Minimum and Guidance Levels for

Big Gant Lake

in Sumter County, Florida

Draft – September 2006

Ecologic Evaluation Section

Resource Conservation and Development Department

Southwest Florida
Water Management District

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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., Minimum and Guidance Levels were developed for Big Gant Lake (Table 1), a Category 1 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 Minimum and Guidance Levels are described in the remainder of this report.

Table 1. Minimum and Guidance Levels for Big Gant Lake.

Minimum and Guidance Levels	Elevation (feet above NGVD)
Ten Year Flood Guidance Level	77.6
High Guidance Level	76.1
High Minimum Lake Level	76.3
Minimum Lake Level	74.9
Low Guidance Level	73.4

Data and Analyses Supporting Minimum and Guidance Levels for Big Gant Lake

Lake Setting and Description

Big Gant Lake is located in Sumter County, Florida (Sections 11, 14, and 15, Township 22 South, Range 22 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 Big Gant Lake as the Western Valley physiographic region. Brooks (1981) characterized the area surrounding the lake as the Dry Plain unit of the Webster Limestone Plains subdivision of the Ocala Uplift physiographic district, and described the subdivision as a plain with low relief dipping slightly westward with a thin veneer of clastic sand that covers the limestone. As part of the Florida Department of Environmental Protection's Lake Bioassessment/Regionalization Initiative, the area has been identified as the Webster Dry Plain region, and described as an area that has only a thin veneer of sand or clayey sand over the Ocala Limestone and contains few lakes (Griffith *et al.* 1997).

The lake is located in the Big Gant Canal drainage basin in the Withlacoochee River watershed. Surface water inflow to Big Gant Lake occurs from the east via Canal C (a.k.a. Big Gant Canal), and other canals and ditches that drain areas located to the north, northeast, south, and southeast of the lake. The lake discharges to the west via Canal C, through the District's S-11 water control structure (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 on Canal C (Gant Canal Access Park) just east of C.R. 478A provides access to the lake.

The 1958 United States Geological Survey 1:24,000 Webster quadrangle map indicates an elevation of 76 feet above NGVD for Big Gant Lake. The "Gazetteer of Florida Lakes" (Florida Board of Conservation 1969, Shafer *et al.* 1986) lists the lake area as 93 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 126 acres at an elevation of 76 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. Forested wetlands surround Big Gant Lake and remain relatively undisturbed except for areas altered by the past construction of canals and ditches. A wide and nearly contiguous ring of wetland and aquatic vegetation extends from the shoreline into the lake basin. The central portion of the lake basin is open water. Dominant plant species observed along the shoreline and within the lake basin include, red maple (*Acer rubrum*), cypress (*Taxodium sp.*), willow (*Salix caroliniana*), cattail (*Typha sp.*), pennywort (*Hydrocotyle umbellata*), bur-marigold (*Bidens laevis*), spatterdock (*Nuphar luteum*), hydrilla (*Hydrilla verticillata*), and water milfoil (*Myriophyllum heterophyllum*).

Figure 1. Location of Big Gant Lake in Sumter County, Florida.

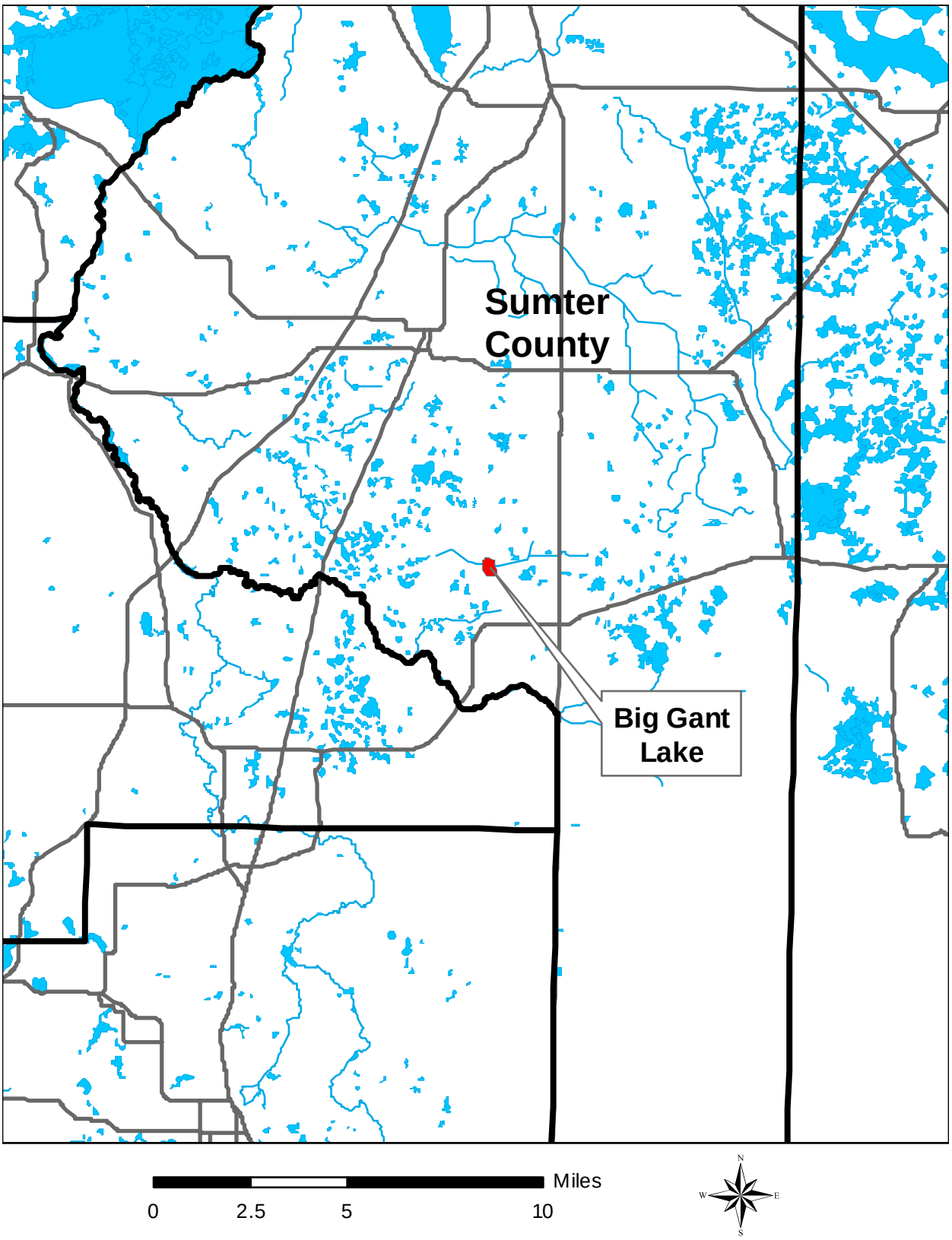
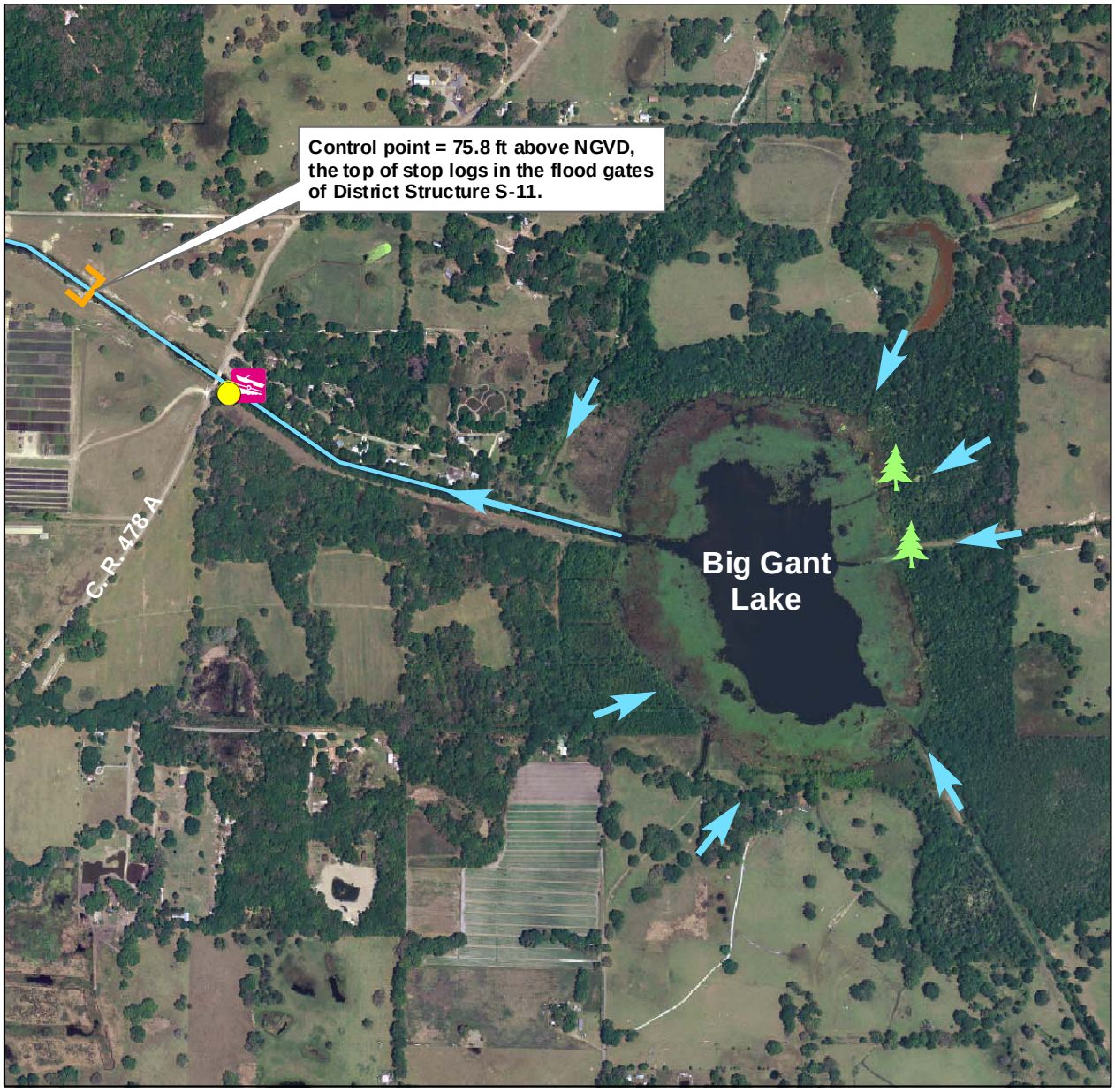


Figure 2. Location of the lake water level gauge, public boat ramp, hydrologic indicators, inlets, outlet, outlet conveyance system, water control structure, and control point for Big Gant Lake.



Legend

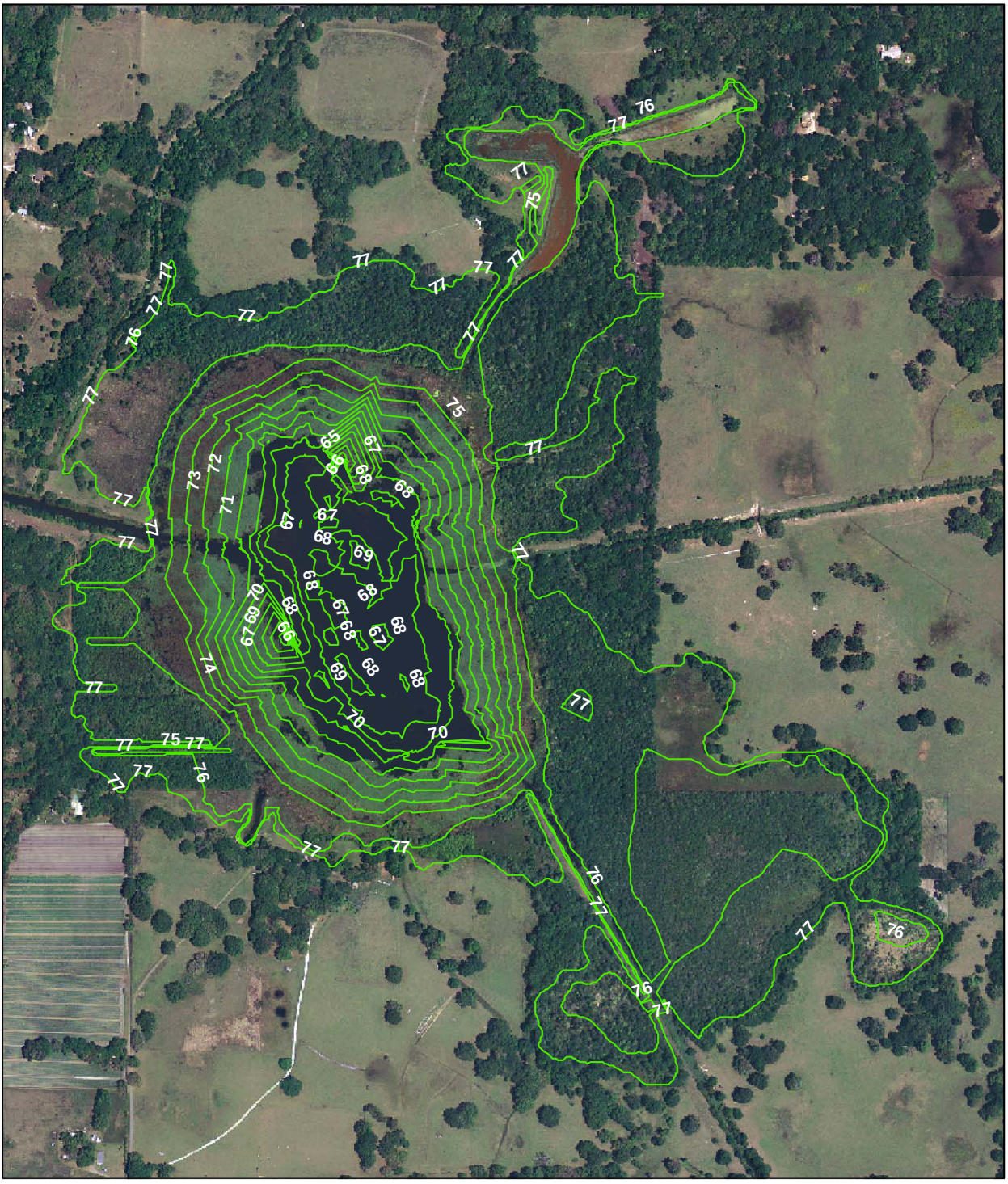
- Lake Level Gauge
- Boat Ramp
- Hydrologic Indicators
- Inlets/Outlet
- Structure

Feet

0 500 1,000 2,000

Map prepared using 2004 true color digital ortho photography.

Figure 3. One-foot contours within the Big Gant Lake 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 1988 SWFWMD aerial photography with contours maps (Secs. 11, 14, and 15, Twp. 22 S, Rge. 22 E), and elevation data collected by D.C. Johnson and Associates, Inc.

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 Big Gant Lake in November 1983. These levels have been incorporated into Chapter 40D-8, F.A.C. (Table 2). A Maximum Desirable Level of 76.25 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. Big Gant Lake is not included on the current or historical Stressed Lakes List (Gant *et al.* 1999, 2006).

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

Management Levels	Elevation (feet above NGVD)	Lake Area (acres)
Ten Year Flood Guidance Level	76.50	168
High Level	76.25	152
Low Level	74.50	69
Extreme Low Level	72.50	51

Development of Minimum and Guidance Levels

Minimum and Guidance Levels for Big Gant Lake were developed using the methodology for Category 1 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. Minimum and Guidance Levels, Historic P50, lake stage percentiles, normal pool and control point elevations, and significant change standards for Big Gant Lake.

Levels	Elevation (feet above NGVD)	Lake Area (acres)
Lake Stage Percentiles		
Historic P10	76.1	135
Historic P50	75.7	84
Historic P90	73.4	59
Other Levels		
Normal Pool	76.7	184
Control Point	75.8	89
Guidance Levels and Historic P50		
Ten Year Flood Guidance Level	77.6	NA
High Guidance Level	76.1	135
Historic P50	75.7	84
Low Guidance Level	73.4	59
Significant Change Standards		
*Dock-Use Standard	77.4	NA
*Species Richness Standard	74.8	72
*Aesthetics Standard	73.4	59
*Lake Mixing Standard	69.3	27
*Basin Connectivity Standard	NA	NA
*Recreation/Ski Standard	NA	NA
Minimum Levels		
High Minimum Lake Level	76.3	152
Minimum Lake Level	74.9	73

NA = not available/not appropriate

* = Category 3 Lake Significant Change Standards developed for comparison purposes only

Lake Stage Data and Percentiles

Lake stage data, *i.e.,* surface water elevations for Big Gant Lake (District Universal Identification Number FLO 45 91, FLO 45 2759, and STA 354 355) are available from the District's Water Management Data Base from September 1970 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 Big Gant Lake recorded in the Water Management Data Base, 77.10 feet above NGVD, occurred on September 27, 2004. The low of record, 68.62 feet above NGVD, occurred on June 20, 2000.

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 Big Gant Lake from September 1970 through December 2005 were classified as Historic data. To determine if these data were sufficient for calculating Historic lake stage exceedance percentiles, a composite sixty-year data record of monthly mean lake surface elevations based on stage records and supplemented with modeled estimates was also used to generate lake stage exceedance percentiles. The sixty-year period incorporates 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 or organic correlation (see Helsel and Hirsch 1992). The procedure was used to describe the relationship between available lake stage data for Big Gant Lake and potentiometric surface elevations for the Upper Floridan Aquifer system, as measured at the Webster City Floridan well site (District Universal Identification Number WEL 348 82: USGS Number 283638082025701) in Sumter County. The line of organic correlation equation developed for the two data sets was utilized to estimate water surface elevation values for Big Gant Lake for the period from January 1946 through December 2005. A Historic, composite data set of monthly mean water surface elevations for Big Gant Lake was then developed using available lake stage records from September 1970 through December 2005, and modeled water surface elevations for the remainder of the sixty-year period (Figure 5).

Comparison of the exceedence percentiles for the lake stage record and the modeled water surface elevations indicate the percentiles are not significantly different. The S-11 water control structure allows significant control of lake water levels, therefore,

variability in rainfall has a limited effect on lake water levels (SWFWMD draft report, 2006). Historic data from the District's Water Management Data Base from September 1970 through December 2005 were, therefore, 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 **76.1 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 **75.7 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 **73.4 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, including biological and physical features. Based on the median elevation of buttress inflection points for 12 cypress trees located along the east and northeast shoreline of Big Gant Lake, the Normal Pool elevation for the lake basin was established at **76.7 feet above NGVD** (Figure 2 and Table 4).

Table 4. Summary statistics used for development of the Normal Pool elevation for Big Gant Lake.

Statistics	Elevations (feet above NGVD)
Mean (Standard Deviation)	76.9 (0.46)
Median	76.7
Minimum	76.3
Maximum	77.5

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 Big Gant Lake, the Control Point was established at **75.8 feet above NGVD,** the elevation of the top of the stop logs in the flood gates of the District's S-11 water control structure (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, **Big Gant Lake is considered to be Structurally Altered**.

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 Big Gant Lake was established at **77.6 feet above NGVD** using the methodology for open basin lakes described in current District Rules (Chapter 40D-8, Florida Administrative Code). The assessment of Big Gant Lake's flooding potential is based on a combination of storm event modeling and probability analysis of annual peak stages recorded between 1971 and 2004. Given the lake's hydrology and period of gauging record, flood elevations are best estimated from probability analysis for the most frequent floods, storm event modeling for rare floods, and a combination of the two for intermediate floods. The ten year flood frequency elevation for Big Gant Lake, which falls within the mid-range between frequent and rare floods, is a weighted average of the probability analysis and storm event modeling results. 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 **76.1 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 Big Gant Lake, the Historic P50 was established at **75.7 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. Because Historic data are available, the Low Guidance Level was established at **73.4 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. Based on the occurrence of lake-fringing cypress, and because the Historic P50 (75.7 feet above NGVD) is higher than the elevation 1.8 feet below the Normal Pool (74.9 feet above NGVD), Big Gant Lake is classified as a **Category 1 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 identifiy 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. Potential changes in the coverage of herbaceous wetland vegetation and aquatic plants associated with use of standards for development of Minimum Levels for Category 3 Lakes is also taken into consideration. Although Big Gant Lake is a Category 1 Lake, Category 3 Lake significant change standards were developed for comparative purposes but were not used for Minimum Levels development (Table 3).

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 Historic data are available, the Dock-Use Standard would be established at **77.4 feet above NGVD** by adding 2 feet and the difference between the Historic P50 and Historic P90 (2.3 feet), to the elevation of sediments at the end of 90 percent of the 10 docks (73.1 feet above NGVD) (Table 5).

Table 5. Summary statistics for elevations associated with docks in Big Gant Lake. Percentiles (P10 and P90) represent elevations exceeded by 10 and 90 percent of the docks.

Statistics	Elevation of Sediments at Waterward End of Docks (feet above NGVD)	Elevation of Dock Platform (feet above NGVD)
N	10	10
Mean (SD)	72.4 (0.8)	78.8 (1.1)
P10	73.1	80.0
P90	71.7	77.4
Maximum	74.1	80.9
Minimum	71.1	77.4

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 Big Gant Lake, the Species Richness Standard would be established at **74.8 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 would be established at the Low Guidance Level, which is **73.4 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 would be established at **69.3 feet above NGVD**, the elevation at which the dynamic ratio shifts across the 0.8 threshold (Figure 6).

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 Big Gant Lake does not contain sub-basins, **the Basin Connectivity Standard would not be applicable.**

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 would be established at 78.3 feet above NGVD based on the sum of the ski elevation (76.0 feet above NGVD) and the difference between the Historic P50 and the Historic P90 (2.3 feet). However, because the Recreation/Ski Standard elevation is 1.2 feet above the highest surface water elevation recorded for Big Gant Lake, **use of this standard for Minimum Levels development would not be appropriate.**

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 significant increase or decrease in the area of wetland vegetation within the lake basin with use of the appropriate significant change standards for Minimum Levels development (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 limited, it is not possible to determine the depth and potential area of submersed aquatic plants for Big Gant Lake.

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 1 Lakes is established 1.8 feet below the Normal Pool elevation. For Big Gant Lake, the Minimum Lake Level was established at **74.9 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 Lake Level for Category 1 Lakes is established 0.4 feet below the Normal Pool elevation. For Big Gant Lake, the High Minimum Lake Level was established at **76.3 feet above NGVD** (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 Big Gant Lake basin were determined to evaluate the potential for flooding when the lake surface is at the High Minimum Lake Level. Based on review of available one-foot contour interval aerial maps for the region and field survey data collected in September 2005, the High Minimum Lake Level is 4.5 feet below the floor of the lowest residential home, 4.0 feet below the porch of lowest residential home, 1.9 feet below the finished floor of a garage, 1.8 feet below the lowest spot on C. R. 783, 4.5 feet below the finished floor of a picnic shelter at Gant Canal Access Park, 1.9 feet below the top of the public boat ramp at Gant Canal Access Park, and 2.8 feet above the bottom of the public boat ramp (Table 8).

Table 8. Elevations of selected features in the Big Gant Lake basin.

Lake Basin Features	Elevation (feet above NGVD)
Mobile home floor	80.78
Mobile home porch floor	80.31
Garage finished floor	78.17
C. R. 783	78.08
Picnic shelter	80.81
Top of public boat ramp	78.21
Bottom of public boat ramp	73.49

Figure 4. Surface water elevations for Big Gant Lake from the District's Water Management Data Base from September 1970 through December 2005.

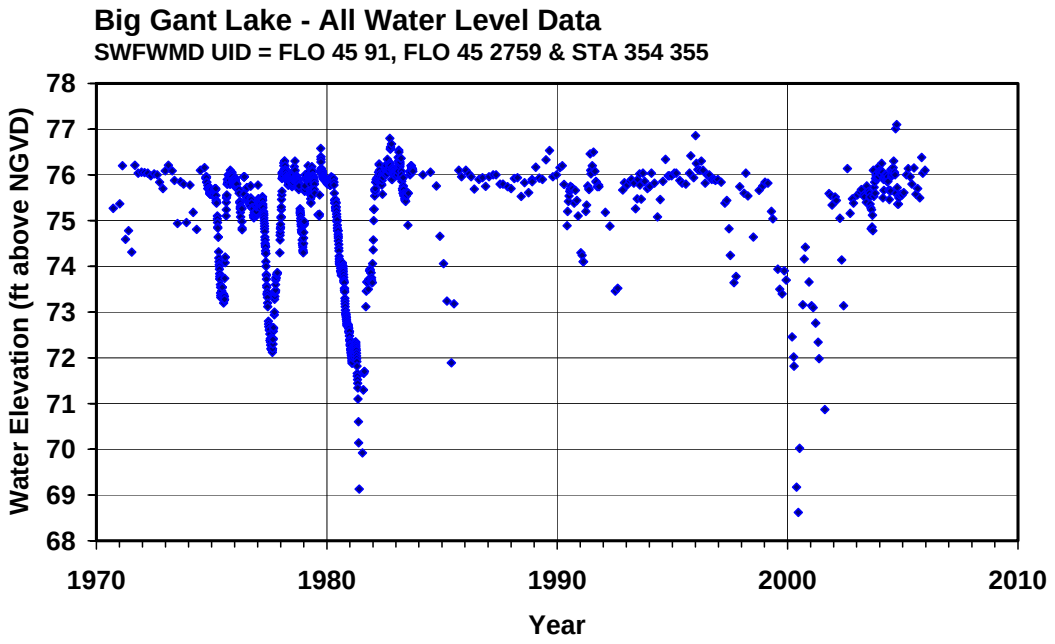


Figure 5. Monthly-mean surface water elevations for Big Gant Lake from September 1970 through December 2005, and Guidance and Minimum Levels. Levels include the Ten-Year Flood Guidance Level (10-YR), High Guidance Level (HGL), Low Guidance Level (LGL), High Minimum Lake Level (HMLL), and Minimum Lake Level (MLL).

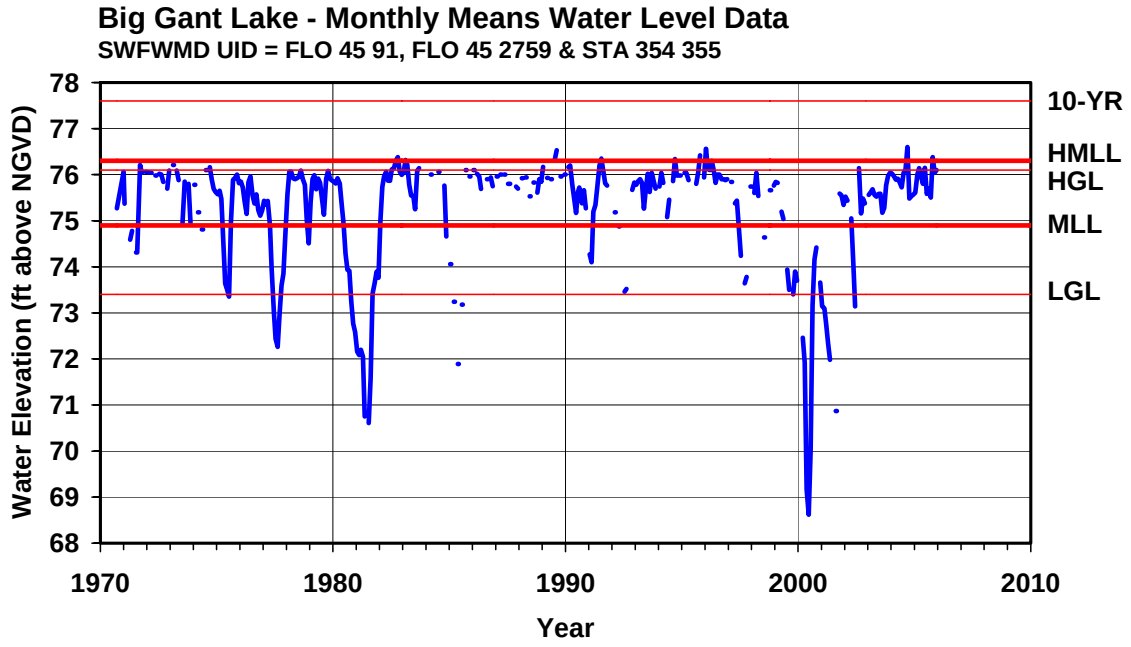


Figure 6. Surface area, maximum depth, mean depth, volume, dynamic ratio (basin slope), and potential herbaceous wetland area versus lake stage for Big Gant Lake.

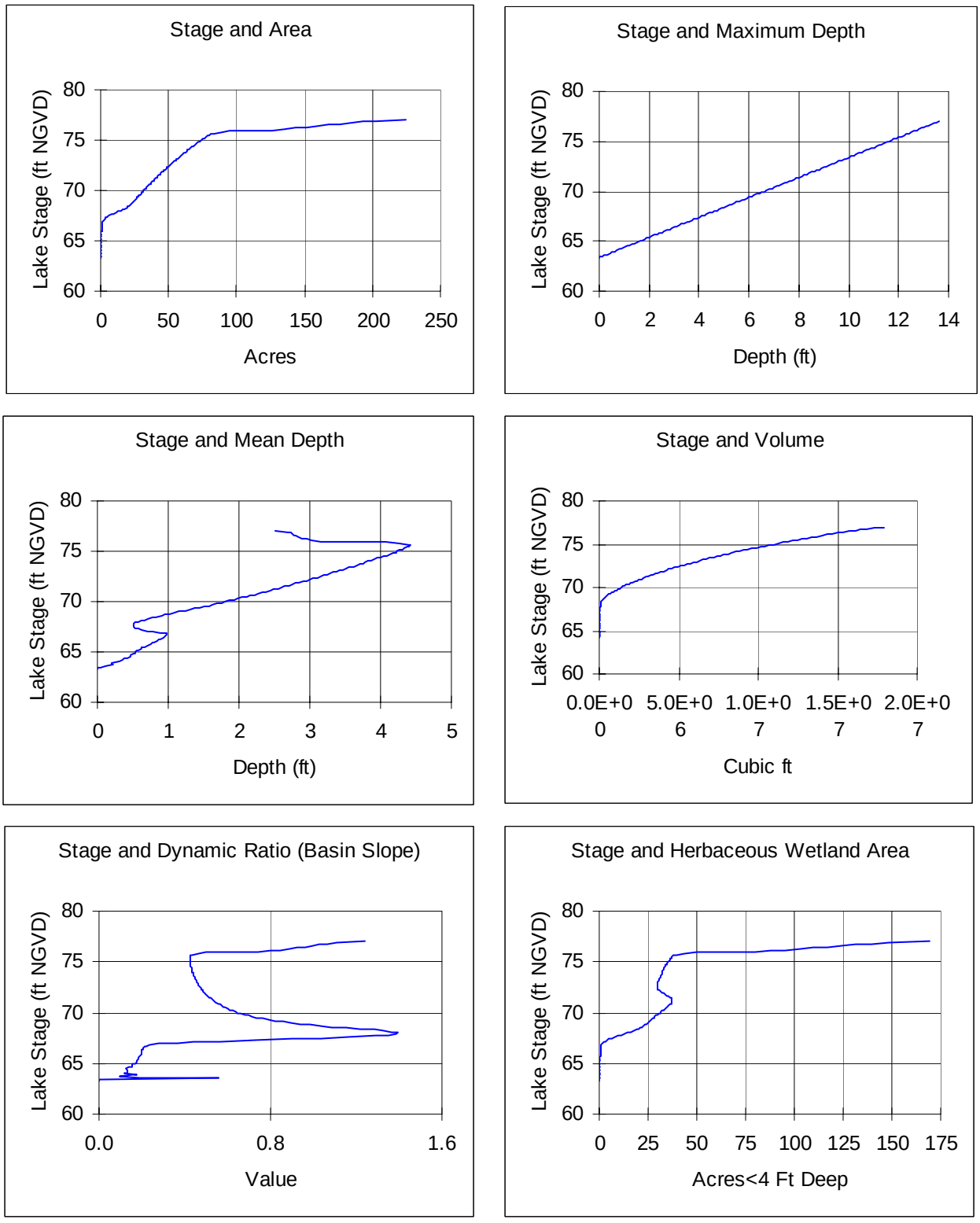
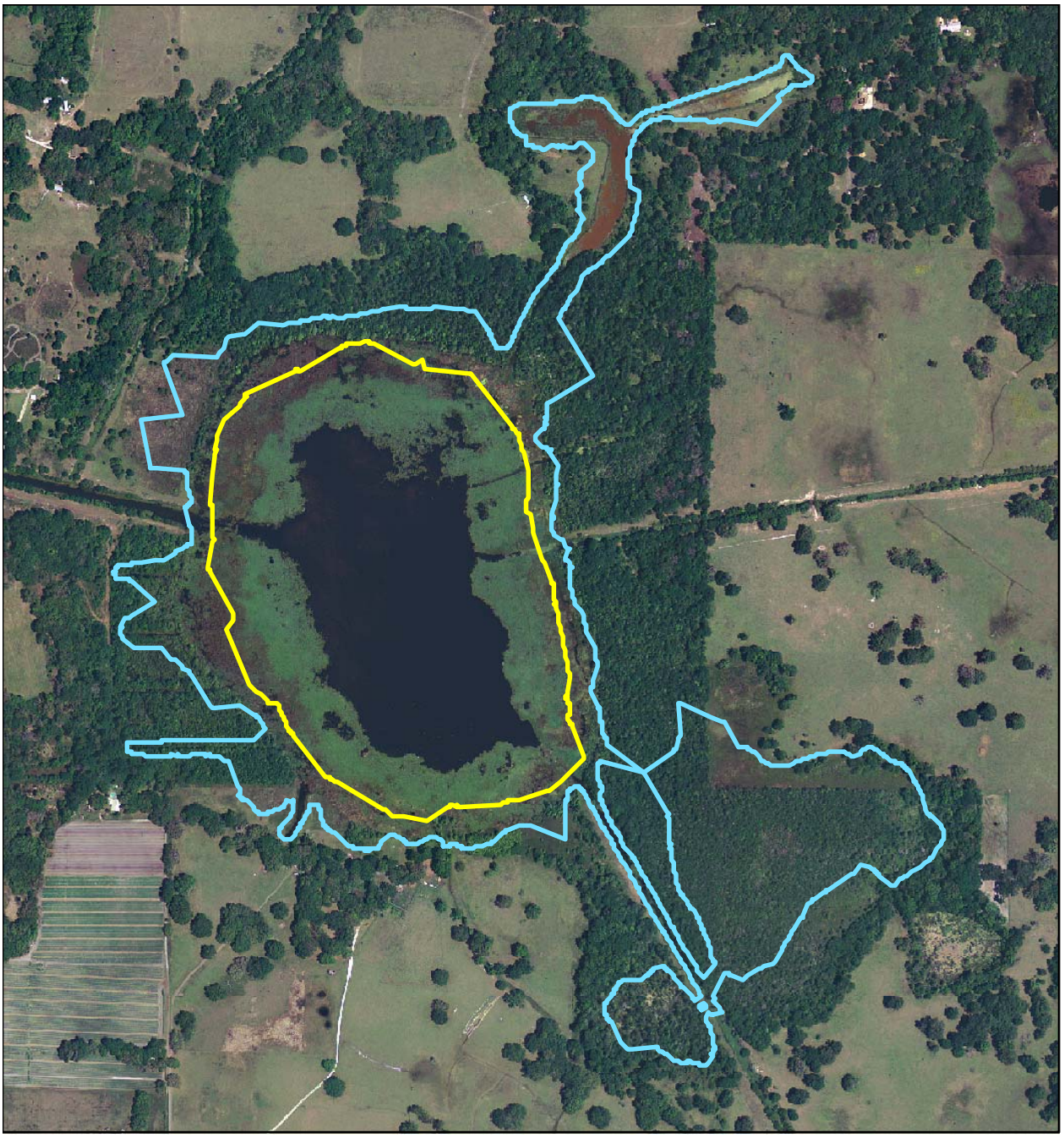


Figure 7. Approximate location of the Minimum Lake Level (MLL) and High Minimum Lake Level (HMLL) for Big Gant Lake.



Legend

Big Gant Minimum Levels

74.9 feet above NGVD = MLL

76.3 feet above NGVD = HMLL

N

W E

S

Map prepared using 2004 true color digital orthophotography, elevation data from 1988 SWFWMD aerial photography with contours maps (Secs. 11, 14, and 15, Twp. 22 E, Rge. 22 S), and elevation data collected by D.C. Johnson and Associates, Inc.

Feet

0 250 500 1,000

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