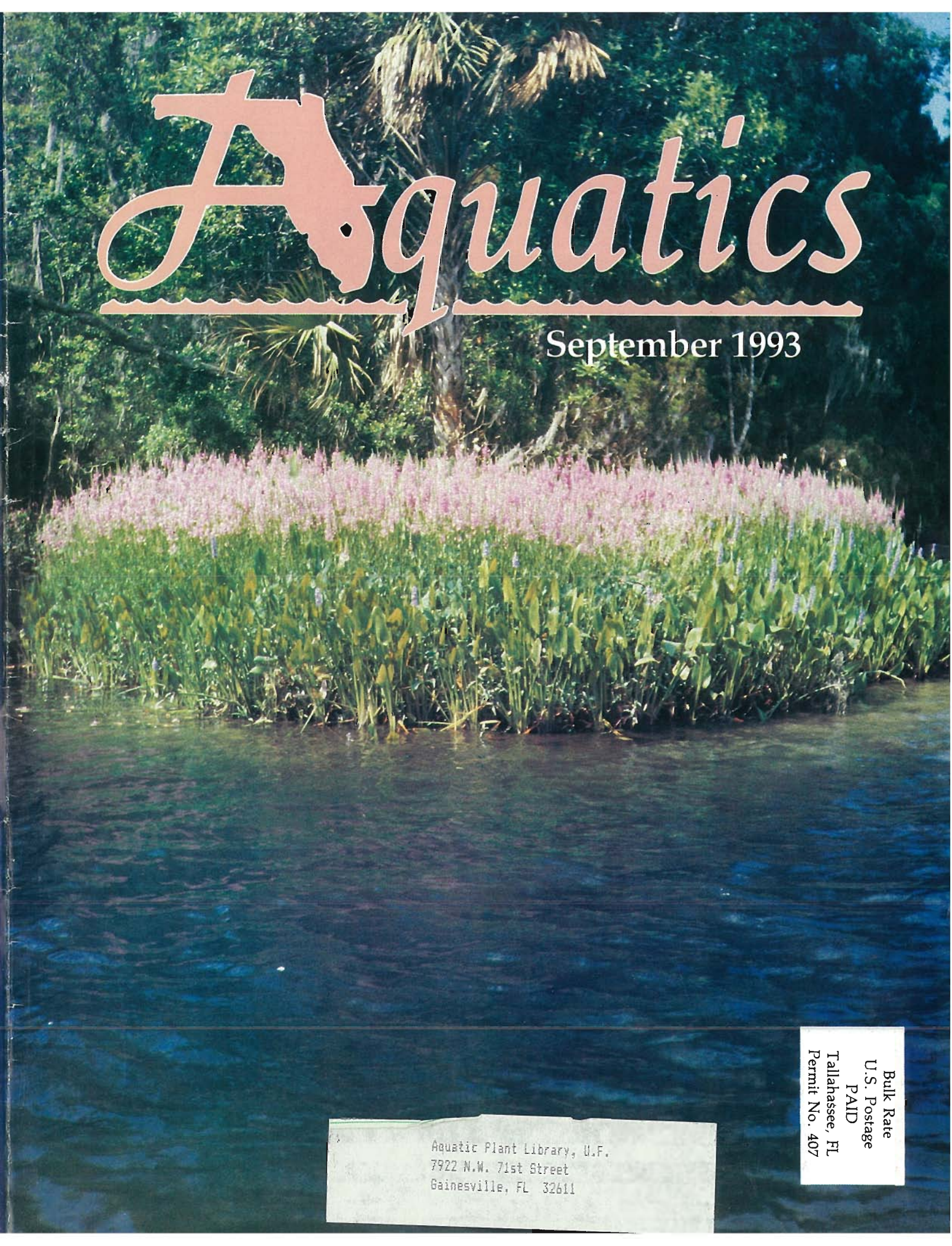
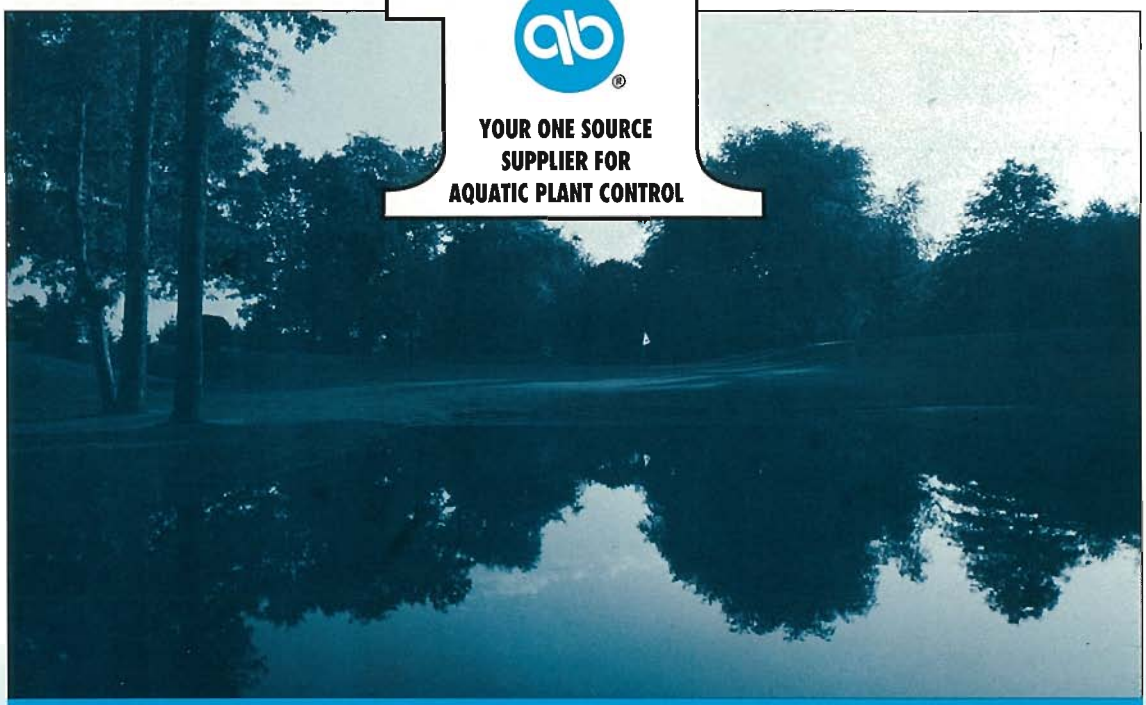


Aquatics

September 1993



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Letter to the Editor

Here we are again with the FAPMS Annual meeting fast approaching and so much to do before we pack our bags. Perhaps in our haste to get to Daytona it is worth taking a moment to reflect on what this annual get-together means to us and our Society. These few days in October provide us with an opportunity to communicate our experiences and opinions, continue our professional education, enjoy social gatherings and a break from the workplace routine, and to show pride in our common field of interest. But above all, this meeting allows us to demonstrate the professionalism of our Society's members, whatever their personal role may be in the management of this State's aquatic plants, be it on the lakeshore or in the halls of government.

Long gone are the days when the FAPMS Annual Meeting was a small and intimate gathering of friends. The size and scope of our meeting now attracts people from outside our profession whose opinions may be swayed by the impression that our assembly creates. Rather than rue this evolution of our meeting we should embrace this opportunity to impress our audience with our professionalism and responsibility.

Unfortunately, despite all our efforts to achieve these goals, those who arrive with a less than sympathetic attitude toward our profession may be easily alienated by any acts of inappropriate behavior or careless jokes. As much as anyone, I want our meetings to be enjoyable and I believe that humor has a useful role in making presentations more interesting and memorable. But the gratification of making an audience laugh carries with it the responsibility to be sensitive to our diverse membership and to maintain our professional image.

This promises to be a great meeting, so let's leave the "bikini" slides at home, and may a good time be had by all.

See you in Daytona!

Alison Fox.

About the Cover
A breath-taking colony of obedient-plants or dragon-heads (*Physostegia leptophylla* Small) decorates Buzzard Island in Kings Bay. Photo by Christy Horsburgh. Identification by Jim Kelley

Aquatics
September 1993/Vol. 15, No. 3

CONTENTS

AQUATICS: Published quarterly as the official publication of the Florida Aquatic Plant Management Society Registration No. 1,579,647.. This publication is intended to keep all interested parties informed on matters as they relate to aquatic plant management particularly in Florida. To become a member of FAPMS and receive the Society newsletter and Aquatics magazine, send $20.00 plus your mailing address to the Treasurer.

EDITORIAL: Address all correspondence regarding editorial matter to Ken Langeland *Aquatics* Magazine.

Does Diquat Effect Movement and Catchability of Largemouth Bass?

By
Jim Sweatman, Ed Moyer, Mike Hulon, Bob Hujik, and Jon Buntz
Florida Game and Freshwater Fish Commission
600 Thacker Ave, Kissimmee, Florida 34741

Abstract

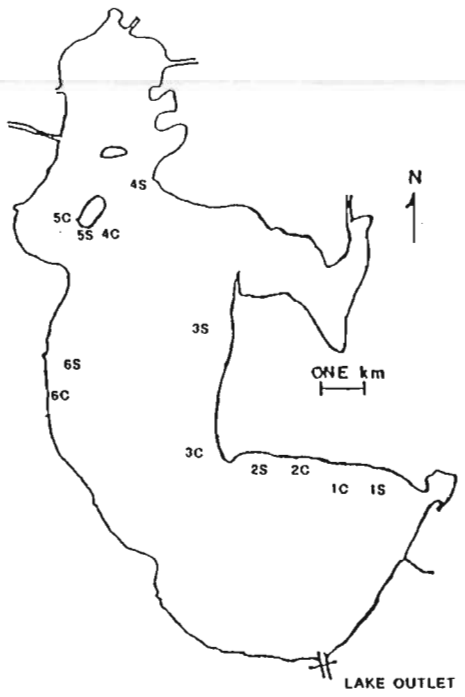
Mean electrofishing catch-per-unit-effort for largemouth bass (*Micropterus salmoides*) was similar between six areas sprayed with diquat dibromide and six areas sprayed with water on Lake Tohopekaliga, fall 1992. In the spring of 1993, ten volunteer largemouth bass anglers fishing Lake Tohopekaliga found catch rates in areas sprayed with diquat to be similar and in some cases superior to, non-sprayed areas. Superior cases were a function of the quality of the fishing area not the application of diquat. In conclusion, there is no evidence within the confines of this study that show diquat directly affects movement and catchability of largemouth bass.

Introduction

Aquatic plant managers on the Kissimmee Chain of lakes have long been implicated by largemouth bass (*Micropterus salmoides*) fishermen as having a detrimental affect on the fisheries resource. Many fishermen vehomently state that an area no longer provides good fishing once it has been sprayed. How long an area is impacted is a function of which fisherman is interviewed. Some state effects are short-lived while others suggest that spray events can impact their "honey-hole" for as much as two years.

On Lake Tohopekaliga (Osceola County, Fl), waterhyacinth (*Eichhornia crassipes*) and waterlettuce (*Pistia stratiotes)* are maintained at low levels using routine, maintenance applications of diquat dibromide. Diquat can burn nontarget vegetation associated with waterhyacinth and waterlettuce and this "browning or burning" is a dead giveaway that an area has been sprayed.

In 1989, a study was conducted on Lake Guntersville that showed



Lake Tohopekaliga

Figure 1. Sprayed (S) and control (C) electrofishing sites on Lake Tohopekaliga, Florida, Fall 1992.

2,4-dichlorophenoxyacetic acid (2,4-D) sprayed on open water Eurasian watermilfoil (*Myriophyllum spicatum*), and diquat and KOMEEN (copper-ethylenediamine complex) sprayed on open-water hydrilla (*Hydrilla verticillata*), did not affect largemouth bass movement (Bain and Boltz 1992). Another study on Guntersville showed largemouth bass catch rates were unaffected by 2,4-D and Aquathol K (Wren et al. In Press). When these studies were presented to fishermen on Lake Tohopekaliga, their response typically referenced the fact that Tohopekaliga was not Guntersville!

Angler scepticism was biologically justified. Lake Guntersville is a much deeper body of water with characteristics similar to a river. Dissolved oxygen throughout the first part of the Guntersville study was always above 5 parts per million (ppm), due in part, to the flow present in the system. Furthermore, as mentioned above, the complaint of Toho fishermen concerned diquat sprayed on waterhyacinth and waterlettuce, not 2,4-D or diquat applied to large plots of Eurasian watermilfoil or hydrilla.

With this in mind, the present study was designed by fisheries biologists of the Florida Game and Freshwater Fish Commission (GFC) with the encouragement and support of the Department of Natural Resources (DNR) and South Florida Water Management District (SFWMD). The goal of this study was to determine the impact of waterhyacinth and waterlettuce maintenance spray programs, on bass movement and catchability.

Materials and Methods

On 26-29 October 1992, initial catch-per-unit-effort (CPUE) values were established for twelve electrofishing sites on Lake Tohopekaliga (Figure 1). Following the initial

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sampling, six sites were randomly chosen to receive diquat; the other six served as controls. Areas of the sites ranged from 0.1 to 0.4 ha. All spraying was accomplished on 2 November 1992. Two days following the spray event, the twelve sites were electrofished again. Finally, one month after the spray event (1 December 1992) a final sample of the twelve sites was accomplished.

Only 5 of the sites contained waterhyacinth and waterlettuce due to the fact that these plants were low in density throughout the lake and largemouth bass were concentrated in small areas. This study, however, was designed to look at the chemical effects of diquat on largemouth bass movement and catchability, not effects associated with plant die-off and oxygen depletion. Dominant vegetation in the sites included giant bulrush (*Scirpus californicus*), maidencane (*Panicum hemitomon*), knotgrass (*Paspalum distichum*), eelgrass (*Vallisneria spp.*), cat-tails (*Typha sp.*), and hydrilla.

Spraying was conducted by SFWMD personel. An airboat equipped with a hydro-pump (5 gallons/minute at 150 psi) was used to apply diquat and Kinetic® penetrator at two quarts per acre. Control sites were sprayed with water. All spraying was conducted in the manner associated with waterhyacinth and waterlettuce maintenance control.

Electrofishing equipment consisted of a 4.9 m aluminum jon boat wired to serve as a cathode, a 220 V/ 6,500 W AC generator, a Smith Root Type VI-A electrofisher, and two rings with four stainless steel droppers used as anodes. All sites were electrofished for 10 minutes (pedal time) per trip for a total of 30 minutes per site. Electrofishing began after sunset.

Largemouth bass collected within a site were measured to the nearest millimeter (total length) and immediately released. Special care was taken to release the fish behind the boat and no backtracking occured within a given transect. If a largemouth bass was collected that was the exact total length as another within the transect, then that largemouth bass was not counted. The presence of other fish such as panfish and forage species was noted.

In March 1993, ten volunteer fisherman were recruited from fish camps and tackle shops around Lake Tohopekaliga. Each volunteer indentified two productive fishing sites on Lake Tohopekaliga. The volunteer and a GFC employee fished these two sites on three different occassions for one hour each. The first trip was used to determine an initial largemouth catch rate for each of the two sites, after which, one of the two sites was sprayed with diquat using the same procedure described earlier. Spray events were conducted 1 to 6 days following the initial trip. Following the spray event each of the two sites were fished twice within a 10 day period. Fishing trips began at the end March of 1993 and finished by the end of April 1993.

Two of the fishermen so strongly believed that spraying ruins a fishing spot that they insisted on spraying the least productive of the two sites. Other than these two exceptions, biologists tried to spray the most productive of a given volunteer's two fishing sites.

Two of the volunteers were only able to fish one time after the spray event. Therefore, 28 trips (56 hours) were accomplished for each experimental group (i.e. spray and control).

Fishing sites were generally less than 0.2 ha. Dominant vegetation was the same as described for the electrofishing sites. Fishing trips were scheduled at the same time of the day for each of the three trips. Volunteers were able to choose between shiner and lure fishing but the method established on the first successful trip had to be used for the remaining two. Total length in millimeters was recorded for each bass caught and all bass were immediately released following measurement. Capture of non-target species was also recorded.

Each volunteer participated in electrofishing their two sites. This also served the purpose of allowing visualization of panfish and bait fish associated with those sites.

Numbers of largemouth bass were recorded but not all sites were sampled due to the fact that two of the volunteers were unable to go electrofishing. Electrofishing trips were conducted anywhere from 4 to 35 days after the spray event.

In the electrofishing portion of the study, dissolved oxygen (D.O.) readings were taken just before the spray event as well as the day of each electrofishing trip. During the angling portion, D.O. was measured before a spray event and after the last fishing trip. Readings were taken at mid-day and accomplished using a YSI model 57 oxygen meter.

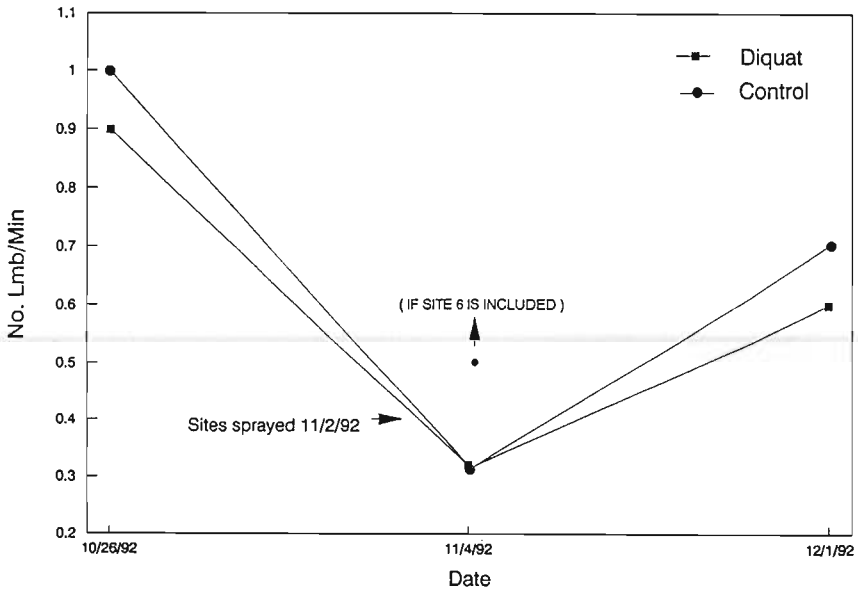

Figure 2: Mean number of largemouth bass collected by electrofishing in Lake Tohopekaliga.

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Results and Disscussion

Electrofishing

Based on angler reports it was generally expected that few bass would be collected in sprayed areas. Mean electrofishing CPUE's, however, indicated almost no differences between sprayed and non-sprayed areas other than the initial difference of 0.1 largemouth bass/minute (Figure 2). This difference from a fisheries standpoint is insignificant. Standard deviations were identical for each experimental group (i.e. spray and control).

Numbers declined two days after the spray event (4 November 1992) in both the control and experimental sites. However, this was most likely due to a cold front the day after the spray event. For some unknown reason, the control at site 6 was unaffected by the front. This site was omitted from the graph for 4 November 1992, so that the relative similarities between the other sites could be seen.

The presence of large numbers of harvestable sized bluegill *(Lepomis macrochirus)* was noted in the site 5 sprayed area both two days and one month after the spray event. While enjoying a personal fishing trip, one of the project biologists noted a fisherman catching bluegill at this site.

Large numbers of forage fish such as golden shiners *(Notemegonus crysoleucus)*, seminole killifish *(Fundulus seminolis)*, threadfin shad *(Dorosoma petenense)*, and small bluegill, were noted in sites 2 and 6. Limited numbers of baitfish were observed at the other sites.

Dissolved oxygen after the spray event remained above 5 ppm for all sites. In a few sites, wind action was so acute that supersaturated conditions were recorded.

Angling

Catch rates for largemouth bass were higher in sprayed areas than in control areas (Table 1). This does not imply that diquat is a fish attractor, although some volunteers jokingly commented to this effect after the study. Rather, the higher catch rates were most likely due to the fact that, when possible, project biologists tried to pick the more productive of the two spots to spray.

The objective was to determine if largemouth bass could be caught in sprayed areas. Therefore, it was believed that stacking the odds in the favor of a sprayed site would reduce the chances that largemouth bass were not caught simply because a given area was unproductive.

Largemouth bass were not the only species caught in sprayed sites. Large mudfish (*Amia calva*), Florida gar (*Lepisosteus platyrhincus*), and chain pickerel (*Esox niger*) were a common catch, while black crappie (*Pomoxis nigromaculatus*) and warmouth (*Lepomis gulosus*) were creeled on occassion.

Initially, most volunteers were very sceptical that any fish could be caught in a sprayed area. Project biologists, on the other hand, had electrofished largemouth bass in sprayed areas, so attitudes were more optimistic.

Although attitude and confidence often affect catch rates, the fishermen's spots were so good that it was not uncommon for the volunteer to catch a bass in a sprayed area within the first five minutes of fishing. Once this first fish was caught the biologist often noted an almost immediate change in fishing intensity, interest, and philosophy.

The night electrofishing trips that were conducted for the benefit of the volunteers proved valuable in reinforcing the fact that fish do remain in spray areas. Almost all of the sites contained small bluegill and other baitfish. Although the timing of these electrofishing trips varied immensely, CPUE effort for largemouth bass was 0.6/min in spray sites and 0.7/min in controls. When the electrofishing trip taken 35 days after the spray event was

Table 1. Largemouth bass caught in sites sprayed with diquat and those sprayed with water (control) in Lake Tohopekeliga, spring 1993. Spray event occured between the first and second trip.

FISHERMEN	FISHING METHOD	NO. CAUGHT FIRST TRIP		NO. CAUGHT SECOND TRIP		NO. CAUGHT THIRD TRIP	
		SPRAY	CONTROL	SPRAY	CONTROL	SPRAY	CONTROL
SWEENY/SWEATMAN	ARTIFICIALS	3	3	4	4	1	5
SHELHORN/SWEATMAN	ARTIFICIALS	2	2	3	0	0	1
KOHLI-LEWIS/SWEATMAN	ARTIFICIALS	3	3	1	0	0	0
PHIPPS/HUJIK	ARTIFICIALS	2	2	0	0	8	2
SCOTT/SWEATMAN	ARTIFICIALS	1	2	1	1	1	1
HUBBARD/DOWNING	ARTIFICIALS	0	0	0	2	-	-
PUGH/SWEATMAN	SHINERS	1	2	1	0	1	1
JOSEPH/SWEATMAN-MOYER	SHINERS	1	0	2	0	-	-
JOSE/SWEATMAN	SHINERS	1	0	2	0	1	1
RICHARDSON/SWEATMAN	SHINERS	2	1	1	0	1	0
Total Number of Bass Caught		16	15	15	7	13	11
Total Number of Bass Caught by Fishermen using Shiners		5	3	6	0	3	2
Total Number of Bass Caught by Fishermen using Artificials		11	12	9	7	10	9
Total Number of Bass/h		0.80	0.75	0.75	0.35	0.81	0.69
Number of Bass/h by Fishermen using Shiners		0.63	0.38	0.75	0.00	0.50	0.33
Number of Bass/h by Fishermen using Artificials		0.92	1.00	0.75	0.58	1.00	0.90

omitted, the CPUE was 0.6 largemouth/min for both spray and control areas.

No major differences in D.O. were noted between sprayed and control sites. Values were generally above 7 ppm from the end of March 1993 to the beginning of April 1993. As the water levels dropped down to summer pool (52 ft msl) in mid-April 1993, values were usually 5-6 ppm with one value in a control site dipping as low as 4.6 ppm. Declining lake levels also had a detrimental impact on catch rates for the shallower fishing sites. The effect however, was seen in both control and spray sites.

The largest largemouth bass caught in a control area was approximately 545 mm while the big catch in a sprayed area was 560 mm. Following the spray event, fourteen harvestable largemouth (≥ 356 mm) were caught in sprayed areas while only seven were caught in controls. This difference was most likely due to the quality of the fishing spots and not to the treatment effect.

Conclusions

Based on this work and other recent studies (Bain and Boltz 1992; Boyer and Cichra 1993; Brown in press), it appears that chemicals associated with aquatic herbicide spray programs do not directly impact largemouth bass movement or catchability. However, this is not to say that spray activities associated with waterhyacinth and waterlettuce maintenance programs never affect bass fishing success. For example, when diquat is used to treat floating plants mixed with American lotus (*Nelumbo lutea*) or water-lilly (*Nymphaea spp.*), the pads tend to curl up and turn brown. More than one fisherman on the Kissimmee Chain has patterned largemouth bass that are taking advantage of the shading capabilities of these pads. When the pads curl up, light is able to penetrate and there is a good chance the largemouth bass leave the sprayed area.

Spray activities may also impact bass catchability when largemouth bass are using waterhyacinth and/or waterlettuce for their primary

cover. It is not unusual for an angler to float a shiner under a hyacinth mat and experience electrifying results. Again, once the the shading capabilities of the floating plants are gone, there is a good chance the fish will relocate.

Lastly, although the waterhyacinth and waterlettuce maintenance program is designed to keep biomass and associated fall-out at a minimum, there may be occassions where applicators get behind. Localized D.O. depressions associated with plant fall-out will undoubtably move fish or make them lethargic (Dave Cox, pers. comm.). The present study was conducted in the fall and spring of the year and no D.O. problems were associated with spray activities. However, this is not to say that the same would hold true in the stagnant summer months of May through September.

It is very likely that fishermen encountered the above examples and expanded their thought processes to conclude "brown" vegetation equals no fish. Cold fronts, lake level fluctuations, and natural fish movement correlated with spraying activities have no doubt contributed to solidifying this thought process. In times past, crisis management of floating plants may have impacted fishing success more than the current aquatic plant maintenance programs.

Due to insufficient public relations efforts by plant and fisheries managers, fisherman have come up with their own opinions. Over time these opinions have solidified into "fact". This has translated into a position where some fishermen on the Kissimmee Chain feel that one of the major problems with the resource is the waterhyacinth and waterlettuce spray program.

Fisheries and plant managers can no longer afford to allow fishermen to expend emotional and political energy towards a program that at present, is the best economical and biological alternative. Education and public relations will have to be expanded beyond their present levels for positive results to be seen. Certainly there will always be those that do not listen to reason or fact. However, the majority of fishermen are eager to aquire new information. If the information in this and similar studies is provided to anglers, it will help break down the walls of erroneus opinion, and redirect efforts towards pertinent challenges impacting our fisheries resources.

Acknowledgements

We would like to express gratitude to our ten volunteer fisherman for caring enough to be personally involved in the resource. We would also like to thank Anna Jasent and Don Arwood for their valuable assistance in many of the various aspects of the project. Many thanks also go to the staff at the Department of Natural Resources and the South Florida Water Management District for providing money and man-power associated with the spraying portion of the study. Finally special thanks goes to Lawson Snyder for editing this paper on such short notice.

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The Role of the Task Force in Today's Aquatic Plant Management

Introduction

by
Nancy P. Allen
U.S. Army Corps of Engineers

Since 1980, a change has slowly been evolving in the way aquatic plant management is being approached. That change is the development of the multi-agency/public task force. It goes by many different names; work group, restoration committee, task force, etc., but no matter what you call it, they all have common goals and experiences that include education, communication, determination, consensus, demonstration, restoration, frustration and getting the job done! We are all aware of the many agencies that are involved in a variety of lake management decisions. Too often one agency has specific plans or guidelines that conflict or are unknown to another agency. This confusion has led to many an interagency meeting. The development of the task force takes this approach much further. Instead of a one time meeting to solve one problem, the task force meets regularly and continues this line of communications rather than waiting for a problem or crisis to occur. This is doubly true of the public. Past aquatic plant management programs have addressed the public usually after an outcry of concern. At that point, the public is not willing to listen and who can blame them? Today's task force has expanded to include the public which may include representation from homeowners, special interest groups, bass guides, fisherman, fish camp owners, environmental groups, etc. This keeps the public out of the dark and they now have an avenue in which to present their suggestions and recommendations. Because each lake, river, stream, and watershed is so unique, a standard form of procedures will not apply. Nor can we assume what has worked well at one lake will necessarily work on another. Lake management is as much of an art as a science due to the tremendous variation of environmental factors that influence a system. Perceptive management decisions must be made on a case by case situation. A task force with a broad interest base will do this for you. A task force will consider the multiple use nature of the waterbody, the hydrology, location, historical trends, economics, wildlife and fisheries populations, public concerns and much, much more. The development and use of a task force is an excellent way of making those lake by lake management decisions. I call it, "Smart Management for the 90's".

Six different task force groups have been formed in Florida that deal with aquatic plant management. These include the Kissimmee Chain of Lakes Aquatic Plant Management Group, The Withlacoochee River Work Group, Crystal and Homosassa Rivers Aquatic Plant Management Interagency Committee, Lake Rousseau Management Planning Task Force, Lake Okeechobee Interagency Task Force and the Ocklawaha Chain of Lakes Restoration Committee. If you would like to learn more about starting a task force in your area, after reading the following descriptions of succesful task forces, contact one of the chairpersons or represntatives who have presented overviews in the remainder of this article.

Crystal and Homosassa Rivers Aquatic Plant Management Interagency Committee

by
Brian Nelson
Southwest Florida Water Management District
and
Judy Ludlow
Department of Environmental Protection

Concerns related to aquatic plant management in Crystal and Homosassa Rivers led to the formation of the Crystal and Homosassa Rivers Interagency Committee. In addition to their multiple-use attributes, these rivers also provide habitat for the endangered West Indian manatee (*Trichecus manatus*). The committee was formed in 1980 and consists of representatives from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the Department of Environmental Protection (formerly the Department of Natural Resources) and Citrus County. Technical assistance has been provided by the Center for Aquatic Plants. Representatives of Save The Manatee Club and the Citrus County Chamber of Commerce also attend meetings to provide input. The group meets in Crystal River at least annually in the fall, and as needed to resolve problems if they occur.

In 1980 the committee developed an aquatic plant management plan. This document, referred to as the Summer/Winter Aquatic Plant Management Plan, represents a cooperative effort between the above listed agencies. It is designed to best serve the navigational and recreational needs of the public while minimizing disturbances to manatees and manatee habitat. The

plan details aquatic plant management activities for the summer (April through September) when the concentration of manatees is low and for the winter (October through March) when the concentration of manatees is high. The Summer/Winter Management Plan is a working document in that it is continually modified as conditions change in the rivers and our understanding of manatee ecology grows.

Lake Rousseau Management Planning Task Force

by
Nancy Allen
U.S. Army Corps of Engineers

The Lake Rousseau Management Planning Task Force was developed in 1985 due to complaints and concerns regarding the channel markers and aquatic plant management program on Lake Rousseau. Lake Rousseau is a 4,000 acre impoundment of the Withlacoochee River located near the Gulf coast between the towns of Dunnellon and Inglis. The task force originally consisted of representatives from the U.S. Army Corps of Engineers, Florida Game and Fresh Water Fish Commission, Department of Natural Resources (now DEP), Southwest Florida Water Management District, Citrus County Aquatics, County Commissioners (Levy, Marion, Citrus Co.'s) and several homeowners, fish camp owners, and bass guides. There were so many different views regarding the spray program that one of the first things this task force did was develop a strategy or scheme that everyone could live with. To do this, the task force put together a series of public meetings that explained the program, especially why waterhyacinths were being treated and gave the public a chance to provide input. Secondly, the task force worked on the issue of channel marking. This interagency group coordinated with Citrus County and the Corps of Engineers which resulted in getting the main channel and several side channels marked.

In 1987, the Corps of Engineers took over the responsibility of overseeing the aquatic plant control operations on Lake Rousseau. Our first objective at this time was to develop a Lake Rousseau Management Plan. Once the plan was in place, we worked at implementing our goals. The single greatest accomplishment of the task force was a 3.5-ft lowering of the lake. Benefits derived from this lowering included; exposing bottom sediments to oxidation and/or compaction for improved water quality and bottom conditions, facilitated stump removal for safe access, benefit to sport fishing, wildlife enhancement, created the opportunity for private docks and public structures to be improved, repaired or constructed and helped check undesirable ecological succession encouraged by stable water levels.

Today's task force has expanded to include representation from Rainbow State Park, DNR Rain-

bow River Aquatic Preserve, IFAS Center for Aquatic Plants, and the Withlacoochee Area Residents. The success of the Lake Rousseau Management Task Force can be attributed to several things. By including homeowners, bass guides, and fish camp owners on the task force, we are able to stay on top of the issues that concern the general public. Each representative is also responsible for bringing in information and providing task force objectives to their interest groups. Instead of just concentrating on the waters of Lake Rousseau, we have included the Rainbow River and the Withlacoochee River in our discussions. Because the system is so closely connected we felt that this was the best management approach. It has also been of tremendous help to have agency personnel located near-by to answer questions and make site visits frequently.

Ocklawaha Chain of Lakes Restoration Committee

by
Robert B. Butler
Florida Game and Fresh Water Fish Commission

The Florida Game and Fresh Water Fish Commission has documented problems with the declining largemouth bass fishery in the Ocklawaha Chain of Lakes since the early 1970's. It is believed these problems were brought about by a combination of factors, which may include floodplain alteration, water level stabilization, agricultural discharge, aquatic plant management practices, and urban stormwater/wastewater discharge.

The dismal results of the 1992 Bass Anglers Sportsman's Society (BASS) tournament served to focus media and public attention and concern on this valuable natural resource. This attention provided the opportunity for interested parties to join together in an effort to prevent further degradation of the Ocklawaha Chain of Lakes and to begin its restoration.

In March of 1992, Colonel Robert M. Brantly, Executive Director of the Florida Game and Fresh Water Fish Commission, appointed an 11 member Ocklawaha Chain of Lakes Restoration Committee (O.C.L.R.C.) tasked with reviewing the current status of the fishery, identify problems impacting the fishery and recommending solutions. An organizational meeting of the appointed members was held on March 26, 1992.

Members serving on the O.C.L.R.C. include: Lieutenant Colonel Robert B. Butler, Committee Chairman and Regional Director of the Commissions Central Region; Leesburg City Commissioner Bob Lovell; William Good, a representative of the Lake County Conservation Council; Jim Bitter, a tournament fisherman and bass fishing guide from Fruitland Park; Bob Martin, a Leesburg

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resident who initiated the Save Our Water movement; William Davis, Lake County Water Authority Director; Lake County Commissioner Richard Swartz; Alex Alexander of the Department of Environmental Protection; Jeff Schardt, from the Tallahassee office of the Department of Environmental Protection; Joe Hill, Governing Board Chairman of the St. Johns River Water Management District and Jeanette Hanst representing water front property owners. In addition, the O.C.L.R.C. appointed a staff of professional individuals who meet on a regular basis to plan and make recommendations to the O.C.L.R.C.

During the first few meetings of the O.C.L.R.C., members agreed to develop a planning document which would address four major issues; Aquatic Plant Management, Water Quality and Habitat, Fish Management, and Education.

The overall goal in addressing these issues is "To restore, protect and manage the Ocklawaha Chain of Lakes (to include Lake Yale, Lake Apopka, Lake Beauclair, Lake Dora, Lake Carlton, Lake Eustis, Lake Harris, Lake Griffin, Lake Denham) in a manner which results in a freshwater aquatic system that supports and maintains a healthy, well-balanced diversity of species of freshwater aquatic life and wild animal life with densities and distributions that provide sustained ecological, recreational, scientific, educational, aesthetic and economic benefits for the public; present and future generations."

Objectives and tasks have been identified for each of the major issues. The Committee is presently developing implementing criteria.

Participating agencies are currently involved in both short and long-term activities aimed at improving the problems of the Ocklawaha Chain. Activities include: land acquisitions, revegetation programs, evaluating water level fluctuation schedules, planning for an extreme drawdown of Lake Griffin, fish disease studies, stocking programs, stormwater management, and evaluating aquatic plant management procedures.

Lake Okeechobee Interagency Task Force

by
Ron Miedema
U.S. Army Corps of Engineers

The Lake Okeechobee Interagency Task Force was created in 1986 to facilitate information exchange and to ensure all federal and state agency concerns are addressed when aquatic plant control activities occur on Lake Okeechobee. Members of the task force include representatives of the Florida Department of Environ-

mental Protection, South Florida Water Management District, Florida Game and Fresh Water Fish Commission, University of Florida's Institute of Food and Agricultural Sciences, U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers.

The aquatic plant control program on Lake Okeechobee is funded by the U.S. Army Corps of Engineers with the South Florida Water Management District conducting the actual treatments. The Corps sponsors and chairs the multi-agency task force to ensure the program protects the natural resources on Lake Okeechobee. Major objectives of the management program include flood control and protection of navigation.

Over the years, the task force has had numerous challenges to meet in order to operate an effective aquatic plant control program. The first was recognizing the management philosophies that the various agencies have on exotic plant control.

From an operational perspective, the toughest challenge has been to adequately control floating exotics within the potable water intake setback. In 1987, the setback was placed at 2 miles. This meant no herbicide treatments could occur within 2 miles of any water intake structure. Through group coordination, the task force was able to ammend the setback to 1/2 mile and still protect the water quality of Lake Okeechobee. The problem is now limited to one area of the lake. To control growth in this exotic plant nursery area, the task force is now examining the possiblilities of using mechanical harvesting, copper, or glyphosate treatments.

Another concern the task force addressed was the Everglades Snail Kite issue. As a result of close coordination of task force members, strict guidelines are now established as to when herbicide treatments occur to minimize potential impacts of spraying during the nesting season and to prevent damage to Snail Kite habitat that is caused by unmanaged waterhyacinths.

These are just a couple of examples of issues the task force has addressed. The task force has evolved into a working group of professionals striving to protect the ecological balance of Lake Okeechobee and ensure that recreation, navigation, and flood control continue as intended.

Kissimmee Chain of Lakes Interagency Working Group

by
Gordon Baker
South Florida Water Management District

The Kissimmee Chain-of-Lakes is interconnected via a series of canals that form the upper portion of the Central and Southern Florida Flood Control Project and is connected to Lake Okeechobee by the Kissimmee River and the C-38 Canal. The lakes of this system provide unique challenges for the agencies which have environmental management interests in this area. The working group was formed in late 1986 as a result of the success of the Lake Okeechobee working group meetings. The purpose remains the continual communication between agencies and the consideration of all input into the planning and management of the environment with primary emphasis on the vegetation management program of the District. The first meeting was held in December, 1986 and has continued approximately every two months since then.

The agencies involved include the South Florida Water Management District, Department of Environmental Protection (formerly Department of Natural Resources), Game and Fresh water Fish Commission, Corps of Engineers, and University of Florida, IFAS. Recently, the group has expanded to include Osceola County, U.S. Fish and Wildlife Service, several lake associations, and a State Representative's office.

The working group has concentrated to a large degree on the proper management of floating vegetation and hydrilla in this lake system. During the drought years from about 1989-1991 the endangered Everglades Snail Kite modified its range to include the Kissimmee Chain-of-Lakes. This caused the modification of aquatic plant management procedures to ensure that the Kite was not adversely impacted. This awareness was made possible through the interagency process. Recently a cooperative project has been initiated to help restore the quality of littoral zones in some of the lakes through mechanically removing tussocks and replanting of bulrushes. During the past year the working group has also tackled the problem of melaleuca expansion in the Osceola County area. Future plans are to continue working together for the enhancement of the regional environment.

The Withlacoochee River Work Group

by
Bill Hennessey, Community Affairs Director
Southwest Florida Water Management District

Residents from the Withlacoochee River system, concerned about water resource problems, particularly low water levels, made it very clear to the Withlacoochee River Board of the Southwest Florida Water Management District that they wanted changes. A series of public meetings and Board workshops brought a number of the issues to the table seeking resolution. Such issues, while generally local in nature, usually had an effect on other portions of the river system as well. The Withlacoochee River Basin Board responded by directing staff to form a work group made up of citizens representative of the entire river basin to formulate a set of recommendations for changes in the way the river system is managed.

Residents' concerns were varied,

so the work group was empowered to discuss and make recommendations on any and all issues. These included but were not limited to recommendations on: new water control structures; operation of existing water control structures; lake and canal restoration; aquatic plant management; and land acquisition and management practices.

District Executive Director Peter G. Hubbell said that every effort would be made to assemble a group that represents the many interests and viewpoints throughout the Withlacoochee River system. "Responding to citizens' questions and concerns is a high priority at the District," Hubbell said. "It's important to us that the residents in the Withlacoochee Basin are involved in the process of resolving differences and finding solutions. We'll need to work together to develop a plan that balances public concerns and protects the water resources and the environment for all," he added.

Pete Hubbel expected that work group members may include fish camp owners, representatives from local environmental organizations, and property owners on Lake Panasoffkee, the Withlacoochee River and the Tsala Apopka Chain of Lakes. A 20-member committee was the goal, and it was decided to hold the meetings in the evening with minutes to be taken and a video tape provided to the local libraries. It was also decided to request that other related agencies send members of their staff to provide information to the Work Group.

The Withlacoochee River Basin Board's citizens' work group held their first meeting on July 21, 1992. Twenty-four members were selected at this organizational meeting held in Inverness. More than 70 people—ranging from waterfront property owners to local environmental activists to fish camp operators—volunteered to serve on the advisory panel. Citizens selected their own representatives, with some suggestions from the water management district, to create a balanced committee able to address their many interests.

Upstream and downstream residents of the Withlacoochee River Basin were represented. If there was a diversity of opinion on an issue, both sides were represented on the panel. If there was more than one individual that represented a particular view, the group was asked to pick a spokesperson to be a member of the Work Group. Organizations such as the Hernanado County Audubon Society, the Lake Improvement Association, Taxpayers Outraged Organization for Accountable Representation, and Withlacoochee Area Residents, as well as others were represented. Those who were not selected, as well as anyone who asked, were included in the mailing list as interested parties to receive informational mailings. Each member was asked to name an alternate to attend meetings if the member was unable to do so.

Guided by Withlacoochee River

Basin Board member Jack Vogel, who was elected Chairman, the work group meets monthly to prepare their recommendations. Work Group interests discussed thus far include: building a water control structure on lake Panasoffkee; operating water control structures differently on the Tsala Apopka Chain of Lakes; dredging the inlet canals to the Floral City Pool from the river; land acquisition and management practices; managing aquatic plants; and various Barge Canal issues.

The exchange of ideas and information began at the first meeting and has continued until the present. All meetings are open to the public, held in public places within the basin, noticed in the press, recorded, and videotaped. Meeting minutes as well as audio and video tapes are available on request from the District. Copies of the meeting video tapes are also available at the Lakes Region Library in Inverness and Coastal Region Library in Crystal River.

The meetings are regularly attended by assigned staff from the U.S. Army Corps of Engineers, The Florida Department of Environmental Regulation, The Department of Natural Resources, The Florida Game and Fresh Water Fish Commission, and The Citrus County Department of Aquatic Plant Management. These individuals are often called upon to add their insight and the position of their organizations to the items under discussion.

Recommendations to the Basin Board are made by motion of a member or sitting alternate, and simple majority is all that is required for passage. As the work group takes action, that recommendation is presented to the Basin Board at their next scheduled meeting. All recommendations, to date, have been accepted by the Board. Decisions for or against implementation will be made when the work group finalizes their input. The staff will draft a report to the Basin Board which will include all recommendations made, as well as a priority ranking of those recommendations.

The Withlacoochee River Work Group is providing an effective means to obtain public participation and meaningful input in a system that many saw as "closed" to them. It has resulted in a clearer understanding on the part of many in the community of the complex nature of water resource protection and development decision making. After the Work Group produces a final report they will be notified of upcoming Basin Board meetings where their recommendations will be discussed and they will be invited to continue their participation. It is also expected that they will be asked to meet on a yearly basis in the future to receive updated information, and to apprise the District of changing attitudes and opinions concerning water resource matters within the basin. The Water Management District is pleased with the work of the membership and thanks them for volunteering their time and effort in this worthwhile endeavor.

Control of Waterhyacinth with Copper Herbicides

by
Ken Langeland, Brian Smith, and Neil Hill

Center for Aquatic Plants
Institute of Food and Agricultural Sciences
University of Florida
Agronomy Department

Maintenance control of waterhyacinth is often hampered in drinking water reservoirs because of "setback requirements," which are distances from drinking water intakes where certain herbicides cannot be used. These "no-spray areas" may serve as nursery areas where large populations of waterhyacinth plants can develop. The plant populations can cause problems in the "no-spray areas" and in other areas of the reservoir when they are moved by currents or wind.

Harvesting machines are often used for waterhyacinth management in proximity to drinking water intakes. This method is expensive and inefficient. Therefore, budget shortfalls can preclude the use of harvesting machines, and when they are used waterhyacinth populations quickly rebound from plants that the harvesters did not collect. Airboats are sometimes used to push waterhyacinth mats out of the "no-spray areas" but this is also expensive, time consuming, and inefficient.

Copper-based herbicides are registered for use in drinking water supplies and have no set-back requirements because of the low toxicity of copper to mammals and the rapid inactivation of the active form of copper (copper ion in the plus-2 oxidation state, Cu^{+2}). Copper compounds are extensively used as algicides in drinking water supplies and are used, to some extent, alone or in combination with other herbicides, for submersed weed control. However, the potential for using copper based herbicides for waterhyacinth control is not known.

The purpose of this study was to evaluate two copper-based herbicides for waterhyacinth control.

Methods and Materials

Waterhyacinth plants, collected from a local lake, were placed uniformly in 26 100-ft^2 floating PVC frames in three 0.1-acre replicate ponds. Plants were allowed to grow for eight weeks, after which the first of two copper applications was made. Copper was applied to the foliage, as either Komeen® or Cutrine® at 2.4, 5.4, 7.2 and 10.8 lb elemental copper per acre (equivalent to 3, 6, 8 and 12 gal/ac, respectively), and each herbicide was applied with either Silenergy®, an organosilicone adjuvant (0.25% v/v), or X-77®, a nonionic surfactant (0.5% v/v). The second application was applied two weeks following the initial application and was identical except that Induce® was used instead of X-77®. All applications were made using a small electric sprayer calibrated to deliver 200 gal of diluent water per acre.

Visual evaluations were taken

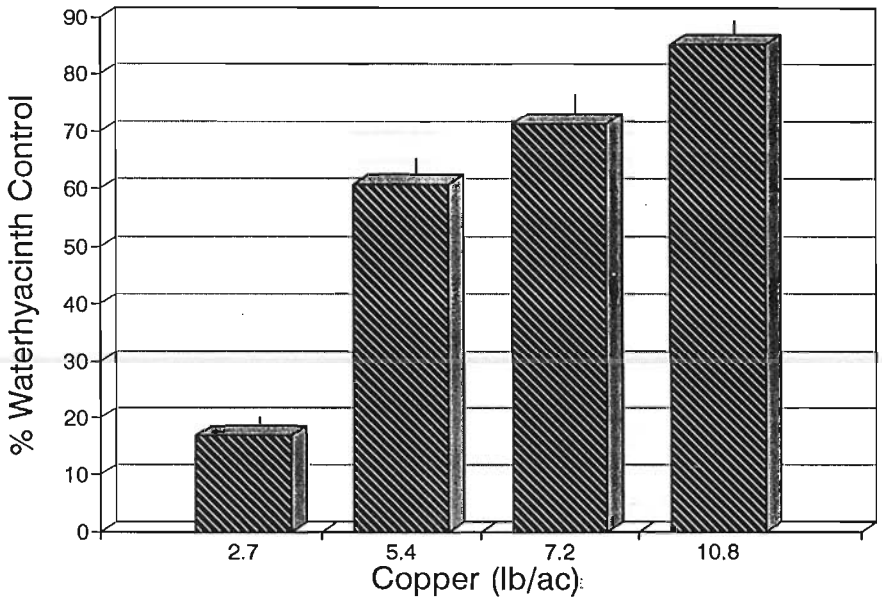

Figure 1. The influence of two applications of copper on the control of waterhyacinth. Columns represent the mean of four replications and are presented with standard error bars.

once a week for two weeks after the first treatment and once a week for four weeks after the second treatment. A scale of 0 to 100 was used, with 0 representing no control and 100 being eradication. Evaluations taken four weeks after the second application are presented.

Results and Discussion

Herbicide activity in the third replicate pond was greatly reduced, therefore data collected from that pond was not included in the statistical analysis. Waterhyacinth growth was more robust and luxuriant in the third pond, which suggests higher fertility and this may have influenced herbicide efficacy. We are evaluating this and other factors, which may influence copper efficacy on waterhyacinth.

There were no interactions between herbicide, surfactant or rate ($p > 0.5$); nor were differences observed between Komeen® and Cutrine® or between surfactant types ($p > 0.5$). Therefore, data were pooled among the two herbicide and surfactant groups.

Copper rate was the only factor that influenced waterhyacinth control. Two applications of copper at 2.7, 5.4, 7.2 and 10.8 lb/ac provided 17, 61, 71 and 85 % waterhyacinth control, respectively (Figure 1). These levels of control, even at the highest rate, would not be acceptable where more effective herbicides for waterhyacinth control can be used. However, within the "no-spray areas" of drinking water reservoirs, the suppression offered by 7.2 to 10.8 lb copper per acre would be effective toward maintenance control. Cost, even at the 10.8 lb rate, would be competitive with mechanical removal in most instances.

This study suggests that copper has potential for waterhyacinth management in drinking water reservoirs where more cost effective methods cannot be used. The data should be considered preliminary. Others who have conducted similar tests have observed results that are at least as good as ours. Invert applications conducted by the South Carolina Water Resources Commission (SCWRC) have resulted in excellent control (Phil Fields, personal communication) and other tests conducted by SCWRC and Griffin Corp. have resulted in excellent control with 6 gal of Komeen® and Kinetic® applied in 100 gal of diluent water per acre (M. C. Mcleod, personal communication). The South Florida Water Management District has observed results similar to ours in field applications (Gordon Baker, personal communication). We encourage others to make similar evaluations and share their results.

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AQUAVINE

The Mexican Connection

Since January 1993 various members of FAPMS have been regretting that they didn't pay more attention in Spanish 101. The Mexican government has recently decided that they need to develop an aquatic plant management program to deal with the enormous waterhyacinth problems they have in their lakes and many reservoirs. This decision has resulted in visits by Directors Haller and Fox to Mexico to view various problem sites and to make presentations describing management programs in the US. Personnel from SFWMD, USACE, DNR and the University of Florida hastily arranged a valuable "show-and-tell" trip around Lake Okeechobee earlier this year for nine Mexican scientists and government officials, and the concept of maintenance control was rapidly appreciated and taken back to Mexico.

Four Mexican biologists attended the recent APMS meeting in Charleston and returned to Florida for airboat operation instruction and hyacinth spraying experience with USACE, SJRWMD and UF personnel. A comprehensive workshop to discuss all waterhyacinth management options is planned in Mexico for September and this will be attended by several FAPMS and APMS members. The general philosophy is that these are Mexican weed problems that need Mexican solutions, but they are anxious to learn from the vast experience that has been gained in the US, particularly in Florida. Assistance with hydrilla control in irrigation canals of northern Mexico is also being offered, particularly from those experienced with similar systems in southern California.

Management issues are just as diverse and complicated in Mexico as they are here so there is plenty of scope for international cooperation in the years ahead. Watch for progress reports in future "AQUATICS."

..... and the Washington Connection

Kathy Adams, famous for her "Herculean effort" to save Long Lake in Washington State (see "Reflections" vol. 3, no.1), recently spent several days in Florida to observe Florida's aquatic plant management

program. The purpose of her trip was to gain information to apply toward development of Washington State's aquatic plant management program. Kathy started her trip by spending a day in Tallahassee conversing with "Bureau" staff. Jeff and Judy then brought her to Gainesville, where we spent a day visiting fish camps on Orange and Lochloosa to see the hardships caused by hydrilla. The next day we traveled to Orlando to see the success that can be achieved through aquascaping combined with intensive vegetation management in urban lakes, and to visit with several other aquatic plant managers. From Florida, Kathy went to Alabama to visit with Al Mills, B.A.S.S Environmental Director, and then to the APMS annual meeting in Charleston, so she got a good cross section of viewpoints on aquatic plant management in Florida and the Southeast. I've asked Kathy to send us her opinion of Florida's program. If it's good, I'll print it. Kathy will, hopefully, attend the 1993 FAPMS meeting, so look for her there.

Change Your Hydrilla Distribution Maps

At the APMS annual meeting in Charleston, Stratford Kay, from North Carolina State University, reported that hydrilla collected from Lake Gaston, on the North Carolina Virginia boarder, was confirmed to be dioecious. The confirmation was made by Dr. Fred Ryan at UC, Davis using sophisticated molecular techniques. Previously, dioecious hydrilla was only known to occur as far north as Lake Marion in South Carolina.

..... And on Waterhyacinth Distribution

John Inabinet, of Santee Cooper, reported that 11 acres of waterhyacinth had been found in Eutaw Creek Embayment on Lake Marion. Lake Marion is a 110,000 acre reservoir and directly connected to 62,000-acre Lake Moultrie. This is the first time that waterhyacinth has been known on the system. But don't change you maps yet. John and his staff should be able to eliminate the plants before they spread. We'll look for an update.

New Aquatic Plant Coloring Books and Weed Alerts Available

The Bureau of Aquatic Plant Management has recently completed an activity-coloring book, "Aquatic Plants: Underwater Forests of Lakes and Rivers" that teaches youngsters the importance of native aquatic vegetation in Florida's freshwater ecosystems. Along with defining basic ecological terms in a fun way, the book describes why exotic plants are not wanted in lakes, rivers and wetlands, and what people can do to help people prevent their spread. The book is geared toward fourth and fifth graders. Two new weed alerts have also been developed to provide information on the ecology and management of Florida's most invasive exotic plants, waterhyacinth and hydrilla. For information on availability contact Bureau staff at 904/487-2600.

Meetings of Interest

Oct. 10-13, 1993
47th Annual Conference Southeastern Association of Fish and Wildlife Agencies

Oct. 12-14, 1993
Florida Aquatic Plant Management Society, Howard Johnson's, Daytona Beach, Florida, Don Doggett, Secretary 813-694-2174

Oct. 27-29, 1993
The 12th Annual Meeting of the Midsouth Aquatic Plant Management Society has been scheduled for October 27 to 29, 1993 at Gulf Shores State Park. The Meeting site is located on the beautiful beaches of the Gulf of Mexico. Fred Harders at 205-242-3881.

Nov. 15-18, 1993
U.S. Army Corps of Engineers Aquatic Plant Control Program Annual Research Meeting, Baltimore, Maryland.

Nov. 30 - Dec. 4, 1993
North American Lake Management Society, 13th Annual Symposium on Lake and Reservoir Management. Loraine Duncan, 904/462-2554.

March 3-5, 1994
Nalms: 3rd Annual Southeastern Lakes Management Conference, Holiday Inn Northeast Columbia, South Carolina. Kathy Stecker, 803/734-5402.

FIFTH ANNUAL FLORIDA LAKES MANAGEMENT CONFERENCE

April 27-29, 1994
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Telephone (813-499-8272)

Deadline for abstract submittals is December 15, 1993

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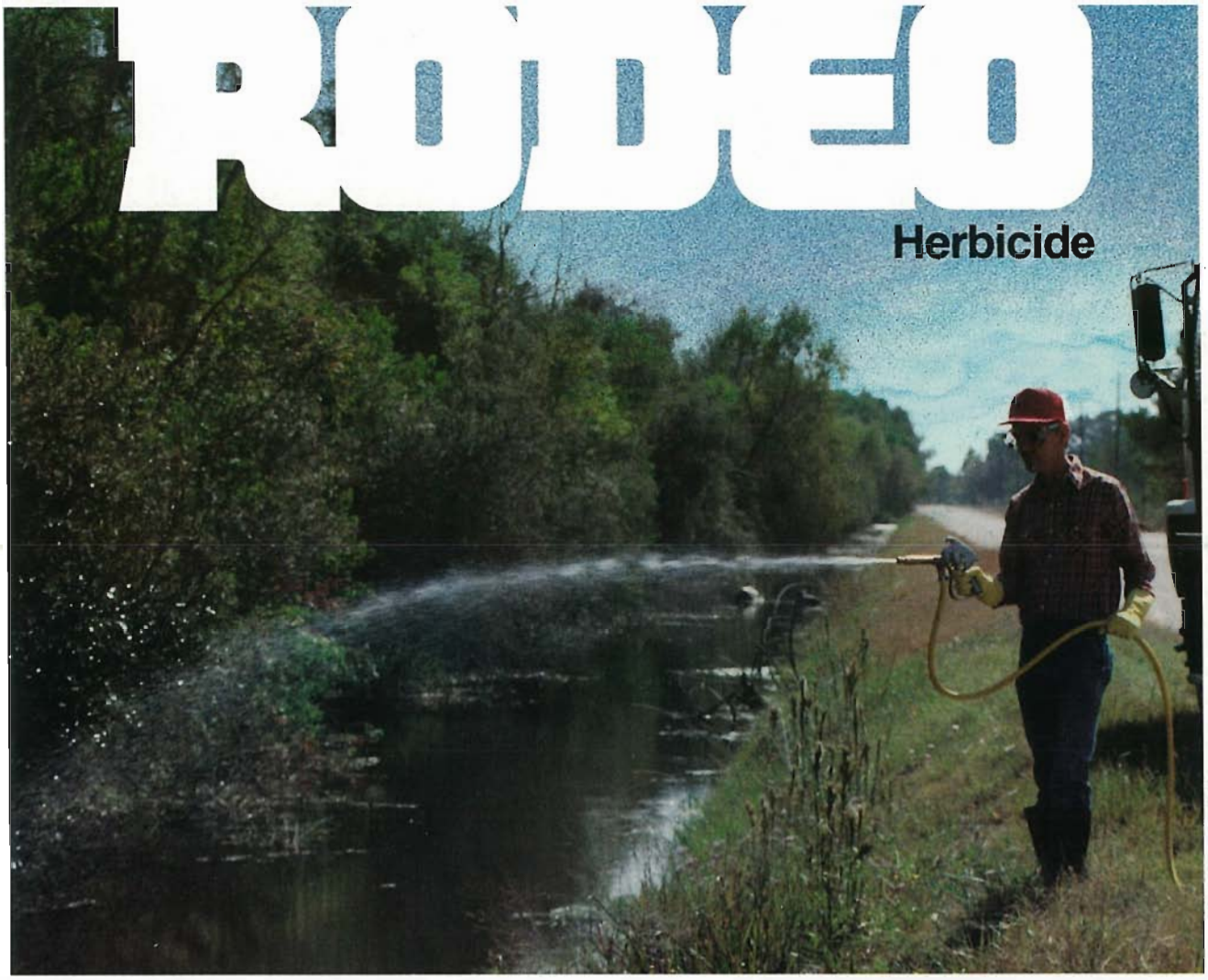

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