EDITOR'S NOTE: On this page are tributes to Lyle Weldon from a few of the many persons in industry, government and education who knew him personally or were aware of his work. Hundreds of others remember him as he is pictured at left, speaking vigorously about research findings in weed science. His appearances were numerous. This scene is from a meeting of the Hyacinth Control Society, to which Weldon contributed an immense amount of time and energy, as an organizer, speaker, editor and officer.

mired among weed scientists and other specialists in Florida, the Southern Weed Conference, the Weed Science Society of America and in many foreign countries. If he had a fault, it was over dedication to his job and to science at personal sacrifice and risk to his health. In my opinion, Dr. Weldon's contribution to Weed Science at age 35 has not been exceeded or even equalled by another scientist at that age.—**F. L. TIMMONS** leader, Weed Investigations, Aquatic and Non-crop, ARS, USDA, Laramie, Wyo.

* * *

DR. LYLE WELDON was without question one of the foremost research men as well as one of the most knowledgeable in the aquatic weed science field. His death is a severe blow to this industry. The team of Weldon and Blackburn seldom, if ever, was matched for effectiveness. These scientists planned together . . . and published together. Rarely did they publish a scientific paper which did not carry the names of both. It is doubtful that this kind of relationship—directed toward a specific scientific phase of the weed control industry—can be repeated.

As a man, Lyle leaves an enviable legacy. Those of us who worked with him in various disciplines concerned with this industry knew him both as friend and congenial companion. We know Lyle for the competent, driving, hard-working, and intelligent person that he was.—**ARTHUR V. EDWARDS,** editorial director, WEEDS TREES and TURF, Cleveland, Ohio.

* * *

IT CAN BEST BE SAID of Lyle that in his short life span he achieved that which many of us never do in a full three score and ten years. Lyle left his mark in accomplishments, long range visions and a person-to-person relationship with all who came in contact with him. He was never too busy to explain to the water user the work that was under way. He believed that an informed lakefront cottage owner became an ally to those of us involved in weed work. Lyle, above all, had a total concept of the place and need for aquatic weed control. We will all miss him with his curiosity, enthusiasm and willingness to work the clock around in his search for answers. He left a large pair of shoes to fill.—**JOHN E. GALLAGHER,** agricultural chemicals division, research and development, Amchem Products, Inc., Ambler, Pa.

* * *

HAVING WORKED in most of the world's countries, I can tell you—Lyle Weldon was one of the best aquatic weed scientists in the world. He had few peers. He understood the biology of aquatic plants and he was an expert on control measures for species which were troublesome. He was technically competent, but he also recognized the social impact of weed problems. He was aware that politicians, farmers, urban people, and citizens from many walks of life would have to be brought together in support of the solution of such problems. His determination and enthusiasm inspired some of us to do things we didn't know we could do. We have lost one of the leaders for our work.—**PROF. LEROY HOLM,** University of Wisconsin, Madison.

* * *

DR. LYLE WELDON had a zest for life and with it a vigorous, contagious aggressiveness directed toward control procedures of aquatic weeds. This made him a leader in this field. We all miss him as a co-worker and as a friend. — **JOHN H. STEENIS,** USDI, Patuxent Wildlife Research Center, Laurel, Md.

* * *

THE LOSS OF LYLE WELDON has been a terrible blow to the field of weed science. His techniques, abilities and methods of developing and transmitting data will be sorely missed in the years to come. Rarely, if ever, in my 20 years of experience in the weed control industry have I had the opportunity and good fortune to work with anyone as dynamic, forceful and determined as Lyle. His precise approach to difficult problems will always be remembered. I will miss him, as will so many others who have worked with him for these last number of years. — **HERBERT J. FRIEDMAN,** president, Southern Mill Creek Products Co., Inc., Tampa, Fla.

Consulting Biologist Jason Cortell inspects some alligator weed research during a tour of USDA's aquatic research facility at Ft. Lauderdale, Fla.

THE ROLE OF HERBICIDES

In the preservation of our urban and industrial water resources

By Jason M. Cortell
JASON M. CORTELL & ASSOCIATES
Consulting Biologists
Wellesley Hills, Mass.

TODAY, MORE than ever, in the midst of the current indiscriminate attack on herbicides and other pesticides, it seems as good a time as any to review the role of these materials in the use and preservation of our water resources. At no time in our nation's history has the public been as aroused about the quality of the environment and nowhere are these problems more acute than in and around our cities.

In recent years, the urban nature of much of today's water resource problems has become increasingly apparent. The growth of metropolitan areas, particularly along our coastlines and inland waterways, is well documented. Population shifts in the last 50 years have been unparalleled in history. According to the U.S. Census Bureau in 1900, one out of 20 Americans lived in urban areas; and in 1968, 14 out of 20 Americans lived in urban or suburban communities. During the same period, the population doubled, meaning that while the rural population dropped about 30%, the urban population has increased 2,800%. It is estimated that the existing population will double again within the next 30 years and some 80% will live in urban areas.

Use of Water

Spiralling use of potable water has increased over the past 50 years from 30 to 150 gallons per person per day, and the total per capita consumption for all purposes, is 1,600 gallons per day. However, surface water flowing from fertile watersheds into reservoirs and holding areas, have caused the accelerated growth of aquatic weeds and algae, seriously affecting the quantity, if not the quality, of our drinking water. Municipal water systems, private water companies, and state and interstate water resource commissions have raised increasingly vocal concern over the needs for an effective means for controlling nuisance aquatic vegetation in hundreds of thousands of acres of eutrophic reservoir and watershed areas.

According to the U.S. Geological Survey, in 1965, the total use of fresh water resources for all purposes was in excess of 310 billion gallons per day. Of this total, about 54% was used by industry, 38% by agriculture for irrigation, 7% for domestic needs and about 1% for rural domestic and stock use. About 23.6 billion gallons of fresh water per day is consumed for domestic purposes.

Holm, Weldon and Blackburn, in a recent article appearing in *Science*, detail the explosive growth of aquatic vegetation throughout the world. They describe the spread of floating plants, such as water hyacinth, *Salvinia*, and water lettuce in Africa and South America, particularly in connection with man-made lakes and hydroelectric schemes. Additionally, the spread of submersed weeds, such as watermilfoil and *Hydrilla* in navigable waters and canals has had a retardant effect on the industrialization of many developing areas, both in this hemisphere and in other parts of the world.

Another consideration is the use of our water resources for recreation.

The extent and nature of outdoor recreation was the subject of a congressionally authorized $2.5 million three-year study. The Outdoor Recreation Resources Review Commission reported in 1962 that most people seeking outdoor recreation want water to sit by, to swim and fish in, to water ski across, to dive under and to run their boats over. Swimming has become one of the post popular outdoor sports. Boating and fishing are also among the top ten leisure activities.

The Commandant of the U.S. Coast Guard reports in *Boating Statistics—1968* that 4,742,800 pleasure crafts of all description were registered and numbered in the U.S.

In addition to boating, swimming and fishing — camping picnicking, and hiking, are also more attractive near water sites and have thus become part of the multiple-use water concept.

Multiple-Use of Water

The use of aquatic herbicides in and around urban areas is complicated by the multiple-use character of our water resources. Regional and state regulatory agencies, municipal water authorities and districts, private water companies, private industry, local health officials, lake and pond associations, private riperian owners and conservationists all have a stake in the control of aquatic weeds in one form or another.

Unlike the comparative seclusion of the field station or the rural isolation of the single agrarian consumer, the use and evaluation of aquatic herbicides in urban areas is not a simple task. Yet, with the need for control becoming ever more acute, substantial progress in urban areas is still slow.

Evaluation of Herbicides

Currently, thousands of acres of recreational waters are being successfully treated for the control of aquatic vegetation using the present limited arsenal of aquatic herbicides.

In most cases, preliminary field evaluations have been made to further refine the desired project specifications. In still other circumstances, where considerable acreage is involved, post-registration field evaluation is required as a standard practice. On many occasions, this initial series of field trials may be the sponsor's first contact with the new aquatic herbicide.

The individual who carries the

main responsibility for the expenditure involved for chemicals will provide the level of control desired.

But others are also involved — state and local health officers must be satisfied that the new herbicide can be safely introduced into public waters without causing injury. Fisheries and game personnel are interested in the chemical's effect on wildlife, as in the regional extension representative concerned about its effect on irrigation water and agriculture. The manager of an industrial facility which may use the treated water for manufacturing or cooling is also concerned about the chemicals introduced therein as it may affect his manufacturing process or equipment. Lastly, the professional applicator may be concerned about the ability of his personnel and the adaptability of his equipment to handle the new aquatic herbicide.

One can easily see that before the chemical even gets an opportunity to perform, a great deal of preliminary work is required. The responsibility for liaison with all interested parties prior to the development and implementation of a field evaluation plan is usually that of the project engineer.

Landmark Projects

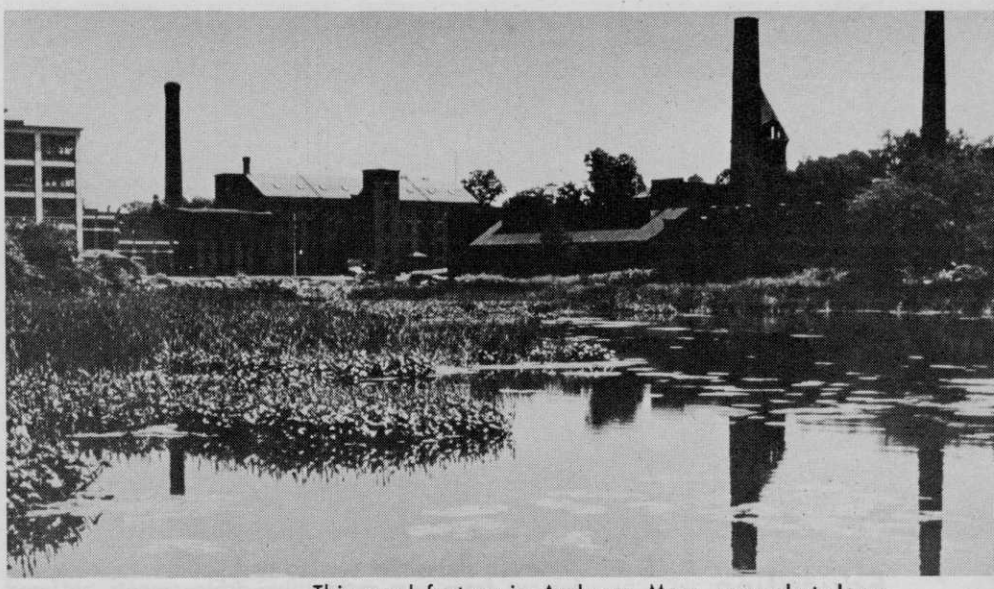
With this as a background I would like to discuss briefly several typical projects which, to one degree or another, have achieved landmark status, illustrating the role of aquatic herbicides in urban and industrial water resource problems.

Let us briefly review the problems particularly associated with the use of aquatic herbicides in potable water systems. Of all areas of research, the need here is substantial.

Copper sulfate has long been used with great success for the control of algae. At one time, one or two treatments a season were enough to control algae growth in an average reservoir or impoundment. Today, however, the influx of nutrients from surface water runoff has accelerated the growth of algae where, in some cases, bi-monthly treatment is required. The American Water Works Association noted in 1968, a 60% increase in total copper used for algae control since 1960.

While today, copper sulfate still provides a satisfactory level of control in potable waters, a pressing need exists for the development of new algicides which are not only more effective, but which do not have the limiting characteristics of copper such as toxicity to fish and build-up of residual copper in mud.

In recent years, the use of 2,4-D



Business Halted

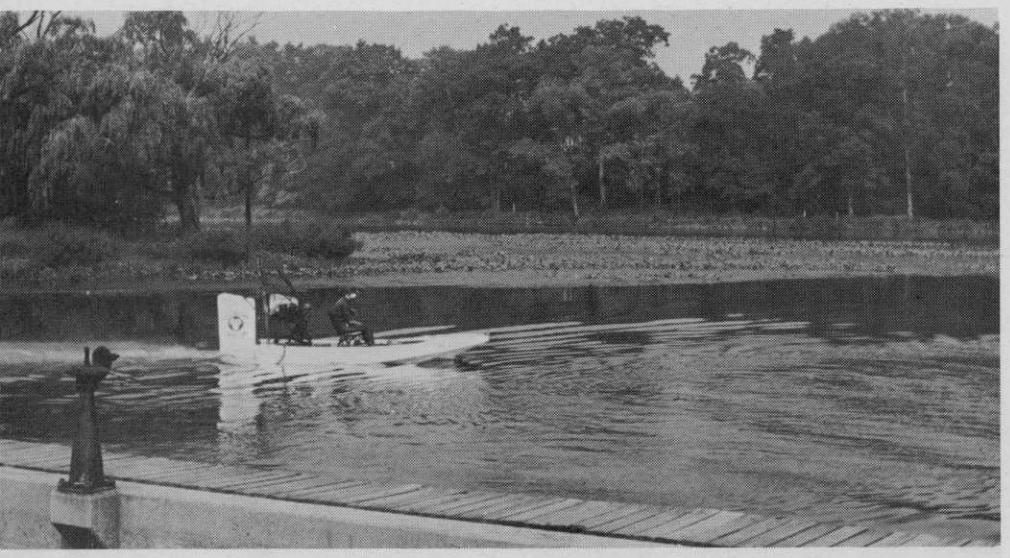
This wool factory in Andover, Mass., was shut down by aquatic weeds. The lake was built in the 1800s to supply water for power and for the woolen process and later as an equipment coolant. Weeds clogged the intake system forcing the factory to close until the weeds were killed.

Flood Control Compromised

Arrowhead, elodea and cattail seriously reduced the effectiveness of this flood control canal winding its way through Chelsea in eastern Massachusetts. The illustrations with this report show typical problems handled by the author's firm, Allied Biological Control, Inc.

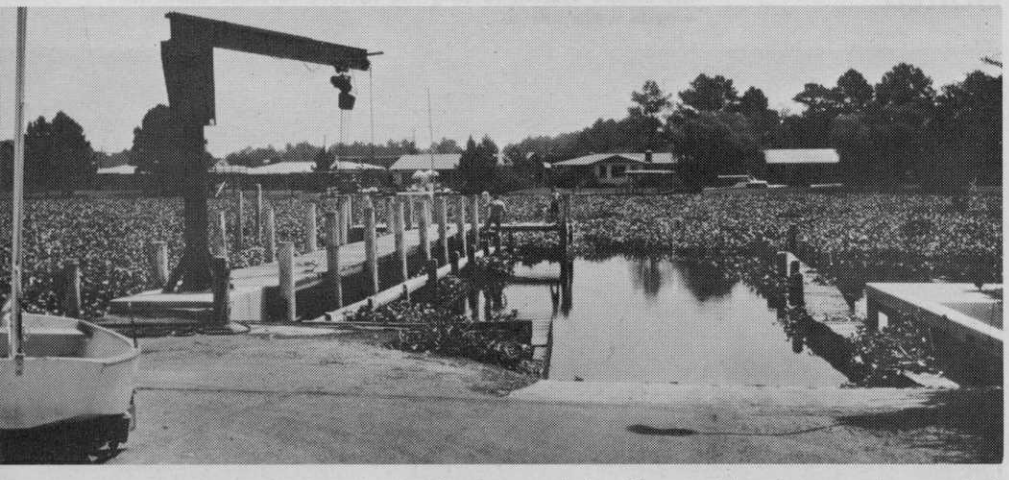
Transportation Endangered

Barely showing behind a formidable "phragmite curtain" is the Boston-Logan International Airport. This weed problem attracts heavy populations of birds, particularly starlings. Flocks of birds present a very real hazard to aircraft landing or taking off.



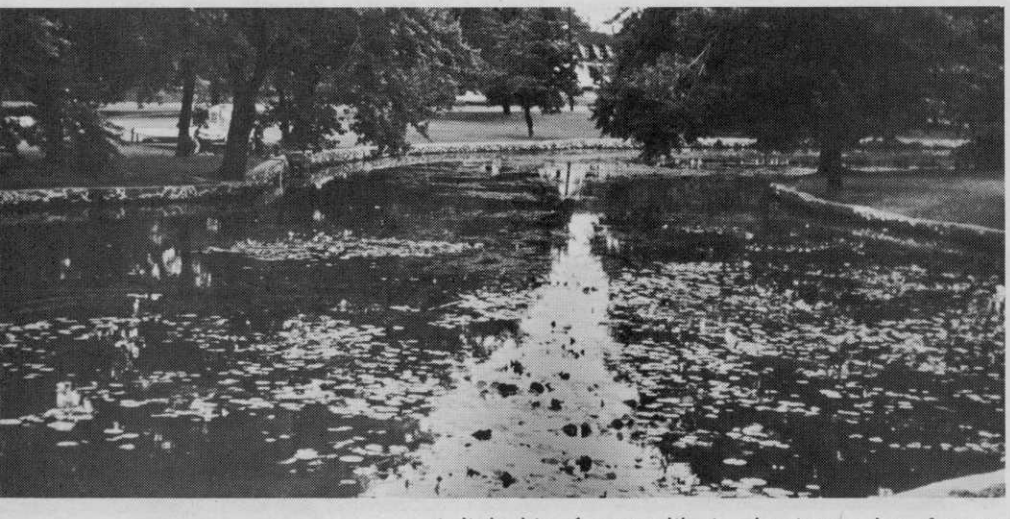
Education Stifled

Princeton University rowing and sailing crews, world famous from past competitive achievements, suffered an ignominious defeat to watermilfoil on their own Lake Cabomba. The sports program was halted until Allied Biological controlled the aquatic pest.



Recreation Prevented

The boat at left without sail and aground on asphalt nevertheless has about as good a chance of moving in the wind as it would on the lake in the background. Water hyacinth closed down this yacht club in the heart of downtown Jacksonville, Fla.



Beauty Impaired

A little bit of water lily is pleasing; a lot of water lily and elodea combined is a problem. This eyesore, before it was cleaned up, was an impoundment of the Wepawag River as it passed through River Park in the middle of Milford, Conn.

Granular for the control of watermilfoil and certain other submersed aquatic species have become a standard operational procedure in many recreational lakes. Early work by Grigsby in Michigan, set the pattern for similar large-scale field evaluations in New Jersey in 1959. Horricks and Smith, with technical assistance from Gallagher, treated more than 750 acres in New Jersey's 2,680-acre Lake Hopetcong. The results obtained from the Lake Hopetcong evaluation work were to set a pattern for operational treatments throughout the decade. Steenis, through the early-1960s, had carried out a series of intensive evaluation studies on the control of eurasian watermilfoil *(Myriophyllum spicatum)* with Granular 2,4-D in Chesapeake Bay, which eventually led to its acceptance as an operational specification. This early work provided a sound basis for future large-scale programs in the TVA reservoirs, North Carolina's Currituck Sound, New York's Chautauqua and Findley Lakes and Rondoe Bay in Canada. Virtually, thousands of weed infested acreage has been cleared in recreational waters using this approach.

Back in 1958, work in Massachusetts by Boschetti and Cortell pointed out that a large group of submersed and floating aquatic plants were susceptible to relatively low rates (0.5 ppm) of silvex. Whereas watermilfoil, elodea, coontail and waterlily represent major problems in this part of the country, silvex has been used extensively for control purposes since that time.

Early field evaluations with diquat in England, Malaysia, Canada and the United States have resulted in the widespread use of this material throughout the world. It has been particularly effective in Florida for the control of water hyacinth *(Eichhornia crassipes)* and waterlettuce *(Pistia stratioites)* in drainage canals. Diquat also has been found to be quite specific for the control of another floating plant — duckweed *(Lemna minor)*. All three of these free floating aquatic plants have a worldwide range and are extremely troublesome when found in the vicinity of hydro-electric water intakes.

Diquat is used widely also in urban areas for the control of numerous submersed aquatic species. Large-scale operational treatments of diquat have been recently carried out in Florida at the Orlando Naval Training Center under the direction of Weldon and in New Jersey's and New York's 1,920-acre Greenwood

Lake by Gilbert. In the latter project, a bottom-release technique was utilized to control flatleaf pondweed *(Potamogeton robbinsii)*.

Another much heralded urban aquatic weed problem is that which besets Winter Park, Fla. Here both chemical and mechanical control procedures are presently being employed by the City's Parks and Recreation Department to abate the rapid growth of Florida elodea *(Hydrilla verticillata)*. At present, about 800 acres of surface water is infested with this and other submersed weeds. Based on extensive work at the U.S.D.A.-A.R.S. Fort Lauderdale Laboratory by Blackburn, numerous herbicidal approaches for the control of *Hydrilla* have been under study. This past year, field evaluation of two endothall products, Hydrothal 191 and 3M System E were made by Pennwalt Corporation and the 3M Company, respectively. While results of this work are still under study, Blanchard reports that municipal officials plan to move ahead on an ever-expanding program which is expected to run in the vicinity of $180,000 this coming year. Other work on *Hydrilla* has been conducted at the Fort Lauderdale Plantation Laboratory by Blackburn and Weldon. Recent field results appear to indicate that a combination of 1 ppm diquat and 4 ppm copper sulfate has given excellent control of *Hydrilla* and other submersed species in non-flowing waters. As a result of these studies, this combination is now being used commercially for *Hydrilla* control in urban sites.

The liquid formulation of 2,4-D Amine has been extremely valuable in controlling both waterhyacinth in the south and waterchestnut *(Trapc natans)* in the northeast. Wunderlich and his co-workers are generally given credit for the early evaluation of this formulation, both in Louisiana and in Chesapeake Bay. The early work of Smith, Greeley and Steenis, on the Mohawk and Hudson Rivers near Albany, further extended the field testing of 2,4-D Amine liquid on waterchestnut already begun by the Corps of Engineers.

Field evaluation of dalapon, in combination with Amitrol-T, back in 1962, for phragmites *(Phragmites communis)* control by workers in Delaware and Massachusetts has proved extremely useful in urban and industrial sites. Treatments with this combination have become an important part of the environment control program at Boston's Logan International Airport in connection with aircraft-related bird control.

Informed Public Wants Action

The foregoing represents a fragment of the evaluation work which has been under way in urban areas for the past decade or so.

We should acknowledge that the general public is more involved, and better informed, today than at any time in history about the problems of environment and the effects of pollution.

Urbanization, in connection with industrialization, has created environmental problems which can no longer be ignored or dismissed as the "price of progress" or the by-product of an expanding G.N.P.

Interest groups from all sectors of the community are now demanding clean air and water, water which is essentially free of undesirable aquatic weeds and algae.

The role of aquatic nuisance control should not be underestimated, as today, the urban dweller is vitally concerned and increasingly articulate about the quality of his drinking water, as well as that of the recreational ponds and lakes nearby.

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ONE WEEK LATER

3M Company Announces Aquatic Weed Service

Constant treatment is necessary to keep south Florida flood canals free of aquatic weeds and algae. Weeds act somewhat like quicksand. A child falling into weed-choked water might not be able to swim in it.

ONE OF THE NATION'S largest industrial corporations has launched a program to help combat Florida's serious lakes and waterways weed and algae problems.

The 3M Company—known for its Scotch, Tartan and 3M brand labels on such diverse products as tapes, sandpaper, copying machines, synthetic football fields and reflective highway signs—has formed a new unit within its New Business Ventures division to accomplish the task.

Dr. William G. Paterson heads its Aquatic Control Systems program at the firm's headquarters in St. Paul. Working under him is Dr. Robert W. Geiger who heads the program's "Lakes and Waterways Management Service" (LAWMS) with facilities in Miami Lakes and Pompano Beach, Fla.

LAWMS is specializing in clearing aquatic weeds and algae from highly-infested bodies of water and in maintaining water in an essentially weed- and algae-free condition. It is accomplishing its work in part with a series of new, selective herbicide systems of low toxicity that have wide margins of safety to fish and wildlife.

LAWMS offers two types of services:

- It will handle water management problems for local and county governmental units or private groups on an annual contract basis, or
- It will train personnel and provide products and "expertise" to qualified governmental agencies that desire to do their own water management work.

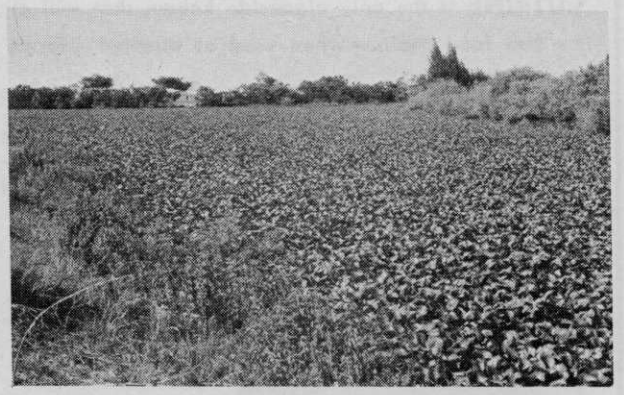
"In the first instance, our yearly contractual agreements are all-encompassing," Dr. Paterson says. "They include an initial survey to identify the scope of the problem and as many treatments as necessary to accomplish the objective."

"We won't merely furnish some herbicides or show up for one quick spray application," says Dr. Geiger. "We want full control over the entire year to make sure the job is done right."

LAWMS has actually been in Florida nearly two years. Initial aquatic weed and algae control work was done with Dade County (Miami). This work continues and LAWMS also has agreements with several city and related governmental units and lake associations.

LAWMS is equipped to handle virtually all of Florida's major aquatic weed and algae problems, including hydrilla, water hyacinth, aquatic grasses, watermilfoil, pondweed, filamentous algae and the weedlike algae, chara.

For more information contact: 3M Company Lakes and Waterways Management Service, 501E N.E. 28th St., Pompano Beach, Fla. 33064, (305) 943-0481, or Aquatic Control Systems, New Business Ventures division, 3M Company, 3M Center, St. Paul, Minn. 55101, (612) 733-1052.



3M Company's Lakes and Waterways Management Service is keeping the 15-acre pond in the infield area of Florida's famed Tropical Park race track free of weeds and algae. Severe infestations of hydrilla, southern naiad, large leaf pondweed, chara and algae scum had driven away waterfowl and were threatening game fish. Much aquatic weed work is left to be done, as indicated by lake of water hyacinths above.

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By NORMAN J. SCHEIN
The Lake Biologist, Inc.
Onalaska, Wis.

Wisconsin lake biologist tells how to convince public

TOTAL LAKE

TOTAL LAKE management is here to stay. Our philosophy in Wisconsin for conducting this type of program is to develop initially a cordial understanding between the applicator and the people concerned.

We tackle a project by first holding several meetings to describe the problem. We want to determine, among other things, these factors:

—How many people desire treatment?

—What cost can be beneficial to the people and to the applicator?

—Will the group allow an area for experimentation?

—Does the group want treatment in public areas, such as landings and center-of-lake areas?

—Do the people understand the chemical to be used, what it will do, what restrictions on water use will be necessary, what regrowth can be expected, what additional controls (such as algae and itch) can be optional?

A lake survey is necessary to determine immediate and long-range treatment. Normally, each lake community has a lake improvement association. If not, one is set up with our assistance. Representatives of this group are invited to participate in the survey of the entire lake. Sketches are made of acreage and places in the worst condition. Desired treatment areas are then determined.

Some people do not desire treatment for a variety of reasons. They are not disturbed. People wanting treatment are pinpointed on the survey and advised as to the most beneficial type of control indicated.

A form letter is mailed to each interested person. In return, he submits his payment to the lake association treasurer. The letter describes the preparation of treatment. For example: A property owner marks his lot line with flags, places a sign on his dock stating dimensions of the area (100x100—meaning 100 feet from shore along 100 feet of shoreline), posts his name and lot number.

A date for treatment is set, depending on growth rate, type of plant, and weather conditions.

When the treatment begins, a committee member (or two) precedes the treatment boat to locate the lots. This person can also observe the treatment from a safe distance.

Each dock is marked with a card notifying the owner that work has been completed. Local press and radio are willing to give notice of treatment date to the public. Almost always these media are contacted. Public areas and landings are posted.

One of the options on the initial treatment is acquiring additional assessment (usually $5 to $10 per owner) for treatment in lake areas or troublesome spots other than along shorelines. The local committee determines feasible locations to be treated.

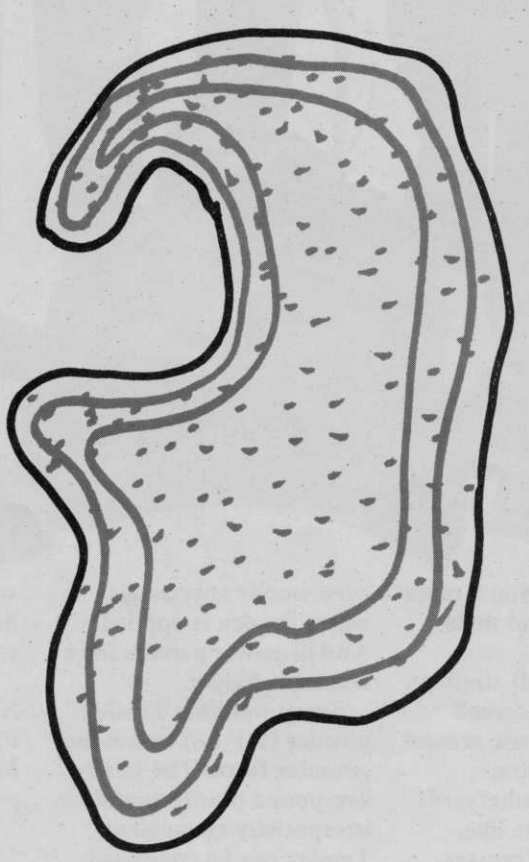
The Three-Year Plan

Because growth is sometimes unpredictable, a three-year plan has been devised. According to the condition, areas are treated as needed. Some badly infested areas will not respond to complete control for three years. Others will hold for two years. Therefore, a gradual and continual control is negotiated. This plan calls for routine supervision and treatment as the need arises. It also includes treatment for filamentous and planktonic algae growth using a copper sulfate (IPPM) on a marginal area.

The complete lake is never treated for any kind of condition, as this would cause a badly unbalanced lake. For algae control, marginal or half-lake control has been successful. Half-lake control is used by watching prevailing winds and algae concentrations. This also eliminates the possibility of a low dissolved oxygen problem.

Our lakes are put on a schedule and are visited about once a week or once every 10 days. Treatment is done or skipped as the situation demands. This routine survey keeps us on the problem without letting it get out of control. It is especially

DIAGRAM 1. Double marginal application technique.



A skip of about 200-300 feet is maintained so the dead algae does not concentrate at once. Of course, wind action must be considered. If there is a wind causing a wave action of more than four inches in height, then treatment should be confined to areas unaffected by wind. At no time should algae be sprayed in excessive wind. Control is negligible. A weekly routine spraying of less than 1 ppm of copper sulfate will clear this lake in two to three weeks and keep it clear all summer.

of the need for . . .

MANAGEMENT

successful on planktonic algae control.

We have controlled algae in a 1,500-acre lake with marginal control by routine spraying of 500 pounds of copper sulfate at about a .05 ppm rate. If a two-week period elapsed between treatments, the algae again got severely out of control. Of course, weather conditions can influence growth.

As an example of a routine inspection: In one lake in the southern part of Wisconsin, the weeds were in need of treatment in late May because of the earlier growing season. Treatment was accomplished, but with the recommendation that a second treatment be done in August to control regrowth. Regrowth did occur but it was chara instead. Therefore, we treated for chara, with about 4 ppm of copper sulfate using underwater injection.

Unless people understand why a situation like this can occur, you are in trouble. A routine inspection and a complete mutual understanding of seasonal lake management is a necessity.

At the end of the summer, each association plans a business meeting. We attend these meetings to discuss our progress with the management plan. Suggestions for the coming year are made, questions answered, and prices are discussed.

The Sanitary District

Some lake areas have organized a step beyond the lake association. By law, they have formed a Sanitary District, which has the right to assess a tax for lake improvement. A board of directors is elected and it works in conjunction with town and county boards. The Sanitary District is quite effective in bringing about a total lake management program. These men are devoted to improving their lake. The sanitary board controls sewages codes, dredging, chemical control, shoreline development, parks, and landings.

Partial-Lake Concept

The state of Wisconsin allows no more than 80% of a lake to be treated for aquatic weeds with 20% remaining for fish habitat. In the 10 years as a Wisconsin state lake biologist, I have never seen this much of a lake treated at one time. What I am suggesting is that it is more beneficial to a lake to treat for aquatic vegetation over a period of several years to gain control, rather than treat a large portion or the entire lake in one season. The shock of released available nutrients from decaying plants most assuredly will cause a terrific algae growth. Beneficial results may not result. It took many years to cause an obnoxious weed problem, and restoring the lake balance also could take a carefully plan treatment lasting several years.

Planktonic algae treatment has a varied number of concepts, but we have gained excellent control with copper sulfate at the rate of 1 ppm, thoroughly covering the surface on a marginal basis. In some cases where a lake has a well-mixed bloom along with large acreage and good depth—more than 20 feet—a double marginal treatment is carried out. See diagram 1)

On the partial lake algae treatment plan, we discovered that there seems to be a chain reaction taking place with aphanezomenon; that is, a copper sulfate treated algal cell appears to be toxic to a living cell and a small area treated results in control over a much larger portion of the lake.

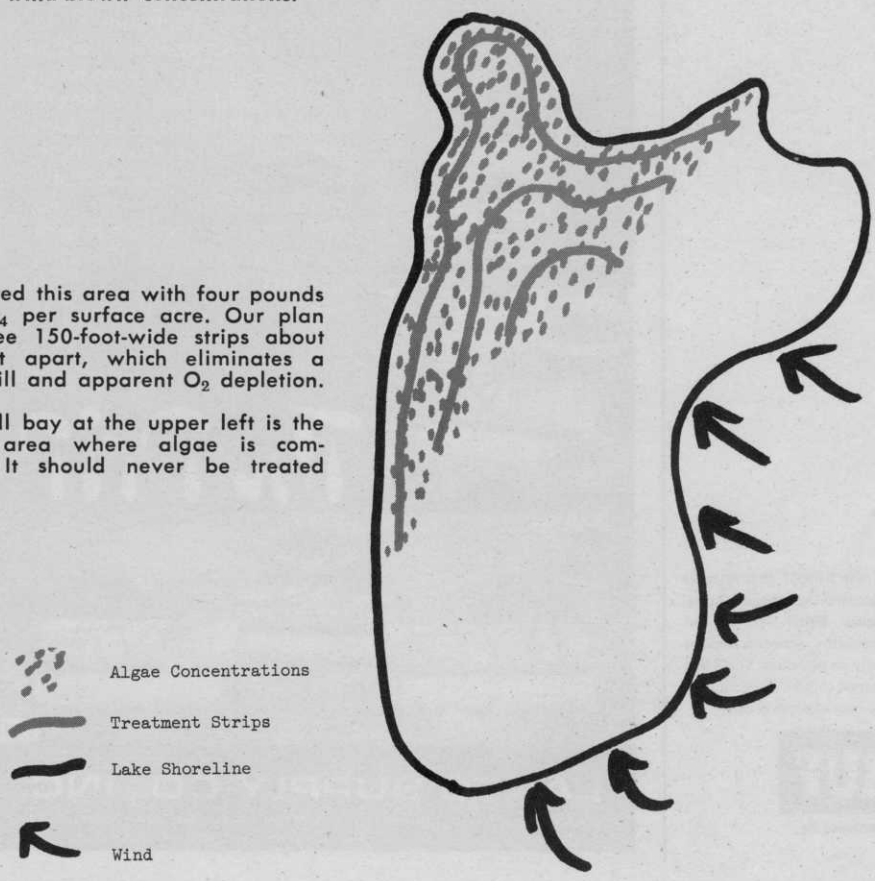
Each lake has its own characteristics. Sometimes the double marginal plan is not needed, usually on smaller lakes.

If a lake has had a bloom for several days and winds have been prevailing from one direction, the resulting situation can be used to the applicator's benefit. (See diagram 2)

At times during any type of marginal control, a concentrated area of algae may be found in the center of the lake. Spot treatment of these concentrations can be effective in gaining control.

Any combination of these ideas

DIAGRAM 2. Successful planktonic algae control treating wind-blown concentrations.



Equipment used: High-speed Homelite pump XL, ½-inch nozzle. Mixing (polyethylene) barrel, 2-inch intake hose with foot valve, venturi system with direct flow of chemical into water intake eliminating heavy mixing barrel, and 25 hp, 79 lb. Johnson Outboard with extended shaft. Our boat is an 18-ft. Kenner Ski Barge (fiberglas).

An example of partial control — the outside area to the upper right shows untreated area. No algae resulted from this treatment, and the following year treatment area was increased. In this manner, in three years we had complete control over the entire lake except for untreated fish habitat areas.

can be utilized to avoid total lake algae spraying. Total treatment can lead to disaster. A complete oxygen depletion is possible. The key to good control is an extremely light treatment done in a routinely devised program. It is advisable to stay away from the "shock" treatment of algae as well as for weeds.

"On Call" Concept

Our algae control programs usually are scheduled on a once-a-week basis, starting when the first bloom appears. It is necessary to instruct one of the lake residents to recognize the beginning of a bloom and inform us of the condition.

This leads to another concept of total lake management: Being on call.

Calls are made by designated people to keep us informed, so we can schedule changes as needed. We

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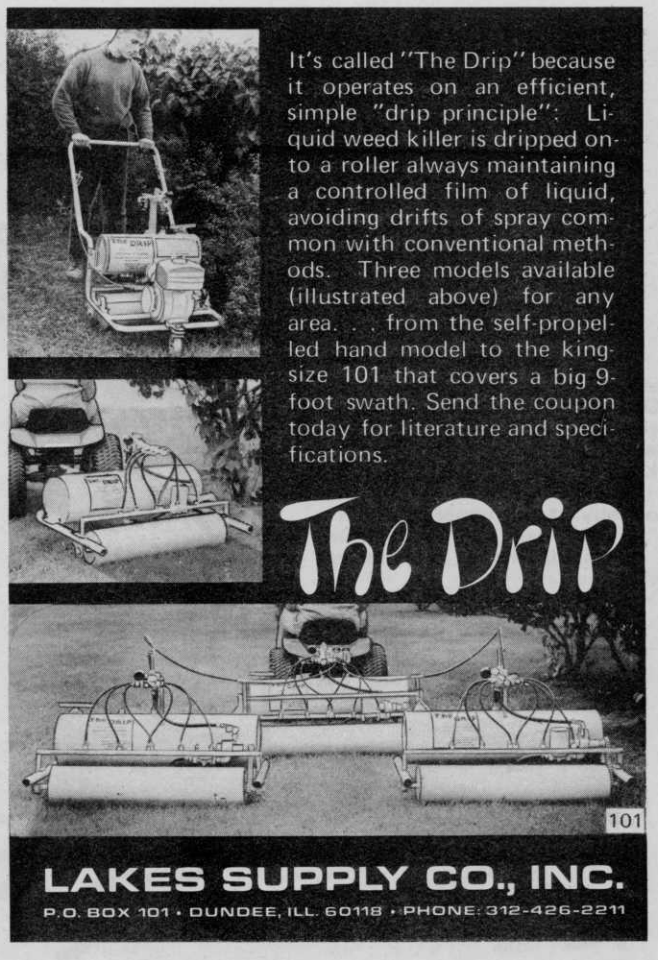

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