Newsletter No. 22, July 1986

THE AQUATIC PLANT MANAGEMENT SOCIETY, INC.

K.A. Langeland, Editor/Weed Science Center—Box 7627/N.C. State University/Raleigh, NC 27695-7627

Spread of Eurasian Watermilfoil

Eurasian watermilfoil has been introduced to Vancouver Island, British Columbia, Canada. In 1984, a commercial water garden was found to contain *Myriophyllum spicatum*, which the owner mistakenly believed to be *Cabomba*. The owner suspects that the *M. spicatum*, which thrived in the culture ponds, was originally a contaminant with other aquarium plants imported from Ontario.

No sales or exports of the *M. spicatum* were believed to have been made from this commercial outlet. However, surveys of about 40 water bodies on Vancouver Island by Ministry of Environment staff in 1985 resulted in the identification of *M. spicatum* in two public water bodies and five of the private ponds became infested because of inadvertent introduction of this plant as a contaminant with *Nymphaea*, an exotic water lily. Most of the private pond introductions originated from the same source, as lilies (and the *M. spicatum)* were "shared" by friends and neighbors. Another private pond became infested because the owner desired to improve water quality for goldfish and obtained milfoil plants for that purpose from a friend's contaminated pond.

The infestation in the remaining public water body, Long Lake, may have originated either from transplantation of water lilies (*Nymphaea* grows there), or from boating equipment. While investigation on the sources will continue, there is little hope of determining the original source, and *M. spicatum* eradication in Long Lake is impossible. However, the Ministry of Environment, in cooperation with local authorities and pond owners, is controlling this plant where possible to help reduce the chance of further spread to uninfested areas. Preventive efforts include public education through the media, water plant vendors and placement of signs warning boaters to remove aquatic plants from boating equipment prior to departure from recreational lakes.—*P.R. Newroth*

Great Plans For Society Meeting

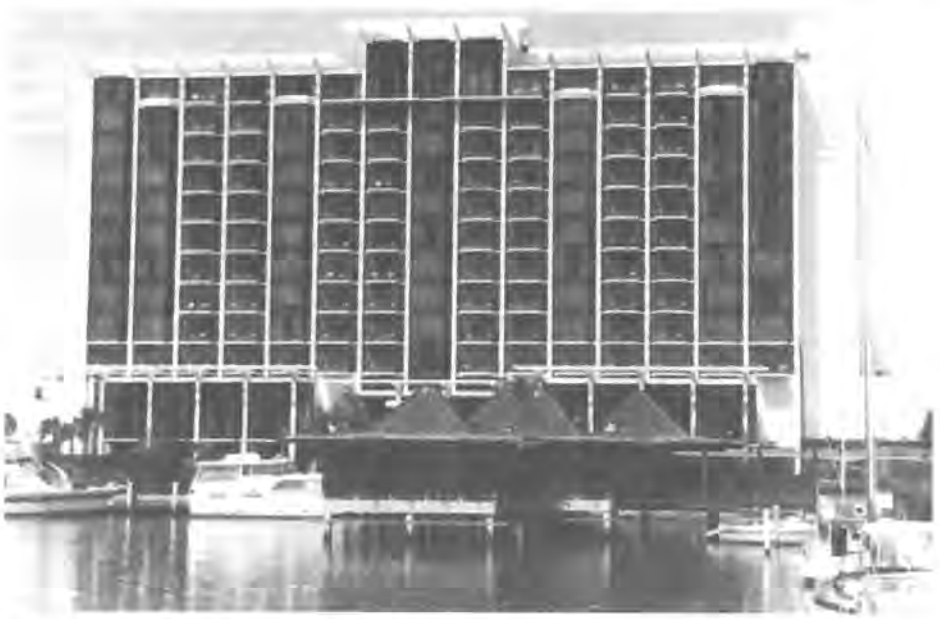
Have we got a meeting for you! First of all, the meeting at the Hyatt Sarasota is in a familiar location (from 1980), with familiar prices (about the same room rates as 1980). Next, a significant improvement: Bill Rushing has scheduled an informal Florida barbecue instead of a formal everybody-get-dressed-up banquet. We had a barbecue at the twenty-fifth meeting, and everyone seemed to enjoy it.

The location is attractive. Sarasota is an interesting city, with fine restaurants, unusual shops and a remarkable list of cultural activities that is unmatched in Florida. A library is across the street; the Ringling Museum is within walking distance. John Ringling, the late circus magnate, made Sarasota his winter quarters, and his 68-acre estate is open to the public. The art museum is impressive, as is the circus museum, but for different reasons.

The Marie Selby Botanical Gardens, located nearby, is an international research center for epiphytic plants. At the Gardens, you can see many varieties of orchids, award-winning beds of hibiscus and giant bamboo. South of Sarasota, Myakka River State Park provides a less cultivated, wilder, natural habitat for over 200 species of birds, a variety of plant and animal life, and a typical collection of nuisance aquatic plants.

St. Armand's Key and a shopping center, St. Armand's Circle, are near the Hyatt. They can be reached by a causeway, which was originally built with the aid of circus elephants. St. Armand's has over 100 shops and is a great place for window shopping. The Hyatt is also located near beaches that are ideal places to visit after attending fascinating papers presented by interesting and interested colleagues.

The truly important part of the meeting has been saved for last, and that is you, the membership of the Society. The fellowship, exchange of information, building lasting relationships, and a sense of contributing to progress are significant activities. We have an ideal location, good prices, good surroundings, and the key ingredient, you, is all that's missing!—***Dean Martin***



The Sarasota Hyatt, 1000 Boulevard of the Arts

Will Exposure To Small Amounts Of Toxic Chemical Cause Cancer?

We are exposed almost daily to a high concentration of misinformation from the media concerning the alleged effects of small amounts of toxic chemicals to human health. Exposure to this misinformation probably causes more adverse effects to our mental health than the toxic chemicals do to our physical health.

A recent book entitled *The Dose Makes The Poison: A Plain-Language Guide to Toxicology* by M. Alice Ottoboni, published in 1984 by Vincente Books, points out that misinformation published by the media has caused the public to develop "poison paranoia." Ottoboni, who has worked as a toxicologist for 20 years, makes it clear that "only the dose makes the poison."

She shoots holes in statements by writers who equate parts per billion and parts per trillion concentrations of a chemical, regardless of the relative toxicity of the compound with a human health hazard. She corrects the concept of bioaccumulation set forth by Rachel Carson in *Silent Spring*. Ottoboni points out that bioaccumulation and biomagnification do exist for certain chemicals, but the belief that the accumulation of all chemicals increases with each step up a food chain is pure myth. She corrects the "no effect level" concept to the "no observable effect level," and points out the dilemma in testing the effects on animal health of chemicals used at very low levels.

Controversial topics such as the "chemical bullet" theory are examined. This concept theorizes that a single molecule of a cancer-causing agent (a carcinogen) striking a critical target in a cell can initiate cancer. Ottoboni raises the question that if this were true, how could anyone escape multiple cancers considering the billions of molecules of natural occurring carcinogens to which we are inevitably exposed?

She discusses the conflict between the threshold vs. no threshold level for carcinogenesis and effectively argues in favor of the threshold level concept. She states that "there are practical thresholds for all carcinogens," exposure levels below which the resulting incidence of cancer would be infinitely small, if not zero. The public's general distrust of science is discussed and appropriate attributed to misinformation fed to the public by the media.

—Jerry Weber

Controversy arises between biologists who value the wildlife habitat provided by bulrush (*Scirpus* sp.) communities such as this and waterfront homeowners who prefer sandy swimming beaches.

How Many Weeds Do We Need?

What should the vegetation level be in multiple-use lakes? Can the public and its governing agencies work together to maintain those levels? Do tools exist to manage lakes at predetermined vegetation levels? These and other questions were explored recently by representatives of federal, state and local agencies responsible for aquatic plant research and control. The forum was the annual Aquatic Plant Research Review and Coordination Meeting held in March at the University of Florida. The meeting was organized by Dr. Joe Joyce and was sponsored by the U.F. Center for Aquatic Weeds and the Florida Aquatic Plant Management Society.

Representatives of universities, Florida's Game and Fresh Water Fish Commission, Department of Natural Resources, Department of Environmental Regulation, and Water Management Districts joined those of the U.S. Army Corps of Engineers and county and local governments to compare their management philosophies and research needs. The 138 participants agreed that scientists have not yet determined what levels of aquatic plants are necessary to support fisheries, waterfowl, water quality, etc., in managed lakes. During the forum, it became clear that the purported "30% rule" ("lakes should have a 30% vegetation coverage"), is not based on research consensus. For example, speakers presented contradictory evidence on the relation between vegetation and fisheries. Participants asked that researchers continue their work to devise models which would indicate the best vegetation levels for individual lakes.

Whatever level of vegetation is desired, participants agreed that "maintenance control" is the best way to manage aquatic plants. Some speakers pointed out that most of the public does not understand the reasons for maintenance control and said that more effort should be made to educate the public about the economic and environmental necessities for aquatic plant control.

Herbicides remain the most widely used tools for control of aquatic plants. Participants were told, however, that in the future Florida water managers may choose from as few as two herbicides. The two would be the most recently labeled, fluridone and glyphosate, which have been subjected to the more rigourous EPA testing since 1981. In the cases of older, unpatented herbicides, companies may be unwilling to spend the millions of dollars necessary for relabeling the aquatic sites since the products constitute so small a percentage of their sales. Participants called for more research on the use of herbicides, especially their use in selecting for native plants.

Biological control topics centered mainly on the potential of the triploid grass carp. One official of the Game Commission said that the fish is now "out of the research phase and has been turned over to management." Other representatives said the fish is so efficient at controlling plants that it sometimes is necessary to remove some or all of the stocked fish when a certain level of vegetation control has been achieved. Grass carp research needs to focus on establishing their stocking rates and devising methods for their selective removal, participants said.

—Vic Ramey

HYDRILLA RESEARCH UPDATE

Hydrilla Eradicated From Ellis Lake

It's possible that someone dumped the contents of a home aquarium into Ellis Lake, Marysville, Yuba County, CA. It's also possible that a piece of fishing equipment or a boat propeller was fouled with a tiny piece of the harmful weed. Whatever caused the infestation, *Hydrilla verticillata* was found for the first time in California, October 1976, in Ellis Lake.

The infestation has been eradicated through the efforts of the City of Marysville, the Yuba County Agricultural Department, the California Department of Food and Agriculture (CDFA), the California Department of Fish and Game, and the U.S. EPA. Actually, no hydrilla plants have been found in Ellis Lake since 1981, but CDFA does not officially declare successful eradication until several years have elapsed with no additional finds. Water, one of California's most precious natural resources, has been protected once again.

Total eradication costs to CDFA and EPA were $850,000. The entire project included an improved drain system, railroad relocation, cobblestone repair and various types of lake beautification required under the Federal Clean Lake Grant Program, of which the Ellis Lake project was the first recipient. The grand total of state and federal funding amounted to $3.3 million.

Ellis Lake is in downtown Marysville. Besides its primary function of storm drainage, the 34-acre lake is also used for recreational purposes. Marysville had been fighting a recurring battle with aquatic weeds in the lake since 1961. Recent chemical treatments and aquatic weed harvesting were used to control what was assumed to be elodea, a common native weed, but not until October 1976, was the plant correctly identified as hydrilla.

Hydrilla, which looks like a common, scraggly aquarium plant, can grow several inches a day during the warm summer months. It has infested millions of acres of lakes, rivers and irrigation systems throughout the U.S., endangering people and property. Drownings and flooding are the most tragic effects of this crippling water weed; lesser effects cause severe problems to agriculture, boating, swimming and fishing.

Hydrilla is not native to North America. It was probably originally imported from South America and sold as an aquarium plant in Florida. It was first observed growing wild in a Miami canal and in a river on the Gulf Coast in 1960. By the mid-70s, it had infested approximately one-half million acres of Florida waters, and Florida is presently spending $6-8 million annually just to keep open its hydrilla-choked waterways. Hydrilla is so well established in Florida that eradication is considered impossible.

Hydrilla develops roots in the soil, where tubers are formed, making the plant difficult to control with most herbicides. The tubers can lie dormant for months, even years, in dry soil. When the pond or lake is refilled, the plant returns to life.

Reprinted from Release No. 86-3, California Department of Agriculture, Jan. 23, 1986.

Researchers Show Lights Inhibit Growth Of Hydrilla

It works! Shining bright lights on a bunch of Potomac River hydrilla weeds in the dark of night inhibits the plants' libidos and limits the number of their offspring.

Federal researchers installed lights in August at the Belle Haven Marina just south of Alexandria. The results are in. The reproduction of the green aquatic weed, widely viewed as a nuisance, was cut in half when 500-watt lamps were trained on it for an hour each night, starting at midnight.

But the main researcher, Lars W.J. Anderson, is going to have to persuade marina operators, the Army Corps of Engineers and assorted local hydrilla haters that stringing lamps above affected waterways is practical.

"We think there is practical application, particularly in localized areas," said Anderson, a plant physiologist with the USDA. Because hydrilla sprouts its reproductive buds in late summer's longer nights, the lights trick the plant into acting as though it is not time to reproduce.

Two types of lamps were tested: 500-watt floodlights and small bulbs encased in plastic tubing somewhat resembling Christmas tree lights. The floodlights did best.

"There was a 50 percent drop in the number of new tubers (roots) produced when the lamps were turned on for one hour at night," Anderson said. "The next time, if we use stronger lamps and start earlier, we may get even better results."

Army engineers and other hydrilla experts are somewhat skeptical.

Because lamps require nearby electrical outlets and must be attached to a steady object, they are not part of the Corps' new plan to eliminate 340 acres of hydrilla from the Washington area's most traveled waterways, which are often far from shore.

"I don't think anyone's taking it seriously, because how are you going to hang the lights out in the middle of the river?" said one Washington area hydrilla expert.

The Corps plans to use a mechanical harvester beginning in June to literally mow down the weed at a cost of $3 million over the next decade. All that to counter the advance of the American strain of an underwater Asian plant that was virtually unheard of here until it appeared in the Potomac two years ago. It has since spread over 1,900 acres of the river.

Anderson says he will travel to Alexandria this spring hoping to persuade other government agencies that shining 1,000-watt lights into the water at midnight is the answer to ridding at least the river's shores of hydrilla.

By Mary Jordan, reprinted from the Washington Post, Feb. 17, 1986.

Proceedings and T-Shirts Available

Proceedings of the First International Symposium on Watermilfoil and Related Halagoraceae Species, Vancouver, British Columbia, which was held July 23, 1985, can be ordered for $15 from Bill Rushing, P.O. Box 16, Vicksburg, MS 39180; (601) 634-3542.

Commemorative T-shirts are still available in all sizes. These T-shirts have the APMS logo on the front and the Milfoil Symposium logo on the back. Don't miss this opportunity. Contact Bill Rush immediately to place your order!!

HYDRILLA RESEARCH UPDATE

Hydrilla Eradicated From Ellis Lake

It's possible that someone dumped the contents of a home aquarium into Ellis Lake, Marysville, Yuba County, CA. It's also possible that a piece of fishing equipment or a boat propeller was fouled with a tiny piece of the harmful weed. Whatever caused the infestation, *Hydrilla verticillata* was found for the first time in California, October 1976, in Ellis Lake.

The infestation has been eradicated through the efforts of the City of Marysville, the Yuba County Agricultural Department, the California Department of Food and Agriculture (CDFA), the California Department of Fish and Game, and the U.S. EPA. Actually, no hydrilla plants have been found in Ellis Lake since 1981, but CDFA does not officially declare successful eradication until several years have elapsed with no additional finds. Water, one of California's most precious natural resources, has been protected once again.

Total eradication costs to CDFA and EPA were $850,000. The entire project included an improved drain system, railroad relocation, cobblestone repair and various types of lake beautification required under the Federal Clean Lake Grant Program, of which the Ellis Lake project was the first recipient. The grand total of state and federal funding amounted to $3.3 million.

Ellis Lake is in downtown Marysville. Besides its primary function of storm drainage, the 34-acre lake is also used for recreational purposes. Marysville had been fighting a recurring battle with aquatic weeds in the lake since 1961. Recent chemical treatments and aquatic weed harvesting were used to control what was assumed to be elodea, a common native weed, but not until October 1976, was the plant correctly identified as hydrilla.

Hydrilla, which looks like a common, scraggly aquarium plant, can grow several inches a day during the warm summer months. It has infested millions of acres of lakes, rivers and irrigation systems throughout the U.S., endangering people and property. Drownings and flooding are the most tragic effects of this crippling water weed; lesser effects cause severe problems to agriculture, boating, swimming and fishing.

Hydrilla is not native to North America. It was probably originally imported from South America and sold as an aquarium plant in Florida. It was first observed growing wild in a Miami canal and in a river on the Gulf Coast in 1960. By the mid-70s, it had infested approximately one-half million acres of Florida waters, and Florida is presently spending $6-8 million annually just to keep open its hydrilla-choked waterways. Hydrilla is so well established in Florida that eradication is considered impossible.

Hydrilla develops roots in the soil, where tubers are formed, making the plant difficult to control with most herbicides. The tubers can lie dormant for months, even years, in dry soil. When the pond or lake is refilled, the plant returns to life.

Reprinted from Release No. 86-3, California Department of Agriculture, Jan. 23, 1986.

Researchers Show Lights Inhibit Growth Of Hydrilla

It works! Shining bright lights on a bunch of Potomac River hydrilla weeds in the dark of night inhibits the plants' libidos and limits the number of their offspring.

Federal researchers installed lights in August at the Belle Haven Marina just south of Alexandria. The results are in. The reproduction of the green aquatic weed, widely viewed as a nuisance, was cut in half when 500-watt lamps were trained on it for an hour each night, starting at midnight.

But the main researcher, Lars W.J. Anderson, is going to have to persuade marina operators, the Army Corps of Engineers and assorted local hydrilla haters that stringing lamps above affected waterways is practical.

"We think there is practical application, particularly in localized areas," said Anderson, a plant physiologist with the USDA. Because hydrilla sprouts its reproductive buds in late summer's longer nights, the lights trick the plant into acting as though it is not time to reproduce.

Two types of lamps were tested: 500-watt floodlights and small bulbs encased in plastic tubing somewhat resembling Christmas tree lights. The floodlights did best.

"There was a 50 percent drop in the number of new tubers (roots) produced when the lamps were turned on for one hour at night," Anderson said. "The next time, if we use stronger lamps and start earlier, we may get even better results."

Army engineers and other hydrilla experts are somewhat skeptical.

Because lamps require nearby electrical outlets and must be attached to a steady object, they are not part of the Corps' new plan to eliminate 340 acres of hydrilla from the Washington area's most traveled waterways, which are often far from shore.

"I don't think anyone's taking it seriously, because how are you going to hang the lights out in the middle of the river?" said one Washington area hydrilla expert.

The Corps plans to use a mechanical harvester beginning in June to literally mow down the weed at a cost of $3 million over the next decade. All that to counter the advance of the American strain of an underwater Asian plant that was virtually unheard of here until it appeared in the Potomac two years ago. It has since spread over 1,900 acres of the river.

Anderson says he will travel to Alexandria this spring hoping to persuade other government agencies that shining 1,000-watt lights into the water at midnight is the answer to ridding at least the river's shores of hydrilla.

By Mary Jordan, reprinted from the Washington Post, Feb. 17, 1986.

Proceedings and T-Shirts Available

Proceedings of the First International Symposium on Watermilfoil and Related Halagoraceae Species, Vancouver, British Columbia, which was held July 23, 1985, can be ordered for $15 from Bill Rushing, P.O. Box 16, Vicksburg, MS 39180; (601) 634-3542.

Commemorative T-shirts are still available in all sizes. These T-shirts have the APMS logo on the front and the Milfoil Symposium logo on the back. Don't miss this opportunity. Contact Bill Rush immediately to place your order!!

Vascular Aquatic Weeds in Alberta

Summarized by

Robert Burland, Alberta Environment, Lethbridge, Alberta
Paul Catling, Agriculture Canada, Ottawa, Ontario

Aquatic weed problems in Alberta occur in irrigation systems and in recreational lakes and rivers. In both situations the more serious problems are associated with eutrophic water and, in one lake, thermal effluent was an additional causal factor.

Specific information including aspects of management is available in papers by Allan (1983) and Burland (1982) and Burland and O'Shea (1982, 1983). Both Alberta Agriculture and Alberta Environment, as well as the Agriculture Canada research station in Lethbridge, provide guidance.

Irrigation Canals and Reservoirs

There are 13 irrigation districts in southern Alberta distributed from Cardston northeast to Lethbridge and east to Medicine Hat and from there northwest to Strathmore. At present, 1.1 million acres are under irrigation and approximately 11,500 km of canals are in use.

Growth of aquatic plants, sometimes in very dense beds, in the canals results in reduced flow rate and reduced water carrying capacity. This leads to increased water loss from seepage and evapotranspiration, increased energy requirements to maintain flow, scarcity of water downstream and flooding. Additionally, vegetation plugs turnout structures and intake screens. The species contributing to most of the problems (Table 1) are submerged species, especially *Potamogeton pectinatus* and *Potamogeton richardsonii*, but *Typha latifolia* and *Phalaris arundinacea* are also significant in some of the smaller canals. The most serious problems are associated with the use of nutrient-enriched water, from the lower Bow River, for example. Control is effected primarily through the use of herbicides (under permit from Alberta Environment). In 1984, satisfactory control of submerged weeds in 640 km of canals in one of the districts cost $30,000 for chemicals alone.

Recreational Lakes and Rivers

Thick growths of aquatic vegetation in some lakes and rivers make swimming, boating and fishing impossible, and masses of decomposing vegetation washed ashore on beaches make these sites generally unattractive. The most serious problems are associated with nutrient enrichment and are controlled by mechanical harvesting. Mechanical cutters are operating in at least five lakes. Control in approximately 45 additional lakes is achieved by hand-cutting, dredging, local herbicide application (1-3 acres under permit from Alberta Environment) and bottom sediment covers, around docks, etc.

The main problem species are *Myriophyllum exalbescens, Potamogeton pectinatus, Potamogeton richardsonii, Potamogeton vaginatus* and *Ceratophyllum demersum* (Table 2). Prolific growth of *Elodea canadensis* in the early 1970s in Wabamun Lake was associated with thermal discharge from two generating stations. During an intensive study of the problem (Beak Consultants, 1980), the *Elodea* population declined substantially, and a relationship between *Elodea* growth and ferrous iron in the substrate became apparent. The severe problems of weed growth in Wabamun Lake, primarily involving *Elodea canadensis*, were associated with initial disturbances and later diminished (e.g., Transalta Utilities, 1983).

The Problem Species

In Tables 1 and 2, species are ranked according to their frequency of occurrence in sufficient abundance to result in a weed problem. Although some species are frequently present in lakes, they are less significant in terms of interference with water-based recreation due to their localization in the lake (e.g., *Sagittaria* spp.). Other species may have a lower frequency but usually contribute to problems due to characteristically extensive growth where they do occur (e.g., *Elodea canadensis* in Wabamun Lake). *Eleocharis acicularis* is very frequent in fast-moving and often fluctuating water of irrigation canals where it forms a low grass-like turf. However, it is in many respects a desirable species since it stabilizes the canal bed and prevents other troublesome species from establishing and is itself too small to seriously affect water movement.

On the other hand, the larger coarse pondweeds represent a very severe impediment to water flow, and although a species such as *Potamogeton vaginatus* is not as common as many other species, its large, coarse growth form and local abundance in some deep canals result in serious problems.

Species such as *Typha latifolia* and *Phalaris arundinacea* are prevalent only along the edges of larger canals and may not seem at first to be a major problem. However, almost every small ditch in the northern and eastern districts has these species which trap silt when left unchecked for too long, making ditch reshaping by dragline necessary. These emergents are more costly to control than some of the submerged species.

The ranking in Tables 1 and 2 takes both frequency and relative problem levels into account. Although it is arbitrary, we feel that it provides a useful indication. Taking these tables and personal observations into account, the main vascular plant contributors to aquatic weed problems in Alberta are *Potamogeton pectinatus, Myriophyllum exalbescens, Potamogeton richardsonii, Potamogeton vaginatus, Ceratophyllum demersum, Typha latifolia, Phalaris arundinacea, Ranunculus circinatus, Elodea canadensis, Alisma gramineum, Potamogeton pusillus, Potamogeton praelongus* and *Lemna trisulca*.

There are some interesting differences between irrigation water and recreational lakes. For example, *Lemna trisulca, Elodea canadensis* and *Potamogeton praelongus* contribute to weed problems in recreational lakes more often than in water utilized for irrigation. *Alisma gramineum*, on the other hand, is rarely a weed problem in recreational lakes or larger canals but is frequently troublesome in smaller canals and shallow ditches.

Lake surveys designed to provide early detection of Eurasian Watermilfoil *(Myriophyllum spicatum)*, (e.g., Stockerl, Kent and Thurber, 1982), have not yet disclosed that plant in Alberta. A useful spinoff of these surveys has been a vastly improved knowledge of aquatic flora and general weed problems in Alberta lakes.

The introduced Curly-leaved Pondweed *(Potamogeton crispus)* was first reported in Alberta in 1943 and is presently known from at least seven localities. It has not yet become a significant aquatic weed problem, although it is becoming abundant in some parts of the lower Bow River.

Additional references deleted due to space limitations.
Reprinted from Canadian Chapter APMS Newsletter Vol 1, No. 3

Table 1. Vascular aquatic plants contributing to weed problems in southern Alberta irrigation districts (including both canals and reservoirs) and other species present, which may or may not be a nuisance. The major problem species are ordered according to their relative contribution to aquatic weed problems. The first 12 are very abundant in the irrigation districts. Based on Burland and O'Shea, 1983, and personal observations.

1. *Potamogeton pectinatus*
2. *Potamogeton richardsonii*
3. *Typha latifolia*
4. *Phalaris arundinacea*
5. *Myriophyllum exalbescens*
6. *Potamogeton vaginatus*
7. *Ceratophyllum demersum*
8. *Alisma gramineum*
9. *Ranunculus circinatus*
10. *Elodea canadensis*
11. *Potamogeton pusillus*
12. *Scirpus* spp.

Additional species present:

13. *Callitriche palustris*
14. *Callitriche palustris*
15. *Eleocharis acicularis*
16. *Lemna minor*
17. *Lemna trisulca*
18. *Najas flexilis*
19. *Potamogeton filiformis*
20. *Potamogeton friesii*
21. *Potamogeton gramineus*
22. *Potamogeton praelongus*
23. *Potamogeton zosteriformis*
24. *Utricularia vulgaris*
25. *Zannichellia palustris*

Table 2. Vascular aquatic plants contributing to weed problems in southern Alberta recreational lakes. The species are ordered according to their relative contribution to aquatic weed problems. The first 10 are very frequent. Based on personal observation.

1. *Myriophyllum exalbescens*
2. *Potamogeton pectinatus*
3. *Potamogeton richardsonii*
4. *Potamogeton vaginatus*
5. *Ceratophyllum demersum*
6. *Potamogeton praelongus*
7. *Lemna trisculca*
8. *Potamogeton pusillus*
9. *Elodea canadensis*
10. *Ranunculus circinatus*
11. *Potamogeton zosteriformis*
12. *Ruppia maritima*
13. *Potamogeton crispus*
14. *Ranunculus aquatilis*
15. *Lemna minor*
16. *Potamogeton natans*
17. *Potamogeton friesii*
18. *Polygonum natans*
19. *Hippuris vulgaris*
20. *Elodea longivaginata*
21. *Najas flexilis*
22. *Utricularia vulgaris*
23. *Equisetum fluviatile*
24. *Zannichellia palustris*

New Publications

Publications Available From SWSS

Two major publication projects will be completed this year. The first set of the *Weed Identification Guide* includes information on 50 weeds, each on an individual sheet which can be placed in a binder. The cost is $14 per set prior to publication; binders will be available at $7 each. A second set of 50 weeds will be available in early 1986.

The Third Edition of the *Weed Science Methods Manual*, edited by N.D. Camper, will also be available later this year. Details about these publications can be obtained from Bob Schmidt, 309 W. Clark Street, Champaign, IL 61820.

Publications On Management Programs

Two new aquatic weed management publications are available from the Water Resources Research Institute of the University of North Carolina, NCSU, Box 7912, Raleigh, NC 27695-7912. They are free within N.C. and available at a cost of $8 out of state.

Management Program for Hydrilla (A Monoecious Strain) in North Carolina, WRRI, No. 225, reports results of field evaluations of currently labeled herbicides for managing a monoecious strain of hydrilla in N.C., and a management program using herbicides and grass carp is recommended.

Management Program for Alligatorweed in North Carolina, WRRI, No. 224, reports results of evaluating some new herbicides for managing alligatorweed, and a management program for alligatorweed in coastal rivers and drainage canals is recommended.

A third report, *Considerations for Using Herbicides in Domestic Water Supplies of North Carolina*, which discusses toxicology, persistence, and movement of diquat, endothall, and fluridone, as they apply to aquatic weed control in domestic water supply reservoirs, should be available soon.

APMS Special Inventory Reduction Sale

The APMS Board of Directors has authorized reduced rates on complete sets and back issue of the *Hyacinth Control Journal* (1962-1975), and the *Journal of Aquatic Plant Management* (1976-Present). This is an excellent opportunity for libraries, laboratories, and people new in the field to complete their holdings of these issues "while they last." These volumes provide an interesting and informative historical background in aquatic plant management.

You may order single volumes to replace lost ones or order complete sets on the form below. Two issues of the *Journal* were printed for volume 8 and volumes 20-23.

Detach this form and send it with your check or P.O. number to: APMS, P.O. Box 16, Vicksburg, MS 39180

Volumes 1-18 (1962-1980) @ $5/Volume — $90 $ _____

Volumes 19 and 20 (1981-1982) @ $10/Volume — $20 $ _____

Volumes 21 and 22 (1983-1984) @ $20/Volume — $40 $ _____

Volume 23 (1985) @ $25/Volume $ _____

Total Set $175 $ _____

I wish to order the following single volumes: _____ $ _____

TOTAL PRICE $ _____

Your Name _____

Mailing Address _____

City/State/Zip _____

P.O. Number _____ Check Enclosed

Letter to the Editor

Dear APMS Readers:

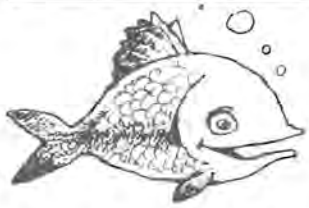
This letter is in response to an opinion issued December 2, 1985, by Dr. Robert E. Stevens, Chief, Division of Fishery Research, U.S. Fish and Wildlife Service, in which it was concluded that the stocking of triploid grass carp in either closed or open water situations will not result in adverse impact on the environment.

In his article, "Grass Carp in Public Waters of South Carolina," Dr. Stevens, USFWS, presented welcome news of no reproduction. However, the stimulus of my response is his quote, "Any adverse impact on desirable aquatic plants will be short-lived and reversible." My biological opinion: members of the grass carp group (fertile, diploid and triploid fish) when stocked in sufficient number to provide aquatic plant control are non-selective biological control agents. Plant species preference lists have been well developed through feeding trials. However, when these fish are faced with a limited preferred species (usually a native aquatic species), they will consume almost any growing plant within reach. Numerous lakes in the Orlando area actually have a brouse line around a flora void lake. The brouse line is on St. Augustine and Centipede grass! This is approximately 8 years post-stocking; species prior to stocking were *Hydrilla, Nitella, Potamogeton, Vallisneria* and *Typha*.

If Dr. Stevens' definition of short-lived and reversible is greater than 9 years, maybe he has a point. Most aquatic researchers and lake managers well experienced with grass carp consider them an "all or nothing control agent." I am not aware of a single lake or pond stocked in which non-desirable aquatic plants were selectively removed without impacting non-target species long term. Since most biologists agree that diversity is the key to a strong, viable population of any species, and grass carp positively decrease aquatic flora diversity, I fail to understand how Dr. Stevens could have knowingly made this statement.

I recommend that your institute contact organizations such as the Florida DNR; Aquatic Weed Research Center, University of Florida; Texas Parks and Wildlife Dept.; and other agencies which have experienced these effects. My own opinion, for what it's worth, is that the grass carp is an excellent tool for total vegetation control in small enclosed urban waters. Use in waters important as waterfowl food sources and those deemed valuable fishery waters with desirable aquatic flora should not be stocked with grass carp. Definitely avoid use in flowing waters; the grass carp is a strong swimmer and migrates readily. These fish are long-lived and nearly impossible to selectively remove.

—Anonymous



Clear Lake Suffers From Too Many Carp

By Bob Port, Pasco Times Staff Writer

Saint Leo—In 1974, this tiny college town found a solution to the weed problem with its lake, Clear Lake, when they let state biologists dump thousands of plant-munching Chinese grass carp into the water.

The weeds disappeared all right.

In fact today, biologists who know the lake acknowledge that the Chinese grass carp, more properly called the white amur, turned out to be too good for Clear Lake. The carp, they say, have become a contributor to the lake's newest problem, an inability to cleanse itself of pollution.

"It's a swap," said Larry E. Nall, a biologist with the State Department of Natural Resources (DNR) who was part of an early experiment with the white amur in Saint Leo.

Clear Lake, a postcard picture of a pond beside Saint Leo College, had become an unnavigable mess in the 1970s. Hydrilla, a long-stemmed river weed imported from Africa to adorn American aquariums, had so choked the lake "you could almost walk on it."

Hydrilla has become one of Florida's biggest aquatic pests. Boats moved around on trailers can spread the troublesome weed from lake to lake. Today, special, relatively inexpensive herbicides are the preferred treatment for hydrilla.

In 1974, chemicals to kill hydrilla were expensive and more dangerous.

So, with the city's welcome, the DNR stocked more than 3,000 white amur in Clear Lake as part of an experiment to gauge the use of the fish in combating hydrilla. Within a few years virtually all the hydrilla was eaten and the white amur, a fish known for its voracious appetite for greens, were left to graze away at any plant that might appear.

Now Clear Lake is filled with the green cast of algae, tiny plant organisms that have taken the place of the lake's bottom-rooting plants. Like normal aquatic plants, algae feed on nutrients always washing into the lake, Nall said. Unlike normal plants, he points out, algae will tend to rob the lake of oxygen and its natural cleansing abilities.

For Clear Lake, which sits like a cereal bowl amid its surrounding hills, runoff rich in nutrients has become a fact of life, as have perpetual blooms of blue-green algae.

"It's plant removal that's causing it," Nall said. "The presence of plants would help. They're facing the same thing that several lakes in Florida are facing."

State officials learned from Clear Lake and other lakes in the experiment that even small numbers of the white amur can do a huge job on hydrilla. In fact, much of the latest research at DNR is focusing on undoing exactly what the white amur was meant to do, Nall said. "We're now researching how to replant the natives."

Indeed, it wasn't long before the new carp in Clear Lake "were almost climbing up on the bank to get something to eat," recalls Father Marion Bowman, 81, a trustee of the college and former abbot at Saint Leo Abbey.

"I think some plants would do some good," Bowman said. "We can't think far enough ahead that you kill one problem, you don't get two more."

Glen Thompson, who heads the Dade City office of the health department, said the answer may be to kill the fish, then start stocking the lake with native plants again. Today, he said, the weeds can be controlled with herbicides.

Clear Lake's latest problem is bacteria, found by Pasco's health department in high levels last month near a swimming area on the lake operated by the neighboring city of San Antonio. Swimming was suspended until the health department can complete more tests.

Even short of killing the fish, there is hope for Clear Lake's problem with its carp thanks to one of their characteristics. "These are among the oldest that were stocked in the state," said Nall of the DNR.

"Much like a salmon," the white amur of the White Amur River in Manchuria and Siberia will only spawn in a fast river.

"They're dying out," Nall said, "slowly, of old age."

Mid-Atlantic Chapter On Hold

To "test the waters" for interest in forming an M-AAPMS, a questionnaire was recently mailed to thirty-three individuals believed to be good contacts in their respective areas. It was assumed that these individuals would further distribute the material so that there would be sufficient exposure for the geographic area which ranged from South Carolina through Ontario. The results of the fourty-two responses are listed below:

Affiliation

University 4
State Government 9
Local Government 2
Federal Government 15
Industry 9
Consulting 1
Other 2

Work Area

Research 12
Extension 2
Sales 3
Operations 27
Water Quality 7

What are your areas of interest related to aquatic plant management?

Biological control 27
Herbicides 32
Mechanical control 27
Ecology 25
Macrophyte re-establishment 15
Phycology 5

Would you attend annual meetings on a regular basis in:

Your own state? (yes) 42; (no) 0
Other Atlantic Coast state?
(yes) 37; (no) 5

Would you present papers at annual meetings?

(yes) 26; (no) 16

State representation:

NC-19; SC-1; VA-5; DE-2; MD-5; DC-2; PA-1; NJ-1; NY-4; FL-1

Although there seems to be a great deal of interest by a small group of people, the committee feels that the number of interested people relative to the large geographic area does not warrant formation of a new affiliate chapter. The concensus is that APMS and/or the South Carolina Chapter is presently serving most of our needs, and further consideration of forming M-AAPMS should await greater interest.

Our thanks go to Steve Mitchel who compiled the responses.

7th INTERNATIONAL EWRS/AAB SYMPOSIUM ON AQUATIC WEEDS

Dale Robson informs us that "arrangements for the Seventh Aquatic Weed Symposium are going well, and about 80 offers of papers have been received. The meeting has attracted the attention of people in over 40 countries, and we expect it to be as well attended as the previous symposia in the series, and as enjoyable."

Dale encourages APMS members to "come over for it." Details for accommodations follow.

The EWRS/AAB 7th International Symposium on Aquatic Weeds will be held at Loughborough University of Technology, Loughborough, England, from September 15-19, 1986. Accommodations have been arranged in the Towers of Residence in single bedrooms. Meals will be served in the Towers Hall Refectory.

Fees must be paid by bank to bank transfer to "EWRS/AAB Symposium A/C" in pounds sterling at the Lloyds Bank, 37 High Street, Loughborough, Leicestershire, LE11 2QG. The account number is 0106839 and the sorting code of the bank is 30-95-21. Payment must arrive no later than July 4, 1986. An additional charge of L10 will be made for any fees received after this date. Delegates registering after July 18, 1986, will not be able to have their papers included in the symposium program.

Accommodation and/or Registration Fees	EWRS or AAB Members	Others
COMPREHENSIVE PACKAGE Monday-Friday accommodations, breakfast, lunch, and evening meal, registration and excursion fees	175 L	195 L
Sunday night and breakfast	10 L	10 L
Registration only (including cost of lunch, the proceedings and excursion)	80 L	90 L
Day registration (including lunch and the proceedings but excluding excursion)	40 L	45 L
One night's accommodation (including evening meal and breakfast)	18 L	18 L

For additional information contact Max Wade, Department of Human Sciences, Loughborough University, Loughborough, Leicestershire, LE11 3TU, England. Telephone: Loughborough (0509) 263171 extension 608 or 654.

CALENDAR

Most Important Dates

- **July 13-16, 1986**
  Aquatic Plant Management Society Annual Meeting.
- **August 15, 1986**
  Deadline to submit articles for October APMS NEWSLETTER.

Chapter Meetings

- **Date TBA**
  Canadian
- **August 20-22, 1986**
  South Carolina
  Pine Island on Lake Murray
  Columbia, SC (tentative)
- **October 14-16, 1986**
  Florida
  Holiday Inn
  Plant City, FL
- **Date TBA**
  Midsouth

Other Important Dates

- **July 20-24, 1986**
  Conference on Research and Application of Aquatic Plants for Water Treatment and Resource Recovery—Orlando, FL
- **September 15-19, 1986**
  7th International Symposium on Aquatic Macrophytes—Loughborough, Leicestershire, England
- **November 5-8, 1986**
  Lake and Reservoir Management 6th Annual Symposium—Sponsored by the North American Lake Management Society—Portland, OR
- **January 12-14, 1987**
  Southern Weed Science Society 1987 Annual Meeting—Hyatt Orlando, Kissimmee, FL
- **February 3-5, 1987**
  Weed Science Society of America 1987 Annual Meeting—Adams Mark Hotel, St. Louis, MO

To submit articles, calendar dates, or letters to the editor contact:

K.A. LANGELAND
APMS Newsletter
Box 7627
North Carolina State University
Raleigh, NC 27695-7627

APPLICATION FOR MEMBERSHIP

There are three regular classes of membership available upon application made in accordance with the Charter adopted in 1961. These classes are:

A. Active Membership	$25.00
B. Student Membership	5.00
C. Commercial Sustaining Membership	200.00

Name of Applicant _____ Spouse's Name _____

Home address* _____ Zip Code _____

Present title & Employer _____

Business Address* _____ Zip Code _____

Business Telephone _____ Home Telephone _____

Amount of Remittance $ _____ Signature of Applicant _____

Membership Type: ACTIVE _____ COMMERCIAL SUSTAINING _____

STUDENT _____ SUBSCRIPTION _____

*Please indicate address to be used by our business office.

THE AQUATIC PLANT MANAGEMENT SOCIETY, INC.
POST OFFICE BOX 16
VICKSBURG, MISSISSIPPI 39180

The Aquatic Plant Management Society, Inc.

The Aquatic Plant Management Society, Inc., is an international organization of scientists, educators, administrators, and concerned individuals interested in the management and control of aquatic plants. The membership reflects a diverse collection of Federal, state, and local agencies; researchers, professors, and students from universities and colleges around the world; corporations; commercial applicators; and others dedicated to promoting research and sharing information about aquatic plants and the technology of aquatic plant management.

Originally called The Hyacinth Control Society, Inc., when founded in 1961, The Aquatic Plant Management Society, Inc., has evolved into a respected source of expertise in the aquatics field. The Society has grown to include several regional or state chapters; and through these affiliates, annual international meetings, newsletters, and the *Journal of Aquatic Plant Management*, members keep abreast of the latest developments in biological, mechanical, chemical, and integrated methods of aquatic plant management and control.