

Minimum and Guidance Levels for Lake Deaton in Sumter County, Florida



Draft – September 2006

Ecologic Evaluation Section

Resource Conservation and Development Department

Southwest Florida
Water Management District

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Proposed Minimum and Guidance Levels for Lake Deaton

State law (Section 373.042, Florida Statutes; hereafter F.S.) directs the Department of Environmental Protection or the water management districts to establish minimum flows and levels (MFLs) for lakes, wetlands, rivers and aquifers. As currently defined by statute, the minimum level of an aquifer or surface water body is "the level of groundwater in the aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area". Adoption of a minimum water level does not necessarily protect a water body from significant harm, however, protection, recovery or regulatory compliance can be gauged once a standard has been established.

Minimum flows and levels are to be established based upon the best available information and shall be developed with consideration of "...changes and structural alterations to watersheds, surface waters and aquifers, and the effects such changes or alterations have had, and the constraints such changes or alterations have placed on the hydrology of the affected watershed, surface water, or aquifer...", with the caveat that these considerations shall not allow significant harm caused by withdrawals (Section 373.0421, F.S.). Additional guidance for the establishment of minimum flows and levels is provided in the Florida Water Resources Implementation Rule (Chapter 62-40.473, Florida Administrative Code; hereafter F.A.C.), which requires that "consideration shall be given to the protection of water resources, natural seasonal fluctuations in water flows, and environmental values associated with coastal, estuarine, aquatic and wetland ecology, including: a) recreation in and on the water; b) fish and wildlife habitats and the passage of fish; c) estuarine resources; d) transfer of detrital material; e) maintenance of freshwater storage and supply; f) aesthetic and scenic attributes; g) filtration and absorption of nutrients and other pollutants; h) sediment loads; i) water quality; j) and navigation."

To address this legislative mandate within its jurisdictional boundaries, the Southwest Florida Water Management District (District or SWFWMD) has developed specific methodologies for establishing minimum flows or levels for lakes, wetlands, rivers and aquifers, and adopted them into the Water Levels and Rates of Flow Rule (Chapter 40D-8, F.A.C.). For lakes, methodologies have been developed for establishing Minimum Levels for systems with fringing cypress wetlands 0.5 acres or greater in size and for those without fringing cypress wetlands 0.5 acres or greater in size. Lakes with fringing cypress wetlands where water levels currently rise to an elevation expected to fully maintain the integrity of the wetlands are classified as Category 1 Lakes. Lakes with fringing cypress wetlands that have been structurally altered such that lake water levels do not rise to former levels are classified as Category 2 Lakes. Lakes without fringing cypress wetlands are classified as Category 3 Lakes. Chapter 40D-8, F.A.C. also provides for the establishment of Guidance Levels, which serve as advisory information for the District, lake shore residents and local governments, or to aid in the management or control of adjustable water level structures. Typically two Minimum

Levels and three Guidance Levels are established for lakes, and upon adoption by the District Governing Board, are incorporated into Chapter 40D-8, F.A.C. The levels, which are expressed as elevations in feet above the National Geodetic Vertical Datum of 1929 (NGVD), are described below.

The **Ten Year Flood Guidance Level** is provided as an advisory guideline for lake shore development. It is the level of flooding expected on a frequency of not less than the ten year recurring interval, or on a frequency of not greater than a ten percent probability of occurrence in any given year.

The **High Guidance Level** is provided as an advisory guideline for construction of lake shore development, water dependent structures, and operation of water management structures. The High Guidance Level is the elevation that a lake's water levels are expected to equal or exceed ten percent of the time (P10) on a long-term basis.

The **High Minimum Lake Level** is the elevation that a lake's water levels are required to equal or exceed ten percent of the time (P10) on a long-term basis.

The **Minimum Lake Level** is the elevation that a lake's water levels are required to equal or exceed fifty percent of the time (P50) on a long-term basis.

The **Low Guidance Level** is provided as an advisory guideline for water dependent structures, information for lake shore residents and operation of water management structures. The Low Guidance Level is the elevation that a lake's water levels are expected to equal or exceed ninety percent of the time (P90) on a long-term basis.

In accordance with Chapter 40D-8, F.A.C., proposed Minimum and Guidance Levels were developed for Lake Deaton (Table 1), a Category 3 Lake located in Sumter County, Florida. The levels were established using best available information, including field data that were obtained specifically for the purpose of Minimum Levels development. Data and analyses used for development of the proposed Minimum and Guidance Levels are described in the remainder of this report.

Table 1. Proposed Minimum and Guidance Levels for Lake Deaton.

Minimum and Guidance Levels	Elevation (feet above NGVD)
Ten Year Flood Guidance Level	65.8
High Guidance Level	65.2
High Minimum Lake Level	64.8
Minimum Lake Level	63.2
Low Guidance Level	62.2

Data and Analyses Supporting Proposed Minimum and Guidance Levels for Lake Deaton

Lake Setting and Description

Lake Deaton is located in Sumter County, Florida (Sections 10 - 15, and 23, Township 19 South, Range 23 East), in the Withlacoochee River Basin of the Southwest Florida Water Management District (Figure 1). White (1970) classified the area of west-central Florida containing Lake Deaton as the Western Valley and Central Valley physiographic regions. Brooks (1981) characterized the area surrounding the lake as the Tsala Apopka Basin subdivision of the Ocala Uplift physiographic district and described the subdivision as an erosional valley in a limestone terrain with thin surficial sands. As part of the Florida Department of Environmental Protection's Lake Bioassessment/Regionalization Initiative, the area has been identified as the Central Valley region, and described as an area with large, shallow, and eutrophic lakes (although lake size and type are variable) that have abundant macrophytes or are green with algae (Griffith *et al.* 1997).

The lake is located in the Lake Deaton Outlet drainage basin in the Withlacoochee River watershed. According to the United States Geological Survey (Foote 1981), the drainage area for Lake Deaton is 12.4 square miles. Surface water inflow to the lake occurs from areas north of the lake. The lake discharges to the southeast through a ditch to a large wetland south of S.R. 44 (Figure 2). Although there are permitted ground water withdrawals within the surrounding lake area, there are no surface water withdrawals from the lake currently permitted by the District. A public boat ramp located on the southwest shore of the lake provides access to the lake.

The 1966 United States Geological Survey 1:24,000 Leesburg West quadrangle map indicates an elevation of 63 feet above NGVD for Lake Deaton. The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 778 acres at this elevation. A topographic map of the lake basin generated in support of Minimum Levels development (Figure 3) indicates that the lake extends over 598 acres at an elevation of 63 feet above NGVD.

Agriculture dominates the landscape within the surrounding lake region with most of the uplands having been altered and converted to improved pastureland. There is some residential development south of the lake. The majority of the shoreline is in natural condition, consisting of expansive hardwood swamps and in some areas, shrub/herbaceous wetlands. Dominant plant species observed along the shoreline and within the lake basin include, red maple (*Acer rubrum*), sweet bay (*Magnolia virginiana*), red bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), sweet gum (*Liquidambar styraciflua*), dahoon holly (*Ilex cassine*), willow (*Salix caroliniana*), cattail (*Typha sp.*), sawgrass (*Cladium jamaicense*), maidencane (*Panicum hemitomon*), pickerelweed (*Pontederia cordata*), arrowhead (*Sagittaria lancifolia*), American lotus (*Nelumbo lutea*), and spatterdock (*Nuphar luteum*).

Figure 1. Location of Lake Deaton in Sumter County, Florida.

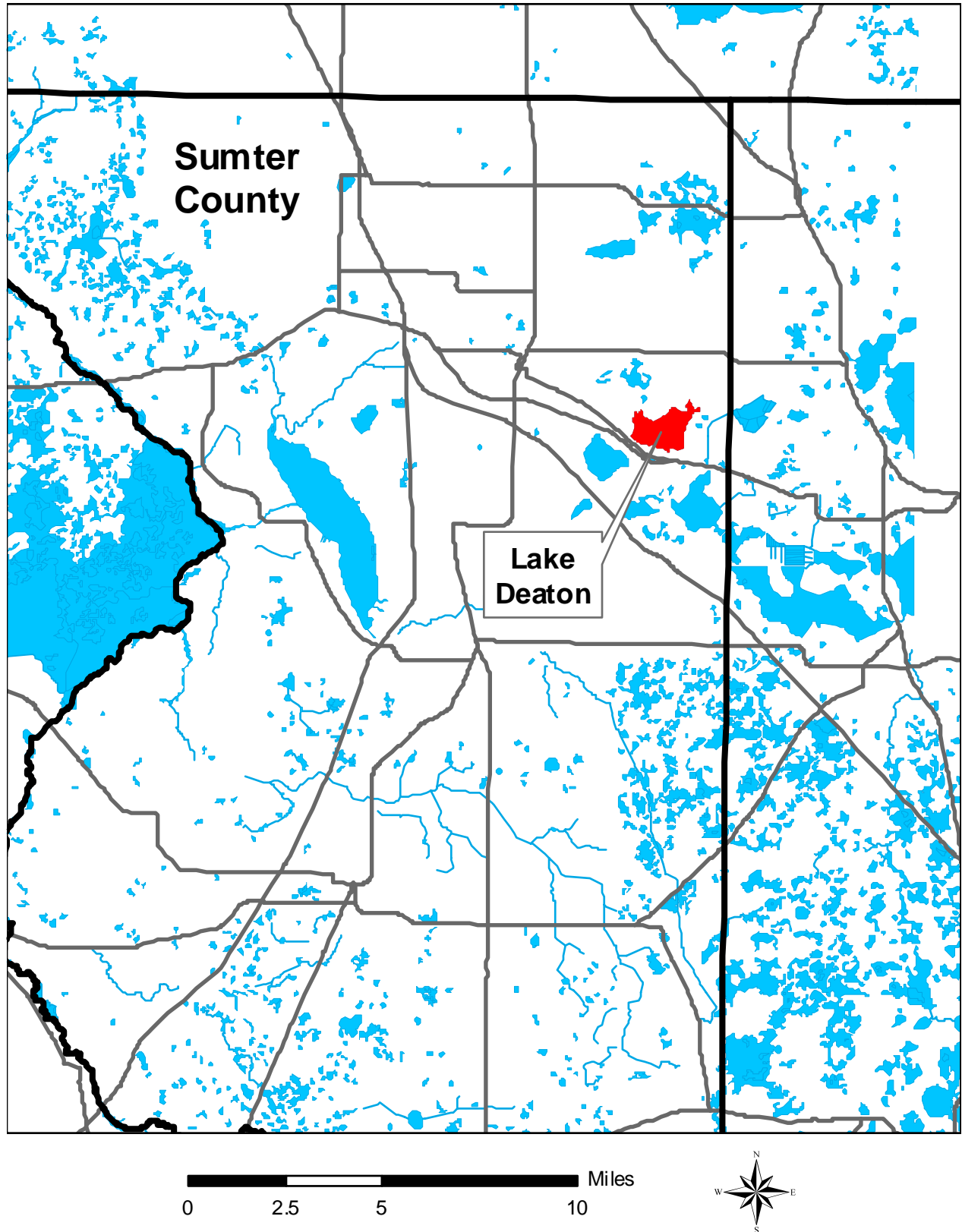



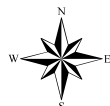


Figure 2. Location of lake water level gauge, public boat ramp, hydrologic indicators, inlets, outlet, outlet conveyance system, water control structure, and control point for Lake Deaton.



Legend

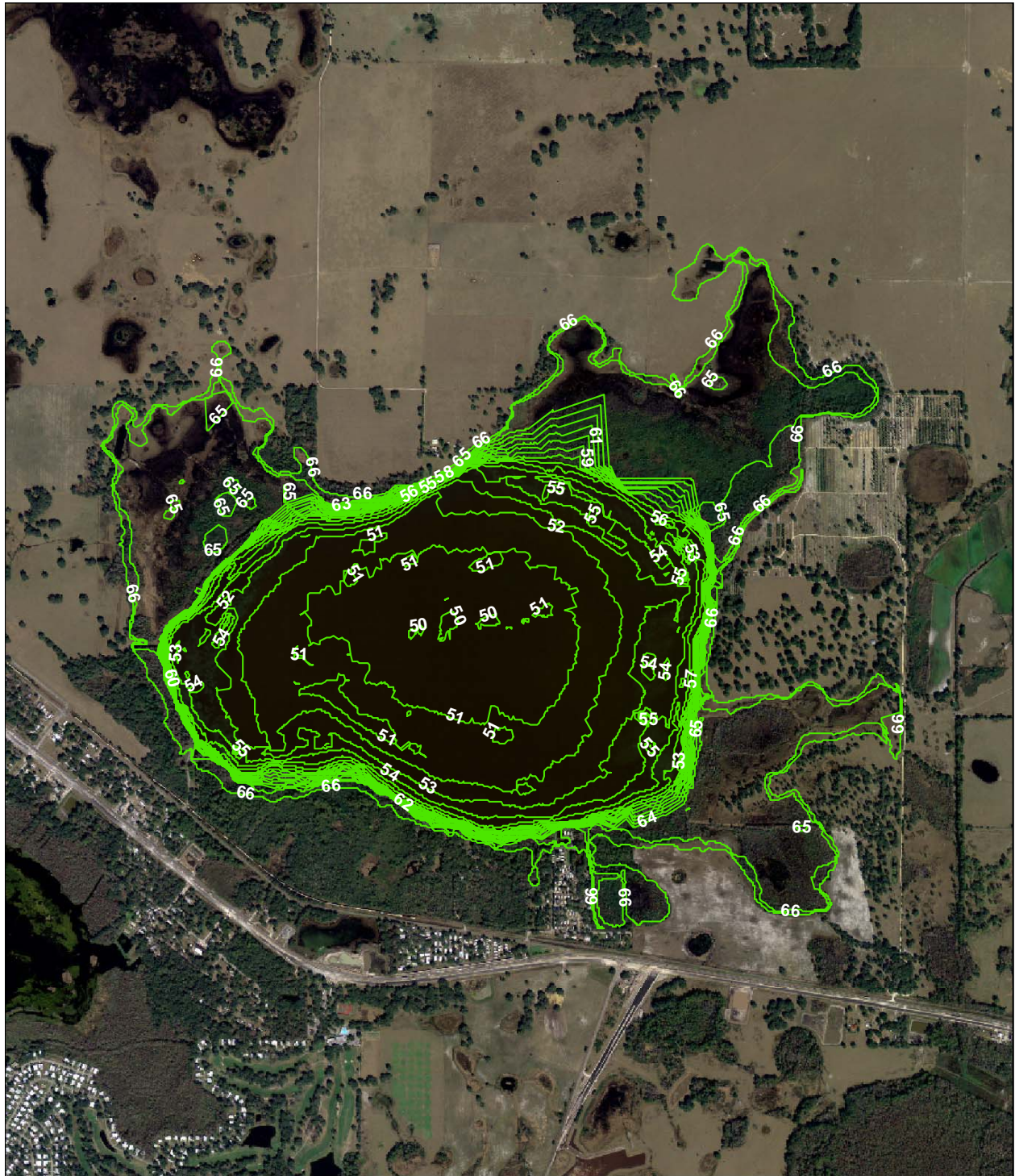
-  Lake Level Gauge
-  Boat Ramp
-  Inlets/Outlet



0 1,000 2,000 4,000 Feet

Map prepared using 2004 true color digital ortho photography.

Figure 3. One-foot contours within the Lake Deaton basin. Values shown are elevations in feet above the National Geodetic Vertical Datum of 1929.



Map prepared using 2004 true color digital ortho photography, elevation data from 1984 SWFWMD aerial photography with contours maps (Secs. 10-15, and 23, Twp. 19 S, Rge. 23 E), and elevation data collected by D.C. Associates, Inc.



0 1,000 2,000 4,000 Feet

Currently Adopted Guidance Levels

The Southwest Florida Water Management District has a long history of water resource protection through the establishment of lake management levels. With the development of the Lake Levels Program in the mid-1970s, the District began an initiative for establishing lake management levels based on hydrologic, biological, physical and cultural aspects of lake ecosystems. By 1996, management levels for nearly 400 lakes had been established.

Based on work conducted in the 1970s (see SWFWMD 1996), the District Governing Board adopted management levels (currently referred to as Guidance Levels) for Lake Deaton in November 1983. These levels have been incorporated into Chapter 40D-8, F.A.C. (Table 2). A Maximum Desirable Level of 64.50 feet above NGVD was also developed, but was not adopted. The adopted Guidance Levels and Maximum Desirable Level were developed using a methodology that differs from the current District approach for establishing Minimum and Guidance Levels. The levels do not, therefore, necessarily correspond with levels developed using current methods. Minimum and Guidance Levels developed using current methods will replace existing Guidance Levels upon adoption by the District Governing Board into Chapter 40D-8, F.A.C.

Annually since 1991, a list of stressed lakes has been developed to support the District's consumptive water use permitting program. As described in the District's Consumptive Use of Water Rule (Chapter 40D-2, F.A.C.), "a stressed condition for a lake is defined to be chronic fluctuation below the normal range of lake level fluctuations". For lakes with adopted Guidance Levels, chronic fluctuation below the Low Level is considered a stressed condition. For lakes without adopted levels, evaluation of stressed condition is conducted on a case-by-case basis. Lake Deaton is not included on the current or historical Stressed Lakes List (Gant *et al.* 1999, 2005).

Table 2. Adopted Guidance Levels and associated surface areas for Lake Deaton.

Management Levels	Elevation (feet above NGVD)	Lake Area (acres)
Ten Year Flood Guidance Level	65.50	845
High Level	65.00	718
Low Level	62.00	584
Extreme Low Level	60.00	555

Development of Minimum and Guidance Levels

Proposed Minimum and Guidance Levels for Lake Deaton were developed using the methodology for Category 3 Lakes described in Chapter 40D-8, F.A.C. and best available information in accordance with Section 373.042, F.S. Additional information

gathered in 2004 and 2005 through field evaluations and survey work was also used. The levels and additional information are listed in Table 3, along with surface areas for each elevation. Detailed descriptions of the development and use of these data are provided in the remainder of this report.

Table 3. Proposed Minimum and Guidance Levels, Historic P50, lake stage percentiles, normal pool and control point elevations, and significant change standards for Lake Deaton.

Levels	Elevation (feet above NGVD)	Lake Area (acres)
Lake Stage Percentiles		
Historic P10	65.2	692
Historic P50	64.0	614
Historic P90	62.2	587
Other Levels		
Normal Pool	NA	NA
Control Point	64.8	672
Guidance Levels and Historic P50		
Ten Year Flood Guidance Level	65.8	895
High Guidance Level	65.2	692
Historic P50	64.0	614
Low Guidance Level	62.2	587
Significant Change Standards		
Wetland Offset Elevation	63.2	602
Aesthetics Standard	62.2	587
Lake Mixing Standard	58.5	536
Recreation/Ski Standard	57.8	527
Species Richness Standard	57.5	523
Dock-Use Standard	NA	NA
Basin Connectivity Standard	NA	NA
Minimum Levels		
High Minimum Lake Level	64.8	672
Minimum Lake Level	63.2	602

NA = not available/not appropriate

Lake Stage Data and Percentiles

Lake stage data, *i.e.*, surface water elevations for Lake Deaton (District Universal Identification Number STA 407 408) are available from the District's Water Management Data Base from April 1978 through the present date (Figure 4, see Figure 2 for current location of the SWFWMD lake water level gauge). The highest surface water elevation for Lake Deaton recorded in the Water Management Data Base, 65.40 feet above NGVD, occurred on August 19, 1996. The low of record, 60.24 feet above NGVD, occurred on June 10, 2002.

For the purpose of Minimum Levels determination, lake stage data are classified as "Historic" for periods when there were no measurable impacts due to water withdrawals, and impacts due to structural alterations were similar to existing conditions. In the context of Minimum Levels development, "structural alterations" means man's physical alteration of the control point, or highest stable point along the outlet conveyance system of a lake, to the degree that water level fluctuations are affected. Lake stage data are classified as "Current" for periods when there were measurable, stable impacts due to water withdrawals, and impacts due to structural alterations were stable.

Based on water-use estimates and analysis of lake water levels and regional ground water fluctuations, available lake stage data for Lake Deaton from January 1983 through December 2005 were classified as Historic data. These data, however, were considered insufficient for calculating Historic lake stage exceedance percentiles, because the record only extends over a 23-year period. Historic lake stage exceedance percentiles were, instead, developed using a composite sixty-year record of monthly mean lake surface elevations based on available stage records that were supplemented with modeled estimates. The sixty-year period was considered sufficient for incorporating the range of lake stage fluctuations that would be expected based on long-term climatic cycles that have been shown to be associated with changes in regional hydrology (Enfield et al. 2001, Basso and Schultz 2003, Kelly 2004).

Modeled monthly mean lake stage values for the composite data set were estimated using a linear fitting procedure known as the line of organic correlation (see Helsel and Hirsch 1992). The procedure was used to describe the relationship between available lake stage data for Lake Deaton and lake stage data for Lake Eustis in Lake County. The line of organic correlation equation developed for the two data sets was utilized to estimate water surface elevation values for Lake Deaton for the period from January 1946 through December 2005 (SWFWMD draft report, 2006). A Historic, composite data set of monthly mean water surface elevations for Lake Deaton was then developed using available lake stage records from January 1983 through December 2005, and modeled water surface elevations for the remainder of the sixty-year period (Figure 5).

Composite Historic data from January 1946 through December 2005 were used to calculate **the Historic P10, P50, and P90** lake stage percentile elevations. The Historic P10 elevation, the elevation the lake water surface equaled or exceeded ten percent of the time during the historic period, was **65.2 feet above NGVD**. The Historic P50

elevation, the elevation the lake water surface equaled or exceeded fifty percent of the time during the historic period, was **64.0 feet above NGVD**. The Historic P90 elevation, the elevation the lake water surface equaled or exceeded 90 percent of the time during the historic period, was **62.2 feet above NGVD**.

Normal Pool Elevation, Control Point Elevation and Structural Alteration Status

The **Normal Pool** elevation, a reference elevation used for development of minimum lake and wetland levels, is established based on the elevation of Hydrologic Indicators of sustained inundation. Because Hydrologic Indicators of Normal Pool do not exist on Lake Deaton, **establishment of the Normal Pool elevation is not possible**.

The **Control Point** elevation is the elevation of the highest stable point along the outlet profile of a surface water conveyance system (e.g., structure, ditch, culvert, or pipe) that is the principal control of water level fluctuation in the lake. For Lake Deaton, the Control Point was established at **64.8 feet above NGVD**, the elevation of the highest point in the outfall ditch (Figure 2).

Structual Alteration Status is determined to support development of Minimum and Guidance Levels. Because the Control Point elevation for the lake is below the Normal Pool elevation, **Lake Deaton is considered to be Structurally Altered**.

Proposed Guidance Levels and the Historic P50

The **Ten Year Flood Guidance Level** is provided as an advisory guideline for lake shore development. It is the level of flooding expected on a frequency of not less than the ten year recurring interval, or on a frequency of not greater than a ten percent probability of occurrence in any given year. The Ten Year Flood Guidance Level for Lake Deaton was established at **65.8 feet above NGVD** using the methodology for open basin lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). For the analysis, a storm event routing model was used to assess flooding potential for Lake Deaton. The flood elevation estimate is based on a 10-year, 5-day storm event totaling 10.5 inches of rainfall. Based on available lake stage data, the Ten Year Flood Guidance Level has not been exceeded.

The **High Guidance Level** is provided as an advisory guideline for construction of lake-shore development, water dependent structures, and operation of water management structures. The High Guidance Level is the expected Historic P10 of the lake. Because Historic data are available, the High Guidance Level was established at **65.2 feet above NGVD**, the Historic P10 elevation.

The **Historic P50** elevation is the elevation that a lake's water levels are expected to equal or exceed fifty percent of the time on a long-term basis. The level is derived to support development of minimum lake levels, and is established using Historic or Current data and, in some cases, reference lake water regime statistics. Reference

lake water regime (RLWR) statistics are used to describe expected water level fluctuations for lakes that lack adequate Historic or Current data and are derived using lake stage data for typical, regional lakes that exhibit little or no impacts from water withdrawals. The statistics include the RLWR50, RLWR5090, and RLWR90, which are, respectively, median differences between the P10 and P50, P50 and P90, and P10 and P90 percentiles. Because Historic data are available for Lake Deaton, the Historic P50 was established at **64.0 feet above NGVD**.

The **Low Guidance Level** is provided as an advisory guideline for water dependent structures, information for lake shore residents, and operation of water management structures. The Low Guidance Level is the elevation that a lake's water levels are expected to equal or exceed ninety percent of the time (P90) on a long-term basis. The level is established using Historic or Current data, and in some cases, reference lake water regime statistics. Because Historic data are available, the Low Guidance Level was established at **62.2 feet above NGVD**, the Historic P90 elevation.

Lake Categories

Lakes are classified as Category 1, 2, or 3 for the purpose of Minimum Levels development. Those with fringing cypress wetlands greater than 0.5 acres in size where water levels currently rise to an elevation expected to fully maintain the integrity of the wetlands (*i.e.*, the Historic P50 is equal to or higher than an elevation 1.8 feet below the Normal Pool elevation) are classified as Category 1 Lakes. Lakes with fringing cypress wetlands greater than 0.5 acres in size that have been structurally altered such that the Historic P50 elevation is more than 1.8 feet below the Normal Pool elevation are classified as Category 2 Lakes. Lakes without fringing cypress wetlands or with cypress wetlands less than 0.5 acres in size are classified as Category 3 Lakes. Although Lake Deaton is fringed by hardwood swamp, because these forested wetlands do not include an area of cypress greater than 0.5 acres in size, the lake is classified as a **Category 3 Lake**.

Category 3 Lake Significant Change Standards and Other Information for Consideration

Lake-specific significant change standards and other available information are developed for establishing Minimum Levels for Category 3 Lakes. The standards are used to identify thresholds for preventing significant harm to cultural and natural system values associated with lakes in accordance with guidance provided in the Florida Water Resources Implementation Rule (Chapter 62-40.473, F.A.C.). Other information taken into consideration includes potential changes in the coverage of herbaceous wetland vegetation and aquatic plants.

Six significant change standards are developed, including a Species Richness Standard, an Aesthetics Standard, a Lake Mixing Standard, a Recreation/Ski Standard, a Dock-Use Standard, and a Basin Connectivity Standard. Although potential changes in the coverage of herbaceous wetland vegetation and aquatic plants associated with

use of the standards is taken into consideration in the development of Minimum Levels, there is no significant change standard to determine a threshold for preventing significant harm to fringing non-cypress wetlands. Based on the Cypress Wetland Standard for Category 1 Lakes, however, a Wetland Offset Elevation was developed for Category 3 Lakes to provide protection for non-cypress fringing wetlands. Since Lake Deaton is a Category 3 Lake, the applicable significant change standards and the Wetland Offset Elevation were developed (Table 3).

The **Wetland Offset Elevation** is developed to protect fringing non-cypress wetlands. Based on the rationale used to develop the Cypress Wetland Standard for Category 1 Lakes (1.8 feet below the Normal Pool elevation), a Wetland Offset Elevation for Category 3 Lakes was developed. Because Hydrologic Indicators of sustained inundation used to determine the Normal Pool elevation usually do not exist on Category 3 Lakes, another datum, in this case the Historic P50 elevation, was used in the development of the Wetland Offset Elevation. Based on an evaluation of the relationship of the Cypress Wetland Standard with the Historic P50 for hydrologically unimpacted cypress wetlands, the Wetland Offset Elevation for Category 3 Lakes was established at an elevation 0.8 feet below the Historic P50 elevation (Hancock, draft memorandum, 2006). For Lake Deaton, the Wetland Offset Elevation was established at **63.2 feet above NGVD**.

The **Aesthetics Standard** is developed to protect aesthetic values associated with the inundation of lake basins. The standard is intended to protect aesthetic values associated with the median lake stage from becoming degraded below the values associated with the lake when it is staged at the Low Guidance Level. The Aesthetic Standard was established at the Low Guidance Level, which is **62.2 feet above NGVD**.

The **Lake Mixing Standard** is developed to prevent significant changes in patterns of wind-driven mixing of the lake water column and sediment resuspension. The standard is established at the highest elevation at or below the Historic P50 elevation where the dynamic ratio (see Bachmann *et al.* 2000) shifts from a value of <0.8 to a value >0.8 , or from a value >0.8 to a value <0.8 . The Lake Mixing Standard was established at **58.5 feet above NGVD**, the elevation at which the dynamic ratio shifts across the 0.8 threshold (Figure 6).

The **Recreation/Ski Standard** is developed to identify the lowest elevation within the lake basin that will contain an area suitable for safe water skiing. The standard is based on the lowest elevation (the Ski elevation) within the basin that can contain a five-foot deep ski corridor delineated as a circular area with a radius of 418 feet, or a rectangular area 200 feet in width and 2,000 feet in length, and use of Historic lake stage data or region-specific reference lake water regime statistics. Because Historic data are available, the Recreation/Ski Standard was established at **57.8 feet above NGVD** based on the sum of the ski elevation (56.0 feet above NGVD), and the difference between the Historic P50 and Historic P90 (1.8 feet).

The **Species Richness Standard** is developed to prevent a decline in the number of bird species that may be expected to occur at or utilize a lake. Based on an empirical relationship between lake surface area and the number of birds expected to occur at Florida lakes, the standard is established at the lowest elevation associated with less than a 15 percent reduction in lake surface area relative to the lake area at the Historic P50 elevation. For Lake Deaton, the Species Richness Standard was established at **57.5 feet above NGVD**.

The **Dock-Use Standard** is developed to provide for sufficient water depth at the end of existing docks to permit mooring of boats and prevent adverse impacts to bottom-dwelling plants and animals caused by boat operation. The standard is based on the elevation of lake sediments at the end of existing docks, a two-foot water depth requirement for boat mooring, and use of Historic lake stage data or region-specific reference lake water regime statistics. Because only one dock platform is located on Lake Deaton, **there is not enough information to develop the Dock-Use Standard**.

The **Basin Connectivity Standard** is developed to protect surface water connections between lake basins or among sub-basins within lake basins to allow for movement of aquatic biota, such as fish, and support recreational uses. The standard is based on the elevation of lake sediments at a critical high spot between lake basins or lake sub-basins, a water depth requirement for movement of aquatic biota or powerboats and other watercraft, and use of Historic lake stage data or region-specific reference lake water regime statistics. Because lake basin depth measurements indicate Lake Deaton does not contain sub-basins, **the Basin Connectivity Standard is not applicable**.

Herbaceous Wetland Information is taken into consideration to determine the elevation at which change in lake stage would result in substantial change in potential area of herbaceous wetland vegetation within the lake basin (*i.e.*, basin area with a water depth less than or equal to four feet) relative to the potential herbaceous wetland area at the Historic P50 elevation. Review of changes in potential wetland area in relation to change in lake stage indicated there would not be a substantial increase or decrease in potential wetland area within the lake basin at the Wetland Offset Elevation (10% of the lake basin) relative to the potential wetland area at the Historic P50 elevation (also 10% of the lake basin) (Figure 6).

Submersed Aquatic Plant Information is taken into consideration to determine the elevation at which change in lake stage would result in substantial change in potential area of submersed aquatic plants within the lake basin relative to the potential aquatic plant area at the Historic P50 elevation. Because colonization of aquatic plants is dependent on sufficient light penetration, but data on the depth of light penetration into the lake water column is insufficient, it is not possible to determine the depth and potential area of submersed aquatic plants for Lake Deaton.

Proposed Minimum Levels

The method used for establishing Minimum Levels for a lake is dependent on its lake category. For Category 1 Lakes, the High Minimum Lake Level and Minimum Lake Level are established 0.4 feet and 1.8 feet below the Normal Pool elevation, respectively. For Category 2 Lakes, the High Minimum Lake Level is established at the High Guidance Level, and the Minimum Lake Level at the Historic P50 elevation. For Category 3 Lakes, the High Minimum Lake Level is established using Historic data or region-specific reference lake water regime statistics, and the Minimum Lake Level using lake-specific significant change standards or the Historic P50 elevation. Other available information taken into consideration in the establishment of Minimum Levels for all three lake categories includes: substantial changes in the coverage of herbaceous wetland vegetation and aquatic macrophytes; elevations associated with residential dwellings, roads or other structures; frequent submergence of dock platforms; faunal surveys; aerial photographs; typical uses of lakes (e.g., recreation, aesthetics, navigation, and irrigation); surrounding land-uses; socio-economic effects; and public health, safety and welfare matters.

The **Minimum Lake Level** is the elevation that a lake's water levels are required to equal or exceed fifty percent of the time on a long-term basis. The Minimum Lake Level for Category 3 Lakes is established at the elevation corresponding to the most conservative significant change standard, *i.e.*, the standard with the highest elevation, except where that elevation is above the Historic P50 elevation, in which case, the Minimum Lake Level is established at the Historic P50 elevation. Using current rule criteria, the Minimum Lake Level for Lake Deaton could be established at the Aesthetics Standard (62.2 feet above NGVD). However, establishing the Minimum Lake Level at this elevation would not be appropriate. This elevation is 1.8 feet lower than the Historic P50 and represents the Historic P90 elevation, the elevation the lake has historically equaled or exceeded ninety percent of the time (Figures 5 and 7). Establishing the Minimum Lake Level at the Historic P90 elevation could result in adverse impacts to the forested hardwood wetlands that are contiguous with the lake. To protect the fringing wetlands, the Wetland Offset Elevation, which is lower than the Historic P50, but higher than the significant change standards below the Historic P50, was used to establish the Minimum Lake Level at **63.2 feet above NGVD** (Figures 5 and 7).

The **High Minimum Lake Level** is the elevation that a lake's water levels are required to equal or exceed ten percent of the time on a long-term basis. The High Minimum Level for Category 3 Lakes is established at an elevation corresponding to the Minimum Lake Level elevation plus the difference between the Historic P10 and the Historic P50 (1.2 feet). Using current rule criteria, the High Minimum Lake Level for Lake Deaton could be established at 64.4 feet above NGVD. However, based on an evaluation of the relationship of the Cypress Wetland Standard with the Historic P10 for hydrologically unimpacted cypress wetlands, the High Minimum Lake Level was established 0.4 feet below the Historic P10 elevation, at **64.8 feet above NGVD**, (Hancock, draft memorandum, 2006) (Figures 5 and 7).

Comparison of the High Minimum Lake Level with Lake Basin Features

The elevations of various man-made features within the immediate Lake Deaton basin were determined to evaluate the potential for flooding when the lake surface is at the proposed High Minimum Lake Level. Based on review of available one-foot contour interval aerial maps for the region and field survey data collected in May 2005, the proposed High Minimum Lake Level is 4.6 feet below the floor of the lowest residential home in the southern lakeshore area, 3.3 feet below the porch floor of the lowest residential home, 2.5 feet below a shed in the southern lakeshore area, 2.1 feet below a road in the southern lakeshore area, 2.1 feet below the top of the public boat ramp at the southwest end of the lake, and 6.6 feet above the bottom of the public boat ramp (Table 7).

Table 7. Elevations of selected features in the Lake Deaton basin.

Lake Basin Features	Elevation (feet above NGVD)
House finished floor	69.01
Porch finished floor	67.71
Shed	66.88
Road	66.51
Top of public boat ramp	66.46
Bottom of public boat ramp	57.82

Figure 4. Surface water elevations for Lake Deaton from the District's Water Management Data Base from April 1978 through December 2005.

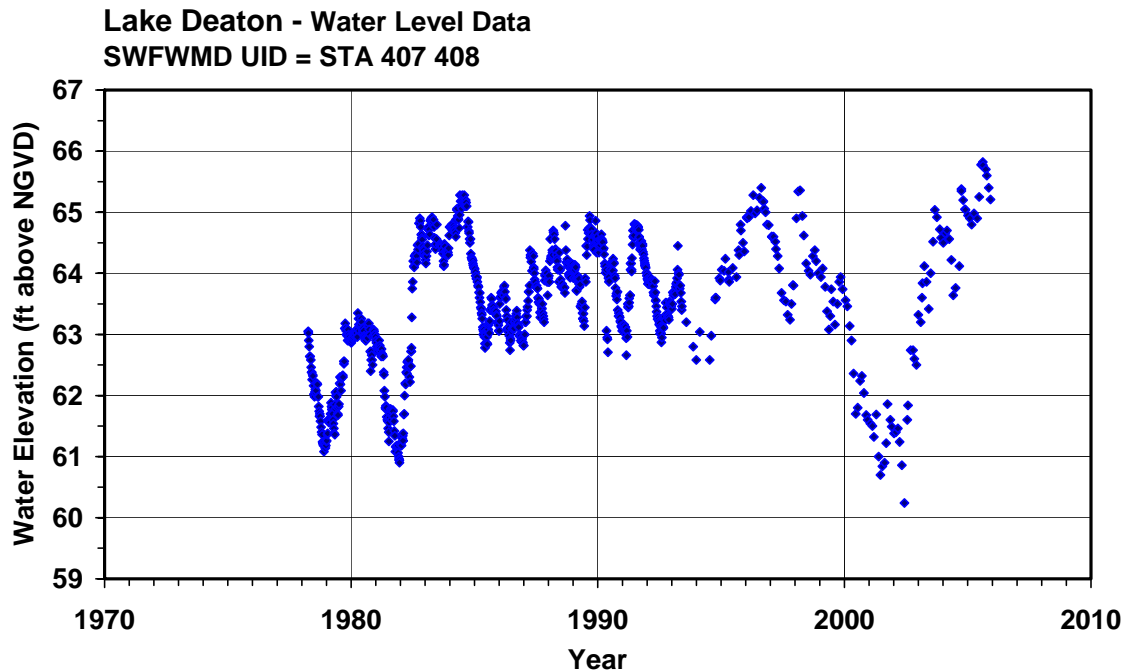


Figure 5. Composite monthly-means surface water elevations for Lake Deaton from January 1946 through December 2005, and Guidance and Minimum Levels. Levels include the Ten-Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake Level (HMLL), and Minimum Lake Level (MLL).

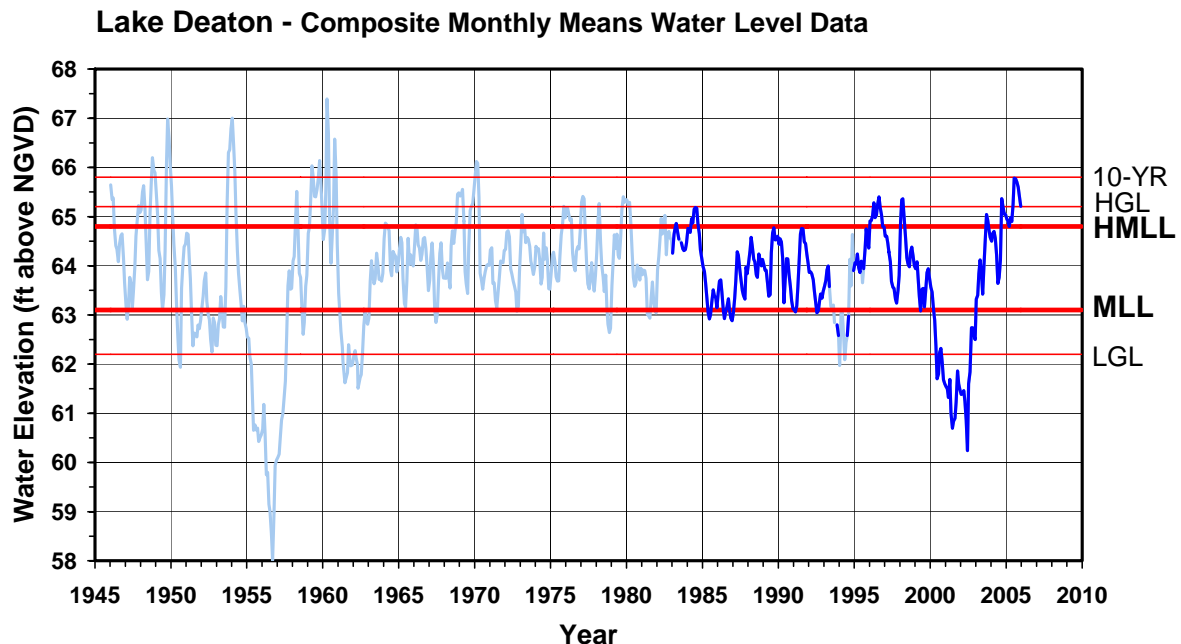


Figure 6. Surface area, maximum depth, mean depth, volume, dynamic ratio (basin slope), and potential herbaceous wetland area versus lake stage for Lake Deaton.

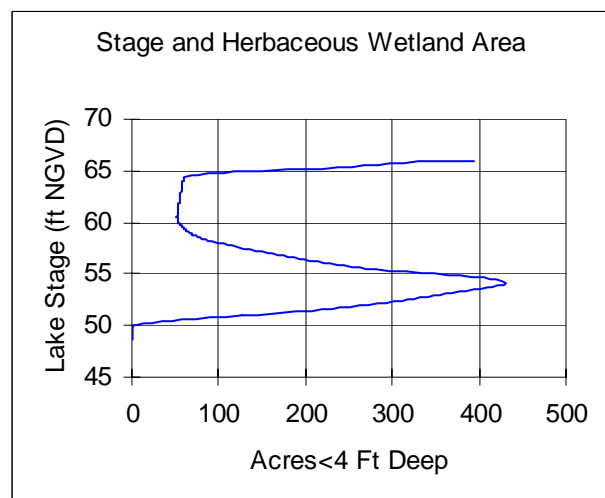
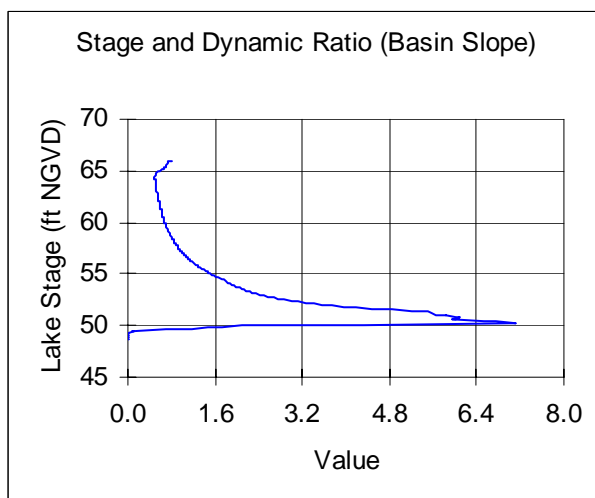
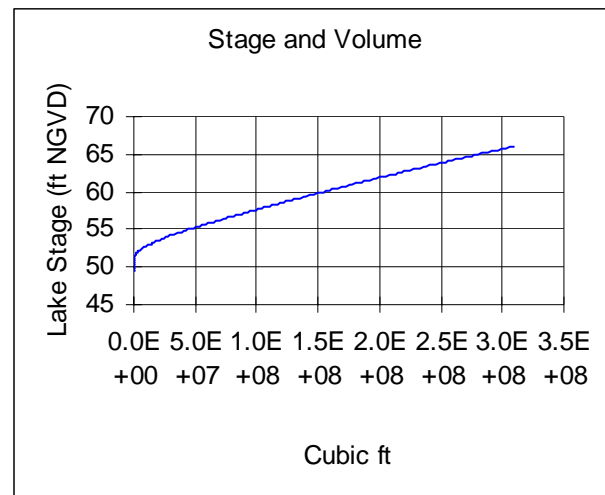
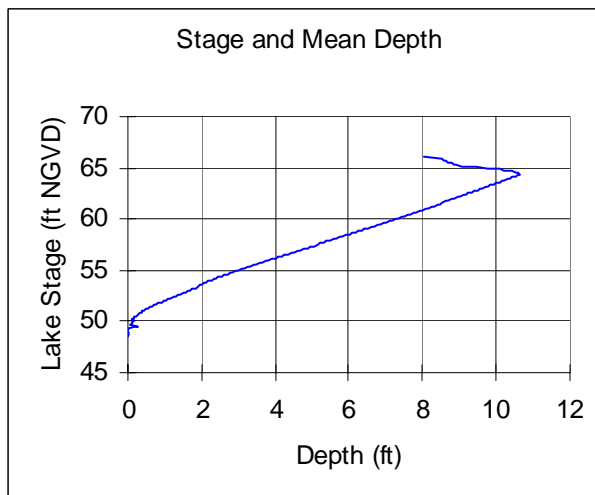
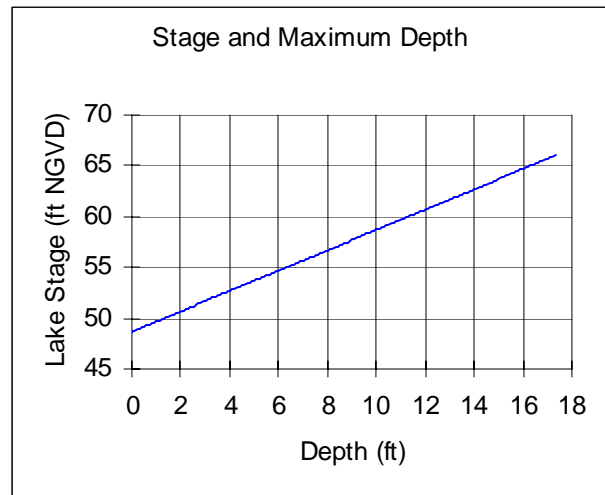
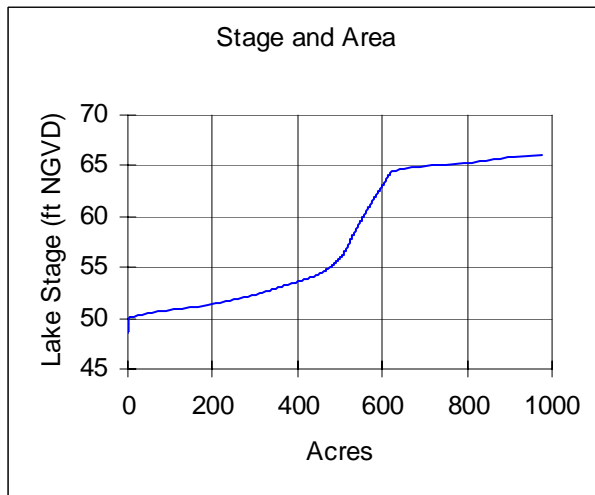
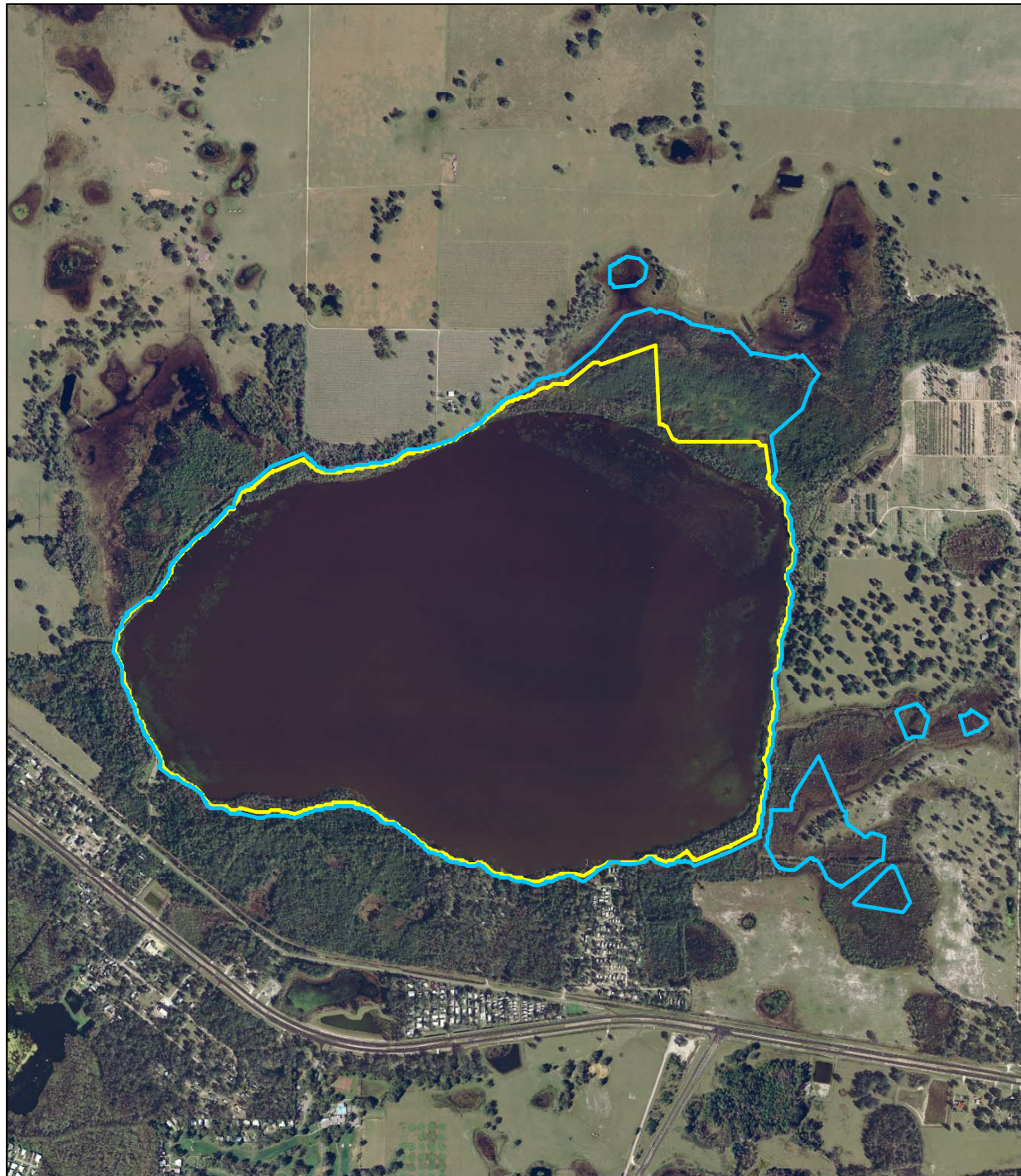


Figure 7. Approximate location of the proposed Minimum Lake Level (MLL) and High Minimum Lake Level (HMLL) for Lake Deaton.



Legend

Deaton Minimum Levels

- 63.2 feet above NGVD = MLL
- 64.8 feet above NGVD = HMLL



Map prepared using 2005 true color digital ortho photography, elevation data from 1984 SWFWMD aerial photography with contours maps (Secs. 10-15, and 23, Twp. 19 S, Rge. 23 E), and elevation data collected by D.C. Associates, Inc.

0 1,000 2,000 4,000 Feet

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