

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 Round Lake in
Hillsborough County, Florida

Round Lake

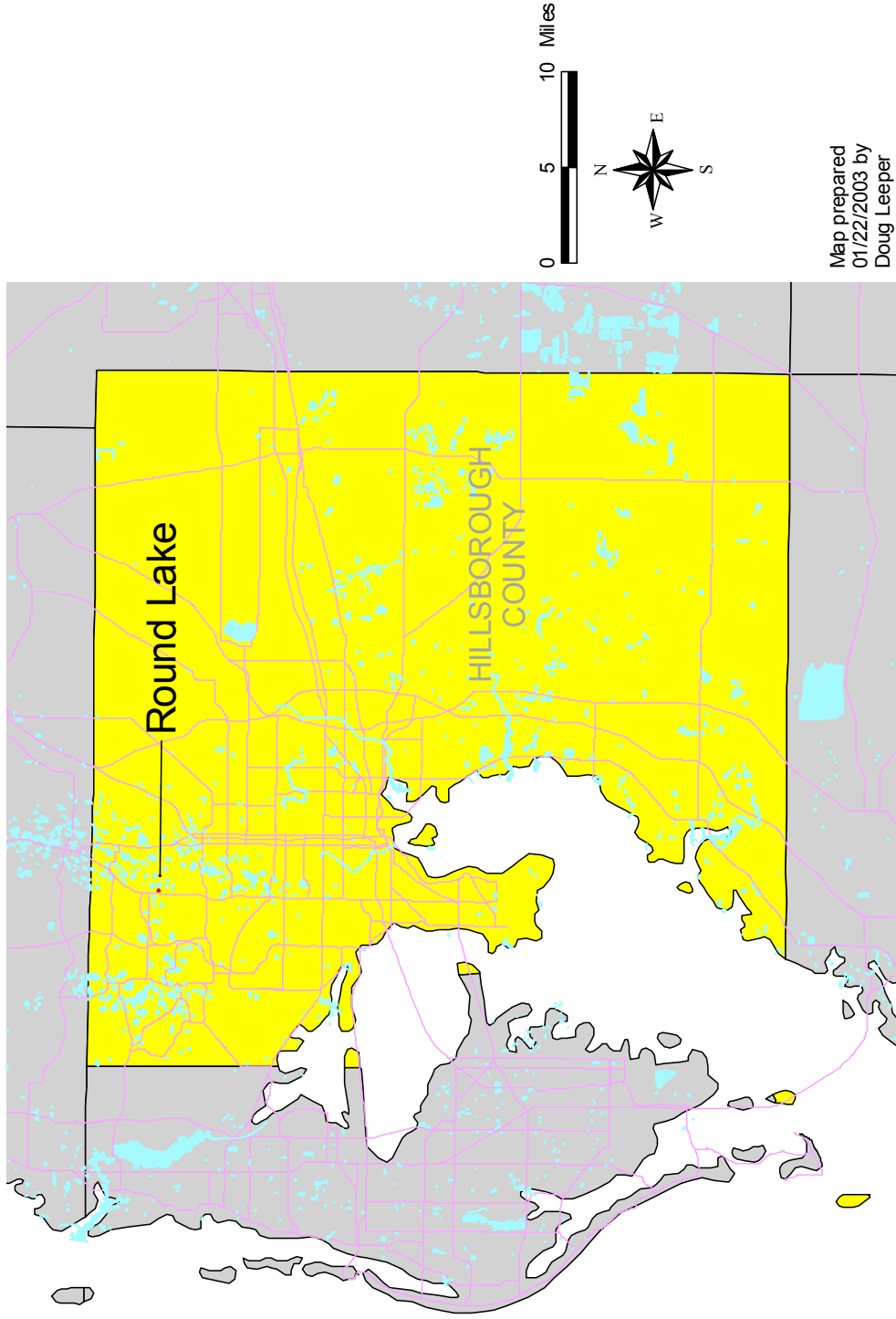
General Lake Description

Round Lake (Figure Round-1) is located in the Northwest Hillsborough Basin in Hillsborough County, Florida (Sections 21 and 22, Township 27S, Range 18E). 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 Land-O-Lakes lake region; an area of numerous neutral to slightly alkaline, low to moderate nutrient, clear-water lakes (Griffith *et al.* 1997).

The drainage area for the lake is 0.7 square miles (Florida Board of Conservation 1969). A series of culverts and an open ditch connect Round Lake with Saddleback Lake to the east (Figure Round-2). There are no surface water withdrawals from the lake currently permitted by the District. There are, however, several permitted groundwater withdrawals in the area. Round Lake has been regularly augmented with water pumped from the Floridan Aquifer since the mid-1960s (Stewart and Hughes 1974, SWFMD Water Use Permit No. 2011425).

A lake surface elevation is not included on the 1956 United States Geological Survey (photorevised 1987) 1:24,000 Sulphur Springs, Fla. quadrangle map or the 1956 (photorevised 1987) Citrus Park, Fla. quadrangle map. The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 11 acres at an elevation of 53 ft above mean sea level. This elevation corresponds to a lake surface area of 10.2 acres, based on a topographic map of the basin generated in support of minimum levels development (Figure Round-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. The basin contains extensive dredged areas.

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



Map prepared
01/22/2003 by
Doug Leeper

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

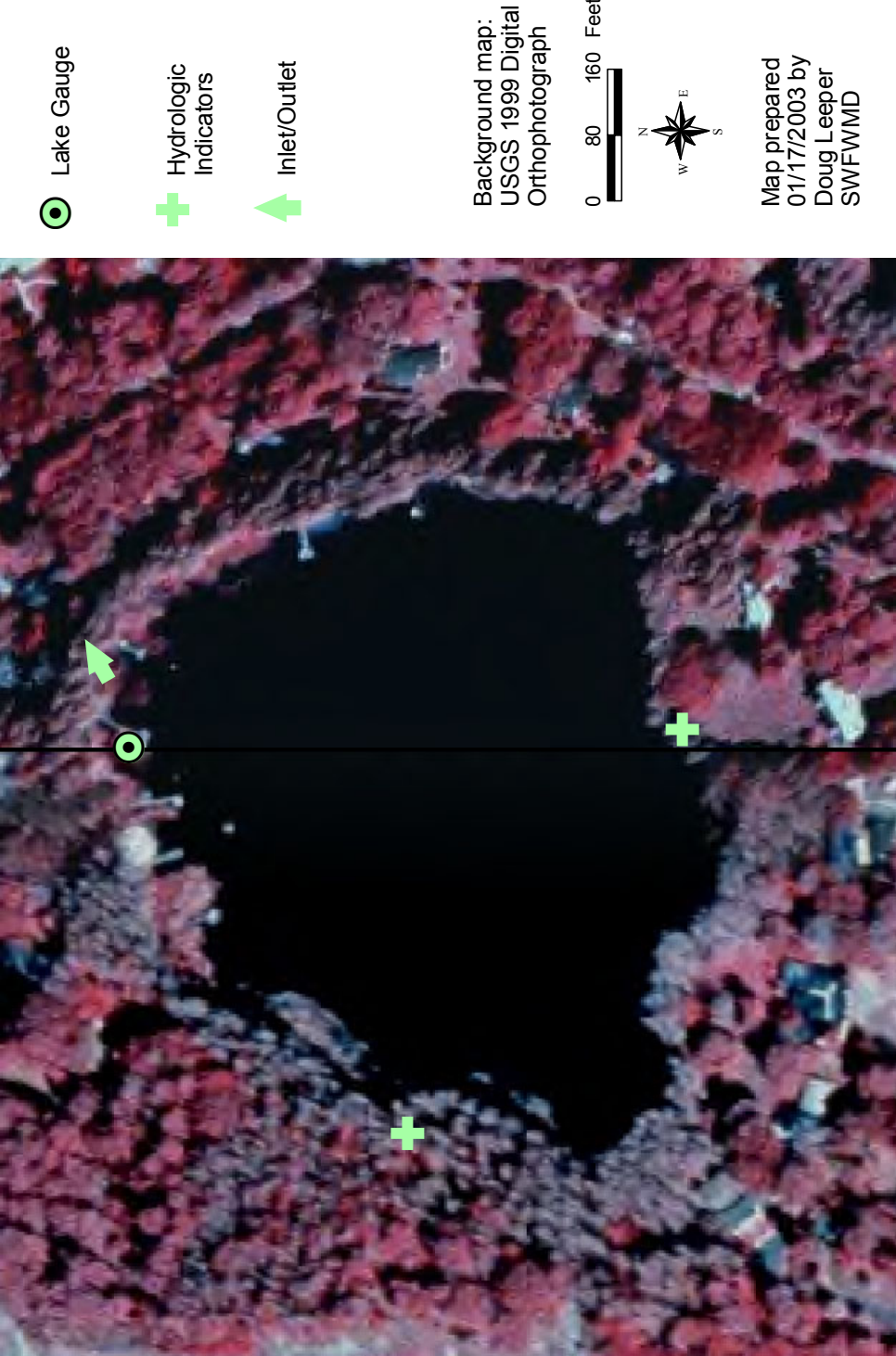
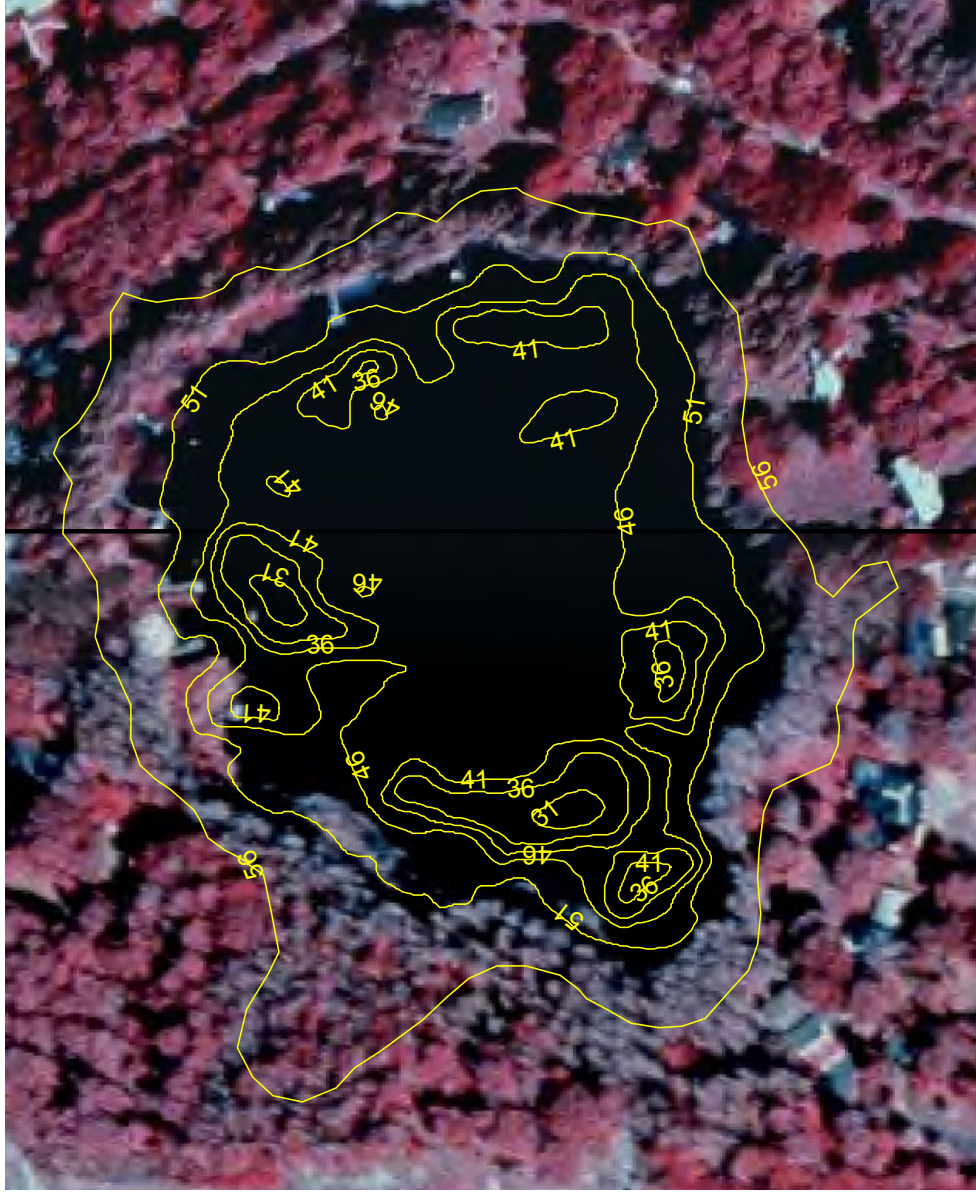


Figure Round-3. Five-foot contours within the Round Lake basin in Hillsborough County, Florida. Values shown are elevations, in feet, above the National Geodetic Vertical Datum of 1929.



Background map:
USGS 1999 Digital
Orthophotograph



Map prepared
01/17/2003 by
Doug Leeper
SWFWMD

Previously Adopted Lake Management Levels

Management levels have not previously been adopted for Round Lake. An Augmentation Control Elevation of 53 feet above NGVD was developed in the 1990s to support issuance of a water use permit for augmentation of the lake (Mas 1998, SWFWMD 1996).

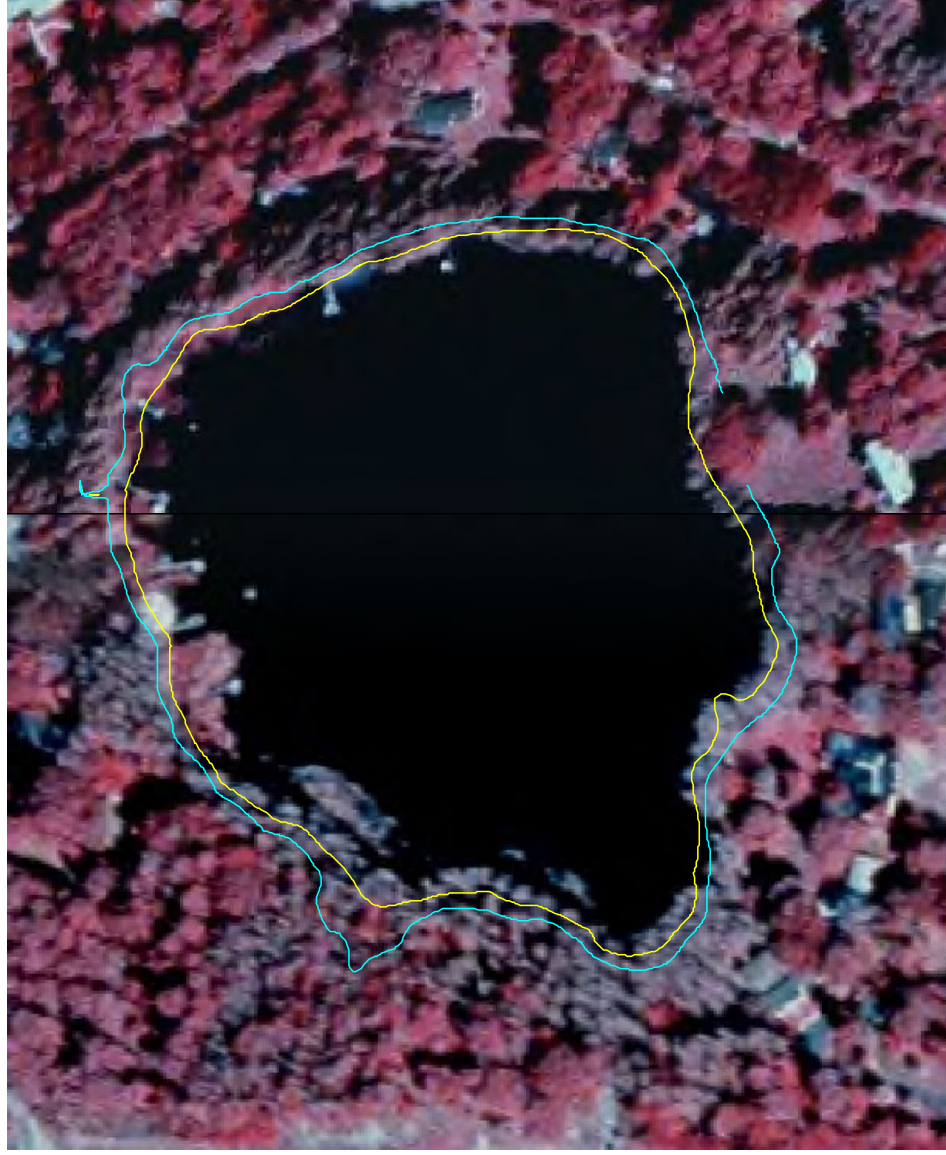
Proposed Minimum and Guidance Levels

Proposed Minimum and Guidance Levels were developed for Round 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 Round-1. The locations of the proposed minimum levels within the lake basin are shown in Figure Round-4.

Table Round-1. Proposed minimum levels, guidance levels and associated surface areas for Round Lake in Hillsborough County, Florida.

Level	Elevation (feet above NGVD)	Lake Area (acres)
Ten Year Flood Guidance Level	56.17	NA
High Guidance Level	55.60	13.5
High Minimum Lake Level	54.50	11.8
Minimum Lake Level	53.50	10.6
Low Guidance Level	53.50	10.6

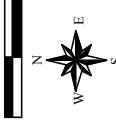
Figure Round-4. Approximate location of the proposed Minimum Lake Level (yellow) and the proposed High Minimum Lake Level (blue) for Round Lake in Hillsborough County, Florida. Elevations listed are in feet, relative to the National Geodetic Vertical Datum of 1929.



**Proposed
Minimum Levels**
**High Minimum
Lake Level = 54.50 ft**
**Minimum
Lake Level = 53.50 ft**

**Background map:
USGS 1999 Digital
Orthophotograph**

0 70 140 Feet



**Map prepared
01/21/2003 by
Doug Leeper
SWFWMD**

Summary of Data and Analyses Supporting Recommended Minimum and Guidance Levels

Hydrologic data are available for Round Lake (District Universal ID Number STA 190 190) from January 1965 through September 1967, from July 1971 through September 1981, from January 1982 and September 1985, and from July 1996 through June 1999. (Figure Round-5). For the period of record from January 1974 through the present date, the hydrologic data are classified as Current data. Current data collected through June 1999 were used to calculate the Current P10, P50, and P90 (Table Round-2).

The Category 3 Lake Normal Pool elevation (Table Round-2) was established at 55.85 ft above NGVD, based on buttressing of large cypress trees along the west and south shores of the lake (Table Round-3). 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 Round-2 and Round-4, Figure Round-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 55.6 ft above NGVD (Table Round-2). Although differences between the Current P10 and Current P50 and P90 were less than the Northern Tampa Bay Region RLWR statistics, the RLWR50 (1.0 ft) and RLWR90 (2.1 ft) statistics were used to determine the Historic P50 and Low Guidance Level (see SWFWMD 1999 for a discussion of the reference lake water regime statistics). The RWLWR statistics were used because it is believed that the augmentation schedule for the lake does not permit the range of water level fluctuation that would be expected in the absence of withdrawals.

The Ten Year Flood Guidance Level was established for Round 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 method, 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. The initial elevation of Round Lake was set at the control point elevation of 55.6 ft above NGVD. The District modified data set was used to determine the 10-year flood level based on runoff hydrographs from the 10-year storm event.

The Ten Year Flood Guidance Level (56.49 ft above NGVD) has not been exceeded in

the recent era, based on available stage records (see Figure Round-5). The highest recorded surface elevation for the lake, 56.40 ft above NGVD, occurred on September 25, 1979.

Round 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 maidencane (*Panicum hemitomum*), cattail (*Typha* sp.), torpedograss (*Panicum repens*), water pennywort (*Hydrocotyle umbellata*), southern naid (*Najas quadelupensis*) and spatterdock (*Nuphar luteum*) occur throughout the basin.

Aesthetics, Dock-Use and Species Richness Standards were evaluated for minimum levels development (Table Round-2). The Aesthetic-Standard for the lake was established at the Low Guidance Level elevation of 53.50 ft above NGVD. The Dock-Use Standard was established at 53.3 ft above NGVD, based on the Northern Tampa Bay area RLWR5090 (1.1 ft) and a Dock-End Sediment elevation of 50.2 ft, developed from measurement of 13 docks. The Species Richness Standard was established at 53.05 ft above NGVD, based on a 15% reduction in lake surface area from that at the Historic P50 elevation. Development of a Recreation/Ski and Basin Connectivity Standards were not appropriate, based on the size and shape of the lake basin. 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 (Figure Round-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 Round-7).

The Aesthetics Standard, the most conservative of the appropriate standards, is less than the Historic P50 elevation and was used to establish the proposed Minimum Lake Level at 53.50 ft above NGVD. The proposed High Minimum Lake Level was established at 54.50 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 3.4 ft below the Low Floor Slab elevation.

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

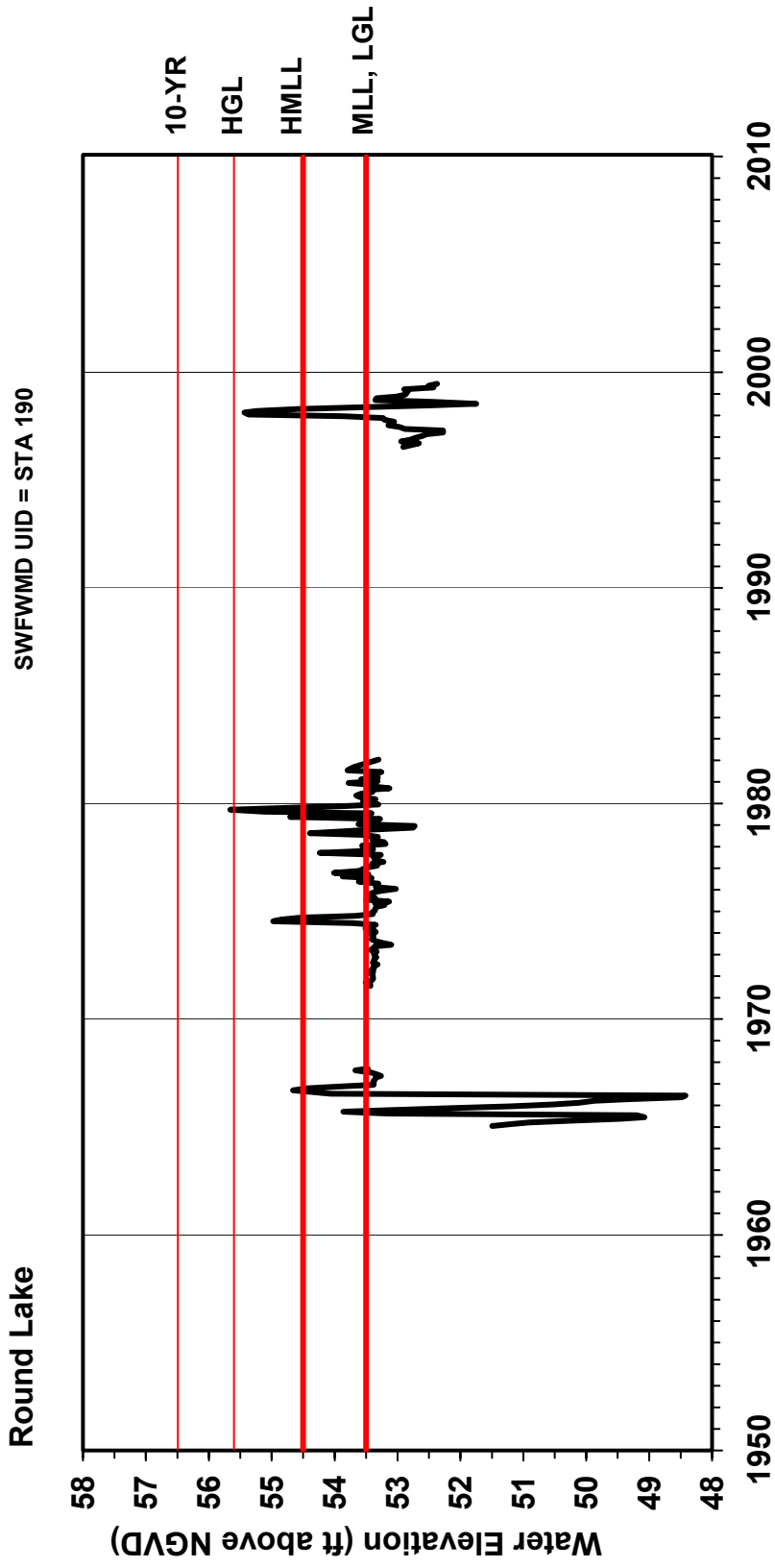


Table Round-2. Elevation data and associated area values used for establishing minimum levels for Round Lake in Hillsborough County, Florida.

Level or Feature	Elevation (feet above NGVD)	Lake Area (acres)
Current P10	54.25	11.4
Current P50	53.38	10.5
Current P90	52.75	10.0
Category 3 Lake Normal Pool	55.85	13.8
Low Floor Slab	57.86	NA
Low Other (shed slab)	56.26	NA
Low Road	57.1	NA
Control Point	55.6	13.5
High Guidance Level	55.60	13.5
Historic P50	54.60	12.0
Low Guidance Level	53.50	10.6
Aesthetic Standard	53.50	10.6
Dock-Use Standard	53.3	10.5
Species Richness Standard	53.05	10.3

NA = not applicable

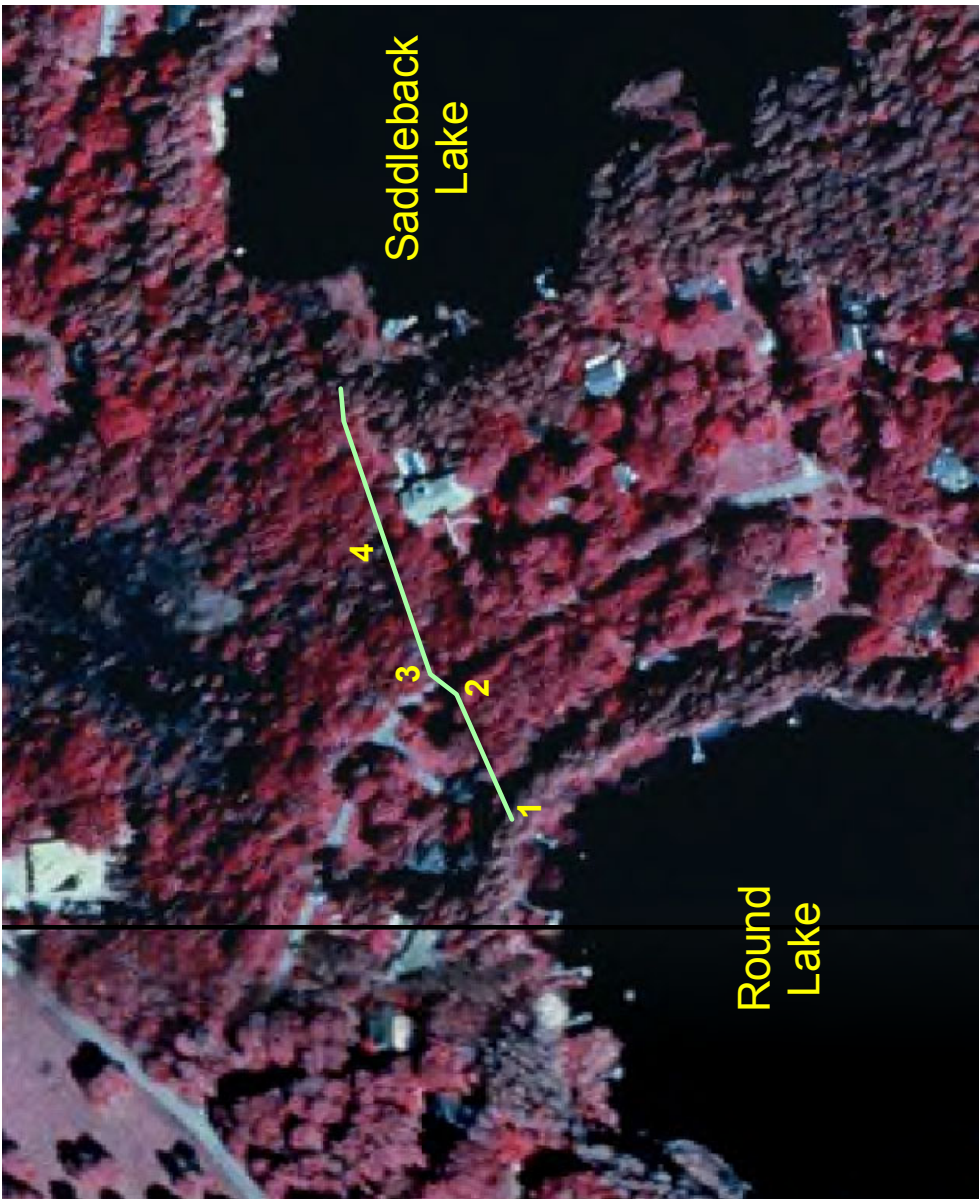
Table Round-3. Elevation data used for establishing the Category 3 Lake Normal Pool Elevation for Round Lake in Hillsborough County, Florida. Data were collected on June 24, 1999; water level elevation was 52.82 ft above NGVD.

Hydrologic Indicator	Elevation (feet above NGVD)
Normal pool based on cypress buttress	55.47
Normal pool based on cypress buttress	55.98
Normal pool based on cypress buttress	56.3
Normal pool based on cypress buttress	55.97
Normal pool based on cypress buttress	55.64
Normal pool based on cypress buttress	55.78
Normal pool based on cypress buttress	55.85
Normal pool based on cypress buttress	55.64
Normal pool based on cypress buttress	55.85
N	9
Median	55.85
Mean	55.83
Standard Deviation	0.23

Table Round-4. Summary of structural alteration and control point elevation information for Round Lake in Hillsborough County, Florida. Numbers correspond to those shown in Figure Round-6.

No.	Description	Elevation (feet above NGVD)
1	Invert at west end of 18" corrugated metal pipe	52.91
2	Invert at east end of an 18" corrugated metal pipe (No. 1 above) connected to catch basin with floor elevation of 53.78 ft above NGVD	53.81
3	Inverts at west and east ends of 18" corrugated metal pipe that runs under Linda Vista Circle; west end of pipe is connected to catch basin identified in No. 2 above	53.66, 53.72
4	Control point; high spot in open channel to Saddleback Lake	55.6

Figure Round-6 Outlet conveyance system for Round Lake in Hillsborough County, Florida. Numbered sites along conveyance system are described in Table Round-4.



Background map:
USGS 1999 Digital
Orthophotograph

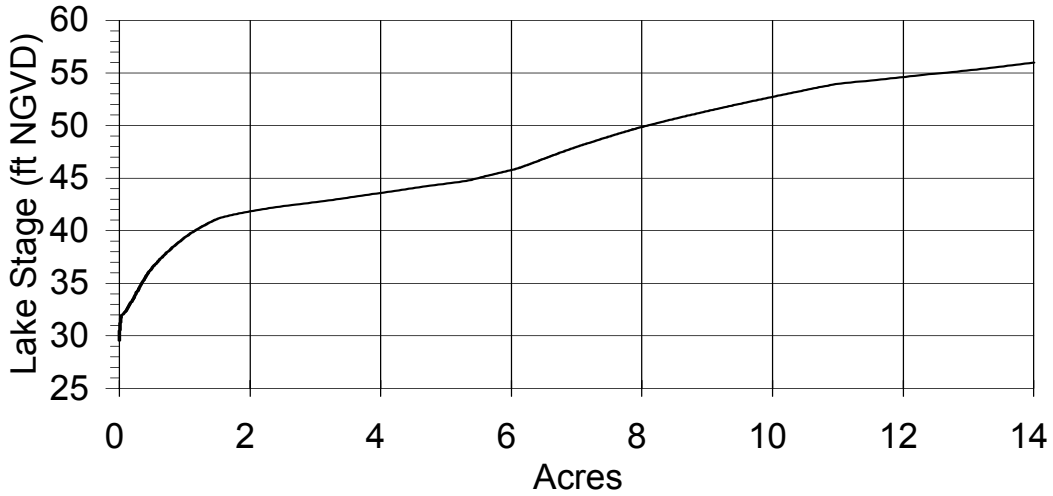
0 90 180 Feet



Map prepared
01/17/2003 by
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SWFWMD

Figure Round-7. Surface area, volume, potential herbaceous wetland area, area available for aquatic macrophyte colonization, and dynamic ratio versus lake stage for Round Lake in Hillsborough County, Florida.

Stage and Area



Stage and Volume

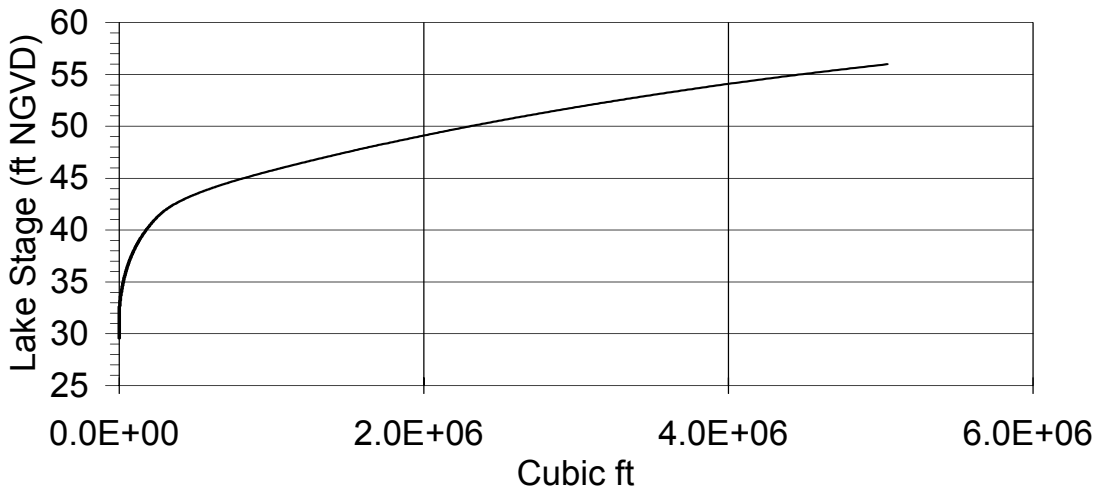
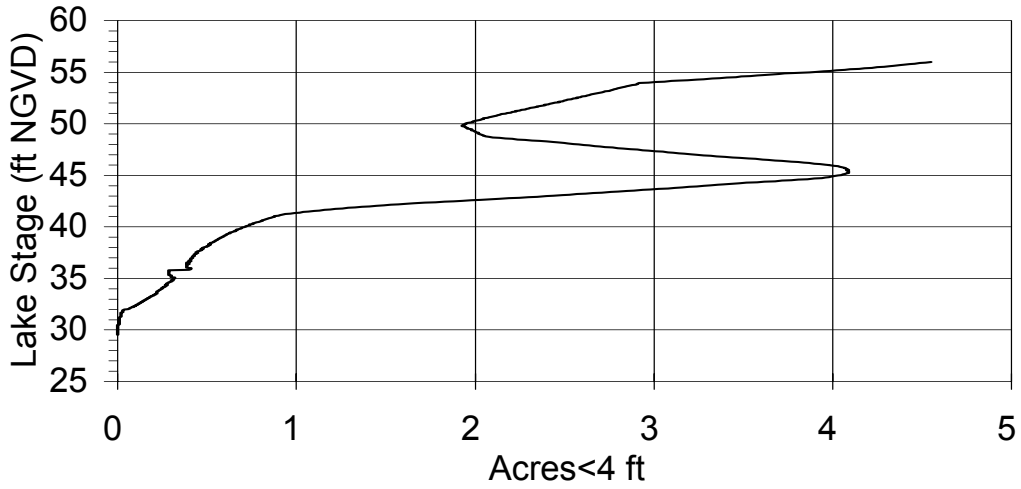


Figure Round-7 (continued).

Stage and Herbaceous Wetland Area



Stage and Area Available for Aquatic Plant Colonization

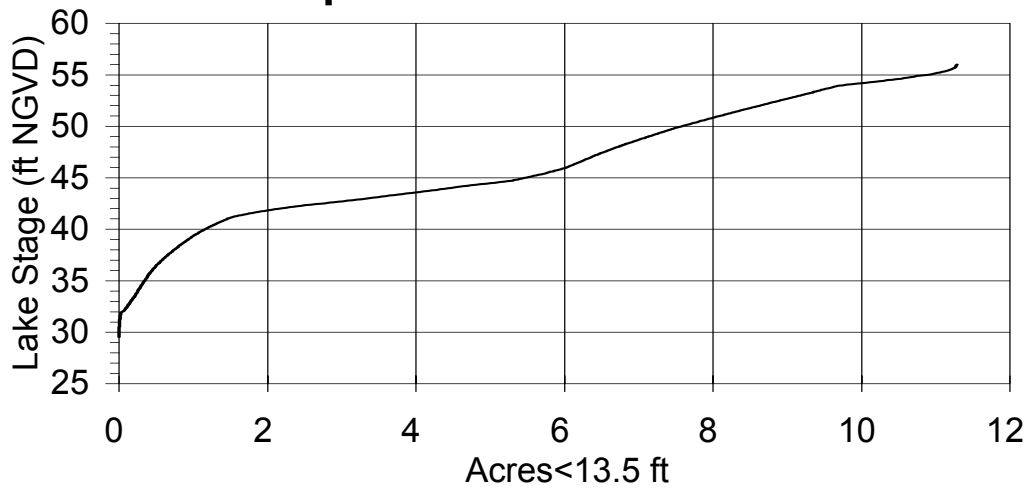
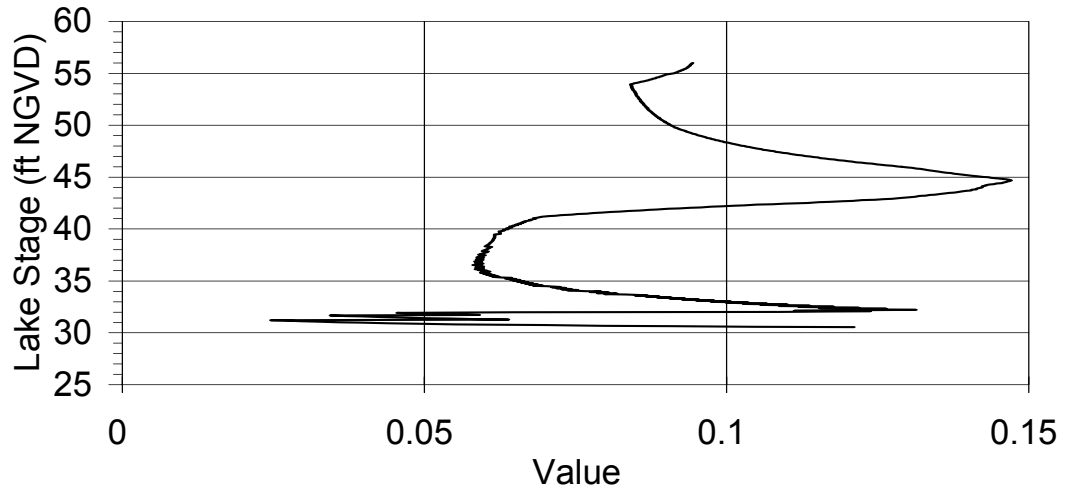


Figure Round-7 (continued).

Stage and Dynamic Ratio



Documents Cited and Reviewed for Development of Proposed Guidance and Minimum Levels for Round Lake

Allen, M. S. 1999. Assessment of fish assemblages in Lakes Dosson, Halfmoon and Round in Hillsborough County, Florida. Department of Fisheries and Aquatic Sciences, University of Florida, Gainesville, Florida. Prepared for the Southwest Florida Water Management District, Brooksville, Florida.

Alligator, The. 2000. Radioactive mussels found in Round Lake near Tampa. The Alligator, September 27, 2000. Gainesville, Florida.

Brenner, M. and Whitmore, T. J. 1999. Paleolimnological reconstruction of water quality for Lakes Dosson, Halfmoon and Round in Hillsborough County, Florida. Department of Fisheries and Aquatic Sciences, University of Florida, Gainesville, Florida. Prepared for the Southwest Florida Water Management District, Brooksville, Florida.

Brenner, M., Smoak, J. M., Allen, M. S., Schelske, C. L., and Leeper, D. A. 2000. Biological accumulation of ²²⁶Ra in a groundwater-augmented lake. *Limnology and Oceanography* 45: 710-715.

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.

Camp, Dresser & McKee, Inc. 1985. Section 21 Wellfield lakes impact study, Northwest Hillsborough County, Florida. Bradenton, Florida. Prepared for the West Coast Regional Water Supply Authority, Clearwater, Florida.

Coats, B. 2000. Radium conundrum. St. Petersburg Times, September 22, 2000. St. Petersburg, Florida.

Coats, B. 2000. Scientists fish area lakes for radium. St. Petersburg Times, November 25, 2000. St. Petersburg, Florida.

Coats, B. 2002. Lake warning: please don't eat the mussels. St. Petersburg Times, December 13, 2002. St. Petersburg, Florida.

Cowell, B. C. 1999. Benthic invertebrates of three lakes in northwest Hillsborough County, Florida (Lake Dosson, Halfmoon Lake and Round Lake). Department of Biology, University of South Florida, Tampa, Florida. Prepared for the Southwest Florida Water Management District, Brooksville, Florida.

Cowell, B. C., Young, S. N., and Resico, C. H., Jr. 1973. Aquatic insect survey of Upper Tampa Bay Watershed Project and Brooker Creek Watershed. Department of Biology, University of South Florida, Tampa, Florida. 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.

Dooris, P. M. 1978. *Hydrilla verticillata*: chemical factors in lakes affecting growth. Ph.D. dissertation. Department of Biology, University of South Florida, Tampa, Florida.

Dooris, P. M., Dooris, G. M., and Martin, D. F. 1982. Phytoplankton responses to ground water addition in central Florida lakes. *Water Resources Bulletin* 18: 335-337.

Dooris, P. M., and Martin, D. F. 1979. Ground-water induced changes in lake chemistry. *Groundwater* 17: 324-327.

Dooris, P. M., and Moresi, R. J. 1975. Evaluation of lake augmentation practices in northwest Hillsborough County, Florida. 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 the Round Lake area, 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.

Florida Sportsman Online (web site: www.floridasportsman.com). 2000. Curbing your mussel intake.

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.

Hassell, A. L., Dooris, P. M., and Martin, D. M. 1979. Maucha diagrams and chemical analyses to diagnose changes in lake chemistry. *Environmental Chemistry* 60: 75-80.

Hazardous Substance and 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 1998. Rocky/Brushy Creek area stormwater management master plan. Public Works Department/Engineering Division, Stormwater Management Section, Tampa, Florida.

Hillsborough County Watershed Atlas (web site: www.hillsborough.wateratlas.usf.edu). 2002. Developed by the Hillsborough County Public Works Department Stormwater Management Section, the University of South Florida Florida Center for Community Design and Research, and the Southwest Florida Water Management District, Tampa and Brooksville, Florida.

Hogg, W. 2002. Letter to Doug Leeper (Southwest Florida Water Management District), dated February 15, 2002. Subject: Comments on proposed methodology to establish minimum levels for Category 3 lakes. Tampa Bay Water, Clearwater, Florida.

Hunter, E. 2000. Radioactive mussels discovered in Round Lake near Tampa. University of Florida IFAS Print News (website:<http://news.ifas.ufl.edu>), Gainesville, Florida.

Jones, K. C. 1878. Lake augmentation alternatives in Northwest Hillsborough Basin. Southwest Florida Water Management District, Brooksville, Florida.

Kinsler, L. 2000. Radium level of mussels alarms scientists. The Tampa Tribune, September 24, 2000. Tampa, Florida.

Leeper, D. 2001. Draft memorandum to Marty Kelly (Southwest Florida Water Management District), dated November 21, 2001. Subject: Staff response to written comments on the District's proposed methods for developing minimum levels for Category 3 lakes. Southwest Florida Water Management District, Brooksville, 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.

Martin, D. F., Victor, D. M., and Dooris, P. M. 1976. Effects of artificially introduced ground water on the chemical and biochemical characteristics of six Hillsborough County (Florida) lakes. *Water Research Journal* 10: 65-69.

Martin, G. 2000. Study: mussels act as radioactive 'canaries'. The Charlotte Sun Herald, September 28, 2000. Charlotte, Florida.

Mas, A. 1998. Letter modification of WUP No. 2011425.01 to E. E. Eichorn von Wurmb and Roger P. Schatzel, Round Lake Association. Dated July 27, 1998. Southwest Florida Water Management District, Brooksville, Florida.

Matus, R. 2000. Study finds radium-contaminated mussels. The Gainesville Sun, September 26, 2000. Gainesville, Florida.

Metz, P. A., and Sacks, L. A. 2002. Comparison of the hydrogeology and water quality of a ground-water augmented lake with two non-augmented lakes in northwest Hillsborough County, Florida. Water-Resource Investigations Report 02-4032. U.S. Geological Survey, Tallahassee, Florida, in cooperation with the Southwest Florida Water Management District, Brooksville, Florida.

Murphy, W.R., Jr., Evans, R.P., and Whalen, J.K. 1984. Flooding in northwestern Hillsborough and southern Pasco Counties, Florida, in 1979. Open-File Report 82-96. U.S. Geological Survey, Tallahassee, Florida.
Pedreira, D. 2000. Radium creeps into lake's life. Published April 19, 2000 in the St. Petersburg Times, St. Petersburg, Florida.

Romie, K. 2000. Water chemistry of lakes in the 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.

Slonena, D.L. 2001. Letter to Doug Leeper (Southwest Florida Water Management District), dated August 6, 2001. Subject: A multiple-parameter approach for establishing minimum levels for Category 3 lakes of the Southwest Florida Water Management District – June 14, 2002 draft. Pinellas County Utilities, Clearwater, 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. 1989. Northwest Hillsborough Basin Northwest Re-Map II, aerial photography with contours. Sheet No. 22-27-17. Brooksville, Florida. Prepared by Kucera International, Lakeland, Florida.

Southwest Florida Water Management District. 1996. Water use general permit no. 2011425.000. Issued February 2, 1996. 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. 2002. Special purpose survey, Section 22, Township 27 South, Range 18 East, Hillsborough County; Northwest Hillsborough Basin, Minimum Flows & Levels, Lake Crenshaw, Saddleback & Round. Brooksville, Florida.

Stewart, J. W., and Hughes, G. H. 1974. Hydrologic consequences of using ground water to maintain lake levels affected by water wells near Tampa, Florida. United States Geological Survey, Southwest Florida Water Management District, and the Florida Department of Natural Resources, Tallahassee, Florida.

United States Geological Survey. 1956. Sulphur Springs quadrangle, Florida-Hillsborough Co., 7.5 minute series (topographic) map; Sulphur Springs, Fla., 28082-A4-TF-024, 1956, photorevised 1987, DMA 4540 III SW-Series V847. Department of Interior, Washington, D.C.