CORPS OF ENGINEERS LETTER OF OPERATING PROCEDURES
FOR
AQUATIC PLANT MANAGEMENT ON LAKE OKEECHOBEE

WHEREAS, maintaining clear and unobstructed navigational channels to promote and protect interstate and foreign commerce in navigable waters of the United States is an obligation of the Federal government, and, whereas, Congress has entrusted this responsibility to the United States Army Corps of Engineers (Corps) under the broad legislative mandate of section 10 of the Rivers and Harbors Act of 1899, as amended, which directs the Corps to maintain navigable waters and enforce the removal of obstructions to navigation; and

WHEREAS, the maintenance and improvement of basins, channels, and waterways in the interest of flood control is a Federal governmental responsibility entrusted to the direction and supervision of the Corps under section 2 of the Flood Control Act of 1944; and

WHEREAS, the maintenance and improvement of water areas of all water resources development projects to promote and provide recreational parks and facilities is a Federal governmental responsibility entrusted to the direction and supervision of the Corps under section 4 of the Flood Control Act of 1944, as amended; and

WHEREAS, the Corps is responsible for the conservation of natural resources held in public trust on water resources development projects such as forests, grasslands, wetlands, soils, and fish and wildlife under sections 1 and 2 of the Forest Cover Act of 1960, and under section 2 of the Fish and Wildlife Coordination Act of 1958, as amended; and

WHEREAS, it is recognized that the State of Florida and the Federal government have concurrent authority to manage aquatic plants within Lake Okeechobee and that the exact parameters of those powers have not been defined and need not be defined in order to effectuate a coordinated approach to aquatic plant management in Lake Okeechobee; and

WHEREAS, this Letter of Operating Procedures shall not be construed as a waiver of the legal rights of any party with respect to the regulation and control of aquatic plant management activities; and

WHEREAS, in the State of Florida, one of the most pervasive and serious obstructions to the Corps' commission of the aforementioned navigational, flood control, recreational, and conservation duties is aquatic vegetation: the obnoxious exotic and, on occasion, native aquatic plant growth that clogs inland rivers, lakes, and streams, and threatens to render them impassable to water traffic, ineffective to control flood waters, inappropriate for recreation, and detrimental to animal life and habitat; and

WHEREAS, Lake Okeechobee is a unique natural resource that contains important interstate navigational channels and flood control structures, is a water supply source for the citizens of the Southern portion of the State of Florida, supports endangered species, and is a prime recreational area, and that to preserve and enhance these functions, obnoxious exotic and, when necessary, native aquatic plant growth must be managed, and such management activities must be conducted so as to protect human health, endangered species, safety and recreation and, to the greatest degree practicable, to prevent injury to plant and animal life and property; and

WHEREAS, the State of Florida has established environmental and natural resource agencies to protect, preserve, and enhance water and wildlife resources within her borders, namely, the Department of Environmental Regulation, the Department of Natural Resources, the Game and Fresh Water Fish Commission, and the South Florida Water Management District; and

WHEREAS, the Corps has regularly sought the advice and comment of the environmental and natural resource agencies of the State of Florida and the Federal government in its management of aquatic plant programs and has valued their interest and cooperation in these efforts; and

WHEREAS, the Corps' objective is to maintain obnoxious exotic, and when necessary, native aquatic plants on Lake Okeechobee and allied waters at their lowest possible levels through an environmentally-sensitive, balanced program; and

WHEREAS, the Corps' program shall employ the best technology and biological, chemical, and mechanical aquatic plant management research to aid, enhance, and maintain navigability, flood control effectiveness, and recreational use of the nation's water; and

WHEREAS, the Corps seeks to enlist the counsel of the State of Florida and its agencies in this effort and to move forward with its mission in the spirit of interagency cooperation:

NOW, THEREFORE, in consideration of the aforesaid premises, which are hereby made a part of this agreement, and in order to aid and assist in the achievement of the above-defined goals, the Corps proposes to furnish to the State, sufficiently in advance of implementation, and to solicit comment without obligating the State to issue a permit as described in their Section 16-C 20.0025 Rule, the following Corps' Lake Okeechobee aquatic plant management program as detailed in the following policy guidelines:

POLICY GUIDELINES

1. The Corps of Engineers aquatic plant management program on Lake Okeechobee shall be conducted for, but not limited to, the protection of the following: Public health and safety; navigation; flood control; sport and commercial fisheries, water quality, wildlife, and native plant habitat (except as described above), endangered species; and recreation.

2. The Corps of Engineers shall chair, and actively solicit participation in, the Lake Okeechobee Aquatic Plant Management Interagency Task Force. The Task Force members will represent State of Florida agencies (including the South Florida Water Management District), State Universities, the Corps of Engineers, and other Federal agencies. The Task Force will serve in an advisory capacity, providing multi-disciplinary technical and scientific data from which the Corps' aquatic plant management strategy, methodology, and research planning and operational efforts will evolve. The focus of the aquatic plant effort will be to benefit the overall ecological health of Lake Okeechobee.

3. Concerns not worked out at the program staff level or at Lake Okeechobee Interagency Task Force meetings will be included on the Corps/DNR/DER quarterly meeting agenda and discussed by agency heads at that meeting. If issues regarding Lake Okeechobee aquatic plant management are to be discussed at the Corps/DNR/DER quarterly meeting, the agency heads of the Florida Game and Fresh Water Fish Commission and the South Florida Water Management District will be invited to participate in these discussions. A special meeting, if necessary, may be called by any of the parties hereto if a legitimate concern arises prior to the next scheduled meeting.

4. The Corps will host, in conjunction with other appropriate agencies, annual public meetings in communities around Lake Okeechobee to discuss aquatic plant management activities.

5. The Corps of Engineers will conduct management efforts and agrees to provide an annual aquatic plant management work plan to the State of Florida Department of Natural Resources (DNR) each year for a 45-day comment and review period. The DNR will be responsible for coordinating the work plan with all responsible state agencies and consolidating their comments during the 45-day review period and addressing any areas of concern with the Corps staff. The Corps' work plan shall contain:

a. the estimated number of acres of each aquatic plant species that shall be controlled during the federal fiscal year;

b. maps of sufficient detail to locate all areas of rooted aquatic plants proposed for control;

c. the method of control that will be utilized (biological, herbicidal, mechanical, and integrated), the application strategy and/or application rate, biological agent description; and

d. the number of acres of aquatic plant species controlled and the method(s) used in that control effort during the previous federal fiscal year.

6. The Corps shall provide the DNR with work schedules and a monthly program activity report. Any contractor(s) executing the Corps program will invoice the Corps directly in accordance with applicable Corps guidelines.

7. Any Corps of Engineers hired labor and/or contractor(s) shall comply with the aquatic herbicide use criteria as set forth; these criteria being:

a. that the aquatic herbicide(s) applied in project waters shall be applied pursuant to, and identified in, the annual work plan, and as detailed in the Lake Okeechobee Floating Plant Herbicide Guidelines (Attachment 1); and

b. that only aquatic herbicides approved for use by the Federal Environmental Protection Agency (EPA) and the State of Florida Department of Agriculture and Consumer Services will be employed; and

c. that aquatic herbicide(s) shall be applied in accordance with EPA label instructions, the Florida Pesticide Law, the Lake Okeechobee Floating Vegetation Herbicide Guidelines (Attachment 1), the Lake Okeechobee Aquatic Vegetation Management Plan (Attachment 2) and the provisions of Federal Regulation ER-1130-2-413.

8. The Corps of Engineers, vested with the ultimate responsibility and direct management for the federally funded aquatic plant management program on Lake Okeechobee, shall

comply with the Lake Okeechobee Aquatic Vegetation Management Plan (Attachment 2).

9. Any party to this Letter of Operating Procedures may withdraw by giving all other parties 120 days notice of the decision to withdraw.

Signed this 30th day of March, 1989.

U.S. ARMY CORPS OF ENGINEERS

Robert L. Herndon
Colonel, Corps of Engineers
District Engineer
Jacksonville District

STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL REGULATION

By: _____ Date: 29 March 89

Mr. Dale Twachtmann, Secretary

STATE OF FLORIDA, DEPARTMENT OF NATURAL RESOURCES

By: _____ Date: 3/28/89

Mr. Tom Gardner, Executive Director

STATE OF FLORIDA, GAME AND FRESH WATER FISH COMMISSION

By: Robert M. Brantley Date: 3/29/89

Col. Robert Brantley, Executive Director

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

By: _____ Date: 3/23/89

Mr. John R. Wodraska, Executive Director

ATTACHMENT 1

LAKE OKEECHOBEE FLOATING VEGETATION HERBICIDE GUIDELINES

	Control Method	Rate Per Acre
Waterhyacinth monocultures (less than 10% mix of waterlettuce) in front of, or adjacent to, native vegetation including grasses	2,4-D	2-3 quarts
Waterhyacinth and/or waterhyacinth/ waterlettuce within stands of native vegetation excluding grasses	Diquat	1-3 quarts
Waterlettuce	Diquat	1-2 quarts
Waterhyacinth/waterlettuce without stands of native vegetation	2,4-D and Diquat	2 quarts 1 quart

Polymers should be used for drift control when necessary.

ATTACHMENT 2

LAKE OKEECHOBEE AQUATIC VEGETATION MANAGEMENT PLAN (1)

BACKGROUND

Lake Okeechobee is an artificially impounded reservoir containing approximately 450,000 acres of open water, marsh and wetlands when at a stage of 15.5 feet above mean sea level. In addition to fish and wildlife habitat, diverse human uses of this water body include flood control, navigation, drinking water supply, water storage, irrigation and recreational uses such as boating, recreational and commercial fisheries, hunting and wildlife observation.

Approximately 20% of the lake is vegetated, mostly by native species. However, since the early 1900's, the floating exotic species, waterhyacinth (and to a lesser extent waterlettuce) have presented management problems particularly to navigation, flood control, and fish and wildlife management. Mechanical methods were utilized extensively in the early 1900's to control waterhyacinth but were expensive and inefficient. In the late 1940's, the development and testing of organic herbicides such as 2,4-D provided a more efficient and safer means of aquatic plant management within the lake.

During a herbicide spraying moratorium in 1986, the explosive growth and destructive capacity of uncontrolled floating vegetation was demonstrated on Lake Okeechobee as the waterhyacinth/waterlettuce population expanded from approximately 2000 acres to nearly 8000 in six months. Nearly all recreational boat trails and access points were blocked at the peak of this expansion. Extensive damage occurred within native vegetation communities, in particular bulrush, which declined through uprooting, localized oxygen depletion and sedimentation brought about by mats of waterhyacinth and waterlettuce. More than one million dollars were spent in 1987 by Federal and State agencies returning the floating vegetation population to the pre-expansion level.

In addition to the floating vegetation problem, the submersed exotic plant, hydrilla, has become a threat to the diversity and stability of the native aquatic plant community in Lake Okeechobee. Hydrilla began to proliferate in the northern and western portions of the reservoir in the late 1970's and now

---

(1) This management plan was drafted by the Florida Department of Natural Resources (DNR). During its evolution it was reviewed and commented upon by participating agencies of the Lake Okeechobee Aquatic Plant Management Interagency Task Force. The plan has been modified by the Corps to reflect recent administrative and management changes in the aquatic plant management program. This version was subsequently approved by the DNR.

covers approximately 10,000 acres. In addition to the loss of navigation and suitable fishery habitat, native plant species valuable to fish and wildlife, such as Illinois pondweed, have declined in certain areas in part through direct competition with hydrilla.

MANAGEMENT AUTHORITY

The U.S. Army Corps of Engineers, by virtue of congressional mandate (2) is responsible for the funding and management of the Federal aquatic plant control program on Lake Okeechobee. This program shall be administered and managed by the Corps and field operations shall be generally conducted by Corps' hired labor and/or Corps' contractor(s).

Because various other Federal, State, and local government agencies, concerned citizens and user groups are affected by the aquatic plant management program, their concerns and recommendations have been addressed in this plan.

The management plan, shall be updated as needed. Any concerns with the plan shall first be discussed with involved agencies and authorized by the Corps before becoming part of the plan. The plan requires maintenance levels of exotic floating aquatic plants. If plants grow beyond maintenance levels, more aggressive control measures will likely be necessary to re-establish control.

This program shall be conducted under the maintenance control philosophy which was originally conceived and implemented by the Corps of Engineers and subsequently adopted by the State of Florida. Section 369.22 (3), Florida Statutes, states in part that:

"...a maintenance program is a method for the control of nonidigenous aquatic plants in which control techniques are utilized in a coordinated manner on a continuous basis in order to maintain the plant population at the lowest feasible level as determined by the State Of Florida Department of Natural Resources."

This management plan was prepared to ensure that the common goal of exotic aquatic plant management is achieved for flood control, navigation, water quality, and recreation while maintaining or enhancing native plant communities for fish and wildlife habitat.

---

(2) section 10 of the River and Harbor Act of 1899, 33 U.S.C. section 403 (1986); section 2 of the Flood Control Act of 1944, 33 U.S.C. section 701a-1 (Supp. 1988); section 4 of the Flood Control Act of 1944, 58 Stat. 889 (codified as amended at 16 U.S.C. section 460d (1974 and Supp. 1988)); sections 1 and 2 of the Forest Cover Act of 1960, 16 U.S.C. sections 580m-n (1985); section 2 of the Fish and Wildlife Coordination Act of 1958, 72 Stat. 5639 codified as amended at 16 U.S.C. section 661 91985 and Supp. 1988)).

GOALS AND OBJECTIVES

The goal of the aquatic plant management program on Lake Okeechobee is to safely manage problem exotic aquatic plants at their lowest possible levels concurrent with the availability of funds. The major target plants include waterhyacinth, waterlettuce, and hydrilla. Maintenance control of waterhyacinth and waterlettuce throughout the lake and the control of all species located in navigation channels, boat trails and at flood control structures, is of primary concern. Due to the funding limitations, the control of hydrilla, whether on a small scale to open fishing access or on a large scale to reduce competition with native vegetation or increase water circulation, is a secondary priority. Control of native species is of tertiary importance unless plants are impeding access, navigation or associated with floating tussocks. These objectives will be reached by integrating the most environmentally sound, cost-effective methods available including biological, herbicidal, mechanical, and integrated means.

FLOATING VEGETATION MANAGEMENT

Maintenance Control Level

The exotic plants, waterhyacinth and waterlettuce, because of their floating nature, can be transported readily by wind and water movement throughout the lake, blocking access and navigational and flood control structures. Also because of their extremely rapid growth and continual shedding of leaf and root material, these plants can degrade lake ecology by displacing native plant communities, increasing the accumulation of organic sediment on the lake bottom and locally depleting the available dissolved oxygen in the water column and sediments. Therefore, in order to reduce damage to native vegetation as well as management costs and herbicide use, maintenance control levels of floating vegetation on Lake Okeechobee shall be at the lowest possible levels.

Eradication of waterhyacinth and waterlettuce from Lake Okeechobee has proven to be unobtainable. Therefore it must be realized that a certain level of floating plant infestation may be present. This level must be one where navigation channels and access points are unobstructed and damage to native vegetation, recreational and commercial fisheries, wildlife, and other environmental considerations are minimized throughout the lake.

During the late 1970's and early 1980's, approximately 400 acres of floating vegetation were maintained on Lake Okeechobee. At this level, major negative impacts to navigation and fish and wildlife habitat were uncommon. While 400 acres of floating vegetation may be useful to delineate an upper level of maintenance control, it would be negligent to arbitrarily establish an abundance level for floating vegetation because of the temptation to discontinue control when that level was

reached. The size of the floating plant population should not dictate the maintenance control level. Rather, maintenance control is a level from which local populations would not quickly become a problem if the control program had to be discontinued for a short period. The closer the floating vegetation population is to zero acres, the better the maintenance control.

Additionally, it is not possible to simply express maintenance control levels of floating vegetation on Lake Okeechobee in total acres present within the lake. While the presence of 400 acres of floating vegetation in a lake the size of Okeechobee may seem small, impacts to navigation, flood control, native vegetation or fish and wildlife habitat could be devastating if the majority of these plants were confined in small areas. Consequently, maintenance control levels must also be expressed on a local basis.

Floating vegetation does not accumulate in open waters within Lake Okeechobee but rather along the shorelines, or along the vegetation/open-water interface, and within open marshes such as those which surround Fisheating Bay, Eagle Bay Island and Chancey Bay. Therefore, these areas should be continually patrolled and floating vegetation controlled when individual communities exceed approximately 100 square feet (roughly the size of an airboat).

When maintenance control is achieved throughout the navigable areas of Lake Okeechobee, then bands and small mats can be further reduced. Floating vegetation within unnavigable areas should be left unmanaged until water levels increase to allow access by control crews. As the plant population is brought closer to zero acres, actual spray time will decrease while survey time increases. Although cost per acre of control would increase, environmental damage would be minimized and herbicide use would be reduced.

CONTROL METHODS FOR FLOATING VEGETATION

An integrated biological, herbicidal and mechanical control program is utilized to manage floating plants on Lake Okeechobee. Three biological controls (insects) have been released to control waterhyacinth, yet because of the rapid growth rate of this plant and its ability to recover from insect feeding pressure, control has been minimal to date. An insect was released to control waterlettuce in 1987; however, since it was only recently released, results are inconclusive. Mechanical harvesters are also employed, but because of their expense, slow rate of control and impact to non-target organisms, their use on Lake Okeechobee is limited to areas surrounding drinking water intakes and other areas such as control structures where their use would be more expedient. Herbicides are currently the most effective and cost-efficient means of managing floating aquatic plants on Lake Okeechobee. In particular, the EPA-approved herbicides 2,4-D and diquat are employed for floating vegetation management.

Herbicide Guidelines

The herbicide 2,4-D is used to control waterhyacinth in most Florida water bodies because it is an accepted, cost-effective method of control. Under maintenance control conditions, and when used with a polymer for drift control, neither over-spray nor non-target impact has been a problem. While diquat controls waterhyacinth, it has not been as effective on Lake Okeechobee as 2,4-D, usually requiring two or more treatments for control. Since diquat is a contact type herbicide and not systemic in action, as is 2,4-D, it is more difficult to apply as plants must be completely covered with the herbicide to achieve control. Additionally, diquat is nearly nine times more expensive per gallon than 2,4-D. Therefore, 2,4-D shall be used to control monotypic populations of waterhyacinth in Lake Okeechobee. Diquat shall be used when controlling monotypic stands of waterlettuce. Guidelines are presented in Attachment 2 for herbicide control of waterhyacinth and waterlettuce mixed together or when mixed with other aquatic plant species.

ADDITIONAL CONSIDERATIONS

Water Quality

Floating vegetation shall be controlled only by mechanical harvesters within 1/2 mile of potable water intakes. Because much of the oxidation of a decomposing floating vegetation mat occurs at the surface and because plants do not generally sink below the surface until 4-6 weeks after initial treatment, there is no need to curtail operations due to low oxygen levels. Delaying operations until higher oxygen levels are present will only allow the problem to increase. Likewise, floating vegetation management shall not be curtailed because of the planktonic algae content in the water. Under maintenance levels, the nutrients released by chemically controlled floating vegetation is negligible compared to available nutrients in the water column.

Fish and Wildlife

Floating vegetation control shall be conducted in areas identified as snail kite nesting and foraging habitat so that no control takes place within the designated distance of snail kite nests during a treatment window each year as specifically approved by the Corps, U.S. Fish and Wildlife Service, Florida Game and Fresh Water Fish Commission and the Florida Department of Natural Resources. These agencies jointly survey the lake to locate snail kite nests to ensure their safety.

Floating vegetation control shall be coordinated with fish camps and the general public in advance of control. Notification methods shall include fliers distributed to local businesses, signs posted at boat ramps, newspaper advertisements or other effective methods.

SUBMERSED SPECIES

Hydrilla is by far the most troublesome submersed aquatic plant species in Lake Okeechobee covering approximately 10,000 acres. Although thousands of acres of native submersed vegetation species exist in Lake Okeechobee, none poses the navigational and environmental problems associated with hydrilla. Hydrilla can quickly grow to fill the water column and form dense surface mats. The resulting diminished light and oxygen levels allow hydrilla to outcompete native plants and reduce species diversity.

The hydrilla population in Lake Okeechobee has been quite variable in recent years due perhaps to shading by floating vegetation or because of widely fluctuating water levels. However, monocultural stands of hydrilla covering thousands of acres have formed in four major areas; 1) The Monkey Box, 2) Fisheating Bay, 3) east of Harney Pond Canal, and 4) in the Kings Bar/Eagle Bay Island area. While hydrilla provides a good food source for some water fowl species and an "edge effect" for fisheries, its competitiveness and ability to form dense surface mats are undesirable in a system which currently supports extensive stands of native submersed species.

HYDRILLA MANAGEMENT

As with floating plant management, hydrilla control is accomplished using an integrated biological, herbicidal and mechanical control approach. An insect, Hydrellia pakistanae, was released in 1988, but its effect has not yet been quantified. Mechanical control is used in boat trails and within one-half mile of potable water intakes, but is too costly and slow for large-scale use. While the price per acre is fairly high, herbicides currently provide the most effective and cost-efficient means for controlling hydrilla .

Because of the high cost of hydrilla control, large-scale hydrilla management shall be limited on Lake Okeechobee as floating vegetation control has first priority. Large scale control (100 acres or greater) shall be carried out using the herbicide fluridone (liquid or pellet formulation). Dates of fluridone application(s) will be coordinated through the Interagency Task Force and will be based on current aquatic plant management research in order to minimize damage to non-target species.

Small areas, of five acres or less in size, may be opened in hydrilla mats to enhance fishing or water circulation. Maintenance within these areas as well as navigation trail maintenance of hydrilla or other submersed species (excluding Chara) shall be conducted using diquat or the dipotassium salt formulations of endothall.

ADDITIONAL CONSIDERATIONS

Water Quality

Mechanical harvesters shall be used to control submersed vegetation in established boat trails which are within 1/2-mile of potable water intakes.

Navigation

Mechanical harvesting may be used for general trail maintenance as identified in the annual work plan.

EMERSED SPECIES MANAGEMENT

The management of emersed or native submersed species shall be carried out only to gain access to the lake or to maintain established boat trails. Mechanical harvesters/cutters or herbicides such as glyphosate shall be employed to control most emersed vegetation.

The cookie cutter (or other approved rotary type mechanical cutters) may be used to open trails through dense vegetation. Thereafter, mechanical harvesters/cutters or glyphosate shall be used to maintain control. Boat trails shall be maintained no wider than 30 feet. The cookie cutter may also be used to break apart floating tussocks. If tussocks are in open water, turbidity curtains shall be placed around the tussocks to prevent water quality degradation.

CONCLUSION

We feel that this plan currently represents the best aquatic plant maintenance program for Lake Okeechobee given the various uses and biological conditions on the lake. Years of experience on waters throughout the State have proven that improper floating vegetation management has lasting impacts, especially on sedimentation and the general health of the plant and animal communities. Adherence to this plan and the concept of maintenance control should enable continued flood control protection, support navigation and recreation, and benefit the native aquatic plant and associated animal communities within Lake Okeechobee by decreasing the amounts of herbicide used, by decreasing the amounts of organic sediment deposited on the lake bottom from decomposing plants, and by decreasing the cost of the overall program.