

**May 12, 2004**

**MEMORANDUM**

**TO: File**

**FROM: Doug Leeper, Senior Environmental Scientist  
Resource Conservation and Development Department  
Southwest Florida Water Management District**

**SUBJECT: Proposed minimum and guidance levels for Lake Jackson in  
Hillsborough County, Florida**

## **Lake Jackson**

### ***General Description***

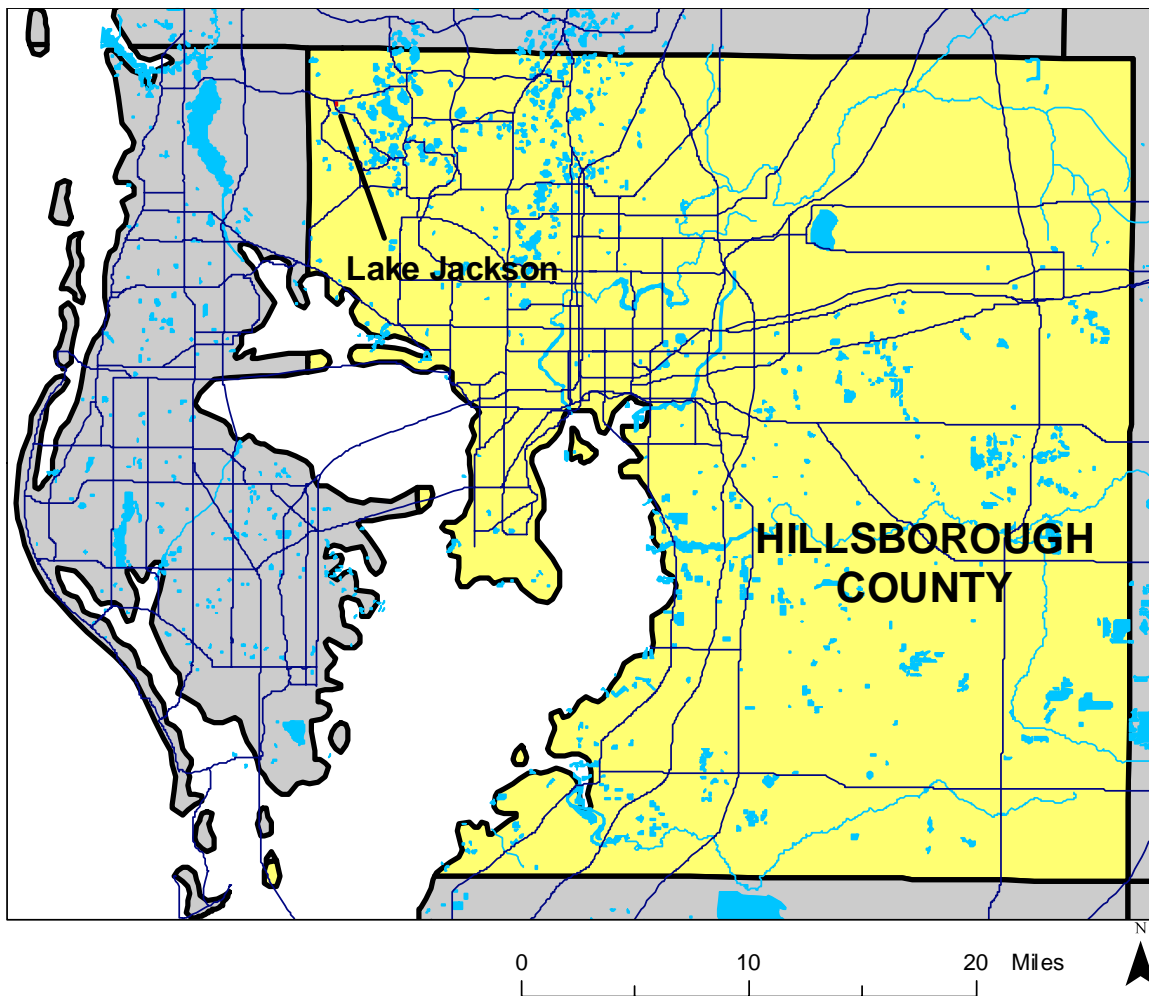
Lake Jackson (Figure 1) is located in the Northwest Hillsborough Basin of the Southwest Florida Water Management District (SWFWMD or District) in Hillsborough County, Florida (Section 17, Township 27S, Range 17E). White (1970) classified the area of west-central Florida containing Lake Jackson as the Northern Gulf Coastal Lowlands physiographic region. Brooks (1981) characterized the area surrounding the lake as the Odessa Flats subdivision of the Tampa Plain in the Ocala Uplift Physiographic District, and described the subdivision as a poorly dissected low sandy plain overlying Tampa Limestone. As part of the Florida Department of Environmental Protection's Lake Bioassessment/Regionalization Initiative, the area has been identified as the Keystone Lakes region, and described as well-drained, sandy upland with numerous slightly acidic, clear-water lakes with low nutrient levels (Griffith *et al.* 1997).

Residential development covers the east and southwest shores of Lake Jackson (Figure 2). Uplands along the north shore are used for livestock grazing, and citrus production occurs along the south shore. The lake lies in the Brooker Creek Watershed. Inflows to Lake Jackson occur through a ditch/culvert system that drains a wetland associated with Sunset Lake into the northeast corner of the lake, and through a ditch located along the southeast corner of the lake, where pumped groundwater is used to augment lake water levels. Augmentation of Lake Jackson, along with two other nearby lakes, Sunset Lake and Garden Lake, has been conducted by Pinellas Count Utilities since October 1976 (Biological Research Associates, Inc. 1982, 1996). Water used for augmentation of the lakes is pumped from the Floridan aquifer at a site located just north of Tarpon Springs Road and east of Burrell Road. An outlet along the northwest shore of the lake provides conveyance for outflow under Boy Scout Road to a wetlands system that drains under Tarpons Springs Road to Brooker Creek. There are no surface water withdrawals from

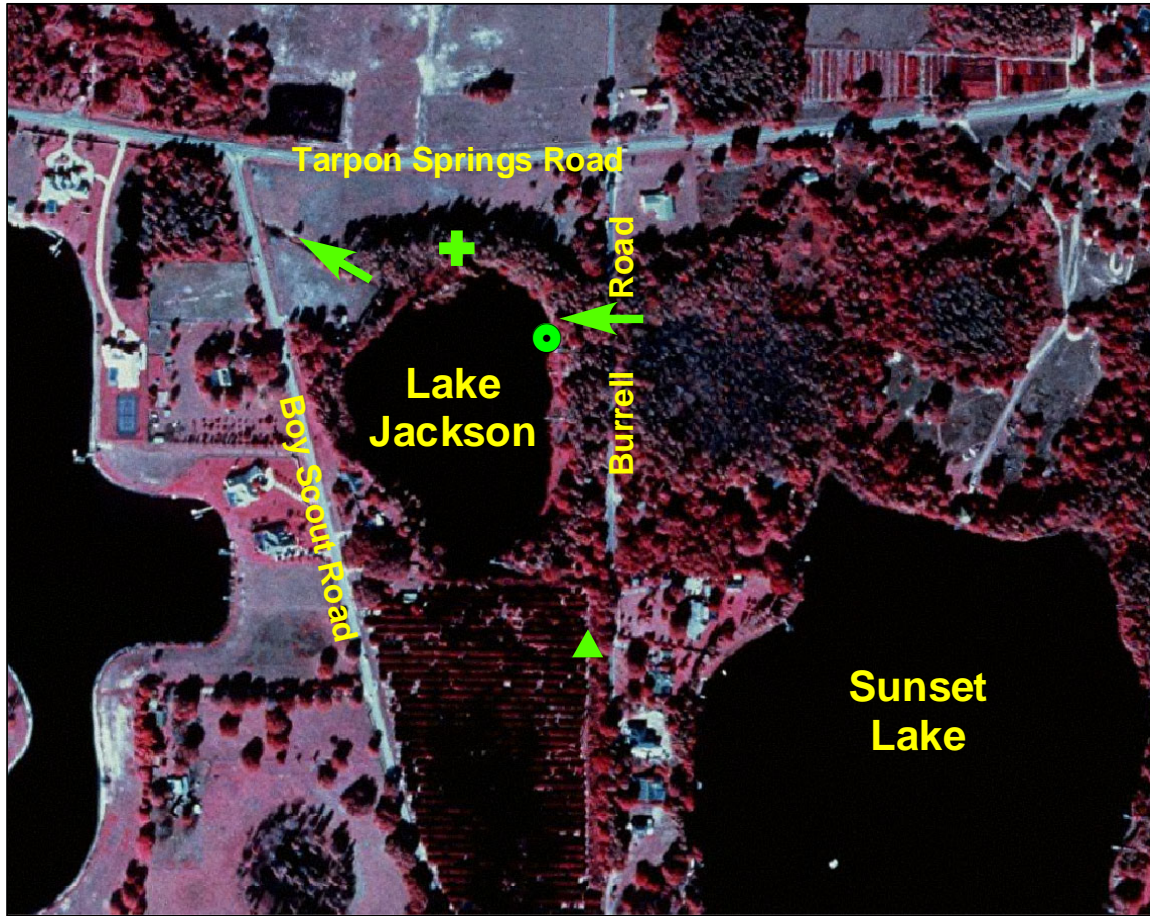
the lake currently permitted by the District. There are, however, numerous permitted groundwater withdrawals in the area, including major withdrawals associated with the Eldridge-Wilde Wellfield facility, which has been in operation since 1956.





Lake Jackson is not listed in the "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986). The 1974 United States Geological Survey 1:24,000 Elfers quadrangle map shows the lake water surface at 29 ft above the National Geodetic Vertical Datum of 1929 (NGVD). A topographic map of the basin generated in support of minimum levels development (Figure 3) indicates that the lake would extend over 8 acres at this elevation.

**Figure 1. Location of Lake Jackson in Hillsborough County, Florida.**



**Figure 2. Location of District lake-level gauge, inlet, outlet and sites where hydrologic indicators were measured and pumped groundwater is discharged for lake augmentation at Lake Jackson in Hillsborough County, Florida.**



-  Lake gauge
-  Inlets/Outlets
-  Hydrologic Indicators
-  Augmentation discharge site

0                      500                      1,000    Feet

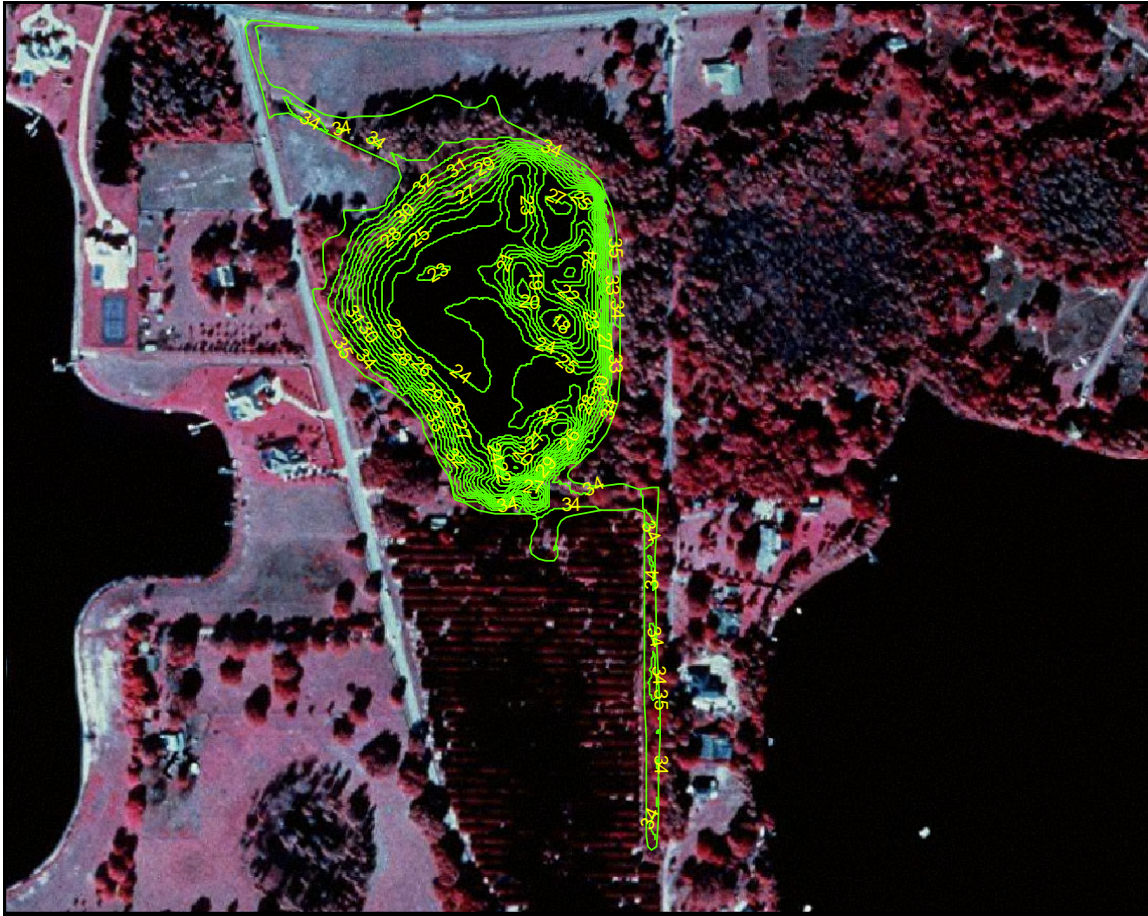
Aerial photography from 1999 USGS Digital Orthophotograph.

Map prepared January 29, 2004





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



Map prepared August 26, 2003 using 1999 USGS digital orthophotography, one-foot contour data from a 1989 SWFWMD aerial photography map (Sheet No. 17-27-17), and elevation data collected by SWFWMD staff on February 10, 2003.

0 250 500 Feet



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

Based on work conducted in the 1970s (see SWFWMD 1996), the District Governing Board adopted management levels (currently referred to as Guidance Levels) for Lake Jackson in September 1980 (Table 1). A Maximum Desirable Level of 33.00 ft above NGVD was also developed, but was not adopted by the Governing Board.

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

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Ten Year Flood Guidance Level	36.00	NA
High Level	33.50	10.5
Low Level	31.00	9.2
Extreme Low Level	29.00	8.2

NA = not available

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

Proposed Minimum and Guidance Levels were developed for Lake Jackson using the methodology for Category 2 Lakes described in SWFWMD (1999) and current District Rules (Chapter 40-D8, Florida Administrative Code). Proposed levels, along with lake surface area values for each level are listed in Table 2. Locations of the proposed minimum levels within the lake basin are shown in Figure 4.

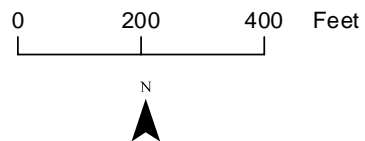
**Table 2. Proposed minimum levels, guidance levels and associated surface areas for Lake Jackson in Hillsborough County, Florida.**

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Ten Year Flood Guidance Level	34.7	13.4
High Guidance Level	33.0	10.2
High Minimum Lake Level	33.0	10.2
Minimum Lake Level	32.0	9.7
Low Guidance Level	30.9	9.1

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



Map prepared August 27, 2003 using 1999 USGS digital orthophotography, one-foot contour data from a 1989 SWFWMD aerial photography map (Sheet No. 17-27-17), and elevation data collected by SWFWMD staff on February 10, 2003.



**jackson\_min\_levels**

**CONTOUR**

— 32.0 ft above NGVD

— 33.0 ft above NGVD

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

Hydrologic data are available from the District Water Management Database for Lake Jackson (District Universal ID Number STA 103 103) for a few dates in the 1970s and from June 1980 through the present date (Figure 5, see Figure 2 for current location of the SWFWMD lake-level gauge). Note that hydrologic data record is not continuous; *i.e.*, there are some months during the period of record when water level data were not recorded. Monthly mean water surface elevations, along with proposed guidance and minimum levels are graphed in Figure 6. Historic data are not available. For the period of record from May 1973 through the present, the hydrologic data are classified as Current data. Current data collected through January 2003 were used to calculate the Current P10, P50, and P90 (Table 3).

The Normal Pool elevation was established at 35.1 ft above NGVD based on elevations associated with the buttressing of cypress (*Taxodium sp.*) trees along the north shore of the lake (Table 4, Figure 2). The low floor slab elevation, extent of structural alteration and the control point elevation were determined using available one-foot contour interval aerial maps and field survey data collected in July 2003 (Table 3). The control point elevation was established at 32.4 ft above NGVD, based on the ground elevation in a ditch south of a culvert located at the outlet along the northwest shore of the lake (Figure 7). The Normal Pool elevation is higher than the control point elevation so the lake is considered to be Structurally Altered.

Based on the relative elevations of the control point, the Normal Pool and the Current P10, the High Guidance Level was established at the Current P10 elevation of 33.0 ft above NGVD (Table 3). The Historic P50 and Low Guidance Level were established at 32.0 and 30.9 ft above NGVD, respectively, using the High Guidance Level and the Northern Tampa Bay Region RLWR50 (1.0 ft) and RLWR90 (2.1 ft) statistics (see SWFWMD 1999 for a discussion of the reference lake water regime statistics).

The Ten Year Flood Guidance Level was established for Lake Jackson at 34.7 ft above NGVD using the methodology for open basin lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). For the analysis, Hillsborough County's modified version of the Environmental Protection Agency's Stormwater Management Model (SWMM), version 4.31C (Hillsborough County 2000) was used. Model input 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 25 years (Figures 5 and 6). The highest surface elevation for Lake Jackson included in the District water management database, 33.96 ft above NGVD, occurred on February 19, 1998. The low of record, 26.7 ft above NGVD, occurred on May 1, 1973

Lake Jackson contains diverse stands of aquatic macrophytes and other hydrophytes, including cattail (*Typha sp.*), southern naiad (*Najas guadelupensis*), pennywort (*Hydrocotyle umbellata*), hydrilla (*Hydrilla verticillata*), and cypress (*Taxodium sp.*). The



lake is contiguous with a cypress-dominated wetland greater than 0.5 acre in size, so it is classified as a Category 1 or 2 Lake for the purpose of minimum levels development. Because the Historic P50 elevation is more than 1.8 feet below the Normal Pool elevation, the lake is classified as a Category 2 Lake. Note that herein, for discussion purposes, the elevation 1.8 ft below the Normal Pool elevation is identified as the Cypress Standard. For Lake Jackson, this standard is established at 33.3 ft above NGVD.

Based on the relationship between the Cypress Standard and the Historic P50 elevation, the proposed Minimum Lake Level was established at the Historic P50 elevation (32.0 ft above NGVD). The proposed High Minimum Lake Level was established at 33.0 ft above NGVD, an elevation corresponding the High Guidance Level. The proposed High Minimum Lake Level is 3.7 ft below the lowest residential home floor slab in the immediate lake basin, and 3.4 feet below the lowest spot in the roads surrounding the lake.

For comparative purposes, minimum level standards used for establishing Minimum Lake Level for lakes without fringing cypress wetlands were developed for Lake Jackson (Table 3). The Dock-Use Standard would be established at 32.7 ft above NGVD, based on the elevation of sediments at the end of 90% of the 16 docks at the lake (29.6 ft above NGVD, Table 5), a clearance value of 2 ft based on use of powerboats in the lake, and the Reference Lake Water Regime 5090 for the northern Tampa Bay area (1.1 ft). The Aesthetic Standard for the lake would be established at the Low Guidance Level elevation of 30.9 ft above NGVD. The Species Richness Standard would be established at 29.1 ft above NGVD, based on limiting reduction in lake surface area to less than a 15% decrease in the lake area at the Historic P50 elevation. The Basin Connectivity Standard would be established at 28.1 ft above NGVD, based on a critical high-spot elevation of 25 ft above NGVD, a 2 ft clearance for movement of biota and use of non-powerboats in the lake, and the Northern Tampa Bay area RLWR5090 (1.1 ft). Development of a Mixing Standard for the lake would not be appropriate, based on dynamic ratio values (see Bachmann *et al.* 2000) for the basin (Figure 8). Development of a Recreation/Ski Standard would similarly not be appropriate, based on the size of the lake. Review of changes in potential herbaceous wetland area associated with change in lake stage did not indicate that use of any of the identified standards would be inappropriate for minimum levels development (Figure 8).



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

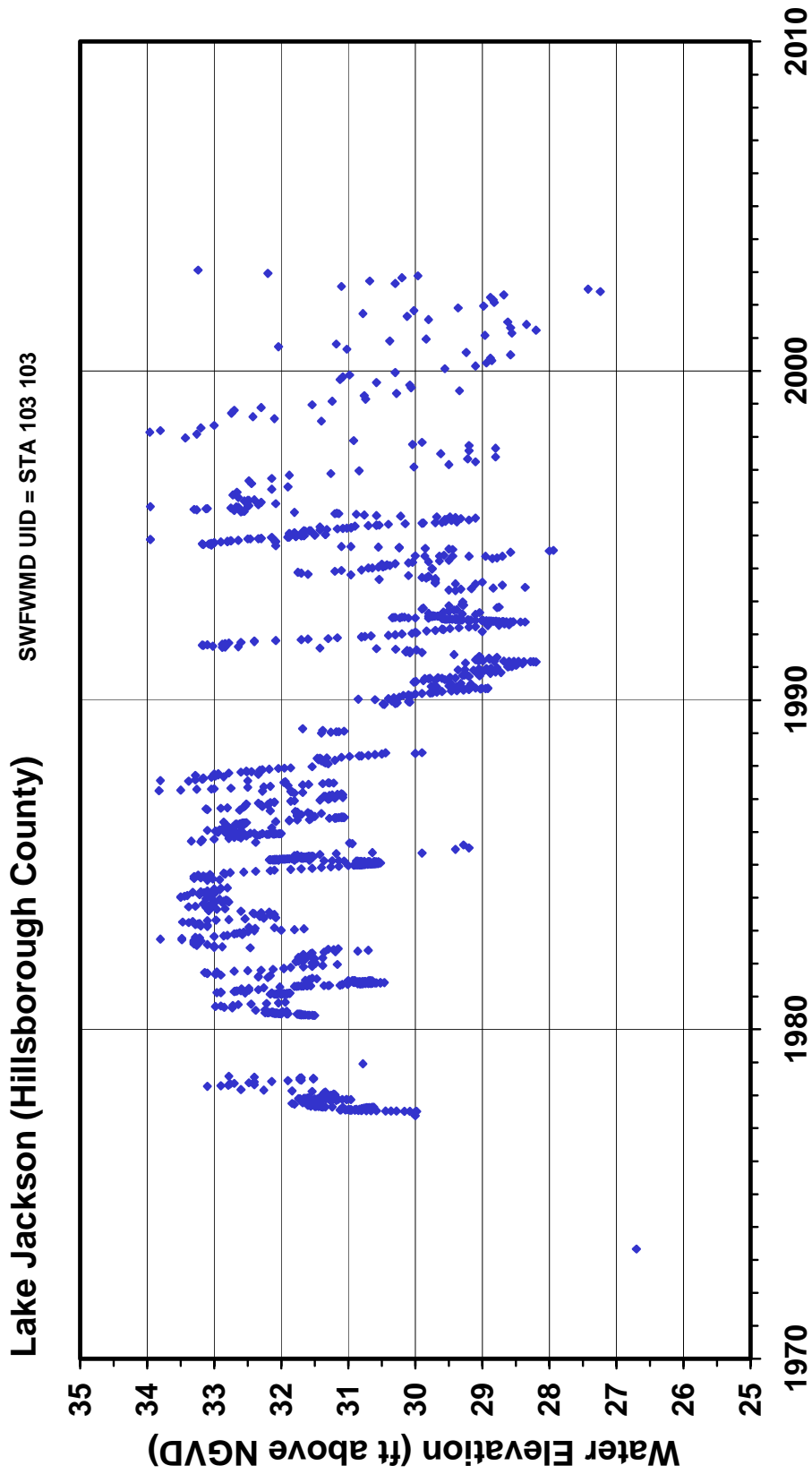
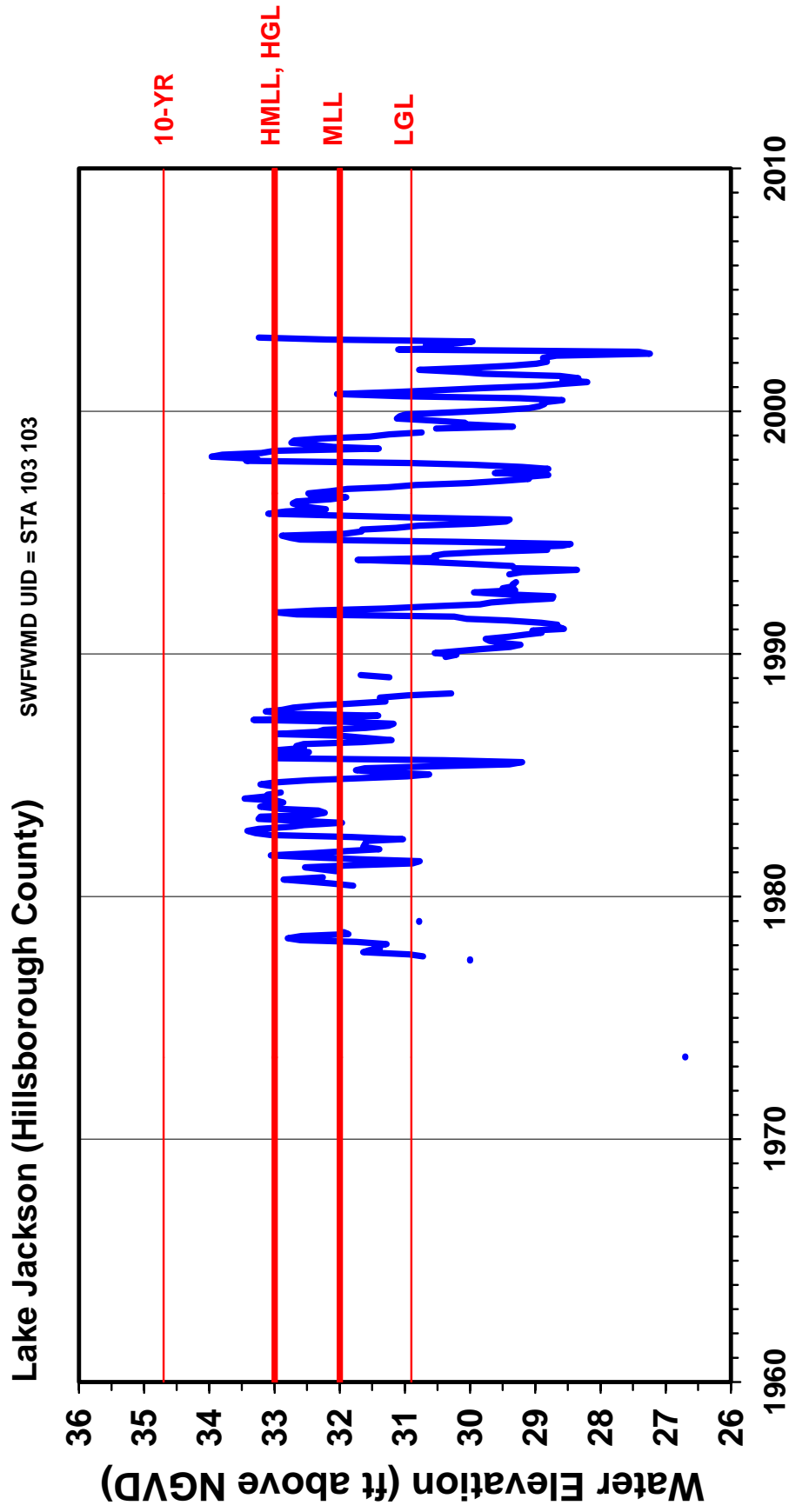


Figure 6. Mean monthly surface water elevation through January 2003, and proposed guidance and minimum levels for Lake Jackson in Hillsborough County, Florida. Proposed levels include the Ten Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake Level (HMLL), and Minimum Lake Level.



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

<b>Level or Feature</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Current P10	32.97	10.2
Current P50	31.25	9.3
Current P90	28.91	8.2
Normal Pool	35.1	NA
Low Floor Slab	36.72	NA
Low Other (wooden storage shed)	34.75	13.6
Low Road	36.34	NA
Control Point	32.4	9.9
High Guidance Level	33.0	10.2
Historic P50	32.0	9.7
Low Guidance Level	30.9	9.1
Cypress Standard	33.3	10.4
*Dock-Use Standard	32.7	10.1
*Aesthetic Standard	30.9	9.1
*Species Richness Standard	29.1	8.3
*Connectivity Standard	28.1	7.8

NA = not available

\* = Established for comparative purposes only; not used for minimum levels development

**Table 4. Elevation data used for establishing the Normal Pool Elevation for Lake Jackson in Hillsborough County, Florida. Data were collected on September 26, 2002 by SWFWMD staff.**

<b>Hydrologic Indicator</b>	<b>Elevation (feet above NGVD)</b>
Normal pool based on cypress buttress	34.26
Normal pool based on cypress buttress	34.49
Normal pool based on cypress buttress	34.62
Normal pool based on cypress buttress	34.8
Normal pool based on cypress buttress	34.82
Normal pool based on cypress buttress	34.92
Normal pool based on cypress buttress	35.12
Normal pool based on cypress buttress	35.13
Normal pool based on cypress buttress	35.22
Normal pool based on cypress buttress	35.27
Normal pool based on cypress buttress	35.42
Normal pool based on cypress buttress	35.47
Normal pool based on cypress buttress	35.57
Normal pool based on cypress buttress	35.62
Normal pool based on cypress buttress	35.72
<b>N</b>	<b>15</b>
<b>Median</b>	<b>35.1</b>
<b>Mean</b>	<b>35.1</b>
<b>Standard Deviation</b>	<b>0.4</b>



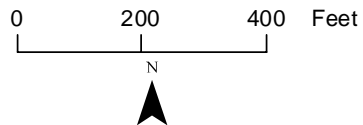
**Table 5. Summary statistics for elevations associated with docks (n=16) at Lake Jackson in Hillsborough County, Florida, based on site visit on September 12, 2002. Percentiles (P10, P50, P90) represent elevations exceeded by 10, 50 and 90 percent of the docks.**

<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)	27.9 (1.6)	34.6 (0.9)
P10	29.6	35.6
P50	28.2	34.6
P90	25.7	33.6
Maximum	30.4	36.8
Minimum	24.4	33.1

**Figure 7. Outlet conveyance system for Lake Jackson in Hillsborough County, Florida.**

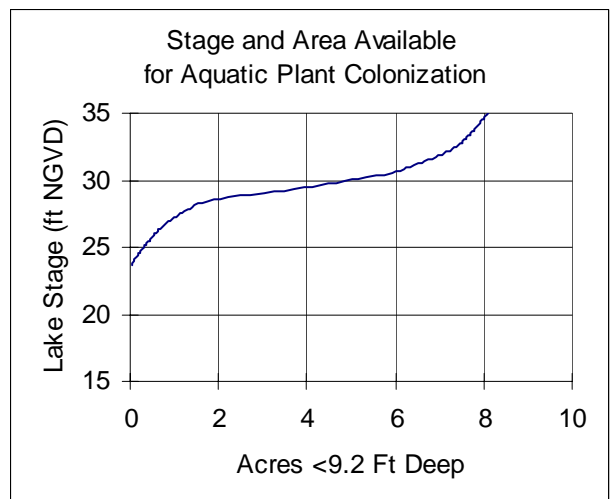
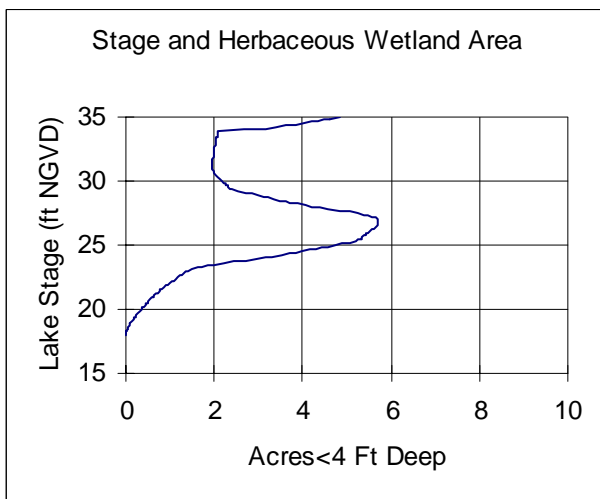
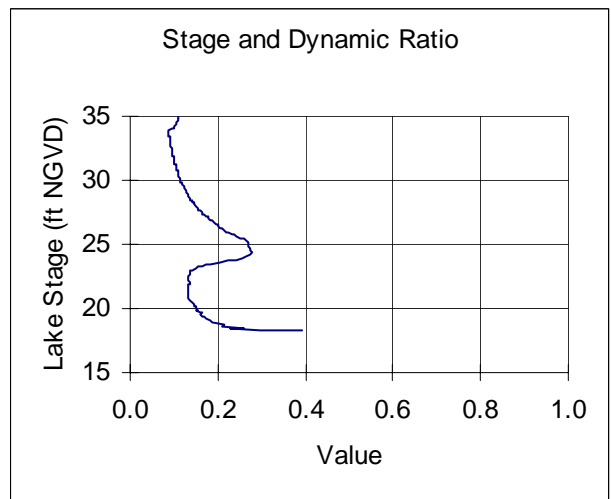
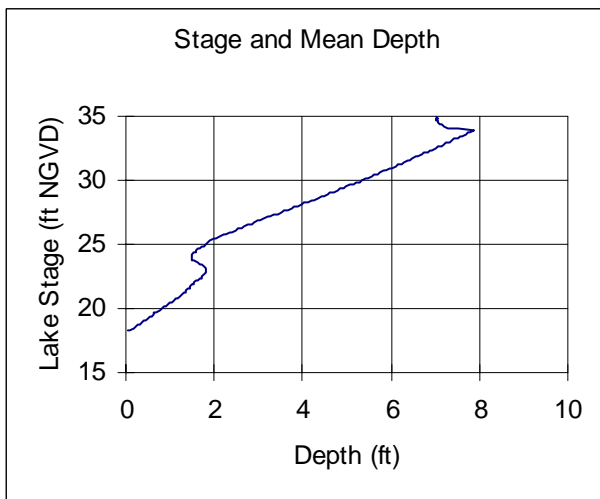
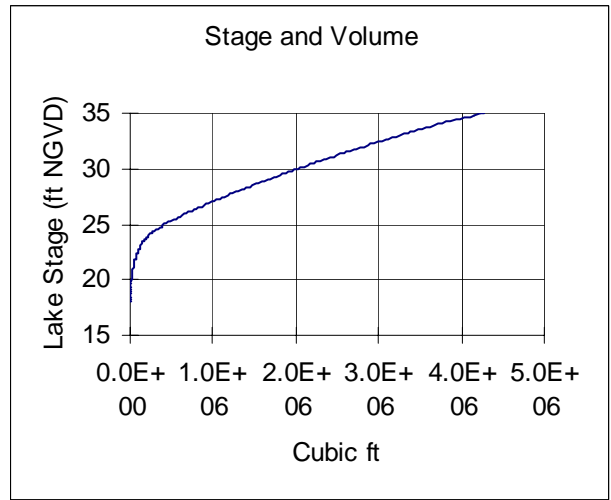
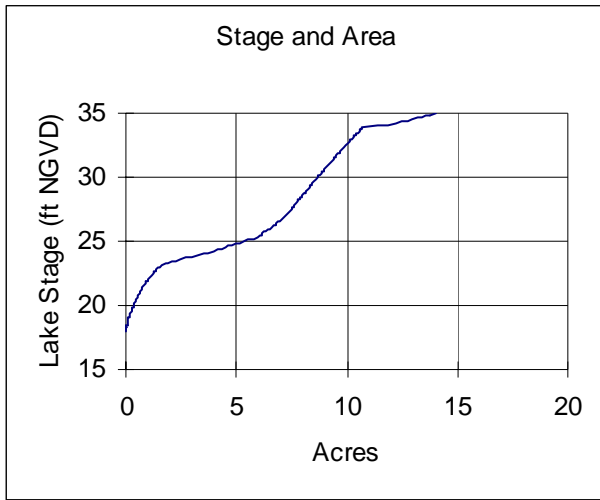


Map prepared August 25 2003 using 1999 USGS digital orthophotography.



Site	Description	Elevation (feet above NGVD)
1	Control point; ground elevation in center of ditch.	32.4
2	East invert of 36 inch diameter, 20 ft long corrugated metal pipe.	32.13
3	West invert of 36 inch diameter, 20 ft long corrugated metal pipe.	31.89
4	Ground elevation in center of ditch.	32.3
5	Ground elevation in center of ditch.	31.9
6	East invert of 34 inch x 52 inch oval reinforced concrete pipe running under Boy Scout Road.	31.70
7	West invert of 34 inch x 52 inch oval reinforced concrete pipe running under Boy Scout Road.	31.68
8	Ground elevation in center of ditch	31.7

**Figure 8. Surface area, volume, mean depth, dynamic ratio (basin slope), potential herbaceous wetland area and area available for aquatic macrophyte colonization versus lake stage for Lake Jackson in Hillsborough County, Florida.**



## ***Documents Cited and Reviewed for Development of Proposed Guidance and Minimum Levels***

Bachmann, R. W., Hoyer, M. V., and Canfield, D. E., Jr. 2000. The potential for wave disturbance in shallow Florida lakes. *Lake and Reservoir Management* 16: 281-291.

Biological Research Associates, Inc. 1982. Ecological impact of augmentation in three lakes in Hillsborough County, Florida. Tampa Florida. Prepared for Pinellas County Water System, Clearwater, Florida.

Biological Research Associates, Inc. 1996. General limnological assessment of three augmented lakes in northwest Hillsborough County Florida. Tampa Florida. Prepared for Pinellas County Water System, Clearwater, Florida.

Brooks, H. K. 1981. Physiographic divisions of Florida: map and guide. Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida.

Dierberg, F. E. and Wagner, K. J. 2001. A review of "A multiple-parameter approach for establishing minimum levels for Category 3 Lakes of the Southwest Florida Water Management District" June 2001 draft by D. Leeper, M. Kelly, A. Munson, and R. Gant. Prepared for the Southwest Florida Water Management District. Brooksville, Florida.

Florida Board of Conservation. 1969. Florida lakes, part III: gazetteer. Division of Water Resources. Tallahassee, Florida.

Florida Department of Agriculture and Consumer Services. 1938. Aerial photography of Sections 16, 17, 20 and 21, Township 27S, Range 17E. Tallahassee, Florida.

Florida Lakewatch. 2001. Florida Lakewatch data report 2000. Department of Fisheries and Aquatic Sciences, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida.

Griffith, G., Canfield, D., Jr., Horsburgh, C., Omernik, and J. Azevedo, S. 1997. Lake regions of Florida (map). United States Environmental Protection Agency, University of Florida Institute of Food and Agricultural Sciences, Florida Lakewatch, Florida Department of Environmental Protection, and the Florida Lake Management Society. Gainesville and Tallahassee, Florida.

Hazardous Substance & Waste Management Research, Inc. 2000. Human health risk assessment and preliminary ecological evaluation regarding potential exposure to radium-226 in several Central Florida lake ecosystems. Tallahassee, Florida. Prepared for the Southwest Florida Water Management District, Brooksville, Florida.

Hillsborough County. 2000. Modified version of the Environmental Protection Agency's Stormwater Management Model (SWMM), version 4.31C. Tampa, Florida.



Leeper, D., Kelly, M., Munson, A. and Gant, R. 2001. A multiple-parameter approach for establishing minimum levels for Category 3 Lakes of the Southwest Florida Water Management District, June 14, 2001 draft. Southwest Florida Water Management District. Brooksville, Florida.

Shafer, M. D., Dickinson, R. E., Heaney, J. P., and Huber, W. C. 1986. Gazetteer of Florida lakes. Publication no. 96, Water Resources Research Center, University of Florida. Gainesville, Florida.

Southwest Florida Water Management District. 1981. An evaluation of lake regulatory stage levels on selected lakes in the Northwest Hillsborough Basin. Brooksville, Florida.

Southwest Florida Water Management District. 1989. Northwest Hillsborough Basin, Northwest re-map II, aerial photography with contours. Sheet No. 17-27-17. Brooksville, Florida. Prepared by Kucera International Photogrammetric Consultants, Lakeland, Florida.

Southwest Florida Water Management District. 1996. Lake Levels Program lake data sheets / 1977-1996, NW Hillsborough Basin – 14, Volume #2 – Lakes I thru Z. Brooksville, Florida.

Southwest Florida Water Management District. 1998. Survey Section Field Book 14/92, pages 35-36. Brooksville, Florida.

Southwest Florida Water Management District. 1999. Establishment of minimum levels for Category 1 and Category 2 lakes, *in* Northern Tampa Bay minimum flows and levels white papers: white papers supporting the establishment of minimum flows and levels for isolated cypress wetlands, Category 1 and 2 lakes, seawater intrusion, environmental aquifer levels, and Tampa Bypass Canal; peer-review final draft, March 19, 1999. Brooksville, Florida.

Southwest Florida Water Management District. 2003. Survey Section Field Book 14/93, pages 35-46. Brooksville, Florida.

Southwest Florida Water Management District. 2004. Survey Section Field Book 14/93, pages 67-69. Brooksville, Florida.

United States Geological Survey. 1974. Elfers quadrangle, Florida, 7.5 minute series (topographic) map; Elfers, Fla., N2807.5-W8237.5/7.5, 1974, AMS 4440 II NW-Series V847. Department of Interior. Washington, D.C.

White, W. A. 1970. The geomorphology of the Florida peninsula. Geological Bulletin, No. 51. Bureau of Geology, Florida Department of Natural Resources. Tallahassee, Florida.