

**April 23, 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 Reinheimer Lake in  
Hillsborough County, Florida**

## **Reinheimer Lake**

### ***General Description***

Reinheimer Lake (Figure 1) is located in the Northwest Hillsborough Basin of the Southwest Florida Water Management District in Hillsborough County, Florida (Sections 14 and 15, Township 27 South, Range 18 East). White (1970) classified the area of west-central Florida containing Reinheimer Lake as the Northern Gulf Coastal Lowlands physiographic region. Brooks (1981) characterized the area surrounding the lake as the Land-O-Lakes subdivision of the Tampa Plain in the Ocala Uplift Physiographic District. The subdivision is 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 Land-O-Lakes lake region, and described as an area of numerous neutral to slightly alkaline, low to moderate nutrient, clear-water lakes (Griffith *et al.* 1997).

Public access to the shoreline is not available. Uplands surrounding the lake have been cleared for pastureland or residential development, but much of the shoreline remains covered in natural vegetation (Figure 2). The lake is located in the Rocky/Brushy Creek watershed. An inlet along the north shore of the lake conveys water from a series of wetlands that receives inflow from an unnamed lake north of Crystal Lake Road. An outlet along the south shore of the lake conveys water under Van Dyke Road to wetlands that drain to Lake Merrywater. There are no surface water withdrawals from Reinheimer Lake currently permitted by the District. There are, however, several permitted groundwater withdrawals in the area, including major withdrawals associated with Tampa Bay Water's operation of the Section 21 Wellfield.

The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) does not include any information on Reinheimer Lake. The 1974 and 1987 (photorevised) United States Geological Survey 1:24,000 Lutz quadrangle maps do not

include an elevation for the lake surface. A topographic map of the basin generated in support of minimum levels development (Figure 3) indicates that the lake extends over 40 acres at an elevation of 60 ft above the National Geodetic Vertical Datum of 1929 (NGVD). Data used for production of the topographic map were obtained from field surveys and aerial photography maps containing one-foot contour lines prepared using photogrammetric methods.

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

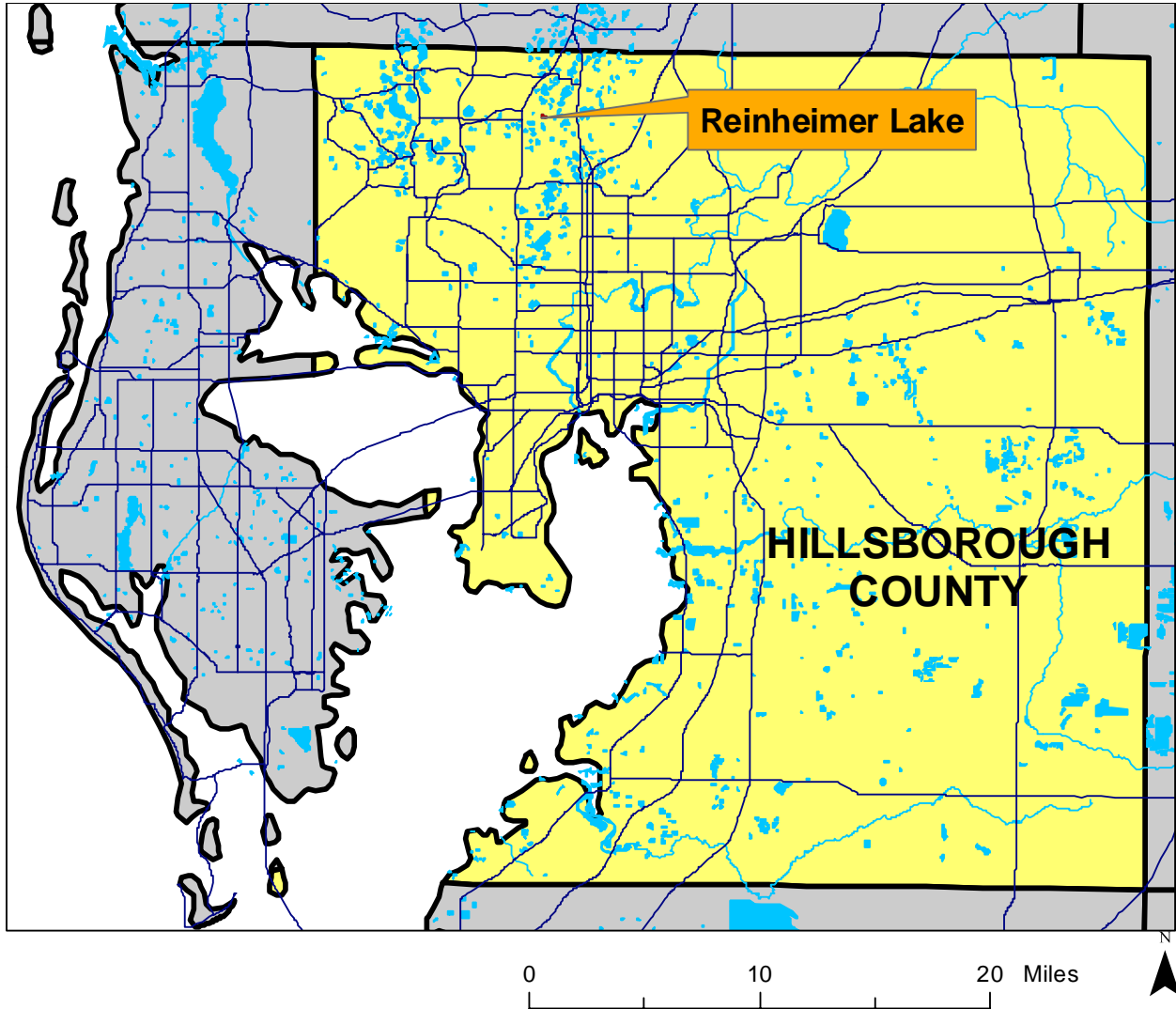
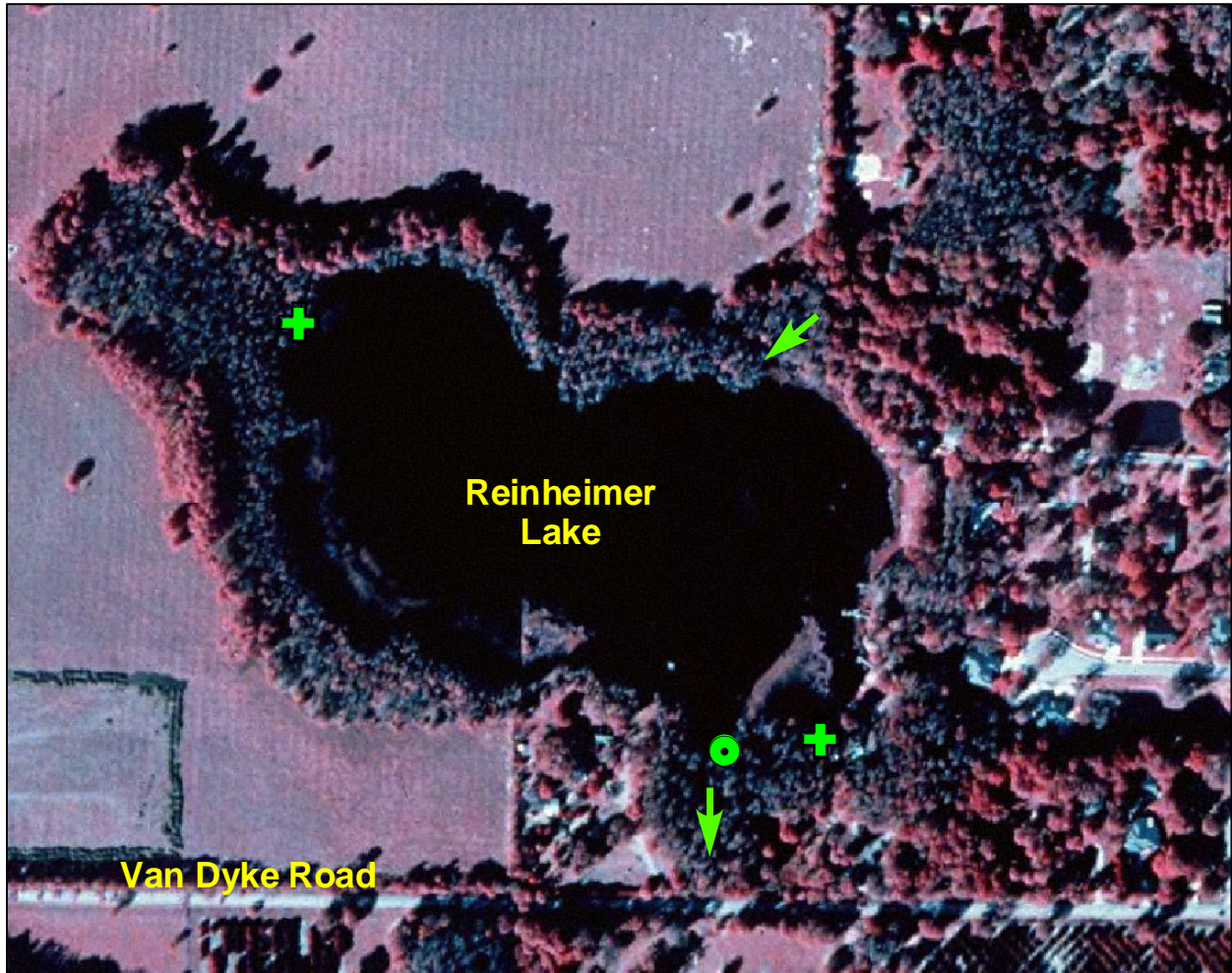





Figure 2. Location of District lake-level gauge, inlet, outlet and sites where hydrologic indicators were measured at Reinheimer Lake in Hillsborough County, Florida.



-  Lake gauge
-  Inlets/Outlet
-  Hydrologic Indicators

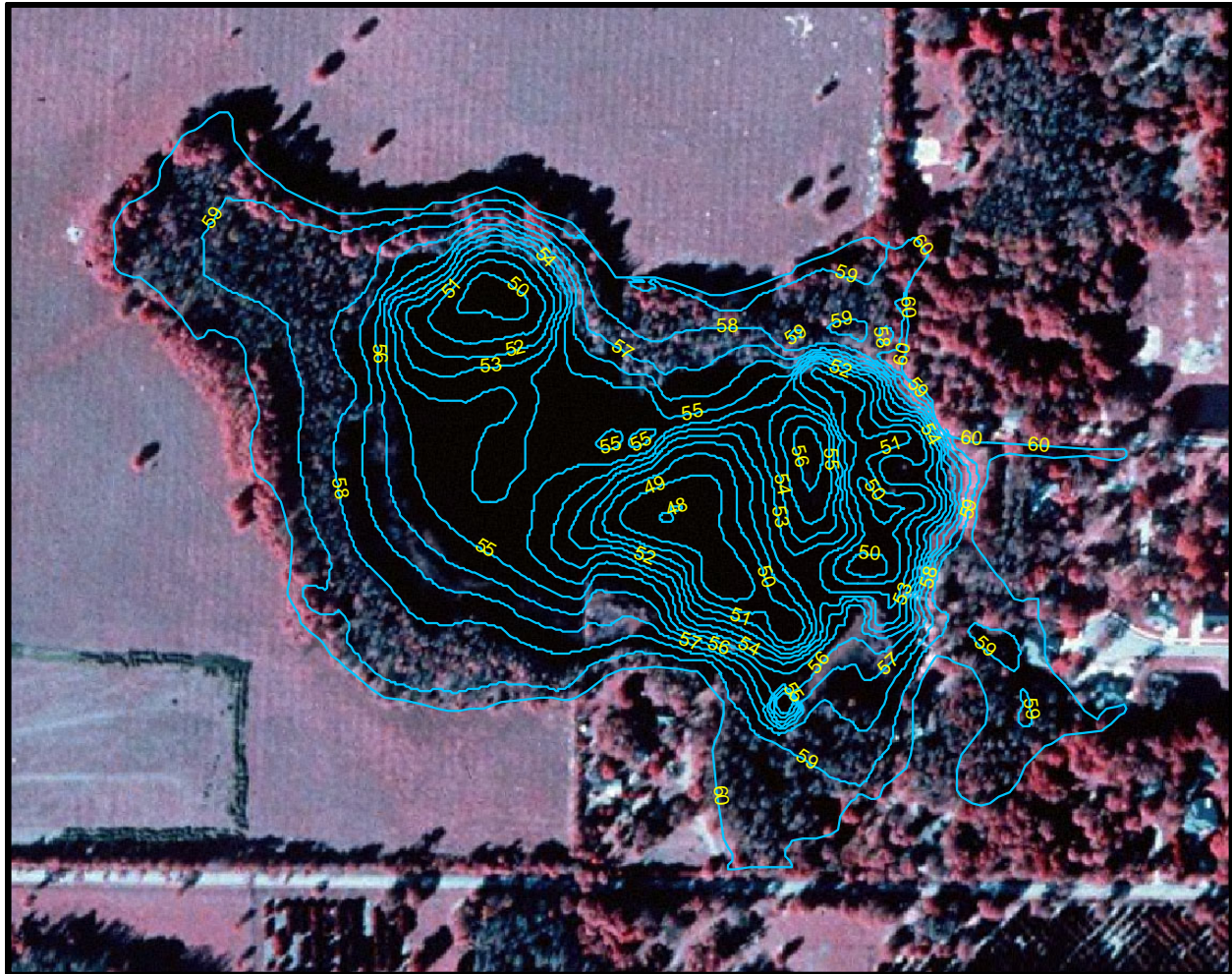
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Aerial photography from 1999 USGS  
Digital Orthophotograph.

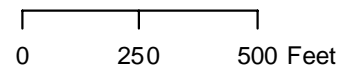
Map prepared September 4, 2003



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



Map prepared September 4, 2003 using 1999 USGS digital orthophotography, elevation data from 1989 SWFWMD aerial photography with contours map (Sheet Nos. 15-27-18), elevation data from 1981 SWFWMD aerial photography with contours map (Sheet No. 14-27-18), and elevation data collected on May 29, 2003 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 Reinheimer Lake in September 1980 (Table 1). A Maximum Desirable Level of 59.00 ft above NGVD was also developed, but was not adopted by the Governing Board.

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

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Ten Year Flood Guidance Level	61.50	NA
High Level	59.50	35
Low Level	57.00	20
Extreme Low Level	56.00	17

NA = not applicable

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

Proposed Minimum and Guidance Levels were developed for Reinheimer Lake using the methodology for Category 1 Lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). Additional lake-level information was developed using methods outlined 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 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 Reinheimer Lake in Hillsborough County, Florida.**

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Ten Year Flood Guidance Level	60.8	NA
High Guidance Level	58.6	26
High Minimum Lake Level	58.9	28
Minimum Lake Level	57.5	21
Low Guidance Level	56.5	18

NA = not applicable

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



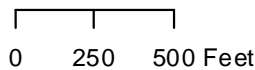
**Legend**

**Reinheimer Minimum Levels**

- 57.5 ft above NGVD = MLL
- 58.9 ft above NGVD = HMLL



Map prepared September 4 2003 using 1999 USGS digital orthophotography, elevation data from 1989 SWFWMD aerial photography with contours map (Sheet Nos. 15-27-18), elevation data from 1981 SWFWMD aerial photography with contours map (Sheet No. 14-27-18), and elevation data collected on May 29, 2003 by SWFWMD staff.



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

Hydrologic data are available for Reinheimer Lake (District Universal ID Number STA 225 225) for a few dates in the late 1980s and early 1990s and from June 1994 to the present date (Figure 5, see Figure 2 for current location of the SWFWMD lake-level gauge). The 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 January 1974 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 59.3 ft above NGVD based on elevations associated with the buttressing of large cypress (*Taxodium* sp.) trees along the northwest and south 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 July and August 2003 (Table 3). The control point elevation was established at 57.7 ft above NGVD, based on the elevation of a weir and the ground elevation between the weir and Van Dyke Road at the lake outlet (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 relationship between the control point elevation, the Normal Pool elevation and the Current P10, the High Guidance Level was established at the Current P10 elevation of 58.6 ft above NGVD (Table 3). The Historic P50 and Low Guidance Level were established at 57.6 and 56.5 ft above NGVD, respectively, using the High Guidance Level and the Northern Tampa Bay Region reference Lake Water Regime 50 (RLWR50) (1.0 ft) and Reference Lake Water Regime 90 (RLWR90) (2.1 ft) statistics (see SWFWMD 1999 for a discussion of the reference lake water regime statistics).

The Ten Year Flood Guidance Level for Reinheimer Lake was established at 60.8 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 26 years (Figures 5 and 6). The highest surface elevation for Reinheimer Lake included in the District water management database, 60.3 ft above NGVD, occurred on February 18, 1998. The low of record, 52.21 ft above NGVD, occurred on June 27, 2001.

Reinheimer Lake contains diverse stands of aquatic macrophytes and other hydrophytes, including cattail (*Typha* sp.), spatterdock (*Nuphar luteum*), pickerelweed

(*Pontedaria cordata*), torpedograss (*Panicum repens*), pennywort (*Hydrocotyle umbellata*), and primrose willow (*Ludwigia* sp.). The lake is also contiguous with cypress (*Taxodium* sp.) dominated wetlands 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 Reinheimer Lake this standard is established at 57.5 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 (57.5 ft above NGVD). The proposed High Minimum Lake Level was established at 58.9 ft above NGVD, an elevation 0.4 ft below the Normal Pool elevation. The proposed High Minimum Lake Level is 2.5 ft below the lowest residential dwelling located along the lakeshore and 2.4 ft below the lowest spot in the surrounding paved roads.

For comparative purposes, minimum level standards used for establishing Minimum Lake Levels for lakes without fringing cypress wetlands were developed for Reinheimer Lake (Table 3). The Dock-Use Standard would be established at 58.8 ft above NGVD, based on the elevation of sediments at the end of 90% of the 5 docks at the lake (56.7 ft above NGVD, Table 5), a clearance value of 1 ft based on movement of fauna and use of non-motorized boats in the lake, and the difference between the Reference Lake Water Regime 5090 for the northern Tampa Bay area (1.1 ft). The Basin Connectivity Standard would be established at 56.6 ft above NGVD, based on a critical high-spot elevation of 54.5 ft above NGVD, a 1 ft clearance for movement of biota and use of non-powerboats in the lake, and the Northern Tampa Bay area Reference Lake Water Regime 5090 (RLWR5090) (1.1 ft). The Aesthetic Standard for the lake would be established at the Low Guidance Level elevation of 56.5 ft above NGVD. The Species Richness Standard would be established at 56.5 ft above NGVD, based on limiting reduction in lake surface area to less than a 15% decrease in the area at the Historic P50 elevation. Based on basin morphology, development of Recreation/Ski and Mixing Standards would not be appropriate. 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 Reinheimer Lake in Hillsborough County, Florida. Data through January 2003 are shown.

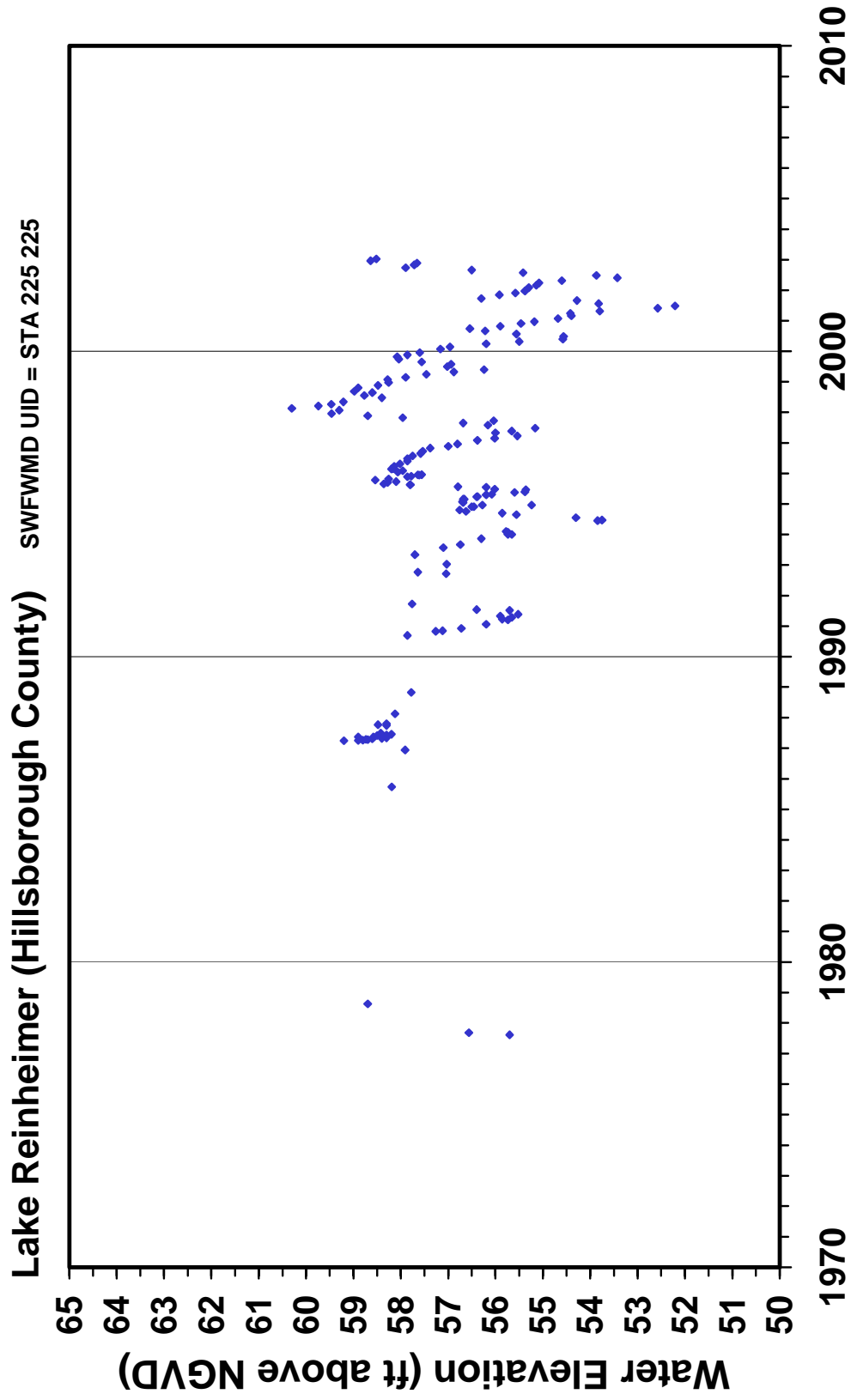
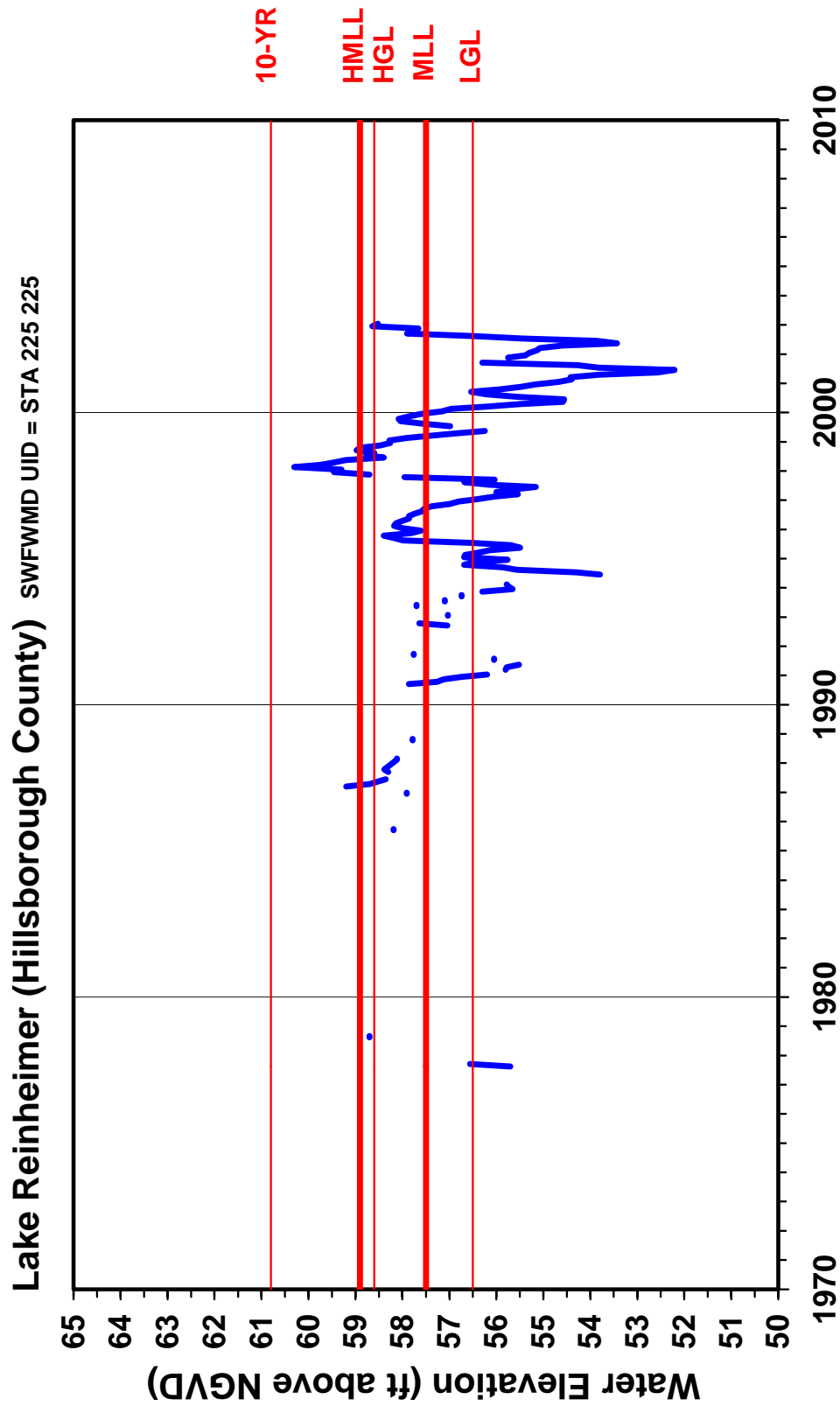


Figure 6. Mean monthly surface water elevation through January 2003, and proposed guidance and minimum levels for Reinheimer Lake in Hillsborough County, Florida. Proposed levels include the Ten Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake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



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

<b>Level or Feature</b>	<b>Elevation (feet above NGVD)</b>	<b>Lake Area (acres)</b>
Current P10	58.62	26
Current P50	56.88	20
Current P90	54.63	13
Normal Pool	59.3	33
Low Floor Slab	61.4	NA
Low Road	61.3	NA
Control Point	57.7	22
High Guidance Level	58.6	26
Historic P50	57.6	22
Low Guidance Level	56.5	18
Cypress Standard	57.5	21
*Dock-Use Standard	58.8	28
*Connectivity Standard	56.6	19
*Aesthetic Standard	56.5	18
*Species Richness Standard	56.5	18
*Mixing Standard	NA	NA
*Recreation/Ski Standard	NA	NA

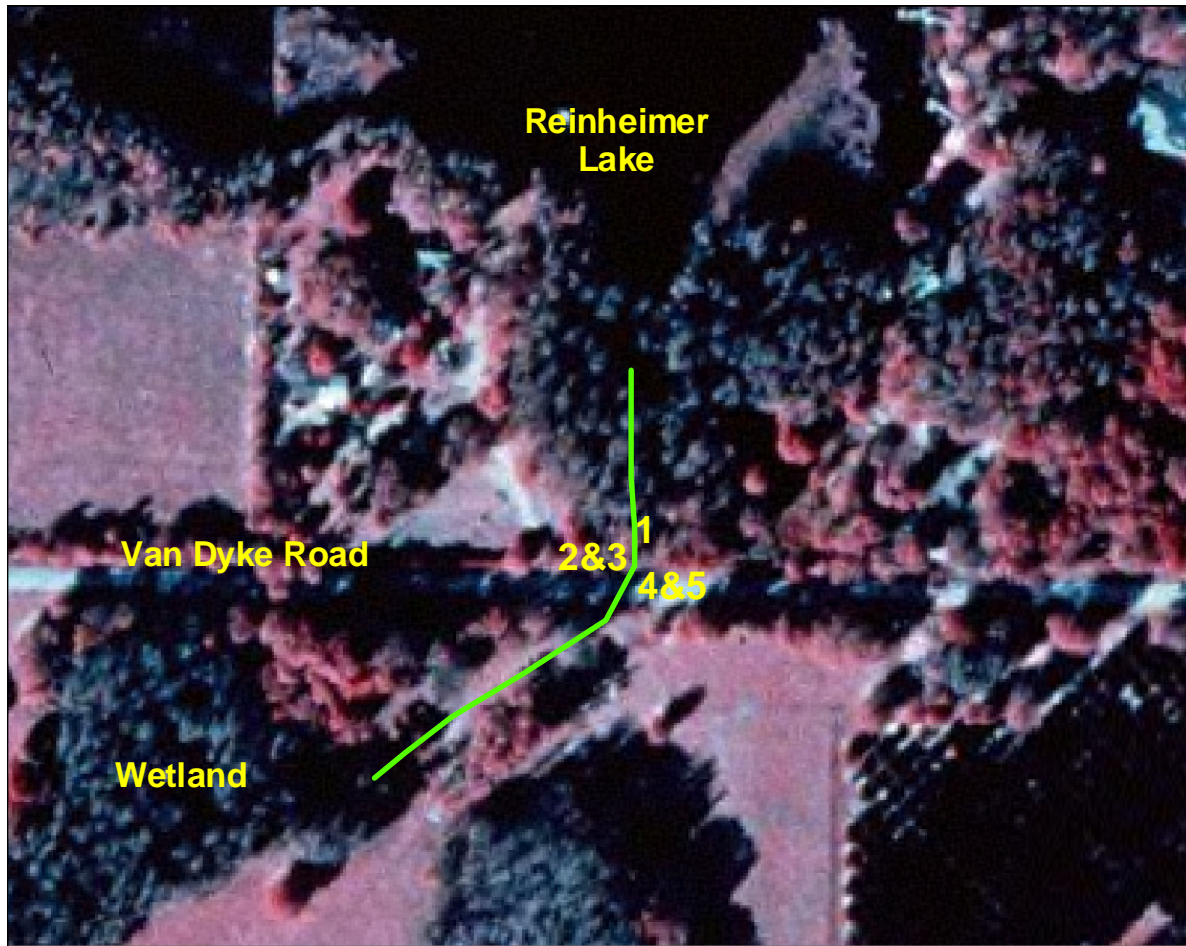
NA = not available/applicable

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

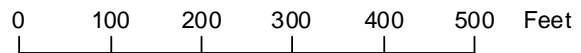
**Table 4. Elevation data used for establishing the Normal Pool Elevation for Reinheimer Lake in Hillsborough County, Florida. Data were collected at two sites by SWFWMD staff on September 16, 2002.**

<b>Hydrologic Indicator</b>	<b>Tree Diameter at Breast Height (ft)</b>	<b>Elevation (feet above NGVD)</b>
Normal pool based on cypress buttress	1.8	59.03
Normal pool based on cypress buttress	1.4	59.23
Normal pool based on cypress buttress	1.3	59.23
Normal pool based on cypress buttress	1.6	59.23
Normal pool based on cypress buttress	1.9	59.23
Normal pool based on cypress buttress	2.6	59.23
Normal pool based on cypress buttress	2.5	59.33
Normal pool based on cypress buttress	1.2	59.33
Normal pool based on cypress buttress	2.4	59.33
Normal pool based on cypress buttress	1.4	59.43
Normal pool based on cypress buttress	1.4	59.43
Normal pool based on cypress buttress	2.3	59.53
Normal pool based on cypress buttress	2.7	59.63
Normal pool based on cypress buttress	3.2	59.73
Normal pool based on cypress buttress	0.8	59.83
Normal pool based on cypress buttress	2.0	59.83
Normal pool based on cypress buttress	1.9	60.13
<b>N</b>		<b>17</b>
<b>Median</b>		<b>59.33</b>
<b>Mean</b>		<b>59.45</b>
<b>Standard Deviation</b>		<b>0.3</b>

**Figure 7. Outlet conveyance system for Reinheimer Lake in Hillsborough County, Florida. Ditched flow paths are indicated by green line.**



Aerial photography from 1999 USGS Digital Orthophotograph.



Map prepared September 4, 2003

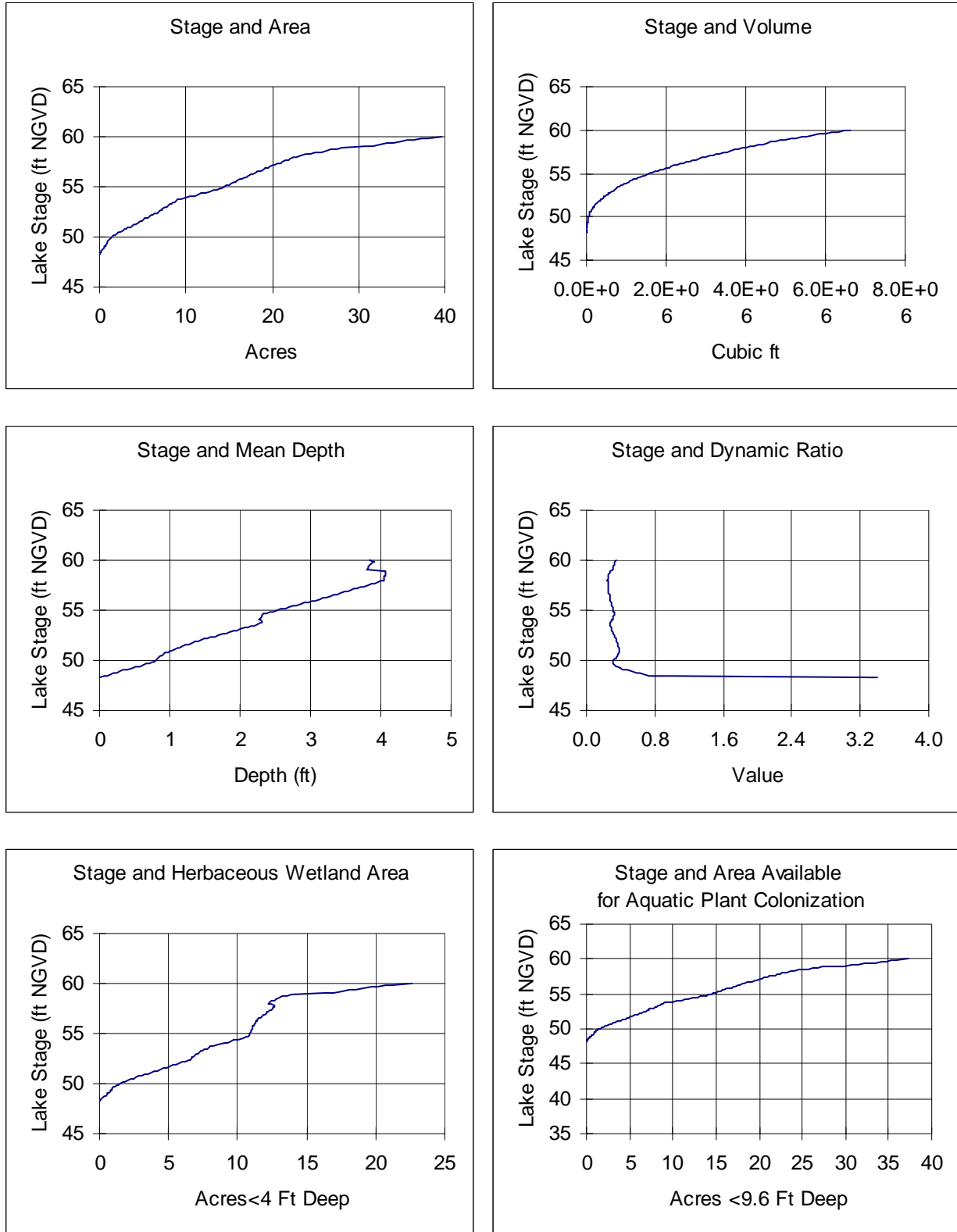


Site	Description	Elevation (feet above NGVD)
1	Control point; invert of concrete weir at north end of structure with an 18-inch diameter PVC pipe.	57.7
2	Ground shot in ditch at north end of 38-inch X 60-inch oval pipe running under Van Dyke Road.	57.7
3	Invert at north end of 38-inch X 60-inch oval pipe running under Van Dyke Road.	57.3
4	Invert at south end of 38-inch X 60-inch oval pipe running under Van Dyke Road.	57.1
5	Ground shot in ditch at south end of 38-inch X 60-inch oval pipe running under Van Dyke Road.	57.5

**Table 5. Summary statistics for elevations associates with docks (n=5) at Reinheimer Lake in Hillsborough County, Florida, based on data collected by SWFWMD staff on September 16, 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 of Docks (feet above NGVD)</b>	<b>Elevation of Dock Platform (feet above NGVD)</b>
Mean (SD)	54.3 (2.1)	59.5 (1.0)
P10	56.7	60.1
P50	53.1	59.9
P90	52.8	58.5
Maximum	57.6	60.1
Minimum	52.6	57.6

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



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