WILD ROSE MILLPOND
WAUSHARA COUNTY
MANAGEMENT ALTERNATIVES

BY

Office of Inland Lake Renewal

Wisconsin Department of Natural Resources

1978

WILD ROSE MILLPOND

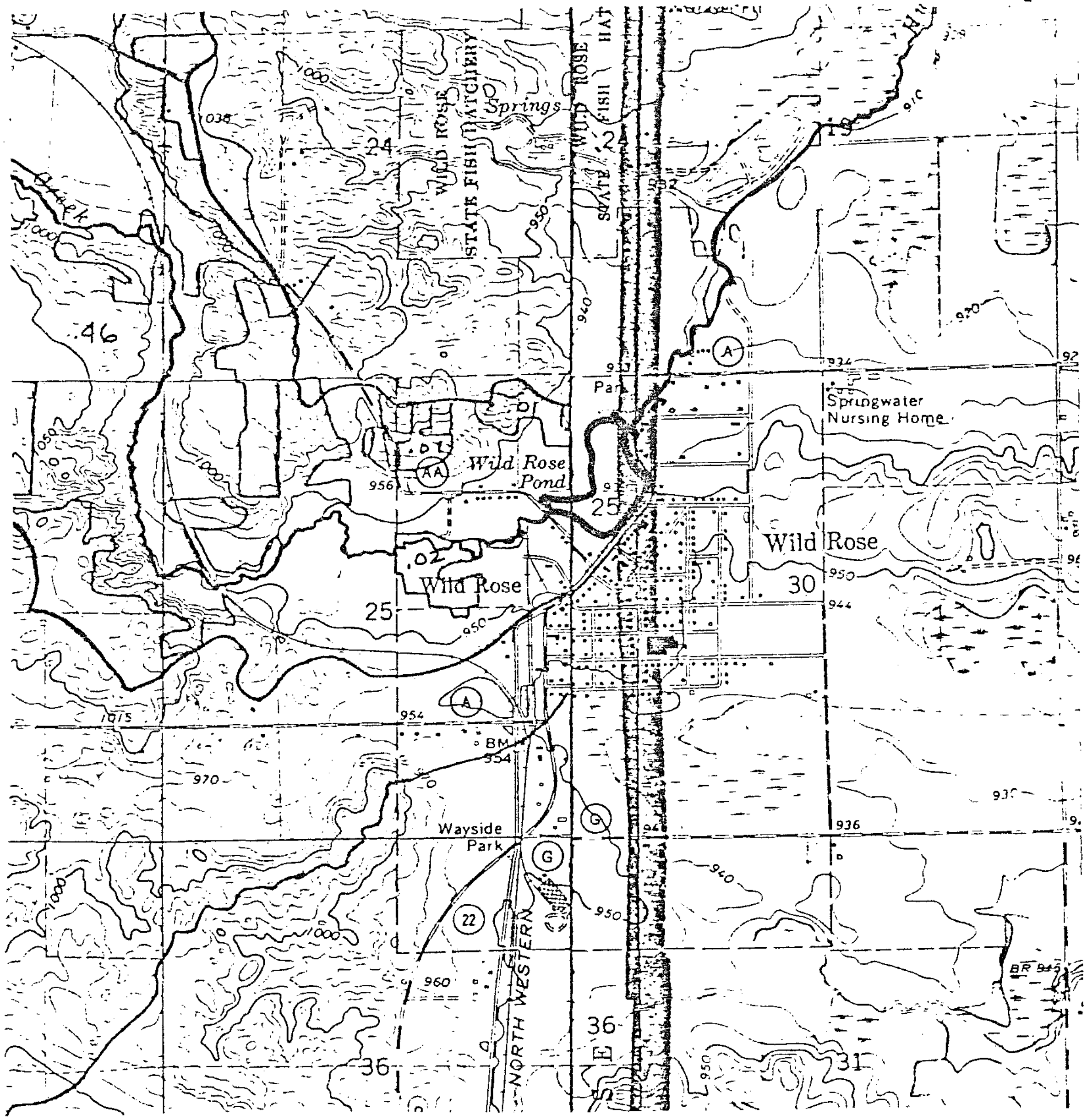
INTRODUCTION

The interpretations, results and management alternatives presented in this report were developed from data collected during the Wild Rose Millpond study from 1976 to 1978. The purpose of this feasiblity study was to gather information on the physical, biological and chemical characteristics of the lake and its watershed. This data was then used to assess the Wild Rose Pond's present and possible future water resource potentials. The components of the study included analyses of the upstream and inlake water quality, the aquatic plant populations, and determination of the type and quantities of soft sediments accumulated in the pond.

The purpose of this report is to present management alternatives to the Wild Rose Lake District that are designed to improve or maintain the usefulness of the lake. In developing these alternatives consideration was given to the lake's current trophic status, nutrient budget, and watershed characteristics of the inlet stream. The future of the pond and the management alternatives selected will be dependent upon the desired uses and values of the pond as perceived by the Lake District. Any plans must conform to any local, State or federal regulatory restraints.

DESCRIPTION OF THE AREA

The Wild Rose Pond is located in the Village of Wild Rose, Waushara County. As illustrated in Figure 1, the pond is an impoundment of the Upper Pine River, a stream which directly drains 4,640 acres. The pond was originally formed by the construction of a dam in 1873 to provide power for milling. In 1875 the dam was strengthened and enlarged. Ownership changed hands several times until the present, with the dam having been recently repaired and now owned by the Village of



Location Map

Figure 1: Wild Rose Pond

Wild Rose. The entire watershed of the Upper Pine includes an area of 13,248 acres. Much of this area is internally drained, becomes part of the groundwater system, and ultimately emerges and provides a large proportion of the streamflow. Average streamflow has been estimated to be 19.2 cfs, with average monthly streamflow ranging from 13 to 30 cfs.

The soils of the area are comprised predominately of sandy and silty loams and overlay glacial drift deposits of 100 to 200 feet in thickness. Bedrock is comprised of sandstone. The watershed's topography is governed by glacial activity; the most recent being the Cary ice sheet. The land is relatively hilly and consists of outwash plains as well as terminal and recessional moraines. These soils and glacial deposits permit rapid groundwater infiltration and a minimal amount of direct surface drainage results.

A majority of the Upper Pine's flow originates from groundwater seepage, with its headwaters being a group of springs. It's water quality is also dominated by the groundwater inflow which is generally very low in nutrients and of very good quality. The stream's excellent water quality is evident in the fact that the Upper Pine supports a good trout population and is a Class 1 trout stream.

Much of the land in the watershed is woodlot with some dairy farming and other agricultural uses being practiced in the flatter areas of the watershed. There are very few areas of animal concentrations and only minimal farming impacts upon the stream's water quality. Most of the steep slopes in the watershed are wooded and soil loss appears to be minimal. In general, the watershed is in good condition. Efforts in the watershed should be primarily aimed at protection.

LAKE CHARACTERISTICS

The surface area of the Wild Rose Pond is 16 acres and its maximum depth is 7 feet. A hydrographic map of the lake (Figure 2) illustrates that a majority

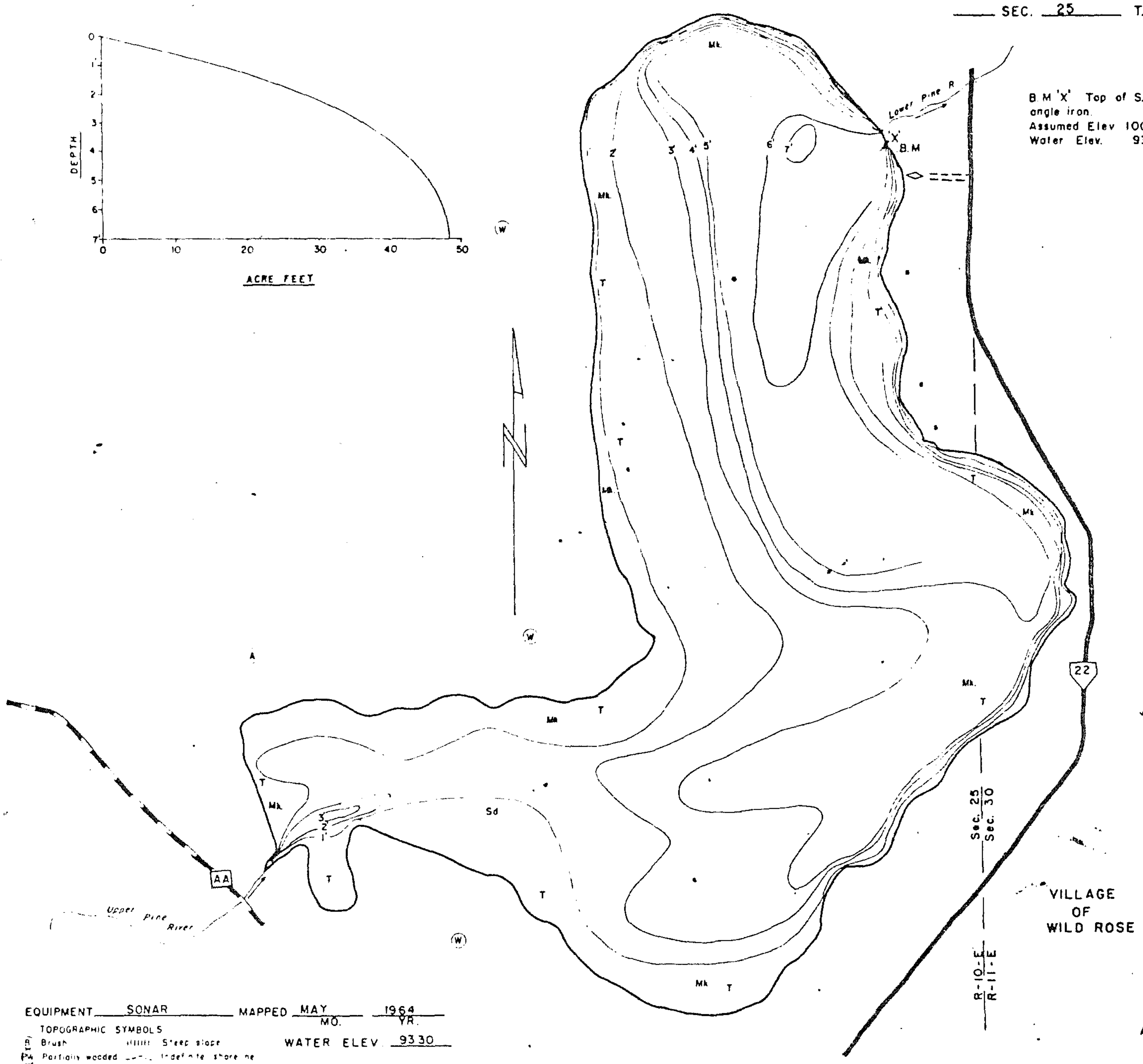
Figure 2

WISCONSIN CONSERVATION DEPARTMENT

LAKE SURVEY MAP

WILD ROSE POND (LAKE) — WAUSHARA (COUNTY)

SEC. 25 T. 20 N. R. 10 E.



SPECIES OF FISH	Abundant	Common	Rare
Muskie			
N Pike			
Walleye			
L M Bass			
S M Bass			
Panfish		X	
Trout		X	

EQUIPMENT SONAR MAPPED MAY (MO.) 1964 (YR.)

WATER ELEV. 93.30

TOPOGRAPHIC SYMBOLS

- Brush
- Partially wooded
- Wooded
- Cleared
- Pastured
- Agricultural
- B.M. Bench Mark
- Dwelling
- Resort
- Steep slope
- Indefinite shoreline
- Marsh
- Spring
- Intermittent stream
- Permanent inlet
- Permanent outlet
- Dam

LAKE BOTTOM SYMBOLS

- P. Peat
- Mk. Muck
- C Clay
- M Marl
- Sd. Sand
- St Silt
- Gr Gravel
- R Rubble
- Br. Bedrock
- Stumps & Snags
- T Submergent vegetation
- Emergent vegetation
- Floating vegetation

100' 0' 100' 200' 300' 400' 500'
SCALE

Access — Access with Parking — Boat Livery

Field work by H. Schmude, F. Hilbert Drawn by C. Harrison

AREA 16.71 ACRES
UNDER 3FT 59 %
OVER 20FT 0 %
VOLUME 48.5 ACRE FT
TOTAL ALK. 140 PPM
SHORELINE 0.83 MILES
MAX. DEPTH 7 FEET

of the lake is less than 3 feet deep, with the upper end of the pond being dominated by both submergent and emergent vegetation. As illustrated in Figure 3, both organic and inorganic sediment has accumulated in the pond during the hundred years since the dam was built. Total soft sediment, at present, is over 45,000 yd^3. A limited amount of dredging was done in the past to construct a dike along the pond's northwest shore, but most of the sediment still remains. The rate of sediment accumulation over the hundred year period has been relatively small, averaging only 500 cubic yards per year.

The lake does not experience any significant algae blooms at present. Given the present flushing rates and low nutrient concentrations, no algae problems are expected to develop in the future either. However, one cannot assume that present watershed conditions will remain as they are. Extensive development, or change to more intensive agricultural practices can dramatically change these present good conditions. The Lake District should be concerned about such changes, and should play an active role in insuring that any large scale activities proceed in an environmentally sound manner.

Water clarity is good with secchi disc readings consistently averaging 7 feet. Water clarity could be even better, but is somewhat limited by color. The good water clarity, however, has allowed extensive areas of rooted aquatics to develop. Figure 4 illustrates the present distribution of growth. Although it is unclear exactly why the growth has developed where it has, one might theorize that the small amount of organic material the inlet stream is carrying has, over time, accumulated in the upper end of the pond and provided a suitable substrate for growth.

The pond's fish population was surveyed in 1970, and the dominant species at that time was the white sucker. Brown trout and rainbow trout were also present, and were the most abundant game fish. Bullheads and small panfish were also present,

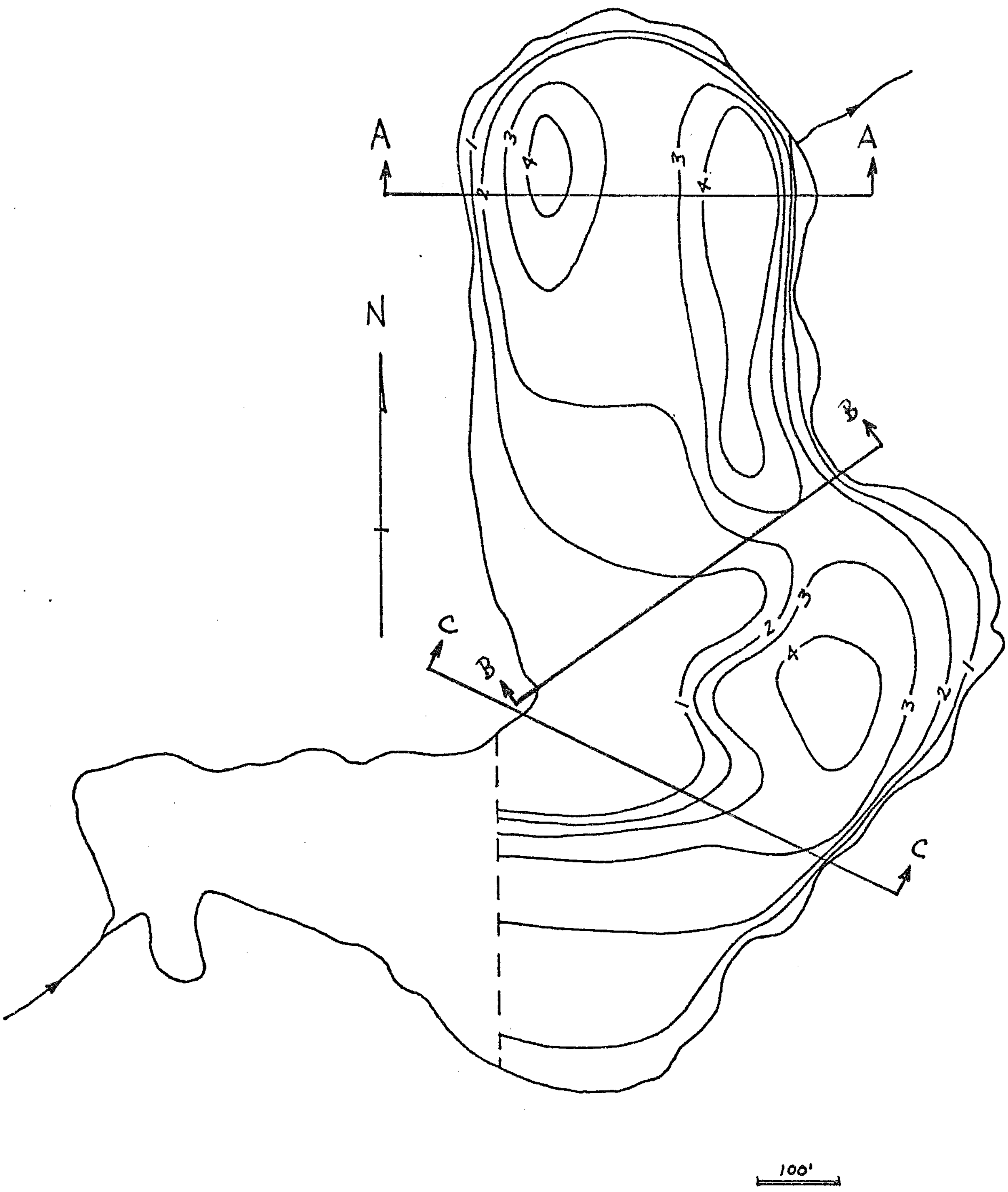


Figure 3a: Depth of Sediments in Wild Rose Pond

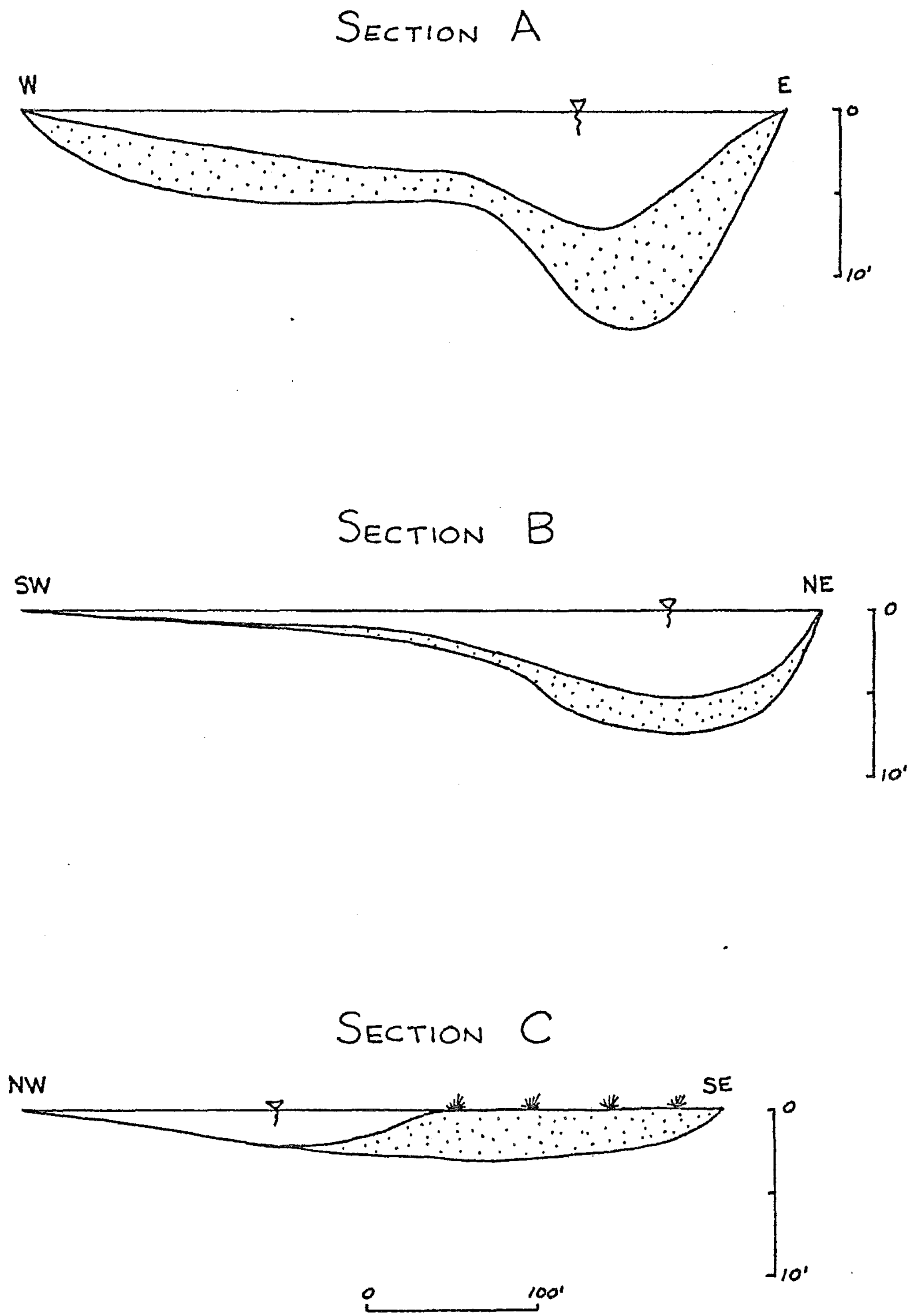


Figure 3b

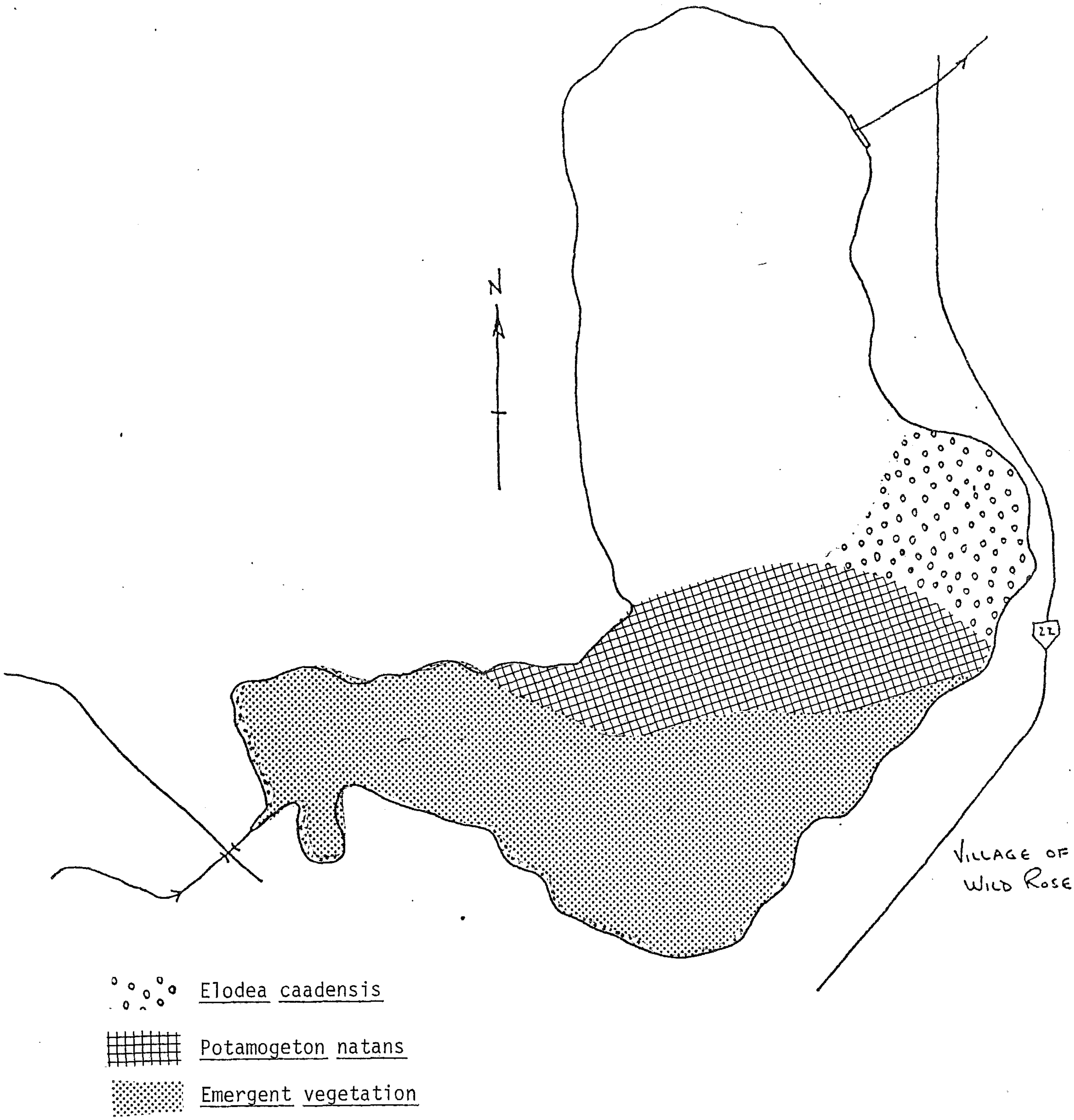


Figure 4: Aquatic Macrophyte Community

but were generally small and in poor condition. Winterkills do not occur because of the high inflow and subsequent flushing rates. The warm water fishery is perhaps limited by the relatively cold water conditions of the pond. However, the major limiting factor for the fishery at present appears to be the pond's lack of volume and dense vegetation in the upper end.

HYDROLOGIC AND NUTRIENT BUDGET

During the course of the study 600 kg of total phosphorus was delivered to the pond along with 2.5×10^6 kg of solids. Very little of this material was retained in the pond however, with most being lost through washout.

Flow measurement during the study indicated average residence time for the pond was less than one day. Mean monthly flows have been calculated by the U.S. Geological Survey and are shown in Table 1.

TABLE 1: ESTIMATED MEAN MONTHLY FLOWS FOR THE UPPER PINE RIVER AT WILD ROSE

Month	Flow	Month	Flow
January	14.9	July	16.7
February	13.1	August	13.5
March	22.5	September	17.4
April	30.1	October	17.3
May	27.0	November	18.0
June	23.2	December	15.7

Examination of this flow information indicates that even under low flow conditions, washout is sufficient to minimize algae problems.

Examination of the pond's sediments and watershed also indicates that the pond is not receiving a very large sediment load. The inlet stream is primarily groundwater fed with little opportunity for soil loss to occur. Also, the stream passes through an extensive wetland area prior to its exiting the pond. Examination of the stream indicates that it is carrying only a very limited bed load, substantiating estimates that no more than 500 cubic yards of sediment per year are being deposited in the pond. Quite probably the present loading is much less than that. Most sediment loss in the watershed probably occurred when land was first cleared for agriculture, sometime during the later part of the 1800's.

MANAGEMENT ALTERNATIVES

The following management alternatives have been proposed to give the Lake District a starting point in implementing a plan for the pond. These alternatives are not, however, all inclusive and the District should consider their needs and priorites in concluding a final lake management plan.

Drawdown

A well planned drawdown of the pond could have two beneficial effects. One would be the temporary control of some of the submergent weed species. The second would be the consolidation of some of the pond's flocculent, organic sediment. The pond would be permanently deepened by six inches or more. The minimum time for drawdown would be overwinter, but for best results an 18 month period is recommended. Refilling of the pond in the spring would be short, requiring less than a week's time. The depth of drawdown might be dependent upon such limitations as the capabilities of the dam, but in general, the greater the drawdown the greater the potential for consolidation.

Sediment consolidation resulting from a drawdown would be relatively permanent since once compacted, the sediments tend not to expand. Weed control which might result would be relatively temporary. Periodic drawdown, perhaps every 3 to 5 years, could help for a time, but eventually, drawdown resistant weed species could replace those which are susceptible. Certain emergent species such as the cattails have the potential to benefit from drawdown. Normally, however, to increase their range they need wet areas exposed for longer than just an overwinter period. For maximum results drawdown should be inititated in October and retained through May.

The response of this proposal to the present fish population would be short term. Many of the fish can migrate either up or downstream during the period of drawdown and could naturally repopulate the pond after refilling. Restocking is another method available to more quickly repopulate the pond. The advantages of drawdown include 1) low cost, 2) sediment consolidation and 3) opportunity for a general cleanup of the lake bottom, such as stump removal and bulkhead repair. The disadvantages of drawdown include: 1) elimination of water based recreation during drawdown period, 2) increased growth of emergent and drawdown resistant plant species, 3) not a permanent solution and 4) results are somewhat unpredictable--may control excessive growth for several years or may be relatively ineffective.

A permit would be required from the Department of Natural Resources (DNR) district office at Green Bay to implement this and other alternatives.

Sediment Coverings

At the present time, the DNR is conducting an evaluation of various artificial bottom coverings. Until this evaluation is complete, this alternative must be considered experimental in nature and the effectiveness of this technique unproven. Certain monitoring of any bottom coverings might also be advisable given the limited experience with this alternative.

Bottom coverings have several positive benefits including: 1) reduction of macrophyte growth by elimination of suitable substrate, 2) sealing of the nutrients in the bottom sediments, 3) control of macrophytes at less cost than physical removal of sediments and 4) establishment of areas suitable for recreational use, e.g., swimming, fishing and boating.

There are a variety of materials on the market that can be used as bottom coverings, including but not limited to polypropelene sheets, polyester fiber fabric and polyethelene sheeting. These materials are generally tough, durable, puncture resistant, rot and mildew resistant, chemical resistant and easy to handle. An added advantage that some of the fiber or fabric sheets have over plastic (polyethelene) sheets is that they allow the vertical release of gases from the sediments. Most of these materials are neutrally bouyant, consequently they need weight to hold them in place. Pea gravel (3-4 inches thick) is commonly used to hold these coverings down.

Cost of these artificial bottom coverings varies depending on the manufacturer, quality of material, volume purchased and shipping distance. For example, polypropylene sheets of 2.0 ounces per square yard are available for approximately $0.17 per square yard. This comes to nearly $850 per acre covered. A more expensive cost item is pea gravel. Depending on the availability of pea gravel in the Wild Rose area and hauling distance, this gravel is $3.00 to $5.00 per cubic yard. Thus it would take $1,200 to $2,000 to cover one acre with three inches of pea gravel. Therefore, the total cost of bottom covering materials ranges from $2,000 to $3,000 per acre.

Dredging

Dredging the upper pond area to hard bottom would physically remove the soft sediment and the weeds that are now present, leaving a relatively "hard" sandy bottom. Following dredging, aquatic plants would gradually move back into this area, but their abundance would be severely limited due to the marginal substrate (sand bottom). As silt and organic material from the upper area is moved downlake, either slowly by current action or more rapidly by large runoff events, the relative abundance of aquatic plants will increase. The rate at which the pond would fill up, however, would be relatively slow. Further work may be done to substantiate this estimate, but it appears that infilling is taking place slower than a third of an inch per year.

Dredging the entire lake to hard bottom is the third alternative under sediment removal. This would require removal of some 45,000 cubic yards. With this approach, the weedy inlet areas would no longer function as a sediment filter and the present fish spawning areas would be changed. As sediment from the watershed settles out in the lake and covers the original sandy bottom, the aquatic plants will slowly return.

Either mechanical excavation or hydraulic dredging could be used to remove sediment. If drawdown and sufficient drying out of the sediments is possible, removal of sediment from the lake bed could be done by earthmoving equipment. This type of mechanical excavation is less complicated and probably less costly than hydraulic dredging. If mechanical excavation is possible, the sediment removed can be stock-piled or used as fill. Consequently, adequate disposal sites are generally available.

Hydraulic dredging involves a cutterhead and pump to remove sediments. This type of dredging generally requires a number of holding ponds, out of the floodway, to settle out the dredged material. Usually dikes have to be constructed to create holding ponds. Thus a common problem with hydraulic dredging is finding adequate upland disposal sites. An unavoidable side effect of hydraulic dredging is the turbidity created in the impoundment by the dredge's cutterhead. Also, dredging would require a permit under Chapter 30, Wisconsin Statutes, and approval by the U.S. Army Corps of Engineers. A dredging permit would generally require that any water returned to the river or impoundment from the disposal areas be "visually clear." This means that if the dredging alternative is selected, further investigation on settling rates of solids in a sediment-water mixture will be necessary.

Various factors influence dredging costs including project size, method of removal, type of material to be dredged, distance to disposal sites and availability of contractors. Unit costs on current dredging projects range from 1.0 to 1.5 dollars per cubic yard of material removed. Thus, removal of approximately 45,000 cubic yards of sediment from the bed of Wild Rose Pond would cost between $45,000 and $70,000.

AQUATIC PLANT CONTROL BY HERBICIDES OR HARVESTING

The objective of these alternatives are to reduce the aquatic plant population to tolerable levels, thereby improving recreational opportunities.

Herbicide treatment is a commonly used, effective approach for control of aquatic weeds. All weed species in the lake could be controlled chemically, although effective control will probably require using more than one herbicide. Some of the disadvantages of herbicide treatment include: 1) treatment has to be repeated annually, and probably more than once per summer. 2) the treated and dying weeds settle to the bottom resulting in an increased oxygen demand during decomposition and in organic sediment accumulation; and 3) only near shore (shallow) areas can be treated effectively.

Anyone conducting chemical control of aquatic nuisance must obtain a permit from the DNR in accordance with Wisconsin Administrative Code Section NR 107.

Weed harvesting is another common method used to reduce plant abundance and maintain open water areas. There are two variations to this method. One method involves a cutter and a push bar which simply cuts the weeds and does not collect them. Wisconsin statutes require, however, that cut weeds be removed. A cutter and push bar machine can be obtained commercially for approximately $3,500. A collection system and transport to disposal area would add substantially to the cost.

The other variation is to use a weed harvesting system consisting of a harvester, transport barge and shore conveyor. This system has an advantage over the cutter and push bar system in that it cuts, collects and delivers the weeds to a shore station. A small weed harvesting system can be obtained commercially for $10,000 to $15,000.

Harvesting has several advantages over herbicides, including: 1) discrete areas can be treated anywhere in the lake, 2) plant biomass and nutrients are removed from the lake, and 3) all species present will be controlled. Retreatment will still be required annually, and adequate control may necessitate cutting an area 2-3 times each summer. The primary disadvantages compared with herbicides include initially higher equipment costs, and the need to remove and dispose of the harvested material. In addition, a small harvester can clear a couple of acres per day.

PARTIAL OR COMPLETE REMOVAL OF THE DAM AND RESTORATION OF THE AREA TO A STREAM ENVIRONMENT

As described in historical records, the original stream had a quick fall in the area of the dam, making it a good location for a dam and the original saw mill. Removal of the dam would eliminate the weed problem by changing the environment to that of a stream. The rapidly flowing water would prevent the accumulation of algae and heavy weed growth and the corresponding problems associated with them.

Complete dam removal would not in itself restore the stream to its original condition. There has been a large amount of sediment deposited on the original streambanks and extensive landscaping and earth work would be required to provide an aesthetically pleasing stream environment.

A partial reduction in the pond's volume could provide both increased trout stream habitat and, if well planned and landscaped, a smaller fishing pond as well.

If dam abandonment or removal is desired, the legal steps Wild Rose would be required to take are specified in Section 31.185, Wisconsin Statutes. Dam abandonment would require that a permit from the DNR be obtained. It would also be advisable that the legal ownership of the land no longer to be flooded be determined prior to development of any plans proposing to utilize the land made available.

LEAVE AS IS

To leave the pond as is would be a management alternative designed to allow the pond to respond naturally as it has for the most part in the past. The submergent weed problem would give way to the emergent vegetation as it already has in the upper end of the pond. In time only a channel would remain. However, this process is a long one and would undoubtedly take more than the next hundred years to occur.

11/13/78
djc