

# Florida Audubon's Viewpoint On Aquatic Weed Control

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Florida Audubon Society is a private organization dedicated to protecting and developing interest in native wildlife and areas of natural beauty for the present and future benefit of mankind. In the following I have substituted the terms "aquatic vegetation" and "water plant" for "aquatic weed" since the last term carries an unfavorable connotation. Whether an aquatic plant is desirable or not depends on the situation and attitude of the investigator.

Early writers reported Florida to have an amazingly productive natural environment supporting a wealth of wildlife that must have directly or indirectly utilized almost every available niche (1, 7). Continuing effects of development and urbanization have drastically altered vast areas of natural interest. There is no hope of restoring Florida to its original wilderness condition, nor would many want this. Therefore, we encourage wise development, protection, management and use of those systems of present or potential natural productivity now in existence.

Developments in and adjacent to natural watercourses have resulted in removal of native plant communities, overfertilization of lakes, streams and canals, and introduction of exotic plants, creating inhospitable conditions for many species of fish and wildlife and encouraging others. Some species have adopted these new conditions causing a shift in populations to man-made conditions.

Many families of our birds, such as grebes (Colymbidae), herons, egrets and bitterns (Ardeidae), surface-feeding ducks (Anatinae), limpkins (Aramididae), rails, gallinules and coots (Rallidae), redwings and grackles (Icteridae) are typically found in areas supporting floating, emersed and marginal plant growth. Some, such as our fresh water ducks, feed directly on the plants; others, such as herons, search for small animal life associated with these areas. Still other birds seek shelter or nest in the marginal plants and use marginal vegetation for nesting material (19). These birds are all protected by either state or federal law or by state game regulations.

A much publicized bird, the everglade kite (*Rostrhamus sociabilis plumbeus*), has been the object of national concern among ornithologists due to its reduction to a total population of 50 or fewer individuals. This highly specialized hawk once ranged throughout Peninsular Florida to Wakulla but is now restricted to some of the marshes from Lake Okechobee south in the Everglades (21).

This bird apparently feeds exclusively on a single species of fresh water mollusk, the apple snail (*Pomacea paludosa*), which in turn depends on suitable water levels and aquatic plants, certain species of which are characteristic of its habitat in Conservation Area 1:

Considerable areas of relatively open water exist, vegetated by lowgrowing species like fragrant waterlily (*Nymphaea odorata*), big floatingheart (*Nymphoides aquaticum*), maidencane (*Panicum hemitomon*), sloughgrass (*Panicum paludivagum*), false maidencane

(*Sacciolepis striata*), spikerushes (*Eleocharis elongata* and *E. cellulosa*), bulltongue (*Sagittaria lancifolia*), and pickerelweed (*Pontederia lanceolata*). The submersed vegetation is dominated by the bladderworts (*Utricularia floridana* and *U. purpureum*) and southern naiad (*Naias quadalupensis*). Muskgrass (*Chara* sp.) and waterweed (*Elodea* sp.) are locally common.

"Pest" plants like cattail (*Typha domingensis*), alligatorweed (*Alternanthera philoxeroides*), water hyacinth (*Eichornia crassipes*), and water lettuce (*Pistia stratiotes*) are present in the area.

The tree islands are very similar to those found in Conservation Area 2. Many dead snags remain standing, as they do in the former area. Dominants are holly (*Ilex cassine*) and willow (*Salix amphibium*). Waxmyrtle (*Myrica cerifera*) and buttonbush (*Cephalanthus occidentalis*) are also abundant. Pickerelweed, bulltongue, ferns, and sawgrass are commonly found in the understory (21).

Richard L. Thompson<sup>1</sup> has suggested an association between the hunting success of the kite and southern naiad. When frightened the snail may try to drop to deeper water, but when present on dense beds of southern naiad, it would be more readily available for capture.

Several harmless native reptiles and amphibians typically inhabit water hyacinth. These include the salamanders *Siren lacertina* and *Pseudobranchius striatus*, and swamp snakes *Seminatrix pygaea* and *Liodites alleni* (4, 6). These are often abundant in areas of new growth of water hyacinth, especially where shallow open water adjoins such growth.

Several of our southeastern water turtles (*Pseudemys nelsoni*, *P. floridana*, etc.) also feed extensively on water plants (5). These turtles are not only harmless and colorful but through much of their ranges are eaten extensively by humans and the young and eggs are eaten by other wildlife.

Many of our forms of wildlife feed on fish and aquatic invertebrates, which again benefit by the presence of various water plants. Studies of hyacinth control using 2,4-D (2,4-dichlorophenoxyacetic acid) was carried out on the Withlacoochee River by the Florida Game and Fresh Water Fish Commission (12, 16). Complete eradication of water hyacinth caused drastic reduction in both invertebrates and fish, while more moderate control had little detrimental effect or possibly assisted aquatic animal life. It was suggested that there was a direct toxic effect on the invertebrates by 2,4-D since inhibition of oxygen intake by the mitochondria of certain animals has been reported—this in addition to loss of supportive habitat.

Fogarty and Albury (9) have reported that 97.7% of the stomach contents of 36 young American alligators taken in the everglades consisted of apple snails and crustaceans, both of which typically thrive in areas where there is

<sup>1</sup>Richard L. Thompson, personal communication.

abundant aquatic vegetation. The alligator is classified as an endangered species by the U. S. Fish and Wildlife Service, and one of the reasons is destruction of habitat.

In the North New River Canal thick *Najas* beds, bladderwort and water lily growing along canal edges were reported to support abundant bass and other fish due to invertebrates and small forage fishes thriving under these conditions in contrast to sharply reduced faunal populations in non-vegetated, box-cut portions of this canal (8).

We believe that weed control programs must be carefully guided by ecologists and biologists concerned with proper wildlife management. Total eradication is an undesirable and unacceptable goal (2, 14).<sup>2</sup> A now-classic example of mis-management is Lake Apopka (13), where rooted aquatics that were assisting in absorbing nutrients were destroyed by a hurricane in 1947. Later efforts to control water hyacinth and rough fish resulted in leaving masses of these dead organisms in the lake, where they decomposed and added to the overfertilization contributed by economic, agricultural and municipal interests. Massive algal and plankton blooms, turbidity, muds and silts have become dominating features of the lake. As a result, expensive and complicated solutions now seem necessary to restore Lake Apopka to a condition where it again becomes useful for fish, wildlife and humans.

Various suggestions have been made for disposing of over-fertilized waters which can encourage overgrowth of aquatic vegetation. In commenting on a plan presented by the U. S. Army Corps of Engineers for improving water control in Central and Southern Florida, the Bureau of Sport Fisheries and Wildlife (3) expressed concern for Lake Okeechobee, which was recommended as a storage reservoir to receive water from agricultural areas. The Bureau stated, in part:

“... some changes which might be acceptable are:

1. Raise the lake by gradual rather than rapid stages to sustain as much marsh as possible.
2. Construct underwater berms around the periphery of the lake to retain marsh vegetation.
3. Construct shoal areas using material dredged from the Okeechobee Waterway deepening to provide new habitat for marsh vegetation.
4. Reduce nutrient input by every feasible means.
5. Consider means of harvesting nutrients from the lake or its tributaries by removal of fishes and nuisance plants.
6. Consider rerouting some of the backpumped water from the agricultural areas directly to the conservation pools and the park.

Pumping fertilized waters to the pools rather than into the lake is desirable since lakes are notorious nutrient traps in which damages can occur. Marshes, on the other hand, seem much more able to handle nutrients without damages because of their abundant emergent vegetation. The greater loss sustained from channelization of the lower Kissimmee River may not have been the relatively small loss of storage capacity but the loss of the beneficial nutrient-trapping capability of its former marshes.”

Similar proposals were made by Gunter (10), who suggested experimental disposal of treated sewage waters into the Conservation Areas. Some concern was expressed re-

garding pesticides and herbicides that might be present in these waters, but if rapid degrading chemicals were used by agricultural interests, these were not considered to be of danger to the marsh habitat or to wildlife.

Every effort should be taken to use short-lived herbicides and pesticides for other reasons—these chemicals can be taken up by canal and river systems and carried on to estuaries. Provost (17) has warned “70% of the world’s recharge of oxygen into the atmosphere comes from marine phytoplankton, and one of the world’s greatest ecologists is already deeply concerned over our over-consumption of oxygen (combustion, etc.) in this technological age and our over-charging of the atmosphere with carbon dioxide. The earth’s atmosphere leveled off at 20% oxygen 400 million years ago. This means that all forms of life on earth, including man, are by now rigidly adapted to air containing 20% oxygen. The slightest reduction in this percentage could cause havoc among the earth’s entire biota and drastically modify the climate.”

In addition, the Florida Board of Conservation considers grassed submerged lands as important nursery grounds for many species of fish of sport and commercial value. The presence of such vegetated bottomlands is reported to the Florida Cabinet as required by state law before the Cabinet evaluates the desirability of sales of these lands or the granting of permission to private, state, county or municipal interests to dredge or fill these areas. The importance of protecting such productive zones from long-lived or non-selective herbicides for the economy and welfare of the nation should need no elaboration to the members of a biologically-oriented society.

Biological control of water plants has been suggested. Florida Atlantic University has explored the use of manatees (*Trichechus manatus latirostris*) for this purpose, which would seem most desirable since, if workable, this would give added justification to attempts for preserving this endangered species. At present the manatee’s habitat requirements appear too little known although they occasionally voluntarily inhabit degraded waterways such as Lake Worth that receive water hyacinth through canals.

Exotic animals have been studied and indicate some promise in controlling aquatic vegetation. A fresh water snail, *Marisa cornuarietis*, which was established in canals near Miami, exhibits feeding preferences for certain plants and can be effective if sufficiently concentrated (18). However, care should be taken that these snails do not compete with or destroy useful native forms such as the apple snail, or eliminate submersed or floating vegetation to such an extent that less desirable species of plants replace those eaten.

Research with South American flea beetles (*Agasicles*) in controlling alligatorweed (*Alternanthera philoxeroides*) has been reported as encouraging.<sup>3</sup> Again, total eradication may have subtle effects for better or worse on fish and wildlife, and leave a niche to be filled by other non-productive plants (14). McGilvrey (15) concluded that “It appeared that over a period of several years the benefits to waterfowl of alligatorweed control were outweighed by increased abundance of maidencane,” the latter being of little value to waterfowl. However, this study was undertaken in South Carolina, and possibly more beneficial plants could be encouraged to replace alligatorweed in Florida. The statement that “nature abhors a vacuum” holds considerable truth, and it might be well to plan for a desirable successor.

<sup>2</sup>C. W. Sheffield, personal communication.

<sup>3</sup>Col. R. P. Tabb, U. S. Army Corps of Engineers *in Litt.*

Several species of carp have been introduced in other areas for controlling water plants with some success, but, like gizzard shad which can endure some eutrophic situations and feed on algae, these are often undesirable introductions unless they are in turn controlled by predators.

Floating water plants, that become troublesome to water control and navigational interests when permitted to reproduce excessively, may be useful in shading out submersed species. Water hyacinth, water lettuce, duckweed (*Lemna minor*), and salvinia (*Salvinia rotundifolia*) were mentioned (20). *Azolla caroliniana* and other duckweeds in addition to *L. minor* could be added to this list. Investigations along these lines appear desirable in view of their values for wildlife stated above. Furthermore, these floating plants appear easier to control than are submersed plants.

Dineen (8) has found the floating mats of periphyton, a community of algae and microscopic animals found in the Conservation Areas, to be beneficial. These mats offer insulation for fish in the summer, especially bass, and inhibit rooted plant growth by shading.

Several members and friends of Florida Audubon have commented on the occasional effectiveness of shade trees adjacent to canals in controlling aquatic vegetation, which seems to grow much more rapidly where high light intensity accompanies an abundance of nutrients. One example cited was a canal along Belvedere Road in Palm Beach County, the banks of which supported large stands of Australian pines (*Casuarina* sp.), cabbage palms (*Sabal palmetto*) and cypress (*Taxodium distichum*). Bank-side vegetation was sprayed, and in 8 to 10 weeks the canal was more clogged with plants than ever before. This was attributed to nutrients from the dead vegetation floating into the water plus increased light on the water surface. These trees assist many species of wildlife, especially the palm and cypress, and add to Florida's native beauty.

### SUMMARY

We see no need for eradication of most aquatic vegetation. Marginal and floating plants are usually beneficial for wildlife, help check erosion, are attractive in themselves and absorb some nutrients that would flow to deeper water where such nutrients encourage growth of submersed species that cause additional waterflow and navigational problems. Developers and weed control agencies should retain as much natural vegetation as possible adjoining waterways. Cypress and other native trees originally inhibited aquatic growth by lowering the pH of Florida's waters by producing leaves that released tannic acid (11), and we would heartily encourage reestablishment of these handsome native trees. Water control agencies should recognize the value of contiguous marshes in supporting wildlife, controlling floods, recharging aquifers and absorbing nutrients—too often marshes have been regarded as non-productive areas to be drained, developed, or to be "improved" for deep water storage. Unnatural maintenance of stable water levels is impractical and costly, and we believe marsh areas with fluctuating water levels deserve protection as an essential feature of our aquatic

ecosystems. Where former marshes are to be drained or flooded, new ones should be established.

Water weed problems were nonexistent until natural waterways were altered, shoreside developments undertaken and exotics introduced. In short, they are a human-created problem that affects man and wildlife in many ways, and there are no simple, all-encompassing solutions for wildlife any more than there are simple solutions for other interests in this regard. However, we strongly feel that wildlife interests deserve consideration equal to that of others involved in these projects.

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