February 4, 2003

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 Calm Lake**
In Hillsborough County, Florida

Calm Lake

General Lake Description

Calm Lake (Figure Calm-1) is located in the Northwest Hillsborough Basin in Hillsborough County, Florida (Sections 10, 11,14 and 15, Township 27S, Range 17E). The area surrounding the lake is categorized as the Land-O-Lakes subdivision of the Tampa Plain in the Ocala Uplift Physiographic District (Brooks 1981); a region of many lakes on a moderately thick plain of silty sand 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; an area of numerous slightly acidic, low nutrient, and mostly clear-water lakes (Griffith *et al.* 1997).

The lake has a drainage area of 0.40 square miles (Florida Board of Conservation 1969), and along it's southwestern shore, is connected to a small wetland pond that drains to Lake Keystone (Figure Calm-2). There are no surface water withdrawals from the lake currently permitted by the District. There are, however, several permitted groundwater withdrawals in the lake vicinity.

The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al*. 1986) lists the lake area at 127 ft at an elevation of 48 ft above mean sea level. The United States Geological Survey 1974 (photorevised 1987) 1:24,000 Odessa, Fla. quadrangle topographic map indicates a water level elevation of 48 ft above mean sea level. This elevation corresponds to a lake surface area of 119 acres, based on a topographic map of the basin generated in support of minimum levels development (Figure Calm-3). Data used for production of the topographic map were obtained from field surveys and 1:200 aerial photograph maps containing one-foot contour lines prepared using photogrammetric methods.

Figure Calm-1. Location of Calm Lake in Hillsborough County, Florida.

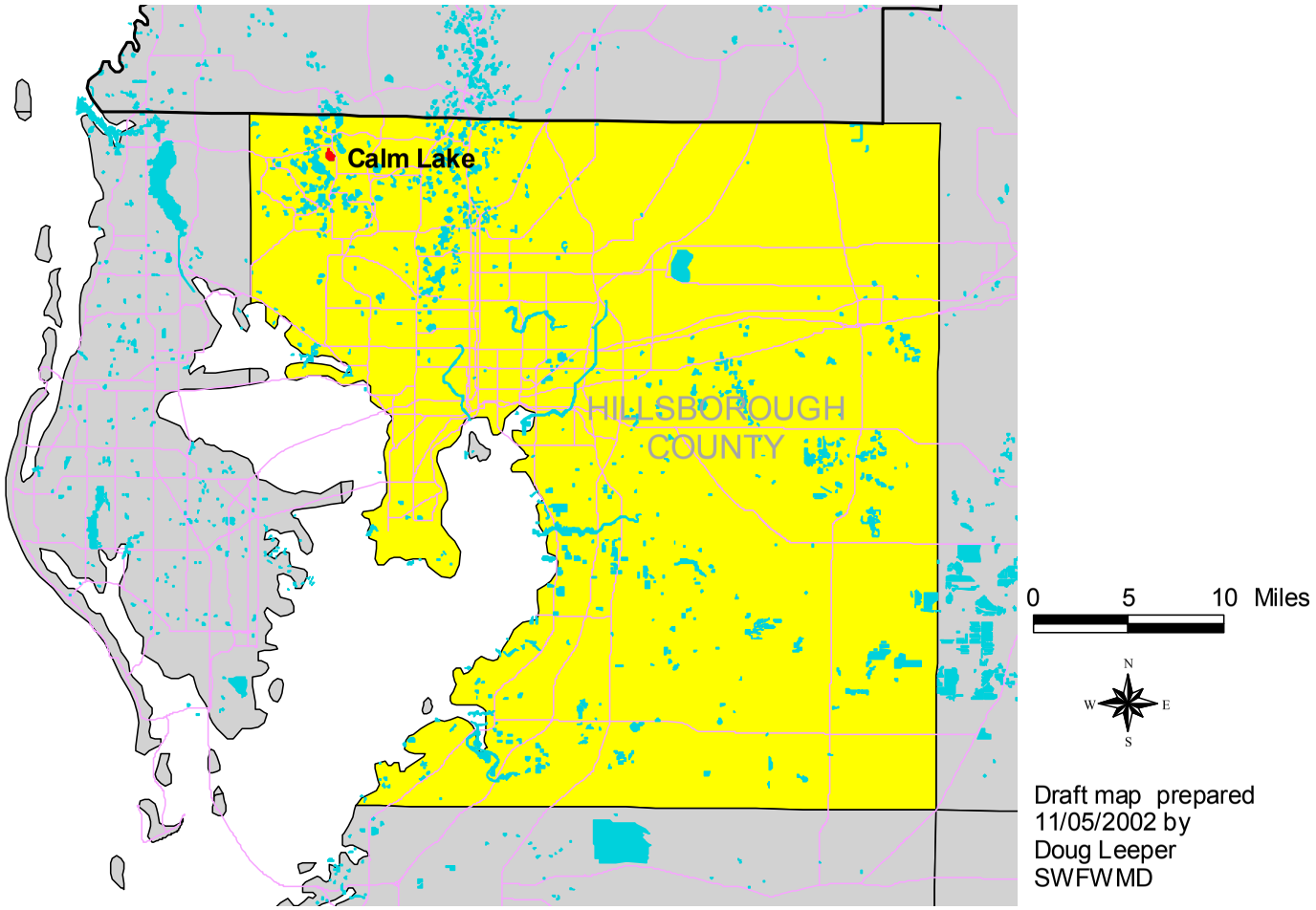


Figure Calm-2. Location of District lake gauge and outlet at Calm Lake, Hillsborough County, Florida.

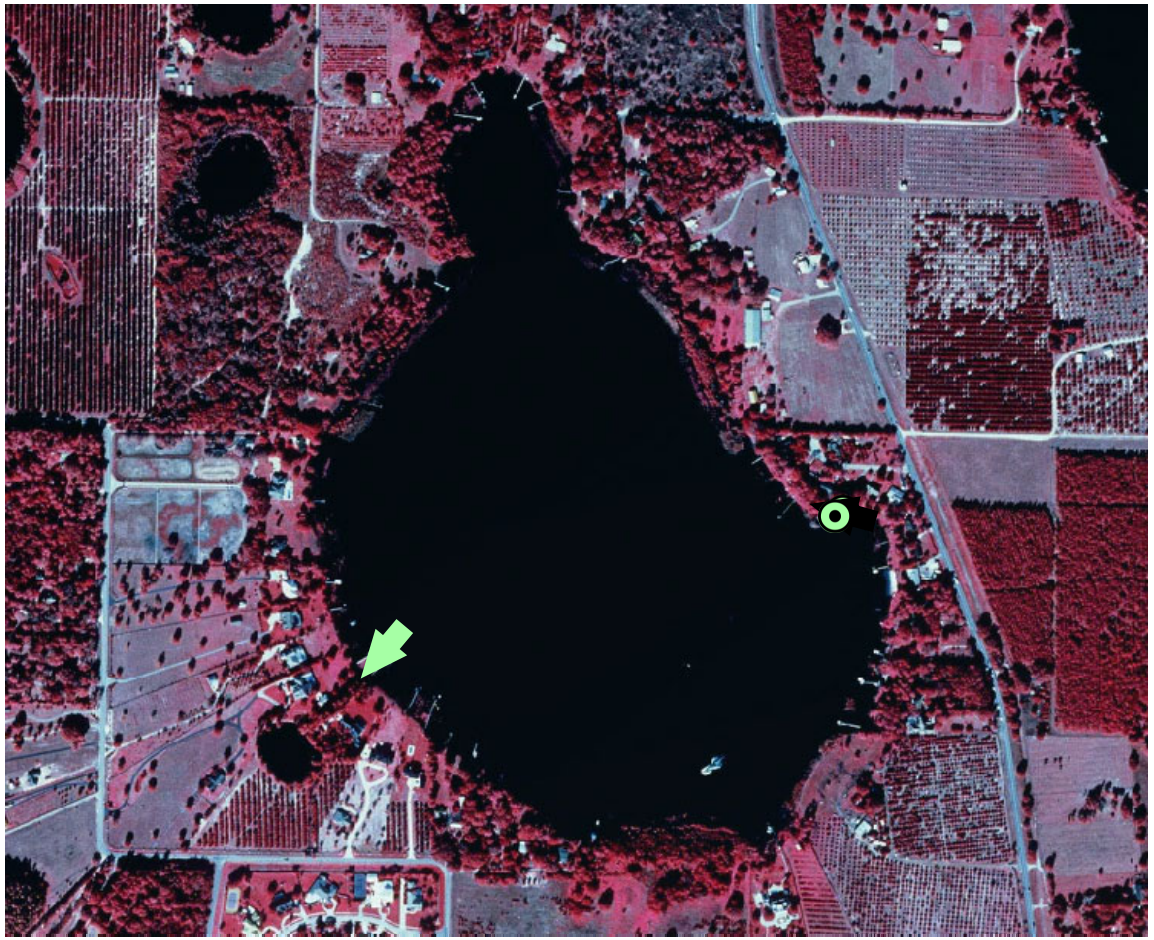
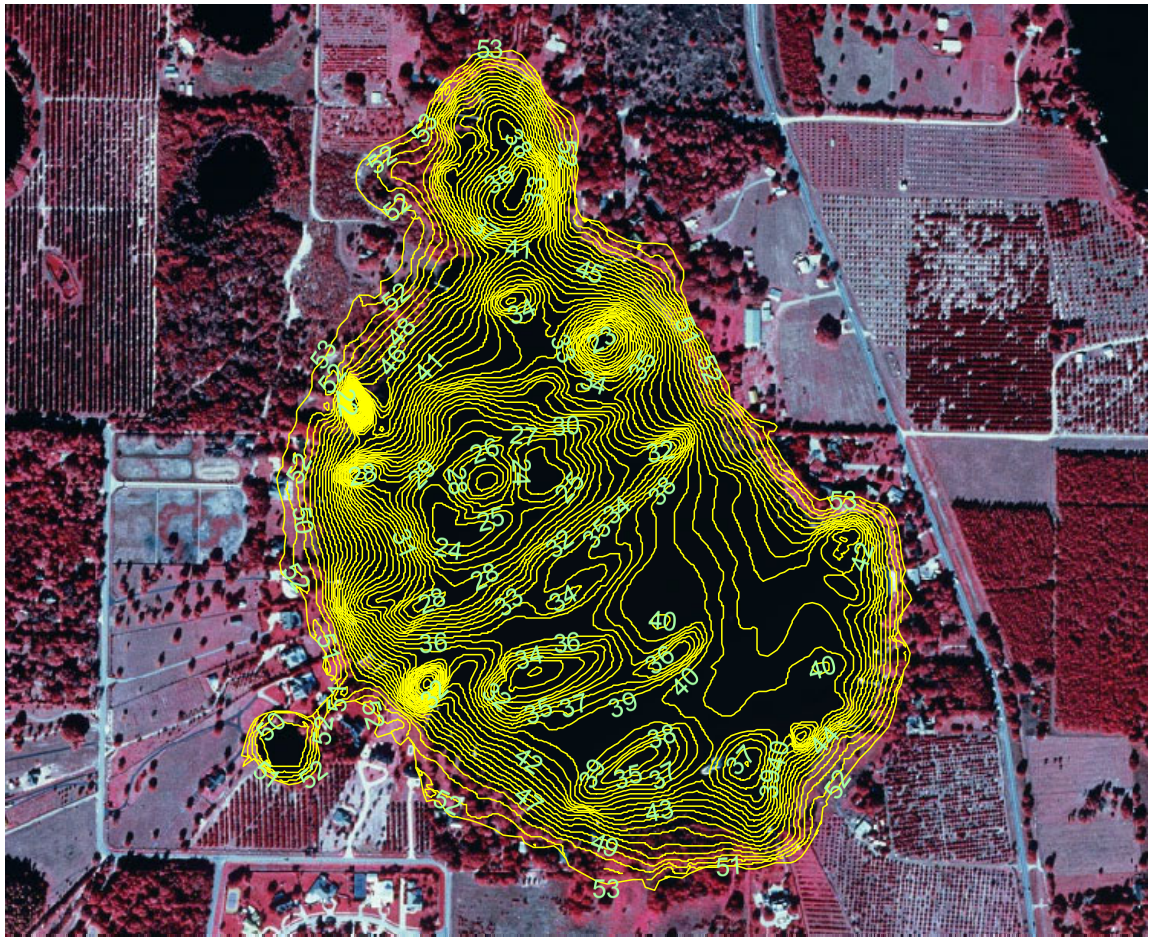


Figure Calm-3. One-foot contours within the Calm Lake basin, Hillsborough County, Florida. Values shown are elevations, in feet, relative to the National Geodetic Vertical Datum.



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Background map:
USGS 1999 Digital
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Draft map prepared
11/05/2002 by
Doug Leeper
SWFWMD

Previously Adopted Lake Management Levels

Based on work conducted in 1977 (see SWFWMD 1996), the District Governing Board adopted management levels (currently referred to as Guidance Levels) for Calm Lake in September 1980 (Table Calm-1). A Maximum Desirable Level of 49.50 ft above NGVD was also developed, but was not adopted by the Governing Board.

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

Level	Elevation (feet above NGVD)	Total Lake Area (acres)
Ten Year Flood Guidance Level	52.20	148
High Level	50.50	134
Low Level	47.50	116
Extreme Low Level	45.50	107

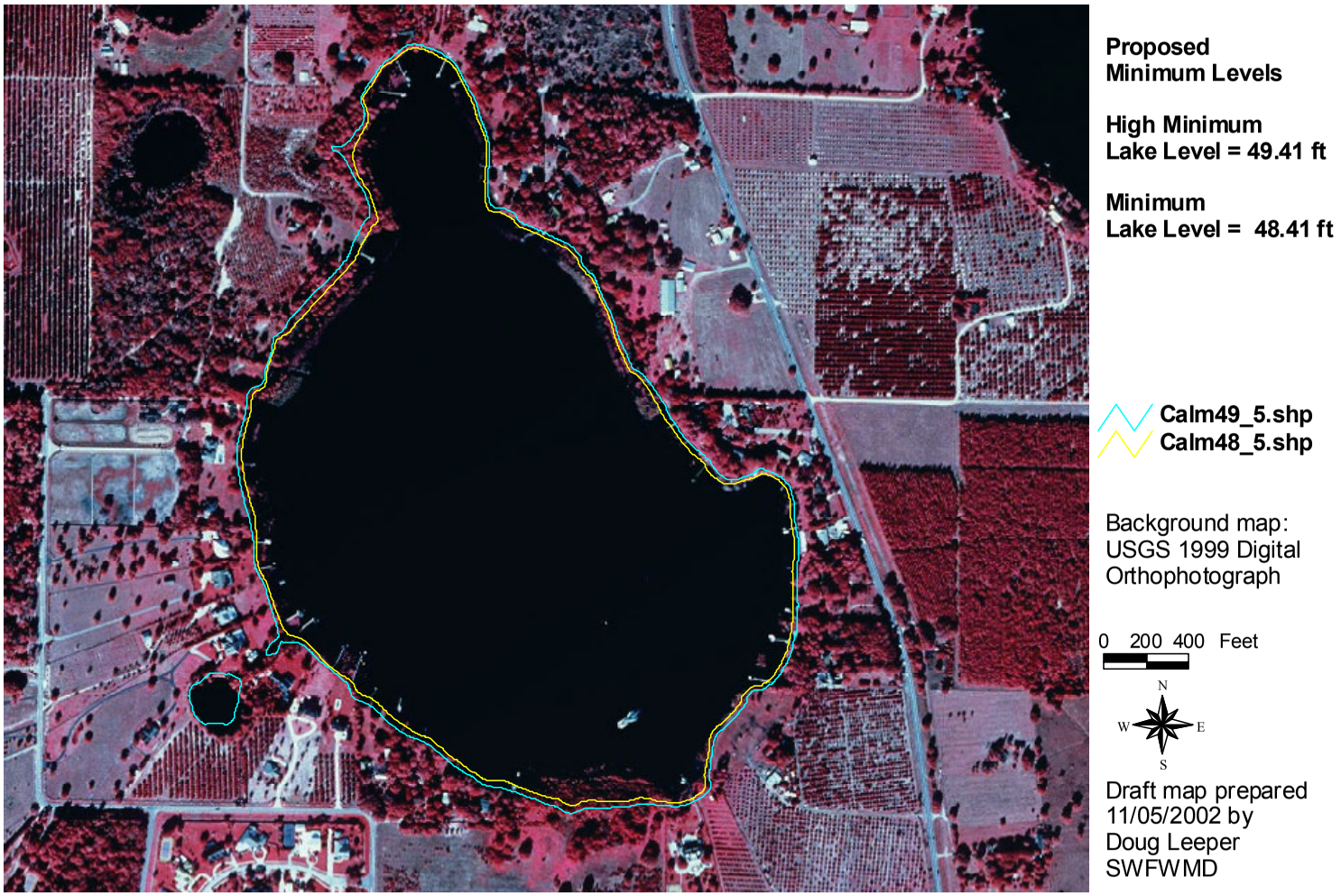
Proposed Minimum and Guidance Levels

Proposed Minimum and Guidance Levels were developed for Calm Lake using the methodology for Category 3 Lakes described in Leeper *et al.* (2001), in accordance with modifications outlined by Dierberg and Wagner (2001). Proposed levels, along with lake surface area values for each level are listed in Table Calm-2. The locations of the proposed minimum levels within the lake basin are shown in Figure Calm-4.

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

Level	Elevation (feet above NGVD)	Total Lake Area (acres)
Ten Year Flood Guidance Level	51.02	138
High Guidance Level	49.41	127
High Minimum Lake Level	49.41	127
Minimum Lake Level	48.41	121
Low Guidance Level	47.31	116

Figure Calm-3. Approximate location of the proposed Minimum Lake Level (yellow) and the proposed High Minimum Lake Level (blue) for Calm Lake, Hillsborough County, Florida. Elevations are in feet, relative to the National Geodetic Vertical Datum.



Summary of Data and Analyses Supporting Recommended Minimum and Guidance Levels

Hydrologic data are available for Calm Lake (District Universal ID Number STA 459 460) for the period from January 1965 through the present date (Figure Calm-5). For the entire period of record, the hydrologic data are classified as Current data. Data collected through December 2001 were used to calculate the Current P10, P50, and P90 (Table Calm-3).

The Category 3 Lake Normal Pool elevation (Table Calm-3) was established at 51.35 ft above NGVD, based on the elevation of the waterward extent of pine (*Pinus* sp.) trees and the landward extent of holly (*Ilex* sp.) along the shore of the lake (Table Calm-4). 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 (Tables Calm-3 and Calm-5, Figure Calm-6). The Category 3 Lake Normal Pool elevation is above the control point, so the lake is considered to be Structurally Altered.

Based on the relationship between the control point elevation, the Category 3 Lake Normal Pool elevation and the Current P10, the High Guidance Level was established at the control point elevation of 49.41 ft above NGVD (Table Calm-3). The Historic P50 and Low Guidance Level were determined 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 Calm Lake using the methodology for open basin lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). The District used the flood information from an existing study of the Brooker Creek Watershed developed by Ayres Associates for Hillsborough County (Ayres 1998). The Brooker Creek runoff hydrographs were computed using the NRCS Dimensionless Unit Hydrograph method, a 256 shape factor, a 10.0-inch rainfall depth, and a 72-hour rainfall distribution developed by the South Florida Water Management District. The Brooker Creek conveyance system was simulated with the Hillsborough County modified version of EXTRAN, and the hydrodynamic routing component of the Environmental Protection Agency's Stormwater Management Model (SWMM) v.4.31. District staff modified the EXTRAN input data developed by Ayres by setting the initial elevation of Calm Lake at the outlet control point elevation of 49.41 feet above NGVD. The modified data set was then used to determine the Ten-year Flood Guidance Level, based on runoff hydrographs from the 10-year storm event. The Ten Year Flood Guidance Level (51.02 ft above NGVD) has not been exceeded during the period for which lake stage data are available (see Figure Calm-5). The highest recorded surface elevation for the lake, 50.60 ft above NGVD, occurred on March 12, 13, 14, 29, 30 and 31, 1970.

Calm Lake is not 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. Aquatic macrophytes, including cattail (*Typha* sp.), rush fuirena

(*Fuirena scirpoidea*), maidencane (*Panicum hemitomum*), and fragrant water lily (*Nymphaea odorata*) occur throughout the basin.

Dock-Use, Aesthetics, Basin Connectivity, Species Richness, and Recreation/Ski Standards were evaluated for minimum levels development. A Dock-Use Standard for Calm Lake was established at 48.86 ft above NGVD, based on the Northern Tampa Bay area RLWR5090 (1.1 ft) and a Dock-End Sediment elevation of 45.76 ft, developed from measurement of 30 docks. An Aesthetic-Standard for the lake was established at the Low Guidance Level elevation of 47.31 ft above NGVD. A Basin Connectivity Standard was established at 44.6 ft above NGVD, based on use of powerboats in the lake, a critical high-spot elevation of 41.5 ft and the RLWR5090 for the northern Tampa Bay area. A Species Richness Standard was established at 44.50 ft above NGVD, based on a 15% reduction in lake surface area from that at the Historic P50 elevation. The Recreation/Ski Standard was established at 41.1 ft, based on a critical ski elevation of 40.0 ft and the Northern Tampa Bay area RLWR5090. Review of the dynamic ratio for lake stages bounded by the Current P10 and Current P90 elevations and the High and Low Guidance Levels did not indicate that potential changes in basin susceptibility to wind-induced sediment resuspension would be of concern for minimum levels development (Table Calm-3, Figure Calm-7). 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 Calm-7).

The Dock-Use Standard, the most conservative of the appropriate standards, exceeded the Historic P50 elevation, so the Historic P50 elevation was substituted for this standard and used to establish the proposed Minimum Lake Level at 48.41 ft above NGVD. The proposed High Minimum Lake Level was established at 49.41 ft above NGVD, an elevation corresponding to the Minimum Lake Level plus the RLWR50 (1.0 ft) for the northern Tampa Bay area. The proposed High Minimum Lake Level is equivalent to the High Guidance Level and is 2.4 ft below the Low Floor Slab elevation.

Figure Calm-5. Mean monthly surface water elevation, and proposed guidance and minimum levels for Calm Lake, 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).

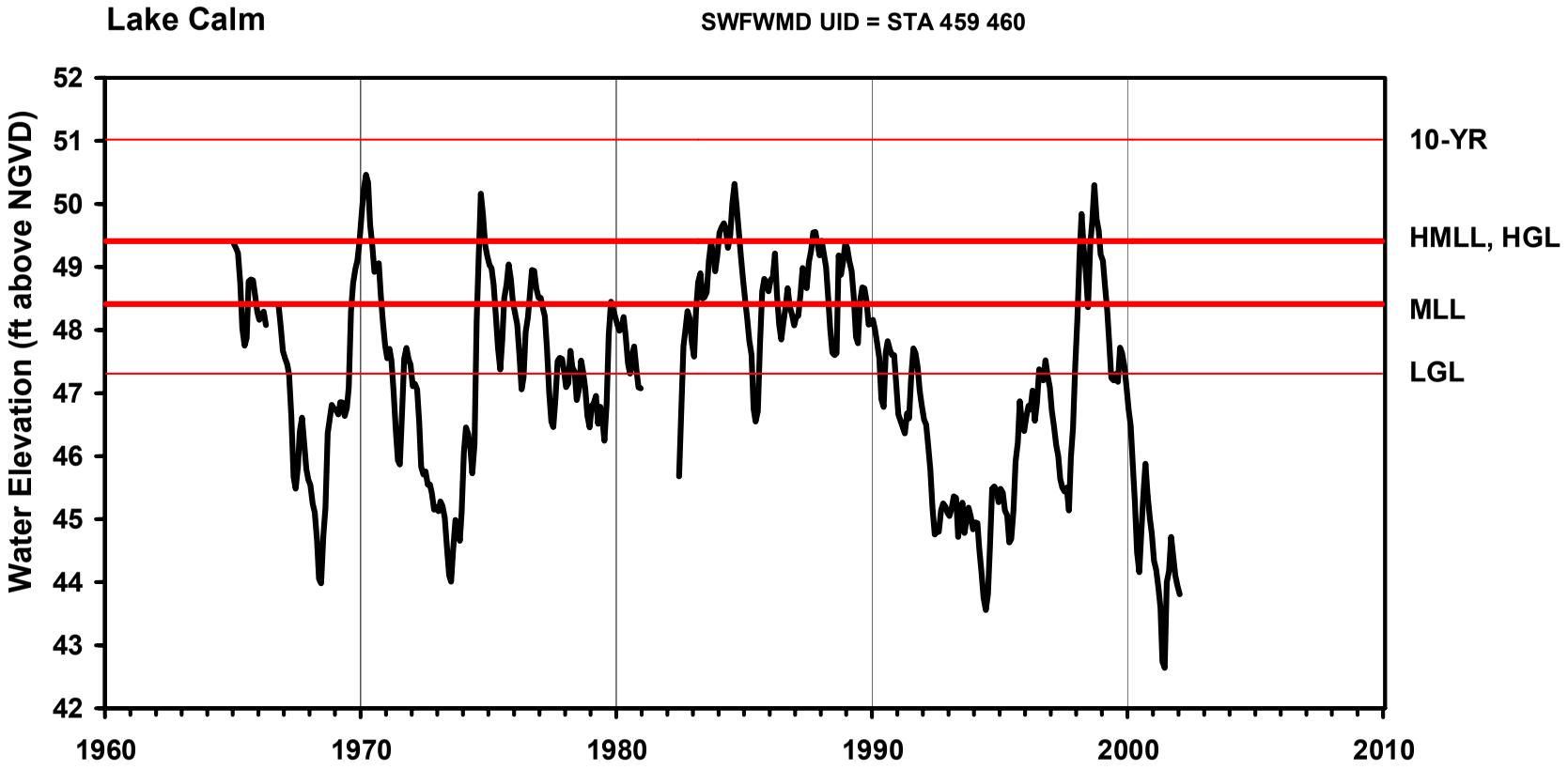


Table Calm-3. Elevation data and associated area values used for establishing minimum levels for Calm Lake in Hillsborough County, Florida.

Level or Feature	Elevation (feet above NGVD)	Total Lake Area (acres)
Current P10	49.20	125
Current P50	47.45	116
Current P90	44.97	105
Category 3 Lake Normal Pool	51.35	140
Low Floor Slab	51.76	144
Low Other (garage slab)	51.50	141
Low Other (shed slab)	51.15	139
Low Road	51.92	145
Control Point	49.41	127
High Guidance Level	49.41	127
Historic P50	48.41	121
Low Guidance Level	47.31	116
Dock-Use Standard	48.86	123
Basin Connectivity Standard	44.6	103
Species Richness Standard	44.50	103
Aesthetic Standard	47.31	116
Recreation/Ski Standard	41.1	76

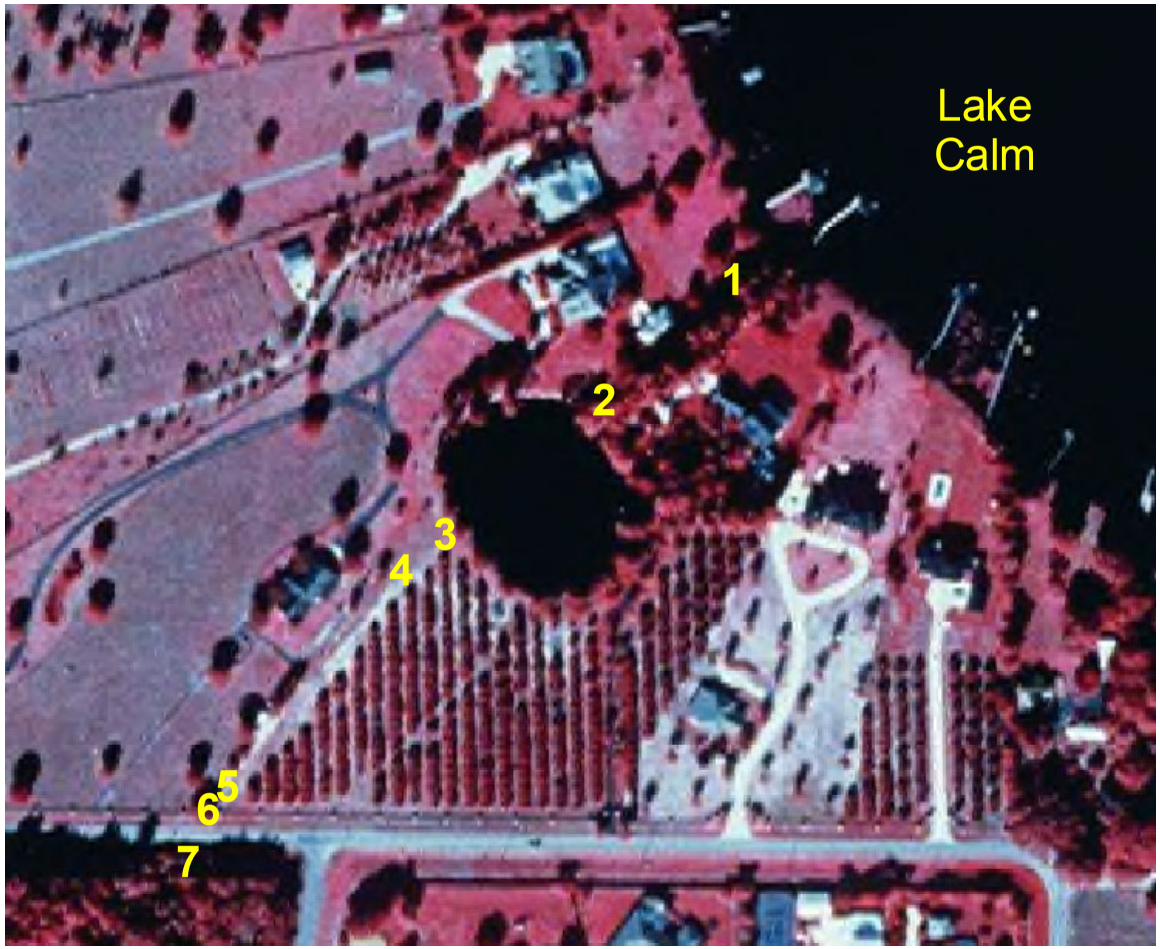
Table Calm-4. Elevation data used for establishing the Category 3 Lake Normal Pool Elevation for Calm Lake in Hillsborough County, Florida. Data were collected in January 1997; water level elevation was 46.79 ft above NGVD.

Hydrologic Indicator	Elevation (ft above NGVD)
Toe of waterward pine hummock	51.81
Base of landward holly species	50.89
Mean	**51.35**

Table Calm-5. Summary of structural alteration and control point elevation information for Calm Lake in Hillsborough County, Florida. Numbers correspond to those shown in Figure Calm-6.

No.	Description	Elevation (feet above NGVD)
1	Top of earthen berm	49.37
2	Top of earth and wood spillway	50.59
3	Control point; invert of northeast end of 36" corrugated plastic pipe	49.41
4	Top of stainless steel riser in drop inlet	50.09
5	Southwest end of corrugated plastic pipe	47.12
6	Northeast end of 36" reinforced concrete pipe under Wayne Road	47.14
7	Southwest end of 36" reinforced concrete pipe under Wayne Road	45.78

Figure Calm-6. Outlet conveyance system for Calm Lake, Hillsborough County, Florida. Numbered sites are described in Table Calm-5.



Background map:
USGS 1999 Digital
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Draft map prepared
11/05/2002 by
Doug Leeper
SWFWMD

Figure Calm-7. Surface area, volume, potential herbaceous wetland area, and dynamic ratio versus lake stage for Calm Lake, Hillsborough County, Florida.

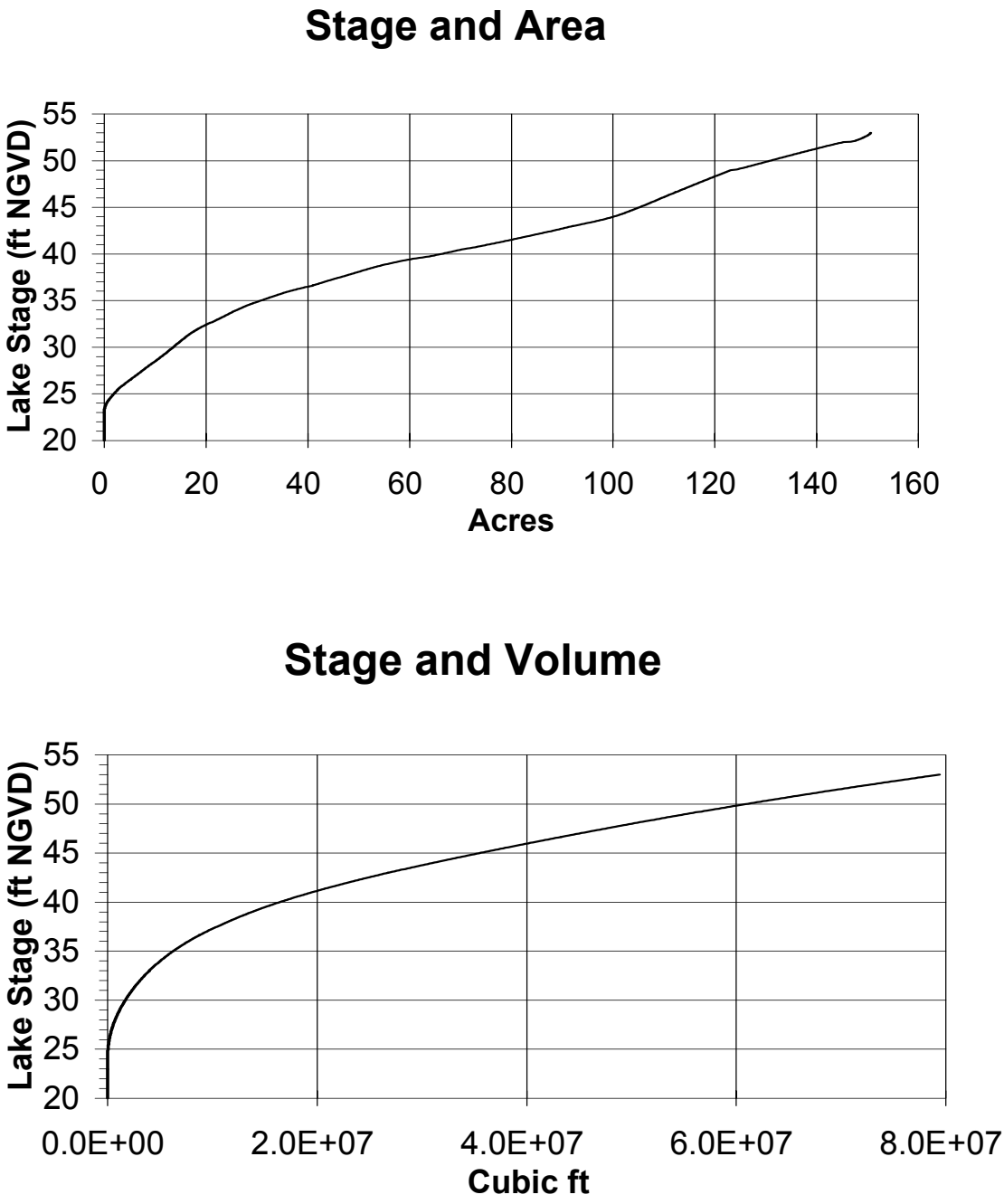
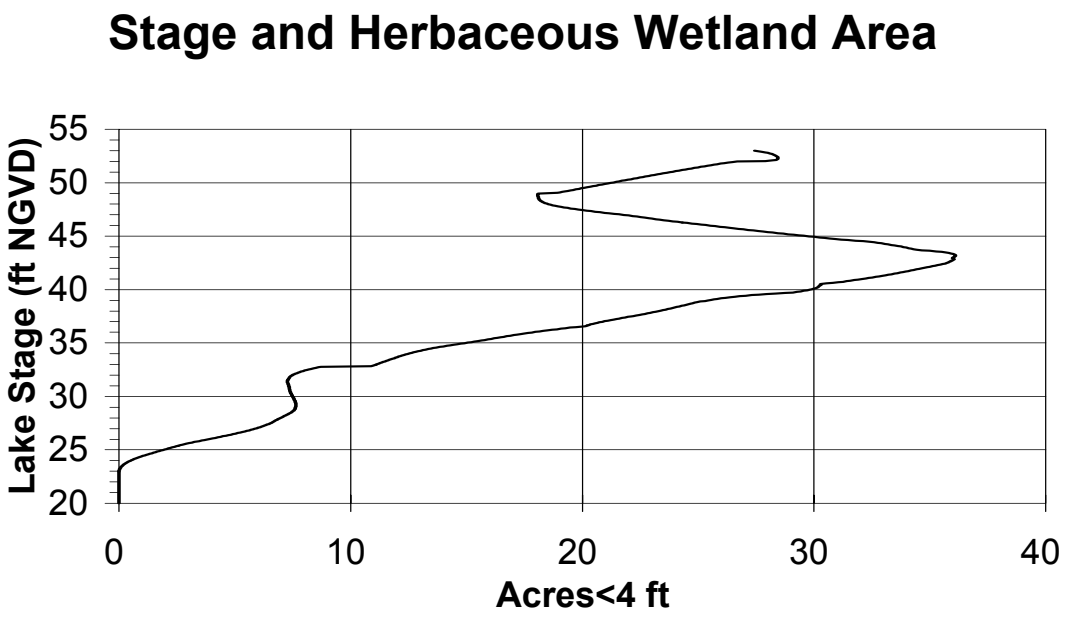


Figure Calm-7 (continued).



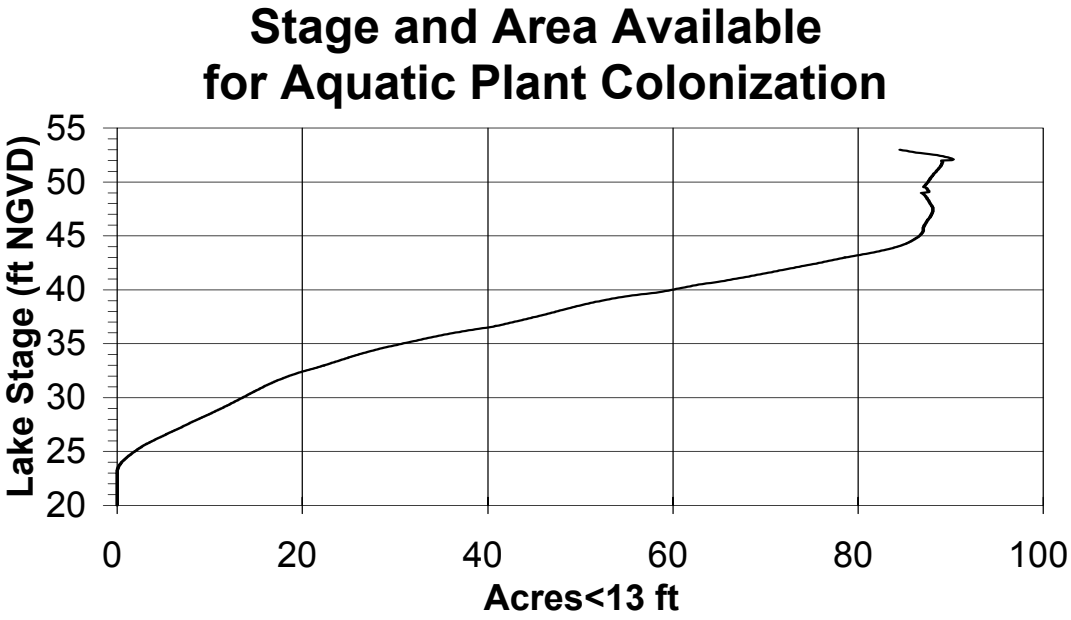
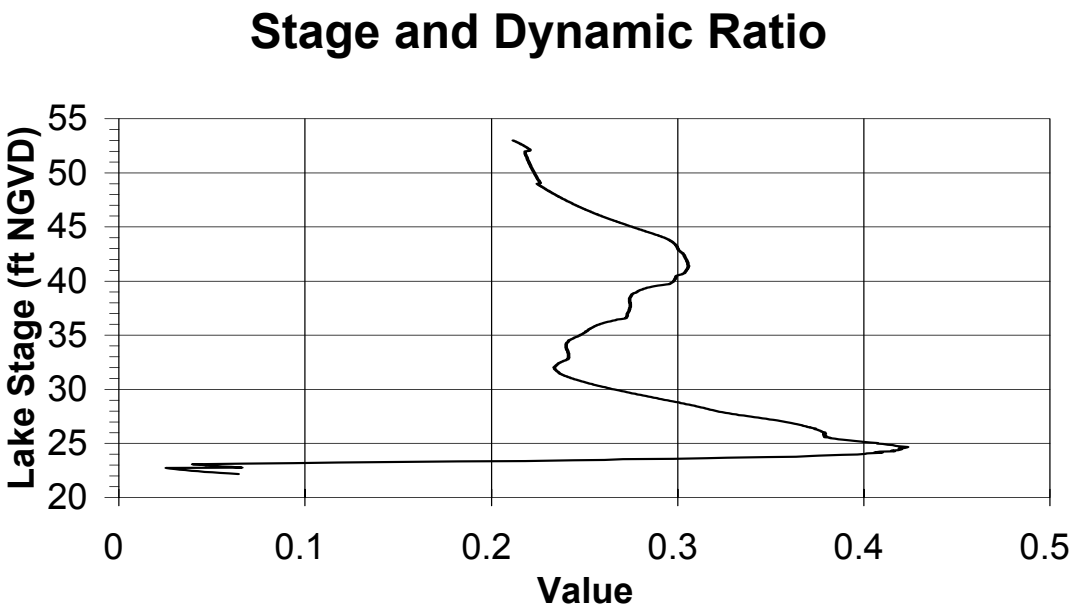


Figure Calm-7 (continued).



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