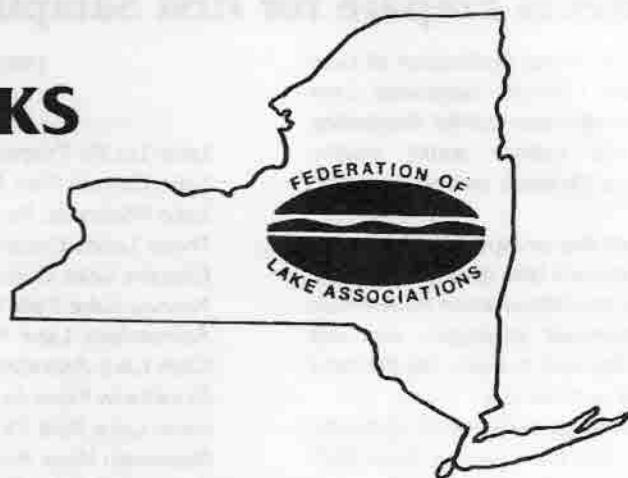


# WATERWORKS



Spring 1986  
Volume 2  
No. 2

## A Layman's Guide to Interpreting Lake Water Quality Parameters

by John D. Koppen, Ph.D. and Stephen J. Souza, Ph.D.

Great insight can be gained in assessing the environmental condition and trophic status of a lake or pond through a properly designed sampling program. A well planned water quality sampling program enables one to ascertain:

1. The existing water quality of the lake or pond,
2. Temporal changes in water quality as related to storm events, season, or increased use of the lake,
3. Inter-relationship between the growth and development of aquatic weeds and algae, and changes in water quality.

It also provides one with a means of evaluating improvements in water quality following the implementation of lake restoration/management measures.

The following briefly explains many of the parameters commonly analyzed as part of a water quality sampling program. It also supplies ranges for these parameters and their implication in terms of the trophic status of typical, temperate lakes.

### Nitrogen

The five major forms of nitrogen in freshwater systems are elemental nitrogen ( $N_2$ ), organic nitrogen, ammonia ( $NH_3$ ), nitrate ( $NO_3$ ), and nitrite ( $NO_2$ ). Of these various forms the last three,  $NH_3$ ,  $NO_3$ ,  $NO_2$ , are readily available to aquatic primary producers for metabolic uptake. In most monitoring programs, these three nitrogen compounds, plus Total Kjeldahl Nitrogen, a measurement of organic and ammonia nitrogen, are usually analyzed.

Ammonia nitrogen is a metabolic by-product of the decomposition of organic material, such as proteins. In most healthy freshwater systems, ammonia is present in low concentrations, usually less than 1.0 mg/l. In highly eutrophic waterbodies, particularly those which become devoid of oxygen (anoxic) much higher ammonia

concentrations may be present. Such high ammonia concentrations can prove lethal to organisms if the pH of the lake or pond is greater than 8. Under these conditions a toxic undissociated form of ammonia becomes present in high concentrations. This undissociated form is particularly toxic to fish.

Nitrate nitrogen ( $NO_3-N$ ) is the preferred form of nitrogen for uptake by algae and plants. The concentration of this nutrient, particularly when measured over a prolonged time scale, can shed much information on the productivity and trophic status of a lake. Although the amount of  $NO_3$  present at any given time is a function of the extent of metabolism in a waterbody, typical concentrations for relatively healthy lakes is less than 0.05mg/l. In eutrophic waterbodies the concentration of nitrate is usually low in the upper layers due to uptake and utilization by algae. In the deeper parts of the lake the concentration of nitrate will be greater as dead plant and animal cells become broken down and decomposed. However, in the anoxic deep water layers of highly eutrophic lakes, a slight depression in the concentration of  $NO_3$  is typically observed and the amount of  $NH_3$  is elevated.

Nitrite-nitrogen ( $NO_2-N$ ) is typically present at very low concentration, less than 0.005 mg/l. Typically, seasonal changes in the concentration of nitrite follow a pattern similar to that of nitrate. High concentrations of nitrite may be indicative of inputs from septic systems or sewage plants.

### Phosphorus

By far phosphorus is the nutrient which has received the greatest amount of attention in relation to lake eutrophication. Phosphorus is an essential element for both plant and animal life. Its importance stems from the fact that it is usually available, in a form amenable to bio-uptake, in low concentrations relative to other essential elements. As a result, it is usually limiting, that is, it is the

Continued on pg. 6

# Volunteers Prepare for First Sampling Season

Patient and persistent efforts of the Federation of Lake Associations on behalf of the Citizens Statewide Lake Assessment Program have finally been fruitful. Beginning this season, volunteers will collect water quality information and samples for a 15-week period between May and September.

The immediate objective of the program is to gather accurate water quality data on each lake on a yearly basis. The long-term goal is to use this information to develop lake and watershed management strategies that will protect or restore water quality and provide for the best use of each body of water as a resource.

The success of the Citizens Program depends upon the volunteers who will be collecting the samples. Both DEC and the Federation will be providing on-site training to each pair of volunteers. Associations are required to have two teams of two people available for the training sessions. One team would be designated as the primary sampling team and the other team ready to collect samples during times when one or both members of the primary team cannot participate.

Each sampling team will be given the necessary equipment to collect data and supplies to process the samples before sending them to the contract chemistry laboratory at the NYS Department of Health in Albany. In addition to the training sessions, teams will be guided by a DEC prepared manual describing the standardized sampling techniques. Program inquiries should be made to CSLAP Coordinator Scott Kishbaugh at (518) 457-7470

## 1986 Program Participants

Lake Lucille Property Owners Association	Rockland
Lake Carmel Park District	Putnam
Lake Mahopac Park District	Putnam
Three Lakes Council	Westchester
Copake Lake Conservation Society	Columbia
Nassau Lake Park Improvement Assoc.	Rensselaer
Adirondack Lake Association	Hamilton
Glen Lake Association	Warren
Goodnow Flow Association	Essex
Loon Lake Park District	Warren
Mountain View Association	Franklin
Butterfield Lake Cottage Owners Assoc.	Jefferson
Fulton Chain of Lakes Improvement Assoc.	Herkimer
Campers & Landholders Association of Joe Indian Lake	St. Lawrence
Mt. Arab Preserve Association	St. Lawrence
Twitchell Lake Fish & Game Society	Herkimer
Crooked Lake Homeowners Assoc.	Onondaga
Lake Moraine Association	Madison
North-South Pond Association	Oswego
Petonia Lake Association	Chenango
Tuscarora Lake Association	Madison
Conesus Lake Association	Livingston
Cuba Lake Cottage Owners Assoc.	Allegeny
Findley Lake Property Owners Assoc.	Chautaugua
Silver Lake Cottage Owners Assoc.	Wyoming

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(315) 655-8407

# Inland Lake Keyhole Development

## An Analysis of Local Zoning Approaches

### PART TWO

by Mark A. Wyckoff, AICP Editor

#### LITIGATION

A search for caselaw involving challenges to municipal keyhole zoning provisions revealed no cases at state appellate or supreme court levels. However, two decisions on local zoning regulations restricting access to coastal beaches have been reported. (See case summaries in Table II and 18 ALR4th 569). In each of these cases, ordinances restricting beach use to single family residences were overturned.

However, caselaw involving riparians versus a keyhole developer is growing. Most of these cases are important to drafters of keyhole zoning regulations, because in almost every instance, the Court has had to determine whether a proposed keyhole development constitutes a "reasonable use" under riparian common law doctrines. An examination of the standards courts have applied in reaching a decision on these issues, reveals that they are the same kinds of standards that planners would apply in developing a land use management plan and accompanying zoning regulations. Another benefit of study of these decisions is their value in identifying the nuances of riparian common law and the implications thereof on local keyhole regulations.

One of these cases, **Thompson V. Enz** 154 N.W.2d 473 (Mich S.Ct. 1967) appears to be the leading national case on this issue. A summary of the **Thompson** case follows. (For a full analysis of this case see also "Riparian Water Law—Lakeshore Developments", Richard C. Glesner, 1966 Wisconsin Law Review 172.) Table II presents a capsule summary of other keyhole and related cases.

#### Thompson V. Enz

This case concerned a proposal by a riparian developer with 1,415 feet of frontage on Gun Lake to plat the property into 144-153 lots, with all but 16 fronting on canals that connect to the lake (the 16 would front on the lake itself). The canals were proposed to have approximately 11,000 feet of frontage. Gun Lake has 2,680 acres of surface area and approximately 30 miles of shoreline. The developer planned to grant easements for rights of way permitting access to the lake through the canal. Riparian property owners sued claiming an infringement on their riparian rights.

The Court reviewed the common law of riparian rights citing authorities in Michigan and many other states and concluded that no riparian rights were created on the canal lots which were "artificial watercourses". The Court concluded that

"While riparian rights may not be conveyed or reserved—nor do they exist by virtue of being bounded by an artificial watercourse—easements, licenses and the like for a right of way for access to a watercourse do exist and oftentimes are granted to nonriparian owners.

We will, therefore, treat the proposal here as though

easements for the rights of way for access are given to the back lot purchasers."

The Court went on to say that:

"Riparian uses are divided generally into two classes. The first of these is for natural purposes. These uses encompass all those absolutely necessary for the existence of the riparian proprietor and his family, such as to quench thirst and for household purposes. Without these uses both man and beast would perish. Users for natural purposes enjoy a preferred nonproratable position with respect to all other uses rather than a correlative one.

The second of these is a use for artificial purposes. Artificial uses are those which merely increase one's comfort and prosperity and do not rank as essential to his existence, such as commercial profit and recreation. Users for artificial purposes occupy a correlative status with the other riparians in exercise of their riparian rights for artificial purposes. Use for an artificial purpose must be (a) only for the benefit of the riparian land and (b) reasonable in light of the correlative rights of the other proprietors. **Evans V. Merriweather**, 4 Ill. (3 Scam.) 492, 38 Am. Dec. 106. It is clear in the case before us that the use made of the property by the defendants is for a strictly artificial purpose and must meet the test of reasonableness."

The Court then reviewed common law on reasonable use of surface waters and remanded the case back to the Circuit Court for a determination as to its reasonableness with instructions

"to keep in mind the following factors in determining whether the use would be reasonable.

**First, attention should be given to the watercourse and its attributes, including its size, character and natural state.** In determining the reasonableness of the use in the case at bar, it should be considered that Gun Lake is not a large lake, that it is used primarily for recreational purposes, and that the defendants are changing its natural state by expanding the lake frontage of their property from an actual 1,415 feet to a total inclusive of the canal, of 12,415 feet, being an increase in frontage of approximately 800 per cent.

**Second, the trial court should examine the use itself as to its type, extent, necessity, effect on the quantity, quality and level of the water, and the purposes of the users.** Factors in this particular case that should be considered include: (a) that this use would permanently add approximately one family without riparian rights to each 18 acres of surface area (or 137 families); (b) the possibility that the level of the lake may be reduced by withdrawing trust waters into over 2 miles of the proposed canals, as is alleged by the Attorney General in his motion to intervene; (c) the possibility that pollution may result; (d) that there is nothing in the record showing any necessity for this use; and (e) the fact that it appears that the purpose of the defendants herein is merely commercial exploitation.

Continued on pg. 5



# Deep Water Aeration System Improves Water Quality

A hypolimnetic aeration system installed 12 years ago on northeastern lake has, in the words of the lake association's president "saved our lake."

Lake Waccabuc, a narrow (1/4 mile wide) 124-acre body of freshwater no more than 45 feet deep, is located in South Salem, NY, just 40 miles northeast of New York City.

Peter Beardsley, president of the Three Lakes Council, an organization of 300 lake watershed residents that monitors the water quality and maintains the system, quoted from an independent study of the effect of the aeration system prepared by Martin Garrell and Alan Gibbs of Adelphi University:

An excellent salmonid (trout) fishery was maintained throughout the summer by the aerators...Previous spotty attempts to stock Waccabuc with trout when there was no hypolimnion (deepest level) oxygen were failures...Warm-water fish apparently use the oxygenated hypolimnion as well, though not to the extent that the salmonids do, as catches of yellow perch, white perch, and bluegill sunfish from the hypolimnion indicate. Secondly, drinking water quality is improved thanks to the elimination of H<sub>2</sub>S and some heavy ions through oxidation and precipitation. Finally, the project involved an entire community through the Three Lakes Council and brought into focus certain environmental problems that could not have been otherwise squarely faced, i.e., septic system loading of watersheds, unnecessary nutrient dumping from various sources.

In contrast, a study done prior to introduction of the system predicted that Lake Waccabuc would "eutrophy at accelerated rates if no steps are taken to alleviate the situation...Although we cannot accurately predict the time required to reach the worst state of eutrophication...our best guess is from 5 to 15 years. At that point drastic action (such as dredging, in combination with some other remedial actions) could be necessary..."

In the summertime, a deepwater lake is thermally stratified into three temperature layers: the hypolimnion (at the bottom), the epilimnion (top), and the metalimnion. During the summer months the layers mix very little. Nutrient materials become trapped on the bottom and do not stimulate algae plant growth on the surface.

A polluted lake produces an excess of organic matter because of a too-rich nutrient supply. The decomposition of this matter requires more oxygen than the ecosystem may be able to provide. If the oxygen in the hypolimnion is completely consumed, the condition becomes critical, with actual fermentation transforming both organic and inorganic matter.

The aeration system used at Lake Waccabuc does not destratify the lake while in operation, instead providing deepwater oxygenation without disturbing the natural underwater environment..

The hypolimnetic aeration system introduces oxygen into the hypolimnion during the summer months to replace oxygen used in the normal decomposition of organic matter, providing oxygen that deep, coldwater fish need to survive.

All lakes do fill in with sediment as a result of decaying matter from within their own boundaries. Deep, clear lakes become shallow, murky lakes. But this is a gradual slow process that can take centuries to accomplish. The

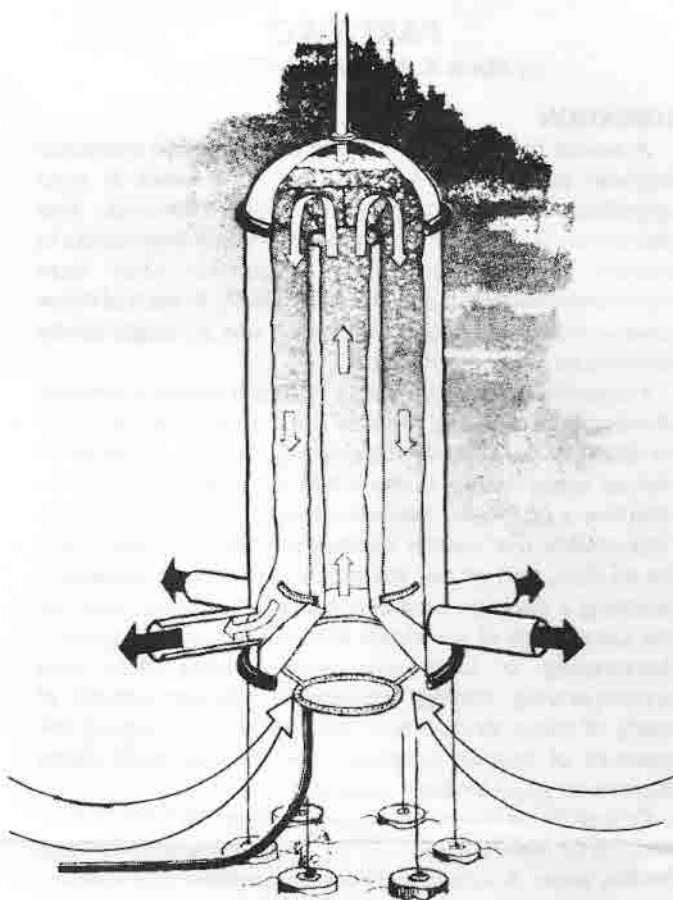


Figure 1.—Limno aerator: principle flow diagram.

presence of externally loaded nutrients in the form of human waste, septic seepage and lawn fertilizer runoff can accelerate the process so that cultural eutrophication will occur within a few decades.

At Lake Waccabuc, two aerator units are located in the deepest section of the lake at a distance apart of about 200 yards.

The basic design consists of two concentric tubes covered by a dome and interconnected by radial walls (Fig. 1). The outer tube has a number of outlets close to the lower end. From the dome a venting pipe connects the unit with the atmosphere. (This venting at the surface can either be concealed, or, as preferred by residents of Lake Waccabuc, permitted to send a light spray into the atmosphere.)

The unit is permanently anchored to the bottom by means of concrete weights and nylon bands attached to the outer tube and the lowering frame. The units in Lake Waccabuc are 15 feet high with an outer diameter of 8 feet. Designs can range from 8 feet high and 5 feet in diameter to 50 feet high and 20 feet in diameter.

At Waccabuc, a shore-based air compressor supplies the aerators with compressed air via hoses anchored to the lake bottom. The air compressor is housed in a sound-insulated shed, and the land piping is underground.

Through the diffuser, placed under the intake cone, the airflow is broken up into fine air bubbles. The bubbles rising

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**Third, it is necessary to examine the proposed artificial use in relation to the consequential effects, including the benefits obtained and the detriment suffered, on the correlative rights and interests of other riparian proprietors and also on the interests of the State, including fishing, navigation, and conservation.** An additional fact to be considered by the trial court in this litigation is whether the benefit to the defendant subdividers would amount merely to a rich financial harvest, while the remaining proprietors—who now possess a tranquil retreat from everyday living—would be forced to endure the annoyances which come from an enormous increase in lake users.” (emphasis added)

In **Thompson II**, 188 N.W. 2d 579 (Mich S.Ct.1971) issues of laches, acquiescence and estoppel were raised.

### Developing a Management Plan

High demand for inland water based recreational opportunities continues to create heavy pressures on inland lakes. Ironically, many of these pressures are compounded by state and local programs designed to improve lake quality or to create jobs in tourist areas. For example:

- successful state or regional advertising campaigns to get tourists to visit and vacation in inland lake resort areas increases lake use.
- successful efforts to improve water quality with municipal waste treatment systems combined with the improved sensitivity of lakefront property owners to runoff carrying soil, fertilizer and pesticides into the lake, has markedly improved the quality of many inland lakes, and hence their attractiveness to users, tourists and prospective purchasers.

When these factors are combined with the following circumstances, a broader picture of some of the pressures on inland lakes emerges. For example:

- available and developable lakefront lots close to metropolitan areas are rare; and the subsequent incentive is high (market demand) to try to put marginal land into use (wetlands, high banks, etc.) and to develop on lakes farther away.
- over the past decade the efforts of developers to sell condominiums and time share units in resort areas has been successful (with the exception of the recession years).
- the supply of natural inland lake property is fixed. And
- aggressive state and private conservation group efforts to increase and/or improve public access on waterways continues.

Thus the interests are varied, the actors are many, and some of the objectives are at cross purposes. Local governments are frequently caught in the middle. As a result, local governments are beginning to realize, that promoting both water quality and tourism may merely further degrade their lakes unless these actions are undertaken in the context of a **coordinated lake**

**management plan.** The task is a complicated one because **at the root of it is allocation of the lake resource among competing users with varied rights and broader desires.** Usually however, competing uses are addressed by focusing on solving specific problems including: 1) controlling surface lake use; 2) controlling new development around a lake; 3) improving/maintaining water quality; 4) flood control; and 5) improving the fisheries/wildlife habitat (often by measures focused on adjacent wetlands protection). **Clearly the problems of keyhole development fall squarely within this scope of issues and should not be addressed in isolation.**

In some states, strong efforts have been undertaken to meet the challenge, such as Wisconsin and Minnesota. In other states the need has been recognized, and the call uttered, but no legislative action has been forthcoming. (see for example “South Dakota’s Lakes: A Valuable Resource in Need of Land Use Protection”, Steven M. Johnson, 20 South Dakota Law Review 618). **In most states, no comprehensive state-local management approach is in place, instead, a variety of statutes and administrative programs carry the load. These include for example, laws regulating dredging and filling of inland lakes and streams, wetland and floodplain regulations, and local watercraft controls.**

While the need for comprehensive inland lake management plans may be clear, the practical considerations arguing against them are often very strong. These arguments start with a severe lack of equivalent detailed information on each lake, and the money for such studies. Statutory and case law present effective limitations in some instances. As a result, a comprehensive solution boils down to a need for states and municipalities to effectively cooperate in melding a workable solution to identified problems.

An inland lake management plan should be based on both the natural and social “carrying capacity” of the lake basin for development. Such a plan would be heavily rooted in solving existing water quality problems, and preventing the occurrence of similar ones, but should also focus on long term development and use of the lake. The potential for keyhole development in not just one or two, but many locations around the lake, also needs to be considered.

One of the problems with current case by case keyhole litigation is that reasonable use determinations are made in the context of the existing situation, thus to a great extent it is “first come first served”. Future property owners otherwise similarly situated, may find that the use of their riparian property for a keyhole development may be found unreasonable, because of crowded lake use by current riparians and their licensees. What recourse if any do they have? Besides, a case by case determination is not very predictable. A local regulatory approach based on sound planning unique to each lake, could address that issue in a fairer way. Note that several of the Michigan cases listed in Table II went through the appellate courts several times before a final solution was fashioned. In large measure, this is due to the courts inability to deal with resource allocation issues.

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essential nutrient in shortest supply. In eutrophic waterbodies phosphorus, due to external and internal sources, becomes available in concentrations sufficient to support and sustain algae blooms. Since the rate and extent of primary production in most freshwater systems is limited by phosphorus, the more that becomes available, the more algae and plant production that can be supported. Thus, most management programs attempt to limit phosphorus pollution to lakes and thereby limit plant and algae production.

Some of the important external sources for phosphorus are fertilizers, septic leachate, sewage effluent, detergents and soaps, particulate material transported by stormwater, and even precipitation. Lake sediments, particularly those which are highly organic or mucky, can serve as an internal source of phosphorus loading especially if the overlying waters become devoid of oxygen. The decomposition of dead algal cells or aquatic weed tissue are other internal sources of phosphorus.

### **Chlorophyll**

Chlorophyll is a photosynthetic pigment common to all green plants. It is important in relation to water quality in that it is utilized as a measure of in-lake productivity associated with phytoplankton or algae.

Mathematical models are available which can predict the summer concentration of chlorophyll based on the spring concentration of total phosphorus. This has important bearing on the management of lakes. In addition, relationships exist between other water quality parameters such as Secchi disc depth, alkalinity, dissolved oxygen and pH which have important bearing on the trophic status and ecological balance of a freshwater system.

### **pH**

The pH of water is a common, easily measured parameter. However, the importance and relevance of this parameter is often not fully appreciated.

By definition pH is a measure of the concentration of free hydrogen ions. In pure water the pH is 7.0. Salts, acids, and bases are normal components of natural waters and will result in some deviation in pH. Those materials which increase the concentration of hydrogen ions ( $H^+$ ) will decrease the pH (more acidic), where those which decrease the concentration of  $H^+$  will increase the pH (more basic).

Changes in the pH of a lake, as well as being influenced by the addition of salts, acids and bases, is influenced by photosynthesis. During photosynthesis, plants fix carbon dioxide ( $CO_2$ ). As mentioned previously (see Alkalinity)  $CO_2$  is an important component in the bicarbonate-carbonate buffering system of a lake. In photosynthesis, as  $CO_2$  is fixed, a shift in bicarbonate-carbonate buffering system is shifted resulting in a decrease in the concentration of  $H^+$ . This causes the pH to increase, and the lake to become more alkaline or basic. Under conditions of excessive productivity, it may be possible to elevate the pH to 8 or 9. This is particularly true in soft water lakes with poor buffering capacity.

In typical north temperate lakes the pH ranges from 6 to 9. In seepage lakes which drain calcareous or limestone deposits, the pH may be substantially in excess of 9. In contrast, lakes which drain igneous deposits and are subject to the accumulation of acids and humic substances may have pH concentrations typically below 5. Lakes which display wide daily fluctuations in pH are indicative of a poorly buffered, highly productive system. Many eutrophic lakes fall into this category.

### **Secchi Disc Transparency**

A widely used, very simple means of determining the productivity of a lake is Secchi Disc transparency. Secchi disc depth, is that depth where a weighted white disc, when suspended from the shade side of a boat, just disappears from view. Numerous models have been developed to relate Secchi depth with productivity, chlorophyll a concentration, and even the concentration of nutrients.

In its simplest interpretation, Secchi disc depths in excess of 8 m are indicative of low productivity lakes (oligotrophic). Secchi depths of 8 m to 4 m are associated with medium productive lakes (mesotrophic). Lakes with Secchi disc depths of 2 m or less are associated with eutrophic lakes. In lakes where suspended sediments are also present, the Secchi disc transparency will be reduced due to the suspended material as well as algae present in the water.

To be continued in next issue

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## **Commission for Oneida Lake**

Assemblyman Michael Bragman has introduced a new bill (9778) this session which would create the Oneida Lake Commission. The responsibilities and powers of the proposed Commission will be to collect and study data relating to the area water, fishery and wildlife resources so as to plan for and promote the development, use and conservation of these resources. It will also advise in securing and maintaining a proper balance between industrial, commercial, agricultural, recreational, and residential uses within the Oneida Lake Region.

The bill, which is currently in the Assembly Environmental Conservation Committee, has only recently acquired the support of the Oneida Lake Association. According to one O.L.A. Director, it has taken 1½ years for the 5000 member association to accept the idea of another authority in the region, but now, with the association and numerous sportsman organizations behind the proposal, it has a good chance of passing.

The commission is to consist of nine members all of whom are appointed by the governor: four upon the recommendation of each of the county legislatures of the counties of Onondaga, Oneida, Oswego, and Madison respectively; two, both of whom are members of the Oneida Lake Association; one upon the recommendation of the governor; one upon the recommendation of the temporary president of the senate; and one upon the recommendation of the speaker of the assembly.

Proponents of the bill are hopeful that the commissions first project will be a new walleye fish hatchery for Oneida Lake.



# FEDERATION OF LAKE ASSOCIATIONS CONFERENCE

Co-sponsored by: COLGATE UNIVERSITY  
Hosted by: LAKE MORaine ASSOCIATION INC.

## FRIDAY, JUNE 6

(Informal for Early Arrivals)

6-7 p.m. Board of Directors Meeting  
7-8:30 Brainstorm Sessions  
A. Zoning & Lake Use Regulations  
B. Special Districts

8:30 Slides

## SATURDAY, JUNE 7

8:00-9:00 Breakfast  
8:30-9:15 Registration  
9:15-9:30 Welcome/Opening Remarks  
9:30-10:15 Session I—Non-point Sources of Pollution  
Dan Halton - NYSDEC  
10:15-11:00 Session II Panel—The Nutrient Budget  
Bruce Gilman - Moderator  
Dr. Thomas Bannister, Dr. Kent Stewart  
11:00-11:20 Break  
11:20-12:00 Session III Panel—Nutrient Budget Control  
Bruce Gilman - Moderator  
Dr. Edward Mills, Dr. Jay Bloomfield  
12:00-1:45 Lunch—Dr. James Sutherland - Status of  
Citizens' Statewide Lake Assessment Program  
Scott Kishbaugh - DEC Program Coordinator  
2:00-3:00 Session IV  
Bruce Gilman - Chairman, Scientific  
Advisory Board  
3:00-3:15 Break  
3:15-4:30 Session V - Protecting Our Lakes from  
Sewage Pollution  
John Lloyd - Moderator; Holly Gettings - Water  
Conservation Systems; Al White - Clivas  
Multrum; George Bickford - Microphor

4:30-5:15 3rd Annual Meeting of Federation  
Membership; Introduction of the Board  
of Directors.  
Dr. John Colgan - President  
5:15-6:15 Wine and Cheese Party  
Hosts: Lake Moraine Association and  
Cazenovia Lake Association  
6:15-7:30 Dinner - Senator Nancy Larraine Hoffmann  
7:45-8:30 Session VI  
Christopher Creech - Fish Management

## SUNDAY, JUNE 8

8:00-9:00 Breakfast  
Board of Directors' Meeting  
9:00-10:15 Session VII—Community Local Assistance  
Programs  
Jim Swart - NYS D.E.C.  
10:15-10:30 Break  
10:30-11:45 Session VIII—Panel - A Testing Program for  
Your Lake that You Can Do.  
Phil Sanzone - Moderator. Richard Rettig,  
Scott Quinn, Ron Ruda.  
12:00 Lunch - Speaker

### Family Recreation Opportunities

Swimming (indoor-outdoor pool), tennis, racquetball, squash, golf,  
canoeing, and sailing.

### Conference Registration Form

1986 Federation of Lake Associations Conference June 7 and 8

Name \_\_\_\_\_ Association \_\_\_\_\_

Address \_\_\_\_\_

Home Phone \_\_\_\_\_ Work Phone \_\_\_\_\_

Conference Fee: \$25/Person

### ACCOMMODATIONS

Arrangements have been made with Colgate University for dormitory housing.

Double Room: \$17/Person per Night ☐ Friday ☐ Saturday Single Room (limited no.): \$17/Person per Night ☐ Friday ☐ Saturday

### MEALS

☐ Saturday (3 meals) \$15.50 ☐ Sunday (2 meals) \$6.50 ☐ All 5 Meals \$22.00

TOTAL \_\_\_\_\_

Mail registration form and check payable to:

Mark Randall, Conference Director 9 Charles St., Hamilton, NY 13346  
Telephone: 315/824-2013

## Notice

Notice is hereby given of the annual meetings of the Federation of Lake Associations, Inc. and of the Federation of Lakes, Inc. to be held concurrently at 4:30 p.m. on June 7, 1986 at Colgate University during the New York State Lake Associations Conference. The purpose of the meetings are to elect directors and to consider any other business which may properly come before the meetings.

John W. Colgan, President

## Lake George not the only lake with weed problem

Recently we have all read, seen, and watched the news emanating from Lake George about the growth of a weed (eurasian milfoil) which may endanger the lake's future for full recreational use and impede the businesses dependent on lake tourism for their survival.

Unfortunately, I own a camp on Cossayuna Lake which is out of the limelight, and in two rural townships, Argyle and Greenwich. Cossayuna Lake is the largest lake in Washington County and has a surface area of 760 acres. A minimum of 300 acres is overrun with the weed. Swimming, boating and fishing were impossible in these areas. In 1983, the weed problem was so bad that a person with snow shoes could walk on top of the water on the whole south end of the lake.


Many letters were sent to the papers and news media, and Cossayuna Lake was not even newsworthy. Our senator, congressman, and assemblyman were all contacted for help. The only thing we got for all our efforts was a large mailing bill and several promises.

I read how something must be done for Lake George as they now have 4.9 acres of a potential lake killing weed and don't spare the expense. I would like to know where they are going to get these funds. If no state or federal funding is available for smaller lakes with the same problem, what makes Lake George special? If it's businesses, or a problem with our duly elected officials, I would like to know.

If any funding from any programs is available, let's not just use it on Lake George. Make it available to all of the lakes no matter how small they are.

Frank G. Gifford Jr.  
Schenectady

Reprinted from the Saratogian



**Check the May-June issue of  
The Conservationist for a  
highlight about the Federation!**

Aeration System cont'd from pg. 4

through the inner tube generate an upwater water flow that improves the effectiveness of the oxygen transfer to the water.

The water flow then turns downward through the space between the tubes and leaves the unit as a number of horizontal jets through the outlets and spreads in the hypolimnion. In newer Limno units compressed air is also supplied to a secondary, ring-shaped air diffuser placed between the tube walls in the lower part of the unit. The air bubbles from this diffuser meet the downward water flow and in this way optimize the aerator's oxygen transfer.

During the summer months at Lake Waccabuc, the oxygen level, temperature, and water turbidity are monitored weekly at depths of 1-13 meters.

The valves on the air compressor are changed twice yearly in accordance with the manufacturer's recommendation. (The work is performed as a voluntary service by one of the directors of the Three Lakes Council, Bill Lounsbury, an engineer.) The units were upgraded within the past few years, including the installation of non-corrosive anchor ropes.

In the winter, when the compressed air supply is shut off, the units stay in position on the bottom of the lake where they remain until the following year when compressed air is reintroduced into the system, thus re-erecting them in functioning position.

Association President Beardsley says that Lake Waccabuc is "moderately eutrophic," and that hypolimnetic aeration "can help to stabilize the condition of a lake — but total reversal of eutrophication requires that the entire watershed be treated, not just the lakes themselves."

Beardsley points out that the installation of the aeration system has focused this community on the need "to protect our lake." During an annual picnic the community is updated on lake developments. Periodic mailings during the year remind watershed residents to upgrade septic systems, and to not use lawn fertilizers. An annual voluntary fund raising campaign provides the approximately \$7,000 needed to pay for electricity and system maintenance.

More information on this aeration system is available from Atlas Copco, Wayne, NJ.

Reprinted from NALMS Lake Line, March 1986.

Inland Lake cont'd from pg. 5

Inland lake management planning must actively be undertaken in light of all relevant state laws and in conjunction with all authorities with important roles in inland lake management. In particular, this will require the active involvement and cooperation with the several divisions of the state department of natural resources, the local and/or state department of public health, the local soil conservationist, and all related municipal or county departments.

Considerable support may also be found from unexpected sources. For example, many states, including Michigan, authorize the establishment of local watercraft controls either independent of state action, or

Continued on pg. 9



cooperatively therewith. Most of these controls take the form of surface water zoning, where controls over portion of the waters surface are imposed to help alleviate problems between competing users. These controls often regulate the times of certain activities (water skiing, or speed boating), the location of those activities, or the speed of surface craft. Rarely are these controls imposed in conjunction with a comprehensive lake management plan, yet it is logical that they should be.

Likewise, dredge and fill activities, wetlands, floodplains and docks/marinas are often subject to regulation under state laws administered by a department of natural resources. A local lake management plan and development regulations need to dovetail with these laws.

The constitutions of many states and clarifying state statutes guarantee certain rights of free access to citizens in the navigable waterways of the state. A management plan that ignored the tremendous potential for increased use from public access sites would quickly negate the careful relationship between watershed land uses and lake use otherwise embodied in the plan and implementing ordinance. Many states have active programs for acquiring public access on all navigable waterways, but are not as careful about decisions to control public access once it has been accomplished. Part of the lake management plan should address public access sites. (see also 420 P2d 352, 1966).

The planning enabling acts of the various states are broad enough to authorize the preparation of lake management plans as part of local comprehensive or management plans. Zoning enabling acts are also broad enough to cover surface land uses, but may lack authority to regulate surface water use unless specific language addresses that situation. ("Water Based Recreational Developments in Michigan — Problems of Developers" Bartke and Patton, 25 Wayne State Law Review, p. 1049, note 304). The argument may be rhetorical however, because access is the key issue, and access can be regulated by zoning. Regulating land access to a waterbody would cover all but waterplanes and helicopters outfitted with pontoons.

A state environmental protection act may give further authority, in that most such acts place an affirmative obligation on persons (including municipalities) to take actions to "protect the air, water and other natural resources or the public trust therein from pollution, impairment or destruction." (MEPA 127 PA 1970). Such statutes clearly extend public trust responsibilities from the state to localities and citizens. Note that the Resort Township ordinance (printed in Table I, of Part I of this article) cited this authority as a basis for its ordinance (yet the ordinance made no findings of alleged "pollution, impairment or destruction").

All of these legal authorities should be used to fashion a coordinated management strategy and a regulatory mechanism to deal with inland lake management problems, including keyhole development. Of equal value should be the "reasonableness" factors the Court set down in **Thompson**. The results of such an endeavor are unlikely to look the same as any of the local ordinances in

Table I, but will include a number of the basic concepts includes within them, such as: 1) control of access via recreational/open space use; 2) language broad enough to cover both artificial and natural lakes; and 3) standards designed to insure the established "carrying capacity" of the lake is not likely to be exceeded in the foreseeable future. A key difference would be that the standards developed would be uniquely prepared to apply to each lake, or class of similarly situated lakes.

The concept of "carrying capacity" should certainly be the basis for a lake management plan and an accompanying set of development regulations. The task of meaningfully establishing the carrying capacity of a lake is a difficult one. Especially valuable references include the following:

- APA, PAS #338, "Carrying Capacity Concept as a Planning Tool", Schneider, Godschalk & Axler, Dec. 1978.
- APA, PAS #307:308, "Performance Controls for Sensitive Lands", Thurow, Toner & Erley, July 1975.
- John A. Kusler, "Carrying Capacity Controls for Recreation Water Uses", Vol. 1973 **Wisconsin Law Review** 1.
- Urban Land Institute, Dec. 1977, **Environmental Comment**, "Carrying Capacity as a Planning Tool", whole issue.

## CONCLUSION

In conclusion, addressing the problems posed by keyhole development without examining them in the context of a coordinated inland lake management plan, is likely to result in an ineffectual long term solution. However, many communities will face keyhole proposals before they have prepared an inland lake management plan. In such a situation, adopting a zoning provision similar to any of those in Table I may present some legal risks, but as a practical matter, may be considered a satisfactory "stop gap action" until a specific management plan and regulatory mechanism can be prepared. The management plan should be based on the concept of carrying capacity and be coordinated with the entire range of legal and administrative authorities that exist. The regulations adopted should attempt to embody the principles of "reasonableness" as laid down in court decisions adjudicating riparian rights in keyhole development cases. An inland lake management plan should address the complex resource allocation issue by establishing parameters within which conflicts between competing users, including keyhole developers, can be reasonably evaluated. Without a management plan or an appropriate state statute, local regulations may be without an adequate rational basis leaving judicial decisions initiated by affected riparian owners as the only remedial means for dealing with the problem.

Mark A. Wyckoff, AICP is the editor and publisher of Planning and Zoning News and President of the Planning. This article is reprinted from the March and April issues of Planning and Zoning News by permission. Part One appeared in the Winter 1986 issue of Waterworks.

Continued on next page

## TABLE II KEYHOLE & RELATED CASES

**Pierce v. Riley** 16 Mich App 419, 168 N.W. 2d 309 (1969). This case went through the Michigan appellate courts four times between 1969 and 1978. In **Pierce I**, defendant developers platted 91 lots with one lot fronting on Stony Lake which is a small lake of 278 acres and 138 owners with frontage on the lake. A waterfront lot with 374 feet of frontage was proposed for a beach area along with an 80' channel that extended 700 feet back. All lot owners were to be given lake access with an easement of right-of-way. Plaintiffs alleged that granting the easements to nonriparians would constitute an extension of use and riparian rights that would be an unreasonable burden on riparian owners. Defendants claimed that by virtue of their ownership of riparian lot #91, they can provide access to the lake across lot 91 to their licensees and invitees. The trial court had issued an opinion prior to the Michigan Supreme Court decision in **Thompson v. Enz** 154 N.W. 2d 473, so the Court of Appeals remanded for hearing on the reasonableness of the proposed use in light of **Thompson**.

In **Pierce II**, 192 N.W. 2d 366 (1971), the Court of Appeals held that the proposed use was sufficiently injurious to the riparian owners to constitute an unreasonable use. The trial court decision had held it was reasonable since a public access site already allowed an unlimited number of people to use the lake. The Court of Appeals determined the issue of public access was irrelevant, and that increasing the number of residences having access to the lake by 66% is "sufficiently injurious to the riparian owners as to constitute an unreasonable use".

In **Pierce III**, 215 N.W. 2d 759 (1974), the riparian owners **Pierce et al** were back in before the Court of Appeals to get the channel filled, not merely enjoined from use as the Circuit Court had ordered. The Court of Appeals ordered the channel filled. Defendants appealed to the Supreme Court who reversed and remanded to the Circuit Court for findings on a pending application before the Dept. of Natural Resources for a permit under the state's Inland Lakes and Streams Act.

In **Pierce IV**, 264 N.W. 2d 110 (1978), the fact that the DNR had approved use of the channel as a marina was not held to make that a reasonable use, since the same impact on the lake as determined in **Pierce II** would be felt. The Court ordered the filling and restoration of the channel, pursuant to guidelines established by the DNR.

**Opal Lake Association v. Michaywé Limited Partnership** 47 Mich App 354, 209 N.W. 2d 478 (1973).

This case involves access to a relatively small lake of 120 acres of surface area and 2.5 - 3 miles of shoreline. At the time of the suit there were 70 dwellings around the lake, a public access site of 200-240 feet of shore frontage and no commercial activities on the shoreline. Defendant Michaywé is a land development company owning 1,990 acres in the area of the lake with plans to build as many as 2,250 residential lots, as many as 1,300 condominiums and 300 mobile home sites. Three other lakes on the acreage were also under development. Michaywé owned 800 feet of shoreline on Opal Lake with about 6 acres of land area. It intended to build a clubhouse on the Opal Lake property with rights of use to everyone purchasing property in the development. A Michaywé Owner's Association would be given full title to the beachfront. Riparian owners on Opal Lake filed suit. Circuit Court had held the proposed use unreasonable and set forth restrictions on the use of the clubhouse and beach. The riparian owners appealed desiring total prohibition of the use. The Court of Appeals remanded the case back because the restrictions proposed by the Circuit Court could not be effectively enforced.

In **Opal Lake II** 234 N.W. 2d 437, (1975, leave to appeal denied 1976), the Court of Appeals accepted (with two changes) the Trial Court's order requiring the filing of deed restrictions on the property that among other requirements, limited use to not more than 120 individuals at one time, and the launching of no motorboats.

**Three Lakes Association v. Kessler** 285 NW2d 300 (Mich App. Ct. 1979).

This case involved a 25 acre subdivision with 47 residential lots which sought access on Torch Lake, a large very scenic lake. Access was to be via a strip of land 42' by 165' abutting the lake on one end and "Troy Park" on the other end. The Circuit Court found no unlawful attempt to create riparian rights in lands not abutting the lake, but held a localized nuisance to riparian owners close to the access strip and ordered restrictions on access to 12 persons, no motor boat launchings and only one dock. The Court of Appeals noted "this is the first instance wherein the lake frontage property title is held by an owners association". After reviewing **Pierce**, **Thompson**, and **Opal Lake**, the court concluded "the directive in the preceding cases is that access rights cannot be restricted if reasonable. It should be noted that the riparian owners were the developers and there was no indication they were owners of any of the property in the backlots being granted access." The court noted that "zoning ordinances in the area clearly allow shared access plans." The Court of Appeals held the trial court adequately applied the test of reasonableness in **Thompson**, but did not adequately fashion a clear mechanism for enforcement of the use restrictions, and so remanded the case back for further "appropriate determinations."

### Related Cases

**Kreis v International Leisure Market Corporation**, Michigan Court of Appeals per curiam, Jan. 30, 1978, Docket No. 77-210 through 213, leave to appeal to Michigan Supreme Court denied Jan. 14, 1979.

Case involved keyholing of 40 lots onto Higgins Lake via one lakefront lot. Case hinged on deed restrictions applying to the lot proposed for the keyholing. The keyholing was prohibited.

**McCardel v. Smolen**, 250 N.W. 2d 496 (Mich. Ct. App. 1977) and 273 N.W. 2d 3 (Mich S. Ct. 1978).

Concerned ownership of riparian rights on a large old plat on Higgins Lake where the strip of land (beach) between the lake and lots had been dedicated to the public years before as a boulevard, but was never used as such.

**Lusardi v. Curtis Point Property Owners Association**, 430 A2d 881 (N.J. 1981).

A zoning ordinance restricting oceanfront land to use by single family residences only, was held invalid as contrary to state policy of encouraging and protecting public access to and recreational use of dry sand beach areas. A backlot property owners association which owned one oceanfront lot, had offered access to the beach as a privilege of membership in violation of the ordinance.

**Zoning Com. of Sachem's Head Assoc. v. Leninski**, 376 A2d 771 (Conn. 1976).

A zoning commission was denied injunctive relief against a property owner who openly offered public access to oceanfront beach on his property in violation of zoning provisions restricting use in Residence A zones to single family and "private parks, beaches and docks." The court held the ordinance was too ambiguous with regard to the definitions of "private" and "beach" and had inadequate evidence to support the claim of ordinance violations.

**Brown v. Heidersbach**, 360 N.E. 2d 614 (Indiana Ct. App. 1977).

Court held that an easement granting access to a lake by a backlot owner did not grant riparian rights therein but did extend to more than the two parties who had exclusively used it for twenty years.

**Silver Blue Lake Apts. v. Silver Blue Lake Home Owners Assn.**, 225 So. 2d 557 (Florida Ct. App. 1969) and 245 So. 2d 609 (Florida S. Ct. 1971).

continued on pg. 11

# The Federation of Lake Associations

We are a coalition of organizations dedicated to the preservation and restoration of all lakes, ponds and rivers throughout New York State. We welcome and encourage the memberships of lake associations, property owner groups, fish and game clubs, corporations and individuals. The Federation is incorporated under two mirror organizations with the same officers and board of directors.

The Federation of Lake Associations, Inc. purposes are:

- \* to provide a clearinghouse of environmental information and expertise in all matters pertaining to lake management.
- \* to promote by education the wise use and appreciation of the lakes in New York State.
- \* to provide a pool of technical knowledge and expertise to advise and assist member associations and individuals.
- \* to establish liaison with other environmental groups and agencies.
- \* to provide a coordinating structure for lake-related research projects.

The Federation of Lakes, Inc. purposes are:

- \* to monitor and report to members on legislation and administrative actions affecting the waters of New York State.
- \* to support and lobby for legislation and administrative actions which promote the sound management of the waters of New York State.

## MEMBERSHIP CATEGORIES

Associations with up to 99 members	\$30.00/yr.
Associations with 100 to 199 members	\$50.00/yr.
Associations with 200 or more members	\$100.00/yr.
Individual	\$15.00/yr. Corporate \$100.00/yr.

Membership dues over \$5.00 are tax deductible contributions to the Federation of Lake Associations, to be used for educational, scientific and public information activities of the Federation.

## APPLICATION FOR MEMBERSHIP

THE FEDERATION OF LAKE ASSOCIATIONS, INC., 273 HOLLYWOOD AVE., ROCHESTER, NY 14618

Type of Membership (please check) ☐ Association ☐ Individual ☐ Corporate

Association Name: \_\_\_\_\_

Assoc. Address: Street \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ County \_\_\_\_\_

President/Contact Person: \_\_\_\_\_

Summer Address \_\_\_\_\_ Winter Address \_\_\_\_\_

Summer Phone ( ) \_\_\_\_\_ Winter Phone ( ) \_\_\_\_\_

Table II Keyhole & Related Cases cont'd from pg. 10

Owner of several hundred apartment units on an 80 acre nonnavigable manmade lake is permitted to rent the rights to use of the water surface to tenants only so far as there is lawful and reasonable use not detrimental to other owners or lawful users and where such use may be subordinate to valid deed restrictions, reservations, agreements or other title burdens.

**Anderson v. Bell**, 433 So. 2d 1202 (Florida S. Ct. 1983).

Court held that owner of property that lies adjacent to or beneath a manmade, nonnavigable water body is not entitled to the beneficial use of the surface waters of the entire water body by sole virtue of the fact that he or she owns contiguous lands.

**Bottom v. State of Washington**, 420 P 2d 352 (Wash. S. Ct. 1966).

Court held on the one hand that the state as riparian owner, may ignore county zoning regulations and permit the public, as its licensees, access to a lake over its property. However, on the other hand, the state cannot permit such use of its property as is unreasonable interference with rights of other riparian owners.

**McCord v. Big Brothers Movement, Inc.**, 185 Atl. 480 (N.J. 1936).

A riparian owner may not divert water from a stream to the use of strangers (to fill a swimming pond for campers)

if the quantity extracted is perceptible, for that is not a permitted riparian right and is unreasonable.

**Harvey Realty Co. v. Borough of Wallingford**, 150 Atl. 60 (Conn. Supreme Court 1930).

Developer of 1,730 lots around a pond adjacent to a river to which all lots would have equal right of access, was prohibited since river was used for public water supply downstream and heavy swimming use was alleged to pollute the stream and public water supply.

## Beachfront Access Cases

**VanNess v. Borough of Deal**, 393 A.2d 571 (New Jersey Supreme Court, Oct. 16, 1978).

**Mackall v. White**, 445 N.Y. S.2d 486 (New York Appellate Division, Dec. 28, 1981).

**Pacific Legal Foundation v. California Coastal Commission**, 180 Cal. Rptr. 858 (Calif. Court of Appeals, Feb. 24, 1982).

**Georgia-Pacific Corporation v. California Coastal Commission**, 183 Cal. Rptr. 395, (Calif. Court of Appeals, June 12, 1982).

**Sea Watch Inc. v. Borough of Manasquan**, 451 A. 2d 192 (Superior Court of New Jersey, July 30, 1982).

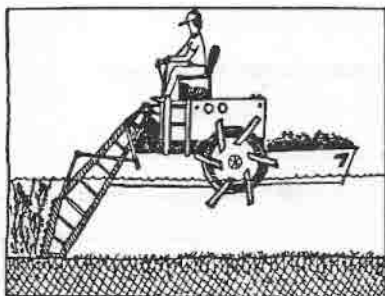


# Notes and Publications

**For Sale** — 1977 Hockney Weed Cutter, model HC-10 complete with three 5-H.P. Briggs & Stratton motors in good condition; Also, 1981 Aquatic Engineering Harvester with or without a 1983 - 9.9 H.P. outboard motor. Contact: William Prigmore, President Cazenovia Lake Association, at (315) 655-8886.

**Conference** — Lake & Reservoir Management: Influences of Nonpoint Source Pollutants and Acid Precipitation. November 5 - 8, 1986, Portland, Oregon, North American Lake Management Society (202) 833-3382.

**Forestry Guide** — The Adirondack Park Agency has printed the brochure, "Citizen's Guide to Adirondack Forestry." It discusses forest management planning, best timber harvesting practices, APA regulations, and the permit process. Contact the APA, P.O. Box 99, Route 86, Ray Brook, NY 12977 for a free copy.



**Correction** — Russ James of Ecoscience's phone number is 717-842-7631.

Waterworks is published four times a year. Individuals who wish to submit material or articles to Waterworks are welcome to contact the editor: Tracey M. Clothier, RR #2 Box 2300, Lake George, NY 12845. For additional copies of Waterworks and address changes, contact: Dr. John Colgan, President, 273 Hollywood Ave., Rochester, NY 14618, (716) 271-0372. Please note that all mail should be sent through the Rochester office.

## 1986 New York State Lake Associations Conference

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