

January 28, 2004

**MEMORANDUM**

**TO:** File

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Lisa Henningsen, Environmental Scientist 3, and  
Richard Gant, Field Technician Supervisor  
Resource Conservation and Development Department  
Southwest Florida Water Management District

**SUBJECT:** Proposed minimum and guidance levels for Clear Lake in  
Pasco County, Florida

## **Clear Lake**

### ***General Description***

Clear Lake (a.k.a. Lake Jovita) is located in the Withlacoochee River Basin of the Southwest Florida Water Management District in Pasco County, Florida (Section 1, Township 25S, Range 20E). The lake is located in the Brooksville Ridge physiographic region (White 1970). Brooks (1981) characterized the area surrounding the lake as the Dade City Hills subdivision of the Ocala Uplift Physiographic District, and described the subdivision as a "spectacular ridge of high hills dissected from Upper Miocene sand and silty sand". As part of the Florida Department of Environmental Protection's Lake Bioassessment/Regionalization Initiative, the area has been identified as the Southern Brooksville Ridge lake region and described as an area of thick sand hills overlying limestone, with slightly colored, mostly neutral to alkaline (some are acidic) mesotrophic or meso-eutrophic lakes (Griffith *et al.* 1997).

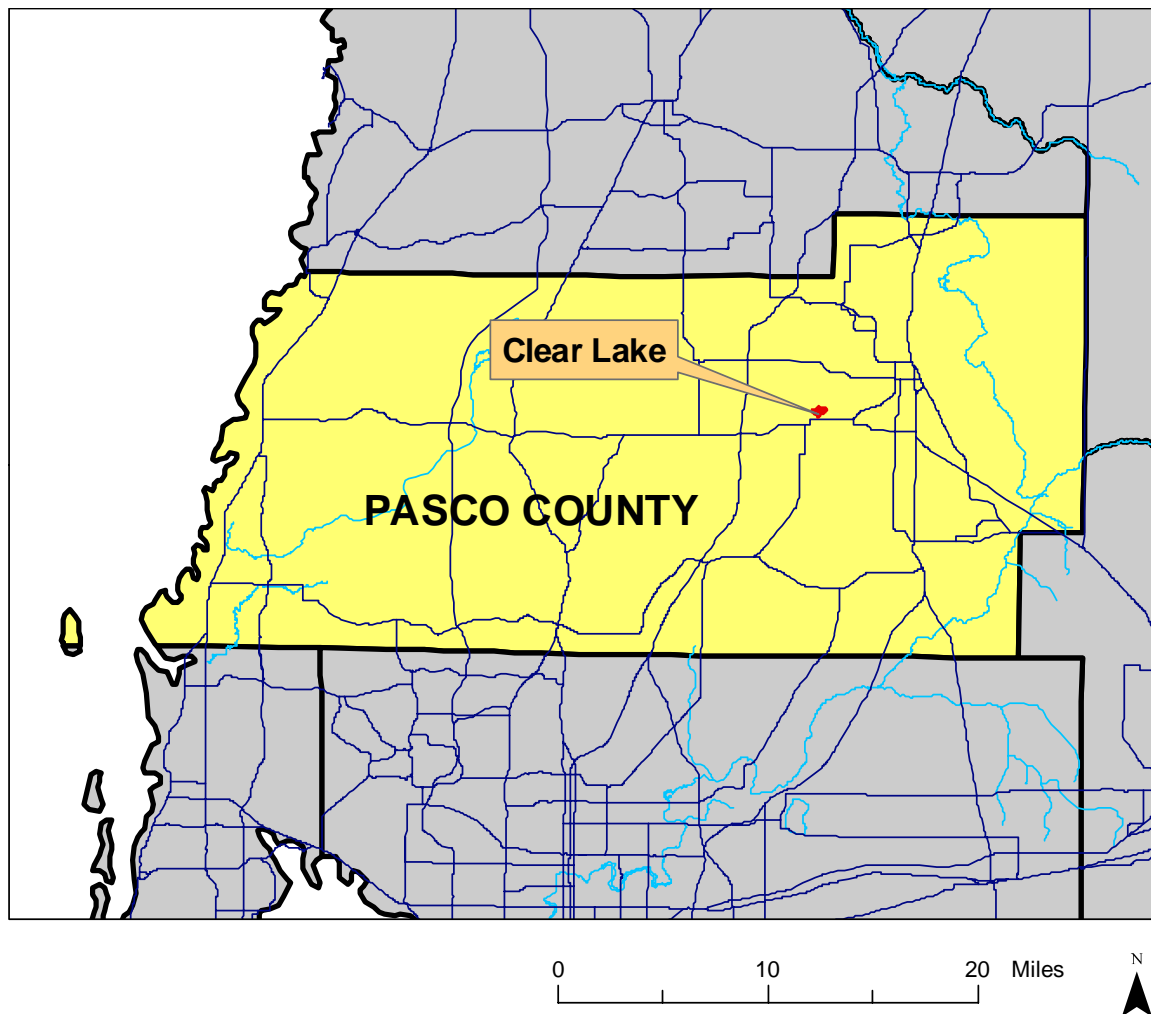
Uplands surrounding the lake have been cleared and are currently in use for citrus production, residential home sites and the grounds for the St. Leo University campus (Figure 2). Pasco County maintains a park and fishing pier along the southwestern shore of the lake. A discontinued United States Geological Survey water level gauge is located at the park site. The Southwest Florida Water Management District regulatory gauge is located a short distance north of the park.

Clear Lake is located in the Tank Lake Outlet drainage basin. The lake has a drainage area of 0.9 square miles (Florida Board of Conservation 1969). Surface inflows occur along the south shore, from a golf course, and along the east shore, from a small lake (Figure 2). A wier, culvert and ditch system provide an outlet from the basin along the

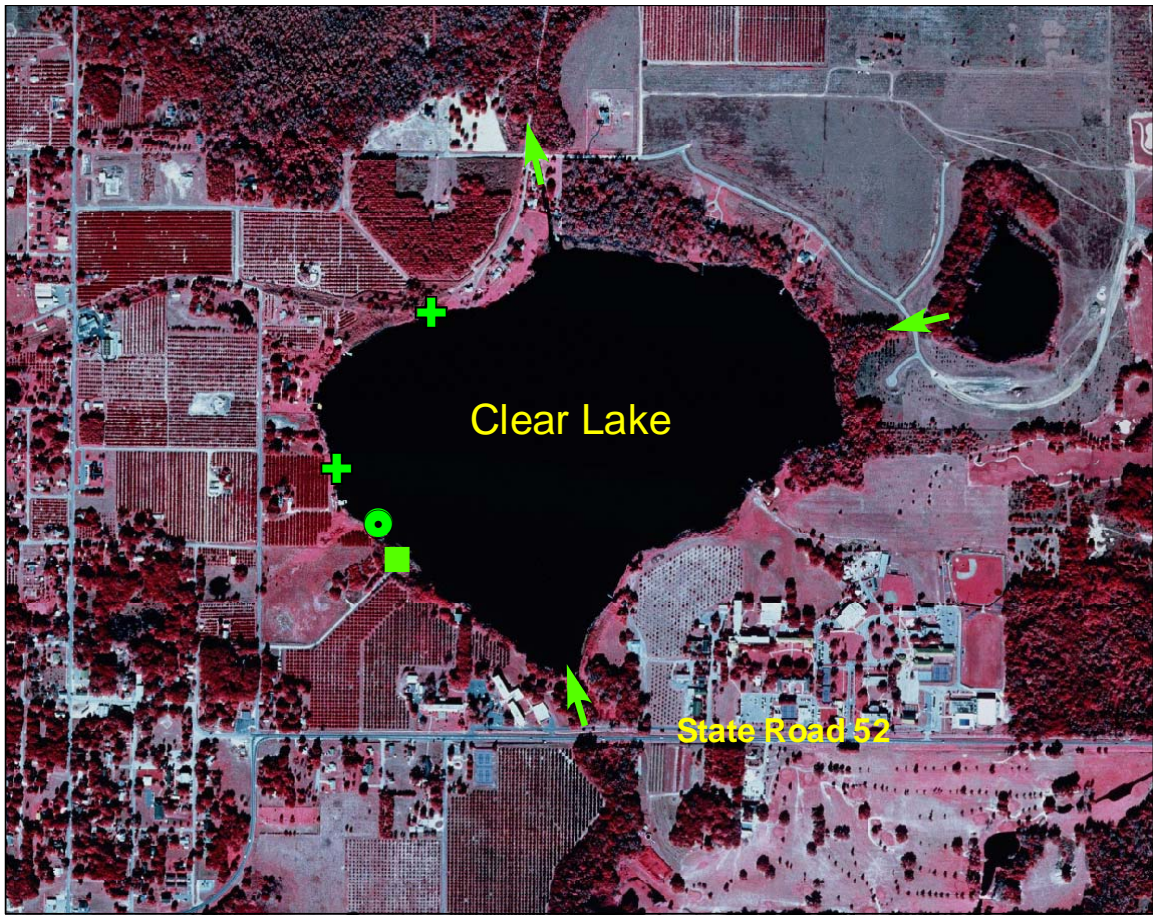
north shore. There are no surface water withdrawals from the lake currently permitted by the District. There are, however, numerous permitted groundwater withdrawals in the area.





The 1954 and 1988 (photorevised) United States Geological Survey 1:24,000 San Antonio, Fla. quadrangle maps show a surface water elevation of 127 ft above NGVD for the lake. The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 158 acres at a surface elevation at 127 ft above the National Geodetic Vertical Datum of 1929 (NGVD). Based on a topographic map of the basin generated in support of minimum levels development (Figure 3), the lake covers an area of 166 acres when the surface level is at 127 ft above NGVD. Data used for production of the topographic map were obtained from field surveys conducted in May 2002 and 1:200 aerial photograph maps containing one-foot contour lines prepared using photogrammetric method.

**Figure 1. Location of Clear Lake in Pasco County, Florida.**



**Figure 2. Location of District lake-level gauge, inlets/outlet, public park, and sites where hydrologic indicators were measured at Clear Lake in Pasco County, Florida.**



-  Lake gauge
-  Inlets/Outlet
-  Hydrologic Indicators
-  Public park

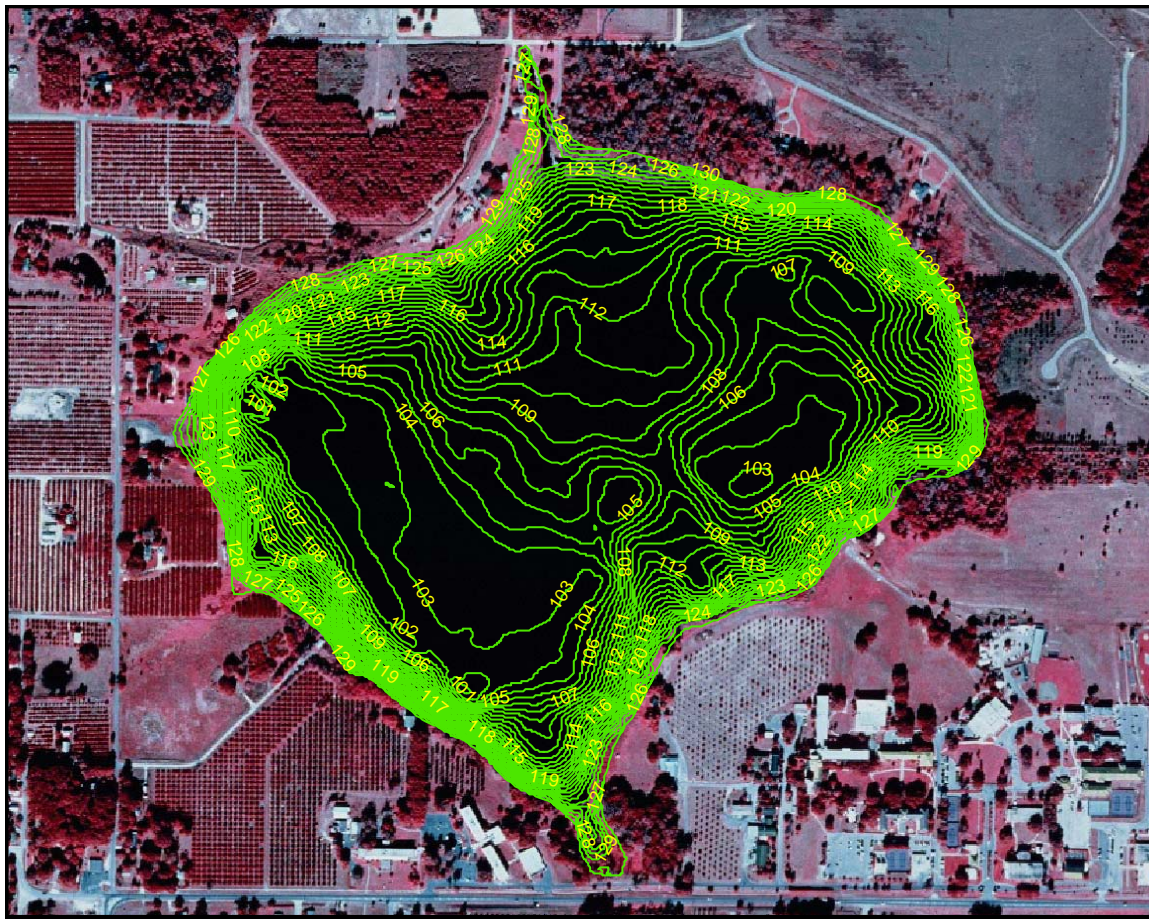
0 1,000 2,000 3,000 Feet

Aerial photography from 1999 USGS Digital Orthophotograph.

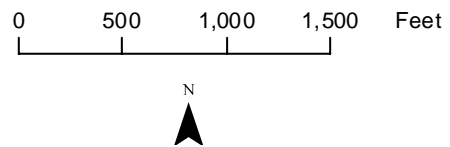
Map prepared November 13, 2003



**Figure 3. One-foot contours within the Clear Lake basin in Pasco County, Florida. Values shown are elevations, in feet above the National Geodetic Vertical Datum of 1929.**



Map prepared June 18, 2003 using 1999 USGS digital orthophotography, one-foot contour data from a 1985 SWFWMD aerial photography map (Sheet No. 1-25-20), and elevation data collected by SWFWMD staff on May 7, 2002.



### ***Previously Adopted Lake Management Levels***

Based on work conducted in the 1980s (see SWFWMD 1996), the District Governing Board adopted management levels (currently referred to as Guidance Levels) for Clear Lake in February 1986 (Table 1). A Maximum Desirable Level of 127.00 ft above NGVD was also developed, but was not adopted by the Governing Board.

**Table 1. Adopted guidance levels and associated surface areas for Clear Lake in Pasco County, Florida.**

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Total Lake Area (acres)</b>
Ten Year Flood Guidance Level	127.90	168
High Level	127.50	167
Low Level	125.25	160
Extreme Low Level	123.75	155

### ***Proposed Minimum and Guidance Levels***

Proposed Minimum and Guidance Levels were developed for Clear Lake using the methodology for Category 3 Lakes described in District rules (Chapter 40D-8, Florida Administrative Code). Proposed levels, along with lake surface area values for each level are listed in Table 2. Contour lines corresponding the proposed minimum level elevations are shown within the basin in Figure 4.

**Table 2. Proposed minimum levels, guidance levels and associated surface areas for Clear Lake in Pasco County, Florida.**

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Ten Year Flood Guidance Level	128.5	170
High Guidance Level	127.0	166
High Minimum Lake Level	127.0	166
Minimum Lake Level	125.7	161
Low Guidance Level	123.7	155

**Figure 4. Approximate location of the proposed Minimum Lake Level (yellow) and proposed High Minimum Lake Level (blue) for Clear Lake in Pasco County, Florida. Elevations of contours are in feet above the National Geodetic Vertical Datum of 1929.**



Map prepared August 22, 2003 using 1999 USGS digital orthophotography, one-foot contour data from a 1985 SWFWMD aerial photography map (Sheet No. 1-25-20), and elevation data collected by SWFWMD staff on May 7, 2002.

0 500 1,000 1,500 Feet



**Contours**

**Clear\_min\_levels**

**Contour**

— 125.7

— 127

## **Summary of Data and Analyses Supporting Recommended Minimum and Guidance Levels**

Hydrologic data are available for Clear Lake (District Universal ID Number STA 118 118) from January 1965 to the present date (Figure 5, see Figure 2 for current location of the SWFWMD lake-level gauge). Monthly mean water surface elevations, along with proposed guidance and minimum levels are shown in Figure 6. For the entire period of record, the hydrologic data are classified as Historic data. Historic data collected through January 2003 were used to calculate the Historic P10, P50, and P90 (Table 3).

The Normal Pool elevation was established at 126.9 ft above NGVD based on the elevations associated with the buttresses of cypress trees growing along the north shore of the lake (Figure 2, Tables 3 and 4). Citrus trees are planted as low as 131 ft above NGVD, based on elevations at the base of trees growing along the west shore of the lake (Figure 2). The low floor slab elevation, extent of structural alteration and control point elevation (127.1 ft above NGVD) were determined using available one-foot contour interval aerial maps and field survey data (Table 3, Figure 7). The Normal Pool elevation is below the control point, so the lake is not considered to be Structurally Altered.

Based on the availability of Historic hydrologic data for the lake basin, the High Guidance Level was established at the Historic P10 elevation of 127.0 ft above NGVD (Table 3). The Historic P50 and Low Guidance Level, 125.7 and 123.7 ft above NGVD, respectively, were also established using historic data.

The Ten Year Flood Guidance Level was established for Clear Lake at 128.5 ft above NGVD using the methodology for open basin lakes described in current District rules. For the analysis, the District used the flood routing model, NETWORK. Model output was based on a ten-year storm event with a 120-hour duration and an 11.3-inch rainfall depth. Based on available lake stage data, the Ten Year Flood Guidance Level has not been exceeded during the past 38 years (see Figure 5). The highest surface elevation for Clear Lake included in the District Water Management Database, 127.86 ft above NGVD, occurred on April 28, 1987. The low of record, 121.12 ft above NGVD, occurred on May 23, 2002.

Aquatic macrophytes, including cattail (*Typha* sp.), torpedograss (*Panicum repens*), pennywort (*Hydrocotyle umbellata*), southern naiad (*Najas guadelupensis*), primrose willow (*Ludwigia* sp.), and wax myrtle (*Myrica cerifera*) occur throughout the basin. Clear Lake is not, however, contiguous with any cypress-dominated wetlands of 0.5 or more acres in size and is therefore classified as a Category 3 Lake for the purpose of minimum levels development.

The Dock-Use, Aesthetics, Species Richness, Basin Connectivity, Recreation/Ski and Mixing Standards were evaluated for minimum levels development (Table 3). The Dock-Use Standard was established at 127.0 ft above NGVD, based on the elevation of sediments at the end of 90% of the 10 docks at the lake (123.0 ft above NGVD, Table 5), a two-foot clearance value based on use of powerboats in the lake, and the difference

between the Historic P50 and P90 elevations (2.0 ft). The Aesthetic-Standard for the lake was established at the Low Guidance Level elevation of 123.7 ft above NGVD. The Species Richness Standard was established at 117.8 ft above NGVD, based on limiting reduction in lake surface area to less than a 15% reduction from the area at the Historic P50 elevation. The Connectivity Standard was established at 112 ft above NGVD, based on the elevation that ensures connectivity among the two major sub-basins of the lake (108 ft), a two-foot clearance value for use of powerboats on the lake, and the difference between the Historic P50 and P90 (2.0 ft). The Recreation/Ski Standard was established at 111.0 ft above NGVD, based on the difference between the Historic P50 and P90 (2.0 ft) and the elevation within the basin at which the lake would contain a 200 ft wide, 2,000 ft long ski corridor with a water depth of five feet. Based on basin morphology, a Mixing Standard for preventing potential resuspension of sediments was established at 105.0 ft above NGVD. Previous study of water column stratification patterns indicates that Clear Lake does not thermally stratify (SWFWMD 1994). Review of changes in potential herbaceous wetland area associated with change in lake stage, and potential change in area available for aquatic macrophyte colonization did not indicate that use of any of the identified standards would be inappropriate for minimum levels development (Figure 8).

The Dock-Use Standard, the most conservative (*i.e.*, the highest) of the standards, is greater than the Historic P50 elevation, so the Minimum Lake Level was established at the Historic P50 elevation (125.7 ft above NGVD). The proposed High Minimum Lake Level was established at 127.0 ft above NGVD, an elevation corresponding to the Minimum Lake Level plus the difference between the Historic P10 and the Historic P50 (1.3 ft). The proposed High Minimum Lake Level is 2.8 ft below the lowest concrete patio adjacent to the lake, 3 ft below the floor slab of the lowest residential dwelling (Low Floor Slab elevation), and 3.4 ft below the lowest spot on the roads located in the immediate lake basin.

Figure 5. Surface water elevation at Clear Lake in Pasco County, Florida. Data through January 2003 are shown.

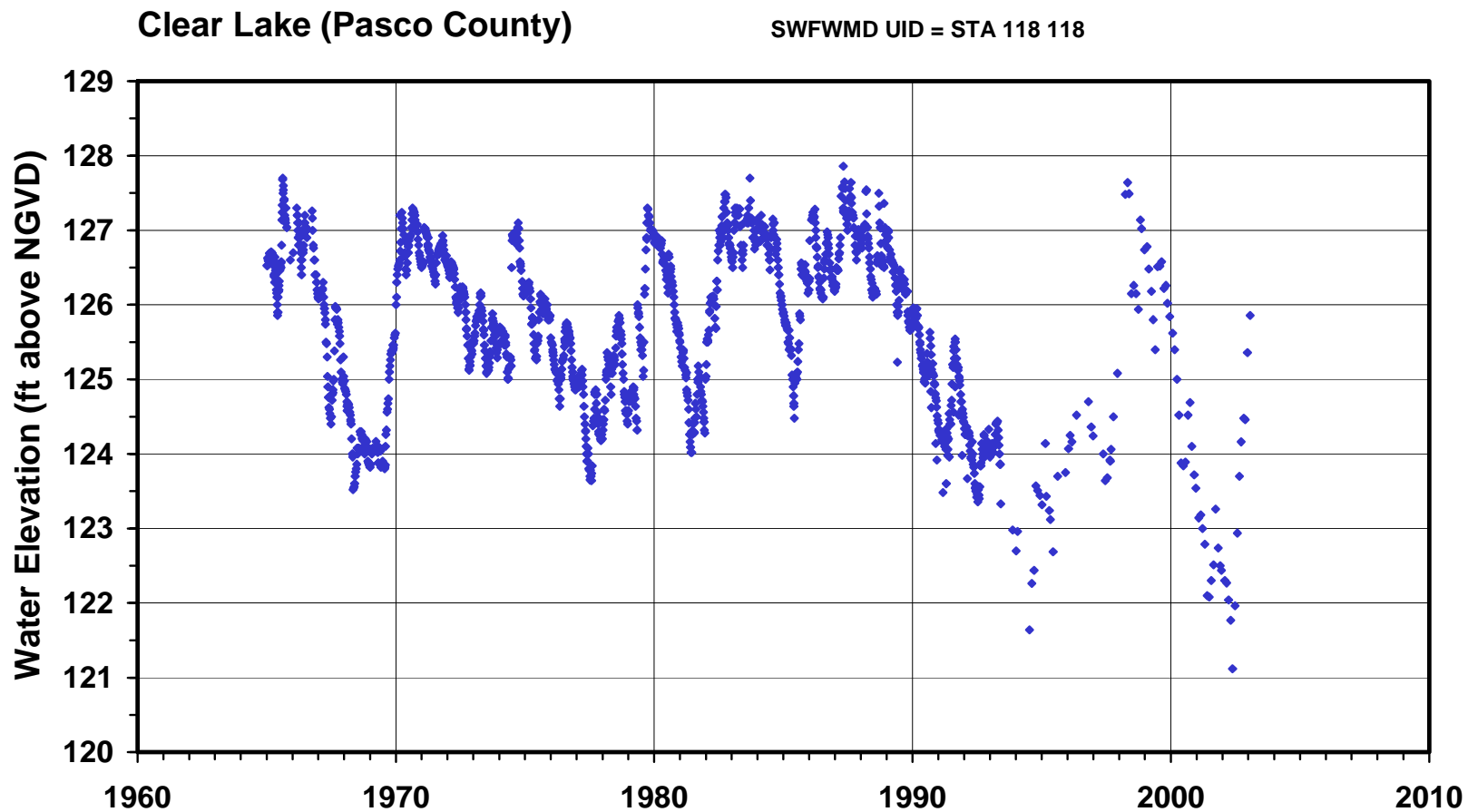
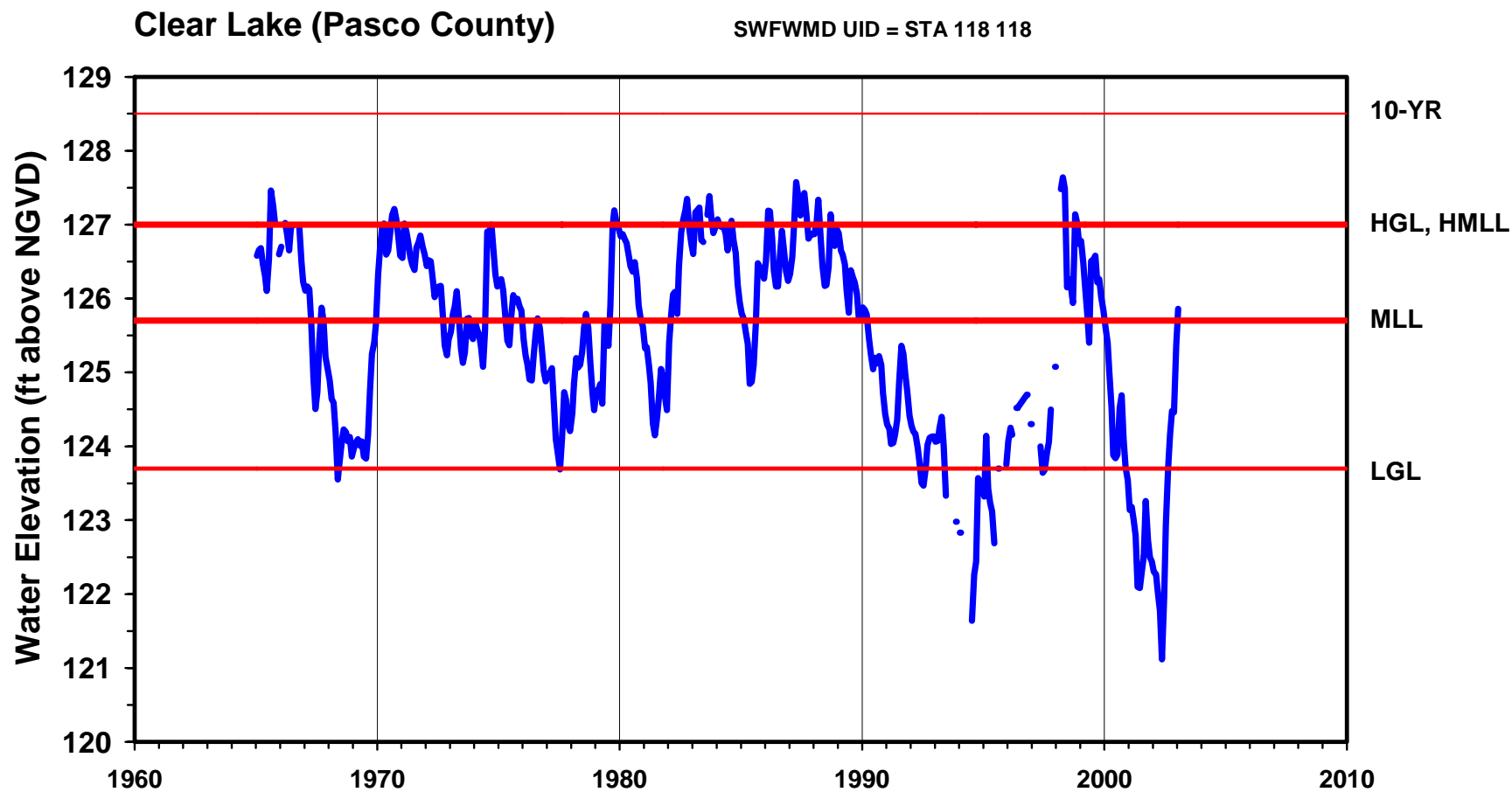


Figure 6. Mean monthly surface water elevation, and proposed guidance and minimum levels for Clear Lake in Pasco County, Florida. Proposed levels include the Ten Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake Level (HMLL), and Minimum Lake Level (MLL).



**Table 3. Elevation data and associated area values used for establishing minimum levels for Clear Lake in Pasco County, Florida.**

<b>Level or Feature</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (aces)</b>
Historic P10	126.99	166
Historic P50	125.68	161
Historic P90	123.71	155
Normal Pool	126.9	166
Low Floor Slab	130.0	173
Low Road	130.4	NA
Low Other (concrete carport slab)	130.2	NA
Low Other (concrete patio)	129.8	172
Low Other (concrete swimming pool slab)	130.0	173
Control Point	127.1	166
High Guidance Level	127.0	166
Low Guidance Level	123.7	155
Dock-Use Standard	127.0	166
Aesthetic Standard	123.7	155
Species Richness Standard	117.8	137
Connectivity Standard	112.0	106
Recreation/Ski Standard	111.0	97
Mixing Standard	105.0	41

NA = not available

**Table 4. Elevation data used for establishing the Normal Pool Elevation for Clear Lake in Pasco County, Florida. Data based on field measurements made by SWFWMD staff in May 2002.**

<b>Hydrologic Indicator</b>	<b>Elevation (feet above NGVD)</b>
Cypress normal pool	126.8
Cypress normal pool	127.0
<b>N</b>	<b>2</b>
<b>Median</b>	<b>126.9</b>
<b>Mean</b>	<b>126.9</b>
<b>Standard Deviation</b>	<b>0.2</b>

**Figure 7. Outlet conveyance system for Clear Lake in Pasco County, Florida.**



Aerial photography from 1999 USGS  
Digital Orthophotograph.

Map prepared June 18, 2003

0 250 500 Feet

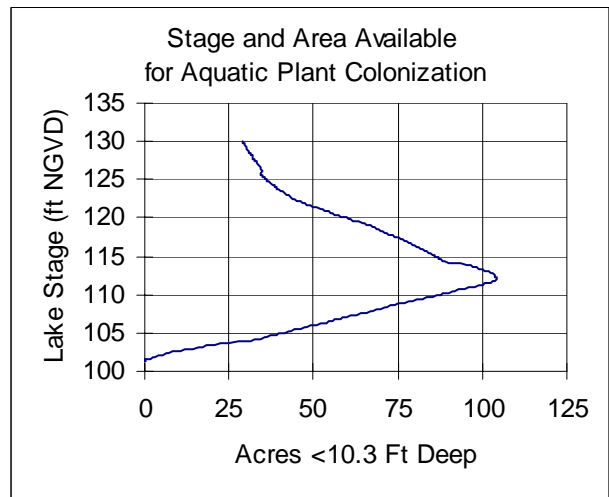
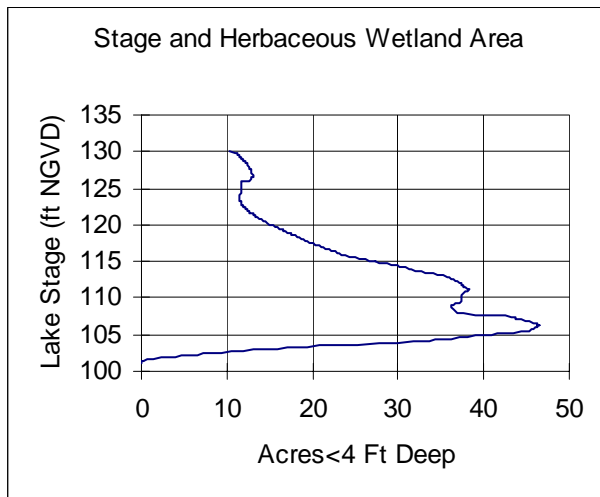
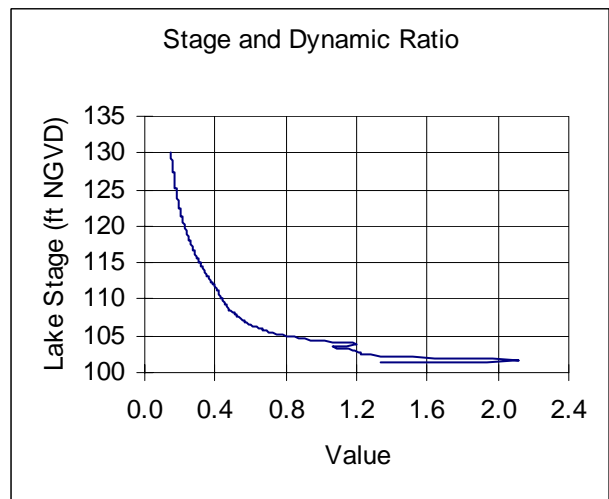
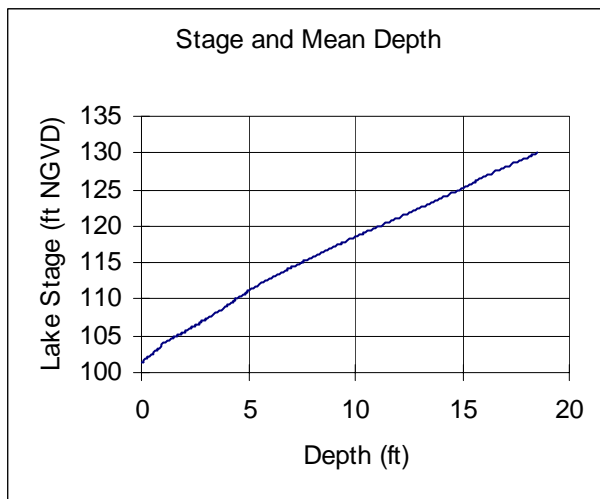
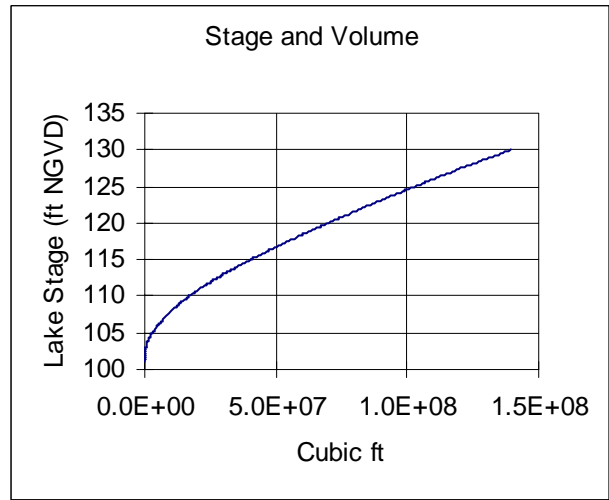
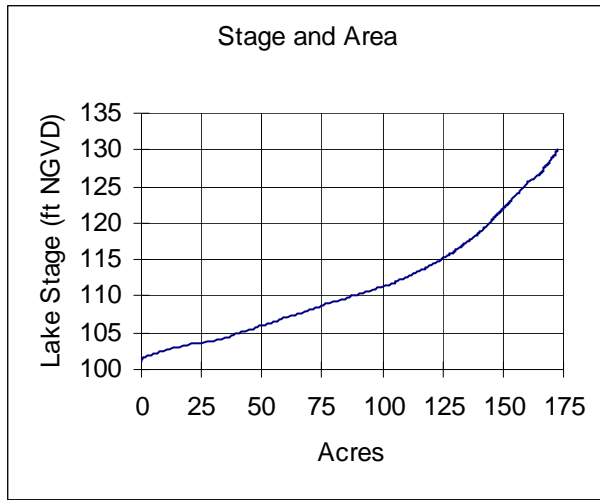


Site	Description	Elevation (feet above NGVD)
1	Control point; ground elevation one foot north of culvert described as site number 2.	127.1
2	Invert at north end of 50-ft long, 3.0-ft diameter concrete culvert	124.98
3	Invert at south end of 50-ft long, 3.0-ft diameter concrete culvert	125.67
4	Top of concrete weir; intermediate and low notch on weir occur at 126.91 and 126.67 ft above NGVD, respectively	127.13

**Table 5. Summary statistics for elevations associated with docks (n=10) at Clear Lake in Pasco County, Florida, based on data collected on May 7, 2002. Percentiles (P10, P50, P90) represent elevations exceeded by 10, 50 and 90 percent of the docks.**

<b>Statistic</b>	<b>Elevation of Sediments at Dock Ends (feet above NGVD)</b>	<b>Elevation of Dock Platform (feet above NGVD)</b>
Mean (SD)	120.4 (2.1)	128.1 (1.8)
P10	123.0	130.0
P50 (Median)	120.7	128.0
P90	117.9	126.3
Maximum	123.4	131.9
Minimum	117.7	125.9

**Figure 8. Surface area, volume, mean depth, dynamic ratio, potential herbaceous wetland area, and area available for macrophyte colonization versus lake stage for Clear Lake in Pasco County, Florida.**



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