Long-Term Use of Grass Carp for Aquatic Plant Control in Deer Point Lake, Bay County, Florida

by
Jess M. Van Dyke[1]

Because the beautiful beaches of the Gulf of Mexico are magnets for tourist development, most of the rapid population growth in the Florida Panhandle has been coastal. The growth boom beginning in the 1950s caused a decline in groundwater resources near coastal areas. This problem was particularly acute in the Panama City Area, where groundwater levels had dropped 200 ft and saltwater intrusion threatened by the late 1950s. The "city fathers" realized that fresh water was fast becoming the limiting factor to growth. Therefore, in 1961, a dam was constructed across North Bay at a constriction where deer often swam. Deer Point Lake was formed by a low-head, causeway dam fixed at 4.5 ft MSL. The 1,200-acre estuary with "an extensive *Juncus* marsh" became a 4,700-acre, freshwater lake (Crittenden 1957). Six hundred million gal a day of pure, fresh water was available as a municipal and industrial water supply, twenty times more than Bay County could use. The Panama City area was the only area in Florida where groundwater became more abundant after 1961 (Fernald and Patton 1984). Real estate interests sprang at the opportunity to develop the shore of the new reservoir.

The inundated estuary plotted its revenge for 7 years. Then in 1968, John Crew of the Florida Game and Fresh Water Fish Commission (GFC) noted that native, aquatic plants were becoming "troublesome" (Crew 1968). Some time after 1972, the exotic Eurasian watermilfoil (*Myriophyllum spicatum*) was introduced into Deer Point Lake. By 1975, according to Jerry Krummrich of GFC, emersed species occupied 19 percent of the lake, while submersed species, mostly a mixture of Eurasian watermilfoil and Illinois pondweed (*Potamogeton illinoensis*), occupied 23 percent of the system (Krummrich 1975). Aerial photography by the Department of Natural Resources (now Department of Environmental Protection) revealed that the submersed vegetation reached the surface of the lake in a near shoreband at least 100 yd wide. Boating access was blocked, and an airboat was required to navigate the system.

Blocking recreational access was a problem, but obstructing the municipal water supply was a crisis. Something had to be done, and the large-scale use of herbicides was not a viable option in this potable water supply. The large size of the system and the abundance of flooded timber negated the use of mechanical harvesting. Furthermore, the lake could be drawn down only approximately 3.5 ft. The political pressure on Dr. Alva P. Burkhalter, the Chief of the Department's new Bureau of Aquatic Plants, was extreme. Meanwhile, from Arkansas was coming good news about biological control using grass carp, which "do not strip lakes of all cover, but leave upright, emergent swamp grasses, reeds, and lilies to serve as cover" (Bailey 1975). At that time, Arkansas was the only state where grass carp had been used to control aquatic plants in large reservoirs. Because Deer Point Lake flowed "into a saltwater bay," Dr. Burkhalter proposed the use of this fish without containment to control the lake's severe submersed vegetation problem. The Department asserted that it should determine where to stock grass carp in Florida, stating it had authority over aquatic plant control; the GFC balked saying it had authority over fish. The major concerns at that time were escapement, reproduction, and naturalization of grass carp. Those concerns

[1] Environmental Specialist, Bureau of Aquatic Plant Management, Northwest Florida Aquatic Plant Office, Tallahassee, FL.

were shared by the field biologists of both agencies. Ultimately, the GFC successfully challenged in court the Department's authority to release grass carp into Deer Point Lake on the grounds that the fish could escape over the dam. The issue was so political, however, that even after the Commission established its authority over grass carp, it agreed to stock Deer Point Lake.

With the flap-gate doors closed, the dam may have made a fairly effective fish barrier; but during heavy rains, the doors were open, and fish could easily escape into North Bay. Fortunately, salinity there averages about 20 ppt, which is lethal to grass carp. In North Bay, the maximum distance grass carp were found from the dam was 9 miles (Hardin 1980). A fish barrier was constructed across the entire dam in 1988. Nevertheless, escaped grass carp can still be found congregating in the fresh water just below the dam.

From October 1975 to August 1977, 107,500 grass carp fingerlings were stocked into grow-out embayments, then released into the main body of Deer Point Lake. The Executive Director of the Department of Natural Resources at that time, Harmon Shields, said, "If the grass carp don't work, we will have to remove the vegetation by hand." His field biologists understood that "we" did not mean "him" either. In order to ensure success, an additional 10,000, 1-lb grass carp were stocked in November and December of 1978. The goal was "full, rapid weed control" (Van Dyke 1979).

Since September of 1974, the Department's field biologists had been monitoring vegetation transects on Deer Point Lake. That last stocking of 10,000 grass carp gave them some apprehension. According to the transect data, grass carp were selecting the Illinois pondweed from stands mixed with Eurasian watermilfoil. A classic response of a nonpreferred target plant was unfolding. As the preferred pondweed was selectively consumed by the grass carp, the watermilfoil actually increased, then declined only after the preferred species disappeared from the transects (Figure 1).

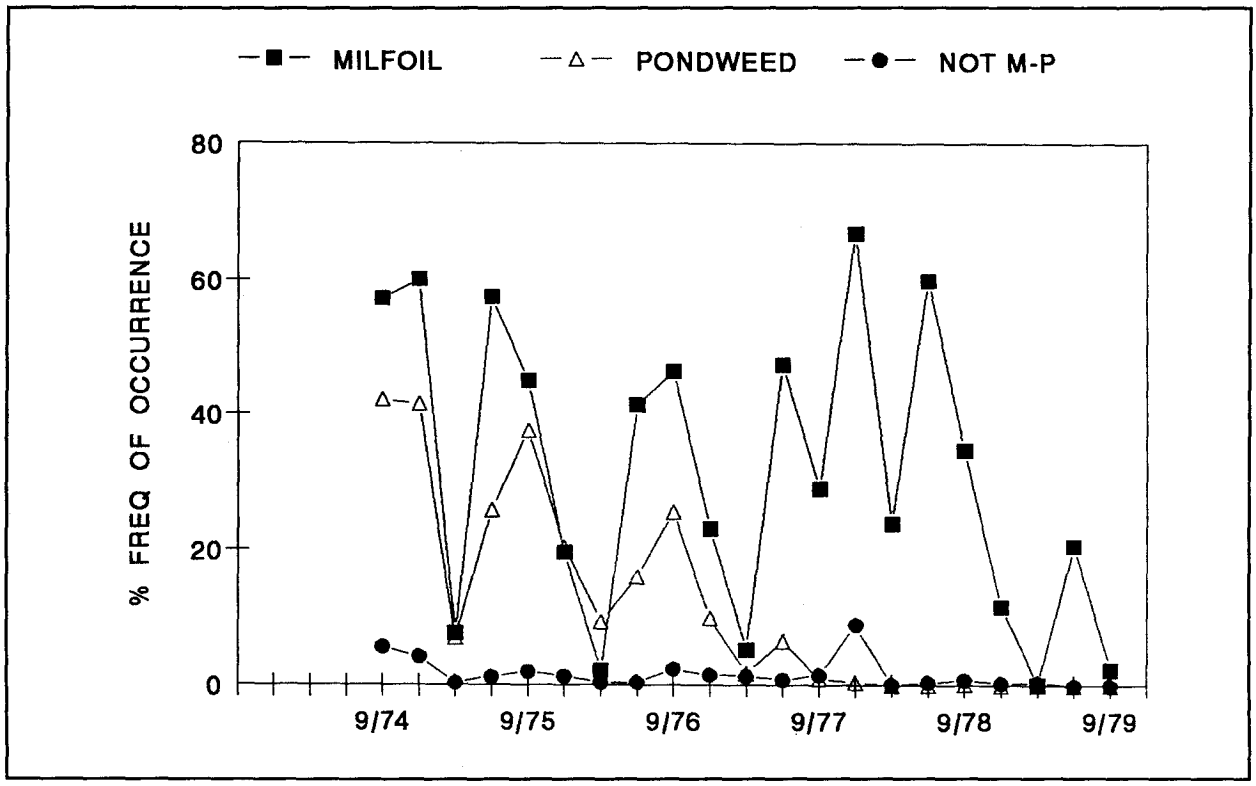

Figure 1. Deer Point Lake vegetation transect data from 1974 to 1979 (DEP)

In the late 1970s and early 1980s, the aquatic plants were controlled in Deer Point Lake from the stocking of 117,500 grass carp (25/acre). Boating access improved dramatically. Most importantly, there was no obstruction to the municipal water supply intake. Everything was not perfect though. In time, not only the submersed species but most of the emersed species were greatly reduced. Large areas of cattails (*Typha* sp.), fragrant water lily (*Nymphaea odorata*), and dollar-bonnet (*Brasenia schreberi*) were eliminated. Shoreline erosion increased because of the decline in emersed vegetation, so many seawalls were constructed.

In 1982, the field biologists of the Department and the GFC ended the practice of conducting separate vegetation transects and began working together, thanks to the cooperative spirit of GFC's Norman Young. Three years later, Eurasian watermilfoil came back with a vengeance, but not the preferred natives, in another classic response to grass carp food preference (Figure 2). The water intake was becoming obstructed again. Therefore, in October of 1985, 40,000 triploid grass carp (8.5/acre) were stocked into Deer Point Lake. The next month, Hurricane Kate destroyed the center section of a fish barrier that had been erected in front of the drawdown structure, and the structure was opened to reduce flooding. Though some grass carp were probably lost, aquatic plant control was again achieved and maintained until 1993. At that point, interesting plant responses began to occur. Nonpreferred native plants, particularly lemon bacopa (*Bacopa caroliniana*) began to appear in abundance. Eel grass (*Vallisneria americana*) also began to expand. The expansion of nonpreferred native plants was considered beneficial in that some habitat for fish and waterfowl was again available. Long term, it is possible to use grass carp to greatly reduce an aggressive exotic without the elimination of all native vegetation, but there will be a shift to nonpreferred native species.

The recent resurgence of vegetation in Deer Point Lake can also be attributed to the expansion of native species that are preferred by the grass carp, such as Southern naiad

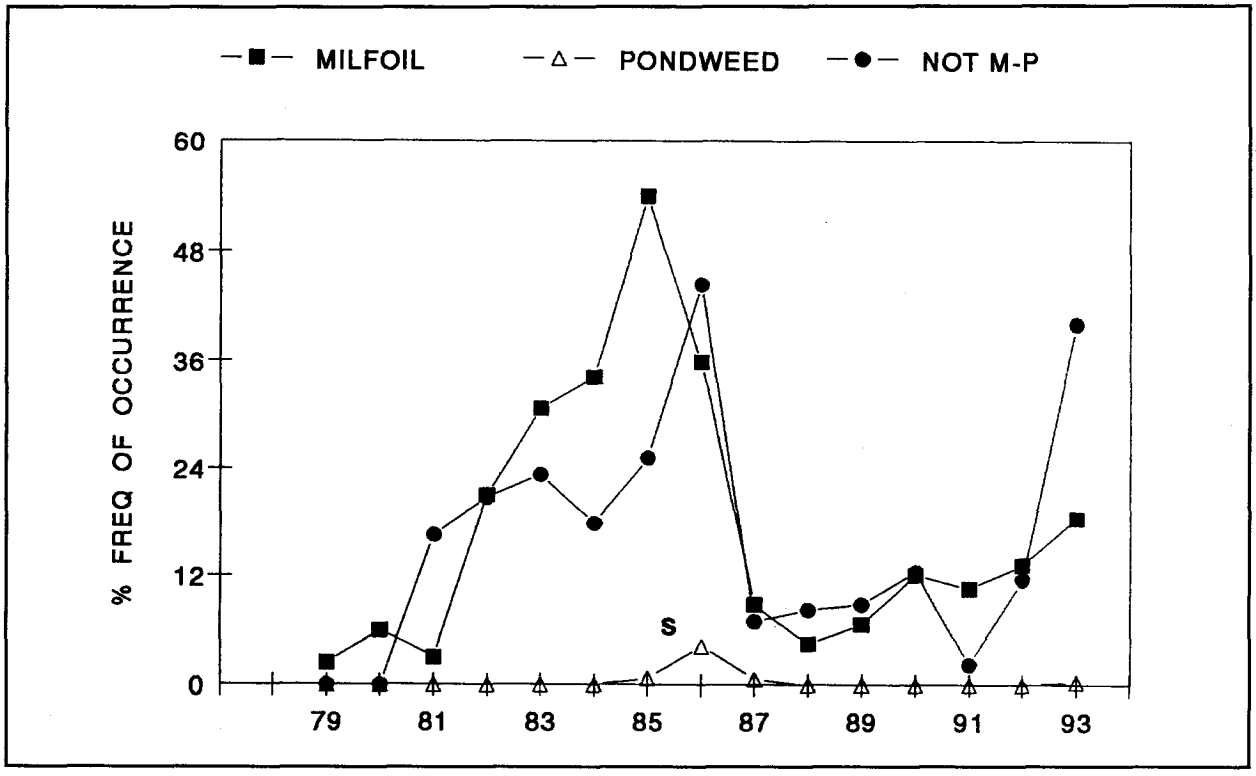

Figure 2. Deer Point Lake vegetation transect data from 1979 to 1993 (GFC/DEP)

(*Najas guadalupensis*) and stonewort (*Nitella* spp.). The presence of these preferred species was cause for alarm because it indicated that the feeding activity of grass carp, last stocked in 1985, was insufficient to protect the lake from hydrilla (*Hydrilla verticillata*). Hydrilla is a far greater threat to Deer Point Lake than Eurasian watermilfoil, and the range of hydrilla is rapidly expanding across the Florida Panhandle (Figure 3). It is likely that grass carp have already prevented the establishment of hydrilla inadvertently introduced into Deer Point Lake via boat trailers. To maintain this protection and to avoid nuisance levels of other aquatic plants, 10,000 triploid grass carp were stocked in Deer Point Lake in March 1994. The goal of this rather low stocking rate (two grass carp/acre) is to provide some suppression in the upsurge of submersed species while preventing the establishment of hydrilla.

In summary, there are lessons learned in 20 years of monitoring the effects of grass carp in Deer Point Lake. The first is that political and economic interests want quick results with the grass carp. Overcontrol from a fish and wildlife standpoint often results, and overcontrol of aquatic vegetation tends to promote shoreline development. The second is that field biologists from different agencies working together to collect and interpret data can produce a consensus that has the power to steer policy in a direction more protective of a lake's ecosystem. The third lesson is that because the weather is unpredictable and each lake is unique, determining the correct stocking rate of grass carp for a given lake is an art, not a science. Models are only guidelines. The fourth lesson is that, though we are all understaffed and underfunded, the long-term monitoring of aquatic plant control using grass carp is crucial. Finally, the grass carp may be viewed as a herbicide with unique characteristics. The grass carp "herbicide" is very inexpensive ($5 to 10/acre/year); it is slow release (obvious results may take several years); it is very persistent (effects may last 10 to 20 years); it is highly mobile; it is moderately selective, and its selectivity varies through time; and it is highly effective though somewhat unpredictable. The grass carp "herbicide" should generally be used at low rates as a supplemental or follow-up treatment to some other aquatic plant control technique. Avoid "drift"; use grass carp in contained areas only. All other herbicides have basic

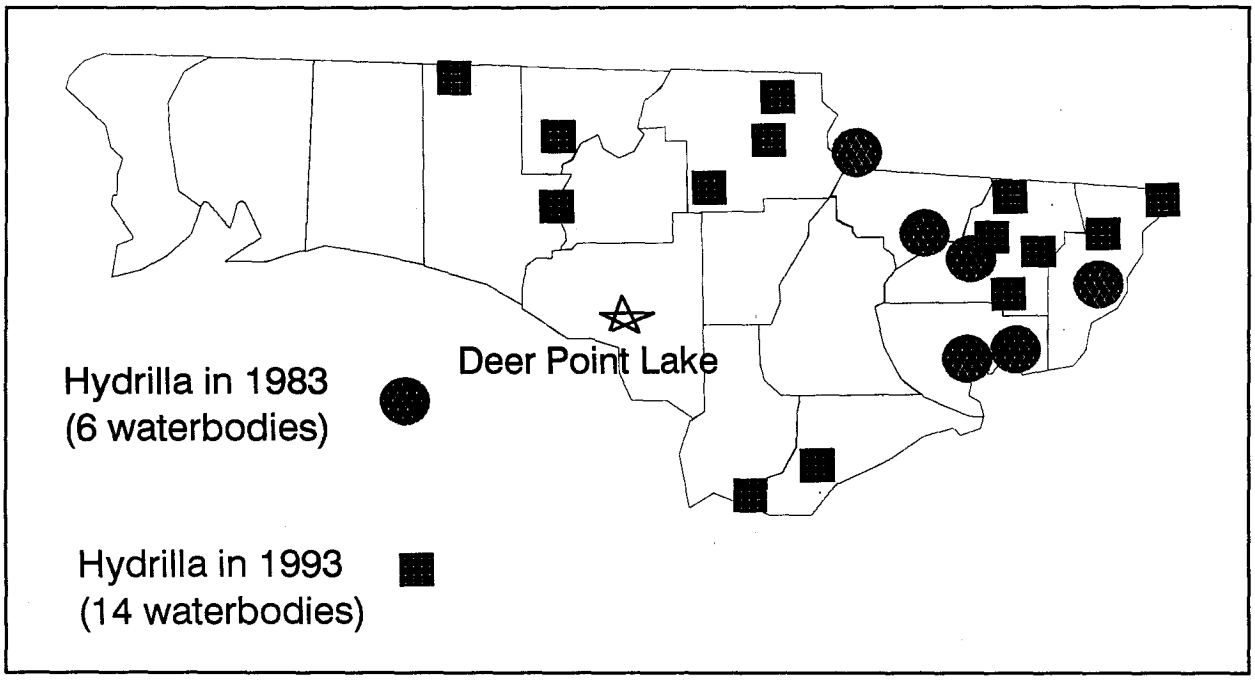

Figure 3. The expansion of Hydrilla verticillata in the Panhandle of Florida (1983-1993)

Federal guidelines. The grass carp "herbicide" is more powerful and persistent than any chemical labeled for aquatic use. Because of the trend in many States of using grass carp without containment, it is clear that Federal "use restrictions" on grass carp are needed to protect valuable fish and wildlife habitat.

References

Bailey, W. M. (1975). "Operational experiences with the white amur in weed control programs," Arkansas Game and Fish Commission, Lonoke, AR.

Crew, J. (1968). "Vegetative survey of Deer Point Lake, Bay County, Florida," Florida Game and Fresh Water Fish Commission.

Crittenden, E. (1957). "A report on North Bay and associated waters, Bay County, Florida," A Report to the Florida Game and Fresh Water Fish Commission.

Fernald, E. A., and Patton, D. J. (1984). *Water resources atlas of Florida*. Florida State University.

Hardin, S. (1980). "Movement and ecological effects of grass carp introduced into an open reservoir system," Florida Game and Fresh Water Fish Commission Final Report.

Krummrich, J. T. (1975). "Deer Point Lake vegetation studies," Florida Game and Fresh Water Fish Commission, Northwest Region, DeFuniak Springs, FL.

Van Dyke, J. M. (1979). "Deer Point Lake milfoil decline considered good," *Florida Conservation News*, 6-7.