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JUNE 1979

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Aquatics

JUNE 1979

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AQUATICS: Published quarterly as the official publication of the Florida Aquatic Plant Management Society. This publication is intended to keep all interests informed on matters as they relate to aquatic plant management, particularly in Florida.

CORRESPONDENCE: Address all correspondence regarding editorial matter to William L. Maier, Editor, AQUATICS Magazine, Dept. of Natural Resources, Crown Bldg., 202 Blount St., Tallahassee, Fla. 32304.

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COVER

A typical central Florida sunset on a cypress studded lake. Cover photograph taken by David P. Tarver.

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EDITORIAL

by
William L. Maier

Permits on top of permits, applications on top of applications, and interagency squabbles in the philosophy of aquatic plant regulations and management still plague the profession. Florida has progressed a long way in the development of a comprehensive approach to the management of noxious aquatic vegetation, but not without growing pains.

Recently, an agreement was made to set up a task force to review the total operational structure of aquatic plant control. This group is expected to make recommendations to improve the existing statewide program, which affects everyone in the profession.


This is the democratic system at work and input from persons potentially affected is extremely important. The Florida Aquatic Plant Management Society, Inc. will play an active role in this process.

Aquatics can be an excellent avenue to express ideas on how Florida should structure this system. You are invited and encouraged to use this magazine as a mechanism for input.

CALENDAR NOTES

- June 29 Items for Florida Aquatic Plant Management board meeting agenda due.
- July 13 Florida Aquatic Plant Management board meeting, Orlando.
- July 15-18 Aquatic Plant Management Society, Inc., national meeting, Chattanooga (Tenn.) Choo-Choo Hotel.
- October 3, 4, 5 Florida Aquatic Plant Management annual meeting, Orlando, FL.





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TORPEDOGRASS (*Panicum repens* L.)

by
David P. Tarver
Administrator
Survey and Inventory Section
Bureau of Aquatic Plant Research and Control
Florida Department of Natural Resources



Photo by David Tarver

A typical torpedograss infestation is exemplified by this scene.

This member of the grass family (Gramineae) sub-family (Panicoidae), is also known as bulletgrass or quackgrass. Its history abroad and here in the United States is as interesting and important as its growth characteristics.

DESCRIPTION

The culms or shoots of torpedograss grow tall and erect from the nodes of strong horizontal rhizomes, which often creep extensively. These sharp-pointed rhizomes have been known to penetrate the soil to a distance of 7 m from the parent plant. The stems are very rigid and are usually between 40 and 70 cm high. The blue-green leaves are sharp-pointed and flat or folded, 2-7 mm wide, and surrounded basically by a sparsely pubescent sheath. The flowering stalk or inflorescence is an

open panicle 7-12 cm long consisting of ovate spikelets 2.2-2.5 mm long. Lower florets are usually staminate with a first glume measuring about one-fifth as long as the spikelet or 0.5 mm long. Reproduction of torpedograss is predominately vegetatively from rhizomes; however, seeds are also viable.

HISTORY

According to the world's most renowned agronomists, taxonomists and the botanical records, torpedograss is a native grass of the Old World. Linnaeus, the father of botany, first described it in Southern Europe in 1762. Botanical collections from Australia, India, Africa and Europe in the early and mid-nineteenth century included torpedograss.

An exact date of the introduction

in the United States is unfortunately lost forever. It was first collected near Mobile, Alabama, in 1876, and preserved in the herbarium collection of the Smithsonian Institution. Dr. W. J. Beal (1896) listed torpedograss as introduced along the Gulf Coast States in his *Grasses of North America*. Seeds were first ordered by the United States Department of Agriculture in 1926 from Java. Weed



Torpedograss occurring along canal ditchbank can cause serious problems.

scientists in Java listed the Mediterranean countries, tropical Asia and Africa as the native homeland of torpedograss. These seeds and those from other shipments were mailed for cattle pasture planting to various research stations throughout the southern states. W. E. Stokes first collected torpedograss in Florida near Tampa for the Florida Agricultural Experiment Station Herbarium, in 1932.

CULTIVATION

According to Hodges and Jones (1950), Torpedograss has been planted in almost every county of southern Florida and to a small extent in central and north-central counties. These plantings varied in extent to a single sprig in a small plot to hundreds of acres in large cattle pastures.

This grass thrives exceedingly well under a diverse variety of soil conditions and locations. It adapts readily to coarse sands and organic land, although wetland areas are its apparent homeland. Periodic flooding exerts no significant stress; on the other hand, well sodded highland pastures are not uncommon.

As previously stated, torpedograss was first planted and cultivated in the southern United States as a forage crop. Through various research projects conducted by the United States Department of Agriculture and the University of Florida it was determined that torpedograss will not produce a large yield of nutritious feed on land too poor for other grasses. Although it sods well under some unfavorable conditions, it does, as many other grasses, have a tendency to become less productive after two or three years without receiving fertilizer. This condition is commonly called sod-bound and is remedied by fertilization. Chopping and deep discing have been found to stimulate new growth of this grass. Following such a treatment many new stems, leaves, rhizomes and roots develop. These are obviously desirable qualities for a forage grass but make it a noxious plant in cultivated farmland and wetland areas. In 1962, torpedograss was described as rapidly becoming one of the most serious weeds of Florida citrus. Mr. D. W. Kretchman, a horticulturist with the University of Florida Agriculture Experiment Station, listed the principal reasons as 1) large acreages of torpedograss pasture-

lands in the flatwoods section of Florida being planted in citrus, 2) no practical means of eradicating this grass prior to planting or of controlling it after a grove is planted and 3) torpedograss is a serious competitor of young citrus trees for moisture and other nutrients. It does, however, serve as an efficient canal and ditchbank stabilizer by preventing soil erosion during periods of high water and excessive water runoff. This is normally the extent of the good graces possessed by this species.

WEED POTENTIAL

"Torpedograss is a serious weed when established in farm and grove land and indiscriminate planting without regard to future crops or adjoining land is dangerous." This statement written by E. M. Hodges and D. W. Jones is as accurate and factual today as it was then in 1950. Since that date, however, the wetland habitat invasion by this exotic grass has become increasingly more critical to multi-water management uses than ever conceived in the 1950's.

Torpedograss is probably the number one pest grass in southern Florida today. Dense infestations three to thirty feet wide often fringe these areas and extend into waters two to four feet deep. It not only impedes water flow but will serve as an effective ecological competitor for more preferred native shoreline species. In this habitat torpedograss does not usually spread into uncultivated upland soil or adjacent road rights-of-way but does rapidly extend into fertile cultivated crop lands. Sodded areas and poor native land are effective barriers to torpedograss and retard the extension of rhizomes thus reducing the spread of this species. There are numerous reports of the sharp-pointed rhizomes piercing roots and stems of other desirable species including citrus. Keep in mind that torpedograss is an aggressive exotic weed and every precaution should be taken to confine it to areas already established to prevent further spread.

CONTROL

Early efforts to eradicate torpedograss were by hand digging. These were largely ineffective due to the difficulty in finding all of the extensively creeping rhizomes and the

corn-like structures at the base of the leafy shoots. These would often break off and remain in the soil to reinfest the area. Obviously this method of control could only be considered for controlling plants occupying extremely small areas.

Discing, plowing and other methods of cultivation which may control other grasses usually stimulate this species. This is especially true on sandy soils. Only cold weather and low fertility limit its growth, economically speaking. At present, once the grass is established, whether in a wetland area or in cultivated fields, the most feasible, effective, and accepted means of controlling torpedograss is chemically.

Many weed killing chemical compounds have been evaluated for controlling torpedograss over the years. Soil sterilants and other chemicals which kill by contact and systemic mechanisms have proven relatively effective for control. New compounds are continuously being researched and tested for improved effectiveness and economics. Hopefully through this process a wider selection of registered chemicals will be available and thus assist those concerned with torpedograss control. □

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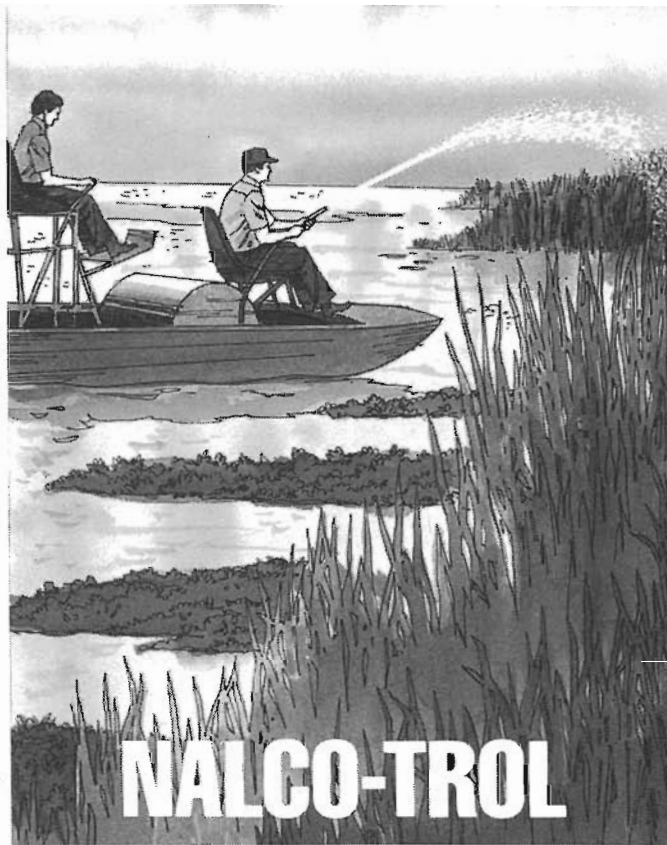
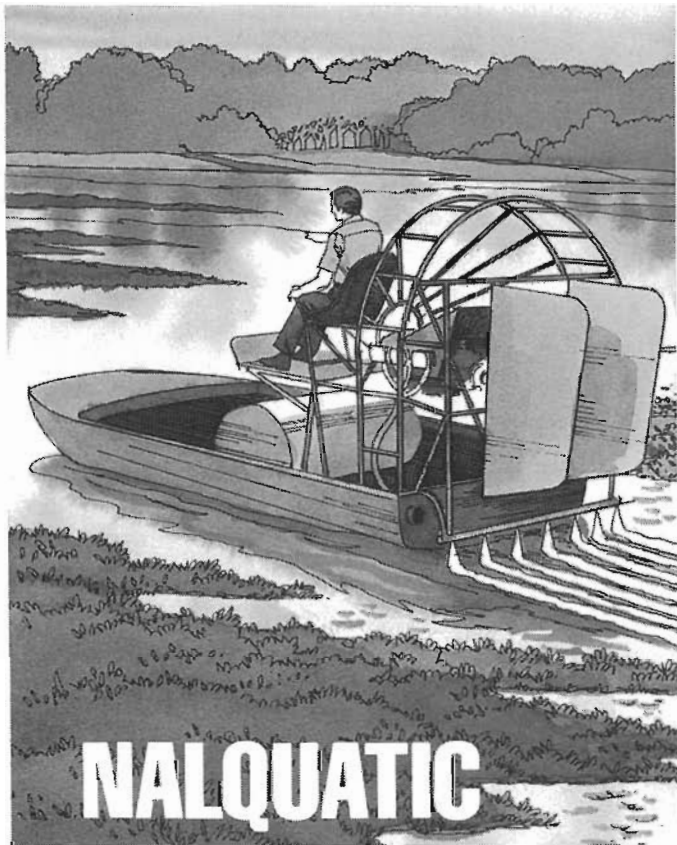
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STATE FUNDING FOR AQUATIC PLANT CONTROL

The Florida Department of Natural Resources established an aquatic plant control funding program in 1970 to aid in the maintenance control of aquatic plants throughout Florida. From the inception of the program until 1977, the legislature designated \$2.5 million from the aquatic plant control Trust Fund to be used in this program. Since that time this appropriation of funds has been \$2.2 million. The Bureau of Aquatic Plant Research and Control administers the disbursement of the funds. Any county or municipal government or Water Management District responsible for controlling aquatic plants in public waters is eligible to receive these funds when it complies with the provisions of the Department of Natural Resources Rule 16C-15 and Sections 372.925 and 372.932 of the Florida Statutes.

These funds are allocated to qualified applicants on an equal percentage basis. The percentage is determined each year according to the amount of state funds available and the total of all the local funds to be spent for aquatic plant control by

that year's participants. In the past, these grants have amounted to a maximum of \$.50 of state funds for every \$1.00 of local funds, or state funds amounting to 33.3% of the participants' total aquatic plant control budgets. However, in FY 1978-79, the grants were the lowest since the program began. During this year there was \$.30 of state funds per \$1.00 of local funds, or state funds amounting to 23.1% of the total budget. The recent annual decline of the funding percentage has been caused by a decrease in the amount of funds allocated by the Florida Legislature, and increases in the total amount of local funds of the applicants.

Application procedures for funds should begin by June prior to the fiscal year for which funds will be requested. Inquiries concerning procedural guidelines for participation in Florida's aquatic plant control funding program should be addressed to the Bureau of Aquatic Plant Research and Control, 202 Blount Street, Tallahassee, Florida 32301. Information can also be obtained by telephone at (904) 488-5631. □

POSITIONS AVAILABLE IN AQUATIC PLANT CONTROL AND RELATED FIELDS:

FLORIDA GAME & FRESH WATER FISH COMMISSION: Aquatic Plant Control Specialist I, Tallahassee; Contact Mr. Stephen Smith, Chief, Bureau of Aquatic Plant Management, Florida Game and Fresh Water Fish Commission, Tallahassee, Fl. 32304. 904/488-4066

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMERS AFFAIRS: One Agricultural Products Supervisor; five Agricultural Products Specialists; one Clerk Typist III. Contact Mr. Paul Crisp, Assistant Bureau Chief, Division of Inspections, Department of Agriculture and Consumer Services, Mayo Bldg., Tallahassee, Fl. 32304.

LAKES AND WATERWAYS MANAGEMENT SERVICE: Biologist with interest in a career in aquatic plant

control. Contact Mr. Tom Denike, President, 400 N.E. 27th St., Pompano Beach, Fl. 33064. 305/943-0481

Anyone interested in listing positions available or desired may do so by contacting the editors of **AQUATICS**.

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SPEAKING UP

In order to obtain comments and better know the thinking of our membership, as well as giving them a chance to express this thinking, we mailed the following questions to a random sampling of our membership. Following the questions are a few of the comments received.

Question: What are the major problems you encounter in your aquatic plant control program on a day to day basis? On an over-all basis?

- (1) People not knowing anything about aquatic weeds living on a body of water wanting assistance or advice being sent to several different agencies. By the time they make the 4th or 5th call or contact they are MAD ASHELL, then ALL agencies' PUBLIC RELATIONS has GONE to pot.
- (2) The high cost of herbicides is a major problem.
- (3) Over the years funding has been the biggest problem. In instances where we had materials that would do certain jobs, state and federal agencies lacked the funds to follow through.

Question: Are you satisfied with the existing materials you have available for your use? If not, what improvements could you suggest?

- (1) Yes. Larger budget to buy more of what is available.
- (2) Our greatest need is for a better grass control herbicide. I strongly suggest that research be done on control of Cabomba, Pond weed, Vallisnaria, and other plants that will likely be problems when Hydrilla is reduced.
- (3) Considering the hyacinth and brush on ditchbank problems, these are controlled very economically with 2,4-D in one formulation or another. Dalapon is economical on grass but it doesn't do a complete job in many cases. The price is too high on Roundup.

As for submerged feed control, Diuron is the most economical compared to control, but we all know what restrictions it must be used under. All the other treatments I'm familiar with are too costly compared to length of control. □

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THE INCLUSION OF HYDRILLA INTO THE CORPS OF ENGINEERS' AQUATIC PLANT CONTROL PROGRAMS

Joseph C. Joyce and James T. McGehee¹

BACKGROUND

Aquatic Plant Control operations by the Corps of Engineers in Florida began soon after the waterhyacinth was introduced into the State in 1890 near Palatka. In 1897, upon petition of the concerned citizens of Palatka seeking relief from the navigation problems caused by the waterhyacinth, the Corps undertook an investigation of the plant on the river. This investigation resulted in the initial authorization for the maintenance project by the River and Harbor Act of 3 March 1899. An expanded pilot project was authorized by Public Law 85-500 passed by the 85th Congress on 3 July 1958. This project was later amended on 27 October 1965 by Public Law 89-298 to a continuing "Program" approach. Today, aquatic plant control operations by the Corps of Engineers in the State of Florida are performed under two separate authorizations: (1) the Removal of Aquatic Growth Project (RAGP) which is the original operations and maintenance project for the protection of navigation in Federal project waters, and (2) the Aquatic Plant Control Program (APCP) which is the cooperative program for the control of obnoxious aquatic vegetation in navigable public waters. The RAGP is 100 percent Federally funded and the work under this program is performed predominately by Corps personnel, whereas the ARCP is a cooperative cost-sharing program of 70 percent Federal and 30 percent State of Florida funds, except that research and planning costs are 100 percent Federal. The major portion of the work under the APCP is conducted by State personnel under the control of the local sponsor, the Department of Natural Resources.

DEVELOPMENT OF THE HYDRILLA CONTROL PROGRAM

Operations under the Federal program are generally restricted to those problem aquatic plants which (1) present significant adverse eco-

nomics and ecological impacts and (2) have exceeded the local government's ability to control adequately. In the past, the Corps' program was only authorized for the control of waterhyacinth; however, the severity

of the water resources related problems associated with hydrilla to a major extent and water lettuce to a lesser extent, justified the inclusion of these two species in the program.

continued on page 17

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¹ Recreation-Resource Management Section, Jacksonville District Corps of Engineers

USE OF SA-77 IN SOUTH DADE COUNTY

by
John R. Adams, Superintendent
Homestead Field Station
and
Gordon Baker, Plant Control Biologist
Department of Field Services

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



This is a picture of the stand of Hydrilla prior to treatment of herbicide.

Since the late 1950's, when Hydrilla was introduced to the State of Florida, the management and control of the aquatic pest has presented a serious problem to the South Florida Water Management District.

Initial attempts to control Hydrilla were strictly mechanical at great cost in terms of time, effort and money to the state. Mechanical efforts have led only to temporary, short term control and have contributed to the spread of Hydrilla to other waterways.

In late 1976, the transition to chemical control of submersed aquatics was initiated in the Clewiston area. A year later the chemical control program had spread to the South Dade County area. Earlier attempts in the South Dade area met with little or no success using various combinations of Diquat and copper complexes. There were numerous chemicals tested in the South Dade County area, but end results were not satisfactory. The original methods and equipment were not as improved and as available as they are today. This in

itself created problems and helped to contribute to numerous failures.

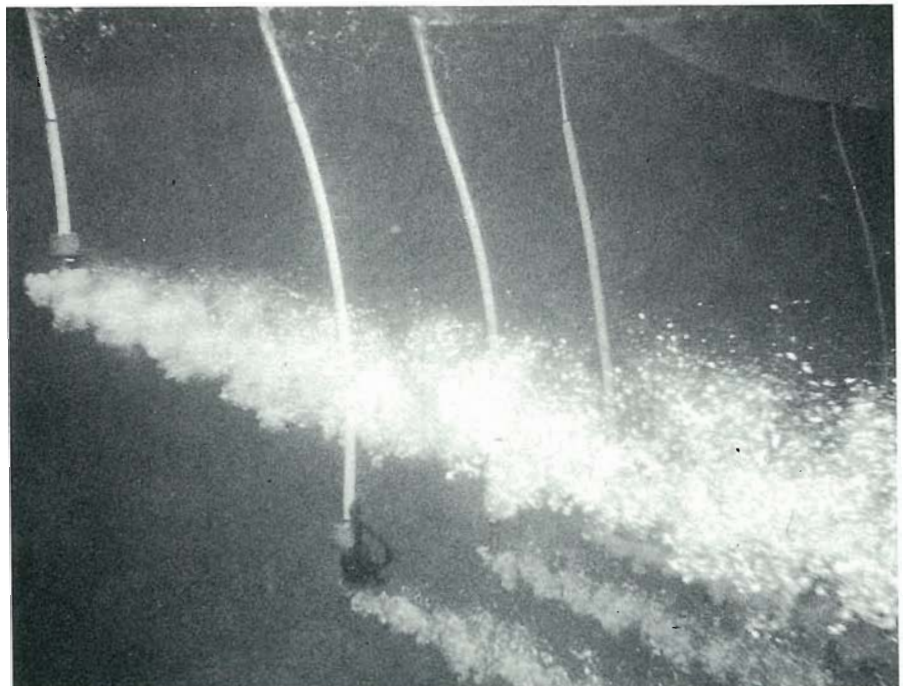
In the fall of 1977, a spray additive known as SA-77, manufactured

by JLB International Chemical Company, was introduced on an experimental basis to the District for ditch bank applications. Due to the success that was experienced with the ditch bank applications, we decided to expand the testing to the submersed aquatic program.

The formulation used was 2 gallons of Diquat, 4 gallons of Komeen and 2 gallons of SA-77 inverted and applied to 1 surface acre. Within one week after application the Hydrilla in the test plot was lying on the bottom of the canal with the leaves stripped from the stems and within 3 to 4 weeks had almost totally disappeared.

Due to these outstanding results, this formulation was then used on the remaining portion of the system. The results were similar. Some of the canals have required 3 to 4 treatments per year to bring the Hydrilla under control while others have required only 1 treatment.

Not being totally satisfied with the end results, we decided to change the formulation slightly. Visko-Rhap inverting oil was being mixed at 5 parts diesel fuel to 1 part inverting oil. We replaced 2 of the 5 gallons of diesel fuel with SA-77. This served a two-fold purpose. We were still getting 2 gallons of SA-77 to the acre while reducing the amount of diesel fuel being applied to the environment. This mixture is being applied as a subsurface application using a 10.0 foot boom made



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of 3/4" brass pipe with 6 trailing hoses each 5.0 feet long. The nozzles on the hose ends are Delavan number 10 swirl jets. The nozzles are aligned on the hoses in such a way that, when the hoses are trailing under the boat, the nozzles are pointing towards the bottom of the canal. This alignment helps to shear or break the invert into small particles resembling what we refer to as a "snow-flake" pattern. This permits the invert to spread evenly leaving approximately a 15 foot swath in a single pass of the boat.

Polymers, such as Nalquatic, have been used in place of the invert system and results have been equal.

As part of the aquatic weed program and because the District is concerned with potential impacts on non-target organisms, we have instituted a water quality procedure. The parameter that is most critical to other aquatic life is the amount of dissolved oxygen (D.O.) in the water. Before any submersed operation is began, the applicator must measure D.O., p.H. and water temperature at the treatment site. The D.O. guidelines are consistent with the proposed state rules regarding water quality standards. If D.O. levels are less than 4ppm, no submersed weed treatment will be performed.

Experience has proven that to try to treat a large biomass that exceeds 60% or more is expensive and in most cases extremely hard to bring under control. We have established that if a 60% or more infestation exists, the weed growth should be mechanically harvested first and re-growth treated at about 25% to 30%. This permits better coverage of the plants by the chemical and usually results in better control. If mechanical removal is not possible, 3 treatments may be required at 6 to 8 week intervals.

As with all successful programs and because nature abhors a vacuum, Pondweed has proliferated and has created as severe a problem as Hydrilla in our canal system. Aquathol K in combination with SA-77, has proven to be a very successful tool to maintaining the desired level of control.

As mentioned earlier, SA-77 was first tried on various ditch bank growths. The chemicals used for ditch bank control are Banvel-720 at 1 gallon per acre, for control of various broadleaf plants, and Dowpon-C for grasses, reeds, and canes at 15



A snow flake pattern as illustrated in this photo provides an excellent coverage on the plants to be controlled.

pounds to the acre. With the addition of a 1% solution of SA-77 we were able to decrease the amount of Banvel-720 to 0.6 gallons per acre and 8 pounds of Dowpon-C. These formulations were inverted with Spraymate inverting oil mixed at either a 1-to-6 or 1-to-7 ratio with diesel fuel, depending on air temperature. Also used was Nalcotrol injected into the system to replace the

inverting oil and the results were comparatively the same. The applicator can choose which method best suits his purpose.

We have established that without the use of SA-77, the chemical aquatic weed control program would not be successful in South Dade County. It has proven its worth so well that the program has been expanded to encompass other areas of the District. □

PEOPLE ON THE MOVE

Mr. Harmon Shields, Executive Director of the Department of Natural Resources, was suspended from office because of investigations being conducted by the Federal Bureau of Investigation, concerning land purchases by the Department of Natural Resources. Mr. Joseph W. Landers, Jr., has been appointed Interim Executive Director of the Department of Natural Resources by the Governor and Cabinet.

Bob Lazor, Section Administrator with the Bureau of Aquatic Plant Research and Control, Department of Natural Resources, has moved to Vicksburg, Mississippi for a year to work on a contract with the Aquatic Plant Control Section of the Corps of Engineers at the Waterways Experiment Station.

Several months ago two new regional botanists were hired by the Game and Fresh Water Fish Commission. Mr. Chuck Padera is in the Fort Lauderdale office and Fred Cross in the DeFuniak Springs office.

Dr. Arnett Mace has been named to head the newly created Center for Aquatic Weed Research in the Institute of Food and Agricultural Science at the University of Florida.

Chris Carter an aquatic biologist in the Quality Control Section of the Game and Fresh Water Fish Commission has recently accepted employment with the University of Florida as Technical Assistant working on an Environmental Protection Agency grant administered by Dr. Jerome Sherman and Bill Haller.

Larry Taylor with the Jacksonville District of the Corps of Engineers, has been transferred from the Palatka office to the Jacksonville District office of the Corps. Dave Bowman has replaced Larry as an inspector in the Palatka area office.

Jim McGehee has been promoted GS-9 to GS-11 with the Corps of Engineers in the Jacksonville office.

Bill Moore has moved from Zoëcon to Pennwalt.



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EPA ENVIRONMENTAL NEWS

EPA Takes Emergency Action to Halt Herbicide Spraying

SUBJECT: 2, 4, 5-T and Silvex Products Subject to the Administrator's February 28, 1979 Suspension Orders and Cancellation Notices

On February 28, 1979, the Administrator suspended the registrations of all pesticide products containing 2, 4, 5-T for forestry uses, rights-of-way uses and pasture uses, and of all pesticide products containing Silvex for forestry uses, rights-of-way uses, pasture uses, home and garden uses, commercial/ornamental turf uses, and aquatic weed control/ditch bank uses, pending the final outcome of Agency cancellation proceedings which were also initiated by the Administrator on February 28.

The following uses were halted immediately by EPA order:

SILVEX

List of sites which the Agency considers to be included in the category of suspended uses.

- Buildings, farm, industrial
- Forestlands and management areas
- Fence rows, hedgerows, fences
- Golf courses
- Home use, lawns, grass, ornamental turf, patios, sidewalks, driveways, farm yards
- Ditch banks, drainage ditch banks
- Ponds, pond margins, standing water
- Lakes, lake margins
- Nonfood crop areas
- Rights-of-way, all; roadsides, road-ways, etc.
- Pastures
- Storage areas
- Waste areas
- Vacant lots, parking areas, etc.
- Ditches — water
- Parks, athletic fields
- Industrial sites
- Marshlands, canals, aquatic sites

Any sale, distribution, or use of a suspended pesticide during the period of its suspension is illegal and may be punished by substantial penalties. The Agency will be issuing Stop Sale, Use, or Removal Orders to all registrants and distributor registrants of 2, 4, 5-T and silvex, as well as to all establishments which produce 2, 4, 5-T or silvex. EPA is requesting the cooperation of States in assuring that the Suspension Order is followed. Persons who hold quantities of these products must stop any further distribution or use. Stocks should be stored in an out of the way area and in accordance with storage instructions on the products' labeling until EPA issues a final order after the cancellation proceedings. □

Thus, the Jacksonville District Office prepared and coordinated a combined "Corps Report and Supplement to the Final Environmental Impact Statement, Aquatic Plant Control" dated November 1977. This document was filed with the Environmental Protection Agency on 14 February 1978, thus allowing operations to commence thirty days thence, pending the receipt of no significant adverse comments. Limited funding (\$798,000) was made available to initiate this program during fiscal year 1978 (1 October 1977 — 30 September 1978). During fiscal year 1979 a significant increase in funds (\$3,376,000) occurred and the hydrilla control program was expanded to include county and water management district programs.

CONTROL OPERATIONS

The actual control work commenced in April 1978, after finalization of control agreements. Control operations are conducted by the Corps, the Florida Game and Fresh Water Fish Commission, the various water management districts (initially the South and Southwest), seven counties and commercial applicators under contract with the above agencies. Selection of areas to be controlled under the program was made on the availability of funds and on the basis of economic justification. Under the current "state of the art" for hydrilla control, a multi-million dollar annual program to control all of the hydrilla in a large lake severely infested with hydrilla may not be economically justified. However, the clearing of fishing trails and limited open public use areas sufficient to allow for navigation and usual recreation pursuits is justified. This is the present approach to operations.

The four basic aquatic plant control methods; chemical, biological, mechanical and environmental manipulation may be used under this program. Generally, the method(s) selected for control in a given water body is (are) based on the inherent characteristic of the specified control option(s) under consideration. These characteristics include:

- a. availability of operational method
- b. ability to control the desired plant
- c. effects to non-target plants and animals
- d. cost, and

e. compatibility with public use patterns.

Due to environmental restrictions, the methods which are used under this program are (1) herbicides specifically labeled by the Environmental Protection Agency for use on hydrilla in Florida's waters and (2) proven mechanical systems in those areas where fragmentation is not a concern. Pending the results of ongoing research and finalization of Statewide policies, other methods such as biological control utilizing the grass carp may be included in the program.

SUMMARY

The inclusion of hydrilla into the cooperative State-Federal aquatic plant control program is the culmination of a planning and coordination effort which began in January 1977. The success of this effort was due to the excellent input and cooperation received from various agencies and individuals contacted. The success of the overall control program will depend on a continuation of this type of cooperation. Anyone desiring additional information on this program can obtain a copy of the "Corps Re-

port and Supplement to the Final Environmental Impact Statement" by contacting the Jacksonville District, Recreation-Resource Management Section, P.O. Box 4970, Jacksonville, Florida 32201. □

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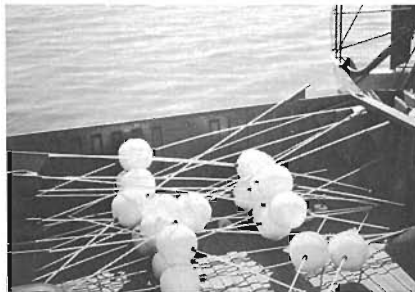
Large scale boat applications for submerged aquatic plants can be a nightmare! Besides the problems of handling large quantities of chemical, mixing, metering, hoses, dust, remoteness of target, equipment failure, etc., etc., there is the problem of keeping track of where you've been and where you're going.

NOTIFICATION — MARKING BUOYS

Our program has historically used a jug buoing system for marking measured shore perimeter acres (150' x 300'). This was done on residential lake hydrilla treatments. Due to limited funds and high chemical cost it was felt that the perimeter treatments were of maximum benefit. Along with residential shoreline treatment comes the chore of notification. To avoid risk each home is given written notification as per di-

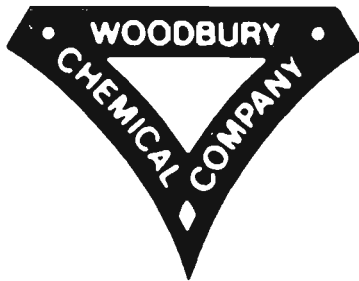
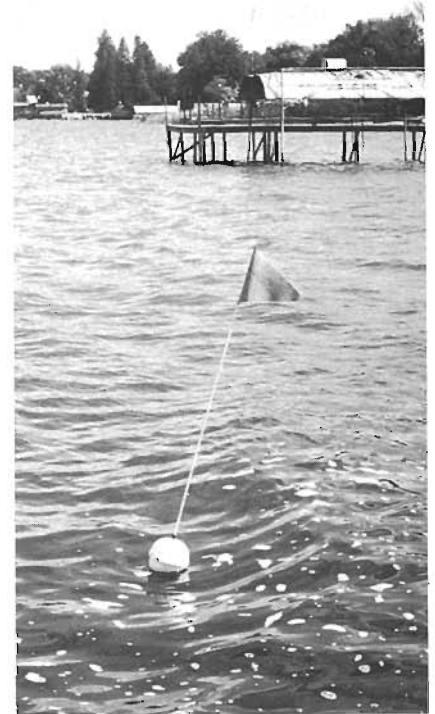
quat labelling. This becomes very time consuming when you consider the hundreds of homes to visit twice each season.

We have now "killed two birds with one stone." Using flag and staff designed for bicycle visibility, crab trap buoys and egg sinkers, we constructed a flagged buoy that is very visible. Each residence is now given written notification once a year to



These buoys are utilized to mark the treatment area and notify persons utilizing the lake of herbicide treatment.

cover any change of ownership and as a reminder of labelled warnings. Simply, they are notified that when the red flagged buoys are visible in their portion of the lake not to use the water. The buoys are placed in



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the lake on the date of treatment and removed fourteen days following treatment. Measured acre treatments have been partially abandoned in our program with the use of more sophisticated application techniques including helicopter and close calibrated boat booms. Our flagged buoys still serve a dual purpose. One, they are very effective for shoreline residence notification and two, they are effective for marking and flagging treatment areas.

LONG TERM BUOYS

This year we have the hydrilla treatment responsibility on Lake Pierce. Lake Pierce is a 3,729 acre Polk County lake which has been 70-80% hydrilla infested. Last year South Florida Water Management District established 150 acres of boat trails and fishing areas. This year we will be maintaining the established areas and expanding the treatment area to 420 acres.

On a lake this size we could foresee the problem of keeping oriented from one application to the next. This is especially true for boat trails. At a meeting with fish camp owners the need for navigational aids to better utilize the trails was of prime concern. We then decided that some sort of buoy should be permanently installed to aid in both navigation and treatment orientation. The buoys would be placed at key points on the boat trail grid i.e. at corners and crossing trails and primary accesses. The question then became what to use for buoys and how to secure them.

Our solution to the buoy question was a manufactured regulatory buoy as pictured. The buoys are 9" x 61" counterbalanced with 36" above the water line. These are the same buoys used by the Florida



This photo illustrates the anchoring and use of long term buoys.

Game and Freshwater Fish Commission for marking fish attractors. We also adapted the Commission's securing techniques using a 32" mobile home hurricane type anchor which has a 3" blade. Anchor and buoy are connected with 3/16" galvanized aircraft cable. Cable thimbles are used to prevent cable wear and nicopress compression sleeves are used rather than bolt type clamps to avoid tampering.

At each buoy site the depth is measured. The cable is attached to the anchor and enough cable to allow the anchor to be screwed through any organic ooze into sound bottom is cut from the roll. The anchor is placed in the installing apparatus as pictured and the cable is taped to the rod. Once the anchor is set the cable is trimmed and attached to the buoy. We installed a total of ten buoys in Lake Pierce and have high hopes for their success.

AUTOMATIC FLAGMAN

In Lake Pierce some boat trails exceed two miles in length. We will be using a helicopter to treat the majority of the boat trails. These trails will be 42 feet in width. This calculates to 5 acres per mile and our ship carries 50-80 gallons of spray mix which is applied at a rate of 20 gallons per acre. The pilot will therefore have to keep himself oriented along the trails. This becomes a problem in 4000 acres of open water.

The pilot is now able to return to the spot where he left off by dropping a flag from an Automatic Flagman. These flags are essentially designed for row crop flagging to keep track of swaths. The flags are two toilet paper type streamers attached to a cardboard base. Since the flags weren't designed for aquatic use and the streamers are the consistency of toilet paper they did not float on first attempts. This was remedied by saturating the folded flags with either Scotchgard or Thompson's Water Seal. Both products made the paper water repellent and allowed them to float. There was no sticky residue and the flags open as they should.

All of the afore-mentioned buoys and flags have helped make our hydrilla treatments run smoother, keep chemicals on target and save many man hours. Our methods and buoys have been conceived to fit the needs of our program. I hope that those reading the article will find some of the ideas useful in their own programs. □

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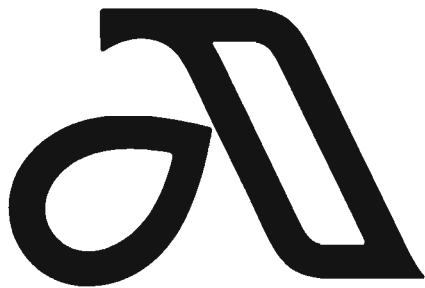
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