Bear Lake Survey 2009-2010

On **8 December 2009**, Seminole County Water Lake Management Program staff Gloria Eby and Dean G Barber surveyed the aquatic plants in **Bear Lake**. The SAV continues to be muskgrass, road grass, hydrilla, baby tears, southern naiad, stonewort, and eelgrass, with some sago pondweed. The dominant SAV inshore is stonewort to a depth of 10 ft. and eelgrass offshore to 16 ft. Considering that over 70% of the lake is in a depth of less than 16 ft. and over 80% of this bottom consist of SAV, 174 acres of SAV, or 56% of the lake bottom cover with aquatic vegetation.

All of these bottom plants are natives except the invasive exotic hydrilla, which is present in small quantities inshore and offshore, which presently represents ~ less than 5 acres of hydrilla. In the inshore, all native SAV are competing with hydrilla for space. Offshore, hydrilla was observed to a depth of 21 ft., deeper than the native SAV. Hydrilla will continue to expand offshore into deeper water as the lake clarity improves, with its long strands fragmenting by wave action caused by wind and boats. These fragments will float into new areas to establish, competing with the native SAV.

The stocking of triploid grass carp fish, coupled with the native aquatic plants will be a major factor in checking this hydrilla expansion. With continued improvement of water clarity and reduction of hydrilla by grass carp, native SAV will expand in the inshore and offshore. Granted conditions will vary.

The dominant emergent aquatic plant continues to be the exotic invasive torpedo grass which left unchecked will continue to expand driving out other beneficial native emergent aquatic plants, such as maidencane grass, duck potato and pickerelweed.

Water hyacinth, is the dominant aquatic plant in the canal off of Linneal Beach Drive consisting of over 0.2 acres (an increase), followed by the two species of the exotic papyrus (*Cyperus papyrus*) and dwarf papyrus (*Cyperus papyrus* or *C. isocladus*). Secchi reading (water clarity) was 9 ft. in 17 ft. decrease from last month of 11.5 ft in 13.5 ft.

On **21 January 2010**, Seminole County Water Lake Management Program staff Gloria Eby, Thomas Calhoun and Dean G Barber surveyed the aquatic plants in **Bear Lake**. The SAV continues to be muskgrass (to 7 ft.), road grass, hydrilla, baby tears, southern naiad (14 ft.), stonewort, and eelgrass. The dominant SAV inshore is stonewort with eelgrass dominant offshore, observed to 15 ft. Although eelgrass is dominant offshore, it is also the second most abundant SAV inshore, making it the most abundant SAV in the lake. All of these native SAV compete for bottom space with the invasive exotic hydrilla, which continues to be present in small quantities inshore and offshore. The offshore hydrilla population is present in 14-21 ft., deeper than any native SAV. Photo of hydrilla during this survey is attached with maximum density.

The dominant emergent aquatic plant continues to be the exotic invasive torpedo grass which is present adjacent to almost all residential waterfronts. Another highly invasive exotic, water hyacinth, was observed during this survey at more lake locations than any other previous survey.

It also continues to be the dominant aquatic plant in the canal off of Linneal Beach Drive consisting of over 0.2 acres, followed by the two species of the exotic papyrus (*Cyperus papyrus*) and dwarf papyrus (*Cyperus papyrus* or *C. isocladus*). Photo of hyacinth in canal attached affected by freeze.
Secchi reading (water clarity) was 12.6 ft in a depth of 20.09 ft., a significant improvement from the 8 December 2009 reading of 9 ft.

On **23 February 2010**, Seminole County Water Lake Management Program staff Gloria Eby, Thomas Calhoun (Assistant Scientist), Dean G Barber (Consultant) and Ryan Hamm (FWC Biologist) surveyed the aquatic plants in **Bear Lake**. This is the first month since 14 May 2009 that hydrilla was not observed on the survey, even though we went to two previously (GPS) documented hydrilla locations and made several other bottom grabs. However, the two surveys before the May 2009 survey, 27 January 2009 and 18 November 2008, hydrilla was observed and all the surveys between 14 May 2009 to present. On all of the previous surveys that hydrilla was observed, it was present in both areas; inshore and offshore. The inshore population has always competed for space with the native SAV, dominantly eelgrass and stonewort, with smaller populations of chara, road grass, baby tears and southern naiad. Offshore hydrilla has competed with mostly eelgrass with also in competition with chara, southern naiad and stonewort. The alarming concern offshore is that the hydrilla can receive enough light in deeper water, documented to depths over 20 feet, than the native SAV, usually to 15 feet, thereby, hydrilla is establishing and spreading into these deeper zones. However, presently it was not observed in any of these sites. The true test will be in the spring when all plants will be actively growing, to see if hydrilla will be included. Also apparent is that the native SAV population is presently not declining or expanding, but also, waiting for spring.
The emergent aquatic plant populations were the most obviously impacted from the winter dieback, such that it was difficult to discern between the exotic grass torpedo grass and the native maidencane, although, both are present. Like the SAV, these populations will be expanding in the spring. Water hyacinth were still observed in the canal off of Linneal Beach Drive, but none were found in the lake. The two species of the exotic papyrus (*Cyperus papyrus*) and dwarf papyrus (*Cyperus papyrus* or *C. isocladus*) are still a dominant factor in the canal. The water elevation was 103.88 feet above sea level.

On **23 March 2010**, Seminole County Lake Management Program staff Gloria Eby, Thomas Calhoun (Assistant Scientist), Dean G Barber (Consultant) and Matt Rayl (Aquatic Ecosystem, Inc. biologist) surveyed the aquatic plants in **Bear Lake**. This is the second month in a row that hydrilla was not observed during the survey, inshore or offshore. Other submersed aquatic vegetation (SAV) observed included: muskgrass to a depth of 7 ft., southern naiad to 12 ft., stonewort to 12 ft. and eelgrass to 15 ft. Eelgrass was the most abundant SAV, however throughout the lake it was not healthy, discolored, torn and fragmented with most plants missing the distal end. The shallower plants were covered with a significant amount of substrate algae. The deeper plants had the same appearance but were not coated with as much algae. As much as the other SAV seemed to be reduced, possibly from winter die back, none of these SAV were as significantly impacted or coated with algae to draw some correlation with the condition of eelgrass. These conditions were not observed previously.

Secchi was 11.8 ft. in a depth of 20 ft., a reduction from the January 21, 2010 reading of 12.6 ft., a change, but not a significant change to see such an impact in the SAV.

The emergent aquatic plant populations continue to be impacted from the winter dieback, however, several species, like the pickerelweed and the invasive exotic torpedo grass are starting to show spring growth. Water hyacinths populations were expanding in the canal off of Linneal Beach Drive, with a few plants observed in the lake. The water elevation was 104.05 higher than last month of 103.88 ft. above sea level.

On **16 April 2010**, Seminole County Lake Management Program staff Gloria Eby, Thomas Calhoun (Assistant Scientist), and Dean G Barber (Consultant) surveyed the aquatic plants in **Bear Lake**. Hydrilla was observed during the survey but only one fragment was found. Other submersed aquatic vegetation (SAV) observed included: southern naiad to 12 ft., stonewort to 5 ft. and eelgrass to 18 ft. Eelgrass was the most abundant SAV offshore with southern naiad and nitella being co- dominant. Secchi was 12.5 ft. in a depth of 31 ft., an increase from the March 23, 2010 reading of 11.8 ft.

The emergent aquatic plant populations are continuing to show spring growth. Water hyacinths populations were expanding in the canal off of Linneal Beach Drive, with a few plants observed in the lake. The water elevation was 103.65 lower than last month's reading of 103.88 ft. above sea level. Our next inspection date will be June 23rd for Bear and June 24th for Cub.

On June 23, 2010, Gloria Eby (Seminole County [SC] Senior Environmental Scientist), Marianne Pluchino (SC Senior Environmental Scientist), Shannon Wetzel, Thomas Calhoun (Assistant Scientist), David Scharr (DEP), Day McClanahan (DEP) and Alicia Knecht (FWC) surveyed the aquatic plants and conducted a Lake Vegetation Index (LVI) of **Bear Lake**. The LVI was created by the Florida Department of Environmental Protection as a rapid screening tool for ecological condition; it determines how closely a lake's flora resembles that of an undisturbed lake. Bear Lake is 311 surface acres with a mean depth of 12 feet, maximum depth of 37 feet, located in the Little Wekiva watershed. The Secchi (water clarity) was 9.2 ft in a depth of 22.7 ft. at the time of inspection. The range of this reading from 1973-2010, 285 samples, has been 4.9 to 37 ft. The Water Quality Index (Trophic State) was 13 (Good) taken 4/20/2010. The water quality range for 262 samples taken from 1991 to 2010 has been 13 (Good) to 52 (Good).

Some of the submersed aquatic vegetation (SAV) found during inspection include eelgrass (*Vallisneria americana*) to 13 ft, stonewort (*Nitella sp.*) to 10 ft, southern naiad (*Najas guadalupensis*) to 13 ft and musk grass (C*hara sp.*) to 6 ft. The SAV found in the inspection has been reduced since the last inspection. Eelgrass was found brown and fragile showing signs of impact (photo attached). The emergent aquatic plant populations are continuing to show growth with the invasive torpedo grass (*Panicum repens*) being dominant. Water hyacinths populations are continuing to greatly expand should in the canal off of Linneal Beach Drive (photo attached). It is recommended to collect or treat the hyacinths in the canal. Water elevation was 103.70 higher than last month's reading of 103.65 ft. above sea level.

On 15 July, 2010 Seminole County Lake Management Program (SCLMP) staff Dean G Barber and Thomas Calhoun surveyed the aquatic plants in **Bear Lake**. Submersed aquatic vegetation (SAV) found during inspection include: musk grass, road grass, and southern naiad to a depth of 13 feet, stonewort to 11 feet and eelgrass to 13 ft. Eelgrass was the most abundant SAV, however, like southern naiad and stonewort, all of these were covered with filamentous algae and each population reduced from the previous survey, 23 June 2010. Additionally, the eelgrass was stressed, had loss of pigmentation and severely fragmented. In waters 2-5 feet deep, filamentous algae was observed coming off the bottom (12-18 inches in length) in areas that have previously been occupied by eelgrass. Torpedo grass continues to be the most abundant emergent aquatic plant, present on most waterfronts. The water hyacinth population in the Linneal Beach Drive canal consist of about 0.5 acres (expanding). A few hyacinths were observed in Bear Lake. We continue to recommend to treat or hand remove the hyacinth from this canal.

Water elevation was 103.63 feet compared to 103.70 last month. The Secchi (water clarity) was 10.3 feet in a depth of 13.2 feet, compared to 9.2 feet last month.

On August 23, 2010, Gloria Eby (Seminole County [SC] Senior Environmental Scientist) and Thomas Calhoun (Assistant Scientist) surveyed the aquatic of Bear Lake. Some of the submersed aquatic vegetation (SAV) found during inspection include eelgrass (*Vallisneria Americana*) to 9 ft, stonewort (*Nitella spp*.) to 9 ft and Sothern naiad (*Najas guadalupensis*) to 9 ft. The SAV found in the inspection has been further reduced since the last two inspections. Eelgrass was found brown and fragile showing signs of a possible treatment. The emergent aquatic plant populations are continuing to show growth with invasive plants being dominant. Some of these invasive shoreline plants include; alligator weed (*Alternanthera philoxereroides*), elephant ear (*Colocasia esculenta*), water primrose (*Ludwigia peruviana*) and the most abundant torpedo grass (*Panicum repens*). The water hyacinths in the canal off of Linneal Beach Drive have been treated in one area but still have a large remaining biomass. The water elevation was 103.70 the same as last month's reading of 103.70 ft. above sea level. The secchi reading during the inspection was 9ft in a total of 35.4ft.

On 7 September 2010 Seminole County Lake Management Program (SCLMP) staff Gloria Eby, Dean G Barber and Thomas Calhoun surveyed the aquatic plants in **Bear Lake**. Submersed aquatic vegetation (SAV) observed during this inspection include: musk grass to a depth of 5 feet, road grass, stonewort (nitella) to 12 feet and eelgrass to 12 feet. Stonewort was the dominant SAV, followed by eelgrass. Southern naiad was not observed during this survey, a native aquatic plant that is the most desirable Bear Lake SAV. Likely this has been reduced by the triploid grass carp fish just as hydrilla. Hydrilla has not been observed for several months, although previously this plant was densely established to a depth of over 20 feet with plant strands almost reaching the surface. All the SAV observed on this survey was covered with algae. Also the eelgrass was stressed, fragmented, showing a significant loss of pigment, very different from Cub Lake eelgrass observed on the same day and other lakes within the county with eelgrass. The invasive exotic torpedo grass continues to be the most abundant emergent aquatic plant, present on most waterfronts, healthy, in thick populations and expanding. The invasive exotic floating aquatic plant, water hyacinth, in the Linneal Beach Drive canal is over 0.5 acres and expanding.

On 27 October 2010 Seminole County Lake Management Program (SCLMP) staff Thomas Calhoun and Marie Lackey surveyed the aquatic plants in **Bear Lake**. Submersed aquatic vegetation (SAV) observed during this inspection include: musk grass (*Chara spp*.) to a depth of 6 feet, stonewort (*nitella spp*) to 14 feet and eelgrass (*Vallisneria americana*) to 14 feet. Eelgrass was the dominant SAV found to 14 feet with blooms coming to the surface at 12 feet, followed by stonewort and then musk grass. Southern naiad was not observed for the second survey in a row, a native aquatic plant that is the most desirable Bear Lake SAV. Likely this has been reduced by the triploid grass carp fish just as hydrilla has. Hydrilla has not been observed for several months, although previously this plant was densely established to a depth of over 20 feet with plant strands almost reaching the surface. The invasive exotic torpedo grass continues to be the most abundant emergent aquatic plant, present on most waterfronts, healthy, in thick populations and expanding. Also a new invasive exotic dwarf papyrus (*Cyperus prolifer*) has been found and is expanding along various shorelines of Bear Lake. The invasive exotic floating aquatic plant, water hyacinth, as well as cattails (*Typha spp.*) and yellow cow lily (*Nuphar leteum*) in the Linneal Beach Dr. canal have been chemically treated and reduced. Also an algae bloom was present in the canal at the time of the inspection probably due to the recent treatment. While conducting the inspection we saw many shorelines cleared or in the process of being cleared of vegetation. Remember in order to remove any aquatic vegetation along your shoreline you must have an aquatic plant-removal permit from the FWC.
http://myfwc.com/License/LicPermit_DownloadApps.htm
The lake elevation at the time of inspection was 103.18 feet above sea level. The secchi depth at the time of inspection was 8.9 feet in a depth of 23.1 feet.