

**April 23, 2004**

**MEMORANDUM**

**TO:** File

**FROM:** Adam Munson, Environmental Scientist III  
Resource Conservation and Development Department  
Southwest Florida Water Management District

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

**Mound Lake**

***General Description***

Mound Lake (Figure 1) is located in the Northwest Hillsborough Basin of the Southwest Florida Water Management District in Hillsborough County, Florida (Section 11, Township 27 South, Range 17 East). White (1970) classified the area of west-central Florida containing Mound Lake as the Northern Gulf Coastal Lowlands physiographic region. Brooks (1981) characterized the area surrounding the lake as the Land O' Lakes Region in the Tampa Plain subdivision of the Ocala Uplift District and described the subdivision as a region of karst features and many small lakes. 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 an area of generally clear water, low nutrient, slightly acidic lakes situated in sandy well-drained soils of the Tampa Plain (Griffith *et al.* 1997).

Uplands adjacent to Mound Lake have, for the most part, been cleared of native vegetation and are used for residential development or citrus production (Figure 2). Public access to the lake is not available. Mound Lake has a drainage area of 0.3 square miles (SWFWMD 1996) and lies within the Upper Brooker Creek Drainage Basin in the Tampa Bay/Anclote River watershed. The lake has no surface inlets and discharges through a small conveyance way to Rebel Lake (Figure 2). Under peak conditions, conveyance will continue from Rebel Lake (also known as Lake Faye) through Wood Lake, Lake Fern, Crescent Lake, and Island Ford Lake to Brooker Creek. There are currently no permitted surface withdrawals from Mound Lake, although renewal of an expired permit is currently under review by District staff. There are a number of permitted surface and ground water withdrawals in the lake vicinity, including those associated with the Cosme-Odesa Wellfield.

The 1974 (photorevised 1987) United States Geological Survey 1:24,000 Odessa, Fla. quadrangle map does not indicate a water surface elevation for Mound Lake. The

"Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 79 acres at an elevation of 45 ft above mean sea level. A topographic map of the basin generated in support of minimum levels development (Figure 3) indicates that the lake extends over 71 acres at an elevation of 45 ft above the National Geodetic Vertical Datum of 1929 (NGVD). Data used for production of the topographic map were obtained from field surveys conducted in February 2004 and aerial photography maps containing one-foot contour lines prepared using photogrammetric methods.

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

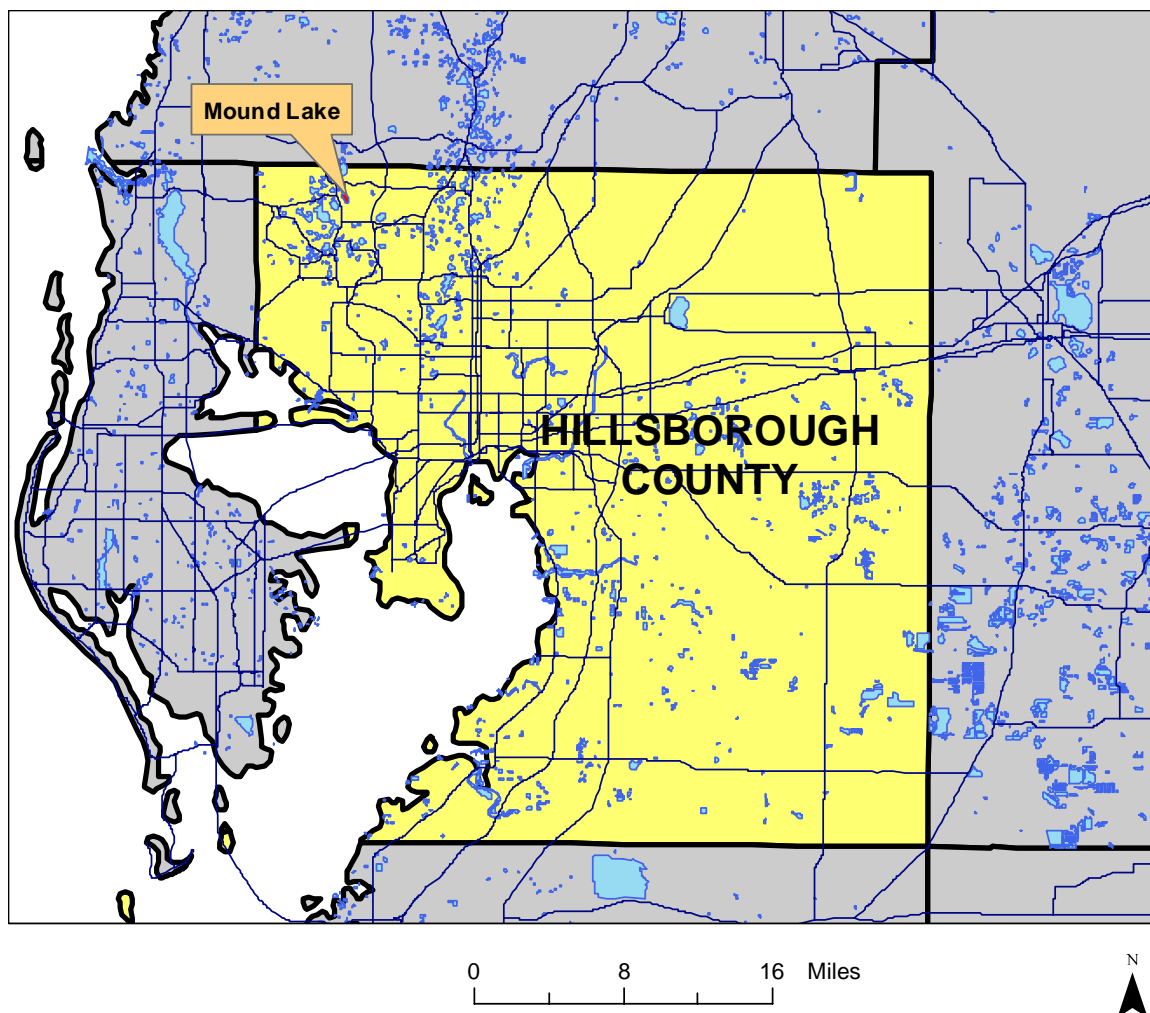
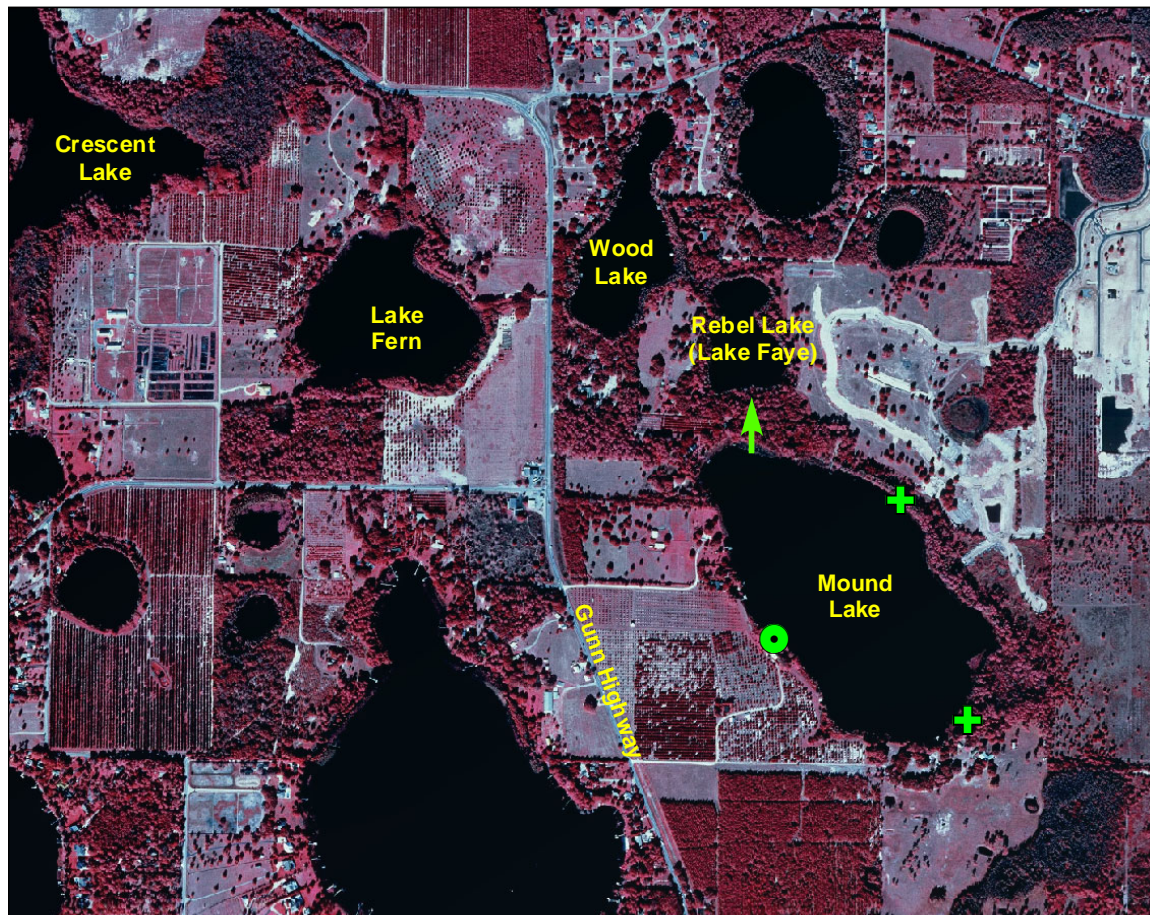





Figure 2. Location of District lake-level gauge, outlet, and sites where hydrologic indicators were measured at Mound Lake in Hillsborough County, Florida.



-  Lake gauge
-  Inlet/Outlet
-  Hydrologic Indicators



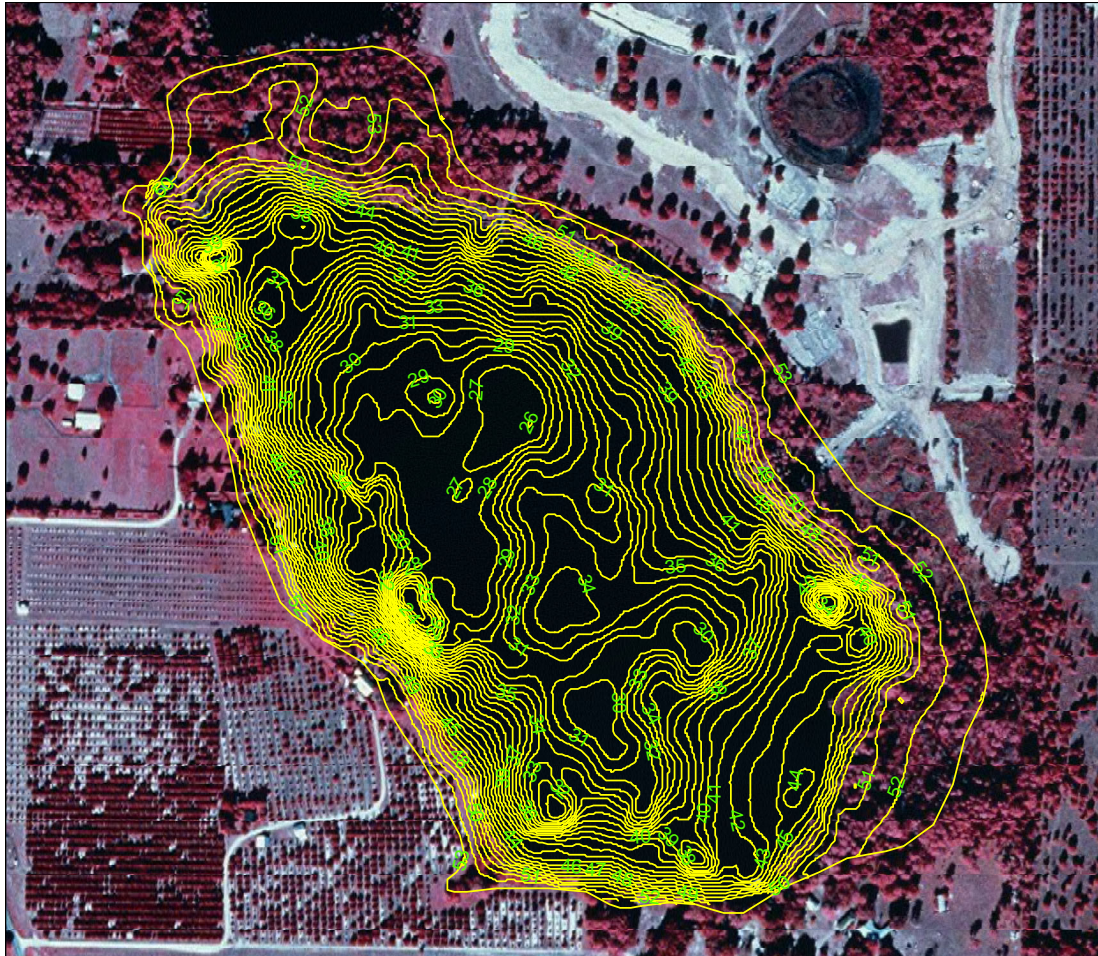
0 1,000 2,000 Feet

Aerial photography from 1999 USGS  
Digital Orthophotograph.

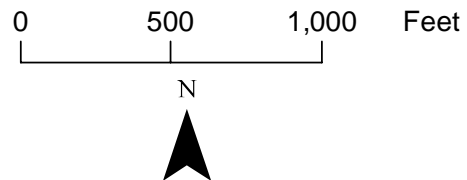
Map prepared April 23, 2004



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



Map prepared February 18, 2004 using 1999 USGS digital orthophotography, elevation data from 1989 SWFWMD aerial photography with contours maps (Sheet No. 11-27-17,), and elevation data collected on February 17, 2004 by SWFWMD staff.



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

Based on work conducted in the late 1970s (see SWFWMD 1996), the District Governing Board adopted management levels (currently referred to as Guidance Levels) for Mound Lake in September 1980 (Table 1). A Maximum Desirable Level of 50.00 ft above NGVD was also developed, but was not adopted by the Governing Board.

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

| <b>Level</b>                  | <b>Elevation<br/>(feet above NGVD)</b> | <b>Lake Area<br/>(acres)</b> |
|-------------------------------|--|------------------------------|
| Ten Year Flood Guidance Level | 51.60                                  | 96                           |
| High Level                    | 51.00                                  | 90                           |
| Low Level                     | 48.00                                  | 79                           |
| Extreme Low Level             | 46.00                                  | 74                           |

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

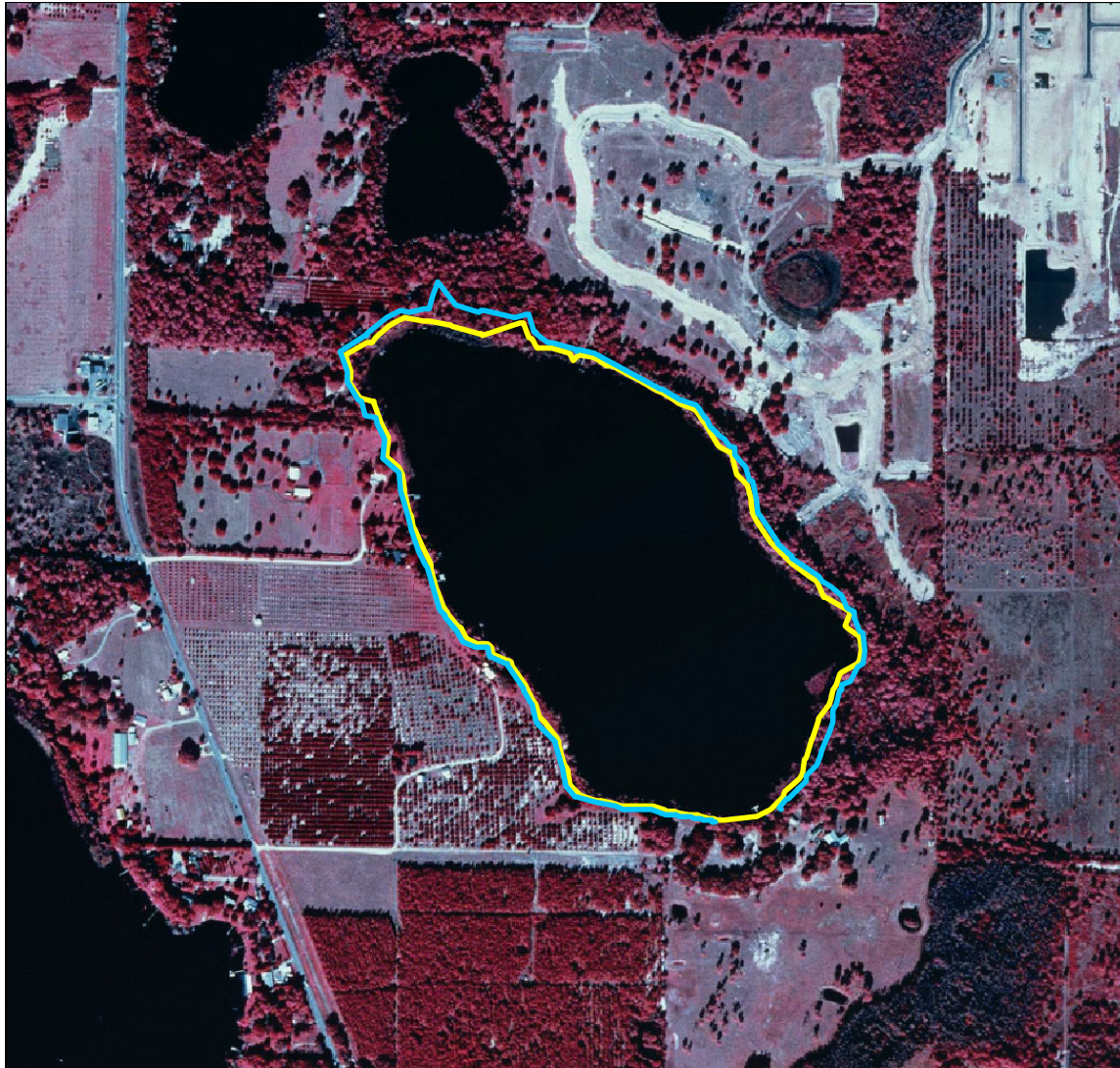
Proposed Minimum and Guidance Levels were developed for Mound Lake using the methodology for Category 1 Lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). Proposed levels, along with lake surface area values for each level are listed in Table 2. Contour lines corresponding to 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 Mound Lake in Hillsborough County, Florida.**

| <b>Level</b>                  | <b>Elevation<br/>(feet above NGVD)</b> | <b>Lake Area<br/>(acres)</b> |
|-------------------------------|--|------------------------------|
| Ten Year Flood Guidance Level | 51.8                                   | 98                           |
| High Guidance Level           | 50.2                                   | 85                           |
| High Minimum Lake Level       | 50.7                                   | 88                           |
| Minimum Lake Level            | 49.3                                   | 82                           |
| Low Guidance Level            | 48.3                                   | 80                           |



**Figure 4. Approximate location of the proposed Minimum Lake Level (MLL, yellow) and proposed High Minimum Lake Level (HMLL, Blue) for Mound Lake in Hillsborough County, Florida.**



## Legend

### Contour

- HMLL = 49.3 ft above NGVD
- MLL = 50.7 ft above NGVD

Map prepared February 18, 2004 using 1999 USGS digital orthophotography, elevation data from 1989SWFWMD aerial photography with contours maps (Sheet No. 11-27-17) and elevation data collected on February 17, 2004 by SWFMWD staff.

0 500 1,000 Feet



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

Hydrologic (*i.e.*, lake stage) data are available from the District Water Management Database for Mound Lake (District Universal ID Number STA 153 153) from July 1972 through the present date (Figure 5, see Figure 2 for current location of the SWFWMD lake-level gauge). The hydrologic data record is not continuous; 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 for the lake are graphed in Figure 6. Historic data are not available. For the period of record from July 1972 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 51.1 ft above NGVD based on elevations associated with the buttressing of cypress (*Taxodium* sp.) trees along the northeast and southern shores 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 August 2003 (Table 3). The control point elevation was established at 49.3 ft above NGVD, based on the ground elevation in a ditch leading into Rebel Lake (Lake Faye) from the northern shore of Mound Lake (Figure 2). 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 50.2 ft above NGVD (Table 3). The Historic P50 and Low Guidance Level were established at 49.5 and 48.3 ft above NGVD, respectively, using the High Guidance Level and the difference between the current P10 and current P50 (0.7 ft) and the difference between the current P10 and current P90 (1.9 ft).

The Ten Year Flood Guidance Level for Mound Lake was established at 51.8 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 31 years (Figures 5 and 6). The highest surface elevation for Mound Lake included in the District water management database, 51.62 ft above NGVD, occurred on June 27, 1974. The low of record, 46.26 ft above NGVD, occurred on June 13, 2000.

Mound Lake contains diverse stands of aquatic macrophytes and other hydrophytes, including cattail (*Typha* sp.), pickerelweed (*Pontederia cordata*), pennywort (*Hydrocotyle umbellata*), Spatterdock (*Nuphar luteum*), 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 less than 1.8 feet below the Normal Pool elevation, the lake is classified as a Category 1 Lake. Note that herein, for discussion purposes, the elevation 1.8 ft below the Normal Pool elevation is identified as the Cypress Standard. For Mound Lake, this standard is established at 49.3 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 Cypress Standard elevation (49.3 ft above NGVD). The proposed High Minimum Lake Level was established at 50.7 ft above NGVD, an elevation 0.4 ft below the Normal Pool. The proposed High Minimum Lake Level is 2.8 ft below the floor slab of the lowest residential building in the immediate lake basin, 2.5 ft below the lowest spot on the paved roads in the vicinity of the lake, and 1.2 ft below the dirt road that runs along the lake's north shore.

For comparative purposes, minimum level standards used for establishing Minimum Lake Level for lakes without fringing cypress wetlands were developed for Mound Lake (Table 3). The Aesthetic Standard for the lake was established at the Low Guidance Level elevation of 48.3 ft above NGVD. The Dock-Use Standard was established at 47.3 ft above NGVD, based on the sum of the P10 elevation of sediments at the end of the 10 docks at the lake (44.2 ft above NGVD, Table 5), a clearance value of 2 ft based on use of powerboats in the lake, and the Northern Tampa Bay RLWR 5090 value (1.1 ft). The Species Richness Standard was established at 44.9 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. A Basin Connectivity Standard for ensuring connectivity among the two major lake sub-basins was established at 34.6 ft above NGVD, based on the critical high-spot elevation of 31.5 ft above NGVD between the two sub-basins, a two-foot allowance for inter-basin movement of fauna and motorized watercraft, and the Northern Tampa Bay area RLWF5090 (1.1 ft). A Recreation/Ski Standard was established at 39.1 ft above NGVD, based on the lake stage that could allow for a five-foot deep area for safe skiing (38 ft above NGVD), and the Northern Tampa Bay area RLWR5090 (1.1 ft). A Mixing Standard for the lake was not developed based on review of dynamic ratio (basin slope) values (see Bachmann *et al.* 2000, Figure 7).

Review of change in the area available for plant colonization associated with change in lake stage indicated that use of the Recreation/Ski Standard for minimum levels development would not be appropriate; approximately 89% of the basin would be susceptible to colonization by aquatic plants at the standard elevation (Figure 7).



Figure 5. Surface water elevations through January 2003 at Mound Lake in Hillsborough County, Florida.

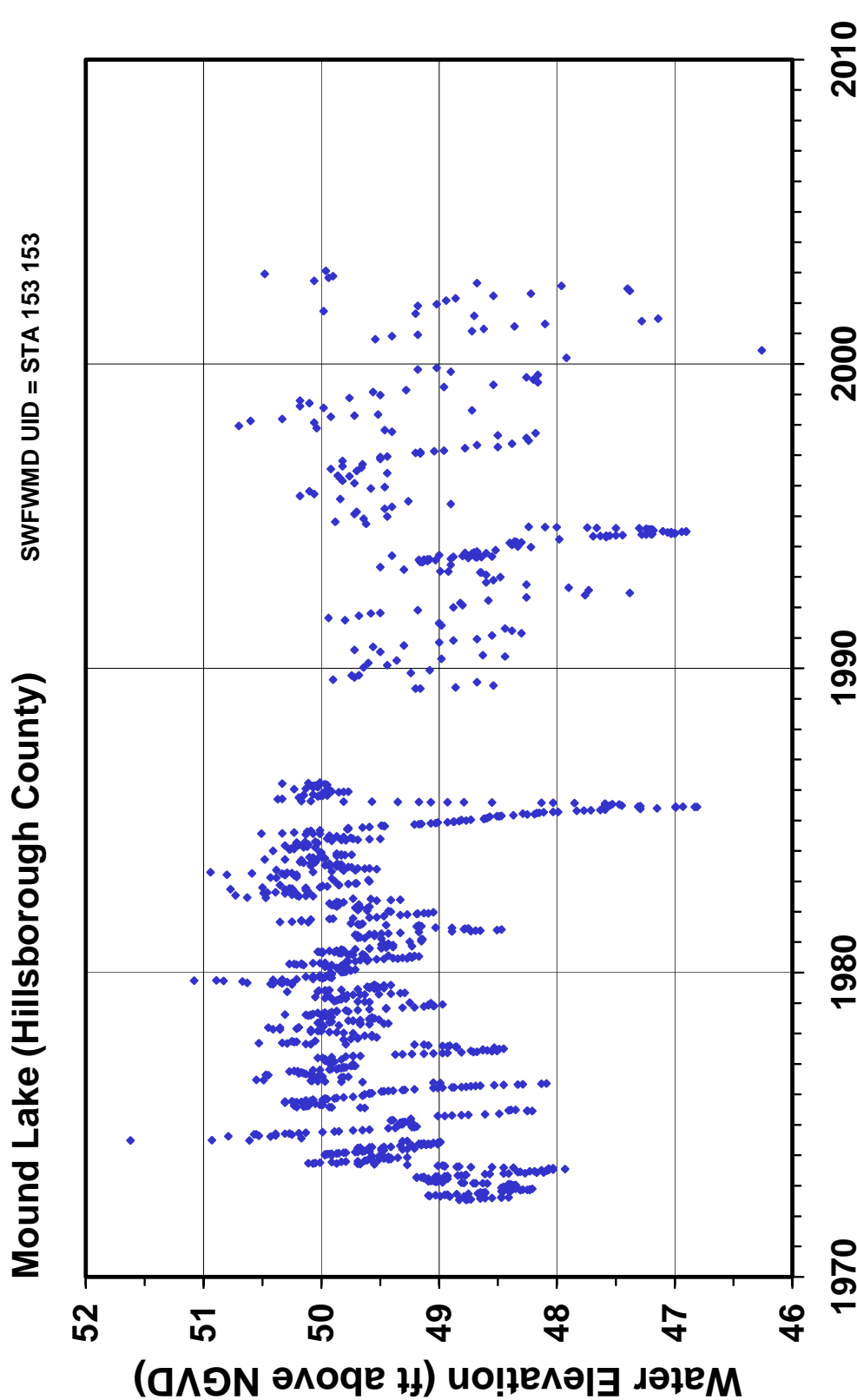
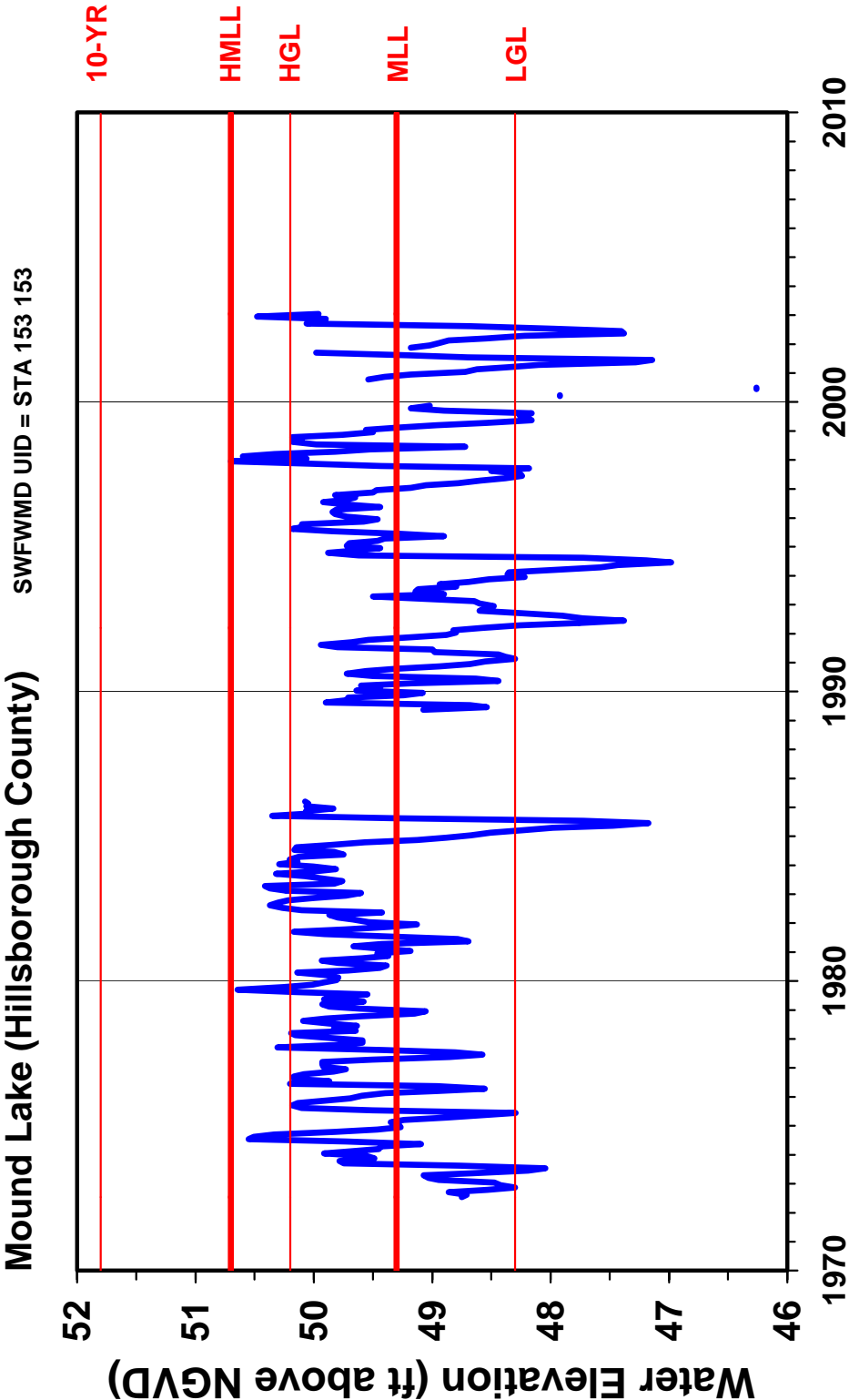


Figure 6. Mean monthly surface water elevations through September 2003, and proposed guidance and minimum levels for Mound Lake in Hillsborough County, Florida. Proposed levels include the Ten Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake Level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



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

| <b>Level or Feature</b>    | <b>Elevation<br/>(feet above NGVD)</b> | <b>Lake Area<br/>(acres)</b> |
|----------------------------|--|------------------------------|
| Current P10                | 50.2                                   | 85                           |
| Current P50                | 49.5                                   | 83                           |
| Current P90                | 48.3                                   | 80                           |
|                            |  |                              |
| Normal Pool                | 51.1                                   | 91                           |
| Low Floor Slab             | 53.5                                   | NA                           |
| Low Road                   | 53.2                                   | NA                           |
| Low Road (dirt)            | 51.9                                   | 99                           |
| Control Point              | 49.3                                   | 82                           |
|                            |  |                              |
| High Guidance Level        | 50.2                                   | 85                           |
| Historic P50               | 49.5                                   | 83                           |
| Low Guidance Level         | 48.3                                   | 80                           |
|                            |  |                              |
| Cypress Standard           | 49.3                                   | 82                           |
| *Aesthetic Standard        | 48.3                                   | 80                           |
| *Dock-Use Standard         | 47.3                                   | 77                           |
| *Species Richness Standard | 44.9                                   | 71                           |
| *Recreation/Ski Standard   | 39.1                                   | 49                           |
| *Connectivity Standard     | 34.6                                   | 34                           |
| *Mixing Standard           | NA                                     | NA                           |

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 Mound Lake in Hillsborough County, Florida. Data were collected on October 1, 2002 by SWFWMD staff.**

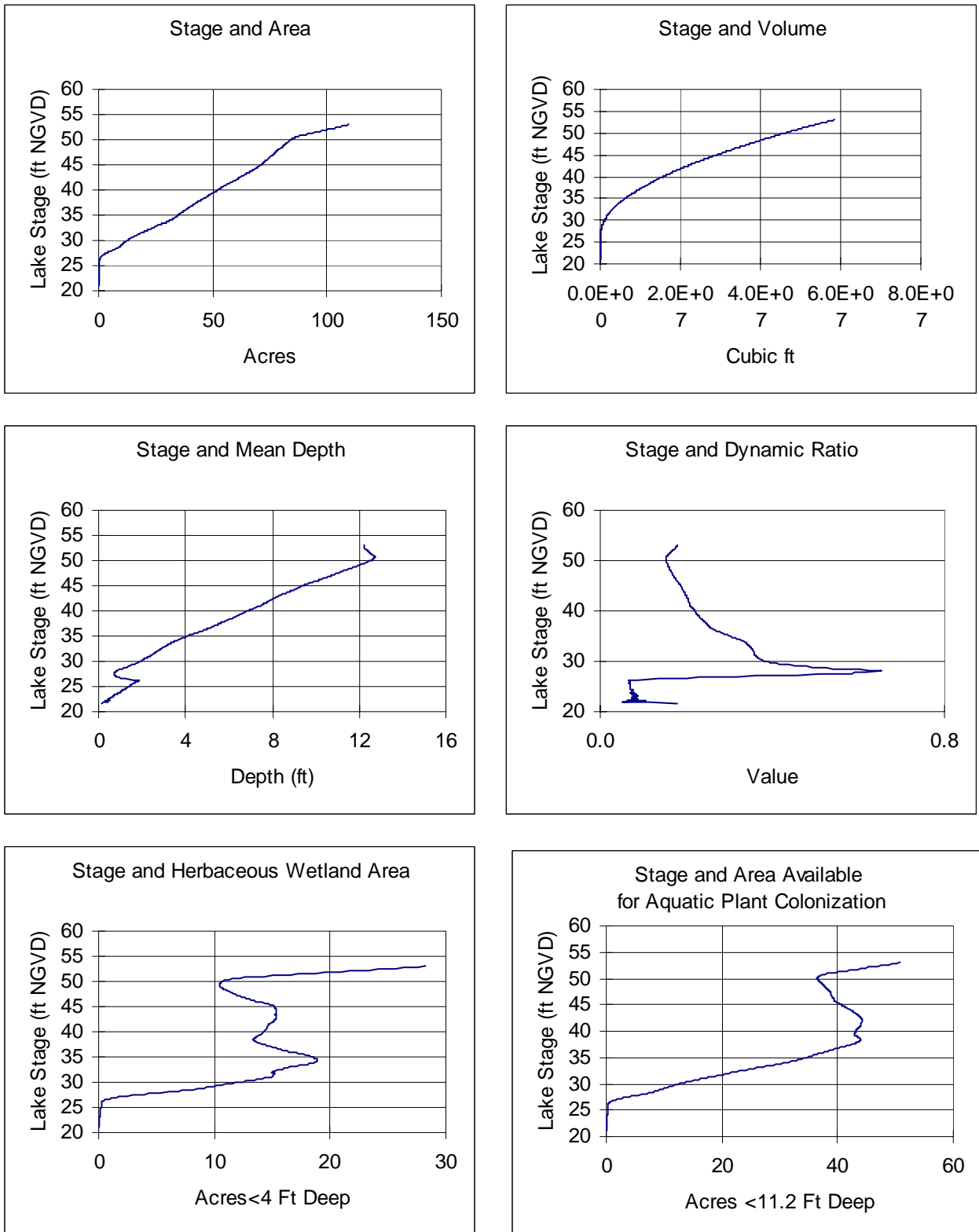
| <b>Hydrologic Indicator</b> | <b>Elevation<br/>(feet above NGVD)</b> |
|-----------------------------|--|
| Cypress buttress            | 51.16                                  |
| Cypress buttress            | 51.26                                  |
| Cypress buttress            | 51.26                                  |
| Cypress buttress            | 51.46                                  |
| Cypress buttress            | 50.76                                  |
| Cypress buttress            | 51.16                                  |
| Cypress buttress            | 51.36                                  |
| Cypress buttress            | 51.06                                  |
| Cypress buttress            | 51.06                                  |
| Cypress buttress            | 50.96                                  |
| Cypress buttress            | 51.16                                  |
| Cypress buttress            | 50.76                                  |
| Cypress buttress            | 51.16                                  |
| Cypress buttress            | 50.86                                  |
| Cypress buttress            | 50.96                                  |
| Cypress buttress            | 51.06                                  |
| <b>N</b>                    | <b>16</b>                              |
| <b>Median</b>               | <b>51.1</b>                            |
| <b>Mean (SD)</b>            | <b>51.1 (0.2)</b>                      |



**Table 5. Summary statistics for elevation data determined for docks (n=10) at Mound Lake in Hillsborough County, Florida, based on data collected by SWFWMD staff 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 Waterward End Docks (feet above NGVD)</b> | <b>Elevation of Dock Platforms (feet above NGVD)</b> |
|------------------|--|--|
| Mean (SD)        | 43.2 (1.2)   | 51.9 (0.9)   |
| P10              | 44.2   | 53.2   |
| P50              | 43.3   | 51.6   |
| P90              | 41.4   | 51.1   |
| Maximum          | 45.4   | 50.7   |
| Minimum          | 41.4   | 53.4   |

**Figure 7. Surface area, volume, mean depth, dynamic ratio (basin slope), area available for colonization by aquatic macrophytes, and potential herbaceous wetland area versus lake stage for Mound Lake 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.

Bishop, E. W. 1967. Florida lakes, part I: a study of the high water lines of some Florida lakes. Florida Board of Conservation, Division of Water Resources. Tallahassee, Florida.

Cowell, B. C., Young, and Resico, C. H., Jr. 1973. Aquatic insect survey of Upper Tampa Bay Watershed Project and Brooker Creek Watershed. Prepared for the Southwest Florida Water Management District. Brooksville, 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 2, 3, 10 and 11, Township 27 S, Range 17 E, dated November 21, 1938. 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.

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. Ecologic Evaluation Section, Southwest Florida Water Management District. Brooksville, Florida.

Robertson, R. T. 1971. Water levels Northwest Hillsborough Basin. Southwest Florida Water Management District. Brooksville, Florida.

Romie, K. 2000. Water chemistry of lakes in the Southwest Florida Water Management District. Environmental Section, Brooksville, Florida.

Sacks, L. A. 2002. Estimating ground-water inflow to lakes in central Florida using the isotope mass-balance approach. Water Resources Investigations Report 02-4192. U.S. Geological Survey. Tallahassee, 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. 1973. Environmental assessment Upper Tampa Bay Watershed Hillsborough, Pasco and Pinellas Counties, Florida. Brooksville, 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. 11-27-17. Brooksville, Florida. Prepared by Kucera International. Lakeland, Florida. Brooksville, Florida.

Southwest Florida Water Management District. 1996. Lake Levels Program lake data sheets/1977-1996, Northwest Hillsborough River Basin – 14, Lakes I thru Z. 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. Special purpose survey: Peace River (sic) Basin, Minimum Flows and Levels Project, Mound Lake. Brooksville, Florida.

Southwest Florida Water Management District. 2003. Survey Section Field Book 13/335, pages 58-75. Brooksville, Florida.



Subsurface Detection Investigations, Inc. 1995. Final report: ground penetrating radar survey, selected lakes in Hillsborough and Pasco Counties, Florida. Largo, Florida.

United States Geological Survey. 1974. Odessa quadrangle, Florida, 7.5 minute series (topographic) map; Odessa, Fla., 28082-B5-TF-024, photorevised 1987, DMS 4400 II NE-Series V847. Department of Interior. Washington, D.C.

Young, S. 1979. Relationship between abundance of crustacean zooplankton and trophic state in fourteen central Florida lakes. M.S. Thesis, Department of Biology. University of South Florida. Tampa, Florida.

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