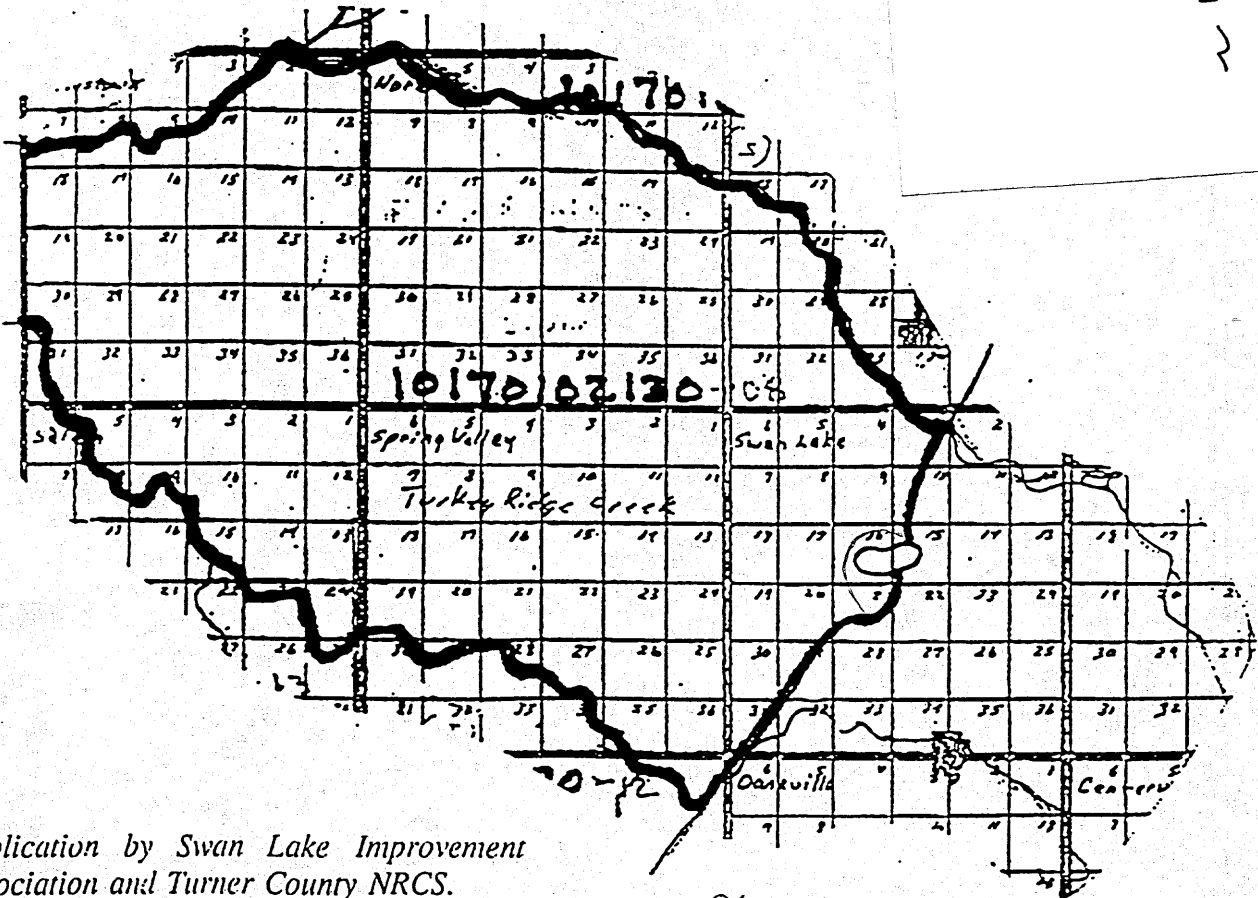
Contact your local or state water quality agency, state lake association, local USDA Natural Resources Conservation Service office, conservation district or extension office for assistance.

Swan Lake Improvement Association
 % Lois Carlson, Editor
 46730 304th Street
 Beresford, SD 57004

BULK RATE
 U.S. POSTAGE
PAID
 Permit #30
 Vermillion, SD



285 E 12
 ~ 84,000 ac
 (95,515.6)
 # actual #



Publication by Swan Lake Improvement Association and Turner County NRCS.

SWAN LAKE FISH POPULATION SYNOPSIS

April 25, 1999

Table 1. Total catch of three, 150 foot, overnight gill net sets at Swan Lake, Turner County, August 19-20, 1998.

Species	Number	Percent	CPUE	80% C.I.	3 Year CPUE Avg.	PSD	Mean Wr
Yellow Perch	216	59.7	72.0	+36.0	*	82	95
Black Bullhead	87	24.0	29.0	+8.7	*	18	--
Carp	48	13.3	16.0	+3.8	*	--	--
Green Sunfish	6	1.7	2.0	+3.8	*	--	--
Bigmouth Buffalo	2	0.6	0.7	+1.3	*	--	--
Shorthead Redhorse	1	0.3	0.3	+0.3	*	--	--

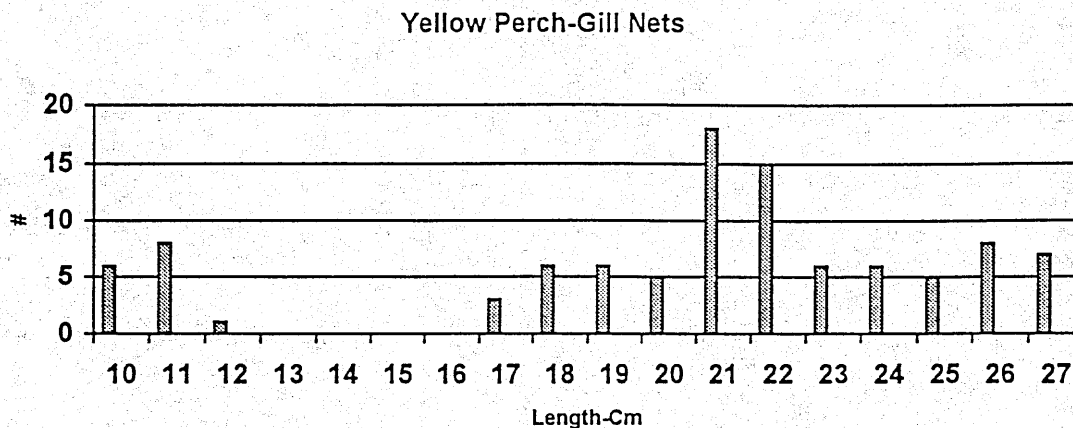
* = This was the first year gill nets were used to sample on Swan.

Table 2. Total catch of ten, 3/4 inch mesh, overnight frame net sets at Swan Lake, Turner County, August 19-20, 1998.

Species	Number	Percent	CPUE	80% C.I.	2 Year CPUE Avg.*	PSD	Mean Wr
Black Bullhead	693	72.6	138.6	+129.2	92.2	--	--
Yellow Perch	83	8.7	16.6	+10.5	0.3	--	--
White Sucker	53	5.6	10.6	+5.1	8.3	--	--
Carp	43	4.5	8.6	+2.5	4.9	--	--
Green Sunfish	36	3.8	7.2	+3.0	11.7	--	--
O.S. Sunfish	20	2.1	4.0	+1.4	0.0	--	--
Bigmouth Buffalo	11	1.2	1.6	+2.3	0.3	--	--
Channel Catfish	10	1.0	2.0	+1.6	1.5	--	--
Northern Pike	3	0.3	0.6	+0.6	0.2	--	--
Black Crappie	2	0.2	0.4	+0.6	0.0	--	--

* = 1989 and 1991

Figure 1. Length frequency histograms of selected species from Swan Lake, Turner County, 1998.



RECOMMENDATIONS

1. Manage the lake with saugeye and yellow perch as the primary species.
2. Stock 18,000 saugeye fingerlings in 1999 to establish another year class.
3. Conduct another lake survey in 1999 to determine the success of the 1998 saugeye stockings.
4. The dredging on Swan Lake was completed in the fall of 1998. Swan will be remapped in 1999 to create a new lake map. When new lake map is available we should evaluate habitat and see if artificial habitat needs to be placed.

ACCOMPLISHMENTS

1. Stocked 1,568 adult saugeyes in October 1998.
2. Have scheduled 18,200 fingerling saugeyes to be stocked in May 1999.
3. Lake survey to sample fish populations scheduled for August 23-26, 1999. Will also evaluate perch spawning habitat.
4. Swan Lake is scheduled to have its lake map updated. Field work is scheduled for summer 1999. Office work will be completed in winter 1999-2000 and a new map will be available by July 1, 2000.

Allen D. Knapp – Fisheries Manager Sioux Falls
4/25/1999