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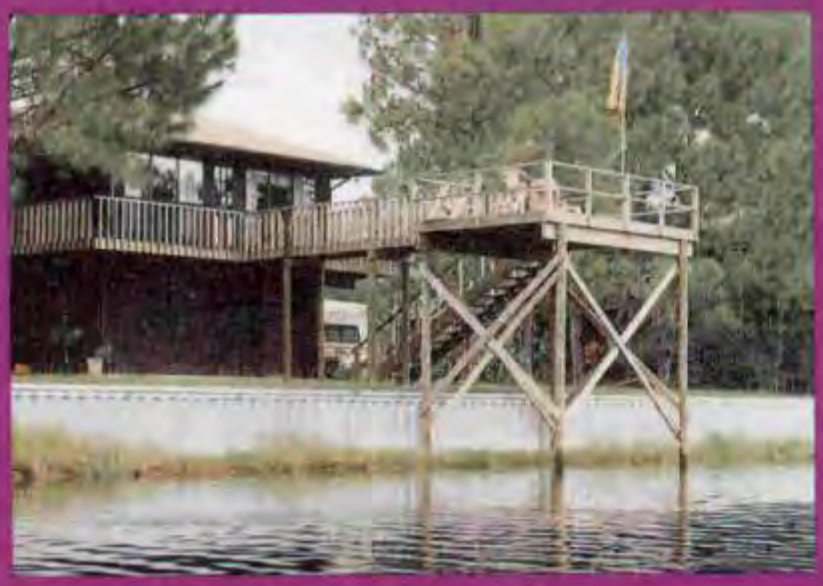

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The picture of the two Mute Swans was taken by Ray Bier Jr., the immediate past president of Michigan Lake & Stream Associations. Photography is one of Ray's abiding interests along with love for the environment.

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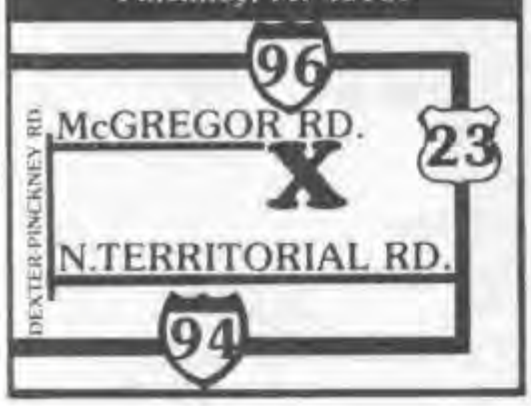

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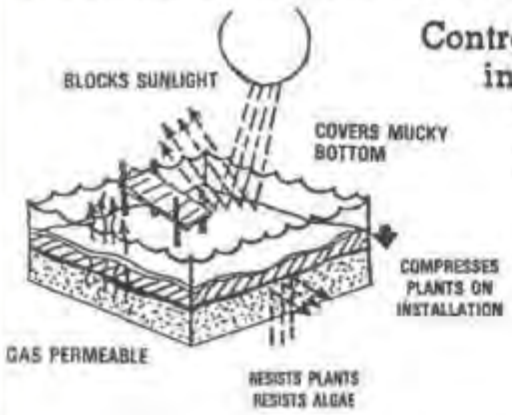

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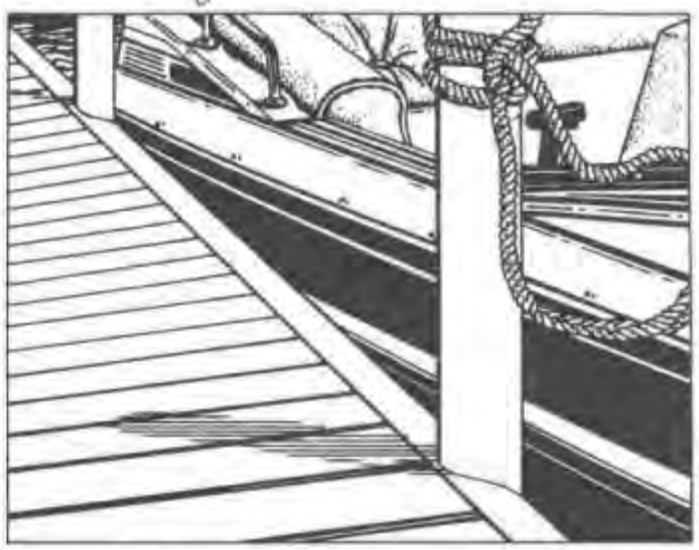

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The Aquatic Plant Management Society, Inc. is an international organization of scientists, educators, students, commercial pesticide applicators, administrators and concerned individuals interested in the management and study of aquatic plants. The membership reflects a diversity of federal, state and local agencies; colleges and universities around the world; corporations and small business,

Originally called the Hyacinth control Society, Inc. when founded in 1961, The Aquatic Plant Management Society, Inc. is a respected source of expertise in the field of biological, mechanical, chemical and other methods of aquatic plant management and the aquatic plant sciences. The Society has grown to include several regional chapters; and through these affiliates, annual meetings, newsletters and the Journal of Aquatic Plant Management, members keep abreast of the latest developments in the field. The objectives of the Society are to assist in promoting the management of nuisance aquatic plants, to provide for the scientific advancement of members of the society, to encourage scientific research, to promote university scholarships, and to extend and develop public interest in the aquatic plant science discipline.

This is the first time since 1979, that the Aquatic Plant Management Society has held it's Annual meeting in the midwest. With this in mind this years program will devote much attention to local aquatic plant problems. As well as a wide variety of topic and concerns dealing with aquatic plant science, federal funding, regulatory issues and technical papers dealing with the latest research in aquatic plant control will be presented.

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How Fast Should Boats Be Permitted To Go On Inland Lakes? Reader Opinions —

Gentlemen:

The problem of boat speed addressed in your February, 1991 issue is, I believe, fast becoming the most important problem faced by riparian owners. It goes far beyond safety risks (as important as they are) and if not solved, will soon destroy the very essence of Michigan lakes and streams. Surely, that essence is peace and quiet. Surely, the tranquility of a northern lake provides one of the most sublime moods in human experience. It is, indeed, the reason why most people sought out Michigan waters in the first place; the reason why many decided to settle down there, either as summer or permanent residents.

Torch Lake, in Antrim County, when I first discovered it 45 years ago, was an exemplar of all of those compelling qualities. For the first 35 years, although the mood changed somewhat, change came imperceptively and one could accommodate to it. Within the last ten years, the pace of change has accelerated to the point that I see the essence of Torch Lake (which I believe is Michigan's second largest lake, and surely its most beautiful) at the threshold of destruction due, in large part, to the size and speed of the power boats that have quadrupled in number in the last three or four years.

Until the last decade, with some exceptions, power boats seemed to be of reasonable size, and generally were operated at moderate speed and noise levels. That has all changed. Now there are very few times when riparian owners and vacationers are not subjected to the roar of some behemoth charging up and down the lake with no apparent purpose, its driver utterly oblivious to the distress he is causing to hundreds of people who have no way of avoiding his noise.

The problem is becoming so serious that, within recent years, I decided against acquiring additional land on Torch Lake in the belief that it was foolish to increase my investment on a lake that was obviously in jeopardy of losing those qualities which have made it worthwhile.

Although the numbers, size and speed of these boats is constantly increasing, people who get their thrills by destroying everyone else's privacy are relatively few compared to the number of riparian owners they offend. Most of these speedsters are either oblivious to the harm they are causing others or so arrogant as to purposely roar up and down in the quiet of the morning and in the beauty of the twilight, as well as midday. Frequently, according to the Sheriff's marine officer, they are so entranced by their own self-importance, that they charge in close to the shore line in the hope that other people will look at them.

I hope you will pass on this letter to the Board of the Michigan Lake and Stream Association, which apparently has succumbed to the wishes of the competitive water skiers and large boat racers who think they have a perfect right to do what they want to do, regardless of the effect on others.

The various riparian owner associations around the state, including the Three Lakes Association, of which I am a member, have, it seems to me, done a wonderful job in initiating programs to fight deteriorating water quality. But having pure water is of relatively minor interest if one can't stand the noise and danger involved in enjoying it.

The Association's proposal to amend the speed limits is a mere shadow of what it should be. The fact that a lake is large should give a boat no license to speed, indeed, what that really means is that more riparian owners will be disturbed than if the speeding were done on a small lake. Moreover, speed limits alone do not go nearly far enough.

It is sad, but true, that most riparian owners, as with other public nuisances, will suffer this kind of abuse in silence. The impression is given that maybe the problem isn't as bad as others say. That has the effect of letting things get so bad that the damage becomes irreparable.

I would like to reiterate that I believe this is a problem of major importance; that it would be foolish, indeed, to let it get worse before any attempt is made to make it better. Accordingly, I urge the Board of the Michigan Lakes and Streams Association and your publication to do everything possible, on a major scale, to encourage enactment of laws in Michigan to solve this problem.

Simply lowering speed limits will *not* be adequate, although it is one step. Marine officers trying to catch speeding boats are almost helpless. By the time the relatively few marine officers can apprehend a speeding boat on Torch Lake, the damage has been done and 99 times out of 100, the boat can't be identified by the time the marine officer arrives on what, fifteen minutes earlier, was the scene.

A solution must be found in legislation that not only lowers the speed limit, but prohibits boats that create noise or are capable of speeds beyond acceptable limits. I see no other effective solution. It will take a massive and concentrated effort to achieve that goal.

If need be, the oblivious and the arrogant who want to roar around should be relegated to some remote lake so that they can listen to and look at one another to their hearts' content.

Yours very truly,

Bruce I. Petrie, Sr.
2787 Walsh Road
Cincinnati, Ohio 45208

Dear Mr. Winne:

We wish to register our support for the resolution on maximum boat speed on inland lakes, and fervently hope that the Michigan Lake and Stream Associations will adopt the proposed restrictions. Our objections to the "go-fast" boats have to do with the noise, the pounding they impose on the shorelines, and the disturbance to which they subject wildlife and people. They are inappropriate vehicles for inland lakes at such speeds. The proponents of every abominable behavior under the sun seem to suggest that the solution to problems is education, (as, in this case, educating boat drivers) rather than putting the lid on the behavior, and this is no exception.

Sincerely,

Nancy A. & John P. Drake
P.O. Box 135
Eastport, Michigan 49627

Gentlemen:

This letter is submitted in response to the Resolution and the letters that appeared in the February 1991 Edition of

The Michigan Riparian.

It is stated in *The Michigan Riparian* that the publication "is the only magazine devoted exclusively to protection, preservation and improvement of Michigan waters and to the rights of riparian owners to enjoy their waterfront property."

I empathisize with Mr. Barry C. Felton in his stance. However, there are far too few of you who need to practice "tournament" skiing at the expense of lake property owners and the general public trying to enjoy the lakes.

As such, and admitting that I am a Juno Lake waterfront owner, I believe that Mr. & Mrs. James LaFleur are exactly correct in their assessment. The combination of high speed on the lakes and the associated noise is a detriment to not only lake property owners, but others trying to enjoy the lakes. I encourage and support resolutions that limit the speeds on lakes as proposed by Resolution V.

Sincerely,

Dean P. Schoonaert
347 Flora Vista
Webster, Texas 77598

Gentlemen:

I am heartily in favor of Resolution V. As a summer resident of the Belvedere Club, I can see the cigarette boats coming out of Round Lake, and immediately turning up full power, with a plume of water rising high into the air, and a deafening noise, piercing the ears, and throwing waves onto our swimming area.

I also own an inboard/outboard motor boat, but I never run at over 20 miles per hour. Being a fisherman, I know these high powered speed boats disturb the fishing grounds, so that I am forced to go out to Lake Michigan to avoid them.

I also believe that ski-boats should not be allowed anywhere near the swimming area. Often they are run by youngsters (illegally) who beach them there.

Please continue your efforts to pass Resolution V, and keep our lakes safe and pleasant for the great majority.

Sincerely yours,

Mr. & Mrs. Norman E. Heitner, Sr.
#9 Belvedere
Charlevoix, Michigan 49720

Public To Discuss Boat Regulations
Tamarack Lake Could Get Curbs

By Kathy Ann Moilanen
News Staff Reporter
January 29, 1991

HAMBURG—A sometimes heated battle has been reignited between those who like Tamarack Lake just the way it is and those who want to permanently slow down boats on the lake.

As the Michigan Department of Natural Resources has previously done at least twice in the past 10 years, it will again step in tonight to hear public views on the issue at 7 p.m. in the Hamburg Township Hall, 10405 Merrill Road.

A survey done last fall by township officials shows that about 54 percent of lakefront residents favor making their lake "Slow No Wake" while 46 percent oppose such a change. Surveys received after the deadline put the split even closer to 50-50.

Following past hearings, the DNR recommended adopting a slow-no-wake ordinance, meaning boats could travel only fast enough to move forward. But residents finally settled on a less extreme "gentleman's agreement" that skiing and speed boating are not appropriate on the narrow lake, especially the south end.

Tamarack Lake resident Charles Wiykovics brought up the issue to the Hamburg Township Board again last year because of repeated violations of that agreement. Wiykovics said some new boaters around the lake come within 10 feet of floats and markers that designate swimming areas.

The subsequent survey by the township board showed:

- 55.4 percent of the respondents agree that high-speed boating is a problem on Tamarack Lake; 44.6 percent disagree.
- 69 percent agree jet skis are a problem; 25.5 percent disagree.
- 53.7 percent agree that water skiing is a problem; 46.3 percent disagree.

Out of 101 questionnaires mailed, 56 were returned. Respondents cited such problems on Tamarack Lake as shoreline erosion, excessive noise and unsafe swimming conditions.

Based on the closely divided response, the township asked the DNR to step in with a public hearing.

DNR Marine Safety Specialist Sgt. Eric Olsen, who is nearing retirement, vividly remembers a similar public hearing about 10 years ago in Hamburg Township. A man screaming profanities at him during the meeting eventually brought one woman in the audience to tears, Olsen recalled.

He said he anticipates another "real good hearing," with plenty of participation.

Currently, Tamarack Lake is open to any boating activity which does not endanger life, Olsen said. However, the Tamarack channel to the Huron River is designated as slow-no-wake, he said. A lakewide slow-no-wake ordinance wouldn't outlaw motor boats, the DNR's Lt. Roger Salminen explained, but it would make speed boating and water skiing impossible.

Salminen's Imlay City office, which has jurisdiction over Livingston County, will consider public feedback and make a recommendation to the DNR office in Lansing within a few weeks. Lansing will contact Hamburg officials with an official DNR recommendation sometime closer to spring, Salminen said.

Those who cannot attend tonight's hearing may submit written comments to: DNR, Law Enforcement Division, Box 30028, Lansing, Michigan 48909.

(Editor's Note: It seems rather ridiculous to discuss the use of speed boats on a 37 acre lake. A round lake of 40 acres could be circled by a boat traveling at maximum boat speed of 55 mph in 58 seconds.

The two legs of Tamarack Lake are less than 1,000 feet long and 500 feet wide. Going from one end to the other of either bay at the state speed limit would take less than one-half minute.)

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EDITORIAL

Donald Winne

Wetlands In Michigan Down The Tube

Applications to destroy wetlands in Michigan in 1990 arrived at the Lansing office of the Department of Natural Resources faster than one a day. The applications to the DNR to fill, dredge, construct roads and buildings in wetland, and otherwise change wetlands under the "Wetlands Protection Act", Act #203, Public Acts of 1979 were approximately 450. Of those applications, only 30 were challenged and a public hearing requested. It can be assumed that most of the unchallenged applications were granted and some of the challenged ones were probably granted. I have often been asked by lake association officials, "Why do we have to establish a war chest and enter into litigation to protect our wetlands? Isn't this what the DNR, by law, is supposed to do?"

Perhaps, it is a mistake to expect the State of Michigan — in this case, the DNR — to take action to protect wetlands. If the 400 applications never reached Lansing, the DNR would not have to decides whether to issue or deny a permit. This would also lessen the budget crunch on the DNR and free up the DNR employees to carry out other needed tasks — such as enforce the polluter pay law.

Another way to reduce the work load of the DNR in issuing permits could be accomplished by the Michigan legislature rewriting the Wetland Protection Act which would specifically **prohibit** the destruction of a wetland contiguous to a lake or stream. Another action by the legislature to reduce the work load of the DNR would be to amend the "Inland Lake & Stream Act", Act #346, Public Acts of 1972, and make it illegal fill in any portion of a lake or stream. This would eliminate all applications under Act #346 to build a seawall which would encroach upon a lake or stream. Permits are not now required to build a seawall at the high water mark of a lake or stream.

Every lake association along with the EPA and other public and private organizations should celebrate May 1991, as **"American Wetlands Month"**. The first step of each lake association would be to increase the awareness of their members to the values and importance of wetland areas. The second step would be to secure the adoption of a "Wetlands Protection Ordinance" by their township(s). The third step would be to inform all riparian property owners around their lake of their opposition to any further destruction of wetlands contiguous to their lake. The fourth step would be to file a complaint with local government whenever any riparian property owner plans to or has violated the adopted wetlands protection ordinance.

(The full text of the Goemaere-Anderson Wetland Act will be found on pages 21-24 of this issue.)

Donald E. Winne

PUBLICATION DEADLINES: At least the 10th day of the preceeding month.

ADVERTISING RATES: Display advertising rates by request. **NOTE:** Stories of general interest are always welcome, especially those accompanied by pictures. All printing is done by offset process so we can use photos, negatives, or polaroid shots. All such material should include return address in pencil on the reverse side if return is requested.

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Mercury Levels In Michigan Sport Fish

Michigan Department of Public Health, Center for Environmental Health Sciences, December 1988

In 1970, Michigan discovered significant mercury contamination in fish from the St. Clair River, Lake St. Clair, the Detroit River and Lake Erie. Mercury levels in fish from these waters have declined dramatically since the industrial sources of contamination were identified and controlled. In recent years, another mercury problem has become evident, but this time, it is much more widespread and the source(s) will likely be more difficult to fully define and control. Below is some background on this problem as we see it emerging.

What Waters Are Affected?

Tests on 67 of Michigan's inland lakes since 1983 have shown that approximately 3 out of every 4 lakes tested have at least some fish with mercury exceeding the Department of Public Health's level of concern of 0.5 parts per million. The problem was initially believed to be limited to the Upper Peninsula, with similar findings in Northern Wisconsin, Minnesota and portions of Ontario. More recently, several lakes in the Lower Peninsula have been identified with comparable levels in certain fish species. Great Lakes waters and streams in general have not shown concentrations as high as in inland lakes.

Where Is The Mercury Coming From?

Mercury occurs naturally in the earth's crust, in rocks and soils, and even though it is a dense liquid in its natural state, it is readily volatilized into air where it can be transported considerable distances and deposited in other locations. Rocks and soils in Michigan's Upper Peninsula have much higher levels than generally can be found in the Lower Peninsula.

Furthermore, watersheds in the Upper Peninsula generally have less buffering capacity to offset the effects of acid rain. With lower pH, mercury is believed to become more soluble in water and more biologically available for uptake by fish and other organisms upon which fish feed. The U.S. Environmental Protection Agency has initiated extensive studies in the upper Midwest into the impact of acid rain, surface soil and sediment composition and other chemical and physical characteristics associated with watershed that hopefully will add to our understanding of conditions leading to unacceptable mercury levels in fish.

At one time, mercury was widely used in chemical plants using the chlor-alkali mercury cell process for manufacturing chlorine and caustic soda. The chlor-alkali industry was identified as the major source of mercury to the Lake St. Clair system in the early 1970's. Mercury was also used extensively in pulp and paper mills for control of slime growths on wood pulp. These uses have been largely halted. Much lesser quantities of mercury are still used as a fungicide on golf courses, and as an amalgam in dental fillings, and in scientific instruments and electrical equipment but these uses are generally not believed to be significant sources of environmental contamination. Mercury occurs as a component of fossil fuels such as coal and can be released to the atmosphere if emissions from coal burning facilities are not adequately controlled. Incineration of household refuse containing items such as mercury cell batteries from watches or small appliances, and evaporation from the use of latex housepaints are reported as other significant sources of mercury to the atmosphere.

Michigan's inland lakes probably receive mercury from a combination of atmospheric deposition and naturally occurring sources with atmospheric deposition likely making a more significant contribution in the Lower Peninsula than in the Upper Peninsula.

How Does Mercury Get Into Fish?

Whether naturally occurring or from human activities, mercury attaches to small sediment particles and settles to the lake or river bed where microorganisms convert a portion of it to the organic or methylmercury form. Methylmercury is rapidly absorbed by a fish either directly from the water passing over its gills or ingested with the organisms which form its diet. Because fish eliminate mercury at a very slow rate, concentrations gradually build up in the fish tissue.

Older, larger fish, especially those species that eat other fish as a major part of their diet, will contain more mercury than smaller, younger fish or fish that eat a more varied diet.

The mercury is incorporated into the muscle tissue of fish and therefore cannot be easily removed by trimming fatty areas or by special cooking methods as are recommended for reducing organic contaminants from fish before eating them.

How Might Mercury Be Harmful To Humans?

Medical authorities have learned a great deal about mercury's effects on humans from poisoning incidents in Japan, Iraq and other areas. In Japan, approximately 90 people died from heavy consumption of highly contaminated fish. Mercury primarily affects the central nervous system in highly exposed persons. Signs of poisoning include lack of coordination, a feeling of "pins and needles", numb lips and mouth, night blindness, tremors, deafness and diminished taste and smell. Since these symptoms may also resemble those caused by other illnesses, extensive medical testing would be required before mercury could be pinpointed as a cause of illness. Fortunately, the dose of mercury people receive from eating most fish is not generally high enough to cause either short-term or long-term effects. Since the mercury level within the human body is directly related to the amount of exposure and body weight, extra caution must be taken to protect a child or fetus.

Mercury is excreted from the human body at a much faster rate than occurs in fish and also much faster than organic chemicals like PCBs which are stored in fatty tissues for years after exposure ends.

How Much Fish Can I Safely Consume?

The Michigan Department of Public Health uses a concentration of 0.5 parts per million of mercury in fish tissue as a trigger for the issuance of fish consumption advisories. The Department recommends that the general public not eat more than one meal per week of fish containing from 0.5 to 1.5 ppm mercury. *Pregnant women, nursing mothers, women who intend to have children, and children age 15 and under should not eat fish contaminated at this level more than one meal per month.* The department further recommends that no one eat fish contaminated at levels over 1.5 ppm.

The World Health Organization recommends that daily consumption of mercury not exceed 35 micrograms of mercury. This would result in a body burden of mercury approximately 10 times less than was observed, to cause effects in humans in mercury poisoning incidents in Japan and Iraq. At the 0.5 ppm contamination level, a person could eat nearly a pound of fish per week without exceeding the WHO recommended maximum daily intake. At 1.5 parts per million, this would correspond to a little over a quarter of a pound per week.

Larger, older fish in many inland lakes throughout Michigan may have concentrations of mercury in the 0.5 to 1.5 ppm range. Fish most likely to contain mercury in the range of 0.5 to 1.5 ppm include *rock bass, yellow perch, and crappie over 9" in length; largemouth and smallmouth bass; walleye; northern pike; and muskie.*

Michigan has approximately 10,000 inland lakes within its boundaries. It will never be feasible for the state to test fish for contaminants in all 10,000 lakes. Because a high percentage of those lakes tested have at least some of the above fish containing mercury at levels between 0.5 and 1.5 ppm, as a precautionary measure the department recommends that the general population not eat more than 1 meal per week of these fish from any inland lakes and that women as described above and children age 15 and under limit their consumption to no more than 1 meal per month.

Persons, such as vacationers, who only eat fish one or two weeks during the year, can safely eat several fish meals during that time period.

(Continued on Page 12)

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Mercury Levels

(Continued from Page 11)

Lakes for which levels higher than 1.5 ppm mercury have been found in some fish species are specifically listed in the advisory tables published in the Michigan Fishing Guide. Species likely to exceed the 1.5 ppm level are listed under the "No Consumption" heading for the affected water bodies.

For more information, persons within Michigan may contact the MDPH Center for Environmental Health Sciences by calling 1-800-648-6942.

Should You Eat Your Michigan Sport Fish?

By Dr. James Bedford

Eating fish is a very healthy choice. Fish are very nutritious, low in calories, and an excellent source of protein. Their flaky flesh is low in fat, and even the oilier species such as lake trout have much lower levels of fat than lean beef.

Fish are especially low in saturated fats, but they are high in omega-3 fatty acids. These unsaturated fatty acids may reduce the risk of heart disease by lowering the level of cholesterol in your system and inhibiting the process of atherosclerosis.

In spite of all the beneficial reasons for eating fish, we are constantly warned to either limit consumption or not eat many Michigan sport fish species. The reason for these warnings are chemical contaminants which are found in our trout, salmon, bass, walleyes, catfish, and other game fish. PCBs, organochlorine pesticides, and mercury are the most common contaminants of the fish. Nursing mothers, pregnant women, women who intend to have children, and children age 15 and under are especially advised to restrict their consumption of contaminated fish since many of these chemicals can accumulate in our bodies and can be passed from mother to infant.

Relatively high levels of these contaminants are found in fish because the chemicals become more and more concentrated as we move up the food chain. In addition, these compounds can enter the fish from the water by passing through the gills as the fish breathes. Most of the fish contaminants are very persistent in the environment and are hydrophobic and lipophilic. This means that the chemicals will move out of the water and into fats at every opportunity. Couple this with their resistance to breakdown and it is easier to understand why a few parts per trillion in the water can result in contaminated fish.

Even though organochlorine insecticides such as DDT, chlordane, and dieldrin have been banned in this country and all of the uses and production of PCBs have been discontinued, these chemicals continue to linger in the environment. A large percentage of these chemicals along with mercury enter our lakes and streams from the air, making their control very difficult. In most cases, though, levels of contaminants are going down. We can help speed this process by decreasing the amount that gets into the atmosphere via incineration and volatilization.

Despite the presence of these contaminants, we can still enjoy eating Michigan fish. We can choose species to eat which tend to have lower levels of contaminating chemicals. In the case of the lipophilic contaminants, we can avoid high levels by choosing fish with a very low fat content such as walleyes, northern pike, black bass, and yellow perch. Picking fish for the table that are lower in the food chain, such as bluegills and smelt, rather than the top predators helps to avoid all types of contaminants. It is also prudent to eat a variety of species from different bodies of water rather than concentrating on one type of fish from one lake.

Taking smaller fish home to eat and releasing the lunkers will also lower your potential exposure to toxic contaminants. The smaller fish are usually younger and have a lower fat content with the net result, in most cases, a lower body burden of contaminants. The smaller fish are also usually better tasting that the large, older fish. Keep a camera handy on your fishing trips and photograph the big fish you catch prior to release. This will make it easier to slide that hawg bass or trophy trout back into the water. In addition to lowering the possibility of exposure to chemicals, releasing large fish is likely to improve the fishing.

Another way to avoid contaminants is to fish in bodies of water that are known to be relatively free of the toxic chemicals that bioconcentrate in fish. Information is provided on lakes and rivers with known contamination problems in the "Michigan Fishing Guide" that comes with your license. While there are exceptions, bays, rivers, and lakes with little or no industry on their shores are less likely to contain contaminants at harmful levels. Background or natural levels of mercury can cause problems in some lakes, but it is hard to identify these without chemical analyses.

Once you have captured that mess of fish for the table you can further reduce the PCB and organochlorine levels by the way you dress and cook the fish. Remember that these compounds concentrate in the fat so that removal of the fat from the fish will reduce the contaminant level.

Fat tends to be concentrated in and under the skin, along the lateral line which runs lengthwise along the side of the fish, along the base of the dorsal fin, and in the belly meat. Except for the belly flaps, the areas of high fat content are darker in color and have poor flavor. Cut these parts out and discard when you dress or filet your catch.

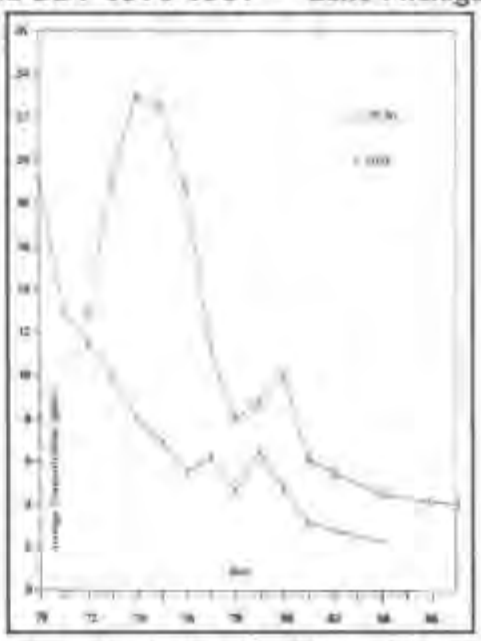
Further removal of fat can be accomplished through cooking. Broiling, grilling, and baking on a rack all allow the fat to be drained away from the fish. Poaching or salt boiling will also remove fat provided that you discard the cooking liquid. Likewise, deep frying your filets in vegetable oil will draw out the contaminant-laden fat. Be sure to drain away and dispose of the cooking oil. Additional information on cleaning and cooking fish can be found in the booklet, "Eating Great Lakes Fish," which is available from the Cooperative Extension Service.

Can we safely eat Michigan sport fish? I think so. By avoiding contaminants as described above, you can enjoy a delicious and healthy meal of our bountiful freshwater fish.

If you have questions about particular contaminants, bodies of water, or fish, call the Department of Public Health's "Toxic and Health Hotline" — 1-800-648-6942.

The author: Dr. James Beford is environmental health ombudsman on the staff of the Michigan Council for Environmental Quality.

PCBs and DDT 1970-1987 — Lake Michigan Trout



Most of the major contaminants in Great Lakes fish are either banned or no longer manufactured in the United States. Michigan was a leader in stopping the use of DDT and PCBs. The levels of these compounds in fish rapidly declined following the bans. The concentrations continue to decrease but at a much slower rate because, while the major point sources have been controlled, these contaminants continue to enter the lake via atmospheric deposition and leaching from contaminated sediments.

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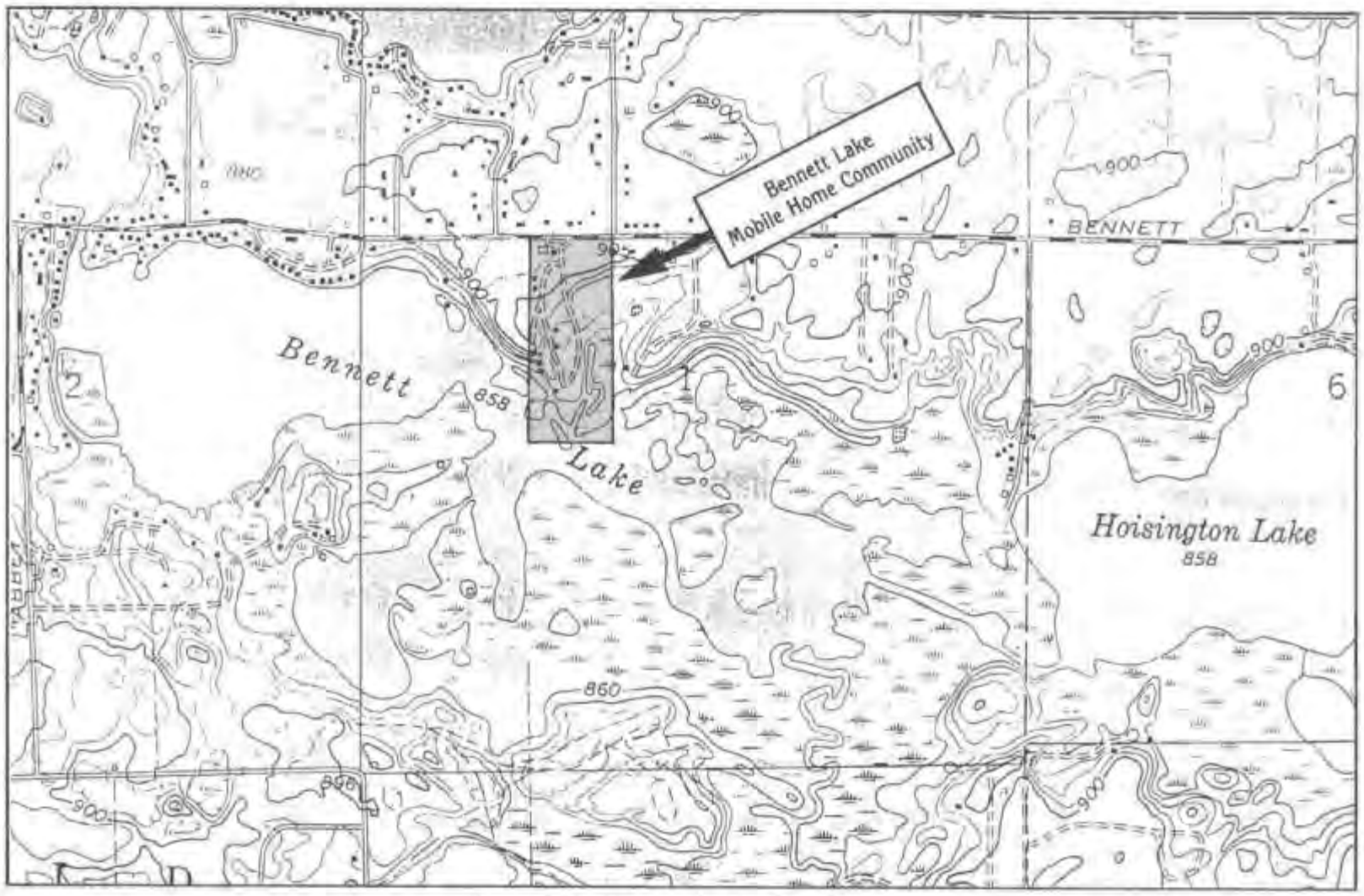
What Impacts Will The Bennett Lake Mobile Home Community Have Upon Bennett Lake?

Bennett Lake is a 134 acre lake located in Deerfield Township, Livingston County. According to the Linden USGS Quadrangle map 1969 and photo-revised in 1983, there were some 70 riparian residences around the lake and located mostly along the North and West shores of the lake. The map below shows that most of the south and east shores as wetland and swamp. The ratio of current dwellings (70) to surface area of Bennett Lake is one for every 1.9 acres. If the Bennett Lake Mobile Home Community adds 94 mobile home site pads with access to Bennett Lake, the ratio would be one dwelling for every 0.81 of an acre. It may be argued that not every family with access to the lake will use it at the same time. True as this may be, the potential of increased usage is there.



Bennett Lake — Hoisington Lake

Is the request by the proprietor of the Bennett Lake Mobile Home Community for dockage of 40 boats a reasonable request? One of the ways to answer this question is to compare the number of boats that could be launched per foot of natural shoreline of the Mobile Home Community with the number that could be launched around the lake using the same ratio. How much natural shoreline does the Mobile Home Community contain? This is difficult to ascertain since channel dredging has occurred in past years on some of the property. Using the width of lots 25 through 31, and adding 500 feet for the toe of the peninsula, the total is approximately 1,000 feet. The shoreline of the channel is not figured in since it is not natural shoreline. The ratio of 40 boats to 1,000 feet of shoreline is one boat for every 25 feet. Since nearly one-half (½) of the shoreline of Bennett Lake is wetland and swamp, one one-half of the DNR figure of 18,902 feet of shoreline is used — 9,451 feet. Using the 9,451 feet, three hundred and seventy eight (378) boats could be launched on Bennett Lake. This figures out to be one boat for every 0.35 of an acre. If only 1/6 of the families with access to the lake used it at any one time, there would be 70 boats on a 134 acre lake.

The potential of the Mobile Home Community to impact Bennett Lake is real. Overcrowding and conflict in usage of the surface must be aniticipated. How much impact on the lake rests with the proprietor of the Mobile Home Community. The impact can be minimized by setting limits on the number of boats launched at any one time, and by limiting the horsepower of motors and the speed that boats may travel across the surface. It is alleged by some Bennett Lake riparian property owners that both local and state government have put development and dollars ahead of the environment and what is good for Bennett Lake. What do you think?

(See Mobile Home Community Map on Page 14)

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Bennett Lake Mobile Home Community

7150 Bennett Lake Road • Fenton, Michigan 48430
Deerfield Township • Livingston County

Michigan Riparian Advertising Rates

B/W	Number of Issues			
Space	One	Two	Three	Four
1 page	492	468	444	420
2/3 page	350	325	300	275
1/2 page	250	240	230	220
1/3 page	210	200	190	180
1/4 page	190	180	170	160
1/6 page	160	150	140	130
1/12 page	90	85	80	70

Color	Number of Issues			
Space	One	Two	Three	Four
1 page	575	570	556	532
2/3 page	450	441	420	399
1/2 page	404	391	384	367

The advertising rates for 1991 will be the same as they have been for the past 8 years.

Any advertiser who orders a full page may deduct twenty-five percent from prices shown. Twenty percent may be deducted for a 2/3 page ad. Fifteen percent for a 1/2 page ad. A Professional Directory ad (1/12 page size) is $55.00 each issue.

Boating Laws — P.A. 303

Prepared by Marine Sgt. Howard

1. Boats, that are propelled by motor (can be electric) regardless of length must be registered. Sailboats 12 ft. and over must also be registered.

2. There must be (1) USCG PFD on board for each person. If your boat is under 16 ft. you may have the USCG approved cushion. 16 ft. and over must have the USCG (orange) type or wearable.

3. Must have a throwable device (ring buoy or cushion) for boats 16 ft. and over, remember again, it must be USCG approved.

4. Must have USCG approved or U.L. approved fire extinguisher for all boats that are closed or semi-closed construction.

5. Must be seated at all times (can't ride back of seat, side or front end of the boat).

6. Water skiing: Need an observer (must be competent) plus 170 degree angle ski mirror when pulling skiers, water sled, surfboard, etc. Can ski legally 1 hour after sunset ... must tow counterclockwise around the lake.

7. 100 ft. rule: Unless going slow-no-wake speed, or picking up or dropping off skier, etc., you must stay 100 ft. away (both skier and boat) from the following: a) anchored fishing boat; b) dock or raft; c) buoyed swimming area; d) boat that is moored; e) must not come inside 200 ft. from diver's flag.

8. Boat and ski accidents must be reported, especially if someone is injured or if damage exceeds $200.

9. Lights on for boats from sunset to sunrise.

10. Must have a horn, or similar device on all boats 16 ft. and over.

Reprinted from The Preserver *Newsletter, May, 1991, Devils & Round Lakes.*

AQUEST

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ML&SA NEWS

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.
Business Office: 11262 Oak Avenue, Three Rivers, Michigan 49093
Phone: (616) 244-5336. Donald E. Winne, Executive Director

NEW ML&SA MEMBERS

Bass Lake Association, Antrim County
Frank Baker, President - 36 Members

Clear Spring Lake Association, Macomb County
Michael Van Dyke, President - 100 members

Collier-Mud Creek Association, Barry County
Orlo J. Smith, President - 30 members

Duck Lake Association, Montcalm County
Ron Mark, President - 20 members

Loon Lake Shores Association, Oscoda County
John Weh, President - 14 members

Robinson Lake Association, Newaygo County
Jerrylyn Miller, President - 78 Members

Squanemah Shores Association, Genesee County
Dave Deemer, President - 66 members

Townline Lake Association, Montcalm County
Charles Dawson, President - 130 members

Regional Meetings Successful

Mrs. Bonnell reports that 242 persons representing 75 lakes have attended the first six regional meetings. One of the goals of the meetings was to increase Michigan Lake & Stream membership. That goal is being realized with new ML&SA members in recent weeks.

Michigan Lake & Stream Associations Exhibits At Michigan State University Agricultural & Natural Resources Week

Information about Michigan Lake & Stream Associations and *The Michigan Riparian* magazine were displayed in the Kellogg Center Building at Michigan State University on March 20 & 21, 1991. Dr. Wallace Fusilier showed the equipment which he uses in measuring and testing lake water quality. He also supplied the staging equipment for displaying ML&SA Logo Banner, list of ML&SA Services to Lake Associations. ML&SA promotional brochures, pamphlets on ground water, copies of the *The Michigan Riparian* magazine and DNR Lake Protection pamphlets were distributed. ML&SA personnel managing the exhibit were Pearl Bonnell, Bene Fusilier, Dr. Wallace Fusilier, Dennis Zimmerman, Paul Clark and Don Winne. A videotape from the DNR on Wetlands was shown at various times during the two day exhibit.

MICHIGAN LAKE AND STREAM ASSOCIATIONS

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517-257-3583

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Aquatic Biologist — Robert Pearce
43345 Saddle Creek, Novi, MI 48375
313-344-4291 (H) 313-344-0205 (W)
Water Quality Specialist — Dr. Wallace Fusilier
9200 Dexter-Chelsea Road, Dexter, MI 48130
313-426-8972

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Secchi Disk Water Quality Measuring Program

If your association plans to participate in the ML&SA Secchi Disk Program this year, start taking measurements in the first week of May and continue through the last week of September. If you wish to start taking measurements in April, fine. We've included twelve report forms, two for each of the months of April, May, June, July, August and September. One report for each month is to be mailed to Michigan Lake and Stream Associations, and one copy is for your records. Mail your monthly report to: Michigan Lake & Stream Associations, Inc., 9200 Dexter Chelsea Road, Dexter, MI 48130. Be sure to fill in your name, name of your lake or association, and address, affix a 29¢ stamp and mail.

The Michigan Lake and Stream Secchi Disk program should not be confused with the DNR Self-Help program. Some ML&SA associations participated in the DNR program when it started in 1974 and have continued to date. ML&SA's program will be patterned after the DNR program so the data will be compatible with both our program and the DNR program. If you are in the DNR program and want to continue in it this year, send your reports to us and tell us to send a copy to the DNR. We plan to work closely with the DNR on the Secchi Disk Program. We are considering making two summary reports to all ML&SA members — one at the end of June and one at the end of September.

What does the Secchi disk measurement tell us? It is an indirect measurement of lake fertility and productivity. It measures the depth of light penetration into the lake. Light penetration may be decreased by algae, water color or particles suspended in the water column. We are most concerned about the abundance of free floating algae which indicates the impact of nutrient input into a lake. Generally, the greater the number of free floating algae, the shallower the Secchi depth reading. The fewer the number of free floating algae, the deeper the Secchi depth reading. Some lakes have a brown color which may be due to humic acid. Other lakes have marl which may cause the water to become "milky".

The purpose of taking Secchi disk measurements is to show changes in water quality from week to week, month to month and season to season. Since each lake is unique, the most valid interpretation of Secchi disk measurements is to identify what is happening to each lake. The seasonal results over a period of years will indicate whether the lake water quality is remaining stable, decreasing or showing improvement. If the readings show a decreasing water quality, the association may want to take a closer look at activities around the lake and within the watershed to determine nutrient input and decide the best possible solutions.

Should you have any questions or comments which would make this program fit your needs and contribute to your efforts to protect your lake, don't desitate to call Dr. Wallace Fusilier (313) 426-8972.

Introduction — A Secchi disk reading is a measurement of water clarity. The depth at which the disk disappears is the water clarity (or transparency) depth. The depth of clarity is affected by such factors as: free floating algae, soil particles from erosion, re-suspension of bottom sediments, etc.

Instructions — Secchi disk measurements should be taken once a week, preferably on the same day of the week, and during the same hour of the day (preferably between 10:00 a.m. and 3:00 p.m.). The boat should be anchored before measuring the transparency to make sure that the Secchi disk is observed straight down. Lower the disk into the water on the shaded side of the boat. The depth at which the disk disappears should be noted, and note the depth at which it reappears. Take one-half the distance between these two readings for the transparency depth. Record your measurement in the table below.

Lake Information

Name of Lake _____

Location: Township _____ County _____ Maximum Depth _____ Surface Acres _____

Individual Taking Measurements

Name _____ Telephone ( ) _____

Address _____ City _____ State _____ Zip _____

Secchi Disk Measurement Report

Circle Month: May June July August September

Week	Date	Secchi Depth (Feet)	Any Unusual Condition
First			
Second			
Third			
Fourth			
Fifth			

Please fill out completely and return to:

Michigan Lake & Stream Associations, Inc. • 9200 Dexter Chelsea Road • Dexter, MI 48130

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ML&SA Member News

BALD EAGLE LAKE PROPERTY OWNERS ASSOCIATION — Brandon Township, Oakland County
Rob Rohde, President

Pesticides, Fertilizers, Soil Erosion - Detrimental To Water Quality
(From the March, 1991, "Voice of The Eagle")

Contaminants from all of the above are carried to lakes and streams, and contribute to water quality degradation. The following are some examples of how each of the above speed up the process of lake aging and add to water pollution:

Pesticides are intended to disrupt the life process of living organisms. Unfortunately, these chemicals can also affect non-target organisms in including the lake wildlife, plants, and people who swim in the lake. Many pesticides find their way into both surface and groundwater resources, threatening aquatic ecosystems.

Alternative: The desire for perfect lawns often leads homeowners to use chemical pest controls rather than non-toxic alternatives. The first alternative that should always be considered is *no* pesticide use at all. The same applies to the use of weed killers. Perhaps it would be better to put up with a few weeds and bugs, rather than exposing yourself, your family, your lake, and the environment to toxic substances. When you feel insecticides must be used, use non-toxic insecticides such as insecticidal soups.

Fertilizers are in the category of nutrient enrichments and are the greatest threat to our lake. I have written in past issues of the *Voice of The Eagle*, and again want to repeat the advice of not feeding the ducks and geese. Do clean our septic systems regularly. Do not use lawn fertilizers. Harvested weeds from the lake can be added to other compost or kept alone and makes excellent fertilizer. As phosphorous levels within a lake rise, aquatic plant growth increases. Increased algae growth reduces water clarity, and causes water to appear green and murky. This makes swimming, boating, and fishing difficult and unpleasant.

Soil Erosion All bodies of water receive runoff from land. This drainage network makes it possible for pollutants and sediments from soil erosion to reach our lake. Establishing a greenbelt is very helpful in preventing polluted runoff into the lake. An example of exactly what *not to do* to our lake can be observed on the canal and hill property adjacent to the southwest corner of Bald Eagle Lake. We all as property owners, should be able to develop and make a profit on our real estate. The problem arises when there is no regard for the possible damage to Bald Eagle Lake. There are safeguards that can be utilized to prevent this damage. When we refer to greenbelts, this is a classic example of not only adding one, but almost totally raping the entire area of an existing greenbelt. We are sadly finding that the DNR is of very little help when it comes to the protection of wetlands (greenbelts), or in the prevention of runoff from soil erosion.

Lakes cannot protect themselves, and we obviously cannot look to the Department of Natural Resources for much help, therefore people must provide for the lake's protection! Maybe the time has come for local laws and ordinances to help us with an ongoing protection process for our lakes. These ordinances would take into the account the need to balance our life styles with the needs of the lake. Please call or write to members of the Bald Eagle Lake Association Board with your feelings about local ordinances concerning lake pollution.

We must assume responsibility for the care of Bald Eagle Lake!
—Mary Ann Brown

BARRON LAKE ASSOCIATION — Cass County
Bruno Eidietis, President

We are still getting information and prices on stocking the lake. Hopefully Dale Lowe will have more information on his process at the April meeting.

The weed cutter will be going out sometime in June, after the fish are done bedding. Please start thinking about helping with the cutting of the weeds.

The Fair is also coming up in July and we will need people to help with the gates.

Spring clean-up is just around the corner. Remember — please do not burn on the beach.

BLACK LAKE ASSOCIATION — Cheboygan and Presque Isle Counties
Bob Moran, President

To whom it may concern:

This letter is to inform you that we, the members of The Black Lake Association of Presque Isle and Cheboygan Counties are very opposed to another landfill in our area. This suggested landfill location is a very bad choice, as it is in the area where there are many underground streams. We have many lakes and rivers in this area that will be affected. The head waters of the Rainy and Miligan Rivers are where the new purposed landfill is. The Rainy and Black Rivers empty into Black Lake, then Black River goes through Cheboygan into Lake Huron, then into Lake St. Clair, into Lake Erie into Lake Ontario, eventually into the St. Lawrence Seaway. A very large area is affected by our watershed.

Our association has approximately 700 members and we have been working for 63 years to improve our lake and the surrounding vicinity. We are planting 10,000 Walleye Fries each year and they cannot survive in contaminated waters. We all favor recycling and are doing our best to help the ecology. We need more recycling facilities, not more landfills. Recycling helps and landfills destroy

Please understand our point of view and help us to continue to improve this beautiful country and not allow it to be destroyed by another landfill in this area.

Thank you for your consideration.

COREY LAKE ASSOCIATION — St. Joseph County
Mary Sue Pollitt, President

DNR Denies Permit To Dredge

Mr. Gary R. Elliott:

The Department of Natural Resources has reached a decision on your application for permit submitted under the regulatory authority of the Inland Lakes and Streams Act (1972 P.A. 346, as amended); the Goemaere-Anderson Wetland Protection Act (1979 P.A. 203); and the Michigan Environmental Protection Act (1970 P.A. 127) to extend an open water channel approximately 107 feet by excavating approximately 900 cubic yards of material from the wetland. Spoils would be used to fill wetland on lots 39 and 40, located on Corey Lake, St. Joseph County. The purpose of the project as stated in your application is to allow access to the lake and facilitate construction of a floating pier for boat mooring.

After due consideration of the permit application, on-site investigation and other pertinent materials, the Department finds that the proposed project will have a significant adverse impact on the natural resources and public interest associated with the wetland and Corey Lake.

The subject wetland filters runoff, removing nutrients and other contaminants prior to their introduction into Corey Lake. This filtration is accomplished by a combination of natural processes such as physical entrapment, microbial transformation, and biological utilization. The Department finds the proposed dredging and filling of the wetland would harmfully alter the filtration benefits of the wetland.

This wetland floods during times of high water and peak runoff. At these times, fish have access to the area, using it for feeding, spawning, nursery, and cover habitat. The Department finds dredging and filling this area will result in an unacceptable disruption and impact on fisheries values of the area.

The wetland area provides breeding, loafing, cover, feeding, and nesting habitat for a variety of marsh birds and waterfowl, escape cover and breeding habitat for furbearers, and cover and feeding habitat for upland wildlife species. This area also provides valuable production habitat for reptiles, amphibians, and macroinvertebrates which are a vital part of the food web. These values would be adversely impacted by the proposal.

Section 9(1) of the Goemaere-Anderson Wetland Protection Act states, in pertinent part: "A permit . . . . shall not be approved unless the Department determines that the issuance of a permit is in the public interest . . ."

Section 9(4) states, in pertinent part: "A permit shall not be issued unless it is shown that an unacceptable disruption will not result to the aquatic resources. A permit shall not be issued unless the applicant also shows either of the following:

a. The proposed activity is primarily dependent upon being located in the wetland.

b. A feasible and prudent alternative does not exist."

The Department finds that the proposed project is not in the public interest in that the benefits which reasonably may be expected to accrue from the proposal do not balance the reasonably foreseeable detriments of the activity; the proposed project will cause an unacceptable disruption to the aquatic resources; the applicant has not shown that the activity is dependent upon being located in the wetland nor that a feasible and prudent alternative does not exist.

Rule 4 (R281.814) of the Administrative Rules for the Inland Lakes and Streams Act states, in pertinent part: ". . . a permit shall not be issued unless. . .

a. The adverse effects to the environment and the public trust are minimal

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and will be mitigated to the extent possible.

b. The resource affected is not a rare resource.

c. The public interest in the proposed development is greater than the public interest in the unavoidable degradation of the resource.

d. No feasible and prudent alternative location is available."

The Department finds that the adverse effects to the environment and the public trust are not minimal nor are they mitigated to the extent possible; the resource affected is a rare resource; the public interest in the proposed development is not greater than the public interest in the unavoidable degradation of the resource; and that a feasible and prudent alternative is available.

Based on the forgoing findings, a permit cannot be granted to extend a channel by excavating approximately 900 cubic yards of material from the wetland and use the spoils to fill two lots and your application is hereby denied. The Department would give consideration to construction of an elevated boardwalk and dock to facilitate lake access. Should you wish to pursue this alternative, or arrange an on-site meeting, please contact this office.

If you have any questions regarding this action, please contact Kimberly Rice at our Plainwell District Office, P.O. Box 355, Plainwell, MI 49080, phone (616) 685-8036. Please be advised that you have the right to appeal this denial under the provisions of the Administrative Procedures Act (1969 P.A. 306, as amended).

Susan K. Klco
District Supervisor, Land and Water Management Division

CROCKERY LAKE ASSOCIATION — Chester Township, Ottawa County
Tina Rooks, President

Meeting Of The Wetland Committee
October 22, 1990

Present were: Tina Rooks, Pat Wolters, Diane Berenbrock, Linda Lane and guest Sue Wobma. Laurel Makowski was absent.

In two to three weeks, Stan from the Wetlands Foundation and their biologist will be walking the area with members of our committee to discuss the wetlands.

Linda Lane will look into the proper way of filing the paperwork, under the Freedom of Information Act, to get all previous and future plans, the Ottawa County Parks Commission has, in regards to expansion of Grose Park.

On October 3rd of 1990, Tina, Diane and Pat walked the properties of Merlin Haas, Barry Glovic and Frank Gunckle with Steve Ludy. He was hired by the DNR to determine wetlands. Permission was given by the three families to come on their property and do the study by way of a legal form they each signed. Each family received a written report of the findings from Steve, as did the lake association. The reports came back to us and we are to give them to Glovic, Gunckel and Haas. All three properties are considered "Protected Wetlands." They cannot be disturbed in any way. No footpaths, dredging, filling, etc.

We need to know when the next meeting of the Parks Commission will be, so a representative from the lake can attend.

We need to take pictures of the Blue Heron nests and document where they are located. Once a nest is destroyed, that pair of Heron will not rebuild another. We have then elected for them to become extinct. Steve Ludy said, "We have an unusual situation here with these birds. Normally there won't be another pair within 30 miles of one another." We have 5 Herons at the present time.

We need to re-address the Funneling Ordinance Issue. Sue will contact Cannon Township. She will get a copy of the ordinance adopted by their township.

Diane reported on the township meeting. We may soon have our own recycling station at the Chester Township Hall.

Pat Wolters, Secretary

DEWEY LAKE ASSOCIATION — Cass County
Mrs. Dave Carnegie, President

Sister Lakes Area Sewer Update. It is the intent of your Association to keep you informed as to the progress of the proposed sewer system around our lakes. We plan to follow the project closely and be a resource for your questions and concerns and hopefully avoid distorted information being circulated.

First, the committees appointed by each township are planning to submit petitions to the property owners in August, 1991, for your approval or disapproval of this project. As we stated in our last Bulletin, it will require the approval of the property owners of over 50% of the *land area* in the sewer districts. This requirement is for both Silver Creek and Keeler Townships. It is not financially feasible for one township to proceed without the other. If the project is approved, they will be then submitted to their respective township boards for verification and board approval.

We have an informational handout, dated January, 1991, giving the estimated cost of this project. It is a multi-page report and it is not feasible to include it in this Bulletin. This report will be available for your review at our May 25 Association meeting in the Township Hall as well as other updated material.

What will it cost? The typical single dwelling home will have the following estimated expenses:

1. Tap-In-Fee - $4,900.00. Payable lump sum or amortized over 20 years at 9%.
2. Front Footage Assessment - $10.00/foot. Payable in lump sum with tax bill following system start-up, with a maximum 250 foot footage per parcel of land.
3. Township Inspection and Recording Fees - $20.00.
4. Monthly Operation Fee - $17.00.
5. The cost of pumping and filling your existing septic tank and the sewer line from your house to the sewer will be the property owners responsibility — estimated at $500 and up.

Further, committees from each township have now been appointed to work on this project. These people are working on your behalf and to protect your interests. Our hope is that through this Bulletin and our Spring Meeting on Saturday, May 25, you will be fully informed for your vote in August. We did receive some comments from a few families concerning the sewer project and the response was just about half for and half against!

Weed Control. We continue to receive contributions towards our weed assessment and wish to thank all those who have contributed. We have now contracted with Weed Patrol, Inc. to treat about 25 acres of our lake early May. Preliminary treatment areas include Garrett Road, reaching 200 feet from the shoreline; Jones Drive; Third Street; and Ash Street on Huckleberry around to channel entrance. A brief meeting was held in January with Julie Lienhart, Director of Weed Patrol, to assist the board in completing the application for submission to DNR. All landowners who have not contributed must sign a consent form indicating that they do not object to their neighbors treating their weed problems. Forms will be distributed to these landowners before treatment date. All those wanting the weeds treated will have their cancelled check indicating their permission to treat. Weed Patrol, Inc. warrants that all chemicals used in lake treatment programs are approved for aquatic use by U.S. Environmental Protection Agency and permitted by the State Department of Natural Resources.

Enforcing Wetlands Protection Is Difficult. An article appeared in the South Bend Tribune on January 6, 1991, and we thought you would like a synopsis of it. The Michigan Wetlands Law was passed in 1979; however, environmentalists report that it hasn't done everything they had hoped for. The DNR is understaffed *and it seems county drain commissioners still have the power to overrule decisions to preserve the wetlands.*

Kameron Jordon, district representative of DNR's Plainwell office of Land and Water Management Division contends the public is becoming "wetland wise" leading to a greater awareness and preservation and a deeper realization of the value of wetlands. It is up to us to watchdog our lake and surrounding wetlands to protect what we have and prevent these areas from being developed. The DNR does have a serious backlog in processing permits and complaints but they are our only resource at present.

Watercraft Noise Pollution. Public Act 289, to go into effect April 1, will reduce noise pollution on Michigan lakes. The new law limits watercraft engine noise to 90 decibels measured at the boat either in open water or at a dock. Violators can be punished by 90 days in jail and up to $500 in fines. So, folks, equip your craft with a muffler or exhaust system to make it conform to regulations!

ELK SKEGEMOG LAKES ASSOCIATION —
Antrim, Grand Traverse and Kalkaska Counties
Lou Wood, President

The President's Corner

I would like to take this opportunity on behalf of the E.S.L.A. Board of Directors to wish everyone a very happy and prosperous 1991.

This is the time of year that we all stop for a moment to reflect on the past year. I felt we have accomplished much; things past-president Dick Luecht had in his data bank but just did not have time in office to accomplish, **i.e.: 1)** Strong standing committees, such as the new Water Quality Committee under that able chairman Dick Vock. **2)** A Riparian Handbook, which is soon to be available due to the tireless efforts of Elaine Burns. **3)** 501-C3 Tax Exemption, so that all dues and other contributions would be income tax deductible. We thank Dick Luecht for this accomplishment. **4)** Full participating membership in the Tip of the Mitt Watershed Council with a full voting director on their Board of Directors who just happens to be Dick Luecht, himself. **5)** A revised method of printing and mail-

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ing your newsletter, made possible by our hard working editor Bill Gast; this has saved the Association hundreds of dollars already!!

Thanks, Dick, for all those good ideas and for all your help in making them a reality. Any more ideas for the coming year? Also, I would like to give a great big "Thank You" to all of the officers and directors for all of their help over the past year in making these projects a reality. It took a lot of time and hard work by many members to make these achievements.

FARWELL INTERLAKE ASSOCIATION — Jackson County
Ann Tallis, President

Association Board approved writing letters to Gov. Engler requesting he intercede in putting an access site on Pine Hill Lake. One such letter follows:

Dear Mr. Engler:

I want to express my appreciation for the manner in which you are addressing the run-away spending in our state. The actions taken thus far lead me to believe that you will honor your campaign promise and contain spending in a responsible manner. This new direction is a difficult road to take and one that will not be without its bumps and bruises along the way.

I also want to bring to your attention an area of unnecessary spending by our states DNR. The DNR has just approved a permit which will allow construction of a public boat launch site and parking area on Pine Hill Lake in southern Jackson County. The unnecessary nature of this planned expenditure is the fact that within 100 yards of the proposed DNR site is a perfectly adequate boat launch site that is privately owned, however, it is open to the public for a modest $1.50 launch fee.

The DNR contends that it is important to assure that the public will have access to the lake and this cannot be guaranteed long-term with a private launch. I agree, however, it has been suggested to the DNR that construction on the DNR launch site be delayed until such time, if ever, that the public access to the lake would be in jeopardy due to a closing of the existing site.

I recognize that this is only a nickel item in the big picture. However, nickels add up and this is truly wasted spending of the taxpayers money. Please stop the DNR from constructing the boat launch site and continuing the wastes of the past. Thank you.

LAKE FENTON PROPERTY OWNERS ASSOCIATION — Genesee County
Dick Brown, President

President's Comments

Because you are living on Lake Fenton and are reading this publication, you are interested in your community and the pleasures lakefront property ownership offers you and your family. The preservation of the many aspects of lake living is very important, not only for today, but for our children and our childrens' children.

These factors were instrumental in the need and the formation of "your" Lake Fenton Property Owners Association 25 years ago. Many residents across the years, have contributed their resources and time to maintaining this organization as one of the most active and involved in the region and the State. To preserve this vital resource; continued individual involvement and support are required. The contribution of the Associations' Officers and Directors provide the interaction between State and Township governments to assure our lakes, clean environment and water quality. We keep abreast of changing laws and area planning for the purpose of monitoring and providing feedback to this organization. We monitor proposed watershed development such as drains, road construction, filling and dredging, construction of sea walls, etc. This publication is used as a means of communicating these areas of current or potential concern; coupled with providing an avenue for distribution of educational information to our residents.

This association consists of Lake Fenton being divided into four districts, each having four directors to properly represent their area. Monthly meetings are held on the second Wednesday of every month except for the months of July and December, at the Township Hall, starting at 7:00 p.m. Discussions are held and actions are taken upon any problems that may arise, affecting our lake and explore new and better means to preserve and protect our lake. We have an *Open Door Policy*, with a time period for visitors to speak. If you have input or a problem in your district, contact your district director or any officer if you are unable to attend our meeting.

HAMLIN LAKE ASSOCIATION — Mason County
Dave Kalina, President

Hamlin Lake Improvement Board
(from *Hamlin Currents*, Winter, 1991)

The Hamlin Lake Improvement Board held its organizational meeting on August 23, 1990. Dave Mahannah was appointed the riparian representative and was elected chairman of the board. Tim Hansen was elected secretary and the Hamlin Township Treasurer will serve as the board treasurer. The West Michigan Regional Planning Commission was approved as the administrator of the EPA Clean Lakes Program grant.

The EPA approved the grant for Hamlin Township on Sept. 18, 1990.

The board, after reviewing submitted bids and proposals, recommended to the WMRPC that Progressive Architects Engineers Planners of Grand Rapids be awarded the contract to do the study. WMRPC accepted the boards' recommendation and after finalizing the contracts work should begin with the monitoring of storm events and taking samples through the ice.

A technical steering committee has been appointed to provide a broader base of expertise to the board during the study. Members of the steering committee are Don Bennett, WMRPC; Fred Kirchner of the Mason-Lake Soil Conservation District; Don Miller, HLA; Michael Mullen, DNR, manager of the Ludington State Park; and a member to be appointed representing the Manistee National Forest. The steering committee members will analyze data, information and results of testing; help decide on goals and policies as they pertain to project objectives; and apply their findings to the content of the lake management plan.

More information regarding the progress of the lake study will be published as it becomes available.

Update: The Ludington Daily News *reported on January 15 that Frank Lenz has been appointed to replace Jim Voelker as the Hamlin Township representative on the lake board. Mr. Voelker resigned for personal reasons.*

LAKE LAPEER ASSOCIATION — Lapeer County
Dave Smith, President

As you have noticed by now, there have been some changes in the way the Association communicates with the residents. The monthly minutes are mailed to everyone on the mailing list. This mitigates the need for the newsletter, at least in its duty to bring the business of the Board of Trustees to the attention of the residents and membership. And this has led to some soul-searching on the part of the editor as to whether it continues to be worthwhile to serve in his capacity. That, in turn, has resulted in this long delay in the publishing of the January Newsletter.

On the one hand, much of the content of previous newsletters involved matters such as the activities of the Board on weed control, island maintenance, social activities, etc., which are now covered in the minutes. On the other hand, the only reason the editor put up with the considerable drudgery of writing and publishing the quarterly Newsletter has been the belief that an outside, independent opinion of the activities of the Board of Trustees was advisable. The pages of the Newsletter have always been available to anyone who wished to express an opinion on any subject of interest to lake residents, although few have taken advantage of the opportunity. That continues to be the situation. For the present we will continue to publish the Newsletter, although it may be a foreshortened version. We will concentrate on news and editorial opinions. We invite letters on any topic which may be of general interest to lake residents, while reserving the right to edit or reject those which we feel may be in poor taste or libelous. We will especially enjoy receiving news of new neighbors and social activities.

MACEDAY-LOTUS LAKES ASSOCIATION — Oakland County
Helen Hoes, President

Dr. Wally Fusilier has completed his extensive studies of both Maceday and Lotus Lakes, and the reports were announced at our annual meeting in March. We are very appreciative that Dr. Fusilier will be presenting the findings of the studies to the MLLA Membership in May, which will provide an opportunity for MLLA Members to ask Dr. Wally questions first hand, about the studies and the condition of our lakes.

The Waterford Landfill, which has been proven to be the source of ground water contamination, and which is located only 1700 feet from Maceday Lake, remains closed by order of the DNR. At least two attempts by the landfill operators have been made to reverse the decision in Oakland County Circuit Court, but have failed.

MLLA Board members and residents have met with a group of Environmental Attorneys, to discuss the residents options for bringing legal action against the landfill operators to assure the site is re-mediated, and for restitution for health hazards and loss of property values.

The new Board was elected at the March General Membership meeting, and consists of Helen Hoes, President, Andy Blain, Vice President, Al Ackroyd, Treasurer, and Jeff Egner, Secretary.

The ice was off the lakes on March 19 — one of the earliest dates on record! So enjoy the lakes, and have a great boating season, but please be careful and courteous!

Sincerely,

Helen Hoes
President, Maceday-Lotus Lakes Association

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LAKES PRESERVATION LEAGUE — Lenawee County
Jane Davis, President

In The Spotlight — Jane Davis
by Ann McKie

We of the Lakes Preservation League are fortunate to have Jane Davis as our President. She and John have been here at Devil's Lake for the past 17 years. They came to our area when John accepted a history professorship at Adrian College.

When I asked her to define her goals for our Association this is how she responded:

"As your President let me share my vision of what we of the Lakes Preservation League are and what we could be. We are *preservers* of the lakes and the area around them including the watershed. We understand that lakes are living things that can die! We continue to educate ourselves so we can raise consciousness of all who come in contact with our wonderful natural resources; that they may enjoy them but not help to destroy them. We pursue this with vigor.

I would like to see a *trust* established, managed independently from the Lakes Preservation League, that could accept gifts of money and property from those people who want to conserve these natural resources as an ever present reality.

We have had fun, too. We have made new friends, have had new experiences and our *quality of life* has been enhanced by our activity in the League. We hope you have found this to be true for you."

I first knew Jane as our Representative to the Lenawee County Commission on which she served for six years. She would come to Rollin Township Board meetings to explain the current issues. Now I count her as a friend, with a gentle persistence which I admire.

Since John's retirement from Adrian College they have had more time to enjoy the families of their four sons. As she explains, "Our four sons are scattered from Quebec to Tallahassee, from East Lansing to Pennsylvania. When you see the tents and trailers on our lawn you know they are all home with our six grandchildren."

John and Jane like to sail. John was one of the first Presidents of our Association and for many years offered his time to the League by supplying and placing the channel markers. I understand that the Davis' strategic location often places on their shoulders a task to provide aid to people in distress on Devil's Lake.

THREE LAKES ASSOCIATION — Antrim & Kalkaska Counties
(Bellaire, Clam, Torch & Connecting Waters)
Alfred Priebe, President

Water Quality And Our Three Lakes

Water quality is really a subjective term. Does our water have good quality — as compared to what? Much of the perception of "good" or "bad" water quality is in the eye of the beholder. In temperate climates, the yearly cycle of the seasons causes the number value of our measures of water quality to vary over a natural range. You can't compare a number taken in January with one taken in July without some understanding of these cycles and what you are measuring. Let's try to explain with the TLA data.

Temperature — Obviously, temperature controls much of the activity in any biological system. A proper temperature is required for fish to spawn, for their eggs to successfully hatch, for phytoplankton and zooplankton to flourish, for aquatic vegetation to produce; and the range determines what species grow in our area. Temperature, along with food supply, is the most important trigger to determine why some algae species appear one year but not the next. Sunlight drives the temperature machine. However our area has numerous springs which provide a steady supply of nearly constant temperature water which tempers fluctuations. Cold Creek, Shanty Creek, and Rapid River vary only a few degrees yearly.

Shallow waters like Clam Lake and Skegemog where sunlight can penetrate most of the water warm the most in summer and stay well mixed by wind and waves throughout the year. Our deeper lakes are subject to thermal *stratification* which requires a quick physics lesson. First you must accept that warm water is lighter than cold water. You know hot air balloons float up around cooler air — the principle is the same. So warm water tends to rise. Got it? Let's talk late fall.

This time of year, the cold winds are chilling the upper layers of water, they sink, and lower, warmer water rises in currents to get the icy blast. Soon all the water has been chilled to the same temperature — the layers have been turned topsy turvy. This is called the *fall overturn* and it causes all the water to become completely mixed. It will stay that way until spring.

Then why don't the lakes freeze like a giant ice cube when the temperature reaches 0° Centigrade. There's always a trick. In freshwater, the water actually becomes the most dense at about 4° C, then it actually starts to get lighter as it continues to cool to 0° C. That means the coldest water floats right on the surface and explains how the entire lake can freeze so quickly overnight. It makes ice from the top down, instead of bottom up.

As summer arrives, hot winds warm the surface. But instead of sinking, the warm water piles up on top because it is lighter. By the end of summer the big lakes are usually stratified — warm water sitting over the top of colder water. A sharp temperature gradient forms between the two layers called a *thermocline*.

Dissolved Oxygen — Very few life forms can survive without oxygen in some form. Humans extract it from the air with lungs. Fish use gills to extract the oxygen from the water where it exists as a dissolved gas. How do you know it's there? Remember the bubbles forming in the bottom of a pan of hot water on the stove — those are the dissolved gasses coming out of solution as the water gets hotter. The pan of water also tells us that more gas can be dissolved in cold water than in hot water. So goes oxygen in our lakes.

Our lakes are normally 100% saturated with dissolved oxygen. In fact, levels over 100% are found because of waves or plankton with chlorophyll which produce oxygen from sunlight (just like trees on land).

That's the way our deep clear lakes work. How about shallower lakes with more nutrients like Lake Bellaire? A look at an early October 1987 profile for Lake Bellaire shows a different story. Lake Bellaire is much more productive — that means it has more fish, *plankton*, plants, bacteria, and decaying material on the bottom all competing for dissolved oxygen. When the thermocline forms in mid-summer (or when ice covers in winter), the lower layer is cut off from its supply of oxygen from the air circulated by currents from the surface. Once isolated, the oxygen consumers in the lower layer (or *hypolimnion*) have only a set amount to consume until the fall overturn (or ice out in spring). Fish and other motile species can simply move to the upper layer (or *epilimnion*) if the oxygen gets too low, but decaying material on the bottom can't move.

Water Transparency - The Famous Secchi Disk — Water clarity is determined by several factors. Suspended sediments from shoreline erosion, streams, or propwash can cloud water. Although invisible to the naked eye, plankton start growing as water warms in summer and die off as the water cools in fall. The size of their populations is determined by the storehouse of nutrients available and to a lesser extent by the temperature. They block light and restrict clarity. Cold, deep, clear lakes grow less plankton than shallow warm lakes. The *secchi disk* (a 20 cm diameter disk) was visible much deeper in Torch than Bellaire.

The transparency typically is clearest in early spring, decreases as summer unfolds, then gradually increases again in the fall. TLA is now sampling chlorophyll to determine what portion of the loss of clarity is due to chlorophyll containing plankton.

Phosphorus - A Limiting Nutrient — All the biological life forms that grow in our lakes need the basic building blocks of life to grow. All the carbon, nitrogen, hydrogen, etc. are present for cell building — what's missing is abundant supplies of phosphorus. If we manage supplies entering the lake through the atmosphere, lawn runoff, septic discharge, and detergents, we can limit the amount of biomass a lake can create in the form of weeds, algae, and plankton. Unwanted releases of phosphorus can "trigger" algal blooms.

Lakes act to cleanse themselves by settling out excess plant and animal storehouses of phosphorus each year and trying to bury them in the bottom sediments. If bottom sediments become too rich, they can become counterproductive to the lake by growing excess bacteria and worms which will begin to release nutrients and gasses back into the water. This will consume more oxygen and grow more weeds and algae creating undesirable water quality.

Levels of phosphorus in our lakes are generally below 10 micrograms per liter (that's the same as a part per billion). Lake Bellaire data since 1970 shows this. Prior to 1978, TLA was not using chemical techniques capable of measuring this low, explaining early high readings. Later high readings were samples either improperly run in the lab or very likely contaminated. At this low level the slightest detergent or dirt in a bottle or sampler will throw off the analysis.

Three Lakes Water Quality In The 90's — The Association hopes to continue what amounts to "baseline" data gathering. No obvious trends towards worsening water quality presently exist. The TLA Lake Watch program now deals with "hot spots" of possible pollution with continuing success. Our lakes need your continued support to keep runoff and nutrients — especially phosphorous — out of them. As more people gather around them each year, the pressure increases. How each riparian maintains his greenbelt, lawn and septic will determine if ominous trends in water quality develop in the coming decade.

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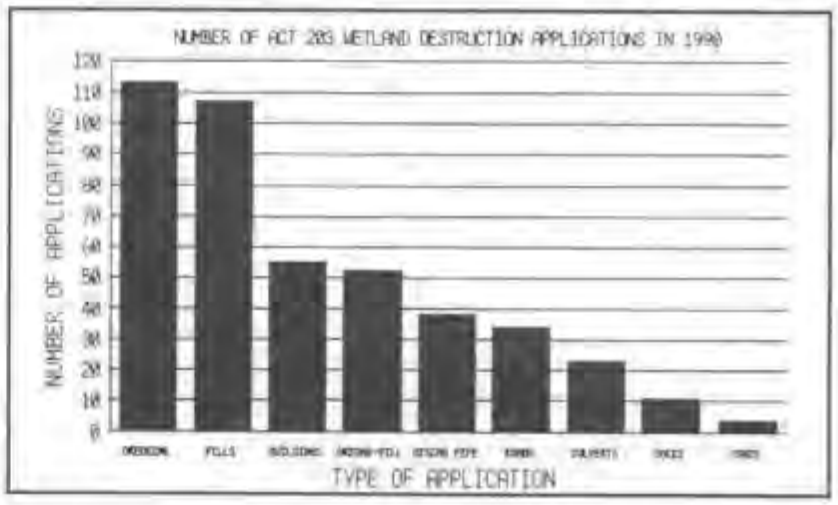
Applications To Destroy Michigan's Wetlands Keeps DNR Busy

Applications to the DNR to change wetlands under the Wetlands Protection Act continue to arrive at the Lansing DNR office at the rate of about eight (8) every week of the year. In 1990, the DNR received 437 applications to change wetlands under the Wetland Protection Act, Act #203 P.A. of 1979. The graph on the right shows the wetland activity proposed by the applicants. The greatest number were for dredging and filling — 62%. Of the total number of 437 applications, only about 30 or seven percent (7%) were contested and a public hearing demanded. It is probably true that most of the applications were approved unless opposition surfaced.

Since the DNR has adopted a policy which will permit on site approval of minor activities in wetlands without the unnecessary delay of public noticing, it behooves lake associations to be vigilant in reviewing applications to change wetlands. The DNR has defined minor fills as "300 cubic yards or less and not exceeding 10,000 square feet placed into a wetland area". The complete text of the Goemaere-Anderson Wetland Protection Act, Act #203, P.A. of 1979, is printed below. The Administrative Rules Adopted under the Act in 1988, and the "General Permit Categories for Minor Activities in Wetlands" are available from *The Michigan Riparian*, 11262 Oak Avenue, Three Rivers, MI 49093.



Goemaere-Anderson Wetland Protection Act #203

An Act to provide for the preservation, management, protection, and use of wetlands; to require permits to alter certain wetlands; to provide for a plan for the preservation, management, protection, and use of wetlands; and to provide remedies and penalties.

The People of the State of Michigan enact:

281.701 Short title.

Sec. 1. This act shall be known and may be cited as the "Goemaere-Anderson wetland protection act".

281.702 Definitions.

Sec. 2. As used in this act:

(a) "Department" means the department of natural resources.

(b) "Director" means the director of the department of natural resources.

(c) "Fill material" means soil, rocks, sand, waste of any kind, or any other material which displaces soil or water or reduces water retention potential.

(d) "Minor drainage" includes ditching and tiling for the removal of excess soil moisture incidental to the planting, cultivating, protecting, or harvesting of crops or improving the productivity of land in established use for agriculture, horticulture, silviculture, or lumbering.

(e) "Municipality" means a city, village, township, or county.

(f) "Person" means an individual, sole proprietorship, partnership, corporation, association, municipality, this state, an instrumentality or agency of this state, the federal government, or an instrumentality or agency of the federal government, or other legal entity.

(g) "Wetland" means land characterized by the presence of water at a frequency and duration sufficient to support and that under normal circumstances does support wetland vegetation or aquatic life and is commonly referred to as a bog, swamp, or marsh and which is any of the following:

(i) Contiguous to the Great Lakes or Lake St. Clair, an inland lake or pond, or a river or stream.

(ii) Not contiguous to the Great Lakes, an inland lake or pond, or a river or stream; and more than 5 acres in size; except this subdivision shall not be of effect, except for the purpose of inventorying, in counties of less than 100,000 population until the department certifies to the commission of natural resources it has substantially completed its inventory of wetlands in that county.

(iii) Not contiguous to the Great Lakes, an inland lake or pond, or a river or stream; and 5 acres or less in size if the department determines that protection of the area is essential to the preservation of the natural resources of the state from pollution, impairment, or destruction and the department has so notified the owner; except this subdivision may be utilized regardless of wetland size in a county in which subdivision (ii) is of no effect; except for the purpose of inventorying, at the time.

281.703 Legislative findings; criteria to be considered in administration of act.

Sec. 3. (1) The legislature finds that:

(a) Wetland conservation is a matter of state concern since a wetland of 1 county may be affected by acts on a river, lake, stream, or wetland of other counties.

(b) A loss of a wetland may deprive the people of the state of some or all of the following benefits to be derived from the wetland:

(i) Flood and storm control by the hydrologic absorption and storage capacity of the wetland.

(ii) Wildlife habitat by providing breeding, nesting, and feeding grounds and cover for many forms of wildlife, waterfowl, including migratory waterfowl, and rare, threatened, or endangered wildlife species.

(iii) Protection of subsurface water resources and provision of valuable watersheds and recharging ground water supplies.

(iv) Pollution treatment by serving as a biological and chemical oxidation basin.

(v) Erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.

(vi) Sources of nutrients in water food cycles and nursery grounds and sanctuaries for fish.

(c) Wetlands are valuable as an agricultural resource for the production of food and fiber, including certain crops which may only be grown on sites developed from wetland.

(d) That the extraction and procession of nonfuel minerals may necessitate the use of wetland, if it is determined pursuant to section 9 that the proposed activity is dependent upon being located in the wetland, and that a prudent and feasible alternative does not exist.

(2) In the administration of this act, the department shall consider the criteria provided in subsection (1).

281.704 Studies regarding wetland resources; contracts; study as public record for distribution at cost.

Sec. 4. The department may enter into an agreement to make contracts with the federal government, other state agencies, municipalities, private agencies, or persons for the purposes of making studies for the efficient preservation, management, protection, and use of wetland resources. A study shall be available as a public record for distribution at cost as provided in section 4 of Act No. 442 of the Public Acts of 1976, being section 15.234 of the Michigan Compiled Laws.

281.705 Prohibited activities.

Sec. 5. Except as otherwise provided by this act or by a permit obtained from the department under sections 7 to 12, a person shall not:

(a) Deposit or permit the placing of fill material in a wetland.

(b) Dredge, remove, or permit the removal of soil or minerals from a wetland.

(c) Construct, operate, or maintain any use or development in a wetland.

(d) Drain surface water from a wetland.

281.706 Activities not requiring permit under act; uses not requiring permit; additional permit not required for project involving discharge of certain fill material.

Sec. 6. (1) Activities which require a permit under Act No. 247 of the Public Acts of 1955, as amended, being section 322.701 to 322.715 of the Michigan Compiled Laws, or Act No. 346 of the Public Acts of 1972, being sections 281.951 to 281.965 of the Michigan Compiled Laws, shall not require a permit under this act.

(2) The following uses shall be allowed in a wetland without a permit subject to other laws of this state and the owner's regulation:

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Goemaere-Anderson Wetland Protection Act #203

(Continued from Page 21)

(a) Fishing, trapping, or hunting.
(b) Swimming or boating.
(c) Hiking.
(d) Grazing of animals.
(e) Farming, horticulture, silviculture, lumbering, and ranching activities, including plowing, irrigation, irrigation ditching, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices.
(f) Maintenance or operation of serviceable structures in existence on the effective date of this act or constructed pursuant to this act.
(g) Construction or maintenance of farm or stock ponds.
(h) Maintenance, operation, or improvement which includes straightening, widening or deepening of the following which is necessary for the production or harvesting of agricultural products:
(i) An existing private agricultural drain.
(ii) That portion of a drain legally established pursuant to Act No. 40 of the Public Acts of 1956, as amended, being sections 280.1 to 280.630 of the Michigan Compiled Laws, which has been constructed or improved for drainage purposes.
(iii) A drain constructed pursuant to other provisions of this act.
(j) Construction or maintenance of farm roads, forest roads, or temporary roads for moving mining or forestry equipment, if the roads are constructed and maintained in a manner to assure that any adverse effect on the wetland will be otherwise minimized.
(k) Drainage necessary for the production and harvesting of agricultural products if the wetland is owned by a person who is engaged in commercial farming and the land is to be used for the production and harvesting of agricultural products. Except as otherwise provided in this act, land improved under this subdivision after the effective date of this act shall not be used for nonfarming purposes without a permit from the department. This subdivision shall not apply to a wetland which is contiguous to a lake or stream, or to a tributary of a lake or stream, or to a wetland which the department has determined by clear and convincing evidence to be a wetland which is necessary to be preserved for the public interest, in which case a permit shall be required.
(l) Maintenance or improvement of public streets, highways, or roads, within the right of way and in such a manner as to assure that any adverse effect on the wetland will be otherwise minimized. Maintenance or improvement does not include adding extra lanes; increasing the right of way; or deviating from the existing location of the street, highway, or road.
(m) Maintenance, repair, or operation of gas or oil pipelines and construction of gas or oil pipelines having a diameter of 6 inches or less, if the pipelines are constructed, maintained, or repaired in a manner to assure that any adverse effect on the wetland will be otherwise minimized.
(n) Maintenance, repair, or operation of electric transmission and distribution power lines and construction of distribution power lines if the distribution power lines are constructed, maintained, or repaired in a manner to assure that any adverse effect on the wetland will be otherwise minimized.
(o) Operation or maintenance, including reconstruction of recently damaged parts, of serviceable dikes and levees in existence on the effective date of this act or constructed pursuant to this act.
(p) Construction of iron and copper mining tailings basins and water storage areas.
(3) After the effective date of this act but immediately prior to the approval of a state program under section 404 of title 4 of the clean water act of 1977, 33 U.S.C. 1344, where a project solely involves the discharge of fill material subject to the individual permit requirements of section 404 of title 4 of the clean water act of 1977, 33 U.S.C. 1344, an additional permit shall not be required by this act.

281.707 Permit for use or development listed in §281.705; filing, form, and contents of application; fee; exemption; proposed use or development as single permit application.

Sec. 7. (1) Except as provided in section 8(4), to obtain a permit for a use or development listed in section 5, the person desiring the permit shall file an application with the department on a form provided by the department accompanied by a fee of $25.00. A person who has a permit for the particular activity under Act No. 346 of the Public Acts of 1972, or Act No. 61 of the Public Acts of 1939, as amended, being sections 319.1 to 319.27 of the Michigan Compiled Laws, does not need to pay the fee prescribed by the subsection. The application shall include:
(a) The person's name and address.
(b) The location of the wetland.
(c) A description of the wetland on which the use or development is to be made.
(d) A statement describing the proposed use or development.
(e) The wetland owner's name and address.
(f) An environmental assessment on a form supplied by the department, of the proposed use or development if requested by the department which shall include effects upon wetland benefits and the effects upon the water quality, flow, and levels, and the wildlife, fish, and vegetation within a contiguous lake, river, or stream.
(2) For the purposes of subsection (1), a proposed use or development of a wetland shall be considered as a single permit application under this act if the scope, extent, and purpose of a use or development are made known at the time of the application for the permit.

281.708 Hearing; location; notice; approval or disapproval of permit application; notice of and reasons for denial or modifications; conditions; appeal; legal action; request and fee for notification of pending permit applications; biweekly list of applications; effect of ordinance regulating wetlands; agreement with municipality; review of permit application by municipality; recommendations.

Sec. 8. (1) Within 60 days after receipt of the completed application and fee, the department may hold a hearing. If a hearing is held, it shall be held in the county where the wetland on which the permit is to apply is located. Notice of the hearing shall be made in the same manner as for the promulgation of rules under Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Michigan Compiled Laws. The department may approve or disapprove a permit application without a public hearing unless a person requests a hearing in writing within 20 days after the mailing of notification of the permit application as required by subsection (3), or the department determines that the permit application is of significant impact to warrant a public hearing.
(2) If a hearing is not held, the department shall approve or disapprove the permit application within 90 days after the completed permit application is filed with the department. If a hearing is held, the department shall approve or disapprove the permit application within 90 days after the conclusion of the hearing. The department may approve a permit application, request modifications in the application, or deny the permit application. If the department approves the permit application, the department shall prepare and send the permit to the applicant. If the department denies, or requests a modification of, the permit application, the department shall send notice of the denial of modification request, and the reasons for the denial or the modifications requested to the applicant. Department approval may include the issuance of a permit containing conditions necessary for compliance with this act. If the department does not approve or disapprove the permit application within the time provided by this subsection, the permit application shall be considered approved, and the department shall be considered to have made the determinations required by section 9. The action taken by the department may be appealed pursuant to Act No. 306 of the Public Acts of 1969, as amended. A property owner may, after exhaustion of administrative remedies, bring appropriate legal action in a court of competent jurisdiction.
(3) A person who desires notification of pending permit applications may make a written request to the department accompanied by an annual fee of $25.00 which shall be credited to the general fund of the state. The department shall prepare a biweekly list of the applications made during the previous 2 weeks and shall promptly mail copies of the list for the remainder of the calendar year to the persons who requested notice. The biweekly list shall state the name and address of each applicant, the location of the wetland in the proposed use or development including the size of both the proposed use or development and of the wetland affected, and a summary statement of the purpose of the use or development.
(4) A municipality, by ordinance, may provide for more stringent definition and regulation of wetland than is provided under this act. This subsection is supplemental to the existing authority of a municipality to protect wetland. Each municipality which adopts an ordinance regulating wetlands shall notify the department. The department shall develop an agreement with each municipality which has an ordinance regulating wetlands. The agreement shall provide for an exhange of information with the department including information regarding the environmental impact of each proposed use or development on wetlands, the proposed decision on each application for a proposed use or development on wetlands, and other information that may assist the municipality in administering its ordinance. The agreement shall provide that the department shall not issue a permit if the municipality has denied permission for the permit under its ordinances, unless the permit involves a use or development of regional or statewide public benefit. The agreement shall require that the municipality

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use an application form supplied by the department, and that each person applying for a permit make application directly with the municipality. Upon receipt, the municipality shall forward a copy of each application to the department. The department shall begin reviewing the application as provided in this act. The municipality shall review the application pursuant to its ordinance and shall modify, approve, or deny the application within 60 days after receipt. The department shall inform any interested person whether a municipality has an ordinance regulating wetlands. If the department receives an application with respect to a wetland which is located in a municipality which has an ordinance regulating wetlands, the department immediately shall forward the application to the municipality, which shall modify, deny, or approve the application under this subsection. The municipality shall notify the department of its decision. The department shall proceed as provided in this act.

(5) If a municipality does not have an ordinance regulating wetlands, the department shall promptly send a copy of the permit application to the municipality where the wetland is located. The municipality may review the application; may hold a hearing on the application; and may recommend approval, modification, or denial of the application to the department. The recommendations of the municipality shall be made and returned to the department within 45 days after the municipality's receipt of the permit application. The department shall approve, modify, or deny the application as provided in this act.

281.709 Permit for activity listed in §281.705; approval conditioned on certain determinations; criteria; findings of necessity; criteria for determining unacceptable disruption to aquatic resources; additional showing.

Sec. 9. (1) A permit for an activity listed in section 5 shall not be approved unless the department determines that the issuance of a permit is in the public interest, that the permit is necessary to realize the benefits derived from the activity, and that the activity is otherwise lawful.

(2) In determining whether the activity is in the public interest, the benefit which reasonably may be expected to accrue from the proposal shall be balanced against the reasonably foreseeable detriments of the activity. The decision shall reflect the national and state concern for the protection of natural resources from pollution, impairment, and destruction. The following general criteria shall be considered:

(a) The relative extent of the public and private need for the proposed activity.

(b) The availability of feasible and prudent alternative locations and methods to accomplish the expected benefits from the activity.

(c) The extent and permanence of the beneficial or detrimental effects which the proposed activity may have on the public and private uses to which the area is suited, including the benefits the wetland provides.

(d) The probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated activities in the watershed.

(e) The probable impact on recognized historic, cultural, scenic, ecological, or recreational values and on the public health or fish or wildlife.

(f) The size of the wetland being considered.

(g) The amount of remaining wetland in the general area.

(h) Proximity to any waterway.

(i) Economic value, both public and private, of the proposed land change to the general area.

(3) In considering a permit application, the department shall give serious consideration to findings of necessity for the proposed activity which have been made by other state agencies.

(4) A permit shall not be issued unless it is shown that an unacceptable disruption will not result to the aquatic resources. In determining whether a disruption to the aquatic resources is unacceptable, the criteria set forth in section 3 and subsection (2) shall be considered. A permit shall not be issued unless the applicant also shows either of the following:

(a) The proposed activity is primarily dependent upon being located in the wetland.

(b) A feasible and prudent alternative does not exist.

281.710 General permit for category of activities; notice and public hearing; determinations; requirements and standards; conditions; time for completion or termination of construction, development, or use; duration of general permit.

Sec. 10. (1) The department, after notice and opportunity for a public hearing, may issue general permits on a state or county basis for a category of activities if the department determines that the activities are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment. A general permit issued under this subsection shall be based on the requirements of this act and the rules promulgated under this act, and shall set forth the requirements and standards which shall apply to an activity authorized by the general permit.

(2) The department may impose conditions on a permit for a use or development if the conditions are designed to remove an impairment to the wetland benefits, to mitigate the impact of a discharge of fill material, or to otherwise improve the water quality.

(3) The department may establish a reasonable time when the construction, development, or use is to be completed or terminated. A general permit shall not be valid for more than 5 years.

281.711 Grounds for revocation or modification of general permit; grounds for termination or modification for cause of general permit.

Sec. 11. (1) A general permit may be revoked or modified if, after opportunity for a public hearing or a contested case hearing under Act No. 306 of the Public Acts of 1969, as amended, the department determines that the activities authorized by the general permit have an adverse impact on the environment or the activities would be more appropriately authorized by an individual permit.

(2) A permit may be terminated or modified for cause, including:

(a) A violation of a condition of the permit.

(b) Obtaining a permit by misrepresentation or failure to fully disclose relevant facts.

(c) A change in a condition that requires a temporary or permanent change in the activity.

281.712 Information required to obtain compliance with act; entering on premises.

Sec. 12. (1) The department shall require the holder of a permit to provide information the department reasonably requires to obtain compliance with this act.

(2) Upon reasonable cause or obtaining a search warrant, the department may enter on, upon, or through the premises on which an activity listed in section 5 is located or on which information required to be maintained under subsection (1) is located.

281.713 Violation; order requiring compliance; civil action.

Sec. 13. (1) If, on the basis of information available to the department, the department finds that a person is in violation of this act or a condition set forth in a permit issued under section 9 or 10, the department shall issue an order requiring the person to comply with the prohibitions or conditions or the department shall request the attorney general to bring a civil action under section 14(1).

(2) An order issued under subsection (1) shall state with reasonable specificity the nature of the violation and shall specify a time for compliance, not to exceed 30 days, which the department determines is reasonable, taking into account the seriousness of the violation and good faith efforts to comply with applicable requirements.

281.714 Civil action; commencement; request; venue; jurisdiction; violations; penalties; restoration of wetland.

Sec. 14. (1) The attorney general may commence a civil action for appropriate relief, including injunctive relief upon request of the department under section 13(1). An action under this subsection may be brought in the circuit court for the county of Ingham or for a county in which the defendant is located, resides, or is doing business. The court has jurisdiction to restrain the violation and to require compliance with this act. In addition to any other relief granted under this section, the court may impose a civil fine of not more than $10,000.00 per day of violation. A person who violates an order of the court shall be subject to a civil fine not to exceed $10,000.00 for each day of violation.

(2) A person who violates this act is guilty of a misdemeanor, punishable by a fine of not more than $2,500.00.

(3) A person who willfully or recklessly violates a condition or limitation in a permit issued by the department under this act, or a corporate officer who has knowledge of or is responsible for a violation, is guilty of a misdemeanor, punishable by a fine of not less than $2,500.00 nor more than $25,000.00 per day of violation, or by imprisonment for not more than 1 year, or both. A person who violates this section a second or subsequent time is guilty of a felony, punishable by a fine of not more than $50,000.00 for each day of violation, or by imprisonment for not more than 2 years, or both.

(4) In addition to the penalties provided under subsections (1), (2), and (3), the court may order a person who violates this act to restore as nearly as possible the wetland which was affected by the violation, to its original condition immediately before the violation. The restoration may include the removal of fill material deposited in the wetland or the replacement of soil, sand, or minerals.

281.715 Disposition of fees and civil fines.

Sec. 15. The fees and civil fines collected under this act shall be deposited in the general fund of the state.

281.716 Revaluation of property for assessment purposes.

Sec. 16. If a permit is denied for a proposed wetland activity, the land-

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Wetland Protection Act

(Continued from Page 23)

owner may request a revaluation of the affected property for assessment purposes to determine its fair market value under the use restriction.

281.717 Rules; hearing; judicial review; proceedings to protect wetland owner's rights.

Sec. 17. (1) The department shall promulgate and enforce rules to implement this act pursuant to Act No. 306 of the Public Acts of 1969, as amended.

(2) If a person is aggrieved by any action or inaction of the department, the person may request a formal hearing on the matter involved. The hearing shall be conducted by the department pursuant to Act No. 306 of the Public Acts of 1969, as amended.

(3) A determination, action, or inaction by the department following the hearing shall be subject to judicial review as provided in Act. No. 306 of the Public Acts of 1969, as amended.

(4) This section does not limit the right of a wetland owner to institute proceedings in any circuit of the circuit court of the state against any person when necessary to protect the wetland owner's rights.

281.718 Inventories of wetland; use; updating; maps, ground surveys, and descriptions as public documents; availability and cost of aerial photographs and satellite telemetry data reproduction to county register of deeds.

Sec. 18. (1) As inventories of wetland are completed, the inventories shall be used as 1 of the criteria by the department in issuing permits. The inventories shall be periodically updated. The maps, ground surveys, and descriptions of wetlands included in the inventories shall be submitted to the respective county register of deeds and shall become a public document available to review by any member of the public.

(2) Aerial photographs and satellite telemetry data reproductions shall be made available to the respective county register of deeds for cost as determined by the department.

281.719 Basis and filing of preliminary inventory of wetland; hearing in state planning and development region; notice; issuance and distribution of final inventory; legislators to receive inventories; inspection of property; written wetland determination; inventory not to delay implementation of act.

Sec. 19. (1) The department shall make or cause to be made a preliminary inventory of all wetland in this state on a county by county basis and file the inventory with the agricultural extension office, register of deeds, and county clerk.

(2) At least 2 hearings shall be held in each state planning and development region created by Executive Directive No. 1973-1. The hearing shall be held by the department after publication and due notice so that interested parties may comment on the inventory. After the hearings the department shall issue a final inventory which shall be sent and kept by the agricultural extension office, register of deeds, and county clerk. Legislators shall receive an inventory of a county or regional classification for their districts including both preliminary and final inventories unless the legislators request not to receive the materials.

(3) Before an inventory is made of a county, interested persons may request the department to inspect property and the department shall make a written wetland determination. The determination shall be made within a reasonable time after the request. Completion of the inventory shall not delay implementation of this act.

281.720 Notice to owners of record of change in status of property.

Sec. 20. As wetland inventories are completed as specified in section 19, owners of record as identified by the current property tax roll shall be notified of the possible change in the status of their property. Notification shall be printed on the next property tax bill mailed to property owners in the county. It shall contain information specifying that a wetland inventory has been completed and is on file with the agricultural extension office, register of deeds, and county clerk, and that property owners may be subject to regulation under this act.

281.721 Legal rights or authority not abrogated; action to determine if property taken without just compensation; court order; limitation on value of property.

Sec. 21. (1) This act shall not be construed to abrogate rights or authority otherwise provided by law.

(2) For the purposes of determining if there has been a taking of property without just compensation under Michigan law, an owner of property who has sought and been denied a permit or has been made subject to modifications or conditions in the permit under this act or the department's action or inaction pursuant to this act may file an action in a court of competent jurisdiction.

(3) If the court determines that an action of the department pursuant to this act constitutes a taking of the property of a person then the court shall order the department, at the department's option, to do one or more of the following:

(a) Compensate the property owner for the full amount of the lost value.

(b) Purchase the property in the public interest as determined before its value was affected by this act or the department's action or inaction pursuant to this act.

(c) Modify its action or inaction with respect to the property so as to minimize the detrimental affect to the property's value.

(4) For the purposes of this section, the value of the property may not exceed that share which the area in dispute occupies in the total parcel of land, of the state equalized evaluation of the total parcel, multiplied by 2, as determined by an inspection of the most recent assessment roll of the township or city in which the parcel is located.

281.722 Effective date.

Sec. 22. This act shall take effect October 1, 1980.

This act is ordered to take immediate effect.

Approved January 3, 1980.

ML&SA Region 6 Meeting

(Reported by Don Hoes, Vice President)

The ML&SA Region 6 meeting was held on April 6, and was well attended by many ML&SA member associations.

Over 35 Lakes were represented by members of Association's boards from many Southeastern Michigan communities, and several local environmental and community leaders attended as well.

Under the theme of "Protecting Your Lake's Quality by Dealing with the Tough Issues", a wide range of topics were reviewed and discussed.

Dr. Wally Fusiller, Water Quality Scientist (limnologist) and long time advisor to ML&SA, presented the latest information on Weed Control, including a discussion on the White Amur (a weed-eating fish), lake quality testing techniques, and an update on the Zebra Mussel threat. As always, his presentation was informative and entertaining.

Michael Alan Schwartz, an Attorney who chairs the Environmental Protection Council of Oakland County and presides on the W. Bloomfield Wetlands Board, presented legislative facts regarding Wetlands and other environmental protection laws. He stressed the importance of clear definitions in ordinances, and urged citizens to petition their local municipalities to enact wetland protection ordinances.

Waterford Township Trustee Katherine Innes, who was elected as a "Grass Roots" candidate to the Waterford Township Board in 1988, spoke to the group about what it takes to fight city hall... and win! Her inspirational speech recounted citizens efforts in establishing wetland and woodland ordinances, and closing a leaking landfill near Maceday Lake in Waterford. Her message centered around the importance of doing your homework by researching the facts and presenting them in public forums.

A featured event of the meeting was a Panel discussion with Michigan legislatures Senator Mat Dunaskiss and Representative Claude Trim, Waterford Trustee Katherine Innes, Attorney Michael Alan Schwartz, Dr. Fusiller, and ML&SA Executive Director Don Winne.

Topics discussed in this forum were the dilemmas and frustrations citizens and Lake Associations face in dealing with the DNR regarding contested permitting issues and public hearings, and the general feeling of poor responsiveness by the DNR in dealing with permit violations and illegal filling of wetlands and dredging access channels on local lakes. Much concern was voiced as well, regarding the pending proposals for restructuring the DNR and the Natural Resource Commissions.

The importance of monitoring the DNR permitting process, and requesting Public Hearings was stressed as a critical means for protecting lakes from projects which would destroy wetlands, or provide keyhole access through marina operations.

In review of the many topics and issues discussed, and which face all ML&SA member associations, it is more evident than ever that citizens and Lake Associations must keep a constant vigilance and be prepared to move quickly into action in protecting their lakes.

Many thanks to Dr. Fusiller, Katherine Innes, Michael Schwartz, Senator Mat Dunaskiss, and Rep. Claude Trim for their time and contributions in making the meeting such a success.

And special thanks to ML&SA Treasurer Pearl Bonnell and Executive Director Don Winne for all their help in organizing and orchestrating the meeting. Thanks too, to all who attended!

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Building Ponds For Sport Fishing

Michigan State University Extension Bulletin E-1554, May 1989

Two general types of fish pond construction are used in Michigan:

Excavated or dug ponds. These are the most common type in Michigan. They are usually rather small ponds in fairly level terrain, made by digging a pit deeper than the groundwater table. The hole then fills with groundwater by seepage, or water flows in from nearby springs. Less commonly, pits are placed to catch runoff water from surrounding land or receive water diverted from a stream. These sources are less desirable than are groundwater springs and seepages.

Impoundments. Usually formed by earthen dams, impoundments are not recommended if construction requires damming a stream. Impoundments need greater land slope and tight soils. If created by damming a stream, they will be a settling basin for silt, sediment, and debris moving downstream and gradually fill in and become less suited for fish. There is also virtually no way to control immigration of undesirable fish from the stream making management all but impossible. If an impoundment is built, it is better for pond quality to impound water from springs rather than from runoff or streams. Damming streams of any size is strictly controlled in Michigan and requires a state permit.

Ponds can also be built by a combination of excavation and damming.

Proper site selection and careful planning of construction play large parts in successful fish pond management. Contact your county's office of the U.S. Soil Conservation Service (SCS) for help in choosing a site and designing the pond. Many mistakes have been made by failure to seek this advice.

When choosing a contractor to build the pond, compare the costs and services of several. Find out the contractor's previous performance by talking with others for whom the firm has built ponds.

A state permit is needed for construction of the pond if any of the following is true:

— It is to be formed by damming any running water.
— It is to be connected to any other running or standing water body.
— It is to be within 500 feet of any other water body.

Contact the nearest DNR office early in the planning stage to find out what restrictions may apply to your situation.

Key considerations in designing a successful fish pond are *water depth, water supply,* and *forming the basin and its surroundings to avoid overabundance of nutrients and aquatic plants.* Usually of lesser importance are the size of the pond's surface and landscaping details. All of these design considerations are interrelated, with one often greatly influencing one or more of the others.

Pond Depth

Pond depth is one of the most important factors for achieving satisfactory fishing. Whether the pond is formed by digging or impounding, and no matter how large its surface area, *a better fish population is likely to result from having water depth of 15 feet (5 meters) or more,* where soil conditions permit, throughout as much of the pond as possible. This helps avoid winter and summer oxygen depletion and resultant stress on fish which can end in poor growth or mass die-off. Michigan ponds with less than 15 feet of water not only are more subject to complete winterkill in especially cold winters, but may, in most years, have disappointing fish populations — fewer fish, smaller fish, and less desirable kinds of fish — owing to near-winterkill conditions.

Lesser depth may suffice where strong flow of well-oxygenated spring water prevents dissolved oxygen depletion. This is the case in trout ponds with large outflow. Even in such ponds, however, depth greater than 15 feet tends to result in superior fishing. This may be a matter of more room for the fish and a greater range of living conditions for them — and their food organisms — to choose from.

Having depth of 18 to 20 feet is distinctly better than 15 feet, and 25 feet is still better. Beyond that depth, we aren't sure whether further improvement takes place. The recommendations of 10 to 12 feet for pond depth, which one often sees, are based on conditions in more southerly states and are inappropriate for the harsh winter climate of the northern tier of states.

We recognize that there are two problems which sometimes prevent attaining pond depths of at least 15 feet — cost and unfavorable soil conditions. Excavation costs tend to become disproportionately higher as depth increases. If money isn't available for digging at least 15 feet deep, it would be well to save up until there is enough rather than creating an inadequate pond and a disappointing fishery.

A soil problem which can occur is when the proper depth cannot be dug because doing so would perforate a clay layer, thereby breaking a natural seal, and allowing the pond water to drain away. It depends on the structure of the soils and should be investigated in advance by SCS or other knowledgable individuals. If natural clay sealing is broken to achieve proper depth, the pond bed can be resealed with clay, but that can be expensive.

Water Supply

It's advantageous if the pond's water supply is exclusively groundwater, either from wells, springs, or slower seepage, rather than from runoff or stream water. Groundwater tends to be well filtered, whereas runoff and stream water often bring in excessive amounts of nutrient phosphorous and other material. Excessive phosphorous creates the overabundances of plants and other organic matter that cause oxygen problems for fish. Obviously, runoffs from barnyards, pastures, and fertilized or eroding cropland are nutrient sources to be avoided. Fertilized lawns and gardens are other sources. Even stream water that appears clear and "pure" often carries far more nutrient into a pond — where plants take it up — than it flushes out.

Precautions may also be needed with seepage and spring water. Such water is sometimes too low in dissolved oxygen for fish as it emerges from the ground. It may also be too high in carbon dioxide. Various methods of aeration can alleviate these problems — perhaps at considerable added cost. Excessive amounts of iron and, as it occurs in some places in the Upper Peninsula, copper dissolved in the water can also be unfavorable for fish. Have the water tested before investing in a pond fed by wells, springs or seepage — unless presence of fish in the same water supply shows its suitability.

Designing for Control of Aquatic Plants

While a moderate amount of rooted aquatic plants may benefit fish in a pond, their overabundance impedes fishing and certain managements. Plant overabundance sooner or later creates unfavorable conditions for fish. Much can be done in design and construction to make a pond less subject to this problem.

Rooted aquatic plants need light and nutrients, and they grow best on rather level pond beds. They can be kept in check by structuring the pond so that (1) inflow of nutrients is minimized, (2) much of the bottom is too deep and dark for plants, and (3) the shallow, well-lit side slopes are steeper than plants "like."

One way to minimize nutrient inflow is to locate the pond where little land slopes toward it so little runoff enters. Runoff can also be diverted away from the pond by means of earthen berms, diversions or grassed water-ways. A filter strip of unmowed grass and other low plants along the banks reduces nutrient inflow. Other aspects of erosion control are discussed in the section on landscaping. If the pond is formed by a dam, an outlet structure that allows discharge from the bottom enables draw-off of nutrient-rich water that accumulates there in summer and winter.

As discussed, making pond depth 15 feet or more keeps much of the bed dark enough to reduce growth of rooted plants.

Submerged side slopes that extend 3 feet into the pond per foot of drop (a 3:1 slope) are sufficiently steep to reduce plant growth while not being so abrupt as to cause unreasonable danger to wading children. If the incline is of fine sand, it is likely to be unstable and slump if steeper than 3:1. Coarse sand, peat, or loam may be stable at a slope of 2 feet horizontal distance per foot of

(Continued on Page 26)

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Building Ponds

(Continued from Page 25)

drop, and clay slopes of 1:1 may be stable. If your objectives are plant control and maximum amount of deep water, the steeper the side slopes the better, but a slippery clay incline of 3:1 or greater will be a great hazard to people or animals that might wade or stumble into the pond and be unable to keep their footing.

Surface Area

As a rule, the larger the pond, the more dependable its fish population will be. While trout ponds of only a quarter acre may support passable fishing if they have strong spring flow, most ponds don't provide satisfactory fishing unless they are a half acre or more.

Small ponds may need much more intensive care than large ones. The disadvantages of small ponds may be somewhat alleviated by making them very deep. Pond depth seems even more important to fish populations than pond surface area.

Landscaping And Erosion Control In The Pond's Surroundings

With a little planning, a fish pond and the area around it can be made very attractive. Decide whether you want a natural setting or a more lawn-like one. In a natural landscape, logs, stumps, rocks and uneven ground may be fitting. If much of the area is to be mowed, you may need to smooth the ground and eliminate obstacles during pond construction.

Plant cover should be established quickly on raw areas after construction to prevent erosion. Sod or a heavy stand of grasses and legumes is needed on areas of greatest slope and washing, such as berms, runoff diversion waterways, tops and slopes of dam embankments, emergency spillways, and bank slopes of the pond perimeter. The latter should be quickly vegetated back at least 20 feet from the water.

Deep-rooted plants such as alfalfa, sweet clover, shrubs and trees shouldn't be planted on earthen dams or fill embankments. Deep roots tend to weaken such structures and cause leaks. Some ponds need reinforcement, called "rip-rap," with stone of 8-10 inches (20-25 cm) diameter piled along the shoreline to protect against wave erosion, especially in the case of dam and fill embankments.

Mixed clumps of evergreens and deciduous trees, bordered by shrubs, provide food and cover for wildlife and give the pond surroundings a pleasing appearance. But trees and shrubs shouldn't be planted so near the pond that leaves fall or blow into the water when shed. Leaves that get into the pond use up oxygen when they rot, and they create layers of litter on the pond bed, as well as furnishing nutrients for overgrowth of water plants. Keep such vegetation at least as far back from the water's edge as the greatest height the tree or shrub will reach — preferably much farther back than that. It isn't necessary to set evergreens so far back. Trees and shrubs on the shore area may also interfere with fishing.

Fence livestock away from the pond. They destroy vegetation of the pond-bank buffer strip, and their droppings overenrich the water. Grazing and trampling also weaken dams, embankments and spillways. If livestock watering is a purpose of the pond, pipe the water to an area where the animals won't harm the pond.

Excavated or Dug Ponds

Dug ponds are built mostly in rather level areas not suited for ponds formed by dams. Many parts of Michigan are favorable for dug ponds because they are fairly flat, the soils are soft and porous, and groundwater lies close beneath the soil surface. The pond is then fed by water slowly seeping in one side of the pit and out the other. Dug ponds can also be positioned so that springs upwell within the pond or flow into it from a short distance up-slope. Groundwater can be pumped into ponds from nearby wells. Sometimes windmills are used for this. Less desirably, dug ponds can be catchment pits for overland runoff if soils are clay or other fine material that will hold water — or if clay or other sealants can be obtained to line the pond bed.

Groundwater seepage ponds are the most common in Michigan. They are generally located in sand or sand-gravel soils through which water easily percolates. Such ponds are possible even in areas with non-sandy surface soils because water-bearing sands and gravels lie close beneath and excavation reaches down to them.

The water level may fluctuate significantly in seepage ponds as the groundwater table rises and falls — higher in wet years and wet seasons, lower during drought. Plan excavation depth to be more than 15 feet below the lowest level that the groundwater table reaches in a very dry year. Consult an SCS engineer, or other field personnel, for such a determination. Make test borings to find the water table in late summer of a dry year.

When contracting for a dug seepage pond, obtain written agreement from the contractor as to the *water* depth that will be achieved. Contracting for a certain pit depth will do little good if the water doesn't rise sufficiently in it. Again, 15 feet or more depth during the low point of summer water levels is advisable, if soil conditions permit.

The type of equipment that is best for digging ponds depends largely upon pond size, site characteristics, and depth desired. Draglines or bulldozers are generally used. Bulldozers are more adapted to the dryer pond beds.

The material dug out of the pond, called the "spoil," should be smoothed back away from the pond edge or piled far enough from the pond that it won't erode back into the water. Using some of the spoil to build a gentle berm around the pond can be helpful in diverting unwanted overland runoff away.

Ponds dug by draglines are seldom wider than about 90 feet but may be much longer. Excavation width is governed by the distance a dragline can move back before it is blocked by its spoil piles — unless the spoil can be moved.

Impoundments

In "embankment" or "fill-type" ponds, water is impounded by an earthen dam containing a core of watertight material. Such ponds are suited to areas where slopes range from gentle to steep. It is best to have a site where a great volume of water can be stored by only a small amount of embankment fill. The ideal location is where the valley is narrow at the damsite, and the pond area is wide and flat but with steep sides.

For fishing ponds, avoid damming a stream. As described earlier in this chapter, they are collecting basins for silt, sediment, and debris, and undesirable fish species can easily enter the pond. One or more permits may be needed depending on applicable state laws. Also avoid sites where the impoundment dams a river or stream and where there is flooding.

Wave erosion on the dam embankment can be a problem in large ponds. Try to choose a site where the prevailing wind doesn't blow along the length of the pond toward the dam.

A properly designed impoundment will have two outlets for the water — a trickle tube or mechanical spillway and a vegetated earthen emergency spillway. The emergency spillway is for flood flows.

As in the case of dug ponds, it will be best for fish if the water supply is from groundwater rather than from runoff. If, however, the impoundment must be designed to catch runoff water, the pond must be located so that its drainage basin is large enough to provide sufficient runoff to fill it — and to maintain it in the face of evaporation and seepage losses. Calculate surface runoff according to the area of land draining into the pond, amount of precipitation, and runoff characteristics involving land slope and porosity, vegetation, and human disturbances of land. For a Michigan pond that depends entirely on runoff water, 8 to 14 acres of runoff basin land are needed per acre of pond surface.

Clay and silty clay are good soils for impoundment beds. Sandy clay is suitable only if the cost of extra materials for sealing the pond is acceptable. Sites in some areas of limestone or gypsum are especially unsuitable — even hazardous — for impoundments. There may be crevices allowing water to drain from the pond. A fair clue to the success of building impoundments in such areas is the previous experience of nearby pond owners.

Soils for earthen dams should be about 20% clay by weight and contain a wide range of particle sizes, varying from fine sand to coarse sand or gravel. The earth must be compacted to minimize percolation through the dam. To insure proper compaction, soil moisture must be controlled in certain ways during construction.

For the dam's vegetated spillway, clay, sandy clay and silty clay are suitable. Avoid loose sand and other easily erodible soils.

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Zebra Mussels: Threat To Inland Lakes — What Can You Do?

By Thomas Krueger and R.A. David, Advanced Analysis and Testing, Inc.;
and Mark Luttenton, Water Resources Institute and Department of Biology, Grand Valley State University

It is no secret, the zebra mussel is here to stay. This is one visitor that may have worn out its welcome, distrupting municipal water supplies, and coating the bottom of boats. Predicting long-term impacts however, have left scientists, government officials, and citizens scratching their heads. One aspect of the zebra mussel's invasion that has been neglected for the most part, is the potential impact mussels might have on small inland lakes.

A native of European fresh waters, the zebra mussel made its way into the Great Lakes via ocean-going freighter. Arriving in 1985 or 1986, zebra mussels have quickly spread, and have now been reported in all of the Great Lakes.

The zebra mussel's success is due in part to its reproductive capabilities. Typically, female mussels begin egg production when water temperatures exceed 54° F. An individual female can produce up to 40,000 eggs during the breeding season which ends in late summer as temperatures fall below 54° F. The free-swimming larvae remain suspended in the water for an average of 8-14 days and can be carried considerable distances by currents, adding to the mussels successful colonization of new areas.

A larvae will attach to any firm surface that is not toxic, although it now appears that mussels can colonize on soft muddy bottoms over a long period of time. Once a suitable substrate is colonized, and individuals reach reproductive maturity, the number of mussels on a substrate will increase rapidly. In Lake Erie, some mussel beds have reached densities of 30,000 to 70,000 individuals per square meter with colonies reaching several layers thick.

The most immediate impact of the zebra mussel has been due to colonies encrusting industrial and municipal water intake pipes. At high densities, mussels can clog pipes and reduce flow. Monroe, Michigan, was forced to ration water after zebra mussels clogged city water pipes. In addition, drinking water may be tainted as mussels die and decompose.

Biologists have suggested that zebra mussels may also cause long-term ecological changes in the Great Lakes. Because mussels are filter feeders, they remove small microscopic organisms, primarily algae, suspended in the water. Individual mussels filter about one liter of water per day, thus, large numbers of mussels can filter considerable quantities of water reducing the abundance of microscopic algae.

Although this may improve the clarity of the water, the reduction in microscopic organisms may spell disaster. The microscopic plants and animals removed by mussels are also the primary food of larval and juvenile fishes. Eventually, zebra mussels may lead to declines in the abundance of fish.

It appears that we have not heard the last of the zebra mussel. Biologists have predicted that the mussel will continue its westward movement. The Chicago Sanitary Canal provides a direct link between Lake Michigan and the Mississippi River. Once in the Mississippi, the mussel will gain access to the Ohio and Missouri Rivers as well as most rivers east of the Rockies.

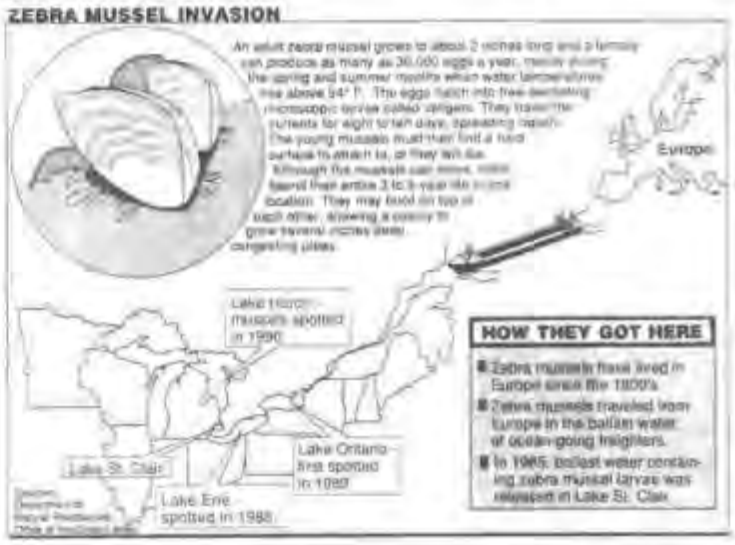
Of more immediate concern is the spread of mussels from the Great Lakes to inland lakes. Zebra mussels can be transported in a number of ways. As larvae, they can survive in any compartment that holds water including, bilge pumps, live wells, bait buckets, and engine compartments. As young adults, individuals can survive for several days attached to boat hulls, engines, or bait buckets.

The impact of zebra mussels on inland lakes is still unknown. Small inland lakes function much like the larger Great Lakes, with similar types of organisms. Consequently, it is reasonable to suggest that the predictions of change made for the Great Lakes can be made for individual inland lakes. Mussels will foul boat hulls, docks, and other solid structures. Once they reach sufficient numbers, zebra mussels could filter sufficient quantities of water, decreasing the production of fish and other aquatic organisms.

Because methods to eradicate mussels are not available, the only method of controlling mussel populations is to prevent the spread of them to individual lakes. Boaters transporting boats from lakes containing mussels to mussel free lakes will facilitate the spread of these organisms.

Every boater should take a few simple precautions when transporting a boat to help prevent the spread of zebra mussels between lakes. Always remember to flush the engine's cooling system with clean water. Drain any compartment that may hold lake water, including the trailer, live well, and bilge pump before entering another waterway. Adult mussels can be seen attached to surfaces, however, larvae may be overlooked. To detect young mussels, run your hand across the boats' hull, if it rough or grainy, it is a good bet they are mussels. Remember to check the lower unit on all boat engines. Any individuals found clinging to a boat or trailer should be scraped off, or the boat should not be used for about two weeks, allowing time for the mussels to die. Be particularly careful transporting baitfish. Do not take water from one lake to another. Remove any plant material tangled around the prop or trailer. When mussels are detected, dispose of them in a trash barrel, do not return them to the lake.

Zebra mussels will continue their invasion of North American lakes and streams. Only time will tell what long-term impacts will result from the mussels presence. However, everyone can do their part to help control the spread of this little mollusk to inland lakes, and minimize the cost and impact to these important ecological and recreational resources.



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Aquatic Plant Control In Michigan

Act #86, P.A. of 1977, known as "The Aquatic Nuisance Control Act", gave authority to the "department of natural resources to supervise the chemical treatment of the waters of the state for the suppression of swimmer's itch, and other nuisance-producing organisms, including aquatic plants, in accordance with this act." Effective date — August 2, 1977.

In 1978, the Michigan legislature passed a new "Michigan Public Health Code", Act #368, which included provisions for chemical treatment program for aquatic nuisances. The act became effective on September 30, 1978. Sections 333.12561, 333.12562 and 333.12563 follow:

333.12561 Aquatic nuisances; chemical treatment program

Sec. 12561. (1) The department of natural resources shall supervise the chemical treatment of the waters of the state for the suppression of swimmers' itch, and other nuisance-producing organisms, including aquatic plants, in accordance with sections 12561 to 12563.

(2) The department of natural resources may conduct experiments to ascertain the best methods for control, and may purchase equipment and materials for control.

(3) The department of natural resources may promulgate rules describing the type of chemicals to be used, the type of solutions to be used, the manner of applying the chemicals, the time of application, and public notice and permit granting procedures.

333.12562 Application of chemicals; persons allowed; time; conditions; permits

Sec. 12562. (1) The application of necessary chemicals in powder, crystal, or solution form to the waters of this state for the control of aquatic nuisances, such as swimmers' itch and aquatic plants, is lawful and not in contravention of the private or public rights to the use and enjoyment of abutting property by the owners or occupants of that property when the application is made in accordance with sections 12561 to 12563 and rules promulgated under section 12561.

(2) The necessary control work may be conducted by the state or a political subdivision or by an organized lake or improvement association on behalf of its members, or by the owner of property abutting on the waters of the state, or by an aquatic pest control applicator licensed under Act No. 171 of the Public Acts of 1976, being sections 286.551 to 286.581 of the Michigan Compiled Laws, after obtaining a permit from the department of natural resources. The permit shall be issued at no charge to the applicant, and, unless revoked, shall expire on December 31 of the calendar year in which issued.

(3) The necessary work shall be conducted at those times, under those conditions, and with those safeguards, as the department of natural resources requires. The department of natural resources may provide permits for the suppression of swimmers' itch and aquatic plants, if applicants provide at their own expense chemicals and other equipment and services called for in the rules promulgated by the department of natural resources.

333.12563 Violations; penalties

Sec. 12563. A person who fails to obtain the necessary permit in advance of undertaking the control work, or who violates a rule of the department of natural resources or a condition of the valid permit is guilty of a misdemeanor. A permit issued under section 12562 shall automatically be revoked when the holder of the permit violates sections 12561 to 12563 or a rule promulgated under section 12561.

A copy of the "Administrative Rules" filed with the Secretary of State on May 24, 1978, and adopted by the DNR for the purpose of supervision of the chemical treatment of the waters of Michigan, is available from *The Michigan Riparian*, 11262 Oak Avenue, Three Rivers, MI 49093. (Please send one dollar for the cost of copying and postage.)

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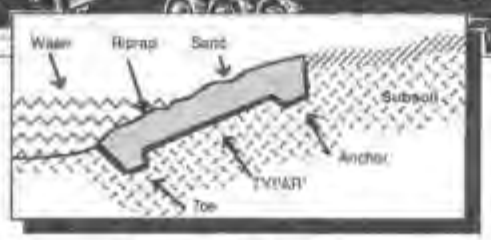

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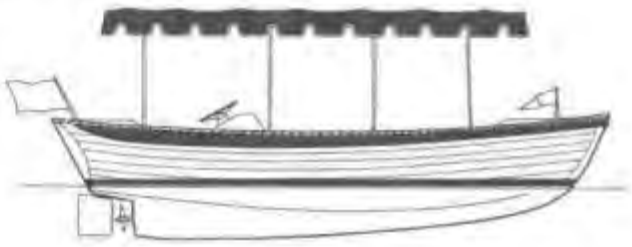

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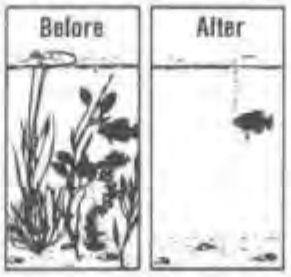

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