

**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 Halfmoon Lake in  
Hillsborough County, Florida**

## **Halfmoon Lake**

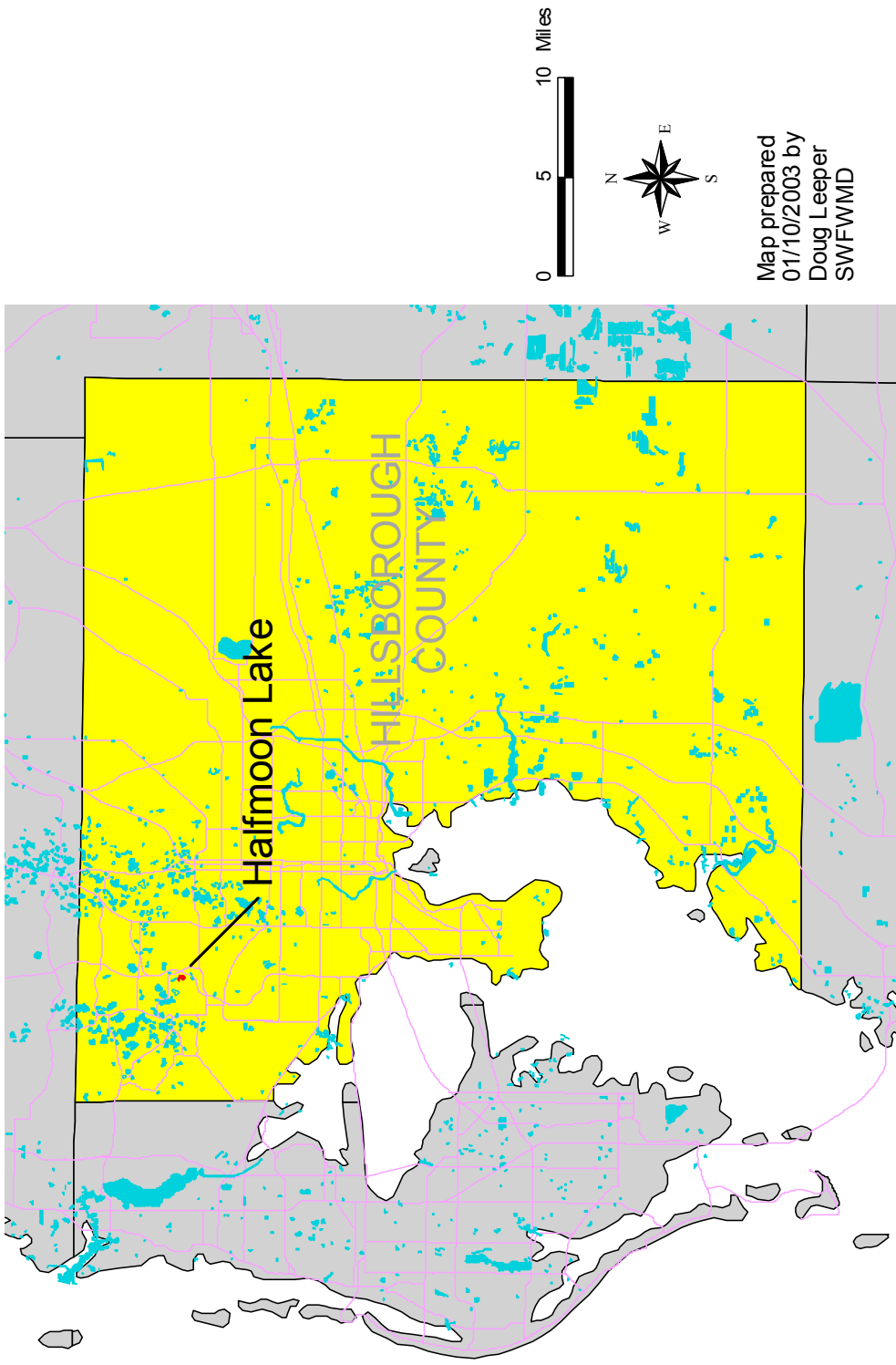
### ***General Lake Description***

Halfmoon Lake (Figure Halfmoon-1) is located in the Northwest Hillsborough Basin in Hillsborough County, Florida (Sections 30 and 31, Township 27S, Range 18E and Sections 25 and 36, 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).

Historically, the lake may have discharged to Rocky Creek through an outlet along the southwest shore of the south lake basin. Currently, the lake may discharge water to the Rocky Creek system through a concrete structure that was installed on the northwestern shore or the north lake basin in 1998 (Figure Halfmoon-2). Ground water from the Floridan Aquifer has been used to augment the lake since summer 2000 (SWFWMD WUP No. 2011086). There are no surface water withdrawals from the lake currently permitted by the District. There are, however, several permitted groundwater withdrawals in the area.

The drainage area for Halfmoon Lake has been estimated at 131 acres (Metz and Sacks 2002). The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 32 acres. The 1956 United States Geological Survey (photorevised 1987) 1:24,000 Citrus Park, Fla. quadrangle map indicates a water level elevation of 44 ft above NGVD. This elevation corresponds to a lake surface area of 37 acres, based on a topographic map of the basin generated in support of minimum levels development (Figure Halfmoon-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 Halfmoon-1. Location of Halfmoon Lake in Hillsborough County, Florida.**



**Figure Halfmoon-2. Location of District lake gauge, outlet and site where hydrologic indicators were measured at Halfmoon Lake in Hillsborough County, Florida.**

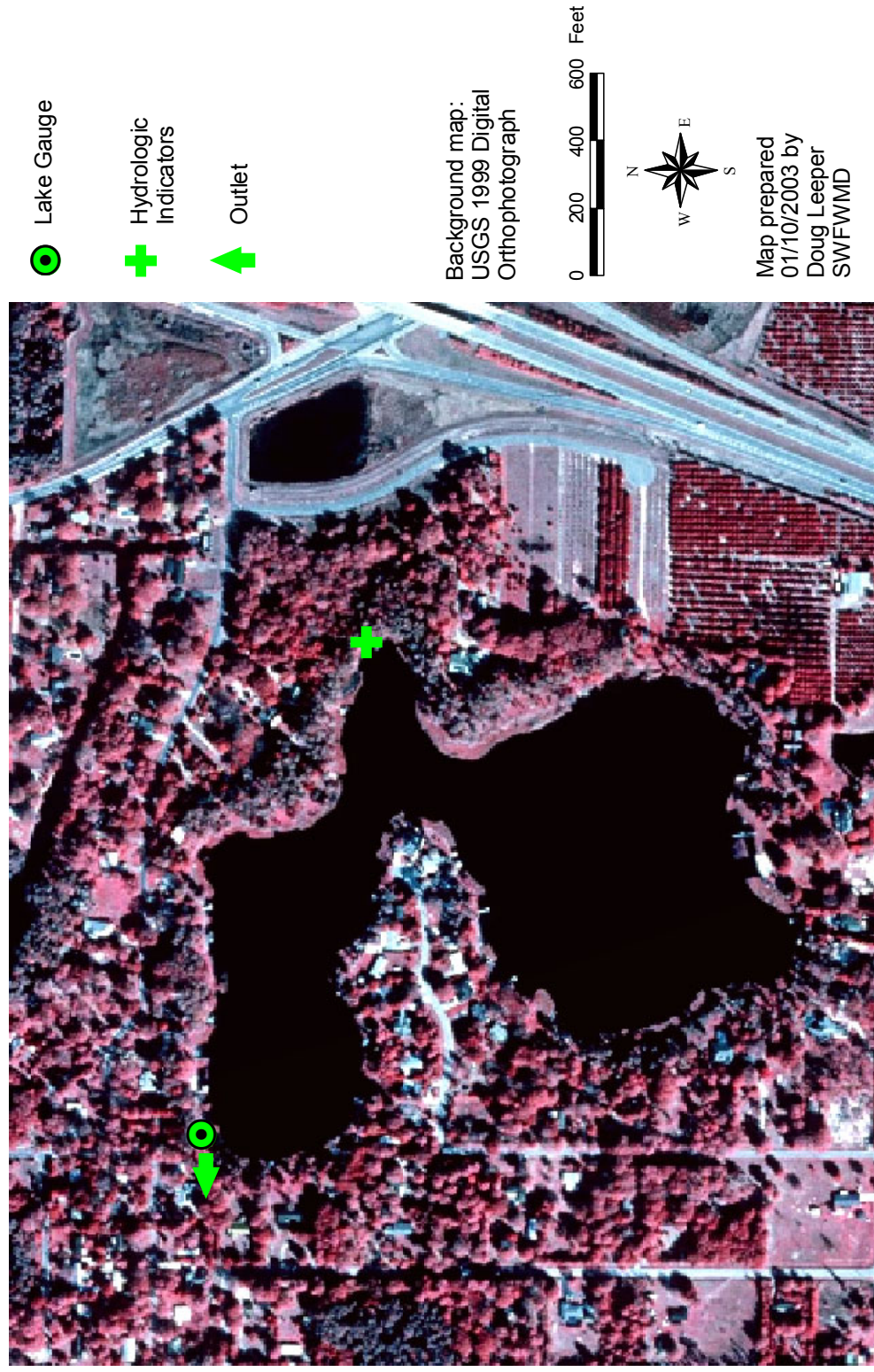
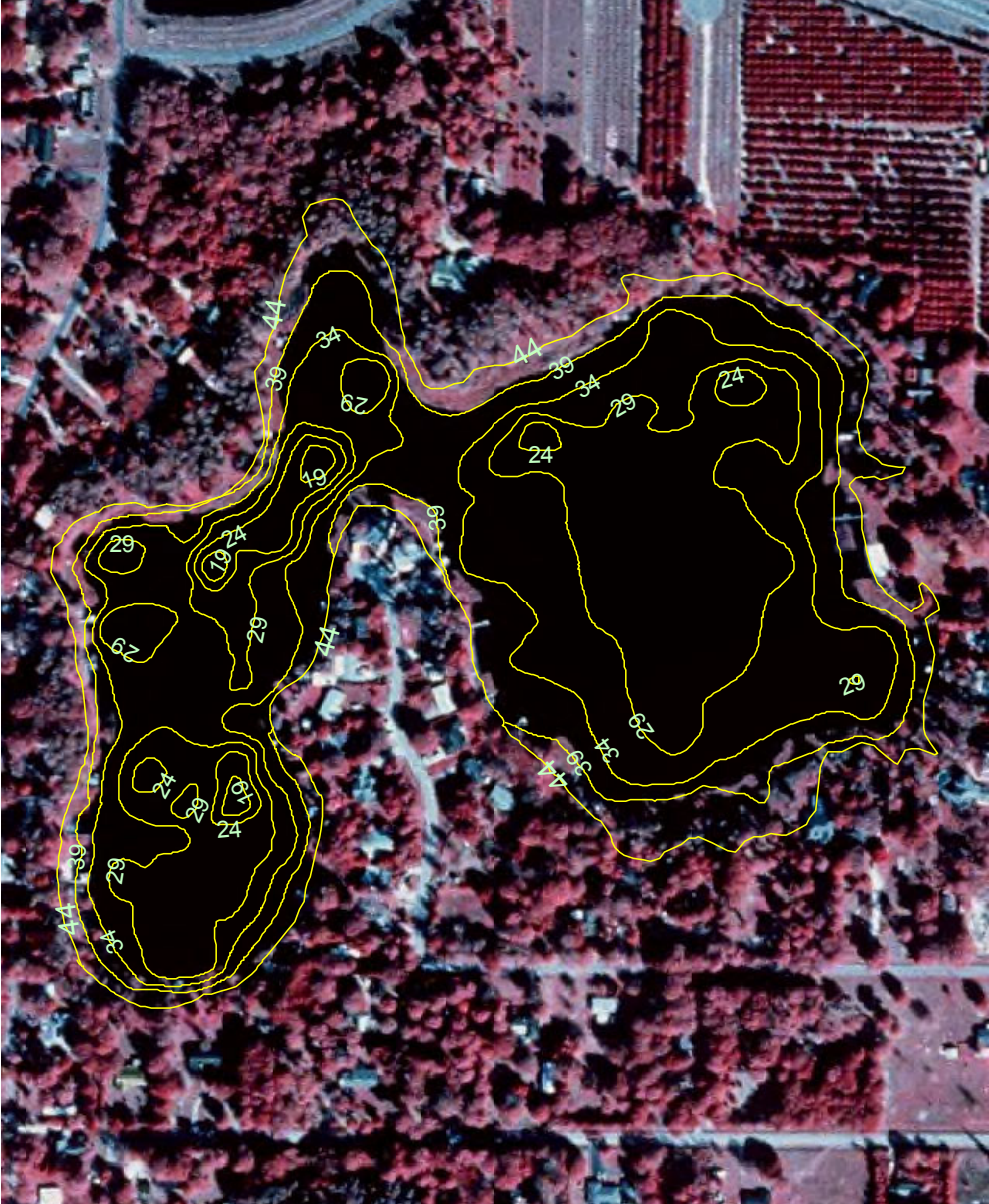


Figure Halfmoon-3. Five-foot contour lines within the Halfmoon Lake basin, Hillsborough County, Florida. Values shown are elevations, in feet, relative to the National Geodetic Vertical Datum of 1929.



Background map:  
USGS 1999 Digital  
Orthophotograph

0 90 180 270 Feet



Map prepared  
01/10/2003 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 Halfmoon Lake in September 1980 (Table Halfmoon-1). A Maximum Desirable Level of 44.50 ft above NGVD was also developed, but was not adopted by the Governing Board.

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

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Total Lake Area (acres)</b>
Ten Year Flood Guidance Level	47.00	NA
High Level	45.00	NA
Low Level	42.00	34
Extreme Low Level	39.00	30

NA = not available

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

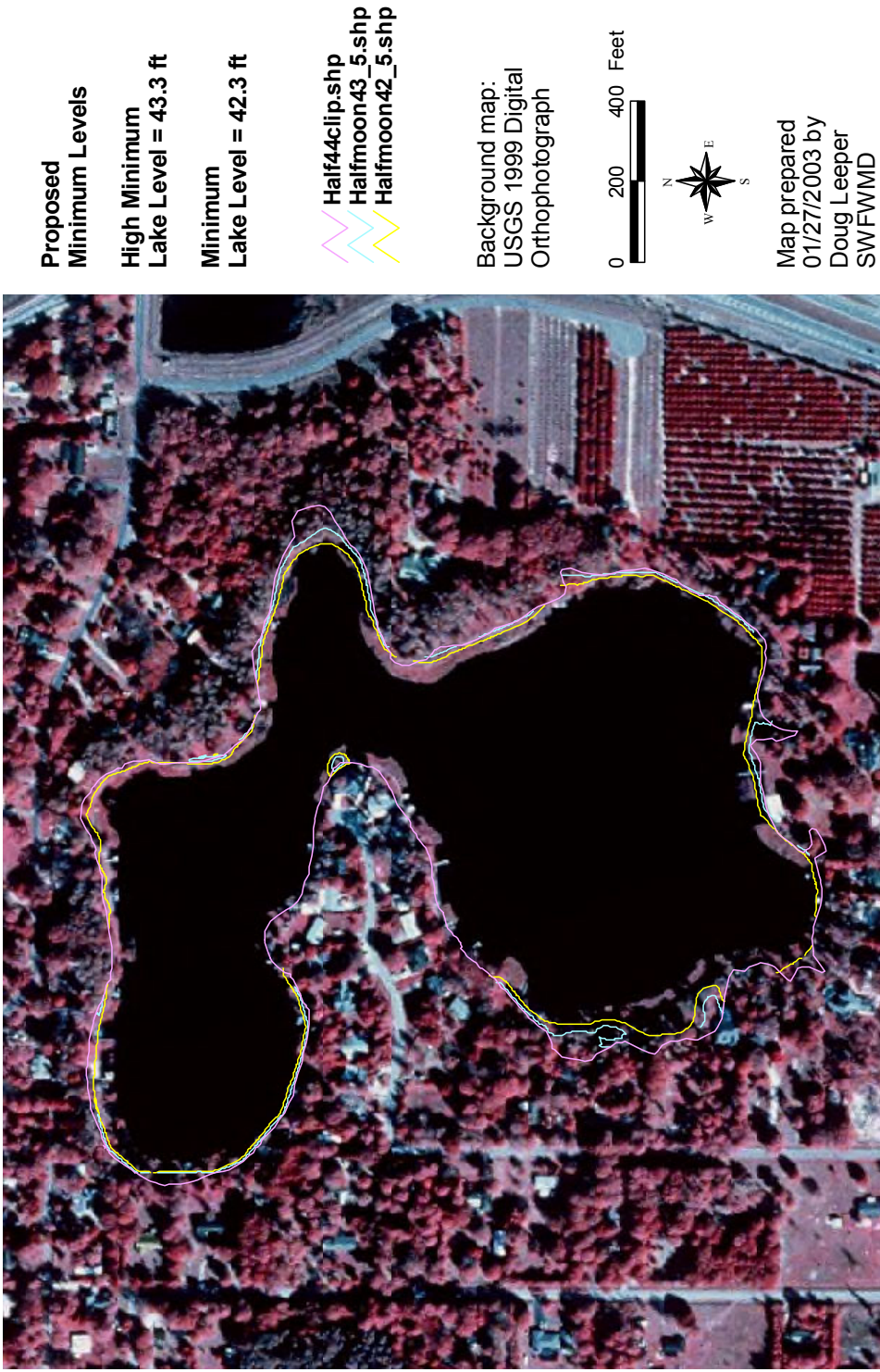
Proposed Minimum and Guidance Levels were developed for Halfmoon Lake using the methodology for Category 2 Lakes described in current District rules (Chapter 40D-8, Florida Administrative Code; see also SWFWMD 1999). Proposed levels, along with lake surface area values for each level are listed in Table Halfmoon-2. The locations of the proposed minimum levels within the lake basin are shown in Figure Halfmoon-4.

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

<b>Level</b>	<b>Elevation (feet above NGVD)</b>	<b>Total Lake Area (acres)</b>
Ten Year Flood Guidance Level	45.07	NA
High Guidance Level	43.30	36
High Minimum Lake Level	43.30	36
Minimum Lake Level	42.30	34
Low Guidance Level	41.20	33

NA = not available

**Figure Halfmoon-4. Approximate location of the proposed Minimum Lake Level (yellow), the proposed High Minimum Lake Level (blue) and a line at an elevation 44 feet above the National Geodetic Vertical Datum of 1929 (fuchsia) within the Halfmoon Lake basin in Hillsborough County, Florida.**



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

Hydrologic data are available for Halfmoon Lake (District Universal ID Number STA 211 211) from April 1981 (a single record from April 1977 is also available) through the present date (Figure Halfmoon-5). These data cannot be classified as Historic or Current data; a new structure was installed at the lake in spring 1998, so less than four years of data reflecting current conditions are available.

The Normal Pool elevation was established using cypress trees within the swamp occurring along the northeastern shore of the lake (Tables Halfmoon-3 and Halfmoon-4, Figure Halfmoon-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 (Tables Halfmoon-3 and Halfmoon-5, Figure Halfmoon-6). The 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 and the Normal Pool elevation, the High Guidance Level was established at the control point elevation of 43.3 ft above NGVD (Table Halfmoon-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).

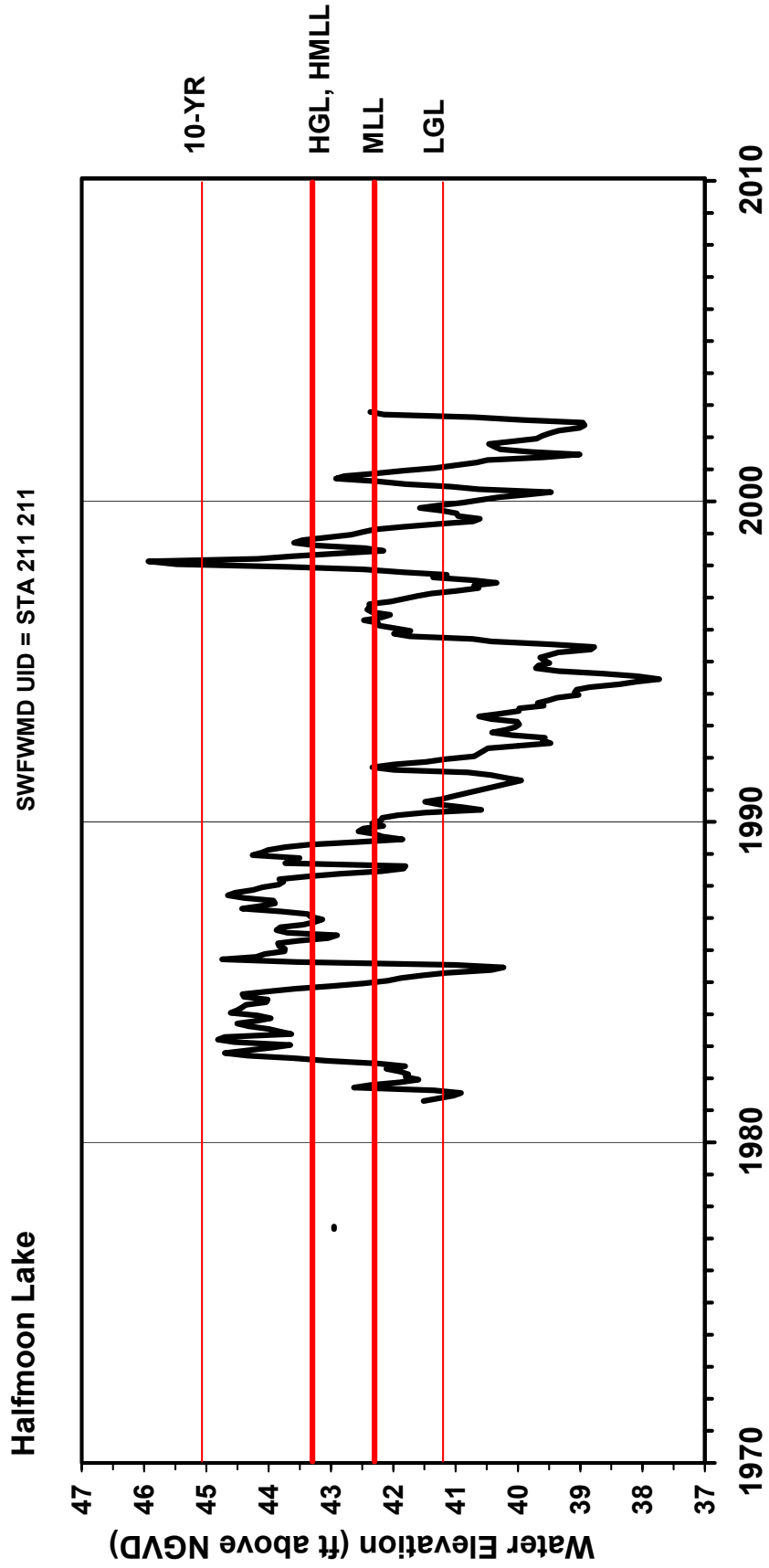
The Ten Year Flood Guidance Level was established for Halfmoon Lake using the methodology for open basin lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). The District used an existing hydrologic and hydraulic computer model of the Rocky Creek Watershed developed by Hillsborough County (Hillsborough County 1998). The Rocky Creek runoff hydrographs were computed using the NRCS Dimensionless Unit Hydrograph, a 256-shape factor, a 10.0-inch rainfall depth based on NRCS TP-49, and a 72-hour rainfall distribution developed by the South Florida Water Management District. The Rocky 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 Hillsborough County to include additional surveyed elements of the Halfmoon Lake outlet conveyance system. The initial elevation of Halfmoon Lake was set at the control point elevation of 43.3 ft above NGVD. The modified data set was then used to determine the 10-year flood level based on runoff hydrographs from the 10-year storm event. Based on available stage records (see Figure Halfmoon-5), the Ten Year Flood Guidance Level (45.07 ft above NGVD) was exceeded in April 1983, September 1985 and on several dates from December 1997 through March 1998. The highest recorded surface elevation for the lake, 46.24 ft above NGVD, occurred on February 17, 1998.

Halfmoon Lake contains abundant stands of aquatic macrophytes, including cattail (*Typha* sp.) and *Panicum* grasses. The northeast corner of the lake is contiguous with a cypress-dominated wetland of more than 0.5 acres in size. Based on the presence of this wetland, Halfmoon Lake may be 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. Based on the relationship between the Cypress Standard and Historic P50 elevation, the proposed Minimum Lake Level was established at the Historic P50 elevation (42.30 ft above NGVD), and the proposed High Minimum Lake Level was established at the High Guidance Level (43.30 ft above NGVD). The proposed High Minimum Lake Level is about 3.65 ft below the Low Floor Slab elevation.

For comparative purposes, minimum level standards used for establishing the Minimum Lake Level for lakes without fringing cypress wetlands were developed for Halfmoon Lake (Table Halfmoon-3). A Recreation/Ski Standard was established at 50.1 ft above NGVD, based on a critical ski elevation of 49.0 ft and the Northern Tampa Bay area RLWR5090. A Dock-Use Standard for Halfmoon Lake was established at 42.88 ft above NGVD, based on the Northern Tampa Bay area RLWR5090 (1.1 ft) and a Dock-End Sediment elevation of 39.78 ft, developed from measurement of 28 docks. An Aesthetic-Standard for the lake was established at the Low Guidance Level elevation of 41.20 ft above NGVD. A Species Richness Standard was established at 38.1 ft above NGVD, based on a 15% reduction in lake surface area from that at the Historic P50 elevation. A Basin Connectivity Standard was established at 38.1 ft above NGVD, based on use of powerboats in the lake, a critical high-spot elevation of 35 ft and the RLWR5090 for the northern Tampa Bay area.



Figure Halfmoon-5. Mean monthly surface water elevation, and proposed guidance and minimum levels for Halfmoon 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 Halfmoon-3. Elevation data and associated area values used for establishing minimum levels for Halfmoon Lake in Hillsborough County, Florida.**

<b>Level or Feature</b>	<b>Elevation (feet above NGVD)</b>	<b>Total Lake Area (acres)</b>
Current P10	NA	NA
Current P50	NA	NA
Current P90	NA	NA
Normal Pool	45.94	NA
Low Floor Slab	46.95	NA
Low Road	46.78	NA
Control Point	43.30	36
High Guidance Level	43.30	36
Historic P50	42.30	34
Low Guidance Level	41.20	33
Cypress Standard	44.14	NA
Recreation/Ski Standard *	50.1	NA
Dock-Use Standard *	42.88	35
Aesthetic Standard	41.2	33
Species Richness Standard *	38.1	29
Basin Connectivity Standard *	38.1	29

NA = not available

\* = not applicable; used for developing minimum levels for Category 3 Lakes

**Table Halfmoon-4. Elevation data used for establishing the Normal Pool Elevation for Halfmoon Lake in Hillsborough County, Florida. Data were collected on August 12, 1999; water level elevation was 40.94 ft above NGVD.**

<b>Hydrologic Indicator</b>	<b>Elevation (ft above NGVD)</b>
Normal pool based on cypress buttress	45.53
Normal pool based on cypress buttress	45.97
Normal pool based on cypress buttress	45.85
Normal pool based on cypress buttress	46.27
Normal pool based on cypress buttress	46.02
Normal pool based on cypress buttress	45.90
Normal pool based on cypress buttress	46.12
Normal pool based on cypress buttress	45.67
Normal pool based on cypress buttress	46.22
Normal pool based on cypress buttress	45.67
<b>N</b>	<b>10</b>
<b>Median</b>	<b>45.94</b>
<b>Mean</b>	<b>45.92</b>
<b>Standard Deviation</b>	<b>0.25</b>

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

<b>No.</b>	<b>Description</b>	<b>Elevation (feet above NGVD)</b>
1	Control point; three slots (one 18" x 18" and two 12" x 18") cut into concrete drop inlet structure. Bottom elevations for three slots = 43.29, 43.31 and 43.32 ft above NGVD.	43.3
2	Invert at east end of 18" reinforced concrete pipe connected to drop inlet structure (No. 1 above)	42.62
3	Invert at west end of 18" reinforced concrete pipe (No. 2 above) that is connected to a second concrete drop inlet structure	41.83
4	Invert at east end of 18" reinforced concrete pipe connected to concrete drop inlet structure	41.83
5	Invert at west end of 18" reinforced concrete pipe	41.04

**Figure Halfmoon-6. Outlet conveyance system for Halfmoon Lake in Hillsborough County, Florida. Numbered sited are described in table Halfmoon-5.**



Background map:  
USGS 1999 Digital  
Orthophotograph

0 70 140 Feet



Map prepared  
01/10/2003 by  
Doug Leeper  
SWFWMD

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