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OPEN-FILE REPORT 94

Text to accompany geologic map of the western portion of the USGS Ocala 30 x 60 minute quadrangle, north-central Florida

By

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Text to accompany geologic map of the western portion of the USGS Ocala 30 x 60 minute quadrangle, north-central Florida

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ABSTRACT

The accompanying 1:100,000 scale geologic map (Open-File Map Series 101, Plate 1) depicts the areal distribution of bedrock and surficial geologic units for the western portion of the USGS Ocala 30 x 60 minute quadrangle. The map was constructed using a combination of field mapping (at 1:24,000 scale), compilation of data from existing maps (various scales), core and cuttings analyses and descriptions, and analyses of various Geographic Information System (GIS) data sources. The resulting data were compiled in ESRI® ArcGIS® ArcMap™ 9.3.1 software for publication as part of the Florida Geological Survey Open-File Map Series. Mapped units range in age from Middle Eocene to Quaternary. Important resources in the mapped area include groundwater, springs, sand, clay and limestone. Numerous springs, one identified swallet (sinking stream), and other karst features are present in the study area. Understanding of geologic units, karst, springs and their interactions within the area aids land planners, environmental professionals, and citizens in making land-use decisions. Examples include designing new construction projects, siting new water supply wells and energy production facilities, siting waste management and storage facilities, locating sources of mineable resources for aggregate supply, and protection of springs, surface and groundwater quality.

Keywords: Florida, geologic map, Hawthorn Group, Ocala Limestone, Avon Park Formation, geomorphology, hydrogeology, springs, swallets, sinkholes, Floridan aquifer system, Levy County, Citrus County, Marion County, Dixie County, Alachua County, Brooksville Ridge, Waccasassa Flats.

INTRODUCTION

The Florida Geological Survey (FGS) Open-File Report (OFR) 94 accompanies Open-File Map Series (OFMS) 101, which is comprised of three plates. Plate 1 depicts the near-surface geology of the western half of the USGS Ocala 30 x 60 minute quadrangle (U.S. Geological Survey, 1978) on a digital elevation model (DEM). Plate 2 depicts eight geologic cross-sections, a stratigraphic correlation chart, and representative photos for several of the lithologic units in the study area. Plate 3 is a geomorphology map on a DEM, showing locations of known springs, sinkholes and swallets, along with photographs of selected exposures within the study area.

The study area lies southwest of Gainesville, Florida and includes the communities of Chiefland, Bronson, Otter Creek, Gulf Hammock, Ellzey, Rosewood, Yankeetown, Crackertown and Inglis. It includes portions of Levy, Citrus, Marion, Dixie and Alachua Counties (Figure 1). It lies due south of the western portion of the USGS Gainesville 30 x 60 minute quadrangle, which was previously mapped under the STATEMAP program (Evans et al., 2004). Three regionally important rivers, the Withlacoochee, the Waccasassa and the Suwannee, occur in the

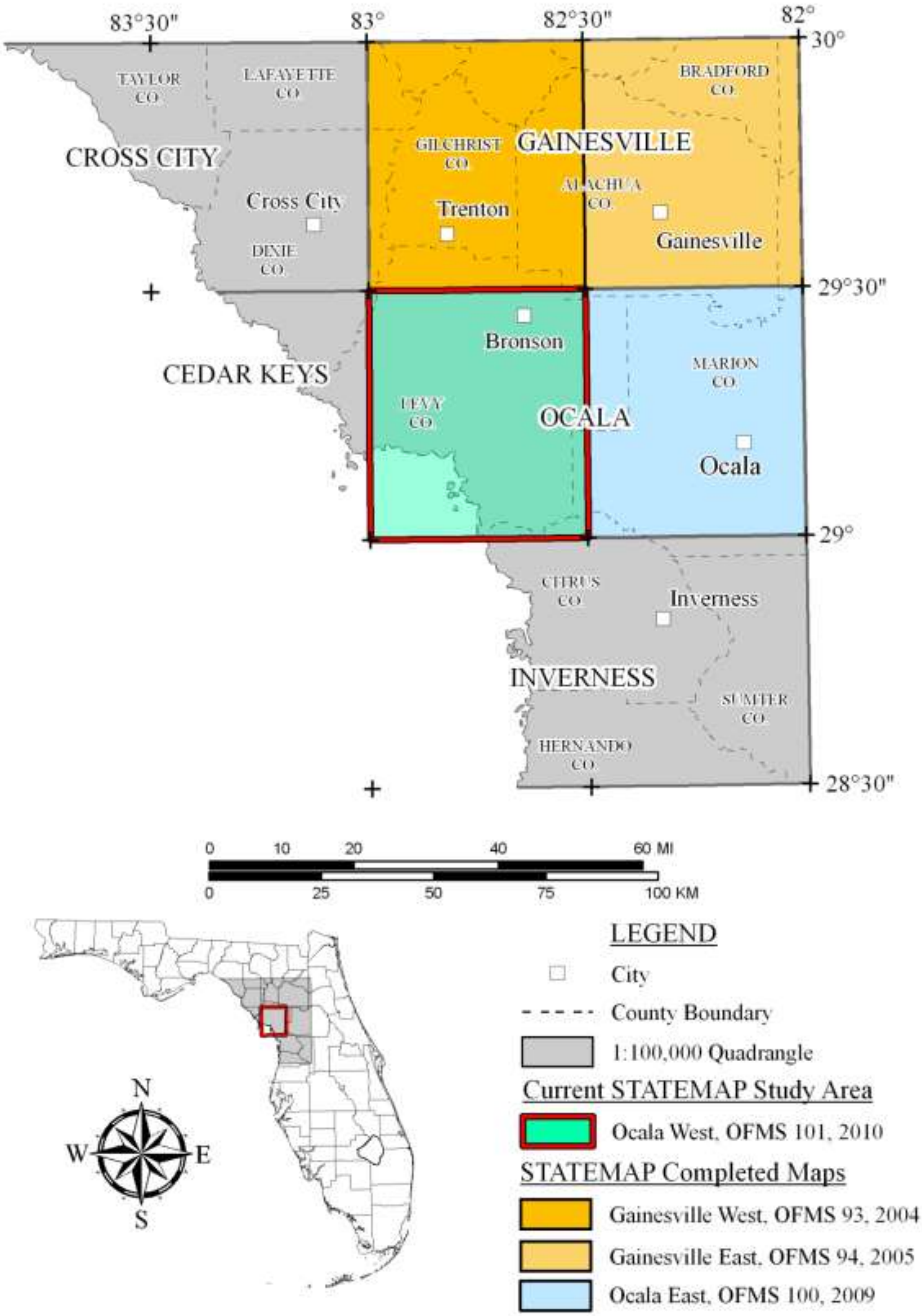

Figure 1. Nearby areas mapped under the FGS STATEMAP Program.

map area. Much of the area provides recharge to the Floridan aquifer system, the primary source of springs and drinking water in the region.

One objective for this report is to provide basic geologic information for the accompanying OFMS 101 geologic map, cross sections, and geomorphology plate. Information provided by this report and the plates in OFMS 101 reaches a diverse audience comprising professionals in geology, hydrology, engineering, environmental and urban planning, and laypersons, all of whom have varying levels of geologic knowledge. The map can help users identify and interpret geologic features which impact activities related to groundwater quality and quantity, location of mineral resources, land-use planning and construction project design. Applied uses of the maps and data in this report include: 1) identifying potential new mineral resources, 2) characterizing zones of potential aquifer recharge and confinement, 3) aiding water-management decisions on groundwater flow and usage, 4) providing information on aquifer vulnerability to potential pollution, 5) ecosystem, wetlands, and environmental characterization and 6) recreational uses.

Methods

Mapping efforts consisted of: 1) reviewing and compiling existing geologic literature and data, 2) mapping geologic units in the field at 1:24,000 scale using standard techniques, 3) analyses of existing core and cuttings samples, 4) new core drilling, 5) collecting and describing outcrop samples and 6) preparing a geologic map, geological cross-sections and geomorphic map of the area. Field work, performed during the fall of 2009 through the summer of 2010, consisted of sampling and describing numerous outcrops, and river and quarry exposures. One hundred eighty new samples of geologic material were added to the FGS surface-sample archives (M-Series) and seven cores (948 ft total) were drilled. An additional 86 archived M-Series samples and over 200 outcrops and exposures were also examined during this project. All data, including over 200 wells from the study area and bordering 7.5 minute quadrangles, were compiled and analyzed by the authors. Appendix A includes both FGS wells within the study area boundary, other than several in the Manatee Springs quadrangle that were not included due to map labeling density, and Water Management District well data points with top of limestone/dolostone rock information. An interpolated top of rock surface was developed using kriging along with the DEM to generate an overburden thickness model. The map and accompanying plates were developed in ESRI® ArcGIS® ArcMap™ 9.3.1 software for publication as part of the FGS OFMS.

Much of the study area is blanketed by a veneer of undifferentiated Tertiary and Quaternary sediments and soils. For this reason, and in keeping with geologic mapping practices developed by Scott et al. (2001), the authors have adopted the policy of mapping the first named geologic unit within 20 ft (6.1 m) of the surface. If undifferentiated Tertiary/Quaternary (TQu) or undifferentiated Quaternary (Qu) sediments attain a thickness greater than 20 ft (6.1 m), then they appear as the mapped unit. If these undifferentiated sediments are less than 20 ft (6.1 m) thick, then the underlying lithostratigraphic unit appears on the map.

The region is generally vegetated, and public access in parts of the mapped area is hindered by the presence of numerous farms, ranches and privately owned land. Much of the central portion of the study area is owned by Plum Creek Timber Company, Inc., and permission to access the area for drilling operations was denied by the company; therefore the authors had to rely on existing well and core data in this area. Fieldwork access was typically limited to public roads, State-owned lands, Levy County-owned lands, and Suwannee River Water Management District and Southwest Florida Water Management District-owned lands. The authors were also allowed reconnaissance access to Plum Creek Timber Company, Inc. lands.

Previous Work

The current study builds on many previous geologic investigations in and around the present map area which were useful in preparing this report. Preliminary county geologic maps for Alachua (Scott and Campbell, 1992), Citrus (Campbell and Scott, 1992), Dixie (Campbell, 1992a), Levy (Campbell, 1992b) and Marion (Scott, 1992) Counties at scales of 1:126,720 were previously published by the FGS. However, each of these OFMS geologic maps were constructed in an average time-frame of two weeks utilizing selected in-house geologic data with little-to-no extra field work. Although these maps provided a starting point for the detailed geologic mapping undertaken for this project, significant refinement of prior geologic maps was possible as a result of this project. A statewide geologic map (Scott et al., 2001) was published by the FGS in digital format and provided much of the base map material. A structure-contour map of the top of the Floridan aquifer system (Allison et al., 1995), and an isopach map of the Hawthorn Group in the region (Groszos and Rupert, 1992) also proved useful.

This study benefited greatly from the work performed during geologic mapping in the eastern portion of the USGS Gainesville 30 x 60 minute quadrangle (Green et al., 2005), the western portion of the USGS Gainesville 30 x 60 minute quadrangle (Evans et al., 2004) and builds upon the work of Green et al., (2009a; 2009b) for the eastern portion of the USGS Ocala 30 x 60 minute quadrangle (Figure 1). Many of the field relationships and stratigraphic problems were worked out during those projects and data gathered during those projects proved invaluable to the completion of this project.

GEOLOGIC SUMMARY

The near surface geology of the western portion of the USGS 30 x 60 minute Ocala quadrangle is composed of a complex mixture of Middle Eocene to Quaternary carbonate and siliciclastic sediments. A combination of factors, including fluvio-deltaic deposition, marine deposition, dissolution of underlying carbonates, erosion of sediments as a result of eustatic changes in sea level and structural features, have influenced the geology of the study area.

Distinction between the Middle Eocene Avon Park Formation and the unconformably overlying unit, the Upper Eocene Ocala Limestone, is at times difficult in the study area. Dolomitization of the Avon Park Formation and common recrystallization of the lowermost Ocala Limestone has significantly altered the original rock lithology and fabric. Fossil indicators are only somewhat helpful because the latest deposits of the Avon Park Formation and the earliest deposits of the Ocala Limestone are both bank assemblages, consistent with deposition in a shallow-water limestone bank or plateau, not unlike the present day Bahama Bank (Bryan, 2004). Karst development on the surface of the Avon Park Formation and later the Ocala Limestone, in addition to regional erosion over the Ocala Platform, has left an undulatory contact that does not allow clear definition of regional outcrops based upon elevation. A modern analog is evident along the Waccasassa Bay and Withlacoochee Bay shorelines where modern islands of Ocala Limestone with elevations rarely more than 5 ft (1.5 m) above MSL exist in shallow flats where water depths are typically less than 3 ft (0.9 m) (OFMS 101; Plate 3, Photos 1 and 3).

Much of the western portion of the Ocala quadrangle is located within the Waccasassa River basin with parts in the Lower Suwannee River, Oklawaha River, Crystal River to St. Petersburg and Withlacoochee River South basins (Figure 2). Within the study area, these rivers and their tributaries contain several documented springs including one first magnitude spring, Manatee Spring (Scott et al., 2004). A first magnitude spring is defined as having a minimum average flow of 100 cubic feet per second, or 64.6 million gallons per day (Copeland, 2003). Many of these springs have shown significant increases in pollutants in the last few decades, particularly nitrate (Phelps, 1994; Phelps, 2004; Jones et al., 1996; Scott et al., 2002; Upchurch et al., 2004). Detailed geologic mapping of lithostratigraphic units in this area provides critical data needed for future assessments of the vulnerability of the aquifer systems and springs to contamination. The recharge areas for many springs are located within and nearby the current study area. Understanding the surficial geology of the map area is a key factor in developing management and protection plans, not only for the springs, but for the unconfined portions of the Floridan aquifer system.

Structure

Several structural variables have affected the geology of the region (Figure 3). The Peninsular Arch, a structurally high area which affected deposition from the Cretaceous to the early Cenozoic, is the dominant subsurface feature of the Florida peninsula (Applin and Applin, 1944; Applin, 1951; Puri and Vernon, 1964; Williams et al., 1977; Schmidt, 1984; Miller, 1986; Scott, 1997). The axis of the Peninsular Arch, which lies primarily to the east of the study area, extends from southeastern Georgia to the vicinity of Lake Okeechobee in southern Florida in a general northwest to southeast trend. The crest of the arch passes beneath Alachua County northeast of the study area and is highest in Union and Baker Counties north of the study area. The arch was a topographic high during most of the Cretaceous Period and had Upper Cretaceous sediments deposited upon it (Applin, 1951). It formed a relatively stable base for Eocene carbonate deposition (Williams et al., 1977). The arch did not affect mid-Tertiary to Holocene sediment deposition (Williams et al., 1977; Scott, 1997).

The Ocala Platform is the most prominent structure affecting the near surface depositional and post-depositional environments within the map area. Hopkins (1920) originally named this feature the Ocala Uplift. Vernon (1951) described the Ocala Uplift as a gentle flexure developed in Tertiary sediments with a northwest-southeast trending crest. Because there is continuing uncertainty about the origin of this feature, Scott (1988) used the term Ocala Platform, rather than Ocala Uplift or Ocala Arch, since it does not have a structural connotation.

The Ocala Platform, which underlies the current study area, influenced late Tertiary sediment deposition. Miocene sediments of the Hawthorn Group are thought to have been deposited across the platform (Scott, 1981a; Scott, 1988; Scott, 1991a). Post-Miocene erosion has removed sediments of the Hawthorn Group from much of the crest of the Ocala Platform, exposing Eocene and Oligocene carbonates (Cooke, 1945; Espenshade and Spencer, 1963; Scott, 1981b). This is evident throughout much of the eastern portion of the map area (OFMS 101; Plate 1). Undifferentiated sediments, thickest over the eastern portion of the study area, have subsequently been deposited on the exposed Eocene carbonates within the map area. These consist of residual clays, sands, and aeolian sands deposited during the Pliocene to Holocene (Scott, 1997).

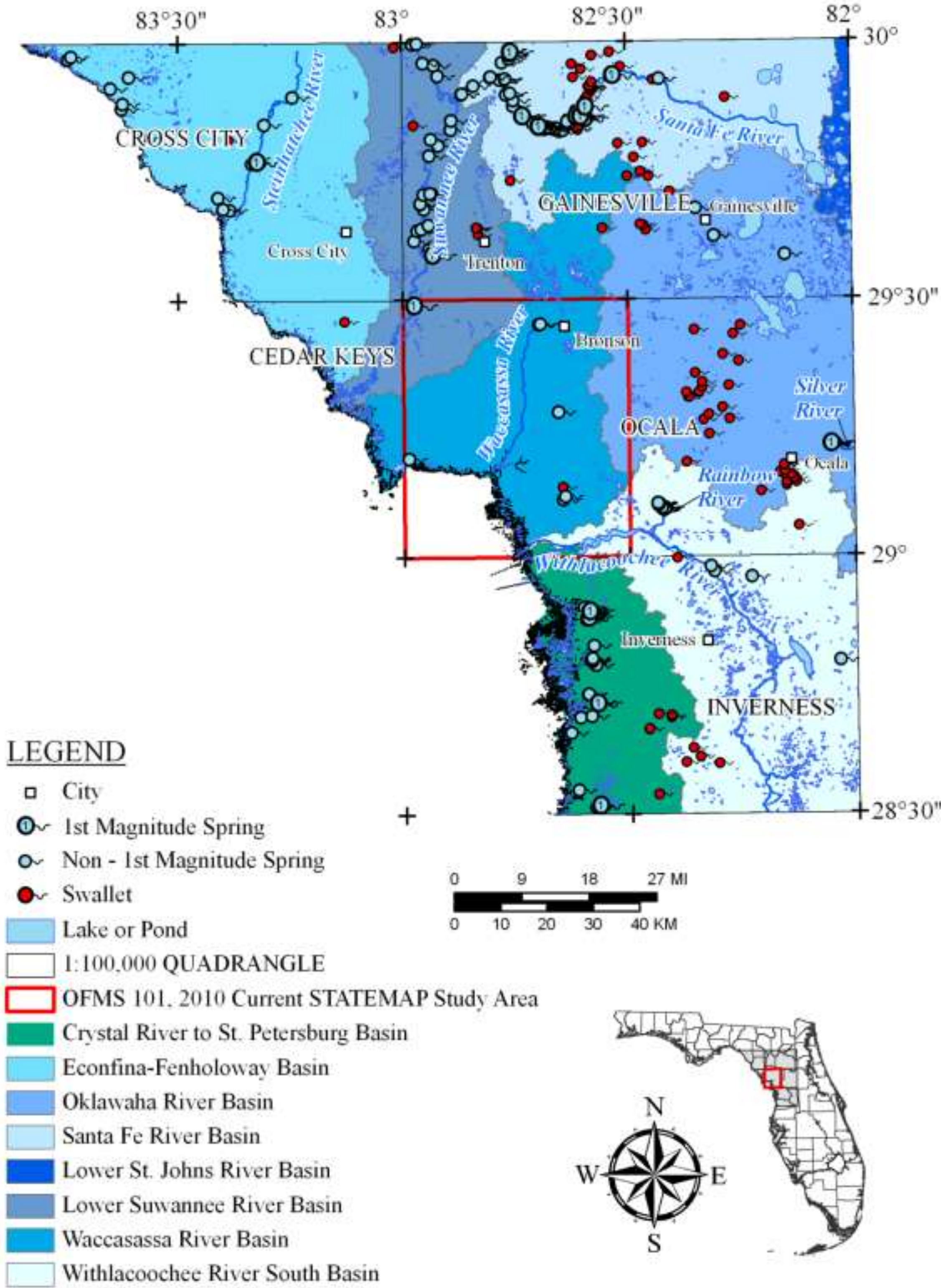

Figure 2. Location of selected river basins, springs, swallets, and other water bodies.

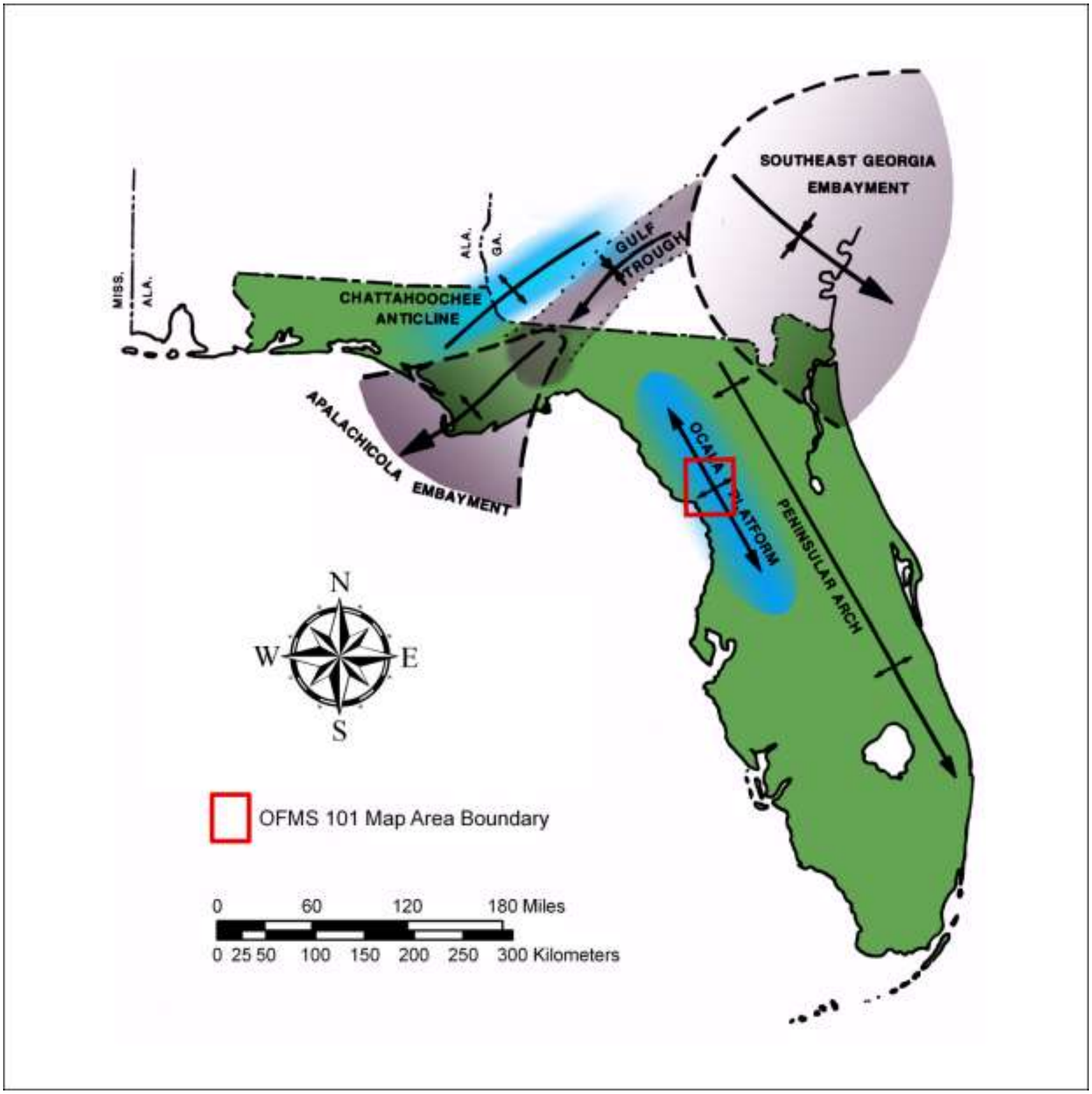

Figure 3. Principal subsurface structures of north Florida (modified from Puri and Vernon, 1964 and Schmidt, 1984).

Vernon (1951), utilizing aerial photographs, mapped fracture patterns throughout northern peninsular Florida. Regionally, these fractures generally trend parallel to the axis of the Ocala Platform in a northwest-southeast orientation. A secondary system of fractures intersects these primary fractures at high angles in a northeast-southwest trend (Vernon, 1951; see p. 47-52 for discussion of fractures). Orientation of stream meanders along portions of the Withlacoochee River suggests that these fracture patterns may be a controlling factor in stream location.

Vernon (1951) also discussed the occurrence of faults in part of the Florida peninsula. He attributed the origin of the faults to his postulated uplift of the Ocala Platform (his Ocala Uplift). Although he described the occurrence and surface-strike orientation of the faults, there was no discussion of the dip of the faults. Vernon did mention that his postulated faults were very steeply inclined. Vernon (1951) also mentioned seeing slickensides and grabens in quarries in the study area. Similar features have been observed by several of the authors of this publication while doing fieldwork in the region. It is believed that these are related to karst collapse and localized block movement within the karst feature, not to faulting as Vernon (1951) suggested. When a cover collapse sinkhole forms, large blocks may move downward along fractures created by the collapse and create localized slickensides which are not related to structural faulting. Additionally, numerous wells that Vernon (1951) used for cross-sections, which depicted faults in his report, were investigated for OFR 93 (Green et al., 2009b) and several were deemed to be karst features. For example, W-1198 (see Vernon, 1951; Figure 14), appears to be karst infill. Karst features in the study area are very common (OFMS 101; Plate 3, Photos 2 and 4).

A secondary critique of the faulting described by Vernon (1951) is the fact that many of the purported faults are actually offsets between biozonations within a formation, such as the Avon Park Formation, or between members of what Vernon (1951) called the Moodys Branch Formation (now Ocala Limestone; Puri, (1957), Scott, (1991b)). Through analysis and interpretation of hundreds of wells in the USGS Ocala 30 x 60 minute quadrangle, the present authors recognize that there is great variability in the Ocala Limestone and the Avon Park Formation that is in large part related to original environments of deposition. Therefore, any faulting inferred based upon differences within the Avon Park Formation and Ocala Limestone are more likely variations due to environmental facies, not that these formations have distinct, identical, horizontal beds that are continuous and contiguous throughout the entire formation. It has already been discussed that the unconformable contact of the Avon Park Formation and the Ocala Limestone is not a planar surface, but formed on a topographically variable karstified surface. Thus, adjacent localities where Ocala Limestone and Avon Park Formation are at the same elevation do not demand a structural solution.

Geomorphology

Several relict Neogene coastal terraces, which developed as a result of fluctuating sea levels, have been documented in the study area. Healy (1975) recognized six possible marine terraces within the study area (Figure 4) based upon elevation: the Silver Bluff terrace between 1 and 10 ft (0.3 and 3 m) above mean sea-level (MSL), the Pamlico terrace from 10 to 25 ft (3 to 7.6 m) above MSL, the Talbot terrace at elevations between 25 and 42 ft (7.6 and 12.8 m) above MSL, the Penholoway terrace at elevations between 42 and 70 ft (12.8 and 21.3 m) above MSL, the Wicomico terrace at elevations of 70 to 100 ft (21.3 to 30.5 m) above MSL and the Sunderland/Okefenokee terrace at elevations between 100 and 170 ft (30.5 and 51.8 m). Detailed discussions and correlations of these marine terraces and relict shorelines have been attempted by many authors, including Matson and Sanford (1913), Cooke (1931, 1939), Flint (1940, 1971), MacNeil (1950), Alt and Brooks (1965), Pirkle et al. (1970) and Healy (1975).

There are at least three relict shoreline features observed in eastern to southeastern Levy County, within the current study area, and they are visible on both Plate 1 and Plate 3, Figure 1 of OFMS 101. The westernmost of these features has a base elevation around 20 ft (6.1 m). The

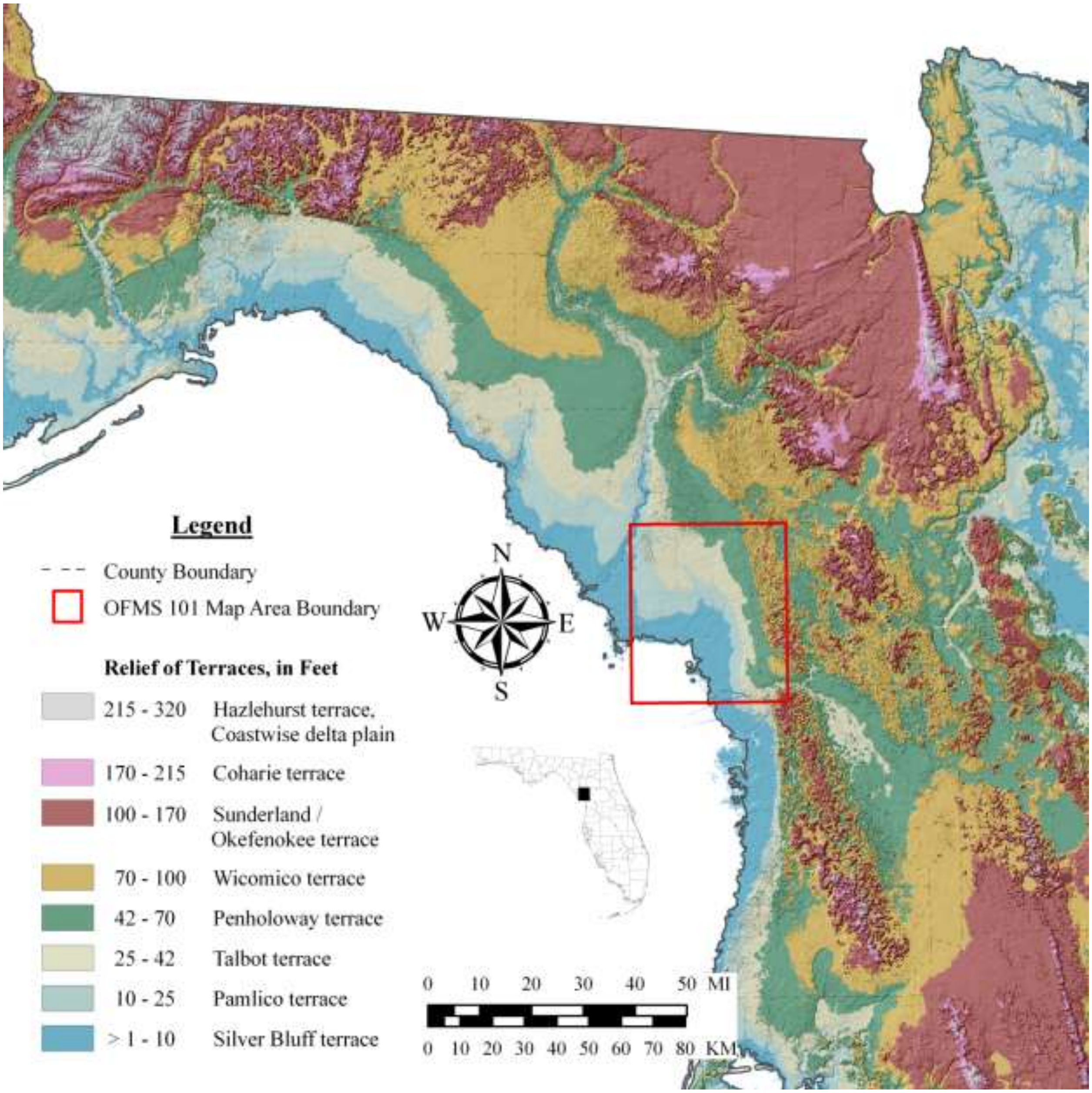

Figure 4. Terraces in Florida (after Healy, 1975).

elevations at the top of the ridge are predominantly 30-35 ft (9.1-10.7 m) with some highs up to 39 ft (11.9 m). This ridge may actually be two ridges as there is a zone of modified trellis drainage with directions of flow parallel to ridge orientation. Elevations to the east of this first relict shoreline decrease to about 35 ft (10.7 m) with some small, persistent swamps. Overall, the elevations then slowly rise to the east to about 45 ft (13.7 m) at the base of the second ridge feature. The second ridge only has dominant highs from 50-55 ft (15.2-16.8 m), but the topography to the east of the ridge returns to about 45 ft (13.7 m). There are several extensive swamps along this trace at the western toe of the Brooksville Ridge. These swamps include

Deerpen Pond, Big Wolf Arbor and Sand Slough, and according to White (1970) are interpreted to exist where lagoons once occurred between this ridge and the Brooksville Ridge. The western toe of the Brooksville Ridge also appears to be a relict shoreline with a base elevation of 50 ft (15.2 m). It has much more headward erosion than the smaller features to the west. Therefore, its western margin is more dissected by stream drainages. Elevations to the east rise rapidly to 75-100 ft (22.9-30.5 m).

Based upon the nomenclature of Healy (1975), the lowest, westernmost of the aforementioned ridges would relate to the Pamlico terrace due to its base elevation of 20 ft (6.1 m). The second ridge has a base elevation that correlates to the Penholoway. However, the terrace developed to the west of this ridge has elevations that vary from 35-45 ft (10.7-13.7 m). These elevations overlap between the Talbot and Penholoway terraces. White (1970) presumes this to be a Pamlico terrace and the ridge as a barrier island positioned between the Gulf of Mexico and the paleoshoreline of the Brooksville Ridge, but the timing seems unlikely given the terrace elevations. The terrace associated with the Brooksville Ridge is best related to the Penholoway, but the elevations of the Brooksville Ridge suggest that it may have formed at some earlier, higher sea level and the present terrace at the western toe is a later geomorphic event that modified the western flank of the ridge. White (1970) inferred by its elevation that the Brooksville Ridge must be related to the Wicomico with sea level over 100 ft (30.5 m) above MSL. However, White (1970) also noted that the Brooksville Ridge has “suffered so much differential subsidence from solution of underlying limestone that it is difficult to correlate.” Isostatic rebound initiated by carbonate dissolution further complicates tracing elevationally delineated features in Florida (Adams et al., 2010).

According to Scott et al. (in preparation), the study area is entirely within the Ocala Karst District (OFMS 101; Plate 3, Figure 2). Within the map area, the Ocala Karst District has been further subdivided topographically into five regional physiographic provinces: the Brooksville Ridge, the Chiefland Karst Plain, the Crystal River Karst Plain, Waccasassa Flats and the Williston Karst Plain.

Ocala Karst District

The Ocala Karst District encompasses a broad area from central Wakulla County in the panhandle of Florida, south to Hillsborough and Pinellas Counties in the west-central peninsula and inland to nearly the center of the peninsula (OFMS 101; Plate 3, Figures 2 and 3). Elevations within the district range from sea level along the Gulf of Mexico coast to a maximum of 300 ft (91.4 m) above mean sea level (MSL) on the Brooksville Ridge. Within the study area, elevations range from sea level at the coastline to 181 ft (55.1 m) above MSL in the southeast portion of the map area at the northern end of the southern part of the Brooksville Ridge in Citrus County.

Carbonate sediments of the Middle Eocene Avon Park Formation and the Upper Eocene Ocala Limestone lie at or near the land surface in this district within the study area. The Ocala Karst District is dominated by dissolution sinkholes and shallow bowl-shaped depressions, producing a rolling topography. Generally, a variably permeable siliciclastic cover allows downward percolating groundwater to slowly dissolve the underlying limestone, leading to cover-collapse sinkholes and cover-subsidence features (Sinclair and Stewart, 1985). Cover-collapse sinkholes form rather abruptly from the structural failure of an underlying cavern roof. An excellent example of this is at Devil’s Millhopper Geological State Park, located in Alachua County northeast of the present study area (Evans et al., 2004).

Cover subsidence features generally occur in areas where sediments sag as carbonates dissolve underneath. Typically, areas such as these have shallow sinks formed by the downward movement of the siliciclastic overburden filling voids created by slow dissolution of underlying carbonates or by slow dissolution of the carbonate surface. Springs, sinking (swallets) and resurgent streams, and caverns commonly occur within the Ocala Karst District.

Brooksville Ridge

The Brooksville Ridge, described by White (1970) as "the most massive of the ridges which rise above the general level of the Central Upland", stands out in stark contrast to the surrounding karst plains. The Brooksville Ridge encompasses most of the eastern portion of the study area (OFMS 101; Plate 3, Figures 1 and 3). It is separated into two sections (northern and southern) by the Withlacoochee River, which forms the boundary between Marion and Citrus Counties. The northern portion of the Brooksville Ridge begins in Gilchrist and Alachua Counties and terminates in Levy and Marion Counties. The southern portion extends from Citrus County southward into Pasco County.

The two sections of the ridge differ in elevation, length to width ratio and underlying geology. Elevations in the northern, narrower portion of the Brooksville Ridge range from approximately 50 ft (15.2 m) to greater than 150 ft (45.7 m) above MSL. Elevations in some sinkholes are less than 50 ft (15.2 m) above MSL. The southern, broader part of the ridge ranges in elevation from approximately 50 ft (15.2 m) to more than 300 ft (91 m) above MSL. In a few sinkholes, elevations of approximately 10 ft (3 m) above MSL occur. Within the study area, elevations in this province range from 44 ft (13.5 m) to 181 ft (55.1 m).

The topography of the Brooksville Ridge displays significant variability. The northern section has low, rolling karst hills interspersed with moderately shallow sinkholes. The southern portion of the ridge becomes progressively hillier and terrain relief increases from north to south. White (1970) describes the southern ridge area as having "the most irregular surface to be found in any area of comparable size in peninsular Florida." From the vicinity of Brooksville southward, the hills are higher and more closely spaced. North of Brooksville, the hills are more widely spaced and generally have lower elevations, an indication of more mature karst. The Brooksville Ridge is well drained with wet conditions existing only in the low lying karst features. There are no springs found on the ridge.

The Upper Eocene Ocala Limestone underlies the northern portion of the Brooksville Ridge. Weathered Miocene Hawthorn Group sediments lie unconformably on the Ocala Limestone with undifferentiated Quaternary and/or Tertiary (Qu and TQu) siliciclastics mantling the ridge. The southern portion of the Brooksville Ridge (which lies predominantly south-southeast of the mapped area) is more complex geologically than the northern section. The southern section of the Brooksville Ridge is only present in a small portion of the southeast corner of the mapped area (OFMS 101; Plate 3, Figures 1 and 3). The province is underlain by carbonates of the Middle Eocene Avon Park Formation and the Upper Eocene Ocala Limestone which are overlain by variable thicknesses of weathered Miocene undifferentiated Hawthorn Group (Th) sediments and undifferentiated Tertiary-Quaternary siliciclastics (TQu), Quaternary siliciclastics (Qu) or relict dunes of the Quaternary Beach Ridge and Dune (Qbd).

Chiefland Karst Plain

The Chiefland Karst Plain lies to the east of the southern portion of the Perry Karst-San Pedro Bay geomorphic province, south of the Branford Karst Plain and west of the northern extension of the Brooksville Ridge. It occurs from northern Gilchrist County to southern Levy County and is the predominant geomorphic province of the mapped area (OFMS 101; Plate 3, Figures 1 and 3). Elevation of the Chiefland Karst Plain in this area ranges from sea level at the Gulf of Mexico coastline to 130 ft (39.6 m) above MSL.

This karst plain is more poorly drained than the Branford Karst Plain to the north (Evans et al., 2004). Many springs occur within this karst plain. The entire karst plain is underlain by either Upper Eocene Ocala Limestone or the Middle Eocene Avon Park Formation. Undifferentiated Quaternary siliciclastics overlie the karstified limestone in varying thicknesses.

Crystal River Karst Plain

The Crystal River Karst Plain occurs between the Gulf of Mexico coastline and the southern Brooksville Ridge in Citrus and Hernando Counties, south of the Withlacoochee River (OFMS 101; Plate 3, Figures 1 and 3). It is an area of low relief with mature karst features and most elevations ranging from sea level to 90 ft (27.4 m) above MSL. Within the mapped area, elevations range from sea level to 91 ft (27.7 m) above MSL. Karst features are usually shallow depressions. Springs are very common near the coast. The area is often well drained, becoming more poorly drained toward the coast. Sand dunes are common along the boundary with the Brooksville Ridge (OFMS 101; Plate 1).

The Upper Eocene Ocala Limestone and Middle Eocene Avon Park Formation underlie most of the karst plain, and there is commonly a thin layer of undifferentiated Hawthorn Group sediments on top of the Ocala Limestone in this part of the map area. Undifferentiated Tertiary and Quaternary siliciclastic sediments cover this karst plain in varying thicknesses.

Waccasassa Flats

The Waccasassa Flats province, north-northwest of Bronson, contains a mixed ecosystem of sand hills, pine flatwoods, small lakes, wetlands and cypress ponds (Col et al., 1997). It is characterized by flat to gently rolling terrain. The province is poorly drained and extends from the Santa Fe River in northern Gilchrist County south throughout central Gilchrist County into northern Levy County (OFMS 101; Plate 3, Figure 1). Waccasassa Flats occurs in a small area along the northern boundary of the current study area. It lies immediately west of the Brooksville Ridge and gradually merges into the Chiefland Karst Plain to the south in northern Levy County. Elevations within the current mapped area range from 44 ft (13.3 m) to 76 ft (23.2 m) above MSL.

The Upper Eocene Ocala Limestone underlies the Waccasassa Flats throughout its extent. A sequence of Miocene and younger, lower permeability sediments overlie the Ocala Limestone. Interpretations from Vernon (1951) suggest a fluvial origin with the Waccasassa Flats occupying an area that was abandoned via stream capture. Yon and Puri (1962) and Puri et al. (1967) proposed that the Waccasassa Flats formed during the Pleistocene in a low energy back barrier bay or lagoon environment. Aspects of both of these interpretations are likely true with the fluvial occurring before the coastal environment, but the timing of these events is uncertain and requires further investigation. The Waccasassa Flats are currently drained from the north by Cow Creek in Gilchrist County and to the south in Levy County by the Waccasassa River.

Williston Karst Plain

The Williston Karst Plain, located on the eastern flank of the Brooksville Ridge, extends eastward to the Hawthorne Lakes Region, the Fairfield Karst Hills and the Ocala Karst Hills and is underlain by the Upper Eocene Ocala Limestone (OFMS 101; Plate 3, Figures 1 and 3). It is covered with variable thicknesses of undifferentiated Quaternary sediments in the current study area (Scott et al., in preparation).

The Williston Karst Plain merges with the Branford Karst Plain and Chiefland Karst Plain north of the study area (OFMS 101; Plate 3, Figure 3). Within the mapped area, elevations of the province range from 49 ft (14.9 m) to 102 ft (31.1 m) above MSL. Much of the plain is well drained and a number of springs, including the Rainbow Springs Group, just east of the current study area, occur within this province.

LITHOSTRATIGRAPHIC UNITS

Tertiary System

Eocene Series

Avon Park Formation

The Middle Eocene Avon Park Formation (Tap), first described by Applin and Applin (1944), is the oldest unit investigated in the present study area. The unit consists of cream to light-brown to tan, poorly- to well indurated, variably fossiliferous limestone (grainstone to wackestone, with rare mudstone). The limestones are interbedded with tan to brown, very poorly- to well indurated, very fine to medium crystalline, fossiliferous (molds and casts), vuggy dolostones, and organics are often present. Fossils present in the unit include mollusks, foraminifera (*Spirolina* sp., *Lituonella floridana*, *Bolivina* sp., and *Dictyoconus americanus*), echinoids, algae and carbonized plant remains.

The Avon Park Formation both underlies the mapped area and is exposed in the central to south-central regions of the study area. The top of the Avon Park ranges from 98 ft (29.9 m) below MSL in W-12615 (OFMS 101; Plate 2, cross-sections A-A' and E-E') to 26 ft (7.9 m) above MSL at the top of W-9434. No wells utilized for cross-sections penetrated the entire thickness of the Avon Park Formation. In locations mapped as Avon Park Formation at the surface, it is possible to find outlier remnants of Upper Eocene Ocala Limestone (To) or shelly Pleistocene sediments (Qu). The Avon Park Formation forms part of the Floridan aquifer system (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986).

Ocala Limestone

The Upper Eocene Ocala Limestone (To), first described by Dall and Harris (1892), is a biogenic marine limestone comprised largely of foraminifera, mollusks, echinoids and bryozoans. Where present, the Ocala Limestone sits unconformably on the Avon Park

Formation. When the Ocala Limestone is absent, the Avon Park Formation may be in direct, unconformable contact with the overlying undifferentiated Quaternary sediments (Qu). The Ocala Limestone is recrystallized to varying degrees within the study area, making the contact between the two units difficult to discern. Based on lithologic differences, the Ocala Limestone can be informally subdivided into an upper and lower unit (Scott, 1991b). This subdivision, while often apparent in cores and quarries, is not readily apparent in cuttings. As a consequence of this, the geologic cross-sections do not break out the upper and lower Ocala Limestone.

The upper unit is typically a white to cream, fine- to coarse grained, poorly- to well indurated, moderately- to well sorted, very fossiliferous limestone (wackestone, packstone, and grainstone). Fossils commonly include foraminifera (*Lepidocyclina ocalana*), bryozoans, mollusks, and a rich diversity of echinoids. The lower unit is typically a white to cream, fine- to medium grained, poorly- to moderately indurated, moderately- to well sorted limestone (grainstone to packstone). Fossils include foraminifera (*Amphistegina pinarensis cosdensi*, *Nummulites* [*Camerina*] *vanderstoki*, *Nummulites* [*Operculinoides*] *ocalana*), bryozoans, algae, mollusks, echinoids, and crabs.

The top of the Ocala Limestone ranges from 56.2 ft (17.1 m) above MSL in W-19071 (OFMS 101; Plate 2, cross-sections A-A' and H-H') to 7 ft (2.1 m) below MSL in W-14689 (OFMS 101; Plate 2, cross-section C-C'). Most of the wells utilized for geologic cross sections penetrate the entire thickness of the Ocala Limestone. In these wells, the thickness of the Ocala Limestone ranges from less than 10 ft (3.1 m) in several wells on several cross-sections (OFMS 101; Plate 2) to 115 ft (35.1 m) in W-17583 (OFMS 101; Plate 2, cross-sections A-A' and F-F'). In areas near outcrops of the Avon Park Formation, the Ocala Limestone thins, and it is possible to find outlier rock outcrops of Avon Park Formation. The Ocala Limestone is generally thickest in the northwestern portion of the study area off the nose of the Ocala Platform. The Ocala Limestone forms part of the Floridan aquifer system (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986).

Miocene Series

Hawthorn Group

Sediments of the Miocene Hawthorn Group are thought to have been deposited over the Ocala Platform throughout the area, but post-Miocene erosion and karstification has removed sediments from the crest of the Ocala Platform, exposing the Eocene carbonates in the central and southern portion of the map area (Cooke, 1945; Espenshade and Spencer, 1963; Scott, 1981b). Fossils in the Hawthorn Group are sparse but may include vertebrate remains, corals, and mollusks. Williams et al. (1977) report that the most commonly found fossils are oysters and coral heads. Within the mapped area, the Hawthorn Group is composed of undifferentiated Hawthorn Group (Th) sediments, and was only observed in the subsurface in cores and cuttings.

Undifferentiated Hawthorn Group

Undifferentiated Hawthorn Group (Th) sediments are light olive gray and blue gray in unweathered sections and reddish brown in weathered sections. They consist of poorly to moderately consolidated, clayey sands to silty clays and relatively pure clays with little to no phosphate due to leaching and transport (Scott, 2001). These sediments are present in the subsurface of the northern Brooksville Ridge, and in the subsurface of the southeast portion of the map area (OFMS 101; Plate 1). They are often deeply weathered. In the Brooksville Ridge, undifferentiated Hawthorn Group sediments are often overlain by more than 20 ft (6.1 m) of undifferentiated Tertiary and Quaternary sediments (TQu) and/or Quaternary sediments (Qu). Hard-rock phosphate deposits are associated with the undifferentiated Hawthorn Group sediments in several places along the eastern flank of the Brooksville Ridge. These hard-rock phosphate deposits were formed by dissolution of phosphates from the Hawthorn Group and subsequent precipitation in karst features within the Ocala Limestone (Scott, 2001).

Where present, Hawthorn Group sediments unconformably overlie the Ocala Limestone (Scott, 1988). They are unconformably overlain by undifferentiated Quaternary sediments (Qu). Very thin beds of the undifferentiated Hawthorn Group were only penetrated in a few wells in the eastern portion of the map area. In these, the top of the Hawthorn Group ranges from 37 ft (11.3 m) above MSL in W-15682 (OFMS 101; Plate 2, cross-sections B-B' and H-H') to 32 ft (9.8 m) above MSL in W-19226 (OFMS 101; Plate 2, cross-sections C-C' and H-H'). The undifferentiated Hawthorn Group is only 10-20 ft (3.1-6.1 m) thick in each of these cores. These are maximum thicknesses for this unit and are not necessarily laterally continuous. Sediments are often clayey sands with some permeability, and only rarely consist of relatively pure clays. The undifferentiated Hawthorn Group sediments generally have low permeability and form part of the intermediate aquifer system/intermediate confining unit (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986).

Tertiary/Quaternary Systems

Pliocene Series

Undifferentiated Tertiary/Quaternary Sediments

Undifferentiated Tertiary/Quaternary sediments (TQu) are siliciclastics that are separated from the lithologically similar undifferentiated Quaternary sediments solely on the basis of elevation (Scott et al., 2001). Pleistocene sea levels reached a maximum of approximately 100 ft (30.5 m) above MSL (Colquhoun, 1969). The sediments which occur above 100 ft (30.5 m) MSL are predominately older than Pleistocene but may have been reworked during the Pleistocene. They are present along the southeastern edge of the map area in the Brooksville Ridge (OFMS 101; Plate 1) in areas where elevations exceed 100 ft (30.5 m). Some areas below 100 ft (30.5 m) may be included in the undifferentiated Tertiary/Quaternary sediments where not including them would have created very complex map polygons. These poorly consolidated to unconsolidated siliciclastics are white to gray to orange to blue-green, fine to coarse grained, clean to clayey unfossiliferous sands, sandy clays and clays with variable admixtures of clay and organics. Permeable sediments of the undifferentiated Tertiary/Quaternary sediments form part of the surficial aquifer system (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986).

Pleistocene Series

Undifferentiated Quaternary Sediments

Undifferentiated Quaternary sediments (Qu) lie unconformably on either the Avon Park Formation, the Ocala Limestone or on undifferentiated Hawthorn Group sediments. The Avon

Park Formation and the undifferentiated Quaternary sediments are only in direct contact where the Ocala Limestone has been completely removed from the section.

The undifferentiated Quaternary sediments present in the eastern portions of the mapped area are highly variable in thickness. Data from this project indicate that the surface of the Ocala Limestone in these areas is heavily karstified. Overlying sediments may range from 20 ft (6.1 m) to over 70 ft (21.3 m) thick in the Brooksville Ridge. Relief on the surface of the Ocala Limestone can easily exceed 30 ft (9.1 m) in karstic areas. Much of these undifferentiated sediments are derived from erosion and weathering of Hawthorn Group and younger units, and sinkholes may contain Hawthorn Group sediments (Scott, 1992). Field evidence also shows that pinnacles of Ocala Limestone and outliers of weathered Hawthorn Group sediments can occur in these areas. The western edge of the extent of mappable undifferentiated Quaternary sediments occurs in association with several relict shoreline ridges which are located to the west of the Brooksville Ridge and are previously discussed in the geomorphology section of this report.

Generally, these undifferentiated Quaternary sediments consist of white to gray to orange to blue-green, fine to coarse grained, clean to clayey unfossiliferous sands, sandy clays and clays with variable admixtures of organics. They are only separated from the undifferentiated Tertiary/Quaternary sediments due to current elevations below 100 ft (30.5 m). The undifferentiated Quaternary sediments form part of the surficial aquifer system (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986). Where these sediments lack clays and overlie the Eocene limestones, they are hydraulically connected to the Floridan aquifer system.

Shelly Pleistocene Sediments

Several thin and discontinuous deposits of shelly Pleistocene sediments (Qu) were encountered within the study area. Aerial extent of the unit did not meet criteria to be mappable. The majority of these were in the Lebanon Station and northern Yankeetown USGS 7.5 minute quadrangles. The samples consist of medium quartz sand with pelecypod shells cemented to form well-indurated, fossiliferous sandstone. The samples were often found in conjunction with the Upper Eocene Ocala Limestone and/or the Middle Eocene Avon Park Formation. At one locality, there were Ocala Limestone rip-up clasts in the sample (OFMS 101; Plate 3, Photo 5). These may correlate to the sediments referred to as the Pamlico Formation in Vernon (1951). Personal communication with Roger Portell with the Florida Museum of Natural History in Gainesville, Florida confirms that samples, other than those collected for the present study, of deposits of this nature have been found in the Waccasassa River basin. Based upon his and his students' studies of the biostratigraphy, these sediments are age equivalent to the Pleistocene Caloosahatchee Formation. This is the northernmost extent of these sediments found to date in Florida.

Quaternary Beach Ridge and Dune

The sediments of the Beach Ridge and Dune are a subdivision of the undifferentiated Quaternary sediments that are noted on the basis of surficial expression of beach ridges and dunes. These sediments typically unconformably overlie the Ocala Limestone, but may exist in contact with the Avon Park Formation where the Ocala Limestone has been removed from the section. Beach Ridge and Dune sediments occur in the southeastern part of the study area south of the Withlacoochee River in Citrus County on the western flank of the southern Brooksville Ridge. They are also present in eastern Levy County, as previously discussed, and along the western boundary of the study area in isolated regions between Cedar Key and Manatee Spring. However, both of these deposits are thin and/or do not cover a significant enough area to be mappable on OFMS 101; Plate 1. Subdivisions of the undifferentiated Quaternary Sediments are not formally recognized lithostratigraphic units, but are noted to facilitate a better understanding of Florida's Quaternary geology (Scott, 2001).

Beach Ridge and Dune sediments are dominantly siliciclastic sands and are unconsolidated to poorly consolidated. Organics typically occur as disseminated organic matrix, roots and plant debris, carbonized remains or charcoal. These sediments are considered part of the surficial aquifer system (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986).

HYDROGEOLOGY

The hydrogeology of the map area consists of (in ascending order) the Floridan aquifer system (FAS), the intermediate aquifer system/intermediate confining unit (IAS/ICU), and the surficial aquifer system (SAS) (Southeastern Geological Society Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986). The FAS, the primary source for springs and drinking water in the region, is generally comprised of carbonate units of the Avon Park Formation and the Ocala Limestone. The sands, silts, clays and carbonates of the Hawthorn Group comprise the IAS/ICU. The IAS/ICU is highly localized and laterally discontinuous in the study area. The SAS is comprised of the undifferentiated Tertiary/Quaternary sediments (TQu), the undifferentiated Quaternary sediments (Qu) and the Beach Ridge and Dune sediments (Qbd).

Where siliciclastic sediments of the Hawthorn Group and younger units are thick and continuous, they provide confinement for the FAS, but where the siliciclastic sediments of the Hawthorn Group and younger units are thin, missing or lack significant clay component, karst features often occur. Swallets (stream-to-sink features) are of particular concern to geoscientists and hydrogeologists. The only one documented in the study area is on Horse Hole Creek, north of Inglis. Overland flow is captured by the swallet thus allowing for direct recharge to the FAS by surface water which potentially consists of runoff from agricultural and urban areas (OFMS 101; Plate 3, Figure 1 and Photo 2).

DERIVATIVE PRODUCTS

Several derivative products will come from this project. During the mapping project, data from over 200 wells were analyzed (Appendix A includes those within the study area boundary, other than several in the Manatee Springs quadrangle that were not included due to map labeling density, and top of limestone rock information from Water Management District wells). Formation picks, made on all available wells with cores and cuttings samples, will allow for the creation of a structure contour map of the top of the Floridan aquifer system, along with the creation of structure contour and isopach maps of the intermediate confining unit in the area. Additional derivative data anticipated to come from this mapping effort include aquifer vulnerability assessment maps. Data derived from prior STATEMAP products have often been used to augment other Florida Geological Survey and Florida Aquifer Vulnerability Assessment (FAVA) projects in the State (Arthur et al., 2007; Baker et al., 2007).

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APPENDIX A: WELLS UTILIZED FOR STUDY

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
1	W-211	FGS	CUTTINGS	-82.647390	29.304200	BRONSON SW	40	70
2	W-212	FGS	CUTTINGS	-82.725890	29.253250	BRONSON SW	12	40
3	W-331	FGS	CUTTINGS	-82.750170	29.208090	WACCASASSA BAY	7	50
4	W-871	FGS	CUTTINGS	-82.706920	29.347280	BRONSON SW	35	679
5	W-1202	FGS	CUTTINGS	-82.561290	29.044750	YANKEETOWN SE	30	70
6	W-1241	FGS	CUTTINGS	-82.784330	29.180310	WACCASASSA BAY	5	16
7	W-1844	FGS	CUTTINGS	-82.860690	29.417250	CHIEFLAND	33	440
8	W-1848	FGS	CUTTINGS	-82.563510	29.007800	YANKEETOWN SE	42	1105
9	W-1849	FGS	CUTTINGS	-82.816950	29.299110	OTTER CREEK	21	670
10	W-7111	FGS	CORE	-82.814610	29.215310	WACCASASSA BAY	5	70
11	W-7114	FGS	CORE	-82.795160	29.214480	WACCASASSA BAY	5	61
12	W-7116	FGS	CORE	-82.803220	29.228370	WACCASASSA BAY	5	55
13	W-7421	FGS	CUTTINGS	-82.920820	29.304480	CHIEFLAND SW	25	75
14	W-7619	FGS	CORE	-82.852380	29.216980	WACCASASSA BAY	5	55
15	W-7896	FGS	CUTTINGS	-82.647950	29.066690	YANKEETOWN	40	37
16	W-7898	FGS	CUTTINGS	-82.619760	29.020020	YANKEETOWN SE	30	225
17	W-9436	FGS	CUTTINGS	-82.577400	29.104190	YANKEETOWN SE	52	570
18	W-9437	FGS	CUTTINGS	-82.644340	29.028910	YANKEETOWN	26	495
19	W-9438	FGS	CUTTINGS	-82.690560	29.220580	LEBANON STATION	17	455
20	W-9439	FGS	CUTTINGS	-82.627390	29.103640	YANKEETOWN	40	465
21	W-9441	FGS	CUTTINGS	-82.644340	29.163360	LEBANON STATION	24	547
22	W-9446	FGS	CUTTINGS	-82.732110	29.280310	BRONSON SW	16	400
23	W-9447	FGS	CUTTINGS	-82.863770	29.336150	OTTER CREEK	30	440
24	W-12582	FGS	CORE	-82.674430	29.026980	YANKEETOWN	13	88
25	W-12615	FGS	CORE	-82.975150	29.479490	MANATEE SPRINGS	14	496
26	W-12726	FGS	CUTTINGS	-82.593510	29.013910	YANKEETOWN SE	30	72
27	W-14519	FGS	CORE	-82.728230	29.027800	YANKEETOWN	9	255
28	W-14689	FGS	CUTTINGS	-82.996540	29.232810	SUMNER	8	46
29	W-15682	FGS	CORE	-82.557670	29.333360	BRONSON SE	72	354
30	W-17583	FGS	CUTTINGS	-82.848210	29.463090	CHIEFLAND	35	320
31	W-19067	FGS	CORE	-82.698350	29.451680	BRONSON	44	116
32	W-19069	FGS	CORE	-82.936220	29.237830	SUMNER	16	100
33	W-19071	FGS	CORE	-82.544167	29.445300	BRONSON NE	90	130
34	W-19206	FGS	CORE	-82.976389	29.392778	MANATEE SPRINGS	12	110.75
35	W-19215	FGS	CORE	-82.733055	29.396112	BRONSON	32	121
36	W-19226	FGS	CORE	-82.575647	29.271732	BRONSON SE	78	0
37	W-172	FGS	CUTTINGS	-82.528610	29.368600	BRONSON SE	90	124
38	W-209	FGS	CUTTINGS	-82.619620	29.006690	YANKEETOWN SE	26	70
39	W-210	FGS	CUTTINGS	-82.717120	29.029470	YANKEETOWN	12	54
40	W-214	FGS	CUTTINGS	-82.600180	29.332160	BRONSON SE	72	95
41	W-330	FGS	CUTTINGS	-82.728060	29.230900	LEBANON STATION	10	50
42	W-333	FGS	CUTTINGS	-82.717390	29.241420	LEBANON STATION	12	40
43	W-379	FGS	CUTTINGS	-82.734610	29.243920	LEBANON STATION	10	50
44	W-380	FGS	CUTTINGS	-82.738500	29.275870	BRONSON SW	17	40
45	W-501	FGS	CUTTINGS	-82.728180	29.248500	LEBANON STATION	9	373
46	W-664	FGS	CUTTINGS	-82.825510	29.296700	OTTER CREEK	20	20
47	W-866	FGS	CUTTINGS	-82.773110	29.320550	OTTER CREEK	28	102
48	W-1112	FGS	CUTTINGS	-82.534900	29.031410	YANKEETOWN SE	72	56
49	W-1201	FGS	CUTTINGS	-82.561290	29.044750	YANKEETOWN SE	30	70
50	W-1203	FGS	CUTTINGS	-82.594750	29.036080	YANKEETOWN SE	31	72
51	W-1204	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	29	69
52	W-1205	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	28	24
53	W-1206	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	31	33
54	W-1207	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	31	81
55	W-1209	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	29	24
56	W-1210	FGS	CUTTINGS	-82.609710	29.029720	YANKEETOWN SE	30	32
57	W-1211	FGS	CUTTINGS	-82.616840	29.022800	YANKEETOWN SE	31	101
58	W-1212	FGS	CUTTINGS	-82.625130	29.027690	YANKEETOWN	29	69

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
59	W-1213	FGS	CUTTINGS	-82.644620	29.011970	YANKEETOWN	10	50
60	W-1214	FGS	CUTTINGS	-82.657400	29.011410	YANKEETOWN	19	59
61	W-1215	FGS	CUTTINGS	-82.657670	29.011140	YANKEETOWN	18	59
62	W-1217	FGS	CUTTINGS	-82.675450	29.012250	YANKEETOWN	14	54
63	W-1218	FGS	CUTTINGS	-82.691246	29.006750	YANKEETOWN	11	51
64	W-1219	FGS	CUTTINGS	-82.705409	29.003142	YANKEETOWN	5	45
65	W-1240	FGS	CUTTINGS	-82.758500	29.004470	WITHLACOOCHEE BAY	2	21
66	W-1242	FGS	CUTTINGS	-82.878580	29.164720	SUMNER	2	12
67	W-1449	FGS	CUTTINGS	-82.707650	29.351520	BRONSON SW	34	380
68	W-1841	FGS	CUTTINGS	-82.551010	29.145030	TIDEWATER	81	600
69	W-1842	FGS	CUTTINGS	-82.507950	29.062800	YANKEETOWN SE	71	1140
70	W-1843	FGS	CUTTINGS	-82.757110	29.316420	OTTER CREEK	25	540
71	W-1846	FGS	CUTTINGS	-82.976540	29.338650	CHIEFLAND SW	15	419
72	W-1847	FGS	CUTTINGS	-82.551840	29.026140	YANKEETOWN SE	30	1198
73	W-1850	FGS	CUTTINGS	-82.793850	29.313170	OTTER CREEK	26	600
74	W-2009	FGS	CUTTINGS	-82.765870	29.320710	OTTER CREEK	26	205
75	W-2010	FGS	CUTTINGS	-82.732940	29.291420	BRONSON SW	17	2173
76	W-2237	FGS	CUTTINGS	-82.628220	29.438370	BRONSON	69	270
77	W-3052	FGS	CUTTINGS	-82.819600	29.408650	CHIEFLAND	37	78
78	W-3342	FGS	CUTTINGS	-82.746460	29.306450	BRONSON SW	26	3857
79	W-3556	FGS	CUTTINGS	-82.977930	29.488650	MANATEE SPRINGS	10	102
80	W-6383	FGS	CUTTINGS	-82.858210	29.494480	CHIEFLAND	29	310
81	W-7112	FGS	CORE	-82.792940	29.208640	WACCASASSA BAY	3	57
82	W-7113	FGS	CORE	-82.807660	29.201700	WACCASASSA BAY	4	57
83	W-7117	FGS	CORE	-82.790720	29.243090	WACCASASSA BAY	7	50
84	W-7118	FGS	CORE	-82.766280	29.239200	WACCASASSA BAY	5	50
85	W-7119	FGS	CORE	-82.763260	29.236520	WACCASASSA BAY	5	28
86	W-7620	FGS	CORE	-82.839050	29.216420	WACCASASSA BAY	5	55
87	W-7621	FGS	CORE	-82.822110	29.210030	WACCASASSA BAY	10	55
88	W-7622	FGS	CORE	-82.831550	29.203090	WACCASASSA BAY	6	60
89	W-7623	FGS	CORE	-82.844610	29.220870	WACCASASSA BAY	6	42
90	W-7624	FGS	CORE	-82.848470	29.217450	WACCASASSA BAY	8	55
91	W-7625	FGS	CORE	-82.843080	29.218260	WACCASASSA BAY	9	55
92	W-7626	FGS	CORE	-82.822280	29.213940	WACCASASSA BAY	10	55
93	W-7895	FGS	CUTTINGS	-82.536840	29.097250	YANKEETOWN SE	36	32
94	W-7897	FGS	CUTTINGS	-82.622120	29.026970	YANKEETOWN SE	32	64
95	W-7918	FGS	CUTTINGS	-82.611560	29.021410	YANKEETOWN SE	30	67
96	W-9424	FGS	CUTTINGS	-82.814050	29.292810	OTTER CREEK	21	670
97	W-9428	FGS	CUTTINGS	-82.544340	29.148640	TIDEWATER	78	600
98	W-9433	FGS	CUTTINGS	-82.797110	29.307260	OTTER CREEK	23	680
99	W-9434	FGS	CUTTINGS	-82.644060	29.103920	YANKEETOWN	26	1235
100	W-9440	FGS	CUTTINGS	-82.610450	29.089190	YANKEETOWN SE	49	475
101	W-9443	FGS	CUTTINGS	-82.979880	29.336150	CHIEFLAND SW	14	410
102	W-9444	FGS	CUTTINGS	-82.764050	29.234200	WACCASASSA BAY	14	380
103	W-9445	FGS	CUTTINGS	-82.610170	29.060030	YANKEETOWN SE	46	420
104	W-9465	FGS	CUTTINGS	-82.510450	29.060580	YANKEETOWN SE	62	1125
105	W-10850	FGS	CUTTINGS	-82.565450	29.326420	BRONSON SE	83	198
106	W-12583	FGS	CORE	-82.674430	29.026980	YANKEETOWN	13	12
107	W-13188	FGS	CUTTINGS	-82.958490	29.494760	MANATEE SPRINGS	23	80
108	W-13374	FGS	CUTTINGS	-82.880440	29.380310	MANATEE SPRINGS	30	50
109	W-13886	FGS	CORE	-82.690170	29.040860	YANKEETOWN	10	306
110	W-13988	FGS	CUTTINGS	-82.879880	29.321430	CHIEFLAND SW	28	30
111	W-14387	FGS	CUTTINGS	-82.694430	29.044760	YANKEETOWN	11	315
112	W-15075	FGS	CUTTINGS	-82.569620	29.129190	TIDEWATER	73	965
113	W-15077	FGS	CUTTINGS	-82.569620	29.126420	TIDEWATER	67	780
114	W-16263	FGS	CORE	-82.570830	29.128600	TIDEWATER	65	192
115	W-17351	FGS	CUTTINGS	-82.648550	29.012460	YANKEETOWN	21	445
116	W-17470	FGS	CORE	-82.557390	29.334200	BRONSON SE	72	53
117	W-17584	FGS	CUTTINGS	-82.848210	29.463090	CHIEFLAND	35	320
118	W-17627	FGS	CORE	-82.812940	29.178640	WACCASASSA BAY	1	2
119	W-17628	FGS	CORE	-82.807110	29.169750	WACCASASSA BAY	1	2

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
120	W-18436	FGS	CORE	-82.979320	29.473100	MANATEE SPRINGS	11	40
121	W-18437	FGS	CORE	-82.978760	29.485870	MANATEE SPRINGS	6	75
122	W-18460	FGS	CORE	-82.973760	29.485870	MANATEE SPRINGS	14	80
123	W-18462	FGS	CORE	-82.966820	29.484490	MANATEE SPRINGS	18	100
124	W-18602	FGS	CORE	-82.557120	29.334200	BRONSON SE	72	64
125	W-19205	FGS	CORE	-82.580000	29.198611	TIDEWATER	60	165
126	-111430017	SRWMD	WATER WELL	-82.940275	29.489165	MANATEE SPRINGS	25	—
127	-111431001	SRWMD	WATER WELL	-82.950275	29.483054	MANATEE SPRINGS	24	—
128	-111431006	SRWMD	WATER WELL	-82.939553	29.478962	MANATEE SPRINGS	21	—
129	-111436012	SRWMD	WATER WELL	-82.863886	29.484164	CHIEFLAND	35	—
130	-111526006	SRWMD	WATER WELL	-82.774164	29.499720	CHIEFLAND	45	—
131	-111526008	SRWMD	WATER WELL	-82.777775	29.493053	CHIEFLAND	52	—
132	-111529007	SRWMD	WATER WELL	-82.828955	29.495148	CHIEFLAND	45	—
133	-111529009	SRWMD	WATER WELL	-82.836664	29.493053	CHIEFLAND	44	—
134	-111530005	SRWMD	WATER WELL	-82.999164	29.493887	MANATEE SPRINGS	40	—
135	-111531004	SRWMD	WATER WELL	-82.839734	29.485805	CHIEFLAND	42	—
136	-111532006	SRWMD	WATER WELL	-82.826684	29.480619	CHIEFLAND	44	—
137	-111533009	SRWMD	WATER WELL	-82.814442	29.478331	CHIEFLAND	42	—
138	-111535004	SRWMD	WATER WELL	-82.777454	29.483724	CHIEFLAND	50	—
139	-111535005	SRWMD	WATER WELL	-82.779720	29.476109	CHIEFLAND	45	—
140	-111629001	SRWMD	WATER WELL	-82.735831	29.492498	BRONSON	55	—
141	-111630002	SRWMD	WATER WELL	-82.743886	29.496386	BRONSON	55	—
142	-111631002	SRWMD	WATER WELL	-82.747061	29.475149	BRONSON	49	—
143	-111631003	SRWMD	WATER WELL	-82.741109	29.477220	BRONSON	50	—
144	-111632005	SRWMD	WATER WELL	-82.729164	29.488886	BRONSON	55	—
145	-111734001	SRWMD	WATER WELL	-82.602775	29.492775	BRONSON NE	80	—
146	-111828002	SRWMD	WATER WELL	-82.511387	29.495553	BRONSON NE	70	—
147	-111832001	SRWMD	WATER WELL	-82.536942	29.484720	BRONSON NE	75	—
148	-121410004	SRWMD	WATER WELL	-82.897497	29.452776	MANATEE SPRINGS	30	—
149	-121411010	SRWMD	WATER WELL	-82.885275	29.448609	MANATEE SPRINGS	30	—
150	-121414002	SRWMD	WATER WELL	-82.876386	29.436109	MANATEE SPRINGS	35	—
151	-121415005	SRWMD	WATER WELL	-82.901942	29.444442	MANATEE SPRINGS	25	—
152	-121418004	SRWMD	WATER WELL	-82.942497	29.436665	MANATEE SPRINGS	25	—
153	-121420001	SRWMD	WATER WELL	-82.934164	29.418331	MANATEE SPRINGS	34	—
154	-121421005	SRWMD	WATER WELL	-82.914132	29.422044	MANATEE SPRINGS	30	—
155	-121422004	SRWMD	WATER WELL	-82.901664	29.427220	MANATEE SPRINGS	30	—
156	-121427002	SRWMD	WATER WELL	-82.894164	29.415276	MANATEE SPRINGS	30	—
157	-121428003	SRWMD	WATER WELL	-82.921664	29.402498	MANATEE SPRINGS	25	—
158	-121429005	SRWMD	WATER WELL	-82.927628	29.415991	MANATEE SPRINGS	28	—
159	-121430002	SRWMD	WATER WELL	-82.945830	29.404165	MANATEE SPRINGS	25	—
160	-121431002	SRWMD	WATER WELL	-82.939164	29.393054	MANATEE SPRINGS	30	—
161	-121434002	SRWMD	WATER WELL	-82.898053	29.387776	MANATEE SPRINGS	30	—
162	-121434003	SRWMD	WATER WELL	-82.901108	29.398609	MANATEE SPRINGS	30	—
163	-121435003	SRWMD	WATER WELL	-82.888331	29.391109	MANATEE SPRINGS	30	—
164	-121435007	SRWMD	WATER WELL	-82.876386	29.391387	MANATEE SPRINGS	30	—
165	-121435008	SRWMD	WATER WELL	-82.886764	29.398334	MANATEE SPRINGS	30	—
166	-121436002	SRWMD	WATER WELL	-82.871164	29.398220	CHIEFLAND	32	—
167	-121501001	SRWMD	WATER WELL	-82.757820	29.470722	CHIEFLAND	45	—
168	-121502002	SRWMD	WATER WELL	-82.785553	29.467498	CHIEFLAND	40	—
169	-121503004	SRWMD	WATER WELL	-82.800124	29.469568	CHIEFLAND	40	—
170	-121504003	SRWMD	WATER WELL	-82.681109	29.463053	BRONSON	40	—
171	-121504004	SRWMD	WATER WELL	-82.818609	29.465553	CHIEFLAND	40	—
172	-121505002	SRWMD	WATER WELL	-82.839305	29.464045	CHIEFLAND	35	—
173	-121505004	SRWMD	WATER WELL	-82.835944	29.473745	CHIEFLAND	40	—
174	-121505005	SRWMD	WATER WELL	-82.831067	29.463956	CHIEFLAND	40	—
175	-121506001	SRWMD	WATER WELL	-82.844330	29.472372	CHIEFLAND	35	—
176	-121507004	SRWMD	WATER WELL	-82.838886	29.445553	CHIEFLAND	30	—
177	-121509003	SRWMD	WATER WELL	-82.814442	29.459720	CHIEFLAND	38	—
178	-121517001	SRWMD	WATER WELL	-82.832027	29.439430	CHIEFLAND	32	—
179	-121517002	SRWMD	WATER WELL	-82.824691	29.441960	CHIEFLAND	32	—
180	-121704004	SRWMD	WATER WELL	-82.620553	29.476387	BRONSON NE	91	—

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
181	-121705001	SRWMD	WATER WELL	-82.633081	29.463720	BRONSON	75	—
182	-121707001	SRWMD	WATER WELL	-82.649442	29.451387	BRONSON	60	—
183	-121708001	SRWMD	WATER WELL	-82.638886	29.454720	BRONSON	70	—
184	-121717003	SRWMD	WATER WELL	-82.633664	29.446303	BRONSON	80	—
185	-121719002	SRWMD	WATER WELL	-82.644164	29.428331	BRONSON	65	—
186	-121722002	SRWMD	WATER WELL	-82.602775	29.428331	BRONSON NE	85	—
187	-121728002	SRWMD	WATER WELL	-82.621386	29.407498	BRONSON NE	75	—
188	-121806001	SRWMD	WATER WELL	-82.554720	29.473609	BRONSON NE	120	—
189	-131404002	SRWMD	WATER WELL	-82.919997	29.379165	MANATEE SPRINGS	28	—
190	-131405001	SRWMD	WATER WELL	-82.926612	29.376259	MANATEE SPRINGS	25	—
191	-131407002	SRWMD	WATER WELL	-82.947219	29.371943	CHIEFLAND SW	25	—
192	-131410006	SRWMD	WATER WELL	-82.898014	29.365813	CHIEFLAND SW	30	—
193	-131413001	SRWMD	WATER WELL	-82.870553	29.357221	OTTER CREEK	30	—
194	-131509001	SRWMD	WATER WELL	-82.816664	29.359998	OTTER CREEK	25	—
195	-131617003	SRWMD	WATER WELL	-82.738886	29.351665	BRONSON SW	30	—
196	-131709001	SRWMD	WATER WELL	-82.613053	29.369720	BRONSON SE	61	—
197	-131717001	SRWMD	WATER WELL	-82.634386	29.347582	BRONSON SW	55	—
198	-131727003	SRWMD	WATER WELL	-82.602497	29.328054	BRONSON SE	70	—
199	-131734003	SRWMD	WATER WELL	-82.596664	29.306943	BRONSON SE	60	—
200	-141326001	SRWMD	WATER WELL	-82.984441	29.231110	SUMNER	8	—
201	-141335001	SRWMD	WATER WELL	-82.974719	29.212776	SUMNER	5	—
202	-141335007	SRWMD	WATER WELL	-82.980274	29.215554	SUMNER	20	—
203	-141336003	SRWMD	WATER WELL	-82.958608	29.223610	SUMNER	8	—
204	-141419001	SRWMD	WATER WELL	-82.939719	29.249999	SUMNER	16	—
205	-141621002	SRWMD	WATER WELL	-82.714720	29.259999	BRONSON SW	18	—
206	-141621003	SRWMD	WATER WELL	-82.704997	29.251943	BRONSON SW	10	—
207	-141711001	SRWMD	WATER WELL	-82.588330	29.286665	BRONSON SE	102	—
208	-141723003	SRWMD	WATER WELL	-82.578886	29.251388	BRONSON SE	70	—
209	-151606001	SRWMD	WATER WELL	-82.730831	29.211110	LEBANON STATION	7	—
210	-151703003	SRWMD	WATER WELL	-82.577775	29.210276	TIDEWATER	80	—
211	-151719004	SRWMD	WATER WELL	-82.630873	29.160195	LEBANON STATION	33	—
212	-171703001	SRWMD	WATER WELL	-82.575276	29.036388	YANKEETOWN SE	30	—
213	745306	SWFWMD	WATER WELL	-82.560844	29.178194	TIDEWATER	—	—
214	749003	SWFWMD	WATER WELL	-82.568125	29.229206	TIDEWATER	—	—
215	750182	SWFWMD	WATER WELL	-82.572308	29.443286	BRONSON NE	—	—
216	752296	SWFWMD	WATER WELL	-82.543422	29.208856	TIDEWATER	—	—
217	752578	SWFWMD	WATER WELL	-82.542267	29.436556	BRONSON NE	—	—
218	752802	SWFWMD	WATER WELL	-82.514031	29.324158	BRONSON SE	—	—
219	753034	SWFWMD	WATER WELL	-82.538950	29.351936	BRONSON SE	—	—
220	753382	SWFWMD	WATER WELL	-82.530786	29.296864	BRONSON SE	—	—
221	753427	SWFWMD	WATER WELL	-82.653339	29.134439	LEBANON STATION	—	—
222	753936	SWFWMD	WATER WELL	-82.504408	29.169967	TIDEWATER	—	—
223	754274	SWFWMD	WATER WELL	-82.533806	29.420806	BRONSON NE	—	—
224	754792	SWFWMD	WATER WELL	-82.633386	29.081500	YANKEETOWN	—	—
225	755360	SWFWMD	WATER WELL	-82.583417	29.042833	YANKEETOWN SE	—	—
226	755484	SWFWMD	WATER WELL	-82.569689	29.407000	BRONSON NE	—	—
227	755757	SWFWMD	WATER WELL	-82.511869	29.139861	TIDEWATER	—	—
228	756331	SWFWMD	WATER WELL	-82.692183	29.008314	YANKEETOWN	—	—
229	756382	SWFWMD	WATER WELL	-82.688403	29.014650	YANKEETOWN	—	—
230	756790	SWFWMD	WATER WELL	-82.619667	29.447833	BRONSON NE	—	—
231	757241	SWFWMD	WATER WELL	-82.557892	29.289892	BRONSON SE	—	—
232	757564	SWFWMD	WATER WELL	-82.552861	29.413250	BRONSON NE	—	—
233	757732	SWFWMD	WATER WELL	-82.572889	29.358278	BRONSON SE	—	—
234	757822	SWFWMD	WATER WELL	-82.520944	29.360444	BRONSON SE	—	—
235	757980	SWFWMD	WATER WELL	-82.505778	29.287472	BRONSON SE	—	—
236	758348	SWFWMD	WATER WELL	-82.626631	29.064478	YANKEETOWN	—	—
237	758476	SWFWMD	WATER WELL	-82.522500	29.243222	TIDEWATER	—	—
238	758558	SWFWMD	WATER WELL	-82.522189	29.317308	BRONSON SE	—	—
239	758625	SWFWMD	WATER WELL	-82.636917	29.005111	YANKEETOWN	—	—
240	759280	SWFWMD	WATER WELL	-82.539194	29.396972	BRONSON NE	—	—
241	760113	SWFWMD	WATER WELL	-82.619833	29.456083	BRONSON NE	—	—

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
242	760253	SWFWMD	WATER WELL	-82.527939	29.179842	TIDEWATER	—	—
243	760736	SWFWMD	WATER WELL	-82.588778	29.422194	BRONSON NE	—	—
244	761360	SWFWMD	WATER WELL	-82.611139	29.469000	BRONSON NE	—	—
245	761477	SWFWMD	WATER WELL	-82.559528	29.258139	BRONSON SE	—	—
246	761481	SWFWMD	WATER WELL	-82.538725	29.317636	BRONSON SE	—	—
247	761557	SWFWMD	WATER WELL	-82.567044	29.308278	BRONSON SE	—	—
248	761751	SWFWMD	WATER WELL	-82.525778	29.348722	BRONSON SE	—	—
249	762133	SWFWMD	WATER WELL	-82.580583	29.407472	BRONSON NE	—	—
250	762313	SWFWMD	WATER WELL	-82.532250	29.411222	BRONSON NE	—	—
251	762464	SWFWMD	WATER WELL	-82.573333	29.457833	BRONSON NE	—	—
252	762512	SWFWMD	WATER WELL	-82.706400	29.009144	YANKEETOWN	—	—
253	762804	SWFWMD	WATER WELL	-82.534500	29.325611	BRONSON SE	—	—
254	763189	SWFWMD	WATER WELL	-82.540694	29.266611	BRONSON SE	—	—
255	763257	SWFWMD	WATER WELL	-82.639806	29.116444	YANKEETOWN	—	—
256	763383	SWFWMD	WATER WELL	-82.608278	29.446722	BRONSON NE	—	—
257	763775	SWFWMD	WATER WELL	-82.564969	29.022219	YANKEETOWN SE	—	—
258	763848	SWFWMD	WATER WELL	-82.583611	29.493806	BRONSON NE	—	—
259	763986	SWFWMD	WATER WELL	-82.598417	29.456500	BRONSON NE	—	—
260	764013	SWFWMD	WATER WELL	-82.519972	29.401472	BRONSON NE	—	—
261	764269	SWFWMD	WATER WELL	-82.580639	29.374250	BRONSON SE	—	—
262	764604	SWFWMD	WATER WELL	-82.545861	29.254083	BRONSON SE	—	—
263	764630	SWFWMD	WATER WELL	-82.600361	29.445250	BRONSON NE	—	—
264	765096	SWFWMD	WATER WELL	-82.553889	29.347611	BRONSON SE	—	—
265	765369	SWFWMD	WATER WELL	-82.502817	29.215872	TIDEWATER	—	—
266	765518	SWFWMD	WATER WELL	-82.569739	29.018067	YANKEETOWN SE	—	—
267	765570	SWFWMD	WATER WELL	-82.553917	29.226833	TIDEWATER	—	—
268	765689	SWFWMD	WATER WELL	-82.516083	29.133419	TIDEWATER	—	—
269	765798	SWFWMD	WATER WELL	-82.555667	29.302778	BRONSON SE	—	—
270	765853	SWFWMD	WATER WELL	-82.501306	29.132956	TIDEWATER	—	—
271	766331	SWFWMD	WATER WELL	-82.540028	29.335694	BRONSON SE	—	—
272	766402	SWFWMD	WATER WELL	-82.579278	29.440556	BRONSON NE	—	—
273	766425	SWFWMD	WATER WELL	-82.527611	29.394583	BRONSON NE	—	—
274	766468	SWFWMD	WATER WELL	-82.696369	29.017511	YANKEETOWN	—	—
275	766546	SWFWMD	WATER WELL	-82.591444	29.472500	BRONSON NE	—	—
276	766797	SWFWMD	WATER WELL	-82.513306	29.360194	BRONSON SE	—	—
277	766843	SWFWMD	WATER WELL	-82.580472	29.456083	BRONSON NE	—	—
278	766884	SWFWMD	WATER WELL	-82.501775	29.049464	YANKEETOWN SE	—	—
279	767545	SWFWMD	WATER WELL	-82.559222	29.358500	BRONSON SE	—	—
280	767772	SWFWMD	WATER WELL	-82.556861	29.422694	BRONSON NE	—	—
281	768087	SWFWMD	WATER WELL	-82.505778	29.262083	BRONSON SE	—	—
282	768359	SWFWMD	WATER WELL	-82.522167	29.342278	BRONSON SE	—	—
283	768825	SWFWMD	WATER WELL	-82.656492	29.087525	YANKEETOWN	—	—
284	769270	SWFWMD	WATER WELL	-82.623556	29.119611	YANKEETOWN SE	—	—
285	769468	SWFWMD	WATER WELL	-82.584500	29.308194	BRONSON SE	—	—
286	769499	SWFWMD	WATER WELL	-82.538750	29.299528	BRONSON SE	—	—
287	770012	SWFWMD	WATER WELL	-82.511900	29.170531	TIDEWATER	—	—
288	770354	SWFWMD	WATER WELL	-82.545444	29.296472	BRONSON SE	—	—
289	770796	SWFWMD	WATER WELL	-82.582583	29.431222	BRONSON NE	—	—
290	771067	SWFWMD	WATER WELL	-82.592944	29.407639	BRONSON NE	—	—
291	771165	SWFWMD	WATER WELL	-82.603000	29.439556	BRONSON NE	—	—
292	771444	SWFWMD	WATER WELL	-82.590722	29.334222	BRONSON SE	—	—
293	771511	SWFWMD	WATER WELL	-82.605178	29.377931	BRONSON NE	—	—
294	771576	SWFWMD	WATER WELL	-82.582361	29.300556	BRONSON SE	—	—
295	771578	SWFWMD	WATER WELL	-82.563833	29.463306	BRONSON NE	—	—
296	771598	SWFWMD	WATER WELL	-82.578000	29.498139	BRONSON NE	—	—
297	771706	SWFWMD	WATER WELL	-82.560194	29.033139	YANKEETOWN SE	—	—
298	771935	SWFWMD	WATER WELL	-82.541444	29.415583	BRONSON NE	—	—
299	772015	SWFWMD	WATER WELL	-82.704358	29.036594	YANKEETOWN	—	—
300	773513	SWFWMD	WATER WELL	-82.520778	29.407583	BRONSON NE	—	—
301	773537	SWFWMD	WATER WELL	-82.500722	29.419778	BRONSON NE	—	—
302	773714	SWFWMD	WATER WELL	-82.569222	29.487389	BRONSON NE	—	—

Map ID	Well Label	Data Source	Sample Type	Longitude	Latitude	24K Quad	Elevation (ft)	Total Depth (ft)
303	773910	SWFWMD	WATER WELL	-82.573944	29.424806	BRONSON NE	—	—
304	774053	SWFWMD	WATER WELL	-82.517806	29.434278	BRONSON NE	—	—
305	774504	SWFWMD	WATER WELL	-82.633028	29.107583	YANKEETOWN	—	—
306	774559	SWFWMD	WATER WELL	-82.586028	29.439028	BRONSON NE	—	—
307	774569	SWFWMD	WATER WELL	-82.542028	29.174083	TIDEWATER	—	—
308	774611	SWFWMD	WATER WELL	-82.538250	29.161056	TIDEWATER	—	—
309	774972	SWFWMD	WATER WELL	-82.512744	29.213056	TIDEWATER	—	—
310	775019	SWFWMD	WATER WELL	-82.609889	29.420139	BRONSON NE	—	—
311	775152	SWFWMD	WATER WELL	-82.652667	29.035389	YANKEETOWN	—	—
312	775620	SWFWMD	WATER WELL	-82.520806	29.154222	TIDEWATER	—	—
313	776416	SWFWMD	WATER WELL	-82.521833	29.291167	BRONSON SE	—	—
314	776459	SWFWMD	WATER WELL	-82.697306	29.028222	YANKEETOWN	—	—
315	776884	SWFWMD	WATER WELL	-82.596528	29.413194	BRONSON NE	—	—
316	776900	SWFWMD	WATER WELL	-82.590361	29.489778	BRONSON NE	—	—
317	776993	SWFWMD	WATER WELL	-82.613472	29.429028	BRONSON NE	—	—
318	777053	SWFWMD	WATER WELL	-82.590750	29.460889	BRONSON NE	—	—
319	778006	SWFWMD	WATER WELL	-82.511278	29.337528	BRONSON SE	—	—
320	778351	SWFWMD	WATER WELL	-82.500333	29.359250	BRONSON SE	—	—
321	778357	SWFWMD	WATER WELL	-82.520978	29.167583	TIDEWATER	—	—
322	778957	SWFWMD	WATER WELL	-82.622167	29.440000	BRONSON NE	—	—
323	779397	SWFWMD	WATER WELL	-82.532633	29.291436	BRONSON SE	—	—
324	779475	SWFWMD	WATER WELL	-82.568856	29.009517	YANKEETOWN SE	—	—
325	780545	SWFWMD	WATER WELL	-82.512833	29.346778	BRONSON SE	—	—
326	780869	SWFWMD	WATER WELL	-82.520278	29.265694	BRONSON SE	—	—
327	781009	SWFWMD	WATER WELL	-82.599750	29.465028	BRONSON NE	—	—
328	781160	SWFWMD	WATER WELL	-82.529917	29.236667	TIDEWATER	—	—
329	781434	SWFWMD	WATER WELL	-82.603589	29.048361	YANKEETOWN SE	—	—
330	781739	SWFWMD	WATER WELL	-82.538786	29.426714	BRONSON NE	—	—
331	782113	SWFWMD	WATER WELL	-82.547364	29.358478	BRONSON SE	—	—
332	782129	SWFWMD	WATER WELL	-82.593639	29.443194	BRONSON NE	—	—
333	782185	SWFWMD	WATER WELL	-82.535183	29.390061	BRONSON NE	—	—
334	782402	SWFWMD	WATER WELL	-82.541653	29.051800	YANKEETOWN SE	—	—
335	782608	SWFWMD	WATER WELL	-82.507028	29.360217	BRONSON SE	—	—
336	782973	SWFWMD	WATER WELL	-82.510839	29.446225	BRONSON NE	—	—
337	783612	SWFWMD	WATER WELL	-82.545028	29.192275	TIDEWATER	—	—
338	784260	SWFWMD	WATER WELL	-82.515936	29.443056	BRONSON NE	—	—

NOTE: Suwannee River Water Management District (SRWMD) **Well Label** is the well's township, range, and section location. The format is as follows: + or – indicates township north (+) versus south (-); there is no need to include an east / west indicator for the range, as the entire SRWMD is east of the Prime Meridian. Following the +/- are 6 digits representing the township, range, and section (TTRRSS), and finally a 3 digit unique identifier assigned consecutively to each well within a given section to differentiate wells with the same +/- and 6 digit number.

For example: **-031224004** means Township 03 South, Range 12 East, Section 24, unique well 004.

NOTE: Elevations for the Southwest Florida Water Management District (SWFWMD) wells used in this project were acquired from an FGS-generated Digital Elevation Model (DEM).