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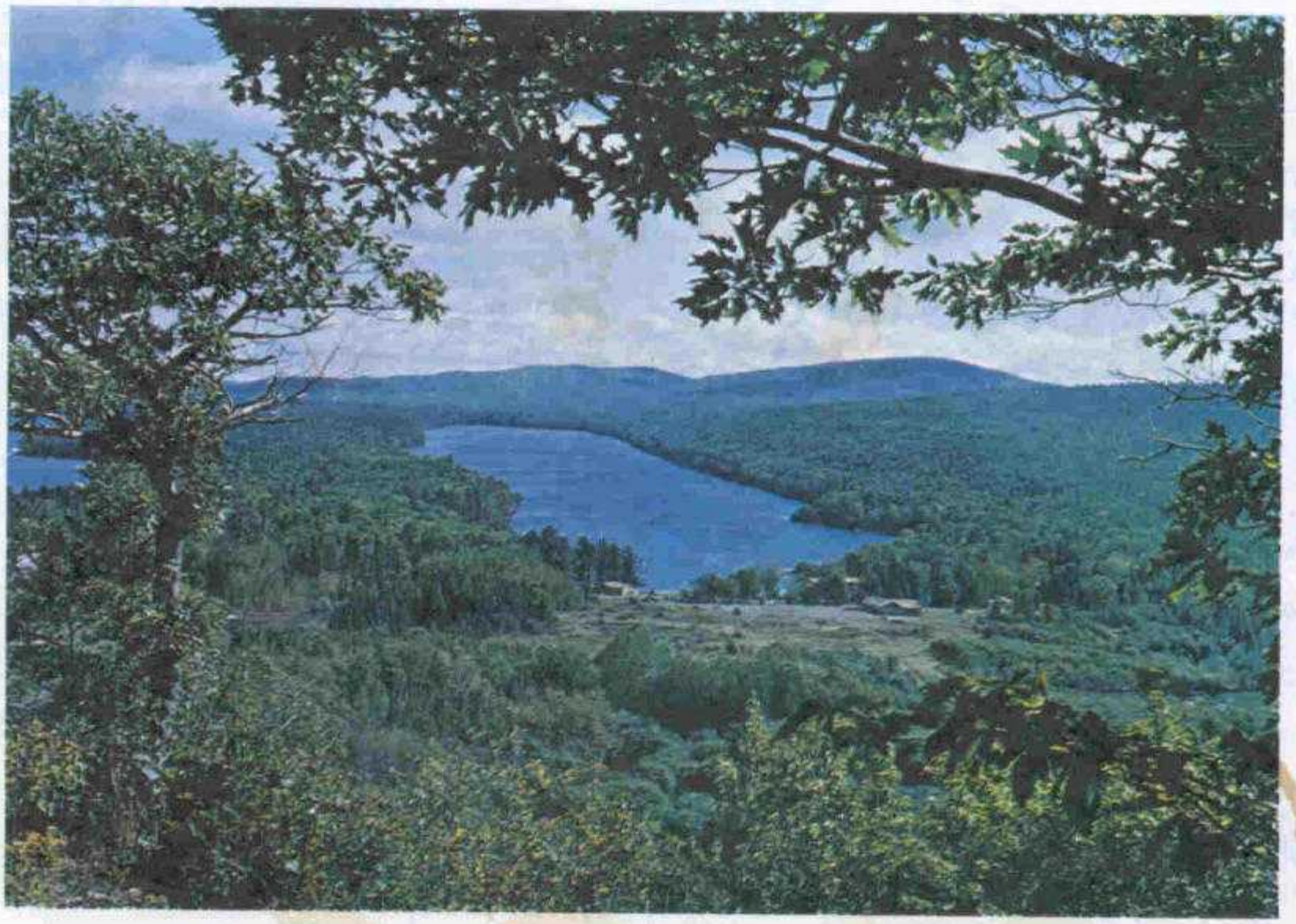
THE MICHIGAN RIPARIAN



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FRONT COVER: Lake Fanny Hooe is a 230 acre lake which lies parallel to and just south of Copper Harbor bay. The lake is two miles long and no wider than the strip of land that separates it from Cooper Harbor -- a distance of about 1,000 yards. The lake acquired its name from the fact that "In the spring of 1844, Fannie Hooe spent some time visiting her sister Richardette and her husband, First Lieutenant Don Ruggles, then stationed at Fort Wilkins. During her stay at the Fort, she made such a lasting impression on the military personnel that the lake was named after her. Fannie S. (Hooe) White died in Fredricksburg, Virginia on 22 April, 1882." This information comes from Howard E. Meadowcroft, Park Manager of Fort Wilkins State Park. Howard also reports that the DNR has planted rainbow trout in the lake on three occasions since 1978, and that "it is not unusual to catch Rainbow 14" to 16" in length. In addition to the Rainbow Trout, Speckled Trout, Chub and Pearch are making the lake their home."

The picture on the front cover was taken by the editor last year on September 21 just as the leaves of Maples were turning bright red. If you have not visited this beauty spot of Michigan, you owe it to yourself to look down upon Lake Superior, Copper Harbor and Lake Fanny Hooe from Brockway Mt. Drive.

THE MICHIGAN
RIPARIAN

USPS 103-830
9620 EAST SHORE DRIVE
PORTAGE, MICHIGAN 49002

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EDITORIAL

Donald Winne

WHICH WAY MICHIGAN?

The Courts of the State interpret the laws that are written and passed by the legislature and approved by the Governor. Before a court will determine what a law means, a judge will ask attorneys to file briefs explaining the provisions of the law. Attourneys wil point out constrictions placed upon its interpretation from State and Federal constitutions and from previous court cases dealing with the subject. If they can find support for their contention in the common law they will cite it.

When an attorney wants to pioneer into an uncharted area, i.e., to expand the social gospel of public rights which encroaches upon private property rights, he will use such words as HIGH, SOLEMN, INHERENT to establish some kind of austerity and integrity to his pronouncements, hoping thereby to influence the judge to accept his arguments and decide in his favor.

Such a situation exists before the Michigan Supreme Court at this time. The Court is being asked to add to the traditional right of the use of a stream by the public for trade, commerce and transportation to make every floatable stream, even though it may be floatable only during the times of high water, also legally wadeable and fishable. WHAT WILL HAPPEN TO ALL THE PRIVATE STREAMS AND CREEKS OF THE STATE IF THE COURT DECIDES IN THIS DIRECTION & You be the judge.

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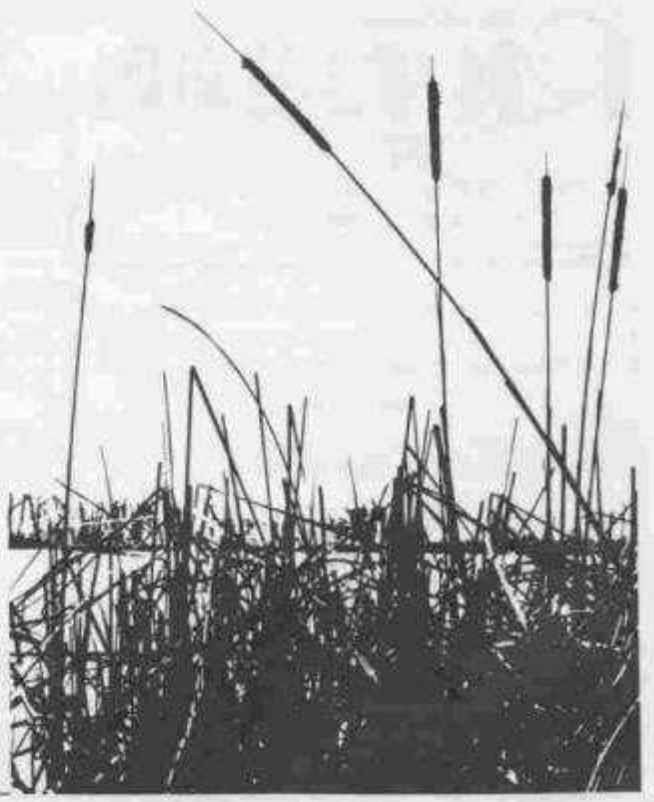
MEASURING THE LAKE'S BIOLOGICAL PROBLEM



by Lowell K. Keup

The following article is a condensed version of the subject of the above title presented by Dr. Keup at the North American Lake Management Conference at Michigan State University on April 16, 1979. The purpose of the paper was to critique the common biological analysis performed on a lake.

Eutrophic, eutrophy and eutrophication are words that within the past decade migrated from the limnological field station and the academic classroom to the popular vocabulary of the general public. Shallow water, excessive weeds, poor fishing, or any situation where a lake is less than perfectly desirable would make eutrophic a substitute for bad conditions for the ecologically **avante garde** of society. The availability of Federal, State and local funds to restore or enhance lakes has created further evolution or expansion of the term to include any conditions that would be amenable to financing or funding under conditions of established law or regulation. Today eutrophication is POLLUTION OR UNDESIRABLE CONDITIONS WHEN THEY OCCUR IN LAKES.

In the late 1960's and early 1970's, various sessions of Congress developed legislation for a clean lakes program. These bills were never enacted but were eventually incorporated into the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) as Section 314 -- Clean Lakes. The 1977 Clean Water Act (PL 95-12) retained this section, modifying it principally with additional Federal monies to inventory lake problems by the States. In the inventory and classification process, each State is required to carry out the "identification and classification according to eutrophic condition" with Federal financial assistance to the States.

Federal funding and assistance has been available to State and local agencies to undertake specific lake-restorative action since 1975. To obtain these Federal funds a State or local agency must prepare an application for Federal funds and compete with other applicants for available funds. The standard form for application must also have attached a narrative statement describing what is the problem and its cause, with a feasible approach(s) to alleviating the adverse situation. To date, 42% of the applications received have been inadequate or insufficient to compete for and receive available funds. Activity is accelerating in lake restoration and unless the quality of the narrative supplement to the application is dramatically improved, we can expect a still higher rate of application failure with an increasing number of applications and no increase in appropriations. Some voluminous applications are shortcoming in many areas. One of the most obvious areas is substantiation of a problem. Not only is a problem not described, but many applicants do not understand what, why, where, when, or the meaning of the environmental measurements that they undertake. Frequently omitted is something as basic as a bathymetric map of the lake. Without this, much of the information that is needed, such as volumes of the epilimnion and hypolimnion, retention time and shallow water areas, cannot be determined or are suspect in their derivation or validity. The majority of the problems are of a biological nature. Large quantities of biological monitoring data are collected. Many of these data are not amenable to descriptive or applied limnology. It is indeed a rare application that quantitatively states how much plankton or vascular aquatic plants are present in the lake. I will review the common biological monitoring procedures and criticize their meaningfulness in a lake survey. There is no single procedure or set of procedures that is applicable to all lakes. The investigator must first determine what the most likely problem is and then tailor his investigations to that problem. Simple channeling of effort to the problem will substantially reduce the quantity of useless data, the quantity of laboratory and limnological equipment needed, and should enhance the information one has by directing resources to it.

MICROBIOLOGY

Microbiology, excluding algology, but including bacteriology, mycology, and protozoology, is rarely thought of as a problem in the field of lake restoration. In many instances, though, it must be considered. Swimming is one of the justifiable uses for lake restoration. Though it may be nice to reduce the rooted equatic vascular plant populations in an area and improve the local swimming beach, EPA will generally not fund this activity if they are aware of bacteriological contamination that would preclude use of the areas under existing water quality standards. If water contains 10,000 coliform bacteria per 100 milliliters, it is in violation of body contact water quality standards and the source of these would have to be located and controlled or at least incoporated along with the restoration activity before solution of the weed and beach problem was funded to improve swimming conditions.

THE SECCHI DISC

Secchi disc measurements are the depths to which a pie-plate size disc is seen in the water. The disc is painted with white and black quadrants to aid visibility and for standardization in discs. Secchi first used the disc in 1865 (Hutchinson 1957) on a Mediterranean oceanographic expedition financed by the Vatican. Though its origins may imply some sanctity, it is probably the most frequently abused and violated measurement undertaken by limnologists. A low Secchi disc transparency value is frequently used to describe the density of plankton that inhibits visibility in the water. This is true if it is viewed as an index and if it has been demonstrated that plankters are the cause of reduced light penetration or transparency. Other suspended solids (organic or inorganic in nature, dissolved materials, color and season of the year, as well as latitude (angle of the sun as a light source), all affect Secchi disc transparency indices.

Secchi disc readings are meaningful primarily in a relative sense. Secchi disc readings are not linear in nature. They do not

decrease by half with a doubling of the material in the water that is inhibiting light transmission. Thus, Secchi disc readings cannot be averaged. In fact, averaging detracts from their usefulness in lake restoration work. Knowledge of the most extreme conditions is desired because this is the time of greatest interference with the uses of the lake.

In summary, Secchi disc values have limited meaning, and then only if we know what is reducing the transparency in the water. If we wish to know the depth of the euphotic zone or determine the volume of water in which sufficient light exists to support photo-synthesis, the Secchi disc must be calibrated in each case against the submarine photometer. Because of its greater meaning and versatility, I would suggest purchasing an economical submarine photometer in lieu of a commercial Secchi disc kit. I also object to seeing a few hundred dollars in a budget to buy a Secchi disc, knowing that it can be made with a pie plate, paint, clothesline and wheel weights. From the public relations standpoint, the plain Secchi disc looks cheap compared to submarine photometric determinations to measure light extinction coefficients and determine the euphotic zone.

TURBIDITY

Turbidity measurements are commonly encountered methods to determine transparency. These measurements have the same drawbacks previously described for Secchi disc readings; notably, lack of linearity and correlation with light extinction. In areas of Secchi disc readings, turbidity, light penetration and pH the most extreme values and the season and length of their duration are most important.

PHYTOPLANKTON

A super abundance of phytoplankters is one of the most common lake problems encountered. Zooplankters are rarely abundant enough to create a problem. In one instance in Maine they interfered with the filtration of water for a municipal water supply. Stocking of planktivorous fish in the small lake effectively eliminated the problem.

A microscope and appropriate accessories would be considered a prerequisite to study any problem in water that is microscopic in nature. Confirmation that the fine brown stuff in the water is diatoms and not suspended silts, organic detritus or fly ash needs to be confirmed since the solution of the problem is dependent upon its origin. The majority of applications do contain an identification of the predominant algal forms and usually the determination of the number per milliliter. In some cases where plankton are not a problem or densities are extremely low, some form of relative abundance scales is used. One of the biggest problems with algal data of this nature is that a large number of bits of information can be generated. These data must be summarized, condensed and evaluated by the applicant. Some valuable considerations to be made include: (1) conditions today relative to those that are historically documented; (2) whether one or two species are particularly dominant in the population; (3) if these species are known nuisances, are they present in sufficient abundance to be a nuisance; and (4) are blue-green algae beginning to appear in the lake or are they already abundant, and does their nitrogen fixing capability give them a competitive advantage because of the water's nutrient chemistry.

Simple numerical counts of algae are only semi-quantitative. Algal cells are extremely variable in size from species to species. If we measure the algae, which is possible by calibrating the microscope with stage micrometer and ocular micrometer, one can make appropirate measurements in microns of the algal cell. With basic solid geometry the volume occupied by the cell can be calculated. For practical purposes the volume or space occupied by the cell can be converted directly to parts per million or milligrams per liter because the planktonic algal cells have a specific gravity near one. There is a tremendous difference in the biomass of vegetable material present for an equal number of different species. As in agriculture, it is the biomass in this facet of lake restoration that must be contended with. The proposed EPA regulations will require this volumetric biomass determination, which is simply a continuation of the basic counting usually undertaken by making representative measuements and appropriate geometic calculations to determine the volume of the biomass. In addition to having the total biomass determined, we see that frequently a species relatively low in abundance can suddenly become predominant in a total algal mass. Taking these algal concentration values and the volume of water the value represents, the limnologist can calculate the pounds or kilograms of algae present in the lake as readily as he can that of the chemical nutrients. With these data, more meaningful comparisons can be made between bodies of water and within a body of water during time. Total algal counts could remain the same but biomass could be drastically changed, thereby affecting the usefulness of a body of water for swimming and other recreational uses.

CHLOROPHYLL

During the past decade, chlorophyll determinations become increasingly common in limnological literature. The quality of chlorophyll determinations depends on the equipment and the techniques used by the investigator. The quantity of chlorophyll in algal cells varies with species and with environmental and nutritional factors. The extraction of chlorophyll also depends upon the species of algae, their age and techniques used. There is a great range in the percentage of chlorophyll that may be in algal biomass. The quantity of chlorophyll decreased throughout the day while photosynthesis occurs in the cell and is rejuvenated during the night and under low-light conditions. The chlorophyll concentration in a cell may double to compensate for depth or seasonal light reduction and to maintain photosynthetic efficiency within the cell.

The advantages of chlorophyll determinations are their rapidity and cost, but its usefulness can be questioned when comparing different algal systems over long periods of time. If the analyst would correlate chlorophyll concentrations to more precise biomass determinations, it could be a more valuable adjunct to limnological monitoring by expanding the data base at relatively low cost.

Phycocyanin, a water soluable pigment unique to the blue-green algae, is not routinely determined because of a lack of a low-cost field analytical technique. Since the blue-green algae are particularly obnoxious and usually occur in many severe cases of eutrophication, the development of a technique to determine phycocyanin as readily as we determine chlorophyll would be a great adjunct in the areas of phytopigment chemistry. Its presence and quantity would be indicative of the intrusion of blue-green algae into the population. The ratio of phycocyanin to chlorophyll could be indicative of a shift from the normal mixed population of algae to one dominated by this group: This predominance is favored by low nitrogen phosphorous nutrient ratios because blue-green algae can more effectively compete in this environment by fixing atmospheric nitrogen.

ROOTED VASCULAR PLANTS

When water is shallow enough to permit light penetration to the bottom during the germination and growth of vascular plants and the bottom is not bedrock or coarse rubble one can expect problems with rooted vascular plants. Severity of the problem will depend upon the nature of the lake bottom, nutrients present, species of plants present and the uses the lake is put to. Many of the grant requests for funds for lake restoration deal with rooted aquatic plant problems. Rooted plants are part of the natural succession in a lake. In the oligotrophic lake they are very sparse. The eutrophic lake may have abundant aquatic vegetation. By the time aging advances to the dystrophic or swamp stage, rooted vegetation is the predominant plant growth in the ecosystem.

(Continued On Next Page)

MEASURING THE LAKE'S BIOLOGICAL PROBLEM ...

(Continued From Page 5)

In many lakes the rooted aquatic vegetation is as much or more of a problem than the suspended phytoplankters. They physically interfere with navigation, fishing and entangled swimmers have drowned. They have contributed to undesirable or lack of fish populations. When growing or decomposing, they can adversely affect water chemistry. When uprooted and wind rowed on beaches they decompose producing objectionable odors and sites for fly breeding. Considering the severity of the problems they cause, we may know less about this component of a lake's biota than any other.

As a minimum, some type of semi-quantative scale should be used when vascular vegetation is a major problem. Along with this the beds of vegetation should be mapped with special reference to bottom configuration and substrate type and information should be included as to how close the weeds come to the surface, i.e., do they break the surface or do they only reach to within 6 to 8 feet of the surface. There should also be a detailed inventory by types of weeds present. Problems encountered with cattails and water lillies are entirely different than those encountered with beds of **Chara** (actually a large attached algae).

FLOATING VEGETATION

Frequently, problems with floating vegetation such as algal mats, water hyacinths, and duck weed are reported. When these growths are present, to effectively cover the water they may be one of the most severe problems because they are particularly objectionable aesthetically, interfere with almost every use and because of their shading effect, restrict light to interfere with any type of production that would occur within the water column.

FISHES

Fishes are the most important, directly used aquatic biota in a lake. Problems with fish may range from none or undesirable kinds through superabundant populations that are stunted and could include excellent populations in waters that are unfishable due to regulations, physical conditions, or poor fishermen. There is an opportunity for much work to improve or enhance fisheries funded under the lake restoration program of EPA. Semi-quantative techniques such as experimental gill netting, trapping and seining would provide meaningful information on fish population composition as well as the biological specimens to determine age, growth, and condition. Comparisons of data related to age, growth and condition can be readily made either from neighboring similar waters or from extensive available fisheries literature.

As in other aspects of lake restoration, EPA will not fund short-term effect fisheries programs. Stocking of fish on a "put and take" basis would not be undertaken nor would harvesting of undesirable fish be considered because the problem would reappear within a year or two. The Agency would consider the installation of a trout-sprawning reef, increased accessibility to a pike-spawning marsh or the permanent elimination of an undesirable fish population, the development of appropriate barriers to prevent reintroduction of undesirable forms and restocking of desirable fisheries could also be considered.

PEOPLE

Though not primarily aquatic, people are biologic and an important factor in any lake restoration program. The common denominator for enhancing any use is the use made of a lake by people. A basic requirement of any lake restoration grant is that the public have guaranteed permanent access to the water body prior to any Federal funding consideration. A lake restoration grant proposal cannot include the acquisition of an access area as part of the program.

There are many activities on a body of water that in themselves are conflicting, such as swimming, water skiing, sailing, and fishing. At times overuse by people will reach a saturation point and the crowds will become self-limiting in the activity. When activities are in direct conflict, lake restoration funds would probably not improve the situation. Reduction of these conflicts would involve people management through various mechanisms such as local regulations and their enforcement. In some cases a lake restoration activity could enhance one or two uses to the detriment of other uses.

Generally speaking, lake restoration funding is favored for areas close to urban centers and where alternate bodies of water are not readily available for use by the people. Data on use activities and availability of the water body would be a good aid in the decision-making process for funding. Better yet might be a people survey of why they are not using a body of water or what they would like to use if for, i.e., "No, we wouldn't sail there, the pond is too small", or "No, we wouldn't swim there, the water is too cold, but we would go trout fishing more often if there were less trash fish and more trout."

CHEMICAL

Chemical constituents and their concentration in a lake must be included in any application for Federal funds. Measurements in micrograms per liter should be made of total phosphorous, soluble phosphorous, organic nitrogen and inorganic nitrogen as a very minimum.

PHYSICAL DATA

It has been common to receive a lake application grant request without the basic prerequisite of a bathymetric map. Without having performed morphological survey work on the lake it is difficult to determine how valid mean depths, retention times, and percent of bottom area occupied by the hypolimnion were determined. Without bathymetry it is impossible to construct a needed hysograph.

Inflow rates and discharge rates from the lake are vey important data that are related to the loadings to the lake, retention time, and assimilation rates of materials within the lake ecosystem. Considering the costs of other analytical and evaluation work that is performed on a lake and that are so critically tied to these flow rates, every effort should be made to obtain firm and reliable data in this area.

In summary, preferential treatment to a lake restoration grant application would be given if it could be demonstrated that the problems of the lake were recently induced by man and in turn the cause could be eliminated or mitigrated by the action of man.

(For more information on this subject, write to Lowell E. Keup, Physical Science Administrator Criteria & Standards Division, U.S. Environmental Protection Agency, Washington, D.C. 20460)

COMING EVENTS

August 21 - Water Resource Commission, Lansing.
August 21,22 - Natural Resources Commission Ironwood/Menominee, Wisconsin DNR.
August 25 - Michigan Environmental Review Board*.
September 11,12 NRC - MacMullan Conference Center, Higgins Lake.
September 18 WRC - Grand Rapids.
September 22 MERB - Lansing.
October 9,10 NRC - Law Building, 525 West Ottawa, Lansing.
October 16 WRC - Lansing.
October 24,25,26 - ML&SA ANNUAL MEETING, Hilton Shanty Creek, Bellaire, MI.
October 27 MERB - Lansing.
November 6,7 NRC - Law Building, Lansing.
November 13 WRC - Lansing.
November 24 MERB - Lansing
December 4,5 NRC - Law Building, Lansing.
December 18 WRC - Lansing.
December 22 MERB - Lansing.

*All MERB Meetings are held at the Main Conference Room 1-C, Baker-Olin West Building, Michigan Department of Public Health, 3500 Logan St., Lansing.

Let's Take A Look At A Eutrophic Lake

by George Jackson
Land Resource Programs &
Water Quality Divisions
Department of Natural Resources, July 1979

Introduction and Background

Water quality and phosphorus loading studies of Kent Lake, the Huron River and significant tributaries were conducted by staff of Water Quality Division between May 1977 and April 1978. The objectives were to determine existing water quality and evaluate the impact of the three principal point source discharges, i.e. the Wixom Wastewater Treatment Plant (WWTP), the Ford Motor Company and the Milford WWTP (Figure 1). Effluent from the Milford WWTP is discharged to the Huron River 1.9 miles above Kent Lake. Effluent from the Wixom WWTP and the Ford Motor Company are discharged to Kent Lake via Norton Creek and the Huron River 7.4 miles and 10.3 miles above Kent Lake, respectively. (see map at end of article.)

Norton Creek has a history of low dissolved oxygen levels resulting from the Ford Motor Company and the Wixom WWTP discharges and is probably a water quality limited stream reach. Previous biological (MDNR, 1971a and 1972a) and water chemistry surveys (MDNR, 1971b and 1972b and 1976) of Norton Creek documented dissolved oxygen levels below standards, dense aquatic plant beds and a degraded benthic animal community.

Kent Lake is one of the most intensively used inland lakes in Michigan and as such is an extremely valuable recreational resource. The entire shoreline of the lake is owned jointly by the State of Michigan (DNR Island Lake Recreation Area) and the Huron-Clinton Metropolitan Authority (Kensington Metropolitan Park). The Island Lake Recreational Area receives approximately 300,000 visitors annually of which approximately 70% utilize Kent Lake. Kensington Metropolitan Park offers a 4,400 acre park and a 1,000 acre lake to approximately 2 million visitors annually and represents a total investment of 8.3 million dollars by the Huron-Clinton Metropolitan Authority. The U.S. EPA National Eutrophication Survey (EPA, 1975a) estimated that Kent Lake received a phosphorus loading of approximately 14,160 pounds per year. The major conclusion of this study was that the communities of Milford and Wixom contributed about 54% of the total phosphorus load to Kent Lake (phosphorus loading from the Ford Motor Company Wixom Assembly Plant discharged to Norton Creek was not separated from the non-point source tributary load). The study further estimated that a reduction in loading to about 9,900 pounds/year would likely result in persistent phosphorus limitation and a reduction in the incidence and severity of nuisance algal blooms.

Kent Lake is managed as a warmwater fishery by Fisheries Division, and possesses abundant bluegill and white crappie populations. Carp are also numerous but do not represent a serious problem to the fishery at this time. The pike population has been greatly improved during recent years through management of an adjacent pike spawning marsh. Efforts to establish a walleye fishery have met with only limited success primarily as a result of their apparent inability to reproduce naturally. Winter and spring fish mortalities have also occurred in recent years. (Ron Spitter, District Fisheries Biologist, pers. comm.). In addition, the Kent Lake Fishery annually attracts approximately 12,000 fishermen representing approximately 80,000 angler days per year. As such, the lake is the most intensively fished lake in southern Michigan.

Ketelle and Uttormark (1971) report that Kent Lake experiences intense and frequent algal blooms. In addition to prolific algal growth, Kent Lake is also plagued with rooted aquatic plant growths. To partially control rooted aquatic plant growth, the Huron-Clinton Metropolitan Authority must annually apply 26,000 pounds of 2, 4-D herbicide at a cost of approximately $30,000. This program controls only a relatively small portion of a dense, extensive rooted aquatic plant infestation.

The effects of phosphorus loading from the Milford WWTP, Wixom WWTP and the Ford Motor Company discharge are not confined to Kent Lake and upstream waters. The EPA National Eutrophication Survey estimated that 10,860 pounds of phosphorus passed out of Kent Lake per year. This loading would constitute a significant phosphorus input to the Huron River and downstream lakes (Strawberry, Gallager, Whiteford and Baseline). The EPA National Eutrophication Survey conducted a study on Strawberry Lake (EPA 1975b) and concluded that the lake was loaded at approximately 3.5 times the rate necessary to maintain a lake in the eutrophic state.

The management of inland lakes basically involves the control of nutrient sources, particularly the nutrient phosphorus. Phosphorus enters Kent Lake not only from natural sources but also from cultural non-point sources and point source discharges. Kent Lake's nutrient budget indicates that the point sources represent the major source of phosphorus input to the lake. Given this fact and the technical and economic controllability of point source phosphorus, point sources represent the most manageable element of the phosphorus budget. International Joint Commission PLUARG studies (Johnson et. al., 1978) indicate that reduction of phosphorus loading at municipal point sources by reducing the effluent concentration from 1 to 0.5 mg/1 phosphorus is far more cost-effective than either rural or urban non-point source phosphorus reduction strategies.

Phosphorus Loading Analysis Methods

Data Resources

Limnological and nutrient loading data for Kent Lake were: 1) collected by Water Quality Division staff from May 1977 through April 1978; 2) obtained from NPDES monthly operating reports for the same period; and 3) determined from land use data and appropriate literature export values. The location of sampling stations and point source discharges are presented in Figure 1. Water Management Division supplied appropriate stream flow data used to calculate stream loadings. Lake hydrologic and morphologic parameters were taken from the EPA (1975a) National Eutrophication Survey of Kent Lake. Physical watershed characteristics were obtained from U.S.G.S. topographical sheets and recent (advanced copies) S.C.S. soils maps.

Phosphorus Budget Analysis

Phosphorus inputs were calculated from the following sources: overland flow from the immediate watershed, septic systems, bulk precipitation, inlet streams and point sources. The steps taken to determine the phosphorus input from these sources are indicated below.

1. In order to determine he quantity of phosphorus entering Kent Lake from the immediate watershed the following methodology was employed (from National Biocentric, Inc., 1978). An average immediate watershed runoff coefficient was estimated using the values in Table 3 which relate runoff to land use type, slope and soil type. Land use types and topography were estimated by superimposing the watershed on U.S. Geological Survey topographic maps. Soil types were obtained from the most recent Soil Conservation Service soil survey maps. These data were averaged to obtain a single

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LET'S TAKE A LOOK AT A EUTROPHIC LAKE ...

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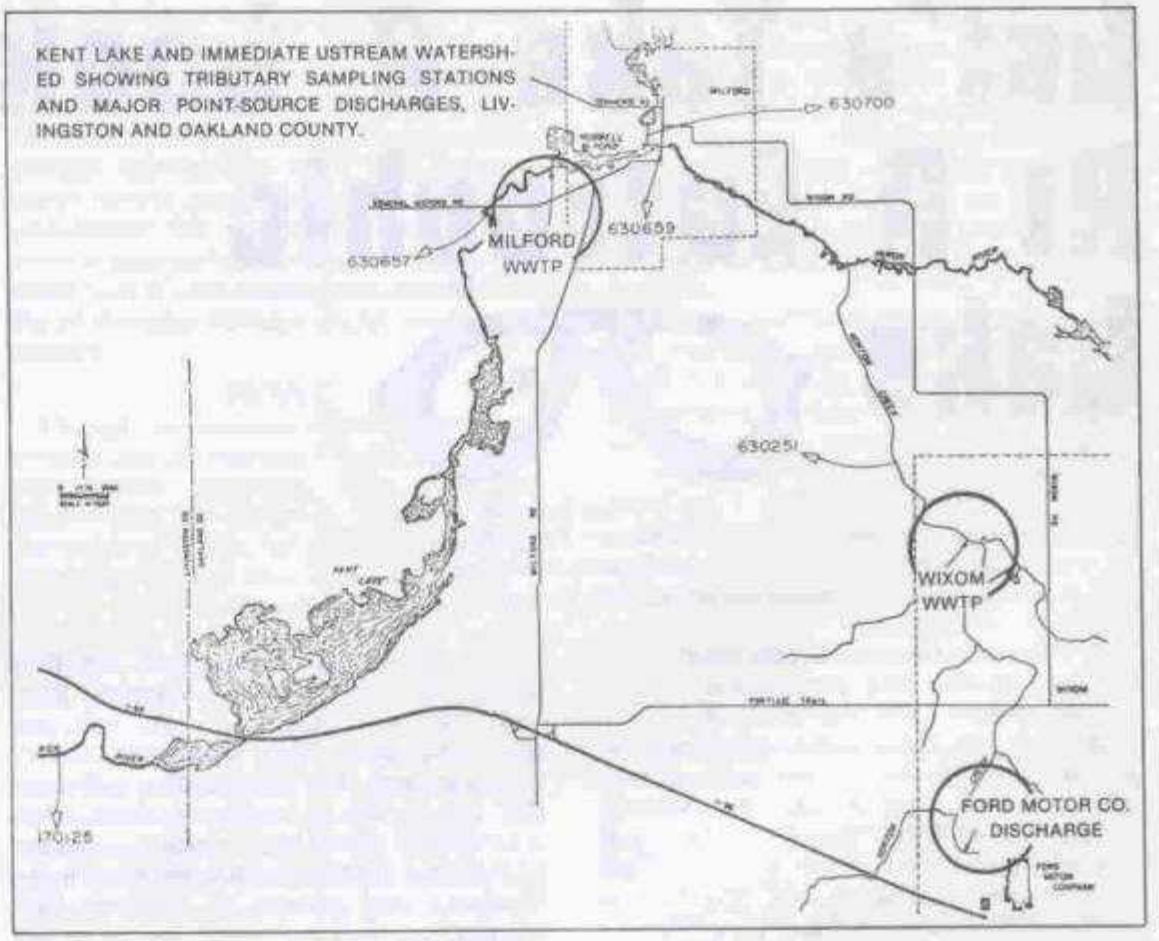
run off coefficient which was used to determine annual phosphorous contribution.

2. Since no septic tanks are known to be within 200 feet of the shoreline of Kent Lake, it was assumed that no phosphorus is currently reaching the lake from this source.
3. The total phosphorus loading supplied by bulk precipitation to the lake was estimated by using a loading rate of 33.3 mg/m^{2}½yr. (TAGUE, 1977)
4. The annual phosphorus input from steams and Kent Lake phosphorus output were calculated from the average streams and Kent Lake phosphorus outphosphous concentrations measured during monthly sampling trips from May 1977 to April 1978 (Tables 6-11).
5. The phosphorus inputs from point sources were calculated from NPDES monthly operating reports. In the case of the Milford WWTP, MDNR effluent monitoring and stream monitoring data was used to supplement monthly operating report data.



KENT LAKE AND IMMEDIATE UPSTREAM WATERSHED SHOWING TRIBUTARY SAMPLING STATIONS AND MAJOR POINT-SOURCE DISCHARGES, LIVINGSTON AND OAKLAND COUNTY.

Summary and Conclusions

1. Kent Lake is an extremely valuable recreational resource. The 1,000 acre lake is entirely public owned and receives approximately 2.3 million visitors annually making Kent Lake the most intensively used recreational lake in the state.

2. Kent Lake is currently a highly eutrophic to hypereutrophic lake and as such is less desirable as a body contact recreational lake than most other inland lakes. The lake normally experiences hypolimnetic oxygen depletion; secchi disc transparency ranges from 3 to 4 feet; the fish population consists principally of warm water pan fish, pike and carp and is subject to periodic fish kills; nuisance aquatic plant growths cover extensive portions of shallow in-shore waters, and algal blooms are com mon.

3. The profundal benthic community is nearly devoid of macroinvertebrates. Those organisms which are present are adapted to living under near anaerobic conditions for extended periods. Such a community indicates persistent anaerobic conditions in the hypolimnion and hypereutrophic conditions.

4. Total phosphorus concentrations in Kent Lake ranged from 0.027 mg/1 to 0.090 mg/1 with a mean of 0.044 mg/1. This mean concentration is very close to the hypereutrophic concentration of 0.050 mg/1.

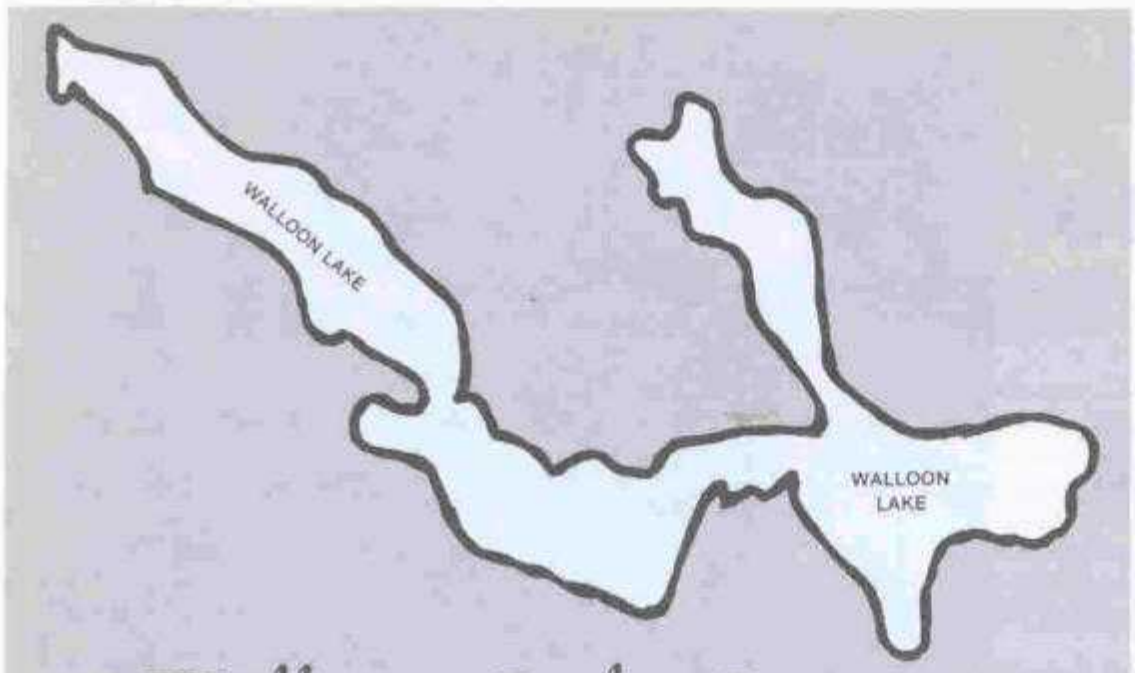
5. The phosphorus loading to Kent Lake is approximately 12,355 pounds or 2.5 times the eutrophic loading rate. This loading is similar to the figure estimated by the 1972, National Eutrophication Survey (EPA, 1975a) after point sources are adjusted to reflect current conditions. Of this 12,355 pound loading 7,371 pounds (60%) are from point sources and 4,983 (40%) are from non-point sources.

6. Future expansion of municipal discharges without additional phosphorus removal beyond conventional NPDES limits and EPA guidelines could result in a phosphorus loading up to 21,565 pounds per year or approximately 4.5 times the eutrophic loading rate. This would severely limit or possibly destroy the recreational value of Kent Lake.

7. Non-point source phosphorus originates from a very large watershed having relatively low phosphorus export rates. Without drastically altering the use of the land within the Kent Lake watershed (for example, from existing uses to deciduous forests) significant reductions of non-point source phosphorus are not feasible.

Recommendations

Kent lake should be managed to optimize its important recreational value. Accordingly, the phosophorus loading to the lake should be at least reduced to a level which will insure that the trophic state remains within a eutrophic range. This loading is approximately 9,000 pounds of phosphorus per year. Since approximately 5,000 pounds per year originates from non-point sources, it is recommended that total point source phosphorus be restricted to approximately 4,000 pounds per year.



Walloon Lake Lawsuit Restricts Funnel Development

by Edgar H. Lotspeich
Vice President
Walloon Lake Association

Trustees Announce Success of Litigation

On May 16, the Trustees of the Walloon Lake Association announced the successful conclusion of a lawsuit against the developers of a "funnel" subdivision which they felt represented a serious threat to the lake and a violation of the riparian rights of other lakefront property owners. Here is the text of their press release to the local newspapers:

Dr. William A. Heisel, President of The Walloon Lake Association, has announced the entry of a judgement by Judge Martin Breighner of the Charlevoix County Circuit Court resolving the lawsuit which the Association earlier filed concerning the Walloon View Brae subdivision on Walloon Lake. The judgement was entered on May 16, 1980 following extensive negotiations between the Walloon Lake Association and the developers of the Walloon View Brae subdivision.

There are 47 lots in the Walloon View Brae subdivision located about one half mile from the lake on Zenith Heights Road in Bay Township, Charlevoix County. There is also a lakefront lot containing 150 feet of lake frontage which had been planned for a park and lake access site for the subdivision.

The Walloon Lake Association filed a civil suit last August 15 in Charlevoix County Circuit Court against the Hildee Company, developers of Walloon View Brae. The suit contended that the practice of permitting the owners of 47 non-riparian backlots to "funnel" onto the lake through a narrow single lot constitutes a trespass on the rights of other lakefront property owners. The Association contended that this type of "funnel" development creates excessive pressures on the lake which can ruin the quality of the lake. The suit asked the Court to enforce restrictions on the use of the lakefront lot.

"The principal concern of the Walloon Lake Association in bringing the lawsuit", said Heisel "was to make sure the lot owners in the subdivision did not overburden the recreational and environmental resources of the lake."

"The judgment entered by the Court imposes a series of restrictions designed to keep the use of Walloon Lake by Walloon View Brae property owners at a reasonable level," explained Heisel.

Charlevoix Court Sets Limits

According to Dr. Heisel, the Lakefront property is being restricted by the court judgment to limited recreational use. No more than 3 power boats may be moored overnight on the property, and provision for parking space is limited to 5 cars. The judgment contains a prohibition against power boat launchings, and only a single dock may be constructed at the property. In addition, the judgment requires that the developers repair and replant a green belt on the lake shore which had been disturbed by previous development operations.

Heisel said he "welcomed the cooperative spirit shown by the Walloon View Brae developers" in working out restrictions which were mutually acceptable to both the Association and the developers.

The Walloon Lake Association is a non-profit Michigan corporation which is comprised of persons owning property on Walloon Lake and others interested in the lake. The association has a long history of monitoring lake development for the overall benefit of the region.

Milestone Achieved

In a notice to their own members, the Association Trustees referred to this legal action as "... a significant milestone in our continuing efforts to protect Walloon Lake from overcrowding and exploitation."

News Release of 1977 Important

For the past several years, the Walloon Lake Association has moved aggressively to fight the growth of "funnel" subdivisions, feeling that a proliferation of these "funnels" along the shoreline could quite literally ruin this uniquely beautiful lake. In the summer of 1977, and again in 1978, the Trustees ran a large advertisement in the local newspapers to publicize their position on this issue and to serve notice to interested real estate developers. In the summer of 1978, the Association announced the signing of a legally binding restrictive agreement with the developers of the Wildwood-on-Walloon subdivision. This agreement, which was the subject of an article in the November 1978 RIPARIAN, was negotiated between the parties without resorting to legal action. In addition, the Association has worked with local zoning authorities to try to develop ordinances which place reasonable restrictions on the use of the lake by backlot subdivision owners. One of the five townships around the lake has now adopted an ordinance which prohibits using lakefront residential property as a private access site for "funnel" subdivisions.

The lawsuit against the Walloon View Brae project is only the latest chapter in what promises to be a continuing struggle to protect Walloon Lake from overcrowding and unreasonable exploitation. In a recent newsletter to its members, the Trustees said "... This is everybody's fight. We urge every member of the Walloon Lake Association to take an active part, in whatever manner he or she feels is appropriate to protect his or her riparian rights."

Peace Pact' Ends Hampton Lake Battle

REPRINTED FROM THE KALAMAZOO GAZETTE FEBURARY 3, 1980

by Tom Haroldson
Gazette Staff Writer

A disagreement over developments on Hampton Lake in Portage that began with clenched fists and scowls has ended with firm handshakes and smiles.

The change in attitudes is the result of an agreement between developers of a $7 million Greenspire Apartments expansion proposal and several lake residents.

The peace pact, which basically limits future use of Hampton by Greenspire, has been lauded by both sides as "innovative" and "farsighted."

It also heads off what could have been a long fight, and possible law suit, involving the 22-acre lake, the headwaters of Portage Creek.

For the developers, Joseph Gesmundo and Roger Hinman, it also clears the way for city council approval of a request to rezone three parcels of property at Greenspire.

Led by lake resident Dr. Russell Mohney, of 3500 Vanderbilt, some lake residents protested the beach's development, stating it would damage the "fragile" nature of the lake, especially since it could be used by a potential 1,000-plus Greenspire residents.

Mohney and others also opposed building any apartments close to the lake shore, primarily for aesthetic reasons, and the drilling of water wells.

Joining the residents in the battle were the Department of Natural Resources, which has a public access site on the lake, and a drove of environmental groups.

HAMPTON LAKE BATTLE ENDS WITH HANDSHAKE, SMILES
Developer Joseph Gesmundo (left) and Russell Mohney

The protestors asked for an environmental assessment study on the development's effects on the lake prior to any consideration of the rezoning requests.

Mohney, who put in long hours to organize the resistance and research his arguments, could scarcely hide his enthusiasm for the settlement.

"This is one of the most significant environmental agreements ever made," Mohney, a Kalamazoo neurologist, said. "I know of no remaining environmental conflict over this issue."

Key points of the agreement call for:

- The Hampton Lake shoreline will be left in its natural state, which prohibits any beach facility or apartments within 250 feet of the shoreline.
- Apartments will be located so as to protect the pristine nature of the lake.
- No water wells will be permitted and no person will be permitted to occupy any new Greenspire apartment until municipal services are available.
- A single boat dock will be permitted that can be used by no more than eight watercraft, none with internal combustion engines.
- The DNR must be consulted before any alteration of a nearby bog or other land where there may be unique wildlife or identified endangered species.
- The restrictions will be attached to the Greenspire land title after a building permit is issued, insuring the agreement will be followd by all future owners of the property.

"I consider this agreement not only farsighted," Mohney said, "but broad in scope to insure the future enjoyment of the water for subsequent generations.

"Keeping this lake free from harm is vital not only to the lake but to all residents along Portage Creek and those who enjoy its environment.

Interim Zoning For Cass County's Porter Township.

By Mrs. Shirley Ross, Secretary
Porter Township Zoning Commission
(Cass County)

The proposed construction of a 72 unit apartment complex in a single family residential area on Sunset Blvd. between Indiana and Coverdale Lakes and just south of Baldwin and Long Lakes in southern Porter Township of Cass County was the catalyst for the formation of a zoning commission and the writing of an interim zoning ordinance.

The chain of events began on August 14th, 1979 when a petition with 410 signatures was presented to the Porter Township Board at their monthly meeting. These petitions opposed the construction of the complex on the grounds of: the additional traffic and accidents which would be incurred; the additional stress on already over-populated schools, police and fire departments; hazards of lake safety; loss of property values and most importantly, sewage disposal and pollution to the lakes. However, because Porter Township lacked a zoning ordinance, the developer wasn't required to obtain the approval of the Township Board and could go directly to the state for the approval necessary to begin construction of the project.

Everett Dozier, Township Building Inspector, had denied a building permit on the basis of a 1964 local building code which stated that, "the building official has the right to refuse any or all permits that may affect the health, safety or general welfare of the area." The Board was uncertain as to the legality of this action and its authority in making a decision; therefore, Walter Stoner, Township Supervisor, tabled the decision until a legal opinion could be obtained. The Board did, however, assure the lake residents that no further action would be taken without holding a public hearing.

After the outcome of the August 14th Township Board meeting, approximately 100-125 lake residents met on Monday August 20th to formulate a plan to prevent the building of the apartment complex. Donald Winne, editor of the Michigan Riparian and Executive Director of the ML&SA, and Supervisor Stoner both spoke to the group. Don impressed upon everyone the importance of forming an effective association to protect private landowner's rights, while Mr. Stoner suggested that petitions be circulated, asking the Township Board to implement zoning. This gave birth to the Porter Association of Concerned Citizens (PACC). Don also commented that since Indiana and Coverdale Lakes are in a watershed area of 9 square miles what happens on them affects other lakes in Porter Township.

At the September 11th meeting of the Township Board, it was revealed that the 72 unit apartment complex could be legally constructed, according to the township's attorney, Jerry O'Connor. Mr. O'Connor told the Board that it had elected to become an enforcing agency for the Michigan State Construction Code and therefore the 1964 local building code ordinance (cited by Building Inspector Dozier) was invalid.

Attorney O'Connor further instructed the Board that it was the duty of the building inspector to issue a permit for multi-housing providing the plans had been approved by the State Plan Review Division and the appropriate fees had been paid. He added that it would take a new township zoning ordinance to control the building of multi-occupancy housing. At this point, the PACC presented petitions containing 623 signatures of township residents to the Board. The petitioners were in favor of establishing a zoning commission. The Board voted unanimously to accept the petitions and agreed that it would name a seven member zoning commission to be presented at the Board's next monthly meeting.

On October 9th the Township Board nominated the following persons to the Porter Township Zoning Commission: Albert Filbrandt - Agriculture; Sid Hagerty - Baldwin Lake; Robert Hutton - Agriculture; Paul Kubic - Shavehead Lake; Mrs. Frances (Willie) Pipher - Agriculture; Shirley Ross -Birch Lake; and Wayne Stutsman - Indiana Lake. Immediately following these appointments, Tom Hines, president of the PACC, requested that the Township Board authorize the Zoning Commission to establish interim zoning for the lakes of the township, according to Section 15 of P.A. 184 (the Rural Township Zoning Act) as amended through 1978. Interim zoning is allowed for the period of one year unless superseded by the adoption of a master zoning ordinance. After much discussion, the Board agreed to authorize interim zoning for the entire township and set a 45 day period for its establishment. This action meant that the contractor would have to apply for and receive a building permit prior to the establishment of interim zoning or be unable to construct the apartment complex.

The newly appointed Zoning Commission met for the first time on October 22nd and began the arduous task of writing an interim ordinance by the December 6th deadline. In order to complete the ordinance by early December it was necessary to meet two evenings per week for 3-3½ hour meetings. At the fourth meeting held on November 1st the Commission was informed that a building permit had been issued to contractor Dennis E. Fuller allowing construction of one of the three proposed 24 unit buildings. The members were disappointed but felt that the Commission could no longer fight construction and that its function, at that point, was to write the best possible interim ordinance for the benefit of all township residents.

The 1974 Porter Township Zoning Ordinance (which had been defeated by the electorate) was used as a guideline for the Interim Ordinance. There were many revisions, deletions, additions and compromises and after 32 hours of meetings (and 21 additional hours of typing and re-typing by the Secretary), the Interim Ordinance, complete with an Interim Zoning Map (the excellent and dedicated work of Commission member, Sid Hagerty) was finished and delivered to the Township Board, Township attorney and the Cass County Planning Commission on December 5th, 1979. We were successful in meeting the 45 day deadline! According to the Ordinance, the township was divided into the following zones: Agricultural ("A"); Residential-1 ("R-1"); Residential-2 ("R-2"), (which allows mobile homes and multi-family dwellings, meeting the requirements set forth in the Interim Ordinance); Lake Residential ("LR") and Comercial ("C"). In the "LR" zone there is a prohibition against "keyhole" developments.

The Interim Ordinance was adopted on February 12th, 1980 at the monthly Township Board meeting, after a delay of several months, while the Board awaited a legal opinion from their attorney who made several minor word changes. The Interim Zoning Ordinance of Porter Township was unanimously accepted by the Board and is now being enforced for the period of one year from the date of adoption. If the Zoning Commission completes work on the master ordinance before the end of the year, the master ordinance, upon its adoption, would supersede the Interim Ordinance. If work is not complete at the end of the first year, the Interim Ordinance can be renewed for another year.

There is a happy ending to this story for both the lakes and their residents. At the April 8th, 1980 Township Board meeting, contractor Fuller informed the Board that he no longer planned to construct the apartment complex. The building permit fee was refunded and now thanks to the Interim Zoning Ordinance all multi-family dwellings are confined to the "R-2" areas of the township.

Shirley J. Ross
Secretary
Porter Township Zoning Commission

ML&SA NEWS

By Cecile Harbour

NEW ML&SA MEMBERS

Region III
LAKE MARGRETHE PROPERTY OWNERS ASSOCIATION, Crawford County
Cal Brenner, President

Region IV
BIRCH LAKE IMPROVEMENT ASSOCIATION, Cass County
Robert Ross, President

KEELER LAKE PO ASSOCIATION, Van Buren County
Joseph G. Slapinski, President

SCRAM LAKE ASSOCIATION, Kent County
(reinstated)
(No name to date)

PROPERTY OWNERS ASSOCIATION OF LINCOLN LAKE, Kent County
Ted Vronko, President

Region V
WATKINS LAKEFRONT OWNERS ASSOCIATION, Oakland County
H. James Elliott, President

APPLICATION FOR MEMBERSHIP IN MICHIGAN LAKE AND STREAM ASSOCIATIONS, INC.

(Name Of Organization) (Lake or Stream)

(Address) (Township) (County)

(City) (Zip)

LAKE INFORMATION:

Year Organization was formed _____ Lake Location (County) _____ Lake Size _____

Are you incorporated? _____ Under What Act? (Summer Resort #137) _____ (Non-Profit #327) _____

President's Name & Address:

(If communication should be sent to a person other than the president, please list below.)

Dues for membership in ML&SA for 1980 includes a base amount of $25.00 for associations with less than 150 members or $35.00 for associations with 150 or more members plus 18 cents per member. **Associations who join after the first of the year will pay a pro-rated amount for the remaining months of the year.** (i.e., An association with 60 members joining in February would pay 10/12 of $25.00 plus $8.40 or $27.87).

A check to cover dues should be made payable to Michigan Lake and Stream Associations, Inc., and sent along with the completed application to:

Michigan Lake and Stream Associations, Inc.
9620 East Shore Drive
Portage, MI 49002

ALGONQUIN LAKE COMMUNITY ASSOCIATION, Region 4. The monthly newsletter is filled with interesting accounts of association activities and local events, with a calendar of the activities. The association has a goal of 140 family members for 1980. Due to the winter draw-down the weed problems have diminished.

AUSTIN LAKE IMPROVEMENT ASSOCIATION, Region 4. The Nautical, published quarterly is distributed to the riparians, whether they are ALIA members or not. The April issue advised readers to use good judgment in lawn fertilizing -- that "what makes your lawn green can also cause your lake to turn green". A filing cabinet has been purchased to store association records.

BEAVER LAKE ASSOCIATION, Region 3. The association will be monitoring a dredging project authorized by the DNR. The Self-Help readings for 1979 indicated no decrease in transparency from the 1978 readings. The DNR planted 1500 tiger muskies in 1979 and will furnish pike fry for the rearing pond in 1980.

BIRCH LAKE IMPROVEMENT ASSOCIATION, Region 4. This is a new association and a new ML&SA member. Among the projects planned are the upgrading of the water quality; improving fish populations; making health and safety programs available to the membership; and addressing local affairs. It is enrolled in the Self-Help program. 7500 rainbow trout were planted this spring, added to the 5000 stocked in 1979.

BLACK LAKE ASSOCIATION, Region 3. The Yearly Banquet is scheduled for August 20 at St. Pauls Hall in Onaway at 6:30 p.m. Tickets are available from all Beach Representatives at $5.00 per person. Reservations can be made by calling 517/ 733-8972 or 517/ 733-8093. A good program has been planned for the evening.

BLUE LAKE TOWNSHIP CIVIC ASSOCIATION, Region 2. Chuck Grant of the NW Michigan Planning Commission presented a slide show on water quality at the May meeting. The association is participating in the Self-Help program again this year. Members can secure bottles for well water samples to be tested by the Health Department.

CAVANAUGH LAKE ASSOCIATION, Region 5. This association was formed in 1979 and has 73% of the property owners as members. It is enrolled in the Self-Help program and is proposing as members. It is enrolled in the Self-Help program and is proposing a township zoning ordinance to control keyhole access. The association leaders are working with the County for better control at the park access.

COREY LAKE PO ASSOCIATION, Region 4. A full agenda for the July meeting included water quality testing, fish stocking and renewal, spot zoning in the Township, water safety regulations and Ripairan rights. A petition is being circulated for an anti-funneling township zoning ordinance.

ELK-SKEGEMOG LAKES ASSOCIATION, Region 2. In the summer of 1979, the NW Michigan Planning Commission in cooperation with the association surveyed the entire shoreline of the lakes and the Torch and Elk Rivers. The purpose was to determine what, if any, contamination was present and the causes. Presence of "cladophora" (a genus of algae) along the shore, is a good sign that phosphorous is entering the water. By observation and by talking with riparians when cladophora was discovered, the cause was determined. Lawn fertilization ranked highest as a possible source with drain systems a close second and mal-functioning or old septic systems a high third. In decreasing order were lakeshore dumping, animal wastes, erosion, unknown causes and natural causes. A map, included with the July newsletter pin-points the "hot-spots" of cladophora. The Directors have decided that the most effective action to be taken is the education of the property owners.

FISH LAKE PO ASSOCIATION, Region 5. Members are urged to make the 80's the "We Generation" by strengthening the association. The roads in the area are owned by the association and "speed bumps" have been built to try to reduce speeding. A study will be made of the effectiveness of this measure. Members have been provided with gravel to fill chuckholes near their properties. Vandalism is a problem in the area.

HEART LAKE ASSOCIATION, Region 3. The association will participate in an extensive study conducted by the NE Michigan Council of Governments, under a federal grant. Meetings will be held between the riparians and the lake study personnel during the summer. The association must contribute $500.00 to the study. It also participates in the Self-Help program.

HESS LAKE IMPROVEMENT ASSOCIATION, Region 2. A committee has been formed to study costs for chemical treatment from the air of weeds and the costs for harvesting and bailing. Efforts are being made to secure Federal funding for sewer construction, but it appears that the lake area may not qualify.

KEARSLEY LAKE ASSOCIATION, Region 5. The Self-Help report for 1979 indicated "fair" water quality. The project will be continued in 1980. The dam was examined during a draw-down and corrective work will be done this summer. The association has made application to incorporate. Due to an accumulation of weeds in a section of the lake, the golf courses adjacent to the lake and in the watershed have been asked to use low phosphate fertilizers.

LAKE CHARLEVOIX PO ASSOCIATION, Region 2. A water quality study to determine sources of pollution has begun. The first step is to identify all the riparian property owners. A survey of the Cladophora growth (see Elk-Skegemog news) will be a part of the study. A second effort by the association is to attempt to limit the phosphorous discharge from the Fish Hatchery on the Jordan River. The NW Michigan Planning Commission, the Charlevoix County Commission, the Tip of the Mitt Watershed Council and the District Health Department support the effort.

LAKE FENTON P.O. ASSOCIATION, Region 5. The association hosted the ML&SA Region V Spring Meeting, March 23. The hospitality is appreciated. Because the Sheriff's Department Marine Safety Patrol budget has been curtailed, the association sponsored the Boating Safety Classes for 12-16 year olds. A Wetlands and Flood Plains ordinance for Fenton Township is under study. Research has started on the history of the lake. A Snowmobile Safety class was sponsored by the association in February. The April issue of the newsletter is outstanding.

LAKE LAPEER ASSOCIATION, Region 5. The association is helping to set new zoning laws; working to save the islands; maintaining the boat launch; improving water safety; stocking fish; has a Political Action Committee; a New Home Plan Approval Committee; a water ski club and a Hobie sailing club.

LAKES PRESERVATION LEAGUE, Region 5. The association newsletter reports the meetings of the 3 townships that are contiguous to the lakes. It plans to conduct PR training this summer; hold an EMT demonstration; provide environmental speakers for meetings; and to have an annual membership party. It offers prizes to members who recruit the greatest number of new members to the association It is enrolled in the Self-Help program and is consulting with tht DNR about fish stocking. Monthly newsletters keep members well-informed.

PINE LAKE ASSOCIATION, Region 4. The Barry County Co-Marine Division has offered to hold a 2-day courtesy Safety Inspection for watercraft with stickers to show inspection. There will be a demonstration of the decibel meter to help enforce the State 86 DCB noise limit and the radar to enforce the 55 MPH State law. The "new look" for the newsletter is great!

PINE LAKE PO ASSOCIATION, Region 5. The association and township are cooperating in the enforcement of an ordinance requiring building permits for permanent structures, shoreward. Riparians are reminded that they are responsible for cleaning the beaches. The weed harvester is not the only source for weeds as anchors, motor props and fish hooks pull up a considerable amount. A good map of the traffic patterns on the lake was included with the May newsletter.

(Continued On Next Page)

ML&SA NEWS....
(continued from page 13)

SILVER-MARL LAKES ASSOCIATION, Region 5. The annual meeting agenda included the association attorney, Joseph Hollander (also legal counsel for ML&SA), a representative from the Sheriff's Department and a speaker from Region V on lake eutrophication. Attached to the May newsletter was the flier prepared by Gale Arent, Kalamazoo County Extension Director, on fertilizing lawns and lake lots. This first appeared in the Riparian and we're happy to see it used again.

STURGIS DAM CITIZENS FOR ACTION ASSOCIATION, Region 4. The DNR has planted 30,000 walleyes in the rearing ponds maintained by the association. A contribution of $25.00 was made to the Mendon Fire Department to assist in the purchase of a "Jaws for Life" tool. A short history of the association was included with the April newsletter.

THREE LAKES ASSOCIATION, Region 2. 2300 copies of the winter issue of the newsletter were mailed. It was an excellent report to members of the TLA activities and should be read by everyone in the area. The summer activities include nature walks, bird-watching, tour of the TLA water quality lab, water quality workshops, a dinner-dance at the Hilton Shanty Creek (site for the ML&SA Annual Meeting) and a jogging race. TLA is on the move!

MICHIGAN LAKE &
19th ANNUAL MEET
Theme: "Wa
Hilton Shanty Creek Sports Resor
Michigan Toll Free

PROGRAM

Friday, October 24

4:00-8:00 Registration
5:00-6:00 Dinner Hour
7:00-8:00 "Cracker Barrel" session
Dr. Ray White, MSU

Saturday, October 25

7:30-8:30 Board of Directors Breakfast
8:00 a.m. Registration Continued
10:00 First General Session, ML&SA
President Cecile Harbour, Presiding
Keynote Speaker, Honorable Judge John Feikens, U.S. Eastern Michigan District Court, Detroit, Michigan
11:30 Time for Exhibits
12:00 Lunch

1:00 First Session Saturday Seminars
A. **MICHIGAN'S WATER**, Dr. Thomas Straw, Professor of Geology, Western Michigan University.
B. **WATER & FOOD**, Dr. Don Garling Professor of Fisheries & Wildlife Michigan State University
C. **WATER & WETLANDS**, Dr. Charles Wolverton, Land Resource Programs, Department of Natural Resources, Lansing.
D. **WATER & LAWS**, Craig B. Smith Department of Natural Resources, Roscommon Office.
E. **GROUNDWATER CONTAMINATION**, Jack Bails, Environmental Enforcement Division, Department of Natural Resources, Lansing.
F. **WATER & HEALTH**, Dr. James Lampky Professor of Biology, Central Michigan University, Mt. Pleasant.
G. **WORKSHOP FOR NEW & PROSPECTIVE ML&SA MEMBERS**, Cecile Harbour, President, ML&SA. (Will not repeat).

2:15 Break
2:30 Saturday Seminars Repeated
3:45 Regional Meetings
4:45 Exhibits, Conversation, Rest and Relaxation
6:00 Dinner
7:30 Second General Session, Annual ML&SA Business Meeting

Sunday, October 26

7:30 a.m. Breakfast
9:00 First Session of Sunday Seminars
H. **WATER FOR AGRICULTURE & INDUSTRY**, Dr. Leighton Leighty, Michigan State University.
J. **PROTECTING MICHIGAN'S WETLANDS**, Ruth O'Gawa, Environmentalist, Petoskey.
K. **WATER & POLITICS**, Pat Cayemberg, Chairman Water Resources Commission, Department of Natural Resources.
L. **WATER & LAKE MANAGEMENT**, Tom Weaver & Chuck Grant, Northwest Regional Planning & Development Commission, Traverse City, Michigan.
M. **WATER & ENERGY**, Dr. Otto Krauss, Ass't. Director, Division of Engineering Research, Michigan State University.
N. **LAKE SAMPLING & LAKE MONITORING PROGRAMS**, Robert Koch, Northeast Michigan Council of Governments, Gaylord.
O. **ORIENTATION OF NEW ML&SA DIRECTORS**, Cecile Harbour, President, ML&SA. (Will not repeat).
10:00 Exhibits & Break
10:30 Seminars Repeated
11:30 Third General Session
12:00 Lunch
1:00 Board of Directors Meeting.

CONFERENCE INFORMATION

The 1980 Conference and Annual Meeting of Michigan Lake & Stream Associations is being hosted by Region V under the direction of Paul Clark, Vice-President. It is being held at Hilton Shanty Creek Sports Resort & Conference Center, Bellaire, Michigan, October 24-26, 1980.

Please make reservations for housing and meals at the Center by completing & returning the accompanying reservation form as soon as possible but no later than September 24, 1980.

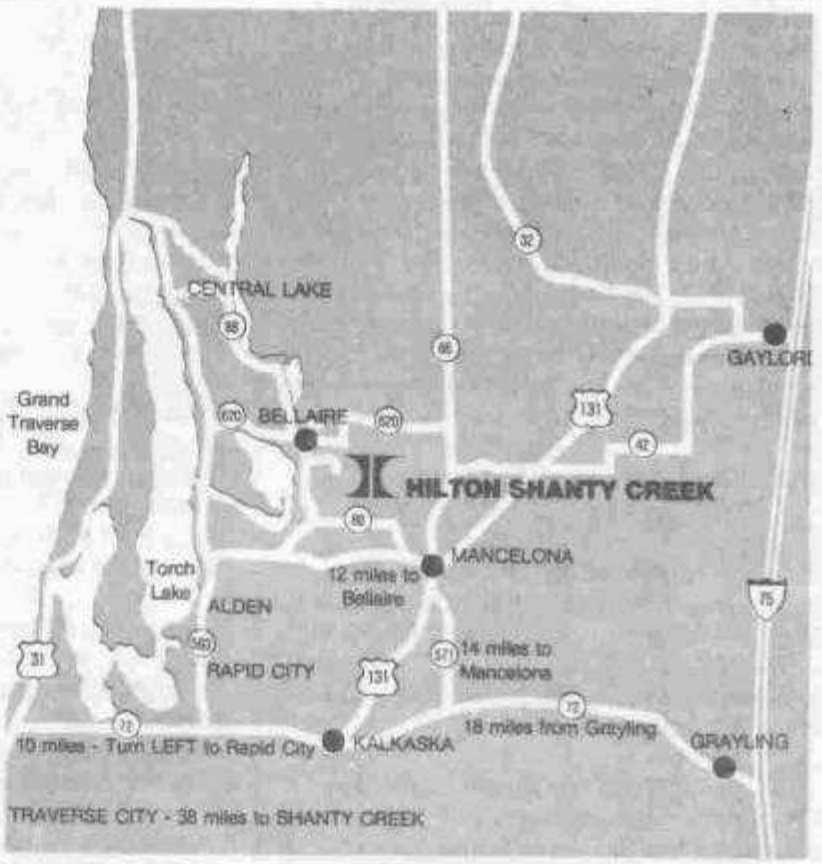
As in the past, a number of exhibitors will be displaying products & services of interest to riparian property owners. Time is scheduled for meeting with the exhibitors.

STREAM ASSOCIATIONS
NG; OCTOBER 24,25,26, 1980
ter - A Limited Resource"
& Conference Center, Bellaire, Michigan 49615
800-632-7118 Bellaire 616-533-8621

HILTON SHANTY CREEK

REGISTRATION FEE PER PERSON:
Entire Conference $9.00
One Day Only $5.00
MEALS (Price includes 15 percent gratuity):
Breakfast $4.00
Lunch $5.20
Dinner $13.80
HOUSING:
Single Room One Person $25.00
Double Room Two People $37.00
PACKAGE COST:
Two Nights Four Group Meals;
Single Room (1) $78.00
Double Room (2) $130.00
One Night Four Group Meals;
Single Room (1) $53.00
Double Room (2) $93.40

Registration fee and meals will be paid at time of registration and housing at check-out time.



RESERVATIONS FOR ML&SA ANNUAL MEETING, *OCTOBER 24-26, 1980, HILTON SHANTY CREEK, BELLAIRE, MI*

Please complete and return this form to:
HILTON SHANTY CREEK, RESERVATIONS
P.O. Box 355
Bellaire, MI 49615

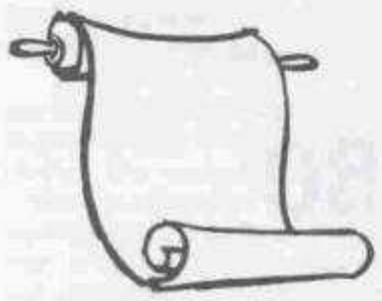
Arrival Date _____
Arrival Time _____

NAME _____ TELEPHONE _____ DATE _____
ADDRESS _____ CITY _____ ZIP _____

Lodging Requested:	**Number of Rooms**	**Number of Persons**
Friday night (October 24, 1980)		
Saturday night (October 25, 1980)		

Meals Requested:	**Breakfast** (no. Persons)	**Lunch**	**Dinner**
Saturday (October 25, 1980)			
Sunday (October 26, 1980)			

To confirm your reservation, a $38.00 deposit must accompany this form. All non-deposited rooms will be released on September 24, 1980. Refund will be made only if written cancellation is received 14 days prior to your arrival.



The Board of Directors Recommends By-Laws Revisions!

The Board of Directors requested last November that the By-Laws of the organization be reviewed and that suggested revisions be made at the spring 1980 meeting for consideration by the Board. The following revisions were presented to the Board at the May meeting. The Board took action to recommend that these changes be considered for adoption at the Annual Meeting in October. In order to meet the 30 day notice requirement, it is being printed in this issue of the Riparian, and will be acted upon by the delegates at the Annual Business Meeting to be held at 7:30 p.m., Saturday, October 25, 1980. The Board believes that these changes will more clearly define the authority and responsibility of the Board and will further professionalize the organization making it possible for the State-wide organization to better serve its members. It is recommended that the words with dashes through them be deleted and the capitalized words be added.

BY-LAWS OF MICHIGAN LAKE AND STREAM ASSOCIATIONS, INC.

ARTICLE I - OFFICES

Section 1. The name of the corporation is Michigan Lake and Stream Association, Inc.

Section 2. THE location of the current registered office is: 9620 East Shore Drive, Portage, Michigan 49002.

ARTICLE II - PURPOSES

The ~~purpose or~~ purposes for which the corporation is formed are as follows:

1. To promote research and study of the water resources of the State of Michigan.
2. To collect and disseminate information about the water resources of the state.
3. To encourage and assist lake and stream associations to plan and carry out programs designed to restore and/~~or~~ preserve the quality of water in lakes and streams and the adjacent lands.
4. To focus attention on uses of the water resources of the State which are or may become injurious to the public health, safety and welfare.
5. To publicize and promote the uses of the water resources of the State which have minimal negative impact on water quality.
6. To encourage the formation of associations by riparians for the purpose of improving and conserving the water resources of the State.
7. To understand and support the current Michigan interpretation of riparian rights.
8. To do any and all other things lawful in connection therewith, for a non-profit corporation.

ARTICLE III - MEMBERSHIP

Section 1. Membership shall be limited to lake and stream associations, individuals, groups, organizations or corporations in Michigan whose members have an interest in the development and use of their riparian rights.

Section 2. Individuals, groups, organizations, associations or corporations with interest corresponding to those of RIPARIAN property owners may become associate members upon aproval of the Board of Directors and the payment of designated dues. Such members do not have voting privileges and may not hold office.

Section 3. Any member may resign by filing a written resignation with the President, but such resignation shall not relieve the resigning member of the obligation to pay any dues, assessments or other charges theretofore accrued or assessed or unpaid.

ARTICLE IV - BOARD OF DIRECTORS

Section 1. The management of the affairs of this corporation shall be ~~subject to the supervision~~ VESTED IN AND EXERCISED BY OR UNDER THE AUTHORITY OF ~~a~~ THE Board of Directors.

Section 2. A PERSON MUST BE A RIPARIAN PROPERTY OWNER IN THE STATE OF MICHIGAN TO BE ELIGIBLE FOR MEMBERSHIP ON THE BOARD OF DIRECTORS.

Section 3. The State of Michigan ~~shall be~~ IS divided into five regions from which the Board of Directors shall be elected ~~by the membership~~ at the Annual Meeting.

Section 4. Each region shall be entitled to ~~up~~ ~~to~~ five directors to serve three years beginning immediately after the Annual Meeting at which they are elected and expiring at the Annual Meeting of the third year, ~~providing that.~~ Only one individual may be elected or appointed from any one member association. In the event a region is unable to fill its quota of five (5) directors, the President may appoint, in any region, additional directors whose term will expire at the next Annual Meeting.

Section 5. Should any duly elected director be unable to serve, the President ~~is authorized~~ SHALL, with the advice of the regional Vice-President, ~~to~~ fill the vacancy until the next Annual Meeting.

Section 6. The Board of Directors shall fix the salaries of all employees of the corporation.

Section 7. A quorum shall be a majority of the duly elected and/~~or~~ appointed members of the Board of Directors.

Section 8. The ~~President may~~ BOARD OF DIRECTORS SHALL, BY A ⅗ VOTE OF ITS MEMBERS, appoint ~~a director~~ AN EXECUTIVE DIRECTOR of the corporation. ~~to serve as Executive Director.~~ This appointee shall carry out the managerial function of the Michigan Lake and Stream Associations, Inc. The appointee may not hold any other ML&SA office. The tenure of office of the Executive Director shall continue as long as that person satisfactorily carries out the duties of the office as defined by the Board of Directors. Failure to fulfill the duties of the office shall be grounds for removal, BY A MAJORITY VOTE OF THE MEMBERS OF THE BOARD OF DIRECTORS. An evaluation of the work and activities of the Executive Director shall be made annually and whenever any two members of the Board of Directors submit a request in writing to the President.

Section 9. A MEMBER OF THE BOARD OF DIRECTORS MAY BE EXCUSED FROM ATTENDANCE AT A REGULAR OR SPECIAL MEETING OF THE BOARD BY NOTIFYING THE SECRETARY AT LEAST FIVE DAYS PRIOR TO THE MEETING. UNEXCUSED ABSENCE FROM TWO CONSECUTIVE MEETINGS OF THE BOARD SHALL BE THE BASIS FOR REMOVAL FROM THE BOARD.

Section 10. THE BOARD OF DIRECTORS MAY, BY A MAJORITY VOTE OF ALL DIRECTORS THEN IN OFFICE, APPOINT AN EXECUTIVE COMMITTEE OF NO LESS THAN THREE AND NO MORE THAN FIVE DIRECTOS TO MEET AND ACT ON BEHALF OF THE BOARD OF DIRECTORS BETWEEN MEETINGS OF THE BOARD. THE EXECUTIVE COMMITTEE SHALL POSSESS AND MAY EXERCISE SUCH POWERS AND DUTIES AS THE BOARD BY RESOLUTION MAY SPECIFY. A MAJORITY VOTE OF THE MEMBERS OF THE EXECUTIVE COMMITTEE SHALL BE NECESSARY IN EVERY ITEM OF BUSINESS.

Section 11. The Board of Directors may determine the boundaries of each region within the State of Michigan as it deems advisable. ~~and may elect or appoint by a majority of these Directors present a regional Vice President.~~

Section 12. ~~If a special situation arises and the Board of Directors approve,~~ a ~~A~~ vote of the Board of Directors ~~or the membership~~ may be conducted by mail IF APPROVED BY A RESOLUTION ADOPTED BY A MAJORITY OF THE BOARD OR IF REQUESTED BY THE EXECUTIVE COMMITTEE. This vote shall have the same effect as if taken ~~at the Annual Meeting or~~ at a meeting of the Board of Directors. Such motions shall constitute a part of the meeting next in session.

ARTICLE V - OFFICERS

Section 1. The officers of Michigan Lake and Stream Associations, Inc., shall be the President, Vice President, ~~five regional Vice Presidents,~~ Secretary and Treasurer, and shall be elected by the Board of Directors at its Annual Meeting. No one shall be eligible to the office of President, Vice-President, ~~or regional Vice President~~ who is not a director of the corporation. The office of secretary and treasurer may be held by one person. The respective officers shall hold office for the term of one year or shall hold office until their successors are duly elected and qualified.

Section 2. REGIONAL VICE-PRESIDENTS SHALL BE ELECTED BY AND AT A MEETING OF EACH REGION'S DELEGATES AT THE ANNUAL MEETING, AND MUST BE A DIRECTOR OF THAT REGION.

Section 3. The President shall preside at all Directors and membership meetings; shall have general supervision over the affairs of the corporation and over the other officers; and shall perform such other duties as are incident to the office.

Section 4. The Vice-President shall assume the duties of the President when absent or disabled and carry on such traditional duties of the office as may be necessary.

Section 5. Regional Vice-Presidents shall preside at meetings of the Directors of each such region and shall assist the President in carrying out the duties and policies of the corporation.

Section 6. The secretary shall issue notices of all Directors and membership meetings; shall attend and keep the minutes of the same; shall have charge of all corporate records and shall perform all such other duties as are incident to the office.

Section 7. The treasurer shall have custody of all monies and securities of the corporation; shall sign all checks of the corporation, shall keep regular books of and shall submit them, together with all vouchers, receipts, records and other papers, to the Directors for their examination and approval as often as they may require; and shall perform all such other duties as are incident to the office. The treasurer shall be bonded.

ARTICLE VI - COMMITTEES

Section 1. STANDING AND special committees ~~will~~ SHALL BE AUTHORIZED BY RESOLUTION OF THE BOARD OF DIRECTORS ~~to properly carry out the needs of the members~~ WITH APPOINTMENTS BEING MADE BY THE PRESIDENT.

Section 2. ~~Nomination for the offices of President, Vice President, Regional Vice Presidents, Treasurer and Secretary may be made by a nominating committee named by the President and/or from the floor by members of the corporation in annual session.~~ THE BOARD OF DIRECTORS SHALL APPOINT A NOMINATING COMMITTEE THAT SHALL PRESENT NOMINEES FOR THE OFFICES OF PRESIDENT, VICE-PRESIDENT, SECRETARY AND TREASURER FOR THE ENSUING YEAR.

ARTICLE VII- MEETINGS

Section 1. The Annual Meeting shall be held at such time and place as approved by the Board of Directors. Written notice of said Annual Meeting shall be sent to all members not less than thirty days in advance of said Annual Meeting.

Section 2. ~~Voting on motions or resolutions may be done by any of the accepted parliamentary procedures.~~ Each member association shall be entitled to one vote on any matter submitted to the vote of the membership. MOTIONS AND RESOLUTIONS PASSED BY THE MEMBERSHIP SHALL BE ADVISORY TO THE BOARD OF DIRECTORS, UNLESS OTHERWISE PROHIBITED BY LAW.

Section 3. A majority of the members present and/~~or~~ voting shall constitute a quorum for the transaction of business at the Annual Meeting, special meetings, or vote conducted by mail.

Section 4. Regular meetings of the Board of Directors shall be left to the discretion of the President ~~or Secretary~~ providing a minimum of two meetings of the Board of Directors be held yearly.

Section 5. Special meetings of the Board of Directors shall be called by the President, or at the request of not less than five members of the Board of Directors, providing ten days notice of the proposed meeting, the meeting site, and the business to be considered, is given.

ARTICLE VIII - FINANCES

Section 1. Dues for membership in the corporation shall be set by the Board of Directors.

Section 2. Any and all monies shall be forwarded to the Treasurer who shall deposit the amount collected.

Section 3. The Corporation shall operate on a calendar year.

Section 4. The annual audit of the financial accounts of the corporation shall be made by an auditing committee from the Board of Directors as named by the President.

ARTICLE IX - AMENDMENTS

Section 1. The By-Laws may be amended, ~~modified, or rescinded and additions hereto may be made by the vote of a majority of the eligible votes cast at any Annual Meeting, provided that the notice of such meeting must be given thirty days in advance of said Annual Meeting, and shall set forth in detail the matters for consideration.~~ BY RESOLUTION ADOPTED BY A ⅔ VOTE OF THE MEMBERS OF THE BOARD OF DIRECTORS. WRITTEN NOTICE OF ANY SUCH PROPOSED AMENDMENT SHALL BE GIVEN TO ALL DIRECTORS AT LEAST TEN DAYS PRIOR TO ANY REGULAR OR SPECIAL MEETING OF THE BOARD.

ARTICLE X - PARLIAMENTARY AUTHORITY

Section 1. ~~Conduct of meetings shall be by Roberts Rules of Order.~~ THE RULES CONTAINED IN THE CURRENT EDITION OF ROBERT'S RULES OF ORDER, NEWLY REVISED, SHALL GOVERN THE ASSOCIATION IN ALL CASES TO WHICH THEY ARE APPLICABLE AND IN WHICH THEY ARE NOT INCONSISTENT WITH THESE BY-LAWS AND ANY SPECIAL RULES OR ORDER THE ASSOCIATION MAY ADOPT.

ARTICLE XI - DISSOLUTION

Section 1. In the event of dissolution, all assets real or personal, shall be distributed to such organizations as are qualified as tax exempt under Section 501 (C) (3) of the Internal Revenue Code or the corresponding provisions of a future United States Revenue Law.

Task Force Says Michigan Water Laws Need Changing

(Reprinted from the Great Lakes Fruit Growers News, May, 1980.)

Michigan needs a new system of water law if farmers are to continue to have an assured supply of irrigation water, according to a task force investigating the subject for Michigan Farm Bureau.

The task force recommends that legislation be enacted which sets up a water-use permit system for critical water areas, with agricultural interests clearly established as having high-prioirty access to the available waters. Such a permit system would be patterned after that used in Iowa for the last decade and reportedly well-received by the farmers of that state.

However, because of the complexity of water law and the many competing interests having a stake in the resource, getting the necessary legislation passed is a longterm goal, says Al Almy, Farm Bureau public affairs director and a member of the task force.

After two years of work the task force completed its report and recommendations in January and submitted them to the Michigan Farm Bureau board of directors for their evaluation. The board voted at its April meeting to accept the report and make efforts to implement the recommendations.

The task force was appointed by the delegates to the 1977 MFB annual meeting to deal with the problem of growing conflicts in the use of surface and ground waters as agricultural irrigation increased rapidly through the 1970's. The amount of farmland irrigated jumped from about 73,000 acres in 1970 to nearly 278,000 acres in 1977, a nearly fourfold increase.

Along with the extra demand on water for irrigation came an increase in the number of complaints made against agricultural irrigators, the task force report noted. ***"The allegations have included depletion of domestic wells, excessive withdrawal of surface water and diminution of recreational, wildlife and fishery resources,"*** the report stated. ***"Nearly all of the complaints involving agricultural irrigation have been resolved without legal action.***

"Demand for water from the three largest sectors of Michigan's economy — industry, agriculture and tourism — is expected to increase during the 1980's [and lead to additional potential conflicts amoung competing users]."

The task force appointed was composed of members both from within and outside agriculture. Besides Mr. Almy, Michigan Farm Bureau was represented by its president, dairy farmer Elton Smith of Caledonia. Dairy farmer and irrigator Bill Spike of rural Owosso was also a member. From the Michigan State University faculty were recently retired agricultural engineering professor Ernie Kidder, farm management specialist Gerald Schwab of the agricultural economics department and resource development professor Leighton L. Leighty, an attorney and specialist on Michigan water law.

The Michigan United Conservation Clubs were represented by Wayne Schmidt, MUCC staff ecologist, and Hale Pearce, chairman of MUCC's water committee. Environmental health director William Baldwin from Mecosta County was also appointed.

Other members were from state agencies. They included Emmanuel Van Nierop, environmental advisor for the agriculture department, and Larry Witte, chief of water management division of the Department of Natural Resources. As ex-officio members of the task force from the DNR were Steve Miller, who works in Mr. Witte's division, and Delbert Johnson, water resource planner from the DNR's land resource programs division. Donald Keech, chief of the ground water quality control section of the state Department of Public Health, was also an ex-officio member of the group.

"I want to emphaze that this report and the recommendations do not at this point reflect the official position of the agencies involved," Mr. Almy said. ***"These are the individual judgements of the members of the task force."***

Now that the Farm Bureau board of directors has approved the report and gone on record supporting legislation to implement the recommendations, the next step is being followed, Mr. Almy explained, ***"Now we're going to the agency members of the task force and asking them to run the recommendations by their policy-making members in order that the agencies can take an official position,"*** he said. ***"We hope to have these positions back to us by late summer.***

"There is bound to be some divergency in these positions. Then we'll try to work out the differences and get something that can receive wide support. We hope to have movement into the legislature next year.

"There is a tremendous complexity to water law, and it will take a long time to get legislation properly drafted. So it will take a long time to get anything passed."

As it is now, he continued, irrigators face a costly investment in setting up their systems, and because of the potential for conflict they have no guarantee their investment will even be usable over the long run. The potential for litigation is now rather serious, and ***"going to court is costly, time-consuming and uncertain, and you may end up not being able to use your system."*** Mr. Almy said.. ***"The task force has said, 'This is not an acceptable way to deal with the problem.' "***

Court resolution of water disputes is a natural procedure under Michigan's present system, which for surface waters is based on riparian doctrine. As the task force report explains, ***"Under the riparian doctrine, each property owner who has access to a water body is restricted from impairing the water for other riparians. The principle that is most frequently used in resolving impairment disputes between riparians is that of 'reasonable use.' Since 'reasonable' is not defined in existing water law it must be re-established for each dispute on a case-by-case basis in the appropriate court of law."***

Complicating the use of water by present-day irrigators is the ***"severance rule,"*** a part of the riparian doctrine. The report states, ***"Under the severance rule the only land that is considered riparian is the original water-bounded property as entered in the original deed [from pioneer times]. Any parcel once separated from the original deed is never riparian land again even if added to the original parcel at a later date."*** Thus it is possible that many irrigators drawing water from surface sources are irrigating on portions of their land that are not legally entitled to the water and therefore have no defense for the practice if it is brought out by a litigant in a court of law.

As a means of simplifying Michigan water law and also assuring a supply to agriculture among the various competitors for the resource, the task force ***"recommends enabling legislation be enacted"*** to cover several points, the report states. First is to ***"implement a water-use permit program for surface and groundwater on a critical water area basis."*** Next is to ***"identify critical water management areas on a watershed basis,"*** and then to ***"allow establishment of minimum in-stream flow standards and/or maximum groundwater withdrawal rates to protect the natural resources of the State from pollution, impairment and destruction."***

The legislation would also need to ***"clarify that commercial agricultural irrigation for food and fiber production is in the public interest and is a reasonable use of water."*** The new laws, the task force recommends, should also modify the severance rule to allow irrigation on all land adjacent to watercourses ***"so long as such is held in the ownership of a single individual or other legal person and is held for the purpose of agricultural production of food and fiber."*** Such legislation should also permit transfer of water from one watershed to another, a practice that is illegal under riparian doctrine, and it should ***"clarify that the riparian rights doctrine is applicable to groundwater,"*** according to the task force recommendations.

Establishment of Critical Water Management Areas along with Water Management Boards to administer them would not necessarily occur on a statewide basis. Mr. Almy explained, ***"Iowa's is a statewide program, but we're talking about a program that could be implemented over a smaller geographical area, such as southwestern Michigan, whereas it wouldn't be elsewhere if there's no problem."*** he said. ***"We're talking about implementation on an as-needed basis, and it could cover an area as small as a single watershed."***

Once a Critical Water Management Area were to be established by the state's National Resources Commission, hydrology and water use studies would be conducted in order to determine how much of the water there is surplus water. Such determinations would also involve considerable input from public meetings, the task force report explains. The surplus waters ***"should be defined as surface waters in excess of established minimum instream flows, water in excess of that needed to maintain critical or legal lake levels, and groundwaters in excess of that needed to maintain the longterm recharge of affected aquifers..."***

Water Management Boards, composed of governmental officials and individual citizens, would then have the responsibility for ***"granting permits to the consumptive users of the surplus water"*** under DNR supervision and according to prioritization of user categories made by the boards. Because of the high priority that would be legislatively granted to food producers, ***"they will have some assurance of water availability,"*** Mr. Almy said. ***"When water is tight, there will be an equitable allocation. This is the response of the task force to the question, 'Is the present system adequate?' The answer we came up with is overwhelmingly 'No.' We have to have a better system."***

State Calls Halt To Gill Netting

By Bob Novosad
Gazette Lansing Bureau

LANSING — Indian gill-net fishing in the Great Lakes was expected to come to a virtual standstill Thursday as the state moved to crack down on tribal fishing activities.

Armed with a sweeping U.S. Court of Appeals ruling, state conservation officers fanned out across Michigan to notify Indian fishermen that they may be arrested if they continue to fish commercially in violation of state law.

The order - Signed by Natural Resources Director Howard A. Tanner - tells Indian fishermen to "cease and desist immediately" from illegal fishing activities.

"If you continue," Tanner warned, "I will recommend that appropriate legal proceedings be instituted which may include criminal prosecution."

The move by Tanner came as Attorney General Frank J. Kelley gave the DNR the green light to move against Indian fishermen in wake of a May 30 Appeals Court decision in the raging controversy.

In a surprise move, the court issued a stay of landmark 1979 decision by U.S. District Judge Noel P. Fox of Grand Rapids which awarded unfettered fishing rights two Chippewa Indian tribes.

GROUNDWATER CONTAMINATION

BY Norris McDowell, Director
Department of Natural Resources Information & Education Division

LANSING — The Michigan Department of Natural Resources brief 75 environmental experts and law enforcement officers from various divisions this week to begin an all-out, six-month battle with 200 of the state's most severe groundwater contamination site problems.

The Groundwater Task Force, composed of three-person teams - an environmental conservation officer, a geologist and water quality or solid waste expert - will set aside certain of their regular job duties during the half-year period to visit identified hazardous waste sites where the groundwater is known or suspected to have been contaminated. The teams will investigate the site geology and groundwater characteristics, seek out responsible parties and gather evidence for escalated enforcement proceedings for all environmental violations.

"This is a full-scale attack on 200 of our most serious groundwater contamination problems" says Task Force Coordinator James Miller.

Miller says a special committee, formed in January of 1980 and composed of DNR, Department of Public Health and citizen interest group representatives, discussed the task force concept and presented it to the Resource Recovery and Natural Resources Commissions and the State Legislature earlier this month.

"At the end of the six months," says Miller, "we expect to report back to the Legislature that enforcement proceedings have been initiated on all possible sites, valuable evidence has been collected, priorities established and cost analysis prepared for continued monitoring and cleanup at all sites.

"Additional monetary cost of the six-month project will be kept to a minimum because we're using existing staff," says Miller, "but the cost in man hours taken from other environmental programs will be high. There's no doubt that many other environmental investigations, routine monitoring projects and permit processings will be delayed during the operation."

"It is impossible to predict what figures we'll come up with next October for projecting additional public expenditures," he says. "We will be concentrating our efforts to insure that the persons responsible for the problems clean them up at their expense."

Dates Set For State Hunting

LANSING (UPI) - The state Natural Resources Commision has set 1980-81 hunting and trapping seasons in Michigan.

They are:

-Firearm deer season, November 15 through November 30.

-Bow and arrow deer season, October 1-October 14 and December 1-December 15 in the Upper Peninsula and December 1-December 31 in the Lower Peninsula.

-Muzzleloader deer season, December 5-December 14.

-Bobcat hunting and trapping, October 25-March 31 in the Upper Peninsula, hunting only Janaury 1-February 28 in Cheboygan, Presque Isle, Otsego, Emmet, Montmorency, Alcona and Alpena counties.

-Hunting and trapping for muskrats and mink, October 25-December 31 in the Upper Peninsula, November 1-January 15 in northern lower Michigan and November 18-January 31 in southern lower Michigan.

-Pheasants, October 10-20 in Menominee County south of U.S 2 and Delta County southwest of the Escanaba River. October 20-November 10 in the Lower Peninsula.

-Crow, August 1-October 15 statewide and December 13-January 29 in lower Michigan.

-Gray, black and fox squirrel, September 15-November 10 statewide.

-Raccoon, October 1-January 31 statewide for Michigan residents. November 1-January 31 for non-residents. Trapping, October 24-December 31 in the Upper Peninsula, November 1-January 15 in northern lower Michigan, November 18-January 31 in southern lower Michigan.

-Ruffled grouse, September 15-November 13 in the Upper Peninsula, September 15-November 14 and December 1-December 31 in northern lower Michigan and October 20-November 14 and December 1-December 31 in southern lower Michigan.

-Sharp-tailed grouse, October 1-31 in Alger, Delta, Chippewa, Luce, Marquette and Schoolcraft counties.

Seaons for migratory game birds will be set later this summer.

EROSION: a serious problem

ON LAND:

According to a report from the New York Times News Service early this year, vital earth resources production of many re-newable and non-renewable materials has reached or is reaching its peak.

The majority of essential nonrenewable mineral resources, such as petroleum and natural gas, and nonfuel minerals such as tungsten, nickel, zinc, lead, silver, tin and platinum have either peaked or are approaching a point close to the highest annual per capita production level it is possible to achieve with current technology.

But study by Lester Brown, director of Worldwatch Institute, the Washington-based research organization, indicates that per capita world production of the earth's principal biolgical, or renewable, resources — cattle, fish, grain and wood — has already peaked and is steadily declining.

The significance of this trend, Brown points out, is that the forests, fishery waters, grasslands and croplands that support these commodities are either being diminished or damaged.

Using data from the United Nations Food and Agriculture Organization and the United States Department of Agriculture, Brown surveyed the per capita production of the six principal biologically originated commodities: fish, beef, mutton, wool, cereals, and wood.

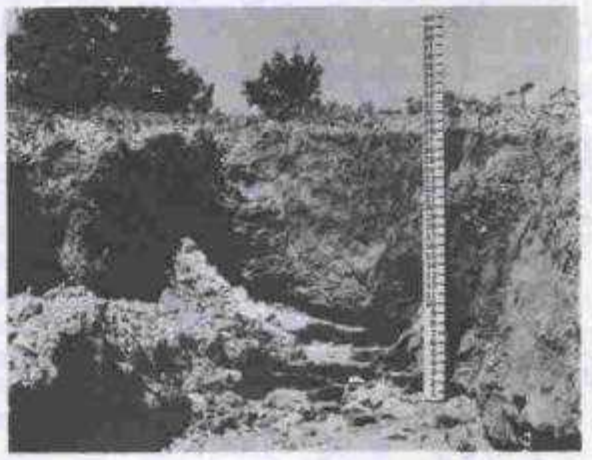
He found that wood production peaked in 1967, when it totaled 2.2 cubic feet per person, and slowly but steadily declined to its present level of 2 cubic feet. Fish from the world's fisheries reached a peak of 43 pounds per person in 1970 and now totals 36 pounds. Beef peaked in 1976 with 26 pounds per person and declined to its present level of 24 pounds.

The mutton output has declined from a high of 4.2 pounds per person in 1972 to the present level of 4 pounds. Wool production reached its peak 20 years ago when production averaged 2 pounds per person. Present data shows total annual per capita production of 1.4 pounds. And the production of cereals from the world's croplands began leveling off in 1971, when 739 pounds per person were obtained, peaked in 1976, when 754 pounds were grown, and declined since then to a total of 701 pounds last year.

Some Michigan land is not suitable for row crops such as corn and soy beans. The pictures below show what happens to fields with a 20 or more degree slope that are showed to row crops, and then deluged with 2½ inches of rain before the seeds send out roots to hold on to the soil.

Michigan loses 40,000,000 tons of top soil a year to rivers, lakes, streams, and low ground. What can be done to avoid this loss? Many farmers are already incorporating best management practices to prevent soil erosion. Those practices include contour cropping, grassed waterways, catch basins and filtering ponds, chisel plowing, maintaining litter on the soil to cushion the impact of the raindrop, erosion dams, and many others. Much more can and should be done by many more farmers and developers.

Sediment, by volume, is the greatest pollutant in the waters of the state. It is a pollutant because it degrades water quality, destroys natural plant growth, fills in stream channels, damages fish habitat, carries chemical pollutants into the waters and impairs waters for public use.



It's hard to imagine just how quickly soil can be eroded away by rain.

ALONG GREAT LAKES SHORE:

By Leslie Y. Lin

ANN ARBOR — Owners of shoreline property along the Great Lakes are spending too much money on poorly designed erosion protection, according to a research scientist in The University of Michigan Graduate School of Business Administration.

Patricia L. Braden says many people invest such large amounts of money in erosion protection that, on the average, they essentially rebuy their house and land every 20 years. They consistently overestimate the value of their property by 20 per cent, and their land continues to erode, she says.

To determine a more economical approach to this widespread problem, Braden and her colleagues recently completed a study of nearly 600 property owners in **Allegan, Berrien, Ottawa** and **Van Buren** Counties in southwestern Michigan; **Leelanau** County in the north, and **Sanilac** County in Michigan's "thumb."

Other members of the study team are Susan Rideout, research associate, and James H. Leigh, research assistant, of the U-M business administration school.

The study was supported by the Michigan Sea Grant Program, a cooperative effort between the U-M and Michigan State University, which is funded by the Office of Sea Grant in the U.S. Department of Commerce, the State Legislature, and private sources.

The U-M researchers found that shoreline property owners rely upon friends and neighbors for advice on how to protect their land from erosion. "They don't call in engineers or contractors until after they've decided what to do," Braden says.

"For instance, many people decide by themselves to build a sea wall. However, if they had hired a consultant, they might have discovered that their property's bluff contours, subsurface soil, off-shore wave patterns and barriers made a groin or a breakwater more appropriate."

Sometimes, she says, the best approach is for a group of adjoining property owners to work together on an overall plan for shore protection. Yet set plans are uncommon, even though the costs can be lower and the results better in the long run, Braden says.

"One owner's lone sea wall may actually increase the rate of erosion on neighboring property. Liability cases are not common now, but I think they're coming."

Braden feels that many property owners may not have know about the financial risk they were taking in buying their property, nor that the land might be difficult to re-sell. The study found that financial institutions, which routinely check erosion rates, were by-passed in three quarters of the shoreline property transfer studied. These properties were most often exchanged among relatives and friends, or bought on land contracts.

"Even in high erosion risk areas, property owners did not notice must erosion damage when they bought their land," says Braden.

She urges prospective owners to get adequate information before making investments in land or in shore protection: "First, get an accurate property value assessment from real estate agents or mortgage lenders. Second, find out the nature of any erosion problem. How serious is it? How much will it cost to build and maintain shoreline erosion protection?"

Braden recommends that property owners consult a variety of experts including consulting engineers and marine contractors. "Don't exclude talking to advisors in the Department of Natural Resources, your district Sea Grant agent or county extension agent. They might suggest solutions other than expensive construction. This is the best way to ensure that you find the most appropriate solution for your property.

"With this information you can then decide how much you are willing to spend and if the investment makes sense," says Braden.

Michigan Sea Grant has free brochures on buying shoreline property and on reducing shoreline erosion. Order them from Michigan Sea Grant Publications, U-M, 220 Bonisteel Blvd., Ann Arbor, MI 48109.

An Overview Of Michigan's Water Quality Standards

By John G. Robinson, Chief, Biology Section, Water Quality Division, Department of Natural Resources.

Presented at the 55th Annual Meeting of the Michigan Water Pollution Control Association, Boyne Falls, Michigan June 23, 1980.

Water Quality Standards are one of the tools that we have developed and used to protect our State's waters. I firmly believe that we are obligated and privileged to be involved in a work effort that will keep our lakes and streams in good enough quality to be used and enjoyed by the people of the State.

Since we are going to spend the whole day discussing Water Quality Standards it is important that you have some understanding of Michigan's Water Quality Standards. What they are, how they have come into being and how they are used.

In describing what Water Quality Standards are it may be helpful first to emphasize what they are not. They are not **real measures** of stream quality but rather are only crude **indicators** of quality. Most of us are familiar with the concept of using the coliform group of bacteria as an indicator of the presence or absence of pathogenic organisms in water. In the use of the coliform standard we don't actually measure pathogenic bacteria to determine if they are present, we rely on the fact that pathogens generally die off in a stream environment faster than coliforms do. Therefore, if we have low numbers of coliforms it is an indication that bacterial pathogens are absent. But it is not a real **measure** of actual cause and effect. To **measure** the effect of pathogens we would have to conduct an epidemological study to determine if people became ill after using the water. The same is true of all other standards used to regulate stream quality. Dissolved oxygen standards are set to protect aquatic life. Therefore, the real **measure** of stream quality is not dissolved oxygen but rather the presence of a normal community of aquatic life in the stream. The reason I make this point is that we tend to put too much faith in the idea that a few chemical and physical parameters actually represent the real world situation in streams. When in fact the aquatic life may be severely degraded by the cumulative effects of the chemical soup we expose it to. Standards are not the "end all" in solving our pollution problems. They are only one of the rough tools of the trade useful because they are convenient and practical to use.

It must also be understood that regulatory standards are set at a level which will provide only a minimally acceptable condition. They are not set to provide the ideal condition. For example, from the field of traffic safety we know that the alcohol standard set to determine if you are too drunk to drive is 0.1% in human blood. Obviously this is not the ideal concentration we should strive for in all drivers - rather it's the standard if exceeded, could cause **harm** or send you to jail. Water quality standards are also set at a level to prevent harm. Violations of the standards should mean that unlawful pollution is occurring. Another way of saying this is that standards are set at the maximum level of contamination which can legally be permitted in the waters of the state. It is obvious then that we shouldn't use standards as a goal for our waters but as a regulatory tool.

That is in fact, how they are used in Michigan. National Pollutant Discharge Elimination System (NPDES) permits are written in such a way that standards will be met. When it's determined by the Department of Natural Resources that national minimum treatment requirements are not stringent enough to meet stream standards then **additional** waste treatment is necessary. However, most permits are written on the basis of minimum treatment requirements, not water quality standards because that treatment level generally will result in the effluent meeting the water quality standards. This is true because it was the intent of the 1972 Clean Water Act to replace the water quality standards approach with a **uniform effluent standard** approach and the zero discharge concept. Some of the authors of the Clean Water Act wanted the added protection of water quality standards so that if the effluent control approach failed they could fall back on water quality standards. So now we have both effluent standards and water quality standards.

Lets back up a bit now and examine the history of Michigan's water quality standards. Formal state-side standards are a relatively new tool in Michigan. An early primitive standard was found necessary shortly after the turn of the century because of the high incidence of typhoid and other waterborne diseases in communities bordering the Great Lakes, its connecting waters and other populated areas in Michigan. In 1913 the legislature enacted Act 98 regulating all communities operating or desiring to build sewers and water systems. Bacterial standards were set on a case-by-case basis to protect the public health. Unfortunately, no protection was provided for fish and wildlife and it wasn't very long before wastewater discharges from growing cities and industries consumed so much oxygen in the rivers that frequent instances of fish kills occurred. Water Pollution Control laws passed in 1929 and amended in 1949 allowed establishment of minimum dissolved oxygen levels in portions of the Kalamazoo River. This "localized Standard" was set at a level designed to maintain sufficient dissolved oxygen in the river to prevent septic conditions which resulted in offensive hydrogen sulfide odors. This septic condition actually caused residents downstream from Kalamazoo to sleep with their windows closed on hot summer nights in order to avoid the odor. Standards were also set on a case-by-case basis for toxic materials such as cyanide and oils to prevent the **death** of aquatic life. These "localized standards" were based on rare literature reports such as California's "Water Quality Criteria of 1952."

Michigan's first **formal** standards were adopted in 1967 in response to the Federal Government's 1965 Water Quality Act. Michigan has state authority to adopt standards under Act 245 which states in Section 5 that "the Water Resources Commission shall establish such pollution standards for lakes, rivers, streams, and other waters of the state in relation to the public use to which they are or may be put, as it shall deem necessary".

In adopting standards Michigan followed the National Guidance by establishing certain water uses to be protected and **then** designating rivers for those **uses.** This concept is similar to zoning.

Nine uses were specified in the 1968 standards:

1. Public water supply
2. Total body contact recreation
3. Partial body contact recreation
4. Cold water fish - (trout and white fish)
5. Warm water fish - (bass and pan fish)
6. Tolerant warm water fish - (carp, bullheads)
7. Anadromous fish routes
8. Agricultural uses
9. Commerce and other uses

Twelve streams were designated for tolerant fish protection and four were given even a lower designation of "commercial and other". This meant that the dissolved oxygen levels and toxicant restrictions would only protect carp and bullheads on the 12 streams designated for tolerant fish protection, and **no** protection for fish life was provided on the four streams designated for "commercial and other uses". It is in-

(Continued On Next Page)

OVERVIEW OF MICHIGAN'S WATER QUALITY STANDARDS ...

(Continued From Page 21)

teresting to note that within a year and a half the "tolerant fish" designations on two rivers, the Pine and the Tittabawassee were changed at the request of local citizens and industries to an "intolerant warm water fish" designation. The remaining **"lower-use-designations"** were removed during the 1973 water quality standards revision process following public hearings. These short lived "lower use designations" illustrate Michigan's definite intent to protect all waters of the state for the maintenance of warm water sports fish as a minimum level of protection. Use designations less protective than warm water fish carries a connotation of degraded water which is apparently not acceptable to the citizens of Michigan. They probably agree with the Izaak Walton League's claim that "If water is not fit for fish it is not fit for anything."

In 1973 the water quality standards were updated to include the latest scientific data for protection of drinking water and aquatic life. In addition a rule was added to include the mixing zone concept. This is a zone for wastes have not yet thoroughly mixed with the receiving waters. This zone is exempt from most of the standards but cannot have toxic levels in excess of the 96 hour LC 50 (a level at which 50% of the fish die) for important species of fish. The 1973 revision was the last change we have had in our water quality standards even though it is a requirement of the Federal Clean Water Act that each state review their standards every 3 years to determine if changes are needed to keep abreast of the latest scientific findings.

Michigan held public hearings in 1976 on a proposed update, but they were never passed because of objections. The most objectionable part of that proposal was the inclusion of a list of specific numerical toxic limitations similar to EPA's Red Book Criteria. EPA's Criteria didn't take into account the antagonistic effects of water hardness on the toxicity of heavy metals nor did they consider that warm water fish are often more tolerant than cold water fish. When estimates were made to determine what the use of EPA criteria would mean to Michigan's municipalities the effluent limits derived in some cases were lower than background water quality. This information lead municipalities to ask the Water Resource Commission to withdraw the proposed rules for further study. The Commission did withdraw the proposal immediately set up an outside Advisory Task Force representing various interest groups to review and rewrite the rules as necessary. This Task Force chaired by Jim Biener from the City of Grand Rapids met twice monthly for a year, laboriously analyzing and reworking the standards. After completing their task in April of this year the Task Force solicited comments from interested State Agencies. State staff sent in a volume of comments, most easily handled, but several were difficult to resolve. Two working sessions with State Staff resulted in resolution of all but two issues. The Water Resources Commission spent a full day last Wednesday working out the remaining differences with State Staff and the Task Force. The proposed standards have now been approved for public hearings. As you can see this proposal represents a very thorough and time-consuming effort on the part of the Task Force and warrants serious consideration by all Water Pollution Control Association Members.

As I pointed out earlier, water quality standards are only rough indicators of the health of our lakes and streams. If we are serious about protecting these waters, we will insist on the most up-to-date, reliable, standards available. Even though regulation is a "dirty word" in our present economic situation, we cannot ignore the fact that Michigan's water quality standards are based on scientific data that is outdated and revisions are in order.

The following public hearings on the proposed water quality standards revision have already been held:

May 14 - Ann Arbor
July 16 - Marquette
July 28 - Gaylord
July 31, August 1 - Law Building Auditorium, Lansing.

Anyone who was not able to attend these hearings may submit written views on the proposed revisions of the Standards by sending them to:

John G. Robinson, Chief
Biology Section, Water Quality Division
Environmental Protection Bureau
P.O. Box 30028
Lansing, MI 48909

Written comments must reach Mr. Robinson's office by August 29, 1980 when the hearing records will close.

SUMMARY OF MAJOR PROPOSED CHANGES:

1. All waters of the state would be protected for total body contact recreation except in wastewater mixing zones and high risk areas downstream from specified urban areas.

2. Dissolved oxygen standards would be more stringent. Warmwater streams would be maintained at a minimum of 5.0 mg/1 instead of 4.0 mg/1. Coldwater streams, Great Lakes and connecting waters would be maintained at a minimum of 7.0 mg/1 instead of 6.0 mg/1.

3. The non-degradation rule would be strengthened by requiring that state and federally designated "Wild Rivers" not be degraded and that the quality of inland lakes and trout streams shall not be lowered unless a variance demonstrates such lowering is consistent with the State's paramount concern for the protection of its natural resources.

4. Adoption of maximum chemical contaminant levels specified by the National Safe Drinking Water Act for all waters protected for public water supply source.

5. All Great Lakes and connecting waters will be protected for public water supply source.

6. The temperature standards would change from specific numerical limitations to a requirement for a demonstration that no significant damage to aquatic life populations will occur.

7. Carcinogens, mutagens, or teratogens would be prohibited in the waters of the state in quantities determined by the Commission to represent an unacceptable level of risk.

8. Genetically-engineered microorganisms would be prohibited in the waters of the state unless it were demonstrated to the Commission that they would not produce injurious effects.

9. A temporary modification provision is proposed to allow lowering of the standards in waters where it is not reasonable to expect compliance with the standards in the foreseeable future.

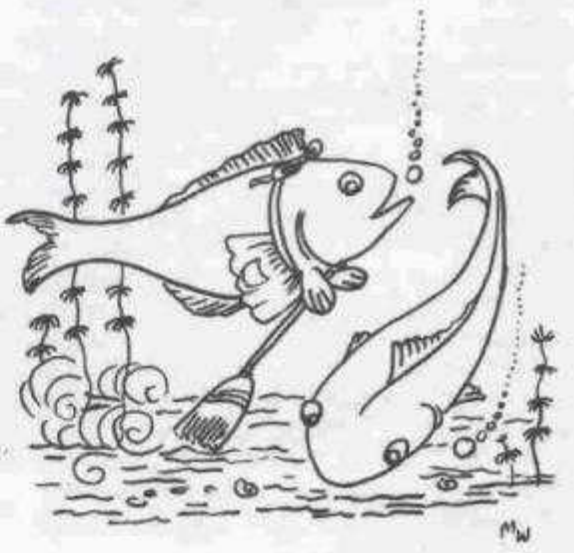
The administrative rules will become effective 15 days after filing with the Secretary of State.

Administration of these administrative rules is by authority conferred on the Water Resources Commission by Sections 2 and 5 of Act 245 of the Public Acts of 1929, as amended, being Sections 323.5 of the Michigan Compiled Laws.

Copies of the full proposal are available for review upon request from the Environmental Protection Bureau address listed above and at the Department of Natural Resources District Office at 1732 W. M-32, Gaylord, Michigan, and Lansing Regional Headquarters, P.O. Box 30028, Lansing, Michigan.

According to John Robinson, head of the DNR's Water Quality Biology Section, one significant proposed change in the standards would be protection of the Great Lakes as a drinking water supply source. Present standards for the Great Lakes protect this use only at water supply intake points, he explains.

"Some 17.3 million people depended on the Great Lakes waters for drinking water in 1970," says Robinson, "and by the year 2000, that number is expected to increase to 26.7 million people. The proposed upgraded Great Lakes standard would provide for future population growth."



"MORE SEDIMENT AGAIN TODAY. I CAN'T KEEP AHEAD OF IT."

LONG LAKE MANUAL THINNING PROJECT

I. **Introduction**

The goal of fish management is to provide high quality angling for fishermen. One of the major challenges the fishery manager confronts is the need for large scale manipulation of game, forage, and rough fish populations to improve angling quality. For example, many southern Michigan lakes have an over population of panfish for the available food supply. When this condition becomes severe, growth of these panfish is very slow and angling is poor. For approximately the past thirty years the principal tool of the fish manager to restructure fish populations has been the use of fish toxicants such as rotenone and antimycin. However, in recent years public opposition to chemical reclamation projects has increased significantly because of enhanced environmental awareness.

As an alternative to the usage of fish toxicants, biologists in the Upper Peninsula have experimented with manual fish removal techniques such as netting. Manual removal techniques have several inherent advantages over chemical reclamation. Desireable fish can usually be removed from trap and fyke nets and released unharmed. The target species are suitable for human consumption or other usage. Also, manual removal projects are often more readily accepted by riparians than chemical treatments.

In the less productive waters of the Upper Peninsula where white suckers and bullheads are the primary target species, netting projects have shown much promise. Although evaluation is incomplete, Upper Peninsula biologists are very enthused with the results to date. In many lakes a relatively small amount of netting apparently has removed a large portion of the bullhead and sucker populations. Netting of the same lakes the following year has produced much lower numbers of target fish. Also, significant improvements in the growth of yellow perch and other game fish species have been documented following the sucker and bullhead removal projects. As an example of the effectiveness of manual removal projects in the Upper Peninsula, the following results are from Laws Lake in the Baraga District. The 1979 netting project resulted in the removal of 188 pounds per acre of bluegills from this twelve acre brown water lake. In 1980 eighty fyke nets set for three nights in Laws Lake took a total of only twelve bluegills.

II. **Long Lake Manual Fish Removal Project**

Southern Michigan biologists deal with more fertile waters and normal problems are stunted panfish and over abundant carp. Therefore, they remained somewhat skeptical of the glowing praise manual fish removal techniques have received from Upper Peninsula biologists. However, it was generally agreed that manual removal projects should be attempted in southern Michigan as an additional fish management tool.

Biologists in the Plainwell District in extreme southwestern Michigan selected Long Lake in west central Cass County for a manual removal project. Long Lake is approximately 211 acres in size and has no inlet or outlet. The maximum depth is approximately 41 feet and the bottom is composed primarily of organic peaty material with much smaller amounts of marl, sand and gravel. Weed growth is heavy, particularly in the shallow bays on the western end of the lake.

Long Lake has had a history of slow panfish growth. The lake received partial chemical treatments with rotenone in 1965 and with antimycin in 1974. Neither of these chemical treatments produced long lasting improvements in the panfish populations of the lake. General fishing reports and an electrofishing survey conducted in the fall of 1979 to evaluate the tiger muskellunge populations indicated that bluegrill growth was again unacceptably slow. A manual fish removal project was proposed in an attempt to increase panfish growth without harming the tiger musky population. Also, antimycin, the chemical that shows the most promise for selective thinning projects, has not been available for several years.

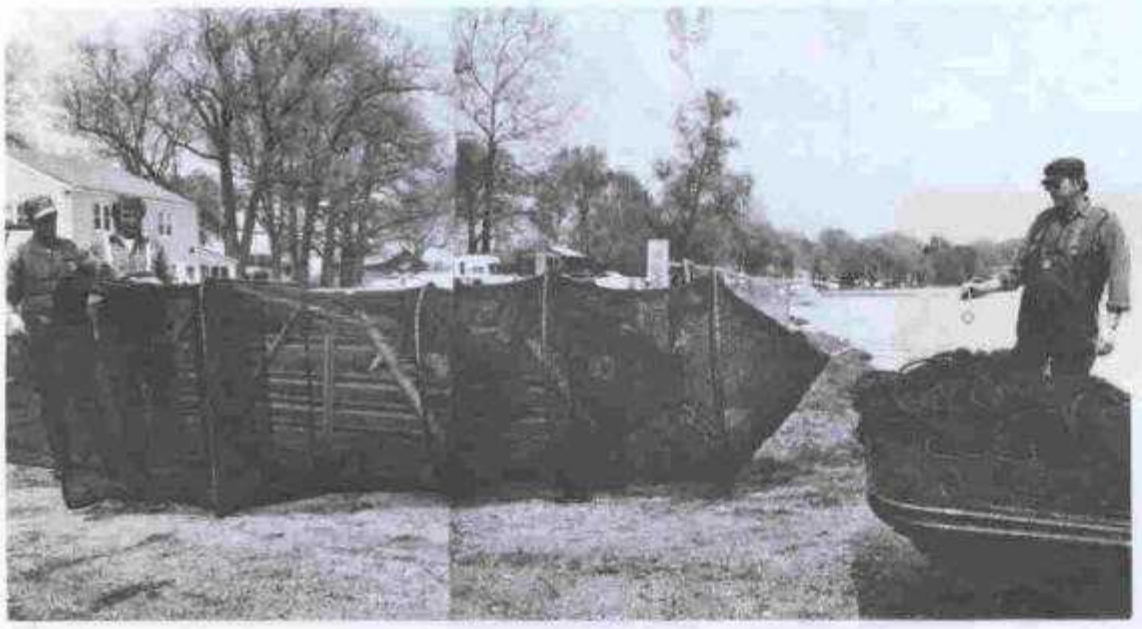
Fyke nets were set in Long Lake on May 9. With the exception of a four day period including Memorial Day, varying numbers of nets remained set until June 6. The total complement of fyke nets available for the project included twelve normal large mesh nets and six small mesh nets designed and built in the Upper Peninsual specifically for manual fish removal projects. The total amount of effort expended during the Long Lake project was 221 net-nights with large mesh nets and 122 net-nights with small mesh nets. Nets which were not catching many fish were continually moved until more productive sets were found. In addition to the extensive netting effort, the electrofishing boat was used on three nights to collect small panfish.

All bluegills and pumkinseeds in excess of six inches in length and all other fish were returned to the water unharmed. The bluegills and pumkinseeds which were less than six inches long were taken to shore. Throughout the project we had no problem locating people to take the small panfish. Although some of the fish were used for food, the majority were placed in gardens for fertilizer. A small number of the panfish were kept alive and planted in private farm ponds.

III. **Results and Conclusions**

The total weight of small panfish removed by the netting and electrofishing effort was 2400 pounds. The estimated number of panfish removed was 34,000. The large mesh fyke nets took 15,500 panfish weighing 1355 pounds during 221 net-nights of effort. The catch of the small net fyke nets totalled approximately 10,400 panfish which weighed 817 pounds. The electrofishing equipment accounted for an additional 8100 small panfish which weighed approxitely 228 pounds.

The total amount of panfish removed from Long Lake was roughly 11.4 pounds per acre. In our opinion, the relatively small amount of panfish removed will not be sufficient to yield the desired result of faster growth of the survivors. Far more small bluegills and pumkinseeds needed to have been removed to create a beneficial growth response.



(Left to Right) Paul Scheppelman, Dave Johnson and Dennis Gordon, holding Fyke Net.

MANUAL THINNING PROJECT ...

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DAVE JOHNSON

The manual fish removal project on Long Lake was rather expensive. The panfish removed cost us an absolute minimum of $1.50 per pound in salaries, gasoline, and other related expenditures. An effective partial chemical reclamation project with antimycin would have certainly removed many more small panfish at a much lower total cost.

Although the results of the Long Lake manual fish removal project were discouraging, it is too early to write off manual removal techniques as a failure in Southern Michigan waters. It is probable that a combination of manual removal techniques would be effective in some situations. One technique that shows considerable promise is electrofishing. Panfish less than four inches long were highly vulnerable to the shocking barge. The development of attached nets to be used in conjunction with the electrodes would eliminate much of the constant bending and stretching required to dip net the stunned fish. We plan to modify the standard electrofishing equipment this winter for possible use in Long Lake next year. Manual fish removal techniques deserve further experimentation and evaluation. The techniques have too many advantages to be abandoned after the Long Lake experience.

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