

Recommended Herbicides For The Five Regions Of The Florida Game And Fresh Water Fish Commission

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INTRODUCTION

The Florida Game and Fresh Water Fish Commission has divided the State of Florida into five regions with a Regional Fish Biologist assigned to each area. The purpose of this paper is to report on the recommended control measures for aquatic weeds made in each region.

The Northwest Florida Region, also known as the Third Region, includes all of the Panhandle over to the Madison and Taylor County lines.

The Northeast Florida Region, or the Second Region, includes all the counties from the eastern edge of the Northwest Florida Region southward to Citrus, Marion, Putnam, and St. Johns Counties.

The Central Florida Region, or Fifth Region, encompasses the counties from the southern border of the Northeast Region to the northern edge of Hernando, Pasco, Polk, Okeechobee, and Indian River Counties.

The South Florida Region, or First Region, includes all counties south of Citrus County east to the Kissimmee River, the east side of Lake Okeechobee, and down to the Collier-Hendry line.

The Everglades Region, or Fourth Region, includes the remaining southeastern counties through Monroe County. (See Figure 1.)

AQUATIC PLANT TYPES

Several of the more common aquatic weeds the Florida Game and Fresh Water Fish Commission personnel are called upon by pond owners to control are covered in this report. The usual classification of dividing plants by their growth habit has been employed.

Plants found floating on the surface of the water and not rooted are in the floating aquatic weed group. Strong winds tend to build-up several layers of the smaller varieties of floating aquatic plants. This creates a problem for the weed applicator since many times the chemical sprayed on the plant may not make contact with plants on the lower levels, thus leaving a seed bed for reinfestation. Examples of floating weeds are duckweed, water fern, water hyacinth, and water lettuce. (See Table 1.)

Plants rooted to the soil at the bottom of a lake, pond, or stream, and growing through the water with a large part of the plant visible above the water surface are called emersed aquatic plants. Rush, cattails, pickerelweed, and spatterdock fall into this category.

Plants growing completely under the water surface of a lake, pond, or stream, rooted or not, are called submersed aquatic plants. Coontail, elodea, naiad, and pondweeds are examples of this type aquatic plant.

Table 1. Common and scientific names of vegetation mentioned in this report.

| Common Name | Scientific Name |
|-------------------|---|
| Bladderwort | (<i>Utricularia</i> spp.) |
| Cattails | (<i>Typha</i> spp.) |
| Chara | (<i>Chara</i> spp.) |
| Duckweed | (<i>Lemna minor</i> l.) |
| Coontail | (<i>Ceratophyllum demersum</i> l.) |
| El-grass | (<i>Vallisneria</i> spp.) |
| Elodea | (<i>Elodea canadensis</i> m., <i>Densa</i> p.) |
| Fanwort | (<i>Cabomba caroliniana</i>) |
| Naiad | (<i>Najas guadalupensis</i> s.) |
| Pickerelweed | (<i>Pontederia cordata</i> l.) |
| Pondweed | (<i>Potamogeton</i> spp.) |
| Rush | (<i>Juncus</i> spp.) |
| Spatterdock | (<i>Nuphar advena</i>) |
| Water fern | (<i>Salvinia rotundifolia</i> w.) |
| Water hyacinth | (<i>Eichhornia crassipes</i> m.) |
| Water lettuce | (<i>Pistia stratiotes</i> l.) |
| Water plantain | (<i>Sagittaria</i> spp.) |
| Water shield | (<i>Brasenia schreberi</i>) |
| White water lily | (<i>Nymphaea odorata</i>) |
| Yellow water lily | (<i>Nymphaea flava</i>) |

ROLE OF AQUATIC PLANTS IN FISH MANAGEMENT

Many fish biologists agree that some aquatic vegetation is desirable for maintaining a good fish population in lakes, ponds, and streams. Vegetation is important not only because it supports a number of food organisms used by fish in their diet, but it offers shelter for both the food organisms and the young fish.

Largemouth bass require a certain amount of shade and shelter. White and yellow water lily are good examples of plants that furnish shade and shelter for fish while their leaves harbor insects.

Desirable vegetation includes water plantain, water shield, fanwort, eelgrass, coontail, chara, and rush. Examples of undesirable vegetation are duckweed, water fern, water hyacinth, and water lettuce. These last four types of vegetation tend to completely cover water areas and provide shelter to the point that only undesirable species such as gizzard shad and chubsucker can survive.

Total eradication of all aquatic plants is not necessarily the thinking of all fish biologists. Vegetation control similar to controlled burning used by game biologists, to improve hunting, is a more logical approach to the problem. In other words, certain plants in specific habitats are desirable. Aquatic weed control should not be an attempt to eradicate all vegetation to the point that a body of water becomes a bathtub.

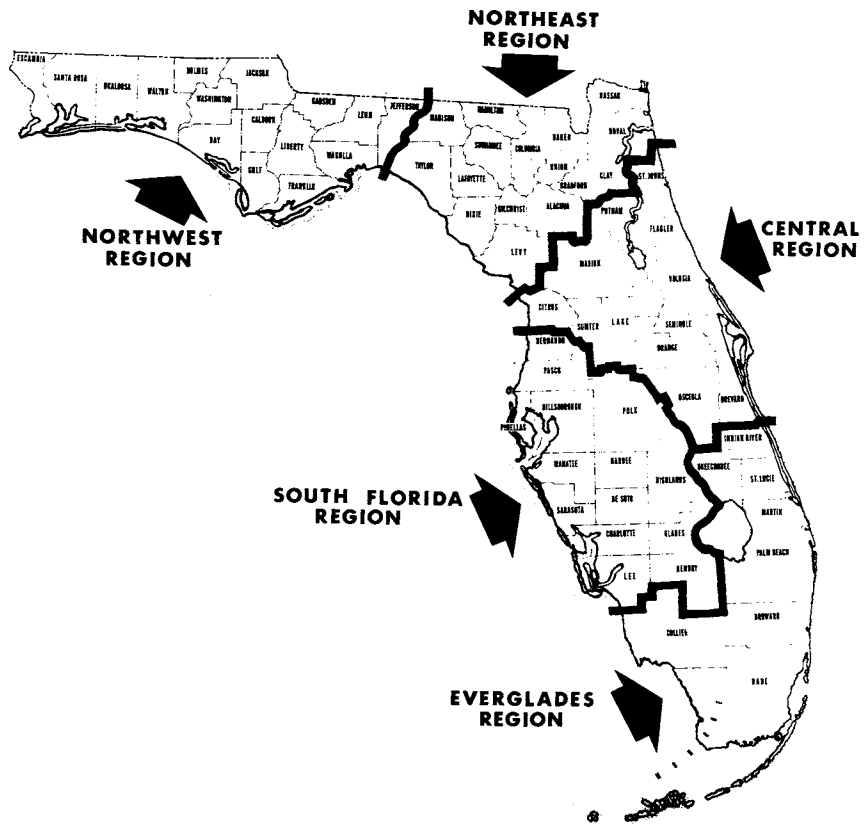


Figure 1. The state of Florida showing the 5 regions of the Florida Game and Fresh Water Fish Commission.

METHODS OF VEGETATION CONTROL

Mechanical

Mechanical removal of aquatic vegetation is probably the oldest method of control devised by fish biologists for ridding a pond or lake of noxious vegetation. Methods include draglines, dredging, blasting, aquatic weed cutters, and towing rakes or chains between two outboard powered boats and pulling out by hand.

Biological

A search has been underway for several years for fish, snails, or beetles that will remove vegetation by using it for food.

Tilapia, a fish imported from Africa, is an example of fish that utilize vegetation for food. Experiments conducted on tilapia revealed it was unable to keep ahead of the abundant growth rate of aquatic vegetation in Florida. Not to mention it to be a poor addition to our sport fishing since it would not readily take artificial or live bait.

Other methods of biological control include manatee, the Marisa snail, and lowering the pH of the water by the introduction of large volumes of acid.

Chemical

The manufacturing and marketing of herbicides for the removal of undesirable aquatic vegetation has become big business in Florida. The large truck farms in the Homestead Area combined with the need to keep drainage canals clear of vegetation and flowing in the vast Everglades Section have provided a large market for weed control chemicals. Chemicals are usually the easiest and cheapest method of controlling vegetation. Although semi-tropical conditions found in Florida are conducive for fast growing conditions for all types of vegetation, most chemical control will last for approximately six to eight months.

REGIONAL AQUATIC VEGETATION PROBLEMS

Northwest Florida Region

The Regional Biologist in Northwest Florida does not consider rush, spatterdock, water fern, water lettuce, and elodea problems in his area. Examples of vegetation that he is called upon to control are cattails, pickerelweed, white and yellow water lilies, duckweed, water hyacinth, bladderwort, coontail, naiad, and pond weeds. He recommends silvex, diquat, and dalapon for control of various species of noxious vegetation. Presently he is experimenting with casoron, and reports it is quite capable of removing several types of submersed weeds. (See Table 2.)

Northeast Florida Region

Rush, water lettuce, elodea, and pond weeds are not considered problems by our Fish Management Biologist located in Lake City (Table 3). 2,4-D in both liquid and granular form, diquat and aquathol (a liquid herbicide) are the primary herbicides recommended in this region. Sodium arsenite is recommended for the control of submersed weeds where and when it is deemed safe. He reports he has excellent control of bladderwort, coontail, and naiad with this veteran herbicide.

Table 2. Northwest Florida Region recommended herbicides.

| EMERSED WEEDS | | | |
|-----------------|----------------|----------------------|--------------------|
| Weed | Chemical | Rate | How Applied |
| Rush | | No problem | |
| Cattails | Dalapon | 10.0 lbs./Acre | Spray on plant |
| Pickerelweed | Silvex | 4.0 lbs./Acre | Spray on plant |
| Spatterdock | | No problem | |
| Water lily | Silvex | 4.0 lbs./Acre | Spray on plant |
| FLOATING WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Duckweed | Karmex | .5 to 2.0 lbs./Acre | Spray on plant |
| | Diquat | .8 lbs./Acre | Spray on plant |
| Water fern | | No problem | |
| Water hyacinth | 2,4-D | 2.0 lbs./Acre | Spray on plant |
| Water lettuce | | No problem | |
| SUBMERSED WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Bladderwort | Diquat | 2.0 to 4.0 lbs./Acre | Spray on plant |
| Coontail | Silvex | 1.0 p.p.m. | Spray on plant |
| Elodea | | No problem | |
| Naiad | Copper sulfate | 100.00 lbs./Acre | Broadcast on plant |
| Pondweed | Fenac | 50.0 lbs./Acre | Broadcast on plant |
| | Casoron | 15.0 lbs./Acre | Broadcast on plant |

Table 3. Northeast Florida Region.

| EMERSED WEEDS | | | |
|-----------------|-----------------|----------------|--------------------|
| Weed | Chemical | Rate | How Applied |
| Rush | | No problem | |
| Cattail | Dalapon | 10.0 lbs./Acre | Spray on plant |
| Pickerelweed | 2,4-D | 2.5 lbs./Acre | Spray on plant |
| Spatterdock | 2,4-D Granules | 50.0 lbs./Acre | Broadcast on plant |
| Water lily | 2,4-D | 2.5 lbs./Acre | Spray on plant |
| FLOATING WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Duckweed | Aquathol | 5.0 p.p.m. | Spray on plant |
| | Diquat | 2.0 lbs./Acre | Inject in water |
| Water fern | Diquat | 2.0 lbs./Acre | Spray on plant |
| Water hyacinth | 2,4-D | 2.0 lbs./Acre | Spray on plant |
| Water lettuce | | No problem | |
| SUBMERSED WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Bladderwort | Sodium arsonite | 4.0 p.p.m. | Inject in water |
| | Diquat | 2.0 lbs./Acre | Inject in water |
| Coontail | Sodium arsonite | 4.0 p.p.m. | Inject in water |
| | Diquat | 2.0 lbs./Acre | Inject in water |
| Elodea | | No problem | |
| Naiad | Sodium arsonite | 4.0 p.p.m. | Inject in water |
| | Diquat | 2.0 lbs./Acre | Inject in water |
| Pondweed | | No problem | |

Central Florida Region

In the Central Florida Region rush, pickerelweed, spatterdock, water fern, and water lettuce create no problems in the fish management areas. Our biologist located in Ocala recommends diquat for the control of several submersed weeds and one floating weed. (See Table 4.) 2,4-D, dalapon, and copper sulfate are recommended for several species of noxious vegetation control.

Table 4. Central Florida Region recommended herbicides.

| EMERSED WEEDS | | | |
|-----------------|----------------|-----------------|--------------------|
| Weed | Chemical | Rate | How Applied |
| Rush | | No problem | |
| Cattail | Dalapon | 10.0 lbs./Acre | Spray on plant |
| Pickerelweed | | No problem | |
| Spatterdock | | No problem | |
| Water lily | 2,4-D | 2.5 lbs./Acre | Spray on plant |
| FLOATING WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Duckweed | Diquat | 2.0 lbs./Acre | Spray on plant |
| Water fern | | No problem | |
| Water hyacinth | 2,4-D | 2.0 lbs./Acre | Spray on plant |
| Water lettuce | | No problem | |
| SUBMERSED WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Bladderwort | Diquat | 2.0 lbs. /Acre | Inject in water |
| Coontail | Diquat | 2.0 lbs. /Acre | Inject in water |
| Elodea | Copper sulfate | 100.0 lbs./Acre | Broadcast on plant |
| Naiad | Diquat | 2.0 lbs. /Acre | Inject in water |
| Pondweed | Diquat | 2.0 lbs. /Acre | Inject in water |

South Florida Region

Of the fourteen species of aquatic plants covered in this report, the South Florida Region considers all of them a nuisance in the lakes, ponds, and streams where fish management techniques are being performed. Liberal use of silvex, diquat, sodium arsenite, and copper sulfate is recommended by the Regional Biologist (Table 5). Sodium arsenite is used for the control of submersed vegetation where safe and practical. The injection method is recommended when using sodium arsenite for weed control.

Table 5. South Florida region recommended herbicides.

| EMERSED WEEDS | | | |
|-----------------|-----------------|-----------------|--------------------|
| Weed | Chemical | Rate | How Applied |
| Rush | 2,4-D | 2.5 lbs./Acre | Spray on plant |
| Cattail | Dalapon | 5.0 lbs./Acre | Spray on plant |
| Pickerelweed | Silvex | 4.0 lbs./Acre | Spray on plant |
| Spatterdock | Silvex | 4.0 lbs./Acre | Spray on plant |
| Water lily | Silvex | 4.0 lbs./Acre | Spray on plant |
| FLOATING WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Duckweed | Diquat | 2.0 lbs./Acre | Spray on plant |
| Water fern | Diquat | 2.0 lbs./Acre | Spray on plant |
| Water hyacinth | 2,4-D | 2.0 lbs./Acre | Spray on plant |
| Water lettuce | Diquat | 2.0 lbs./Acre | Spray on plant |
| SUBMERSED WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Bladderwort | Diquat | 2.0 lbs./Acre | Inject in water |
| | Sodium Arsenite | 4.0 p.p.m. | Inject in water |
| Coontail | Diquat | 2.0 lbs./Acre | Inject in water |
| | Sodium Arsenite | 4.0 p.p.m. | Inject in water |
| Elodea | Copper sulfate | 100.0 lbs./Acre | Broadcast on plant |
| Naiad | Diquat | 2.0 lbs./Acre | Inject in water |
| | Sodium Arsenite | 4.0 p.p.m. | Inject in water |
| Pondweed | Diquat | 2.0 lbs./Acre | Inject in water |
| | Sodium Arsenite | 4.0 p.p.m. | Inject in water |

Everglades Region

This region is unique since the majority of weed control work is performed by flood control districts. Our biologist, located in West Palm Beach, considers water hyacinth, water lettuce, bladderwort, elodea, and naiad the only problem

weeds of our list of fourteen (Table 6). Diquat, 2,4-D, and copper sulfate are the herbicides he recommends for the few floating and submersed weeds considered a problem. It is interesting to note that of the five emerged weeds covered in this report, none were found to be a problem in the Everglades Section of Florida.

Table 6. Everglades Region recommended herbicides.

| EMERSED WEEDS | | | |
|-----------------|----------------|-----------------|---------------------|
| Weed | Chemical | Rate | How Applied |
| Rush | | No problem | |
| Cattails | | No problem | |
| Pickerelweed | | No problem | |
| Spatterdock | | No problem | |
| Water lily | | No problem | |
| FLOATING WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Duckweed | | No problem | |
| Water fern | | No problem | |
| Water hyacinth | 2,4-D | 2.0 lbs./Acre | Spray on plant |
| Water lettuce | Diquat | 2.0 lbs./Acre | Spray on plant |
| SUBMERSED WEEDS | | | |
| Weed | Chemical | Rate | How Applied |
| Bladderwort | Diquat | 2.0 lbs./Acre | Inject in water |
| Coontail | | No problem | |
| Elodea | Copper sulfate | 100.0 lbs./Acre | Broadcas ton plants |
| Naiad | Diquat | 2.0 lbs./Acre | Inject in water |
| Pondweed | | No problem | |

CONCLUSIONS

Water quality varies through the different sections of the state of Florida, and it would appear that different chemicals are required to control the same species of aquatic plant, depending on the location of the water area.

Fish management people approach aquatic weed control a little differently than other people involved in weed treatment. Complete eradication is not our goal since certain aquatic plants produce fish food orgnisms which are required for reproduction by some species of fish, and provide shelter for both adult and young fish.

Most of the recommendations made in this report have been arrived at by the trial and error method of aquatic weed control. Many times several different chemicals are applied until the desired effect is achieved by the management biologist. Problem lakes and ponds are treated until the aquatic plant or plants are under control.

The recommendation for the control of elodea in the three regions where it is considered a problem is the same. All three of our personnel recommended the use of copper sulfate at the rate of one hundred pounds per acre, applied either by the strip method or broadcasted directly on the plant, and reported to have obtained excellent control for a period of six to eight months.

Sodium arsenite is recommended for control of submersed vegetation in the Northeast Region and the South Florida Region where it can be used safely without causing danger to man or animals.