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St. Johns River Water Management District, Dept. of Water Resources 

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EDITORIAL: Address all correspondence regarding editorial matter to Jeff Holland, Aquatic Magazine.
Regrowth of Egyptian paspalidium
Paspalidium geminatum after harvesting

Craig T. Mallison¹, Bill Pouder¹, Boyd Z. Thompson² and Rue S. Hestand, III²
Florida Fish and Wildlife Conservation Commission

Introduction
Over the past four decades, the Florida Fish and Wildlife Conservation Commission (FWC) has conducted projects to restore or improve degraded aquatic habitats (e.g., Holcomb and Wegener 1971, Moyer et al. 1995, Hulon et al. 1998, Mallison and Hujik 1999). One component of habitat enhancement included revegetation to reestablish native aquatic plants. Whole plants were obtained from wild collection sites or nurseries and planted into the desired locations. Sustained populations of desirable emergent plants [Egyptian paspalidium (Paspalidium geminatum), maidencane (Panicum hemitomon)],

A) pre-harvest
B) post-harvest
C) three weeks post-harvest
D) six months post-harvest

Figure 1. Sampling sites of Egyptian paspalidium on Lake Kissimmee, Florida, on A) 5/18/04, before harvesting, B) 5/18/04, following harvesting, C) 6/10/04, and D) 11/17/04.
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and bulrush (Schoenoplectus spp. = Scirpus spp.) have been established in several locations, including Lake Thonotosassa and Lake Henry (Denson and Langford 1982) and Emeraldal Marsh (Marburger et al. 1998).

In fiscal year 2005-06, the FWC secured permits from the Florida Department of Environmental Protection’s (DEP) Cooperative Plant Control Program to plant more than one million aquatic plants (including up to 603,750 maiden-cane and Egyptian paspalidium) in 27 lakes for various revegetation projects statewide. Due to logistical constraints and higher costs associated with nursery-reared propagules, donor plants for most FWC projects were obtained from nearby lakes with well-established populations suitable for serving as wild collection sites. Typically, permit conditions specify that no more than 5-10% of any stand may be collected in order to prevent damage to source populations. To obtain enough plants required for supplying large-scale revegetation projects, collections must be spread over a large area and adequate populations of source plants must be located. Suitable collection sites contain robust, moderately-dense stands of desired plants that are free of exotic vegetation in a water depth appropriate to the collection method. Sites with these criteria and within close proximity to planting sites may be difficult to secure.

Planting grass cuttings (growing tips or tops) is an effective method for establishing grasses in pastures (Adjei and Mislevy 2001). In aquatic habitats, this method showed potential in test plots to establish Egyptian paspalidium in Lake Jackson (Osceola County; Jim Sweetman, FWC, personal communication) and maiden cane in Newnans Lake. On Lake Istokpoga, Egyptian paspalidium and maiden cane growing tips were collected and replanted within the lake. Concurrently, whole plants (rhizome and stem) were collected and replanted in adjacent locations. Regrowth of cut stems was observed within one month in the harvest area. Survival and growth of planted stems was comparable to that of transplanted whole plants. However, no scientific evaluations were made on any of these projects to determine the effects of cutting on source plants or to compare survival rates for planted cuttings and whole plants.

During 2004, the FWC conducted a habitat enhancement project on Lake Tohopekaliga (Osceola County). This involved an extreme drawdown (artificial lowering of water levels) of this 7,615 ha lake to expose the lake bottom in the littoral zone. Dense vegetation and associated organic material was then removed from greater than 1,500 ha of littoral zone with heavy machinery. Approximately four million Egyptian paspalidium cuttings were planted on 79 ha of cleared lake bottom via disking and rolling to reestablish desirable aquatic plants. Source plants for the revegetation effort were mechanically harvested (cut 30-70 cm below the water surface) with a Kelpin 800 harvester (Haller 1996) from nearby Lake Kissimmee during May 2004.

A subsequent project was conducted to evaluate recovery of harvested sites on Lake Kissimmee. The objective of this study was to document the response of source plants to cutting via mechanical harvester.

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of weeks post harvest</th>
<th>Mean stem density</th>
<th>Standard error</th>
</tr>
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<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 18</td>
<td>(pre-harvest)</td>
<td>16.0</td>
<td>3.1</td>
</tr>
<tr>
<td>June 10</td>
<td>3</td>
<td>18.0</td>
<td>4.0</td>
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<td>June 30</td>
<td>6</td>
<td>13.0</td>
<td>2.3</td>
</tr>
<tr>
<td>August 5</td>
<td>11</td>
<td>13.3</td>
<td>1.3</td>
</tr>
<tr>
<td>November 17</td>
<td>26</td>
<td>17.8</td>
<td>3.7</td>
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<tr>
<td>Plot 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 18</td>
<td>(pre-harvest)</td>
<td>23.5</td>
<td>4.2</td>
</tr>
<tr>
<td>June 10</td>
<td>3</td>
<td>18.0</td>
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<tr>
<td>November 17</td>
<td>26</td>
<td>15.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

1 Each value is the mean of four replicates.
Results and Discussion

Substantial regrowth of Egyptian paspalidium had occurred by three weeks after harvest. Harvested areas were difficult to distinguish from non-harvested areas (Figure 1). There was no significant difference (both \(P>0.1\)) between initial (pre-harvest) stem density and post-harvest stem density at either site (Table 1). No significant changes in stem density were observed for the remainder of the study. Regrowth of Egyptian paspalidium in all other harvested areas appeared comparable to that of the study sites. No effects of three hurricanes or high water levels (Figure 1-D), which occurred at three to six months following harvest, were evident on source plants.

Results indicated that harvesting Egyptian paspalidium cuttings as donor plants for revegetation projects had minimal impact to source populations. Revegetation with cuttings may be preferable to that using whole plants because regrowth of source plants can be expected very soon after cutting, ensuring that donor sites remain intact. In addition, whole plant collections would require more time for adjacent plants to expand and replenish source populations. Survival of planted cuttings, compared to that of transplanted whole plants, needs to be evaluated.

Literature cited


Efforts to Establish Egyptian Paspalidium *Paspalidium geminatum* Following Lake Enhancement on Lake Tohopekaliga, Florida

Bill Poudre¹, Craig Mallison¹, Rue Hestand, III², and Boyd Thompson²  
Florida Fish and Wildlife Conservation Commission

Introduction  
Lake Tohopekaliga (Lake Toho) is a 7,615 ha eutrophic lake located within the Kissimmee Chain of Lakes (KCOL) in Osceola County, Florida. Years of regulated (i.e., stabilized) water levels on Lake Toho have led to dense monocultures of aquatic vegetation [cattail (*Typha* spp.) and pickerelweed (*Pontederia cordata*)] and the accumulation of organic sediments in the littoral zone (Moyer et al. 1995). These areas were characterized by having limited angler accessibility and low dissolved oxygen levels that provide poor or unusable habitat for sportfish. In response to this habitat degradation, the Florida Fish and Wildlife Conservation Commission (FWC) implemented drawdowns (artificial lowering of water levels) on Lake Toho in 1971, 1979, and 1987 to promote drying and decomposition of accumulated sediments (Wegner and Williams 1975, Williams et al. 1992, Moyer et al. 1995). A pilot project was conducted during the 1987 drawdown to evaluate the removal of 136 ha of vegetation and organic sediments with heavy equipment (bulldozers, front-end loaders, and dump trucks) from the littoral zone (Moyer et

---

1. 3900 Drake Field Rd., Lakeland, FL 33811  
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Figure 1. Map of six revegetation sites on Lake Tohopekaliga, May 2004. A total of 79 ha were planted with Egyptian paspalidium. (DeLorme 2002).
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Initial evaluations documented improvements in substrate, aquatic macrophyte communities, and standing crops of fish in scraped areas within two years of the drawdown. However, plant communities dominated by dense monoculture stands of cattail and pickerelweed returned to pre-drawdown levels by the third year. By 2002, the majority of the lake's shallow littoral zone was covered in dense rooted emergent vegetation and floating plant communities with associated organic material (tussock). In November 2003, FWC implemented an extreme drawdown that incorporated the removal of organic sediment and plant biomass with heavy equipment from 1,538 ha of the littoral zone. The project was completed by June 2004, at which time enhanced areas of the lake contained predominantly bare (non-vegetated) sand substrate.

Vegetation and associated organic sediment removal in the littoral zone of a lake can be an effective tool in enhancing littoral habitat for sport-fish populations (Moyer et al. 1995). However, this process is non-selective in the removal and subsequent reestablishment of native aquatic vegetation. Native plants provide valuable fish and wildlife habitat (Dibble et al. 1996) and through direct competition may suppress some exotic and nuisance invasive species (Smart et al. 1998). To promote the establishment of Egyptian paspalidium (Paspalidium geminatum), a native emergent grass, a large-scale revegetation project was implemented on Lake Toho within portions of the scraped shoreline.

Previous revegetation projects conducted by FWC entailed manually transplanting plants from within-lake or from a donor lake. In most cases, regrowth and survival with this technique is considered good; however, it is time consuming and costly, depending on the scale of the project. Personal observation indicates it takes five workers approximately eight man-hours per worker to harvest and replant 10,000 stems of a plant species at an estimated cost of $2,500. Alternatively, during a 1997 drawdown of Lake Jackson (Osceola County), an area was planted with Egyptian paspalidium using vegetative cuttings (propagules) that were disked into the soil (Jim Sweatman, FWC, Personnel Communication). Each cutting had multiple growth points (nodes) along the stem. The procedure included cutting stems of Egyptian paspalidium above the soil-water interface, collecting the stems, spreading the cut stems within the revegetation site and disk-him them into the soil. This procedure appeared to have been successful as subsequent observations indicated that Egyptian paspalidium was growing in the revegetation zone. However, no scientific studies were conducted to evaluate the procedure. A similar technique is used by upland farmers in Florida to establish perennial pasture grasses for livestock (Adjei and Mislevy 1998). These authors use the technique described above, followed by rolling the disked area in two directions to prevent drying. Disking would allow for a larger area to be planted in a shorter period of time, relative to standard hand-planting procedures.

The objectives of this study were to 1) establish desirable, native vegetation in areas that had undergone vegetation and associated organic sediment removal, and 2) evaluate and document the efficacy of the disk/roll planting method.

**Methods**

In May 2004, six revegetation locations (Partin's Shoreline, 12.6 ha; Lanier Point, 21.1 ha; Shingle Creek, 13.1 ha; County Park, 22.6 ha; Whaley's Landing, 4.9 ha; and Redd's Fish Camp, 4.7 ha; Figure 1) totaling 79.0 ha were established. Egyptian paspalidium was selected for revegetation due to 1) its habitat value, 2) its reproductive ability to root and form tillers from the stems nodes, and 3) prior success planting this species by disk-him (although not scientifically documented). This species occurs naturally in the lake, and donor plants for revegetation were available at nearby Lake Kissimmee (Osceola County).

Egyptian paspalidium was mechanically harvested in the north cove of Lake Kissimmee during May 12-25, 2004. All grasses were harvested with an aquatic harvester (Kelpin 800, 21.3 m harvester) with a 3.0 m specially designed cutting head 10 cm wide and capable of cutting to a depth < 90 cm below the water surface. During harvesting, stems were collected on a conveyor belt (20.4 m²) on the front of the harvester and personnel searched the cuttings to identify and remove all unwanted plant species. Each full conveyor load held approximately 6,500 stems and thirteen loads (total 84,500 stems) were collected per harvesting event. Cut stems were off-loaded into a dump truck, washed down with lake water to keep stems hydrated, and transported to Lake Toho revegetation sites. One full harvester load (84,500 stems) was equal to one dump truck load. In the bed of the dump truck, stems were divided into quadrants with approximately 21,125 stems per quadrant. Transit from harvest site to revegetation sites ranged from 32 to 80 km, and total time from harvesting to disk-him did not exceed 18 hours.

Revegetation sites were divided into 0.4 ha blocks, as measured with a Garmin 76 GPS unit and/or Bushnell 1000 rangefinder, and marked with PVC poles. At the revegetation sites, the dump truck drove a straight path from one end of the 0.4 ha plot to the opposite end and continued this pattern until the whole plot was covered. Three people scattered the cut stems non-uniformly within the plot until approximately 21,125 stems were dispersed per 0.4 ha plot. One dump truck load covered four 0.4 ha plots. Once plants were dispersed, a Massey Ferguson Model 243 tractor pulling a Model A & B 1.8 m, 3 point hitch with disk gang consisting of 16, 45.7-cm scallop blades was run through the planting plot at a depth of 7 to
Survival of planted Egyptian pascalidium was evaluated during August 2004 (three months after planting). A random-stratified sampling design was used to establish sampling locations. Control sites (scrape only; 79.0 ha) were selected adjacent to revegetation (scraped, planted, disked, and rolled; 79.0 ha) sites. Each of the six revegetation and six control sites was divided equally into three zones; lower (closest to the waters edge), middle (middle of the planting zone) and upper (closest to the natural shoreline). Each of these zones was divided into 25 m² microgrids (25 m length parallel to shore, 1 m width), and each microgrid was assigned a number. Numbers were randomly selected prior to field sampling and coordinates were determined using Topoquads version 2.0 (DeLorme Inc. 2002). The number of microgrids selected at each revegetation site was proportional to the total area planted. A total of three replicates were collected in each zone per site except for County Park and Lanier Points, where six replicates per site were collected. Plant densities were collected following procedures described in U.S. Department of Interior (1996), as follows: A 25 m line transect was established in each selected microgrid. A person walked with a meter stick directly centered on the line (0.5 m of the meter stick laid on each side of the line). All Egyptian pascalidium plants growing within the 25 m² transect were counted (one plant was counted as one, regardless of the number of stems growing from that plant). Total number of plants was enumerated for each transect to calculate the mean number of plants per 25 m². For comparison, these numbers were extrapolated to estimate the total number of plants per sample site and per zone (lower, middle, and upper).

Results And Discussion

An estimated 4,100,000 Egyptian pascalidium stems were harvested from Lake Kissimmee and transported to Lake Toho, where they were disked and rolled into six revegetation sites for a total of 79.0 ha of planted area (Table 1). Total cost of the project was $74,800 which was $946.84 per hectare. All disk- ing activities were completed in 13 workdays with an average of 6.2 ha of revegetation per workday.

Initial observations indicated poor survival of exposed cut stems due to desiccation with no signs of growth. Exposed stems that were not covered with soil were completely dehydrated and appeared to have a poor chance of survival. For a total of 28 calendar days during and following the project, precipitation was variable across the sites but all received very little rain, which likely limited initial survival. However, one month after project completion, stems that were buried within the sediments began sprouting new shoots. To confirm these as planted stems, several plants were removed from the soil to verify that the new growth originated from planted stems (Figure 2). Poor initial survival was apparently due to limited rainfall during the project and future projects of this type should coincide with the rainy season (beginning in June in this region), and/or have an irrigation plan to keep stems hydrated until plants germinate and become established.

Estimates made three months after planting indicated a total 465,598 Egyptian pascalidium plants within revegetation sites and 871,040 plants within control sites (Table 1). Relatively high natural recruitment was evident, which makes it difficult to discern what was planted and what grew back naturally. One noticeable difference was that both terrestrial
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and aquatic vegetation (all species) in the revegetation sites was reduced in comparison to control sites. It appeared that the disking and rolling technique may have reduced or delayed natural recruitment of Egyptian paspalidium and other plant species. Poor initial survival of planted Egyptian paspalidium stems coupled with reduced growth of naturally recruited plants may explain the observed difference in stem densi-

Table 1. Estimated number of Egyptian paspalidium stems planted, mean number of Egyptian paspalidium plants counted per 25 m² transect, and extrapolated total number of plants, for six revegetation and six control sites on Lake Tohopekaliga, August 2004. Sites were divided into three zones, lower (closest to water’s edge), middle (middle of planting site), and upper (closest to the natural shoreline) for evaluation. SE = Standard error.

<table>
<thead>
<tr>
<th>Site/Zone</th>
<th>Number Planted</th>
<th>Mean (SE) number of plants per 25 m² transect</th>
<th>Extrapolated total number of plants</th>
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<tbody>
<tr>
<td></td>
<td>Revegetation</td>
<td>Control</td>
<td>Revegetation</td>
</tr>
<tr>
<td>County Park</td>
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<tr>
<td>Lower</td>
<td>397,854</td>
<td>11.5 (3.3)</td>
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<td>397,854</td>
<td>5.8 (2.5)</td>
<td>1.0 (0.6)</td>
</tr>
<tr>
<td>Upper</td>
<td>397,854</td>
<td>4.5 (1.3)</td>
<td>0.3 (0.3)</td>
</tr>
<tr>
<td>Total</td>
<td>1,193,562</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lanier Point</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Lower</td>
<td>341,448</td>
<td>24.5 (8.8)</td>
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<tr>
<td>Total</td>
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<td>Partin’s Shoreline</td>
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<tr>
<td>Redd’s Fish Camp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>82,740</td>
<td>69.7 (43.9)</td>
<td>117.0 (32.6)</td>
</tr>
<tr>
<td>Middle</td>
<td>82,740</td>
<td>7.0 (1.2)</td>
<td>14.3 (8.7)</td>
</tr>
<tr>
<td>Upper</td>
<td>82,740</td>
<td>5.0 (1.2)</td>
<td>0.3 (0.3)</td>
</tr>
<tr>
<td>Total</td>
<td>248,220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whaley’s Landing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>86,260</td>
<td>15.3 (10.7)</td>
<td>24.0 (6.9)</td>
</tr>
<tr>
<td>Middle</td>
<td>86,260</td>
<td>5.7 (1.9)</td>
<td>8.7 (3.7)</td>
</tr>
<tr>
<td>Upper</td>
<td>86,260</td>
<td>8.3 (4.1)</td>
<td>0.7 (0.3)</td>
</tr>
<tr>
<td>Total</td>
<td>258,780</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>4,082,190</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regrowth of Egyptian paspalidium was greatest along Partin’s shoreline with an estimated 158,592 plants in revegetation sites and nearly double that in control sites. This site was the first to be planted and one of the first to be scraped, which may have resulted in a longer growing period for plants to become established. In both revegetation and control sites at all locations, Egyptian paspalidium plants were greatest in number in the lower zone (closest to the waters edge). Higher soil moisture due to capillary movement of water from the lake may have provided enough water for survival of planted stems as well as for natural recruitment to occur.

In summary, our results indicated that natural recruitment was at least as effective in establishing Egyptian paspalidium as the disk/roll technique used in this study. Prior to this project, Egyptian paspalidium was already one of the dominant plant species in Lake Toho. Therefore, we recommend not using this technique (at least without modification) when the species is already present. However, germination of planted stems was documented and this technique holds promise. We recommend that future projects using the disk/roll technique be conducted on lakes with little or no Egyptian paspalidium so that a more comprehensive evaluation of survival can be reported. Our results also indicated that adequate soil moisture is crucial to the establishment of this species. Therefore, we recommend that planting be concentrated as close to the lake’s edge as possible and during the rainy season.

**Literature Cited**


St. Johns River Water Management District, Dept. of Water Resources

This comment was submitted in response to the editorial “Restoring Sport Fishing at Lake Apopka” published in the spring, 2006 issue of Aquatics magazine (Aquatics 28(1). 2006). Editor.

In a recent editorial, Murphy, Hoyer, and Canfield (2006) proposed a four-point program that in their view would restore a largemouth bass (Micropterus salmoides) fishery to Lake Apopka within a few years. Their proposal was based on their conclusion that the current restoration program for Lake Apopka by the St. Johns River Water Management District (District) is not working to restore aquatic plants and therefore habitat for game fish. Although we share the goal of Murphy et al. (2006) to improve recreational fishing in Lake Apopka, we disagree with some of their analyses and conclusions. Further, we disagree with their recommendations to allow hydrilla (Hydrilla verticillata) to colonize the lake and to begin now to utilize the former farm lands for temporary water storage to enhance lake level fluctuation. We present evidence that restoration of both water quality and habitat has been occurring for more than a decade in Lake Apopka and that the plan proposed by Murphy et al. (2006) is ill advised.

First, Murphy et al. (2006) acknowledged improvements in water quality in Lake Apopka due to the restoration program but did not recognize that the District’s nutrient load reduction program is a work in progress. Reductions in nutrient levels, increases in transparency, and volunteer colonization by eelgrass (Vallisneria americana) in Lake Apopka first were noted in 1995 (Battoe et al. 1999).

These improvements have continued (Coveney et al. 2005), but about 50% of the former farm area still cannot be flooded because of risk for bioaccumulation of pesticide residues from the farm soils. To keep the fields dry, drainage water still is discharged to Lake Apopka although with partial treatment to remove phosphorus. The District will slowly expand the wetland areas, and reduce nutrient loading further, in coming years. In response to the District’s restoration program, improvements to Lake Apopka have been much stronger and have occurred much sooner than many in the scientific community predicted (Coveney et al. 2005). Average values in recent years (January 2003 to July 2006) for important water quality indicators (phosphorus, chlorophyll, Secchi depth) represent a 52% to 67% improvement compared to conditions prior to 1995.

Second, we believe that the statement by Murphy et al. (2006) that eelgrass was planted in Lake Apopka in 1998 and 1999 was incorrect. The District unsuccessfully attempted to plant eelgrass at two sites in the early 1990s. We know of no successful planting of eelgrass and believe that all the eelgrass beds that developed in Lake Apopka starting in 1995 came from volunteer growth.

Third, the conclusion by Murphy et al. (2006) that the current restoration program for Lake Apopka has not improved growth conditions for native aquatic plants and will not accomplish this goal in the foreseeable future is based on an incomplete analysis. They noted that the District found approximately 11,000 m² of eelgrass in the lake in 1997 (cited by Murphy et al. as 1999). Murphy et al. compared that area with their own data (900 m²) from 2004 and concluded that eelgrass had drastically declined due to poor sediment conditions. However, their analysis did not consider the severe drought that occurred between those two observations. In summer 2001 and again in 2002, Lake Apopka reached record low levels. Lake volume was reduced almost 75% from the long-term average, and the eelgrass beds located by District staff in 1997 were eliminated by exposure, desiccation, and replacement by terrestrial plants. Thus the observations by Murphy et al. in 2004 reflected recovery of the eelgrass population from the drought rather than reduction of the population by poor sediment conditions. In 2005 District staff mapped 9,915 m² eelgrass, an area more than 10-fold greater than the area reported by Murphy et al. in 2004. A still ongoing mapping in 2006 already has located over 62,000 m² eelgrass and more than 10,000 m² musk-grass (Chara sp.). Although several-fold increases in area covered by submerged aquatic vegetation from one year to the next will not necessarily be the norm, these data show that eelgrass has increased greatly since the drought, contrary to the conclusion of Murphy et al. (2006).

Murphy et al. (2006) described a scenario for Lake Apopka where water quality improvements have reached the limit of the District’s program and where planted eelgrass largely disappeared because of extensive soft sediments. The scenario that better fits the evidence is that partial nutrient load reductions have been accomplished and that water quality improvements have continued despite record drought and hurricane activity. Colonizing eelgrass beds lost to drought several years ago are rebounding. Nutrient levels are declining, algal levels are declining, water transparency is increasing, and native aquatic plants are increasing. The District has found a small percentage of eelgrass beds growing...
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in soft sediments; therefore, soft sediments do not preclude eelgrass colonization. The conclusion by Murphy et al. (2006) that the current restoration program for Lake Apopka will not provide improved habitat for largemouth bass any time soon is premature.

At the policy level, we disagree with the proposal by Murphy et al. (2006) to allow the non-native, invasive hydrilla to proliferate in Lake Apopka to provide habitat for largemouth bass. This recommendation directly opposes the current work of the District to locate and eradicate even small patches of hydrilla to prevent infestation and promote native species. We see a great risk that control of hydrilla would be prohibitively expensive or impossible to achieve once the plant is allowed to grow freely. Hydrilla could eliminate native submerged plants and require repeated and costly treatments with herbicides to control a lake-wide infestation.

Although they mentioned growing hydrilla behind artificial reefs, Murphy et al. did not describe how hydrilla would be limited to the desirable 10 – 15% coverage nor did they estimate the cost of control. The cost of a single whole-lake treatment with fluridone in Lake Apopka (155,000 acre-feet, 10 ppb fluridone) would be about $1 million (Hoyer et al. 2005). Furthermore, hydrilla is becoming increasingly resistant to fluridone, so control might be impossible even if funding were available. Murphy et al. (2006) proposed that Lake Apopka be the “test lake to determine if the FWCC can manage hydrilla to the benefit of recreational fishing.” A 31,000-acre lake, in which federal, state, and local governments have invested well over 100 million dollars, is not a good candidate for such testing. There are many hydrilla-infested lakes in Florida that better could serve this “test” purpose.

Lastly, Murphy et al. (2006) recommended that water level in Lake Apopka now should be fluctuated by temporarily flooding the restored wetlands (former farms). Their recommendation did not consider the complexities of this process. Large areas of the former farms currently cannot be flooded because of risks with exposure of wildlife to pesticide residues. The District expects to flood these areas eventually, but only through a careful, deliberate, and gradual process that will include risk assessment, monitoring, and possibly remediation. Even if all the former wetlands at Lake Apopka currently were restored and available for flooding, the proposal by Murphy et al. raises other problems. First, the water levels, flooding durations, and return intervals of flooding these wetlands must be carefully regulated. Otherwise, damaged vegetation and degraded wetland quality would result. Second, return-pumping of large volumes of water to Lake Apopka would exceed the allowable phosphorus loading unless costly chemical treatment were provided. Water pumped from this area during the period of farming was the primary source of nutrients that damaged the lake in the first place. Third, fish growing in some areas of the former farms would accumulate sufficient pesticides to be unsuitable for human consumption. This situation will persist until pesticides are reduced by remediation or by natural degradation. Fish from these wetland areas should not be allowed to enter the lake. Finally, lake water levels towards the end of the recent drought (2001 – 2002), reached lower elevations naturally than levels achievable by flooding the north shore.

The District is implementing a comprehensive lake and watershed restoration program for Lake Apopka with goals that extend well beyond improved water quality. Important components of this program include reduction in external nutrient loading from the watershed, removal of nutrients and suspended solids from lake water in a treatment wetland, and large-scale harvest of gizzard

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Evidence of the efficacy of the District’s restoration approach can be found in another lake in the Harris Chain, Lake Griffin, where external nutrient loading has been reduced and gizzard shad have also been harvested. There, improvements in lake water quality, combined with aggressive, multi-agency control of hydrilla, have resulted in expansion of native plants. Improved habitat should lead to larger gamefish production. According to local media reports, sportfishing has improved in Harris Chain lakes in recent years (e.g. “Harris Chain has earned status among anglers”, The Daily Commercial, February 26, 2006). In Lake Griffin the catch per unit effort in May experimental gill nets for four gamefish species combined increased from the first two years (2002/03) to the last two years (2005/06) of monitoring, although the increase was not statistically significant. Further monitoring will determine whether gamefish populations are responding to habitat improvements in Lake Griffin.

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References


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Scholarships Awarded
The FAPMS Scholarship and Research Foundation, Inc. has named seven recipients of the Paul C. Myers Applicator Dependent Scholarship. The following students each received $750.00 for the upcoming school year:

1) Daniel Deese, son of Buddy Deese, is a sophomore attending the University of Miami.
2) Heather Hertel, daughter of Eric Hertel, is a junior attending Indian River Community College.
3) Katie Hertel, daughter of Eric Hertel, is a sophomore attending Indian River Community College.
4) Greg Magee, son of Norma Cassinari, is a junior attending Indian River Community College.
5) Jenna Pontius, daughter of Vicki Pontius, is a freshman attending South Florida Community College.
6) Brianna Schooley, daughter of Nick Schooley, is a freshman at the University of Central Florida.
7) Rena Tchekmeian, daughter of David Blackburn, is a junior at Florida Gulf Coast University.

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