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Evaluation of Waters for Dissolved Oxygen Site Specific Alternative Criteria (SSAC) Development

Prepared by:
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Water Quality Standards Program

2600 Blair Stone Rd.
Tallahassee, FL 32399

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Executive Summary

The Florida Department of Environmental Protection (DEP or Department) evaluated Class III predominately fresh waterbodies that were not meeting the generally applicable Dissolved Oxygen (DO) criteria and have been placed in assessment category 4c (impaired for one or more criteria or designated uses, but do not require TMDL development because the impairments are not caused by a pollutant) for potential development of site-specific alternative criteria (SSACs). This report documents the process by which each waterbody was evaluated, the results of the evaluation, and how the proposed SSACs were developed. As a result of this evaluation, DEP recommends that the following Type II DO SSACs be adopted for the eight waterbodies listed in **Table 1.**

Table 1. Summary of Proposed Type II DO SSACs for Eight Freshwater Systems

Waterbody	WBID	Proposed Type II DO SSACs[1]
Black Creek	679	31 %
Stafford Creek	723	46 %
Pony Creek	1426	34 %
Reedy Creek	1685B	36 %
Daughtrey Creek	3240F	21 %
Popash Creek	3240Q	22 %
Cypress Creek	3235C	28 %
Black Water Creek	2929A	26 %

[1] *The proposed DO SSACs are based on the 10th percentile DO saturation calculated assuming a normal distribution using mean and standard deviation of data collected from 2006 through 2020. The SSACs will be applied such that no more than 10% of the measured DO levels shall be less than the proposed values.*

DEP recommends adoption of DO SSACs for these waterbodies because each waterbody supports a healthy biological community as indicated by passing Stream Condition Index (SCI) scores, and each waterbody has a high percentage of natural lands, such as wetlands and forests, and are not highly influenced by anthropogenic inputs. There will be minimal to no impacts of establishing the proposed DO SSACs to currently permitted facilities or activities because each of the proposed SSACs was developed based on existing DO conditions.

The recommended SSACs were derived based on calculated 10th percentiles of the DO saturation levels measured during the period from 2006 through 2020. Because the proposed SSACs were based on the existing DO regimes that have been shown to fully support healthy biological communities, the proposed alternative criteria more accurately represent the DO regimes necessary to protect sensitive aquatic life within the individual waterbodies.

1.0 Introduction

1.1 Purpose of this Report

The purpose of this report is to describe and document the results of an effort to develop Dissolved Oxygen (DO) Site Specific Alternative Criteria (SSACs) for specific streams listed in assessment category 4c. Waters in the 4c assessment category are "impaired for one or more criteria or designated uses, but do not require TMDL development because the impairments are not caused by a pollutant." Low DO is not a direct pollutant, but rather a response to either anthropogenic pollutants (*e.g.* BOD, ammonia, nutrients) or to specific natural conditions (*e.g.*, decomposition of leaf litter, stagnant flow) (DEP, 2013). This effort identified eight waterbodies appropriate for the development of individual DO SSACs.

This report is organized to first provide background information about SSACs and the generally applicable DO criteria (**Section 1**) and then document the methodology used to develop the proposed SSACs, including a description of how Endangered Species Act (ESA) concerns and downstream waters protection were addressed (**Section 2**). **Section 3** provides waterbody-specific information, including system characteristics, land uses, potential causes of low DO (both natural and anthropogenic), details concerning the 303(d) assessment history regarding DO, water quality and biological data summaries, and the individual proposed DO SSACs. **Section 4** provides a summary of DEP's SSAC recommendations. References cited are provided in **Section 5**. **Appendix A** provides a summary of the biological data [Stream Condition Index (SCI) and Habitat Assessment (HA) scores] for each of the waterbodies.

1.2 Background Information

1.2.1 Surface Water Quality Standards

Surface water quality standards are the foundation of the water quality-based pollution control program under the federal Clean Water Act (CWA). Florida's water quality standards comprise designated uses and the corresponding waterbody classifications, water quality criteria, antidegradation requirements, and moderating provisions. A waterbody's designated use describes the uses of the waterbody. These uses may include public water supply; propagation and maintenance of fish, shellfish, and wildlife; and, recreational, agricultural, industrial, and navigational purposes. The designated uses for a waterbody are based on the physical, chemical, and biological characteristics of the waterbody, its geographical setting, aesthetic qualities, and economic considerations. Florida's waterbody classifications are assigned based on the present and future most beneficial uses of the waters of the state, as set forth in Chapter 62-302, F.A.C., pursuant to Subsection 403.061(10), Florida Statutes (F.S.), and the CWA.

To protect designated uses, states are required to adopt appropriate water quality criteria for each use. These criteria must be based on a sound scientific rationale and must contain sufficient parameters or constituents to protect all applicable uses. Water quality criteria provide the minimum requirements necessary to protect a waterbody's designated use.

1.2.2 Site Specific Alternative Criteria

Site Specific Alternative Criteria (SSACs) are alternative surface water quality criteria that are developed for a particular waterbody or segment of a waterbody and are designed to more accurately reflect site specific conditions, while fully protecting the designated and existing uses of the waterbody. There are three types of SSACs (Type I, Type II, and Type III) in Rule 62-302.800, F.A.C., and each have individual requirements for demonstrating that an alternative criterion is more appropriate for a specific waterbody or waterbody segment than the generally applicable criterion.

Type I SSACs (defined in subsection 62-302.800(1), F.A.C.) are based on natural background (minimally disturbed conditions) and are adopted through Secretarial Final Order. Type II SSACs (defined in subsection 62-302.800(2), F.A.C.) are developed based on scientifically defensible methods that demonstrate the SSAC fully maintains and protects designated uses (recreation, human health, and/or aquatic life). Type II SSACs are typically established for a waterbody that includes some level of anthropogenic influence. Type II SSACs are adopted by rule and must be approved for adoption by the Environmental Regulation Commission (ERC). Type III SSACs (defined in subsection 62-302.800(3), F.A.C.) are limited to nutrients in streams and lakes and must demonstrate that full aquatic life use support will be maintained. Type III SSACs are adopted by Secretarial Final Order. Because Type II SSACs are applicable to this effort, they are discussed in more detail below.

Type II SSACs are used to establish alternative criteria within waterbodies that have anthropogenic disturbance above natural conditions, but can still be demonstrated, based on scientifically defensible methods (other than natural background), to fully maintain and support all designated and existing uses. The majority of SSACs are developed for parameters for which the generally applicable criteria are intended to protect aquatic life; therefore, the SSAC demonstration must show that the proposed alternative criteria will maintain and protect aquatic life. If a proposed SSAC is based on existing water quality conditions in either the target waterbody or a reference waterbody, the existing biological community must be characterized and shown to be healthy.

The most commonly used tools to make this demonstration in predominantly freshwater streams, which are the focus of the current effort, are the Stream Condition Index (SCI), Habitat Assessment (HA), Linear Vegetation Survey (LVS), and Rapid Periphyton Survey (RPS). The exact suite of biological surveys or indices used will depend on the parameter(s) of interest and waterbody characteristics. The SCI is a benthic macroinvertebrate index that is typically used as the primary indicator of biological health for DO SSACs in freshwater streams. The SCI is a regional, ten metric index scored from 0 to 100 developed by DEP to describe the health of the macroinvertebrate community. An average score of 40 or more for at least two temporally independent SCI measurements, with neither of the two most recent measurements being below 35, has been determined to be indicative of a healthy biological community. The SCI has

demonstrated sensitivity to low DO levels (DEP, 2013) and was the basis for the derivation of the generally applicable freshwater DO saturation criteria. Because plant and algal communities are relatively insensitive to DO, measures of these communities (*e.g.*, LVS and RPS) are not generally considered in the assessment of biological health for DO SSACs. Further details regarding how the eight proposed Type II SSACs for DO were developed are provided in **Section 3** and each waterbody-specific subsection.

1.2.3 Generally applicable Dissolved Oxygen Criteria

Florida's current generally applicable DO criteria were adopted in 2013. The freshwater DO criteria were developed largely based on statistically significant relationships between DO and the SCI. The relationships between DO and the SCI were utilized in the development of the revised DO criteria because a) the SCI has commonly been used as an indicator of the overall biological health of Florida streams; b) invertebrates are generally more sensitive to low DO than are fish or other biological communities; and c) the DO requirements of species in flowing waters (*i.e.*, streams) are generally higher than those of species in lentic environments (DEP, 2013).

The revised DO criteria were developed regionally to account for the observed variations in both DO levels and biological response. The development of the revised regional DO criteria was based on the 2012 SCI bioregions. The regional boundaries of the 2012 SCI biological regions are illustrated in **Figure 1.**

The generally applicable regional DO criteria are promulgated in Rule 62-302.533, F.A.C., as follows:

(1) Class I, Class III predominantly freshwaters, and Class III-Limited predominantly freshwaters.

(a) No more than 10 percent of the daily average percent dissolved oxygen (DO) saturation values shall be below the following values:

1) 67 percent in the Panhandle West bioregion,

2) 38 percent in the Peninsula and Everglades bioregions, or

3) 34 percent in the Northeast and Big Bend bioregions.

All the waterbodies evaluated as part of this effort exhibit frequent DO levels below the region-specific generally applicable DO criteria specified above.

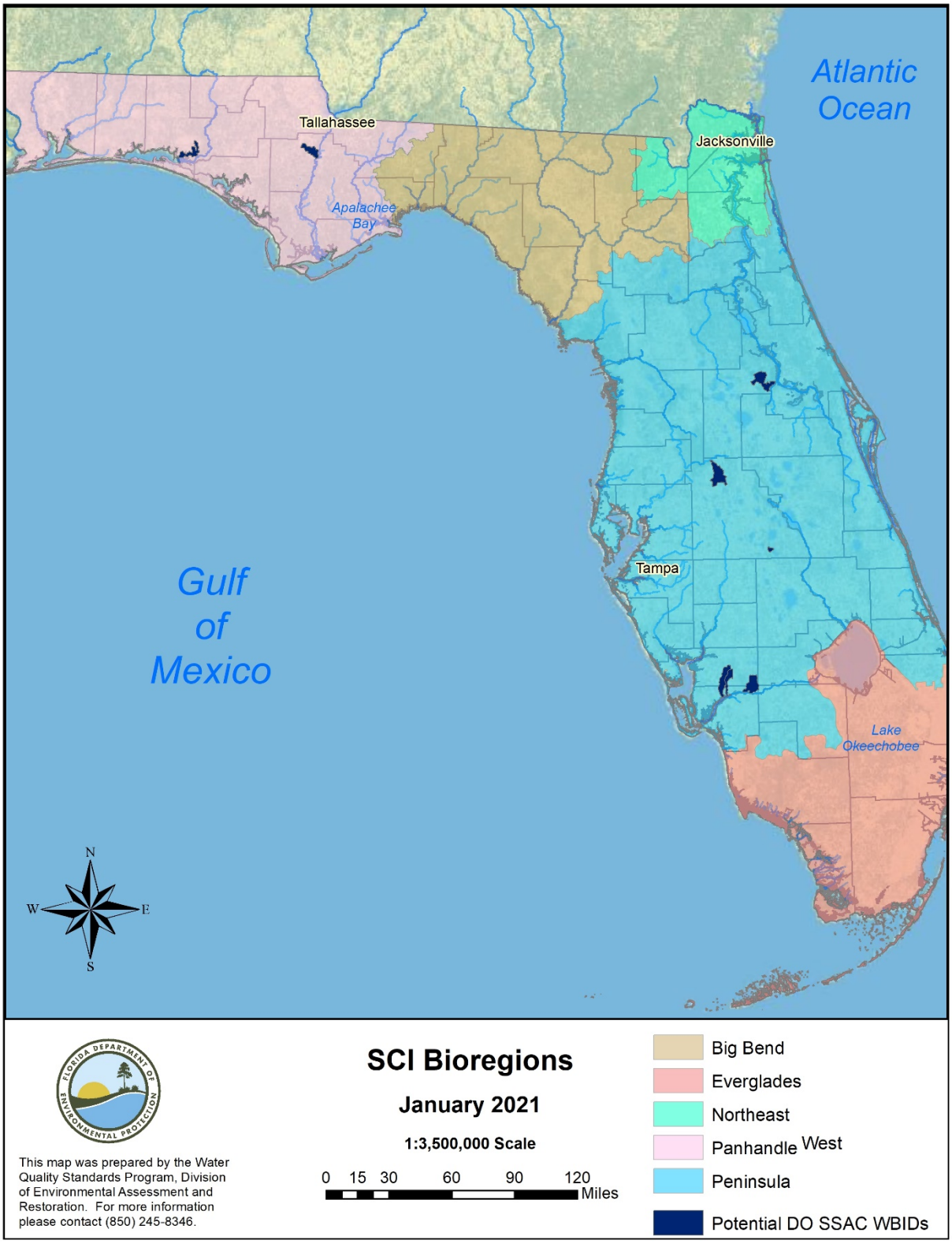

Figure 1. Location of 2012 SCI Biological Regions.

2.0 Methodology

2.1 Identifying waterbodies appropriate for SSAC Development

The purpose of this effort was to evaluate waterbodies placed in assessment category 4c because they did not attain the generally applicable DO criteria to determine if alternative DO criteria would be more appropriate for any of these systems, and to provide information to support the development of SSACs where applicable. This effort focused on freshwater systems with DO impairments. Marine waters and systems dominated by springs on the 4c assessment list were screened out of this assessment and will be addressed through separate efforts.

The waters in assessment category 4c were initially evaluated using the Landscape Development Intensity Index (LDI) to help determine the type of SSACs that were appropriate. DEP considers a 100-meter buffer LDI of ≤ 2.0 in conjunction with a watershed LDI ≤ 3.0 to be indicative of minimally disturbed conditions (https://floridadep.gov/sites/default/files/ldi-hdg-bcg.pdf). LDIs were calculated by DEP's Watershed Services Program using the most current statewide land use GIS layer.

To further refine the list of waters for SSAC development, screens were applied to identify the most appropriate, biologically healthy waterbodies for this effort. The waterbodies were evaluated to ensure sufficient biological data were available to demonstrate that the system was healthy and an adequate amount of DO data were available to accurately characterize the existing DO regime. To satisfy the data sufficiency requirements, a waterbody had to have a minimum of 50 DO measurements collected during the period from 2006 through 2020 and at least two temporally independent SCIs of 40 or higher, with neither of the two most recent SCI scores less than 35.

Additionally, to help ensure that the waters were not highly influenced by anthropogenic inputs, the waters were screened based on surrounding [within the **W**ater**b**ody **Id**entification Unit (WBID)] land use. To be considered for SSAC development under this effort, the WBIDs needed to be composed of either a) 20% or more wetlands; or, b) at least 50% combined wetland, forested and/or shrub and brushland uses, and have no more than 20% urban land uses. The land use screening was based on the level 2 land use from the statewide land use ArcGIS coverage.

After screening was completed, the eight waterbodies listed in **Table 2** remained and were considered the most appropriate waters for this SSAC development effort. **Figure 2** provides the general location of the eight waterbodies. Four of the waterbodies identified for further consideration for DO SSAC development had 100-m buffer and watershed LDIs that were below the thresholds indicative of minimally disturbed conditions and were therefore potential candidates for Type I (*i.e.*, natural background) SSAC development. The remaining four waterbodies slightly exceeded the LDI thresholds, indicating more than a minimal level of anthropogenic input, which would indicate they were not good candidates for Type I SSACs.

The 100-meter buffer and watershed LDI values calculated for the waterbodies evaluated for DO SSAC development are summarized in **Table 3**.

Because DEP wanted to use the same administrative process for all of the SSACs, DEP decided to pursue Type II SSACs for all eight waterbodies. While Type I and Type II SSACs differ in the information and documentation required and in the SSAC adoption process, both types of SSACs would be derived in the same manner and would result in the same criteria. By pursuing Type II DO SSACs for these waters, there is also an increased opportunity for public involvement and additional review at the Environmental Regulation Commission (ERC) hearing in which commission members vote to approve changes and updates to water quality standards.

Table 2. Waterbodies selected for Type II DO SSAC development

Waterbody	WBID	Waterbody Class	Bioregion	County
Black Creek	679	3F	Panhandle	Walton
Stafford Creek	723	3F	Panhandle	Calhoun
Pony Creek	1426	3F	Peninsula	Polk
Reedy Creek[1]	1685B	3F	Peninsula	Polk
Daughtrey Creek	3240F	3F	Peninsula	Charlotte/Lee
Popash Creek	3240Q	3F	Peninsula	Charlotte/Lee
Cypress Creek	3235C	3F	Peninsula	Charlotte/Glades/Hendry/Lee
Black Water Creek	2929A	3F	Peninsula	Lake

[1]*This system was previously named Livingston Creek and was re-named Reedy Creek during IWR Run 56.*

Table 3. 100-meter buffer and watershed LDIs calculated for the waterbodies evaluated for DO SSAC development

Waterbody Name	100-meter Buffer LDI Score[1]	Watershed LDI Score	Watershed Boundary
Black Creek	1.4	2.0	HUC 12
Stafford Creek	1.5	2.2	HUC 12
Pony Creek	2.4	2.6	WBID
Reedy Creek	2.3	3.5	HUC 10
Daughtrey Creek	3.8	2.3	WBID
Popash Creek	3.7	2.1	WBID
Cypress Creek	1.3	2.0	Merged WBIDs: 3235C and 3236
Black Water Creek	1.6	2.5	HUC 10

[1]The LDI calculated for the 100-meter buffer is calculated based on a 100-meter buffer from each bank of the stream system beginning at the most downstream sampling station with data used for SSAC development and extending to the WBID boundary plus an additional 10 km upstream.

Figure 2. General location of the WBIDs proposed for Type II DO SSAC development.

2.1.1 Water Quality and Biological Data Assessment

To characterize the DO regime at the eight selected waterbodies, existing water quality data for each area were compiled, screened (following the method below), and summarized for use in derivation of the proposed DO SSACs. Water quality data collected for each waterbody during the period from 2006 through 2020 were retrieved from the DEP's IWR database (Run 60). Similarly, all available biological data for the waterbodies collected during the same period of record were pulled from the DEP's SBIO database and summarized to demonstrate the health of the systems.

2.1.2 Data Screening and Handling

Water quality data were screened based on laboratory qualifier codes, consistent with the DEP's Quality Assurance Rule (Chapter 62-160, F.A.C.). Any datum associated with a fatal qualifier (H, J, K, N, O, V, Q, Y, or ?) indicating a potential data quality problem was removed from the analysis. Values that exceeded possible physical or chemical measurement constraints (*e.g.*, negative DO levels), had temperatures well outside seasonal norms (*e.g.*, 4° Celsius in July), or represented data transcription errors were excluded. For field parameters, measurements collected at multiple depths at the same location on the same day were considered one sample, with the arithmetic mean used to represent the vertical profile.

Additional considerations in the handling of water quality data are the accuracy and sensitivity of the laboratory method used. For the purposes of summary statistics presented in this document, data reported as less than the Method Detection Limit (MDL) were assigned a value of one-half the MDL unless otherwise noted. All data presented in this report were handled consistently with regard to screening and MDL replacement.

The screened dataset was then used to summarize water quality conditions in each waterbody under consideration for SSAC development. The summary statistics calculated for each area and parameter include: number of samples, mean, median, 10^{th}, 25^{th}, and 75^{th} percentiles. The 10^{th} percentiles for the DO data were also calculated based on the mean and standard deviation assuming a normal distribution of the data. The percentiles calculated in this manner can provide a more accurate estimate of the true percentile of a population than an estimate based on ranking of a limited subpopulation. In this case, the calculated percentiles were only slightly different than those based on ranking. The existing water quality data for DO and several related parameters for each area proposed for SSAC development are summarized in the discussion of each waterbody.

To account for the natural variability within the waterbodies, the final proposed SSACs were calculated as the 10^{th} percentiles of the DO saturation levels. The proposed DO SSACs will be applied such that no more than 10 percent of the DO saturation measurements collected within each waterbody during any calendar year shall be below the specified SSAC. The 10 percent allowable exceedance frequency (i.e., frequency of daily average DO measurements below the

SSAC value) is consistent with the derivation of the SSAC as the 10th percentile of the existing distribution. Approximately 10 percent of the measurements would be expected to be below the 10th percentile under natural conditions; therefore, the allowance of the 10 percent exceedance frequency is expected to minimize Type I[1] errors associated with the use of the 10th percentile.

2.1.3 Land use, 303(d) assessment history, and other sources of potential anthropogenic influence

2.1.3.1 Land use

The level 2 land use was summarized for each area based on the boundaries of the WBID containing the waterbody(s) proposed for SSAC development. The Level 2 land use is the second highest level designation in a hierarchical coding scheme that contains 4 levels that describe land information of increasing specificity (FDOT, 1999). The Statewide Land Use Land Cover GIS layer, which is a compilation of the land use/land cover imagery-based datasets (2011-2017) created by the 5 water management districts (Northwest, Suwanee, St. Johns, Southwest, and South), was used for this calculation and is publicly available through the DEP Geospatial Open Data Portal. These datasets include imagery-based, water management district (WMD)-specific data for the following years: North West Florida Water Management District (NWFWMD) 2015-2016; Suwannee River Water Management District (SRWMD) 2016-2017; St. John's River Water Management District (SJRWMD) 2013 (Dec 2012-Mar 2013) for Duval and Bradford Counties, 2014 (Dec 2013-Mar 2014) for Alachua, Baker, Clay, Flagler, Lake, Marion, Nassau, Osceola, Polk, Putnam, and St. John's Counties, 2015 (Dec 2014-Mar 2015) for Brevard, Indian River, Okeechobee, Seminole, and Volusia Counties, and 2016 (Dec 2015-Mar 2016) for Orange County; South West Florida Water Management District (SWFWMD) 2011; and South Florida Water Management District (SFWMD) 2014-2016.

If an extraction-related land use (mining) was noted within the boundaries of the WBID, additional details regarding the mining activities and related disturbances occurring at the site from documents located in the DEP Information Portal (*e.g.* inspection reports, permits, annual reports) and personal communication with staff from DEP's Mining and Mitigation Program were included in this report.

2.1.3.2 Sources of potential anthropogenic influence

Each WBID was evaluated to determine if there were any National Pollutant Discharge Elimination System (NPDES) dischargers (both wastewater and urban stormwater) that may have an influence on the water quality in the area. This was accomplished through use of the Wastewater Facility Regulation (WAFR) database, Integrated Management System (IMS) facilities and sites ArcGIS layers, and the NPDES Stormwater MS4 (Municipal Separate Storm Sewer System) Permits ArcGIS layer, which are publicly available through the DEP Geospatial Open Data Portal. Although no impact to surface water quality is expected from non-surface

[1] A Type I error is an erroneous rejection of the null hypothesis. In the context of water quality, a Type I error would be an incorrect conclusion that a waterbody is impaired, when in fact it is attaining the criterion.

water dischargers, such as facilities that use land application or have reuse systems, non-NPDES facilities that occurred within the WBID were also noted and described in this section.

2.1.3.3 303(d) Assessment History

DEP used the WBID History Database and IWR Database updated through Run 60 to assess the water quality assessment history of each of the waterbodies evaluated as a part of this effort. The focus of this effort was to describe the listing history associated with DO or related parameters (*e.g.*, TOC, nutrients). None of the eight waterbodies for which DO SSACs are being proposed have been listed as impaired for nutrients or other parameters that could result in depressed DO levels. However, waterbodies may be listed as impaired for other water quality parameters unrelated to DO (*i.e.,* fecal coliforms, alkalinity), and complete listing histories are not provided in this document. Impairment listings for other unrelated parameters will be addressed through separate efforts.

2.1.4 Downstream Waters Protection

SSAC petitions need to provide an affirmative demonstration that the SSAC(s) will protect not only the waterbody for which the SSAC is established, but also downstream waters. 40 CFR 131.10(b) requires that "in designating uses of a waterbody and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of water quality standards of downstream waters" (U.S.EPA, 2014). If a SSAC is set at the existing condition within the waterbody and downstream waters are meeting the applicable surface water quality criteria, then it is assumed that protection of downstream waters has been demonstrated. For this effort, waterbodies downstream of those proposed SSAC areas were evaluated for DO criteria attainment, and additional details are provided in each waterbody-specific section.

2.1.5 Endangered Species Act (ESA) Considerations

The ESA provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The law requires federal agencies (EPA in the case of water quality standards approvals) to consult with the U.S. Fish and Wildlife Service (FWS) and/or the National Marine Fisheries Service (NMFS) (collectively referred to as "the Services"), to ensure that actions (*e.g.*, water quality standards changes) they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed threatened or endangered species of fish, wildlife, or plants. To determine if any endangered species were present in the areas proposed for SSAC development, DEP staff used ArcGIS to determine if there was any overlap between critical habitats and proposed SSAC areas. Additional information is only provided in the waterbody-specific sections if areas proposed for SSAC development are adjacent to or overlaps designated critical habitat. Based on staff evaluation of the areas proposed for DO SSAC development and the fact that the proposed DO SSACs were developed based on existing in-

stream conditions, it is not anticipated that any endangered or threatened species or critical habitat will be impacted by the proposed DO SSACs.

3.0 Waterbody-specific Information

Sections 3.1 to 3.9 of this chapter contain waterbody-specific information used to develop each Type II DO SSAC. The eight waterbodies are organized by location around the state, starting in the northwest panhandle and ending in the northeast region of the state.

3.1 Black Creek (WBID 679)

3.1.1 System Description

Black Creek (WBID 679) is a Class III freshwater system located in Walton County within the Lower Choctawhatchee sub-basin (**Figure 3**). Black Creek flows southwest to the Mitchell River, which subsequently empties into Choctawhatchee Bay. This WBID contains a variety of different conservation lands including portions of several conservation easements managed by the state (the Nokuse Plantation Conservation Easements, the Intrawest Sandestin Company Conservation Easement, the M.C. Davis-Seven Runs Creek Conservation Easement), a portion of the Choctawhatchee River Delta Preserve managed by The Nature Conservancy, and a portion of the M.C. Davis Conservation Easement/Florida National Scenic Trail, which is managed federally. This WBID also contains a portion of the Choctawhatchee River OFW.

3.1.2 Land use

A summary of the Level 2 land use categories located within WBID 679 is provided in **Table 4**. Natural land uses make-up the majority (approximately 91%) of the area surrounding Black Creek, with wetlands covering approximately 21.3% and forest and scrub habitat comprising 70.3% of the total acreage in the WBID. Urban land uses only encompass 3.9% of the area, with agricultural land use making up just over 1% of the area.

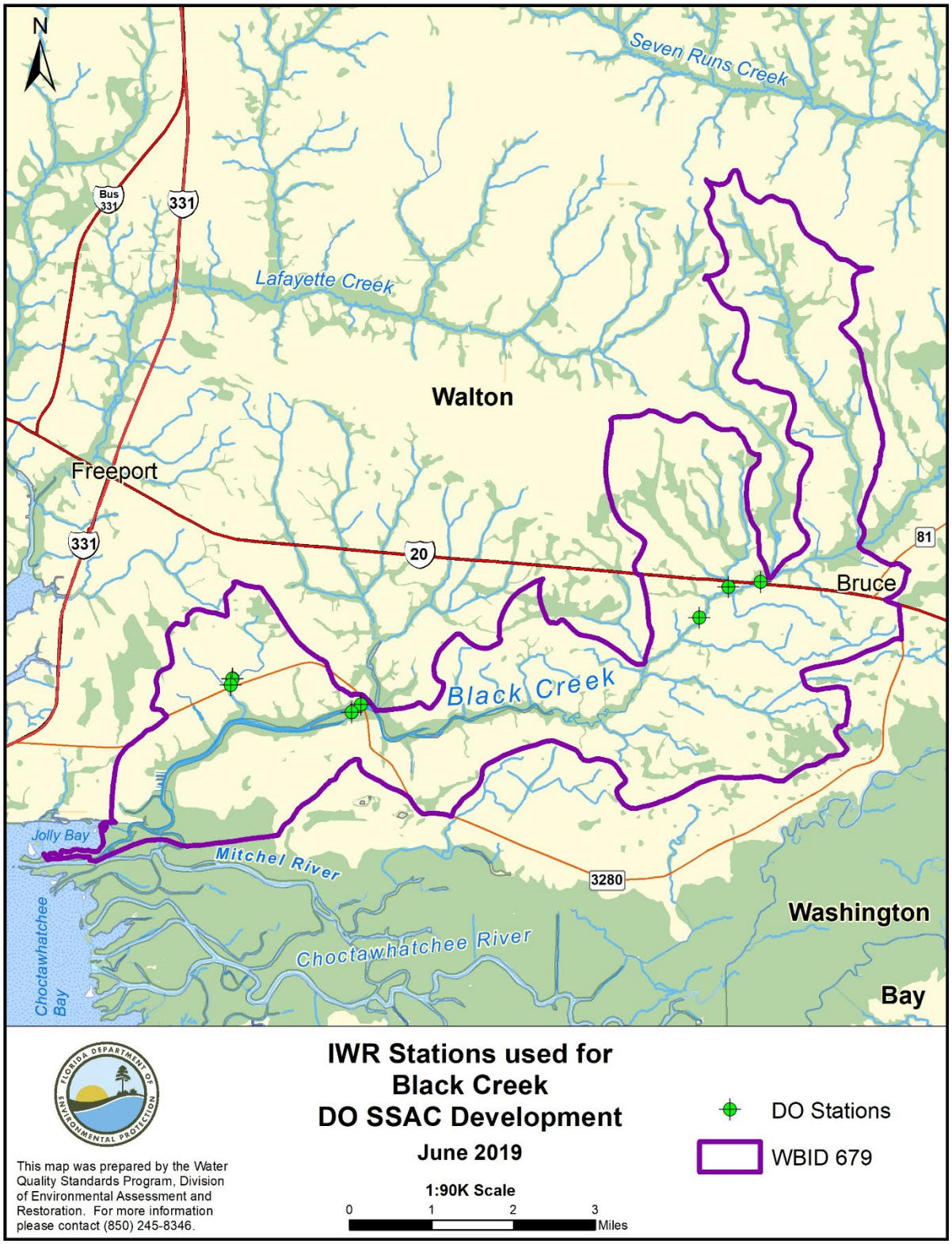

Figure 3. Map illustrating Black Creek and the IWR Stations used to develop the proposed DO SSAC.

Table 4. Level 2 Land Use for Black Creek (WBID 679)

Level 2 Land Use	Level 2 Land Use Codes	Acres	Percent of Total Acres
Residential Low Density	1100	257.95	1.50
Residential Medium Density	1200	276.92	1.61
Commercial and Services	1400	24.11	0.14
Extractive	1600	97.74	0.57
Institutional	1700	5.85	0.03
Open Land	1900	12.41	0.07
Cropland and Pastureland	2100	77.38	0.45
Tree Crops	2200	116.72	0.68
Other Open Lands <Rural>	2600	2.37	0.01
Herbaceous	3100	201.04	1.17
Shrub and Brushland	3200	116.58	0.68
Mixed Rangeland	3300	196.05	1.14
Upland Coniferous Forests	4100	1104.65	6.42
Upland Hardwood Forests	4200	93.12	0.54
Upland Mixed Forests	4300	152.44	0.89
Tree Plantations	4400	10433.69	60.64
Streams and Waterways	5100	213.49	1.24
Lakes	5200	0.46	0.003
Reservoirs	5300	27.83	0.16
Bays and Estuaries	5400	0.40	0.002
Wetland Hardwood Forests	6100	854.76	4.97
Wetland Coniferous Forests	6200	228.19	1.33
Wetland Forested Mixed	6300	2029.93	11.80
Vegetated Non-Forested Wetlands	6400	548.80	3.19
Non-Vegetated Wetlands	6500	4.09	0.02
Disturbed Lands	7400	17.38	0.10
Transportation	8100	40.39	0.23
Communications	8200	0.39	0.002
Utilities	8300	69.66	0.40
Total		17204.81	100

Extractive Land Use

The Statewide Land Use Land Cover layer noted an area of extractive land use of approximately 97.7 acres within the WBID. This extractive land use was identified as the Black Creek Pit owned by Black Creek of Northwest Florida, Inc. This area is used to mine fill dirt/sand. Reclamation in this area is subject to the requirements of Chapter 62C-39, F.A.C., Reclamation Requirements for Solid Resources other than Phosphate, Limestone, Heavy Minerals, and Fuller's Earth. This extractive land use is not believed to be impacting the existing DO levels in this system.

3.1.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

No wastewater facilities were identified by the WAFR layers (sites and facilities) within the boundaries of this WBID.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase II MS4 permit FLR04E084, whose permittee is Walton County, covers the entire portion of Black Creek proposed for DO SSAC development as part of this effort. It is not anticipated that this MS4 is impacting the existing DO levels in this system.

3.1.4 303(d) Assessment History

Black Creek was placed in assessment category 3b (some data and information are present but not enough to determine if any designated use is attained) for DO during cycle 1 (group 3 cycle 1 planning period:1992-2001; verified period:1/1997-6/2004). During cycle 2 (group 3 cycle 2 planning period: 1997-2006; verified period:1/2002-6/2009), Black Creek was moved to assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant) for DO (concentration). During the cycle 3 assessment (group 3 cycle 3 planning period: 2003-2012; verified period: 1/2008-6/2015), Black Creek was moved into the 4c assessment category (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation). In addition to changes in the DO listing status of this waterbody, Black Creek also changed waterbody type over the cycle 1 to cycle 3 assessment periods. During the cycle 1 assessment period, Black Creek was assessed as a Class III fresh waterbody. During the cycle 2 assessment, Black Creek was assessed as a Class II marine waterbody. However, during cycle 3, Black Creek was correctly assessed as a Class III fresh waterbody.

3.1.5 Biological and Water Quality Data Summary

Typical of relatively undisturbed streams in the Florida Panhandle, Black Creek (WBID 679) exhibits very good water quality and a healthy biological community. During the 2006 to 2020 period, the water quality in Black Creek supported a very healthy biological community as indicated by passing SCI scores. Four SCIs were conducted during the period of record used for

this assessment (2006-2020). The two most recent SCIs were conducted on 10/17/2013 and 3/22/18. These two SCIs scored 78 and 67, respectively, with an average of 72.5. The high SCI scores are indicative of a healthy macroinvertebrate community that is not being adversely affected by existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Black Creek.

DO saturation levels in Black Creek average 57.5%, with nearly 65% of the measurements below the 67% DO criterion applicable to Panhandle streams. **Figure 4** provides the DO saturations levels measured in WBID 679 since 2002. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record suggesting that the DO levels in Black Creek have not been adversely impacted by anthropogenic inputs.

Summary statistics for related water quality parameters for Black Creek are provided in **Table 5**. Even with the large percentage of wetland and forest areas surrounding Black Creek, color and TOC levels are relatively low, averaging 115 PCU and 9.38 mg/L, respectively. During the 2006 to 2020 period, chlorophyll-*a* concentrations in Black Creek averaged 3.12 µg/L, with a maximum value of 21 µg/L. Nutrient (i.e., TN and TP) levels in Black Creek averaged 0.46 and 0.01 mg/L, respectively.

Table 5. Summary of water quality and biological data for Black Creek (WBID 679) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	68	3.12	3.66	0.28	0.5	2	4
Color, PCU	19	114.7	66.4	44	72	91	150
Specific Conductance, µmhos/cm	128	446	710	24	43	127	518
DO Saturation, %	178	57.5	20.9	32.2/**30.7**[2]	42.9	58.2	71.2
Total Nitrogen, mg/L	157	0.46	0.16	0.28	0.34	0.43	0.55
Total Organic Carbon, mg/L	27	9.38	5.75	3.9	5.3	7.3	12
Total Phosphorus, mg/L	151	0.01	0.01	0.01	0.01	0.01	0.02
SCI, unitless	4	74.25	6	67	69	76	79

[1] Percentiles based on ranking of data.

[2] 10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.

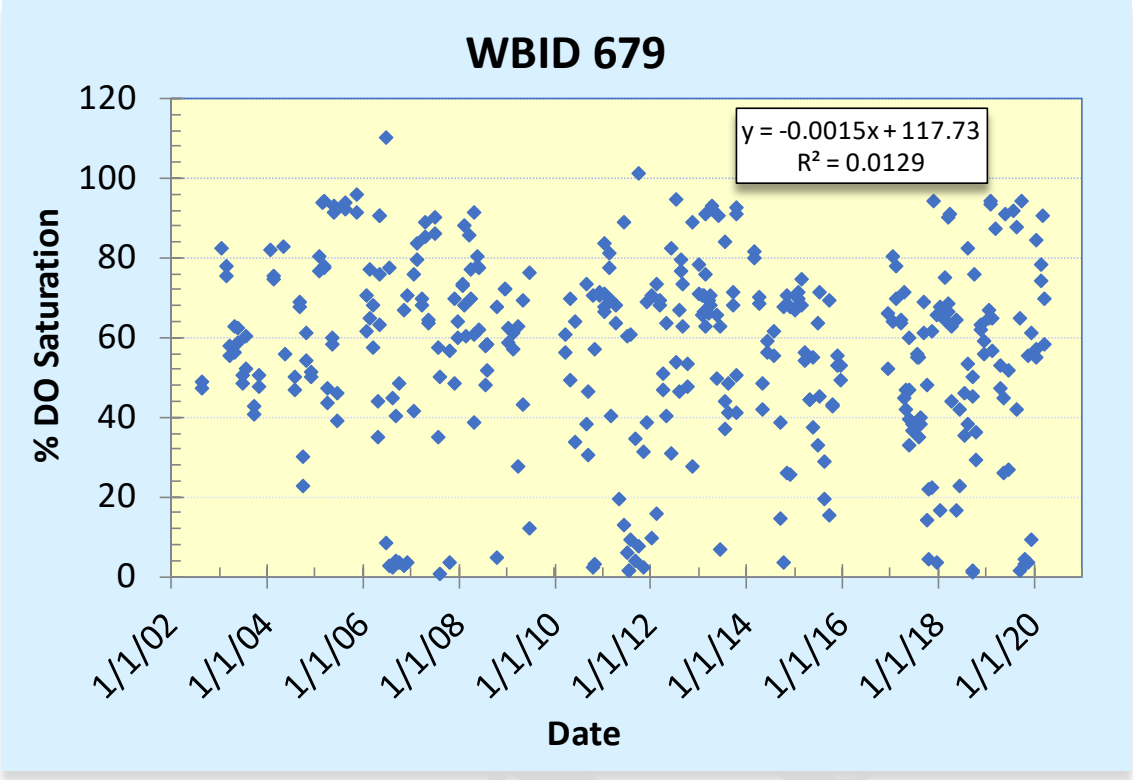

Figure 4. DO saturation levels in Black Creek (WBID 679) during the period from 2002 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

3.1.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Black Creek during the 2006 to 2020 period, a DO saturation SSAC of 31% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 31% DO saturation. The proposed SSAC would apply to freshwater portions of Black Creek and its tributaries from the geographic coordinates, latitude: N 30° 32' 31.73" and longitude: W -85° 59' 41.17" to the confluence with the Mitchell River (**Figure 5**).

3.1.7 Downstream waters protection

Black Creek flows into the Mitchell River, a Class II marine water, which ultimately empties into Choctawhatchee Bay. Based on the current listing status, the Mitchell River is not impaired for DO. Because the DO SSAC for Black Creek will be set at the existing water quality condition and the downstream receiving water of the Mitchell River is meeting the applicable DO criterion, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

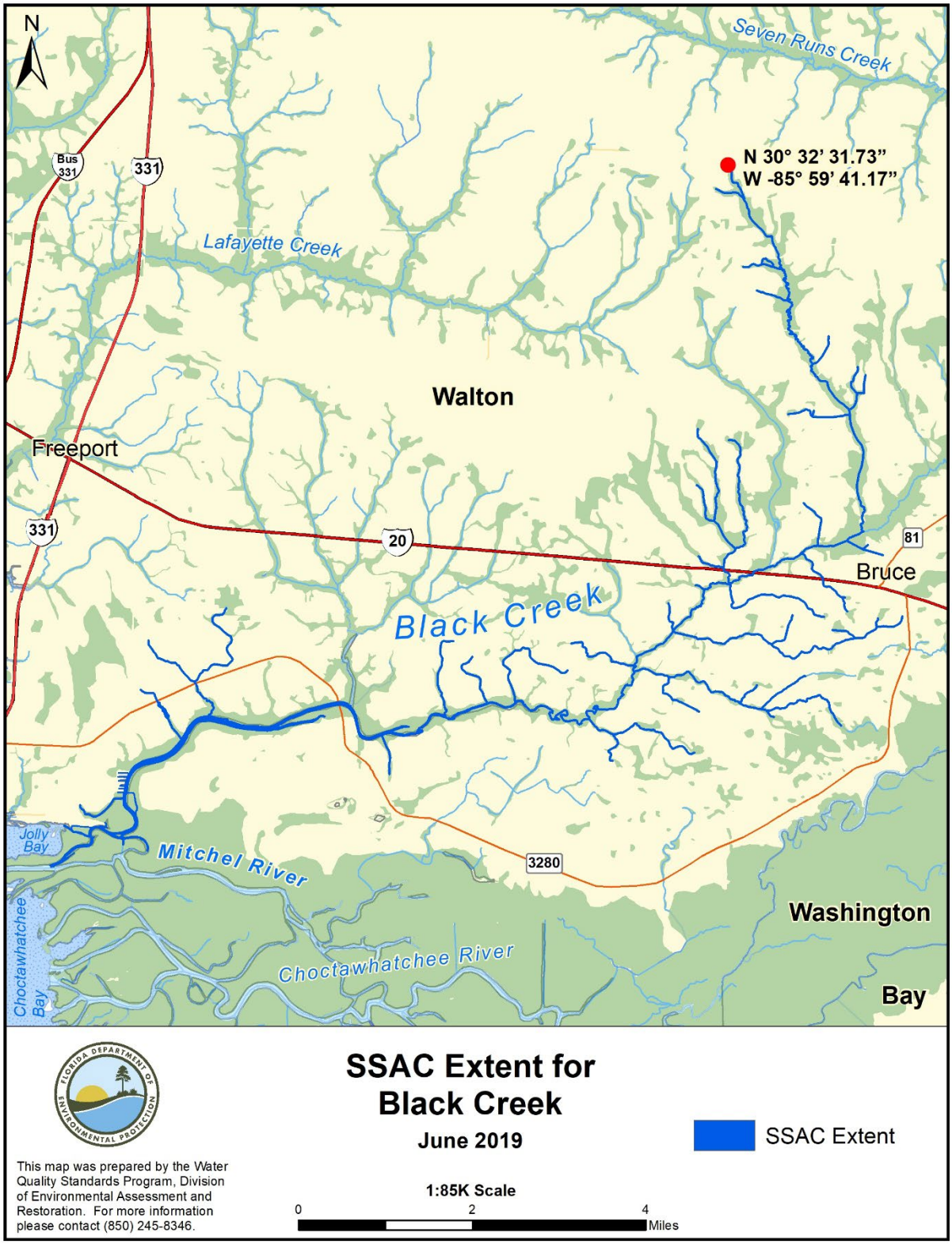

Figure 5. Map illustrating the proposed extent of the Type II DO SSAC for Black Creek.

3.2 Stafford Creek (WBID 723)

3.2.1 System Description

Stafford Creek (WBID 723) is a Class III freshwater system located in Calhoun County within the Apalachicola sub-basin (**Figure 6**). Stafford Creek flows east through Parish Lake to a wetland system called "The Bayou" that flows south and eventually empties into the Apalachicola River. A portion of the Apalachicola River OFW is located within Stafford Creek's watershed.

3.2.2 Land use

A summary of the Level 2 land use categories located within WBID 723 is provided in **Table 6**. The majority (78.2%) of the land uses in the Stafford Creek WBID are natural, with wetlands covering approximately 21.5% and forest and scrub habitat comprising 49.4% of the total acreage in the WBID. Urban land uses only encompass 6.4% of the area, and agricultural land uses (primarily planted pines) make-up 12.5% of the WBID.

3.2.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

No wastewater facilities were identified by the WAFR layers (sites and facilities) within the boundaries of this WBID.

Municipal Separate Storm Sewer System (MS4) permits

There were no MS4 permits identified by the NPDES Stormwater MS4 Permits layer within the Stafford Creek watershed.

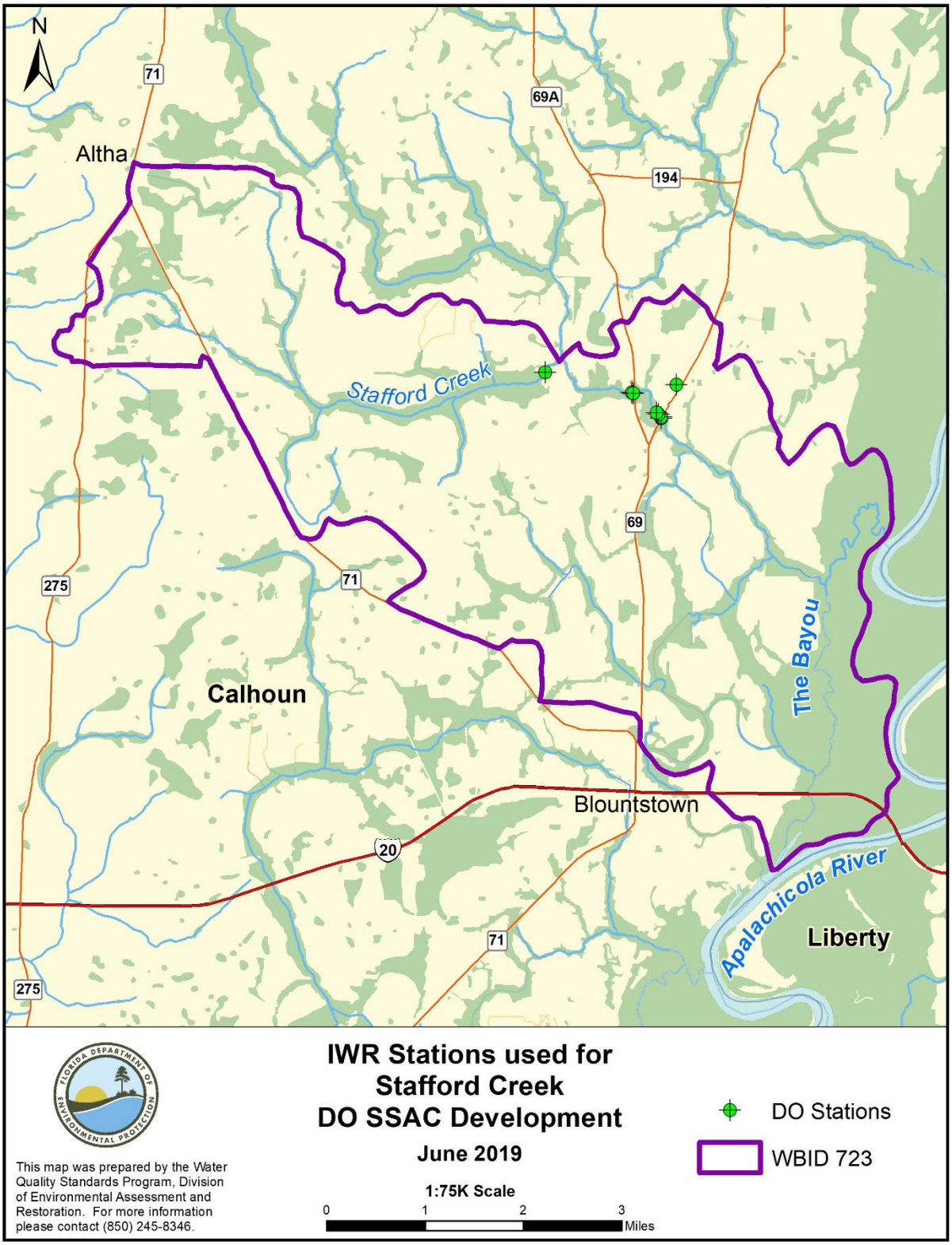

Figure 6. Map illustrating Stafford Creek and the IWR stations used to develop the proposed DO SSAC.

Table 6. Level 2 Land Use for Stafford Creek (WBID 723)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	775.68	4.59
Residential Medium Density	1200	65.81	0.39
Residential High Density	1300	5.29	0.03
Commercial and Services	1400	31.77	0.19
Industrial	1500	13.52	0.08
Institutional	1700	90.28	0.53
Open Land	1900	92.31	0.55
Cropland and Pastureland	2100	1898.41	11.23
Tree Crops	2200	77.68	0.46
Specialty Farms	2500	16.95	0.10
Other Open Lands <Rural>	2600	125.18	0.74
Herbaceous	3100	164.73	0.97
Shrub and Brushland	3200	44.99	0.27
Mixed Rangeland	3300	117.53	0.70
Upland Coniferous Forests	4100	445.86	2.64
Upland Hardwood Forests	4200	247.54	1.46
Upland Mixed Forests	4300	459.70	2.72
Tree Plantations	4400	6858.80	40.59
Streams and Waterways	5100	63.28	0.37
Lakes	5200	3.05	0.02
Reservoirs	5300	46.32	0.27
Slough Waters	5600	4.54	0.03
Wetland Hardwood Forests	6100	2167.12	12.82
Wetland Coniferous Forests	6200	880.37	5.21
Wetland Forested Mixed	6300	1484.75	8.79
Vegetated Non-Forested Wetlands	6400	333.83	1.98
Disturbed Lands	7400	98.80	0.58
Transportation	8100	181.77	1.08
Communications	8200	0.60	0.004
Utilities	8300	102.88	0.61
Total		16899.36	100

3.2.4 303(d) Assessment History

Stafford Creek was placed in assessment category 3b (some data and information are present but not enough to determine if any designated use is attained) for DO during cycle 1 (group 2 cycle 1 planning Period:1991-2000; verified period:1/1996-6/2003). During cycle 2 (group 2 cycle 2 planning period: 1996-2005; verified period:1/2001-6/2008), Stafford Creek was moved to assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant) for DO (concentration). During the cycle 3 assessment (group 2 cycle 3 planning period: 2002-2011; verified period: 1/2007-6/2014), Stafford Creek was moved into the 4c assessment category (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation).

3.2.5 Biological and Water Quality Data Summary

During the 2006 to 2020 period, the water quality in Stafford Creek (WBID 723) supported a healthy biological community as evidenced by passing SCI scores. Four Stream Condition Index (SCI) measurements were collected during the period of record used for this assessment (2006-2020) (**Table 7**). The two most recent SCIs were conducted on 4/9/2015 and 2/26/2019, and scored 77 and 63, respectively. The average score of 70.0 for the last two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Stafford Creek.

The average DO saturation level in Stafford Creek (73.2 %) is above the 67% DO criterion applicable to Panhandle streams. However, approximately 33% of the 77 measurements were below the criterion. **Figure 7** provides the DO saturations levels measured in WBID 723 since 2006. A statistically significant decreasing trend in DO levels was not observed suggesting that the DO levels in Stafford Creek have not been adversely impacted by anthropogenic inputs during the period of record.

Summary statistics for related water quality parameters for Stafford Creek are provided in **Table 7**. Color and TOC levels are relatively low, averaging 78.6 PCU and 8.98 mg/L, respectively, despite the large percentage of wetland and forest areas surrounding the Creek. Chlorophyll-*a* concentrations in Stafford Creek averaged 1.3 µg/L, with a median of 0.77 µg/L. Nutrient (i.e., TN and TP) concentrations in Stafford Creek averaged 1.17 mg/L and 0.07 mg/L, respectively.

Table 7. Summary of water quality and biological data for Stafford Creek (WBID 723) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	70	1.33	1.89	0.28	0.5	0.77	1.23
Color, PCU	50	78.6	42.1	30	39	74.5	110
Specific Conductance, µmhos/cm	73	93	29	60	69	94	115
DO Saturation, %	70	73.2	21.1	39.6/**46.2**[2]	57.8	77.5	85.9
Total Nitrogen, mg/L	69	1.17	0.89	0.56	0.69	0.85	1.33
Total Organic Carbon, mg/L	68	8.98	4.29	4.04	5.85	8.25	11.75
Total Phosphorus, mg/L	71	0.07	0.17	0.01	0.02	0.03	0.05
SCI, unitless	4	59.25	14	48	48	56	74

[1] Percentiles based on ranking of data.
[2] 10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.

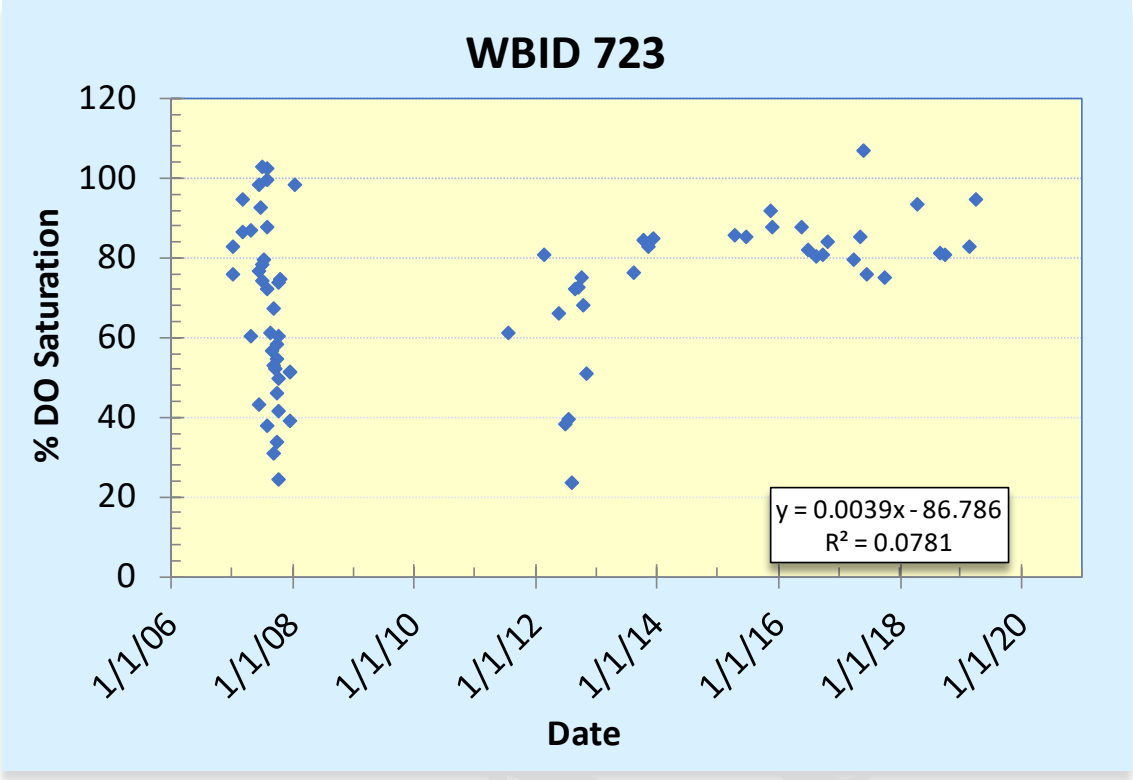

Figure 7. DO saturation levels in Stafford Creek (WBID 723) during the period from 2007 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

3.2.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Stafford Creek during the 2006 to 2020 period, a DO saturation SSAC of 46% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 46% DO saturation. The proposed SSAC would apply in Stafford Creek and its tributaries from the headwaters of Stafford Creek east of Highways 275 and 71 to the confluence with "The Bayou" (**Figure 8**).

3.2.7 Downstream waters protection

Stafford Creek flows downstream into a large wetland system called "The Bayou" that is located in the same WBID as Stafford Creek. The Bayou eventually empties into the Apalachicola River WBID 375F. Based on the current listing status, this portion of the Apalachicola River downstream of Stafford Creek is not impaired for DO. Because the DO SSAC for Stafford Creek will be set at the existing water quality condition and the downstream receiving water of the Apalachicola River is meeting the applicable DO criteria, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

3.2.8 Endangered Species Act Considerations

Stafford creek flows downstream to "The Bayou," which ultimately empties into the Apalachicola River further downstream. The Apalachicola River is designated as critical habitat for the endangered fat three ridge mussel and the threatened purple bankclimber mussel. GIS coverage of this critical habitat area can be located through the Panama City Ecological Services/ Fish and Wildlife Conservation Office Freshwater Mussels webpage. The Apalachicola River is also designated as critical habitat for the threatened Atlantic sturgeon (Gulf subspecies). The portion of mussel and Atlantic sturgeon (Gulf subspecies) critical habitat in the Apalachicola River that occurs near the proposed SSAC area for Stafford Creek is shown in **Figure 9**. It is not anticipated that this SSAC will have an impact on the critical habitat or the health of the mussels or the Atlantic sturgeon (Gulf subspecies) within the Apalachicola river because Stafford Creek is not a direct tributary to the Apalachicola River and the proposed DO SSAC is based on existing conditions.

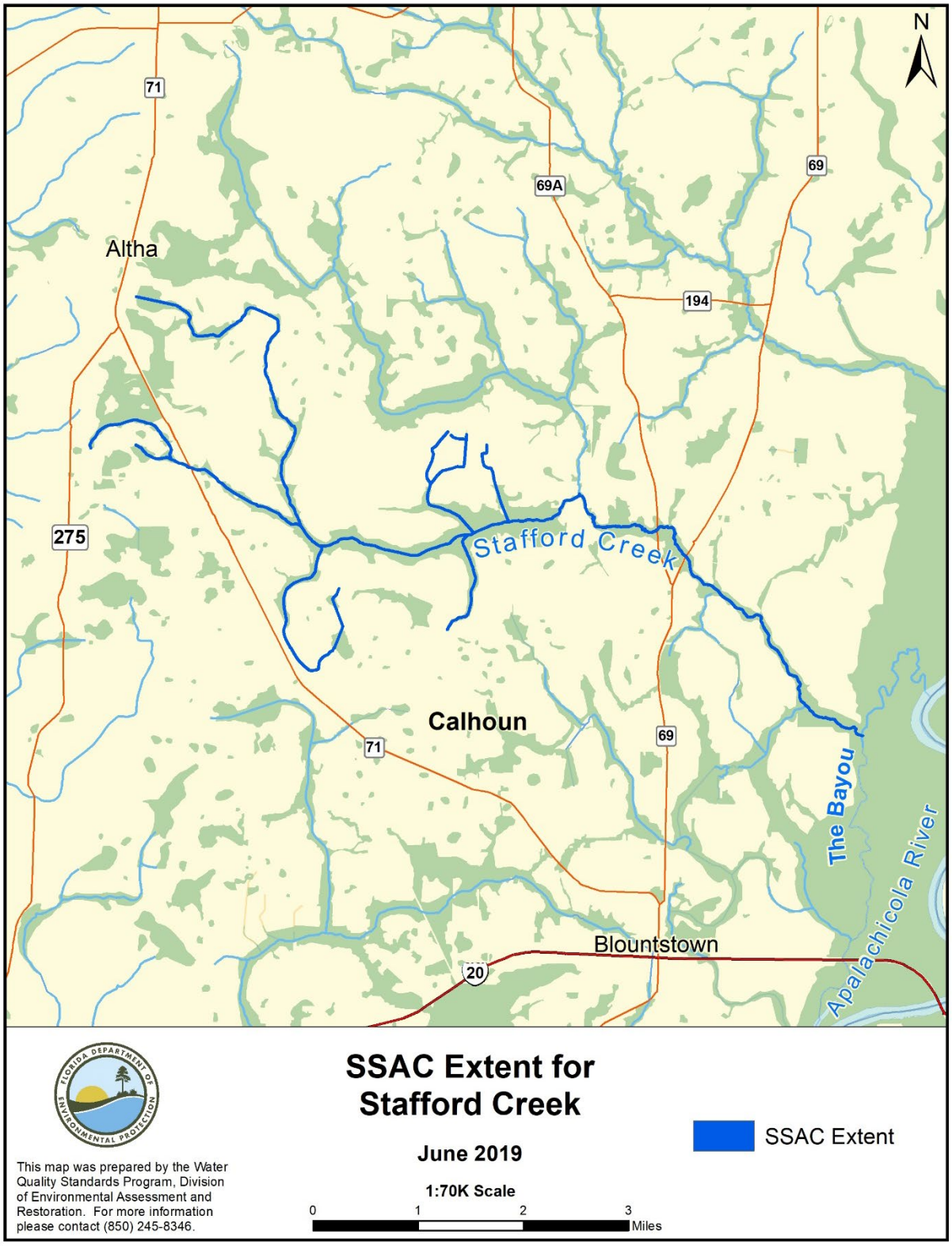

Figure 8. Map illustrating the proposed extent of the Type II DO SSAC for Stafford Creek.

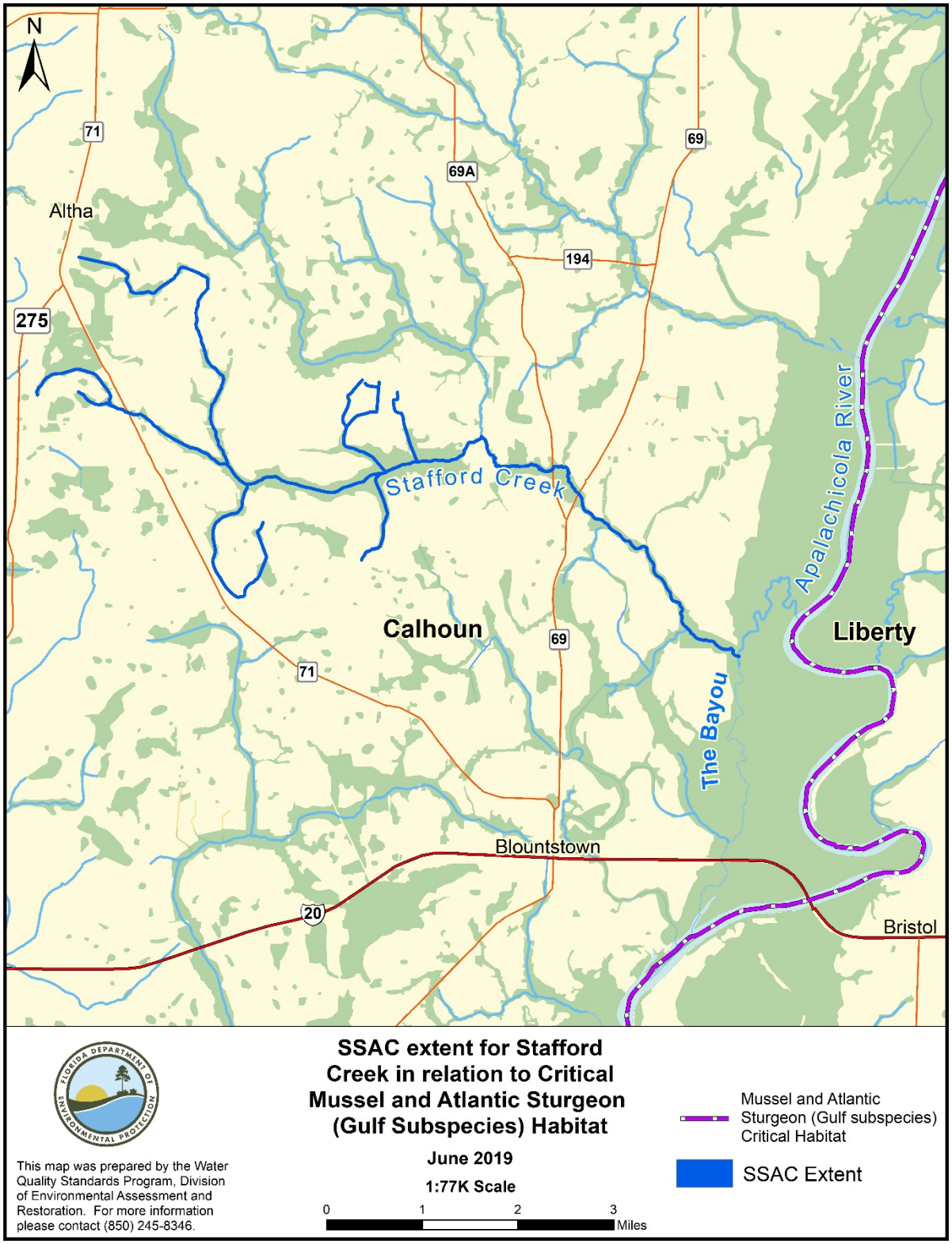

Figure 9. Map illustrating the portion of mussel and Atlantic sturgeon (Gulf subspecies) critical habitat that occurs near the proposed DO SSAC area for Stafford Creek.

3.3 Pony Creek (WBID 1426)

3.3.1 System Description

Pony Creek (WBID 1426) is located in Polk County within the Withlacoochee sub-basin (**Figure 10**). Pony Creek flows north to the Withlacoochee River. This WBID contains portions of several conservation lands, including the Green Swamp, the Green Swamp Land Authority Land Protection Agreements, the SWFWMD Green Swamp Conservation Easements, FL DEP Green Swamp Conservation Easements, the Hilochee Wildlife Management Area, and the General James A. Van Fleet State Trail, which are managed by the state. This WBID also contains a very small portion of the Withlacoochee River System OFW.

3.3.2 Land use

A summary of the Level 2 land use categories located within WBID 1426 is provided in **Table 8**. Wetlands cover approximately 36% of the area surrounding Pony Creek, and forested and scrub habitat cover another 13.3% of the area. Urban land uses encompass approximately 11.1% of the total acreage in the WBID. Agricultural land uses, mostly improved pastures, comprise 39.1% of the area.

Extractive Land Use

The Statewide Land Use Land Cover layer noted an area of extractive land use of approximately 55.36 acres. This extractive land use was identified as the Polk City Byrd Pit owned by the Town of Polk City, which was a sand mine. Reclamation requirements for this site fall under Chapter 62C-39, F.A.C., Reclamation Requirements for Solid Resources other than Phosphate, Limestone, Heavy Minerals, and Fuller's Earth. Sand extraction activities in this area are not believed to be impacting the existing DO levels in Pony Creek.

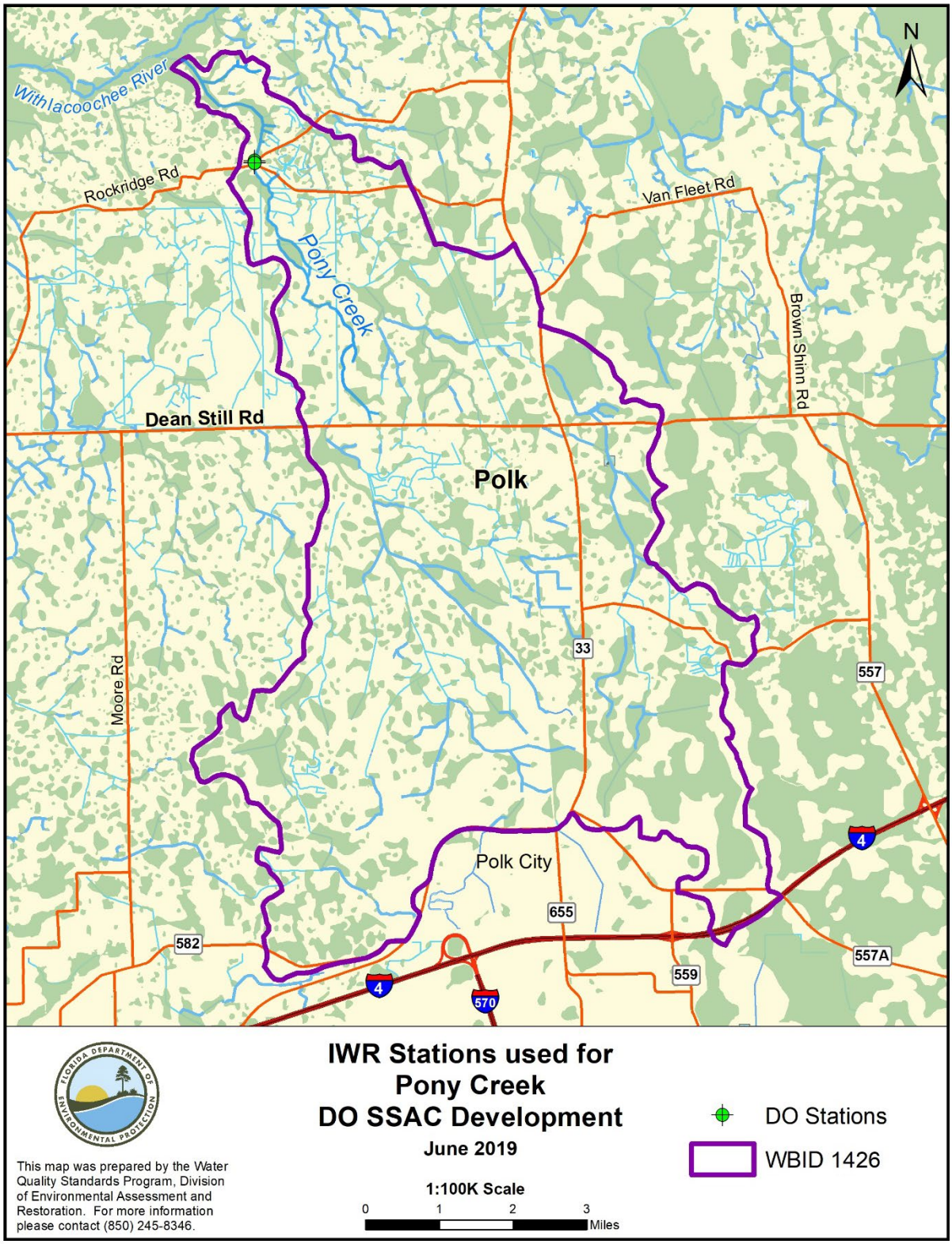

Figure 10. Map illustrating Pony Creek and the IWR stations used to develop the proposed DO SSAC.

Table 8. Level 2 Land Use for Pony Creek (WBID 1426)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	2928.91	9.06
Residential Medium Density	1200	181.32	0.56
Residential High Density	1300	3.68	0.01
Commercial and Services	1400	56.70	0.18
Industrial	1500	81.54	0.25
Extractive	1600	55.36	0.17
Institutional	1700	73.55	0.23
Recreational	1800	54.85	0.17
Open Land	1900	147.00	0.45
Cropland and Pastureland	2100	12005.61	37.12
Tree Crops	2200	174.50	0.54
Nurseries and Vineyards	2400	32.70	0.10
Specialty Farms	2500	46.39	0.14
Other Open Lands <Rural>	2600	387.45	1.20
Herbaceous	3100	36.73	0.11
Shrub and Brushland	3200	898.72	2.78
Mixed Rangeland	3300	91.66	0.28
Upland Coniferous Forests	4100	2743.18	8.48
Upland Hardwood Forests	4200	5.19	0.02
Upland Mixed Forests	4300	310.99	0.96
Tree Plantations	4400	228.48	0.71
Streams and Waterways	5100	3.19	0.01
Lakes	5200	40.57	0.13
Reservoirs	5300	63.04	0.19
Wetland Hardwood Forests	6100	373.96	1.16
Wetland Coniferous Forests	6200	4472.91	13.83
Wetland Forested Mixed	6300	3983.17	12.32
Vegetated Non-Forested Wetlands	6400	2792.46	8.63
Non-Vegetated	6500	2.74	0.01
Transportation	8100	65.51	0.20
Utilities	8300	1.08	0.003
Total		32343.16	100

3.3.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

This area contains one non-surface water discharger, Cardinal Hill WWTF (FLA489093), and a concrete batch plant, A-1 Black Concrete (FLG110321). Cardinal Hill WWTF is a domestic wastewater treatment facility that discharges to land application. The permitted capacity is limited to the combined capacity of two slow-rate restricted public access land application systems and one rapid-rate land application system, for a total of 0.285 MGD. A-1 Black Concrete is covered under a generic permit for concrete batch plants. Cardinal Hill WWTF is located approximately 4.6 miles south of Pony Creek, and A-1 Black Concrete is located approximately 5.7 miles south of Pony Creek. It is not anticipated that these facilities are impacting the existing DO levels in this system.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase I MS4 permit FLS000015, whose permittee is Polk County, covers the majority of this area. The City of Polk City is also a co-permittee under this MS4 permit. It is not anticipated that this MS4 is impacting the existing DO levels in this system.

3.3.4 303(d) Assessment History

During the cycle 1 assessment (group 4 cycle 1 planning period: 1993-2002; verified period: 1/1998-6/2005), Pony Creek was placed in assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant) for DO (concentration). During the cycle 2 assessment (group 4 cycle 2 planning period: 1998-2007; verified period: 1/2003-6/2010), Pony Creek was listed as impaired for DO with total phosphorus identified as the causative pollutant and subsequently moved to assessment category 5 (water quality standards are not attained and a TMDL is required). During the cycle 3 assessment (group 4 cycle 3 planning period: 2004-2013; verified period 1/2009- 6/2016), Pony Creek was moved into the 4c assessment category (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation).

3.3.5 Biological and Water Quality Data Summary

During the 2006 to 2020 period, the water quality in Pony Creek (WBID 1426) supported a healthy biological community as indicated by passing SCI scores. Three SCI measurements were collected during the period of record used for this assessment (2006-2020) (**Table 9**). The two most recent SCIs were conducted on 11/17/2014 and 6/23/2015, and scored 57 and 62, respectively. The average score of 59.5 for the last two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Pony Creek.

The average DO saturation level in Pony Creek (58.2 %) is well above the 38% DO criterion applicable to Peninsula streams. However, 15% of the measurements collected are below the criterion. **Figure 11** provides the DO saturation levels measured in WBID 1426 since 2002. A statistically significant decreasing trend in DO levels was not observed suggesting that the DO levels in Pony Creek have not been adversely impacted by anthropogenic inputs during the period of record.

Summary statistics for related water quality parameters for Pony Creek are provided in **Table 9**. The large percentage of wetland and forest areas surrounding the Creek lead to high color and organic matter levels, with average color and TOC levels of 416 PCU and 43.2 mg/L, respectively. Chlorophyll-*a* concentrations averaged 8.6 µg/L, with a median of 3.2 µg/L, while nutrients (i.e., TN and TP) averaged 1.79 mg/L and 0.23 mg/L for TN and TP, respectively.

3.3.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Pony Creek during the 2006 to 2020 period, a DO saturation SSAC of 34% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 34% DO saturation. The proposed SSAC would apply in Pony Creek and its tributaries from the headwaters north of Dean Still Road to the geographic coordinates: longitude: N 28° 19’ 53.42” and longitude: W -81° 54’ 27.8” (**Figure 12**).

Table 9. Summary of water quality and biological data for Pony Creek (WBID 1426) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	120	8.57	21.07	0.55	1.5	3.2	5.61
Color, PCU	127	416	181.6	151.6	270.7	427.1	519.8
Specific Conductance, µmhos/cm	126	115	35	77	87	113	136
DO Saturation, %	127	58.2	19.1	34/**33.7**[2]	41	58.1	72.5
Total Nitrogen, mg/L	125	1.79	0.59	1.03	1.46	1.73	2.1
Total Organic Carbon, mg/L	91	43.2	16.79	20.12	29.2	42.2	54.8
Total Phosphorus, mg/L	128	0.23	0.18	0.09	0.13	0.2	0.25
SCI, unitless	3	59.67	3	57	57	60	62

[1] *Percentiles based on ranking of data.*

[2] *10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.*

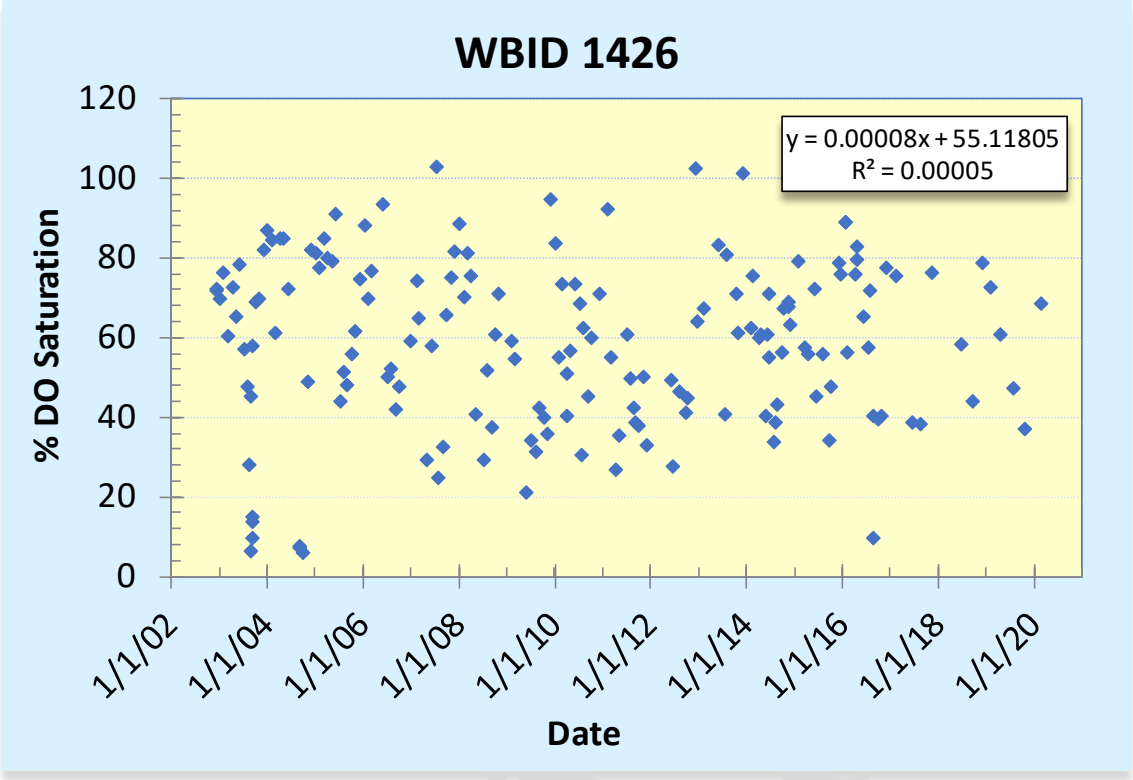

Figure 11. DO saturation levels in Pony Creek (WBID 1426) during the period from 2003 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no statistically significant decreasing trend in DO levels.

3.3.7 Downstream waters protection

Pony Creek flows downstream into the Withlacoochee River (WBID 1329F). Based on the current listing status, this portion of the Withlacoochee River downstream of Pony Creek is impaired for DO. However, during Cycle 3, this portion of the Withlacoochee River was placed in assessment category 4c because no causative pollutant could be identified, and the observed low DO is expected to be the result of natural phenomena. Based on an evaluation of the DO data collected in the Withlacoochee River since 1990, the low DO levels observed in WBID 1329F appear to originate from upstream portions of the River that receive extensive drainage from the Green Swamp. Since 1990, DO saturation levels in the Withlacoochee River segment upstream of Pony Creek (WBID 1329G) have averaged 41.2% compared to 55.0% in the river segment downstream of Pony Creek (WBID 1329F). During the same period, DO levels in Pony Creek were considerably higher, averaging 61.8% saturation. Therefore, water from Pony Creek is improving DO levels in the Withlacoochee River.

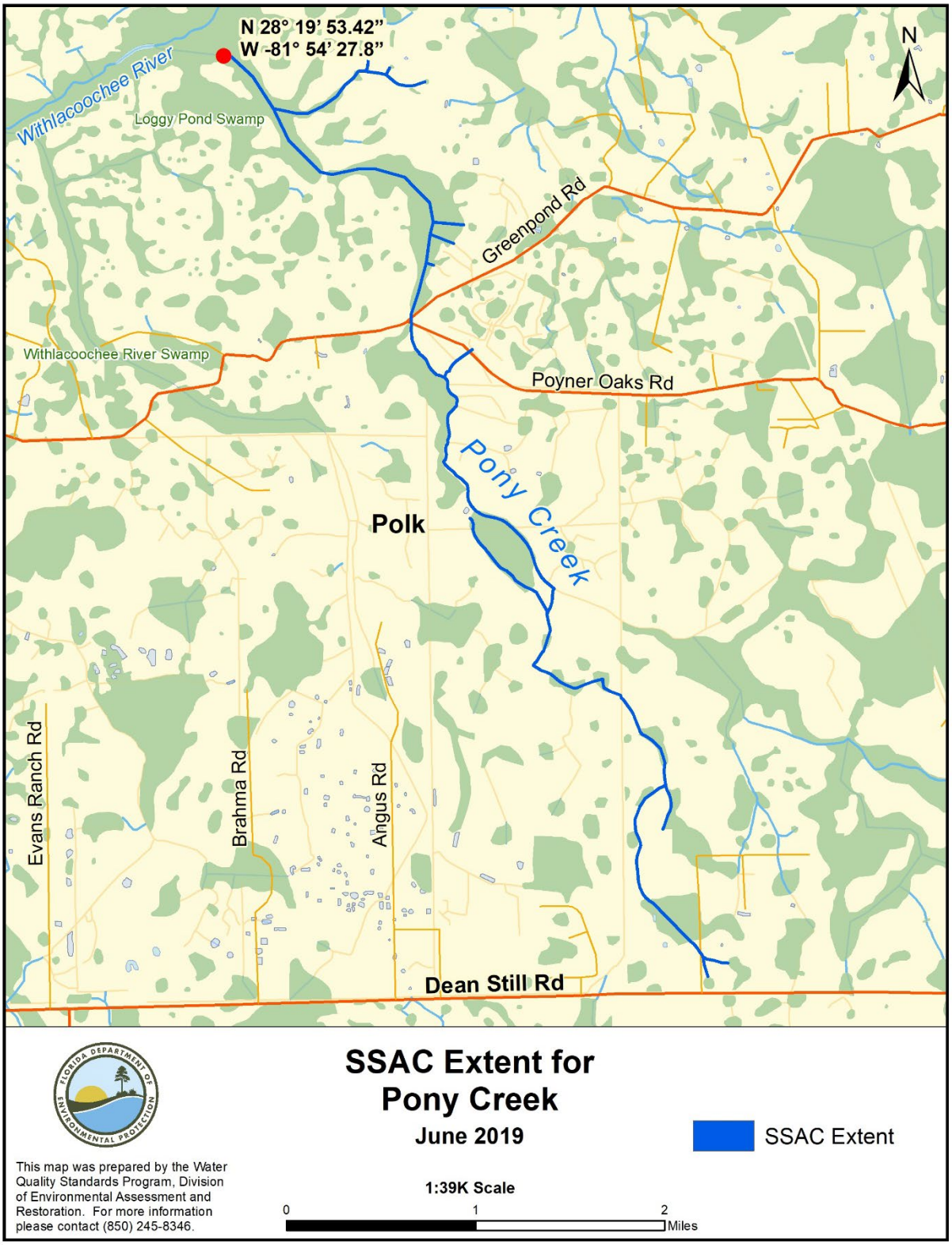

Figure 12. Map illustrating the proposed extent of the Type II DO SSAC for Pony Creek.

3.4 Reedy Creek (WBID 1685B)

3.4.1 System Description

Reedy Creek (WBID 1685B) is a Class III freshwater system that is located in Polk County within the Kissimmee sub-basin (**Figure 13**). An additional close-up map illustrating the area proposed for DO SSAC development is located in **Figure 14**. Reedy Creek flows southeast from Reedy Lake to Lake Arbuckle. This WBID contains portions of the Morgan Lake Wales Preserve Conservation Bank Conservation Easement and Lake Wales Ridge State Forest, which are conservation lands managed by the state. A portion of the Lake Arbuckle State Park OFW is also located within the Reedy Creek watershed.

3.4.2 Land use

A summary of the Level 2 land use categories located within WBID 1685B is provided in **Table 10**. Natural land uses make-up the majority (77.1%) of the area surrounding Reedy Creek, with wetlands covering approximately 17.9% and forest and scrub habitat comprising 59.2% of the total acreage in the WBID. Urban land uses encompass only 1.2% of the area, while agricultural land use, primarily improved pastures with a small amount of citrus, make up 21.6% of the WBID.

3.4.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

No wastewater facilities were identified by the WAFR layers (sites and facilities) within the boundaries of this WBID.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase I MS4 permit FLS000015, whose permittee is Polk County, covers the entire area under evaluation for SSAC development. It is not anticipated that this MS4 is impacting the existing DO levels in this system.

3.4.4 303(d) Assessment History

During cycle 1 (group 4 cycle 1 planning period: 1993-2002; verified period: 1/1998-6/2005), Reedy Creek was listed as impaired for DO and placed in assessment category 5 (water quality standards are not attained and a TMDL is required). During cycle 2 (group 4 cycle 2 planning period: 1998-2007; verified period: 1/2003-6/2010), Reedy Creek remained in assessment category 5 for DO (concentration). However, during cycle 3 (group 4 cycle 3 planning period: 2004-2013; verified period 1/2009- 6/2016), Reedy Creek was moved into category 4c (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation).

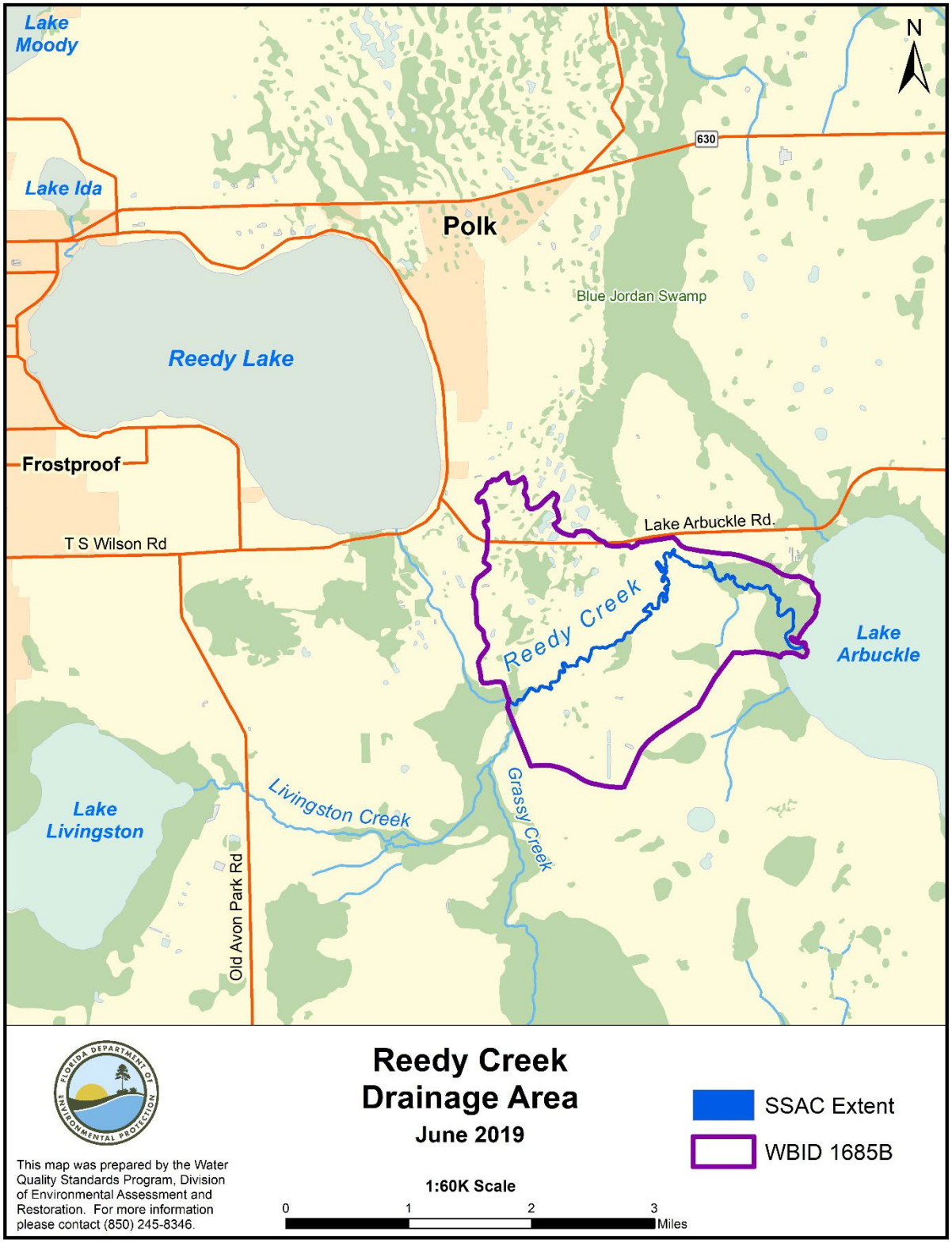

Figure 13. Map illustrating the hydrologic connectivity of Reedy Lake, Reedy Creek, and Lake Arbuckle. Water from Reedy Lake flows through Reedy Creek into Lake Arbuckle.

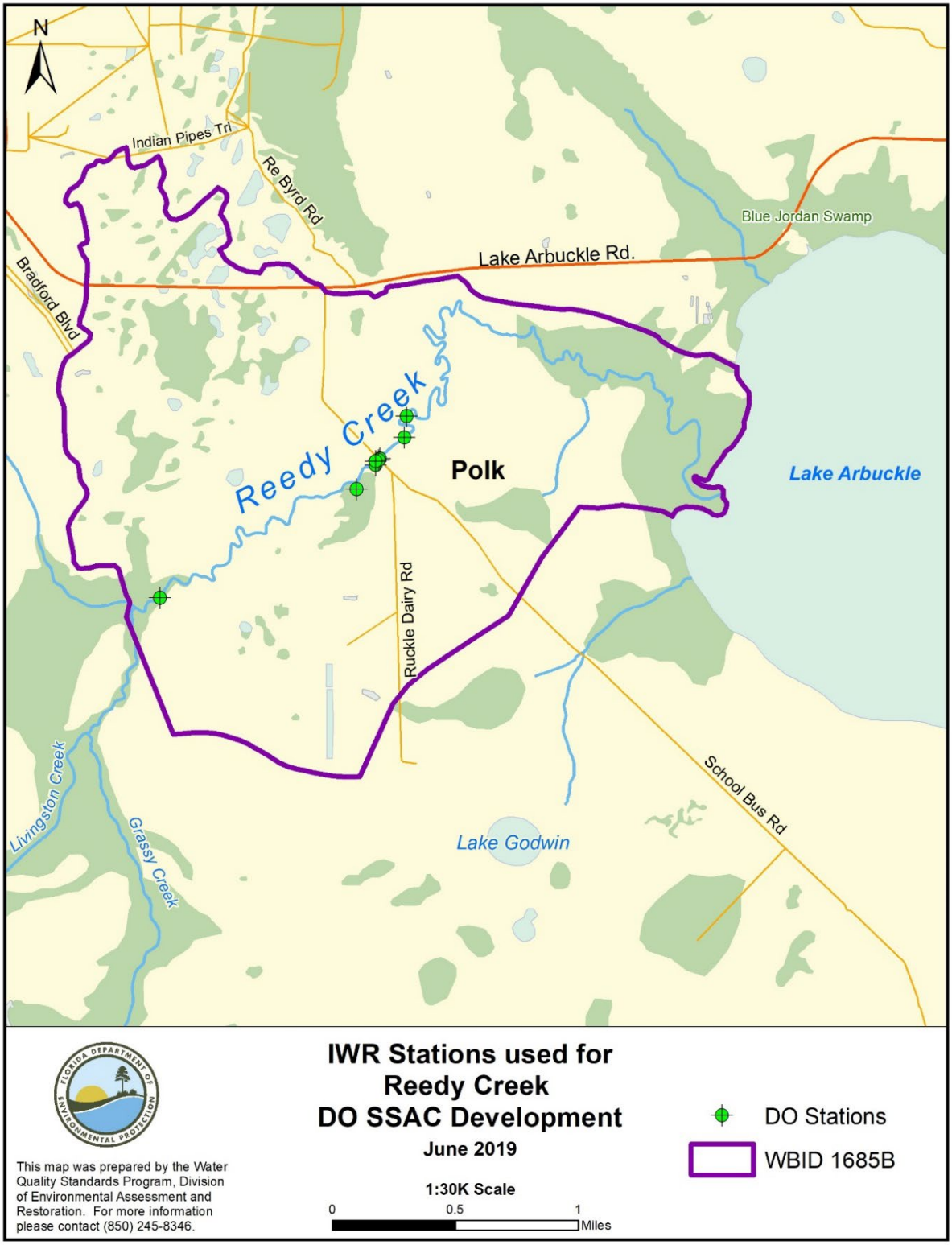

Figure 14. Map illustrating Reedy Creek and the IWR stations used to develop the proposed DO SSAC.

Table 10. Level 2 Land Uses for Reedy Creek (WBID 1685B)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	13.05	0.52
Open Land	1900	17.03	0.67
Cropland and Pastureland	2100	476.41	18.87
Tree Crops	2200	60.10	2.38
Feeding Operations	2300	5.62	0.22
Other Open Lands <Rural>	2600	3.48	0.14
Shrub and Brushland	3200	883.91	35.02
Upland Coniferous Forests	4100	461.42	18.28
Upland Hardwood Forests	4200	74.70	2.96
Upland Mixed Forests	4300	75.15	2.98
Lakes	5200	0.63	0.03
Reservoirs	5300	0.69	0.03
Wetland Hardwood Forests	6100	151.03	5.98
Wetland Coniferous Forests	6200	186.22	7.38
Vegetated Non-Forested Wetlands	6400	114.90	4.55
Total		2524.35	100

3.4.5 Biological and Water Quality Data Summary

Reedy Creek (WBID 1685B) exhibits good water quality that supports a healthy biological community. During the period from 2006 to 2019 period, Reedy Creek exhibited a very healthy macroinvertebrate community. Fifteen SCI measurements were collected during the period since 2006 (**Table 11**). The two most recent SCIs were conducted on 5/8/2017 and 1/15/2019 scored 81 and 86, respectively. The very high average score of 83.5 for the last two SCI measurements is indicative of a very healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Reedy Creek.

The average DO saturation level (59.6%) in the Creek is above the 38% DO saturation criterion; however, DO levels dropped below the criterion in more than 15% of the measurements. **Figure 15** provides the DO saturation levels measured in WBID 1685B since 1994. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record suggesting that the DO levels in Reedy Creek have not been adversely impacted by anthropogenic inputs.

Summary statistics for related water quality parameters for Reedy Creek are provided in **Table 11**. The large wetland and forested areas surrounding the Creek lead to abundant organic matter inputs (TOC average 15.35mg/L); however, color levels are relatively low, averaging 133 PCU. During the 2006 to 2020 period, chlorophyll *a* concentrations in Reedy Creek averaged 9.3 µg/L, with a median of 8.1 µg/L. Nutrient (i.e., TN and TP) levels in the creek averaged 1.64 mg/L and 0.07 mg/L, respectively.

Table 11. Summary of water quality and biological data for Reedy Creek (WBID 1685B) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	71	9.31	7.23	1.0	3.2	8.12	14.4
Color, PCU	71	133.1	113.9	25	40	100	175
Specific Conductance, µmhos/cm	124	225	41	170	200	234	250
DO Saturation, %	124	59.6	18.6	29.6/**35.8**[2]	45.3	63	74.2
Total Nitrogen, mg/L	117	1.64	0.39	1.17	1.36	1.69	1.88
Total Organic Carbon, mg/L	15	15.35	5.71	9.28	11	15	18
Total Phosphorus, mg/L	418	0.07	0.03	0.04	0.05	0.06	0.09
SCI, unitless	15	73.73	10	58	65	77	81

[1] Percentiles based on ranking of data.
[2] 10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.
[3] The count of 15 SCIs includes duplicate samples collected on 10/27/2009 and 6/22/2011

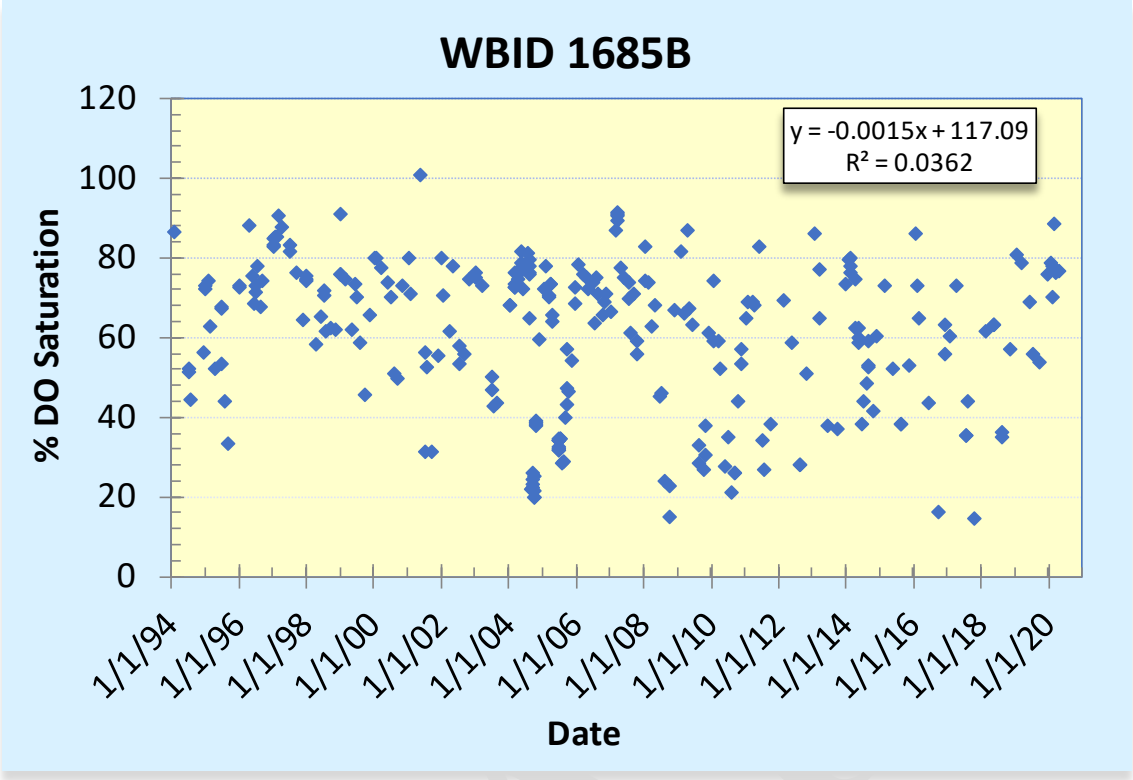

Figure 15. DO saturation levels in Reedy Creek (WBID 1685B) during the period from 1994 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

3.4.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Reedy Creek during the 2006 to 2020 period, a DO saturation SSAC of 36% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 36% DO saturation. The proposed SSAC would apply in the main channel of Reedy Creek from the confluence of Reedy Creek and Livingston Creek downstream to Lake Arbuckle (**Figure 16**).

3.4.7 Downstream waters protection

Reedy Creek flows downstream into Lake Arbuckle WBID 1685A. Based on the current listing status, Lake Arbuckle is not impaired for DO, but was placed on the planning list (3c) for DO trend during Cycle 3. Based on an analysis of the available data from Lake Arbuckle, the weak DO trend appears to be associated with years with higher than normal rainfall, which increases runoff from the surrounding wetlands. In addition to flushing out water with low DO from the wetlands, the higher amount of runoff results in higher levels of color and organic matter being transported to the Lake. This increases oxygen demand and reduces photosynthesis, resulting in slightly lower DO levels. Additionally, the WBIDs surrounding the lake all show similar trends

to varying extents further suggesting that the trend observed is a result of the period of higher rainfall and increased natural wetland inputs. Therefore, any contribution to the DO trend observed in the Lake Arbuckle from Reedy Creek is expected to be from natural runoff from the surrounding wetlands. Additionally, the DO SSAC for Reedy Creek will be set at the existing water quality condition (35.2% saturation), which is only slightly below the generally applicable criterion of 38% saturation. Therefore, the proposed DO SSAC for Reedy Creek is not expected to have an adverse impact on any downstream waters.

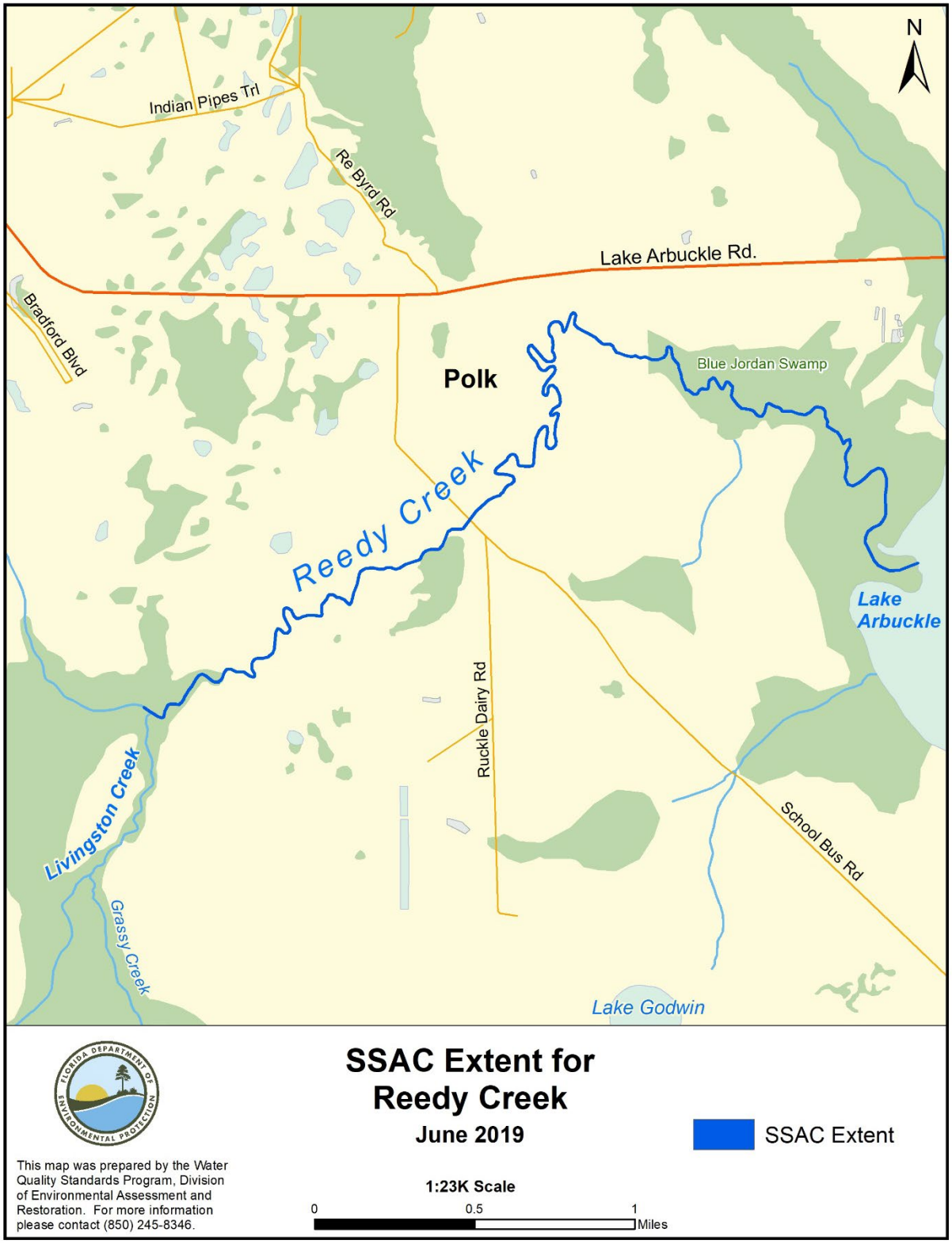

Figure 16. Map illustrating the proposed extent of the Type II DO SSAC for Reedy Creek.

3.5 Daughtrey Creek (WBID 3240F)

3.5.1 System Description

Daughtrey Creek (WBID 3240F) is a Class III freshwater stream that is located in both Charlotte and Lee Counties (**Figure 17**). Daughtrey Creek flows south into the Caloosahatchee River within the Caloosahatchee sub-basin. The WBID contains portions of the state managed Fred C. Babcock-Cecil M. Webb Wildlife Management Area, the federally managed Grasslands Reserve Program Easement #110, and the Prairie Pines and Caloosahatchee Creeks Preserves, which are managed by Lee County.

3.5.2 Land use

A summary of the Level 2 land use categories located within the Daughtry Creek WBID is provided in **Table 12**. Wetlands cover approximately 20.9% of the area surrounding Daughtrey Creek, while forested and scrub habitat cover another 42.6% of the area. Urban land uses encompass approximately 11.2% of the total acreage in the WBID. Agricultural land uses, mostly improved pastures, comprise another 18.1% of the area.

3.5.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

There are two non-surface water dischargers in the WBID: River Trails Mobile Home Park (FLA014676) and Julia Park (FLA014451). The River Trails Mobile Home Park is a domestic wastewater facility that is permitted to discharge 0.097 MGD annual average daily flow to a rapid infiltration basin system. Julia Park WWTP is a domestic wastewater facility with an existing 0.015 MGD annual average daily flow permitted capacity rapid infiltration basin system. River Trails Mobile Home Park and Julia Park are located approximately 0.4 miles and 0.45 miles west of the main stem of Daughtrey Creek, respectively. It is not anticipated that these facilities are impacting the existing DO levels in this system.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase II MS4 permit FLR04E043, whose permittee is Charlotte County, covers the northern portion of Daughtrey Creek, and NPDES Phase I MS4 permit FLS000035, whose permittee is Lee County, covers the southern portion of Daughtrey Creek. It is not anticipated that these MS4s are impacting the existing DO levels in this system.

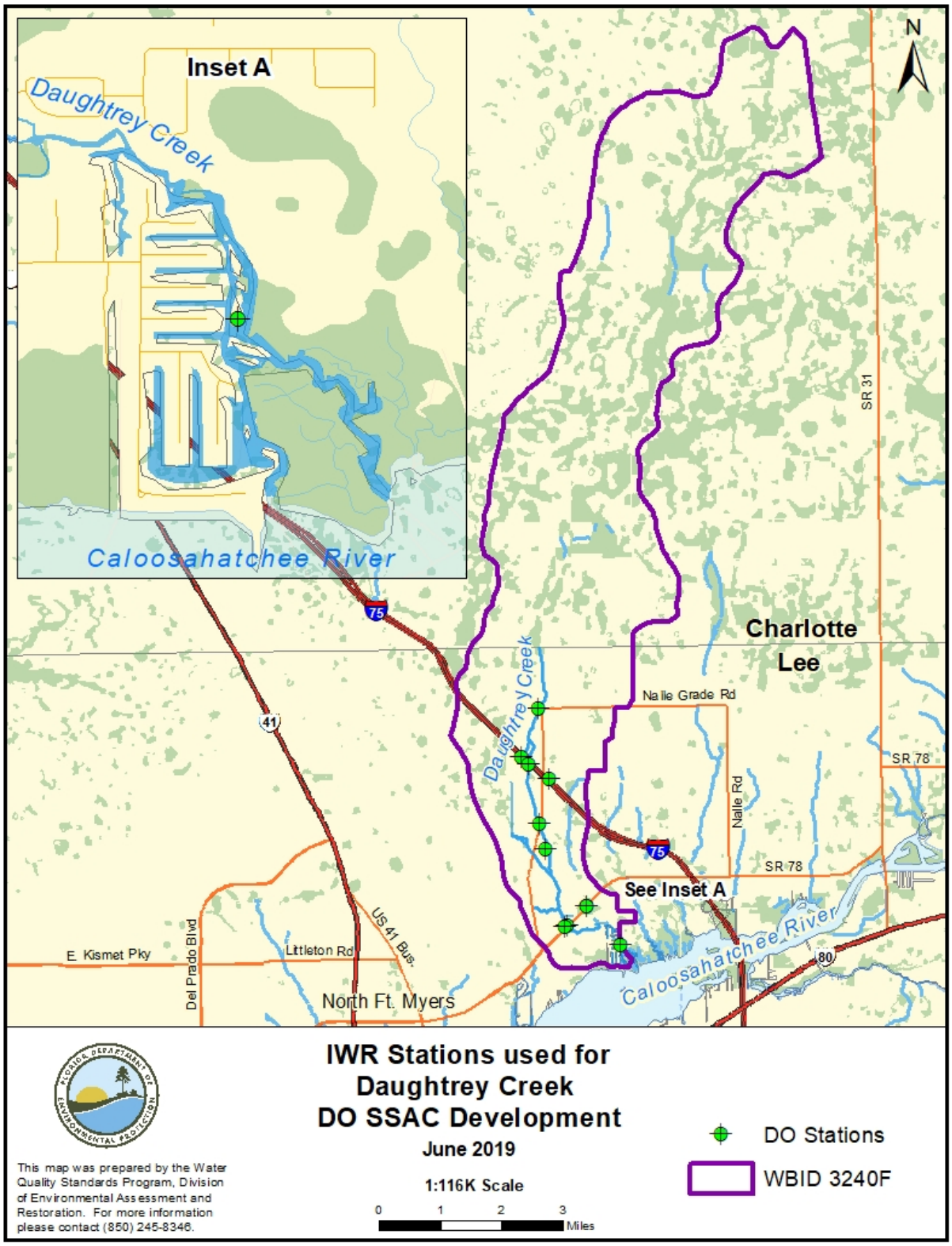

Figure 17. Map illustrating Daughtrey Creek and the IWR stations used to develop the proposed DO SSAC.

Table 12. Level 2 Land Use for Daughtrey Creek (WBID 3240F)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	2085.37	9.12
Residential Medium Density	1200	229.72	1.00
Residential High Density	1300	76.37	0.33
Commercial and Services	1400	89.60	0.39
Institutional	1700	22.02	0.10
Open Land	1900	54.85	0.24
Cropland and Pastureland	2100	3636.15	15.90
Tree Crops	2200	144.94	0.63
Nurseries and Vineyards	2400	80.26	0.35
Specialty Farms	2500	104.00	0.45
Other Open Lands <Rural>	2600	174.11	0.76
Herbaceous	3100	503.51	2.20
Shrub and Brushland	3200	2831.06	12.38
Mixed Rangeland	3300	135.51	0.59
Upland Coniferous Forests	4100	5395.86	23.59
Upland Hardwood Forests	4200	512.32	2.24
Upland Mixed Forests	4300	353.08	1.54
Tree Plantations	4400	17.46	0.08
Streams and Waterways	5100	33.21	0.15
Lakes	5200	1.20	0.01
Reservoirs	5300	281.51	1.23
Bays and Estuaries	5400	1.88	0.01
Wetland Hardwood Forests	6100	628.37	2.75
Wetland Coniferous Forests	6200	817.66	3.57
Wetland Forested Mixed	6300	4.89	0.02
Vegetated Non-Forested Wetlands	6400	4466.31	19.52
Disturbed Lands	7400	14.66	0.06
Transportation	8100	134.98	0.59
Utilities	8300	44.99	0.20
Total		22875.86	100

3.5.4 303(d) Assessment History

Daughtrey Creek was placed on the 1998 303(d) list for DO. During the cycle 1 assessment (group 3 cycle 1 planning period: 1992-2001; verified period: 1/1997-6/2004), Daughtrey Creek was placed in assessment category 2 (attains some designated uses and insufficient or no information or data are present to determine if remaining uses are attained) for DO and was delisted from the 1998 impaired waters list. During the cycle 2 assessment (group 3 cycle 2 planning period:1997-2006; verified period: 1/2002-6/2009), Daughtrey Creek was moved to assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant for DO (concentration). During the cycle 3 assessment (group 3 cycle 3 planning period: 2003-2012; verified period: 1/2008-6/2015), Daughtrey Creek was moved to assessment category 4c (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation). Although the waterbody is impaired for DO based on the number of exceedances for the sample size, there are supporting biological data that validate attainment of designated use.

3.5.5 Biological and Water Quality Data Summary

Daughtrey Creek (WBID 3240F) exhibits good water quality and a healthy biological community. During the period from 2006 through 2020, Daughtrey Creek exhibited a healthy macroinvertebrate community. Four SCI measurements were collected during the period of record used for this assessment (2006-2020) (**Table 13**). The two most recent SCIs were conducted 12/13/2011 and 11/29/2016, and scored 62 and 42, respectively. The average score of 52 for the last two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Daughtrey Creek.

The average DO saturation level (45.0%) in the Creek is above the 38% DO saturation criterion; however, DO levels dropped below the criterion in approximately 35% of the measurements collected since 2006. **Figure 18** provides the DO saturation levels measured in WBID 3240F since 2001. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record suggesting that the DO levels in Daughtrey Creek have not been adversely impacted by anthropogenic inputs during the period of record.

Summary statistics for related water quality parameters for Daughtrey Creek during the period from 2006 through 2020 are provided in **Table 13**. The large wetland and forested areas surrounding the creek lead to abundant organic matter inputs (TOC average 13.5 mg/L); however, color levels are relatively low, averaging 69.2 PCU. During the 2006 to 2020 period, Daughtrey Creek chlorophyll-*a* concentrations averaged 3.91 µg/L, with a median of 1.90 µg/L. Similarly, nutrients (i.e., TN and TP) concentrations in the creek averaged 1.15 mg/L and 0.10 mg/L, respectively.

Table 13. Summary of water quality and biological data for Daughtrey Creek (WBID 3240F). during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	805	3.91	8.06	0.25	0.83	1.9	3.86
Color, PCU	821	69.2	51.8	21.6	29.2	49.7	95.8
Specific Conductance, µmhos/cm	796	698	493	177	278	663	1030
DO Saturation, %	822	45.0	19.1	18.2/**20.5**[2]	32.2	45.4	58.9
Total Nitrogen, mg/L	831	1.15	0.56	0.58	0.79	1.1	1.4
Total Organic Carbon, mg/L	19	13.5	4.42	7.3	10	14	17
Total Phosphorus, mg/L	822	0.10	0.12	0.02	0.04	0.07	0.11
SCI, unitless	4	55.5	9	42	46	59	62

[1] *Percentiles based on ranking of data.*
[2] *10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.*

3.5.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Daughtrey Creek during the 2006 to 2020 period, a DO saturation SSAC of 21% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 21% DO saturation. The proposed SSAC would apply in the freshwater portion of Daughtrey Creek and its tributaries from the Charlotte/Lee County line to the confluence with the Caloosahatchee River (**Figure 19**).

3.5.7 Downstream waters protection

The downstream water for Daughtrey Creek is the Caloosahatchee River, a Class III marine water. Based on the current listing status, the portion of the Caloosahatchee River downstream of Daughtrey Creek is not listed as impaired for DO. However, this portion of the River has a TMDL for TN. The proposed DO SSAC is not expected to have any impact on the TN levels in the River or affect the achievement of the TMDL. Additionally, because the DO SSAC for Daughtrey Creek will be set at the existing water quality condition and the portion of the Caloosahatchee River downstream of the Creek is meeting the applicable DO criteria, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

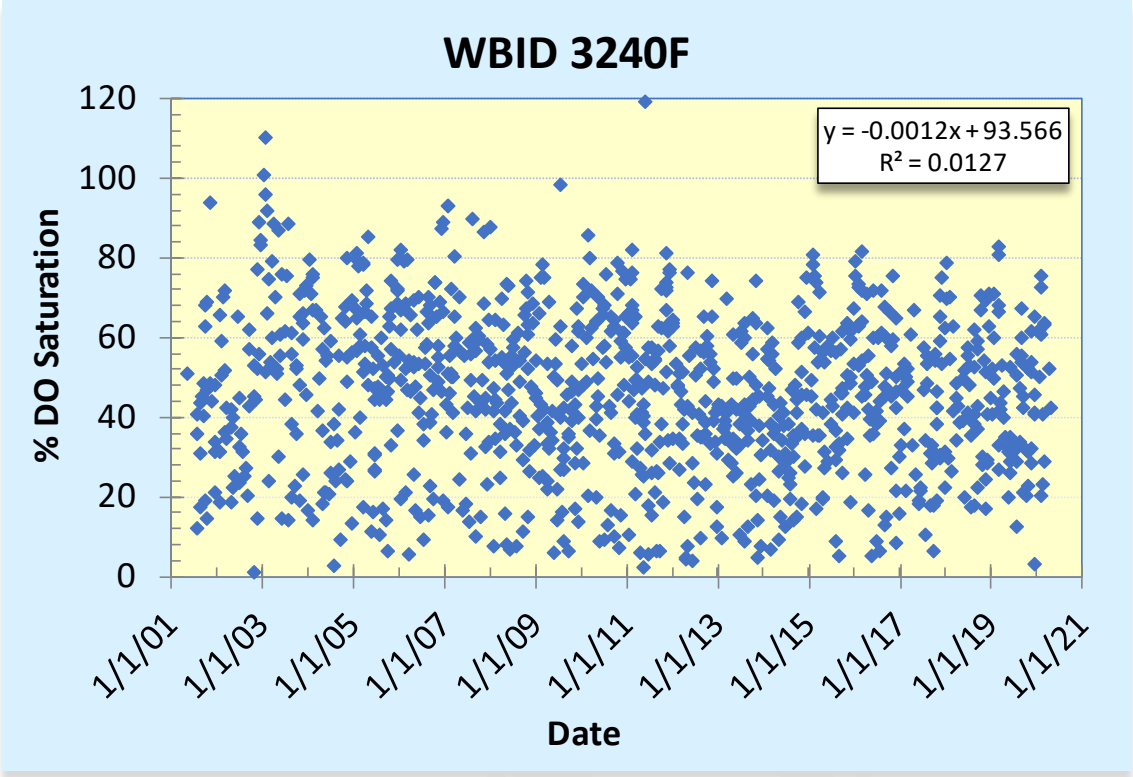

Figure 18. DO saturation levels in Daughtrey Creek (WBID 3240F) during the period from 2001 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

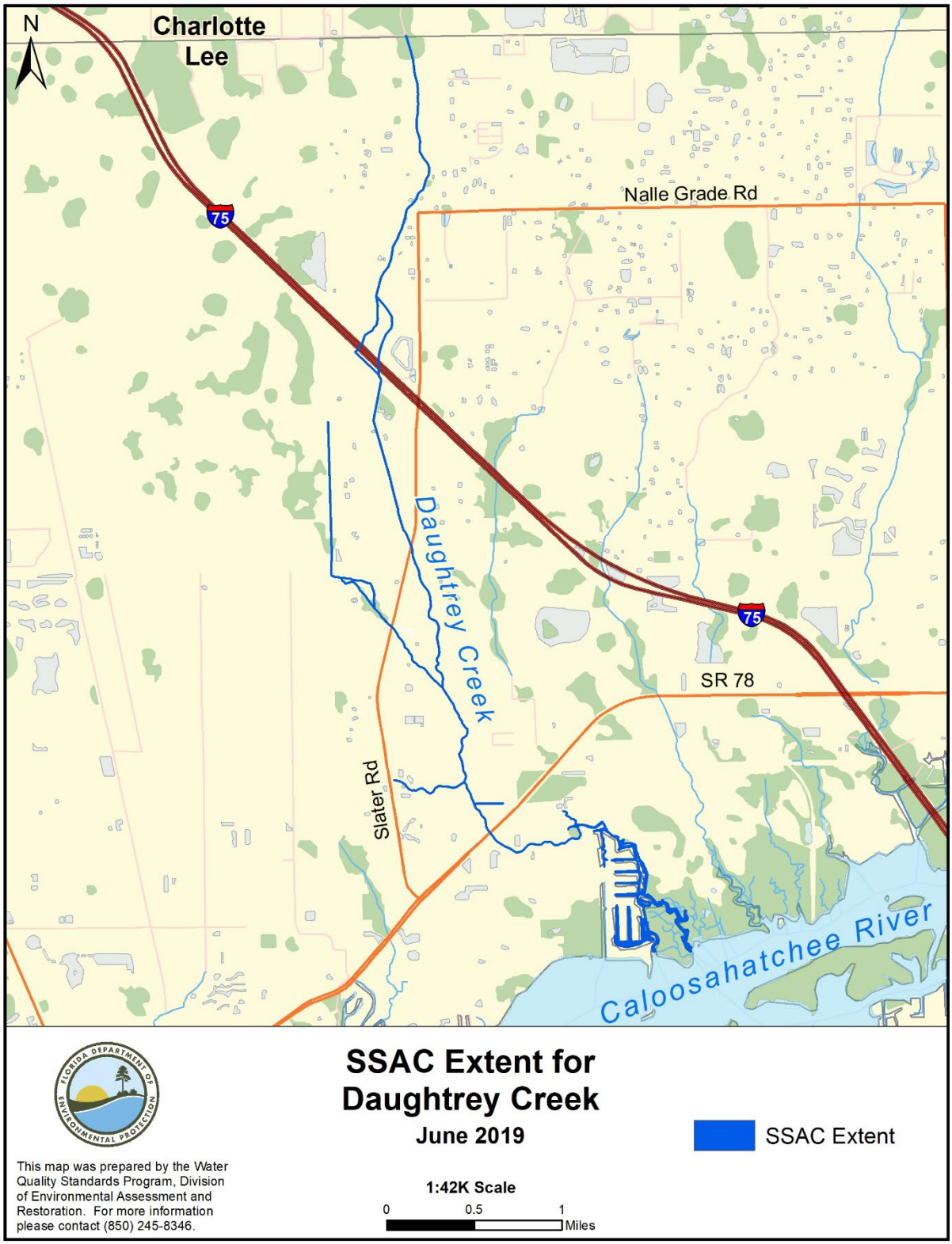

Figure 19 Map illustrating the proposed extent of the Type II DO SSAC for Daughtrey Creek.

3.6 Popash Creek (WBID 3240Q)

3.6.1 System Description

Popash Creek (WBID 3240Q) is a Class III freshwater stream that is located in both Charlotte and Lee Counties within the Caloosahatchee sub-basin (**Figure 20**). Popash Creek flows south to the Caloosahatchee River east of Daughtrey Creek. This WBID contains portions of the state managed Fred C. Babcock-Cecil M. Webb Wildlife Management Area, and the majority of Popash Creek Preserve and a portion of the Caloosahatchee Creeks Preserve, both of which are managed by Lee County.

3.6.2 Land use

A summary of the Level 2 land use categories located within WBID 3240Q is provided in **Table 14**. Wetlands cover approximately 27.7% of the area in the Popash Creek WBID, and forested and scrub habitat cover another 49.2% of the area. Urban land uses encompass approximately 9.3% of the total acreage in the WBID. Agricultural land uses, mostly improved pastures, comprise another 12.4% of the area around the Creek.

Extractive Land Uses

WBID 3240Q contains a portion of the AC Magnum Coral- Coral Rock Mine (formerly Winchester Lake Corp-Coral Rock Mine limestone mining operation), which covers over 1,700 acres. The mine site is made up of two portions: an original eastern portion consisting of 869.6 acres, which is outside the boundary of this WBID, and a western expansion area of approximately 873 acres, a portion of which lies within WBID 3240Q. Mining began in the eastern portion in 1981, and the area has largely been mined out. The western expansion area was approved in 2008. Reclamation in this area is subject to the requirements of Chapter 62C-36, F.A.C., Limestone Reclamation Requirements. Based on an inspection report written by Laura Kellam (DEP Mining and Mitigation Program) in February of 2017 regarding an inspection that took place on January 31, 2017, mining in the expansion area was expected to start soon. However, no excavation or any activity occurred on the property during 2017 or 2018 according to FDEP 2017 and 2018 annual reports. Limestone mining in this area is not believed to be impacting the existing DO levels in Popash Creek.

To the north of the Winchester Lake Corp-Coral Rock Mine, WBID 3240Q also contains a portion of the Cook Brown Partners-Cook Brown Mine, which was identified by the most current version of the Mandatory Non-Phosphate Sites ArcGIS layer as a limestone and sand mine. However, a DEP inspection report from February 6, 2017 written by Laura Kellam of the DEP mining and mitigation program noted that "No mining activity appears to be taking place on site. The site is pasture with cattle and has a house. No mining equipment or preparation of mining activity was observed." (DEP, 2017).

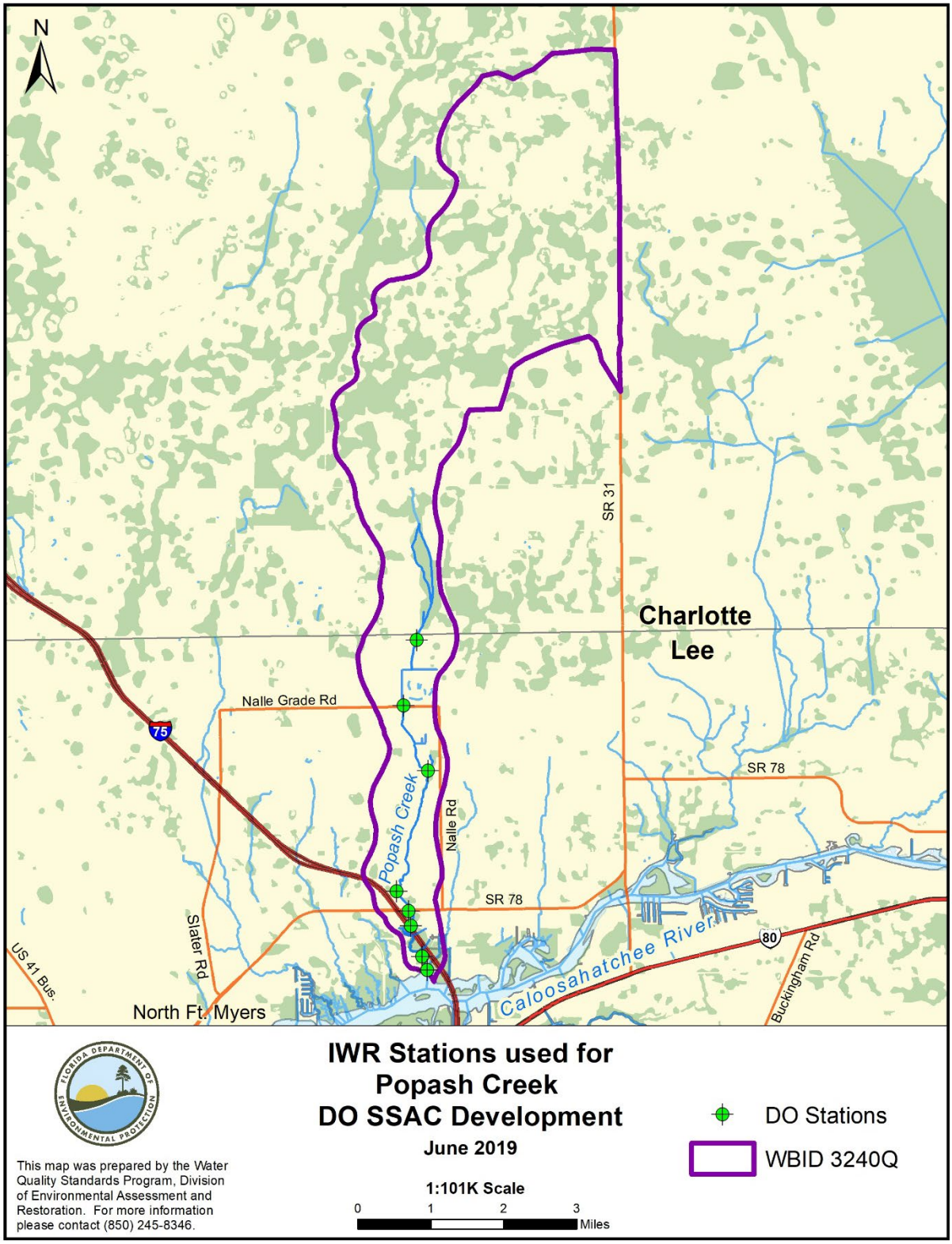

Figure 20. Map illustrating Popash Creek and the IWR stations used to develop the proposed DO SSAC.

Table 14. Level 2 Land Use for Popash Creek (WBID 3240Q)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	1114.54	8.79
Residential Medium Density	1200	39.78	0.31
Commercial and Services	1400	12.37	0.10
Open Land	1900	14.94	0.12
Cropland and Pastureland	2100	1312.11	10.35
Nurseries and Vineyards	2400	8.03	0.06
Specialty Farms	2500	36.58	0.29
Other Open Lands <Rural>	2600	216.68	1.71
Herbaceous	3100	363.28	2.87
Shrub and Brushland	3200	2431.72	19.18
Mixed Rangeland	3300	62.59	0.49
Upland Coniferous Forests	4100	3291.81	25.96
Upland Hardwood Forests	4200	28.32	0.22
Upland Mixed Forests	4300	59.86	0.47
Streams and Waterways	5100	15.81	0.12
Lakes	5200	9.79	0.08
Reservoirs	5300	41.69	0.33
Wetland Hardwood Forests	6100	282.28	2.23
Wetland Coniferous Forests	6200	271.03	2.14
Wetland Forested Mixed	6300	18.66	0.15
Vegetated Non-Forested Wetlands	6400	2937.77	23.17
Disturbed Lands	7400	19.64	0.15
Transportation	8100	75.41	0.59
Communications	8200	0.33	0.003
Utilities	8300	14.52	0.11
Total		12679.54	100

3.6.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

There are two non-surface water dischargers located in WBID 3240Q: High Point WWTP (FLA014491) and Seminole Campground WWTF (FLA014566). High Point WWTP has an existing 0.025 MGD annual average daily flow permitted capacity rapid infiltration basin system consisting of two percolation ponds having 0.0932-acre total bottom area. Seminole Campground WWTF is a 0.010 MGD domestic wastewater treatment plant permitted to discharge to a rapid infiltration basin system consisting of three percolation ponds. High Point WWTP and Seminole Campground WWTF are located approximately 0.18 miles and 0.03 miles to the west of Popash Creek, respectively. It is not anticipated that these facilities are impacting the existing DO levels in this system.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase II MS4 permit FLR04E043, whose permittee is Charlotte County, covers the northern portion of Popash Creek, and NPDES Phase I MS4 permit FLS000035, whose permittee is Lee County, covers the southern portion of Popash Creek. It is not anticipated that these MS4s are impacting the existing DO levels in this system.

3.6.4 303(d) Assessment History

During the cycle 1 assessment (group 3 cycle 1 planning period: 1992-2001; verified period: 1/1997-6/2004), Popash Creek was listed as impaired for DO and placed in assessment category 5 (water quality standards are not attained and a TMDL is required). During the cycle 2 assessment (group 3 cycle 2 planning period: 1997-2006; verified period: 1/2002-6/2009), Popash Creek was moved into assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant) for DO (concentration). During the cycle 3 assessment (group 3 cycle 3 planning period:2003-2012; verified period: 1/2008-6/2015), Popash Creek was moved into the 4c assessment category (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation).

3.6.5 Biological and Water Quality Data Summary

Popash Creek (WBID 3240Q) exhibits good water quality and a healthy biological community. Passing SCI scores indicate that Popash supports a healthy macroinvertebrate community. Four SCI measurements were collected during the period of record used for this assessment (2006-2020) (**Table 15**). The two most recent SCIs were conducted on 12/28/2015 and 3/28/2019, and scored 71 and 60, respectively. The average score of 65.5 for the last two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Popash Creek.

The average DO saturation level (45.6%) in the Popash Creek is above the 38% DO saturation criterion; however, DO levels dropped below the criterion in more than 36% of the measurements. **Figure 21** provides the DO saturation levels measured in WBID 3240Q since 2001. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record.

Summary statistics for related water quality parameters for Popash Creek during the period from 2006 through 2020 are provided in **Table 15**. The large wetland and forested areas surrounding the Creek lead to abundant organic matter inputs (TOC average 16.6 mg/L); however, color levels are relatively low, averaging 74.4 PCU. During the 2006 to 2020 period, Popash Creek chlorophyll-*a* concentrations averaged 7.1 µg/L, with a median of 3.1 µg/L. Nutrient (i.e., TN and TP) levels in the creek during the 2006 to 2020 period averaged 1.19 mg/L and 0.12 mg/L, respectively.

3.6.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Popash Creek during the 2006 to 2020 period, a DO saturation SSAC of 22% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 22% DO saturation. The proposed SSAC would apply in the freshwater portions of Popash Creek and its tributaries from the Charlotte/Lee County line to the confluence with the Caloosahatchee River (**Figure 22**).

Table 15. Summary of water quality and biological data for Popash Creek (WBID 3240Q) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	344	7.05	19.26	0.70	1.5	3.11	6.65
Color, PCU	347	74.4	54.3	26.1	41	50.4	98.7
Specific Conductance, µmhos/cm	339	515	454	140	251	411	681
DO Saturation, %	345	45.6	18.7	20.2/**21.6**[2]	31.6	46.3	58.5
Total Nitrogen, mg/L	351	1.19	0.5	0.71	0.88	1.1	1.4
Total Organic Carbon, mg/L	10	16.61	3.55	12.19	13.75	15.5	19.5
Total Phosphorus, mg/L	351	0.12	0.11	0.02	0.03	0.08	0.18
SCI, unitless	4	57.25	16	35	41	62	69

[1] Percentiles based on ranking of data.

[2] 10th percentile for DO saturation in bolded text was calculated based on a normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.

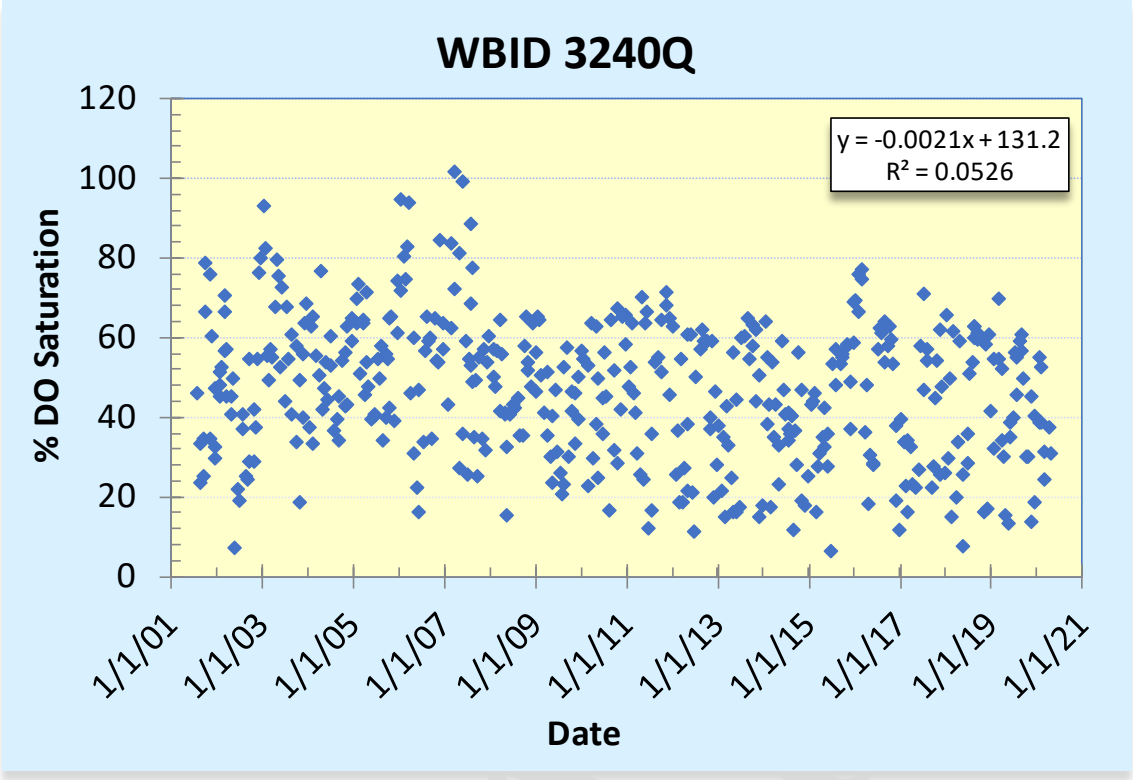

Figure 21. DO saturation levels in Popash Creek (WBID 3240Q) during the period from 2001 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

3.6.7 Downstream waters protection

The downstream water for Popash Creek is the Caloosahatchee River, a Class III marine water. Based on the current listing status, the portion of the Caloosahatchee River downstream of Popash Creek is not listed as impaired for DO. However, this portion of the River has a TMDL for TN. The proposed DO SSAC is not expected to have any impact on the TN levels in the River or affect the achievement of the TMDL. Additionally, because the DO SSAC for Popash Creek will be set at the existing water quality condition and the portion of the Caloosahatchee River downstream of the Creek is meeting the applicable DO criteria, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

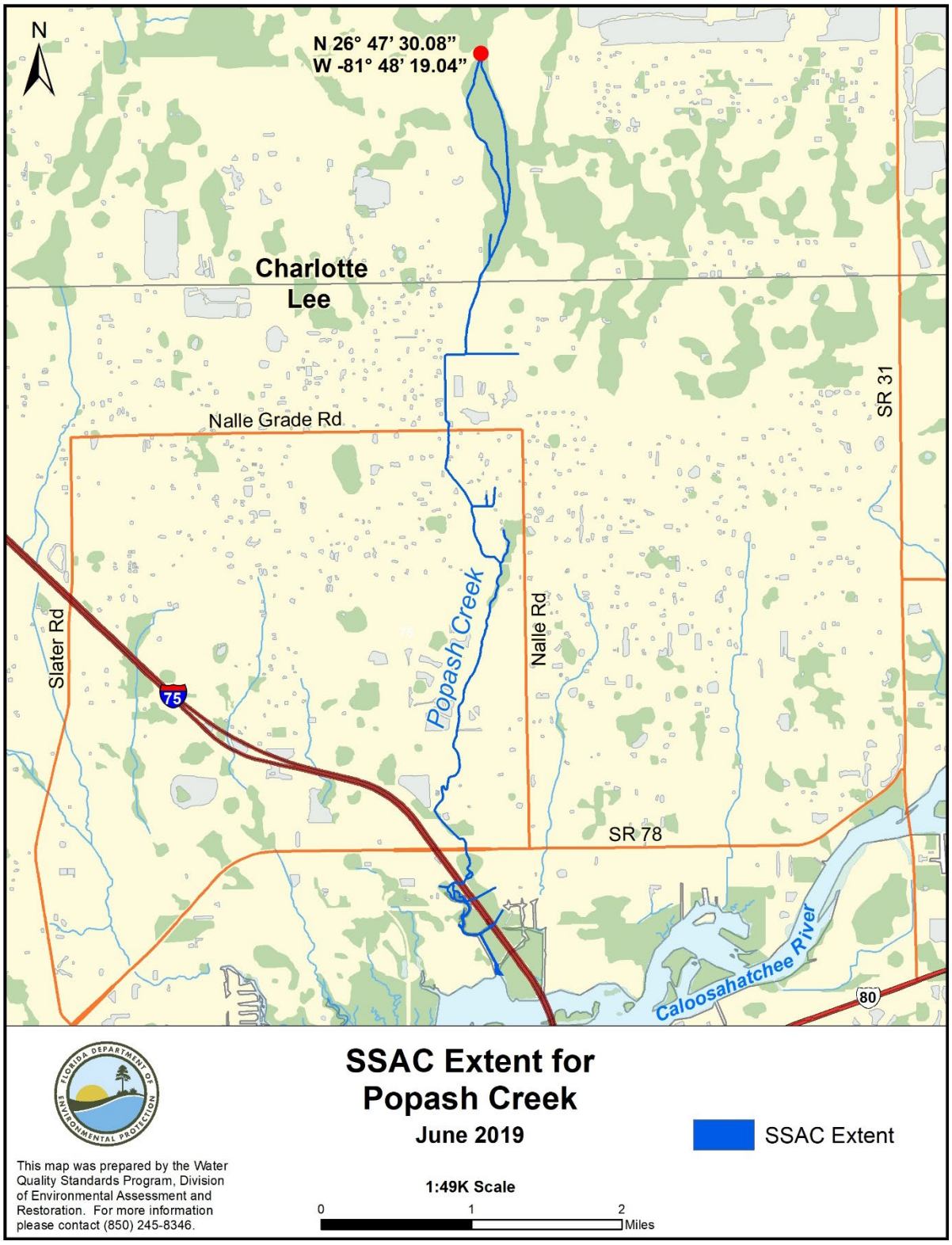

Figure 22. Map illustrating the proposed extent of the Type II DO SSAC for Popash Creek.

3.7 Cypress Creek (WBID 3235C)

3.7.1 System Description

Cypress Creek is a Class III freshwater stream that is located in both Charlotte and Lee Counties, while WBID 3235C also extends to Glades and Hendry Counties, all of which are within the Caloosahatchee sub-basin (**Figure 23**). Cypress Creek flows south into the Caloosahatchee River. This area contains portions of several conservation lands, including Babcock Ranch Preserve managed by the state, and Bob Janes Preserve, Caloosahatchee Regional Park, Persimmon Ridge Preserve, Daniels Preserve at Spanish Creek, and a very small portion of Telegraph Creek Preserve, all of which are managed by Lee County.

3.7.2 Land use

A summary of the Level 2 land use categories located within WBID 3235C is provided in **Table 16**. Wetlands cover approximately 19.4%, forested area covers approximately 18.6%, and shrub and brushland covers approximately 15.3% of the total acreage in this WBID. Urban land uses encompass approximately 2.4% of the total acreage in this WBID. Agricultural land uses encompass approximately 40.6% of the acreage in this area (cropland and pastureland 24.83%, tree crops 15.17%, nurseries and vineyards 0.05%, and other open lands/rural 0.53%).

3.7.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

This area contains one non-surface water discharger, Alva Schools-Elementary and Middle WWTP (FLA014417), located approximately 1 mile to the southeast of Cypress Creek. Alva Schools-Elementary and Middle WWTP is a domestic wastewater facility with an existing 0.020 MGD annual average daily flow permitted capacity. The facility discharges to a rapid infiltration basin system consisting of three percolation ponds. A potable water byproduct (demineralization concentrate) discharges into the domestic wastewater collection system. It is not anticipated that this facility is impacting the existing DO levels in this system.

Municipal Separate Storm Sewer System (MS4) permits

NPDES Phase II MS4 permit FLR04E043, whose permittee is Charlotte County, covers the majority of the northern portion of WBID 3235C, and NPDES Phase I MS4 permit FLS000035, whose permittee is Lee County, covers the majority of the southern portion of WBID 3235C. Given the low levels of urban land use, it is not anticipated that these MS4s are impacting the existing DO levels in this system.

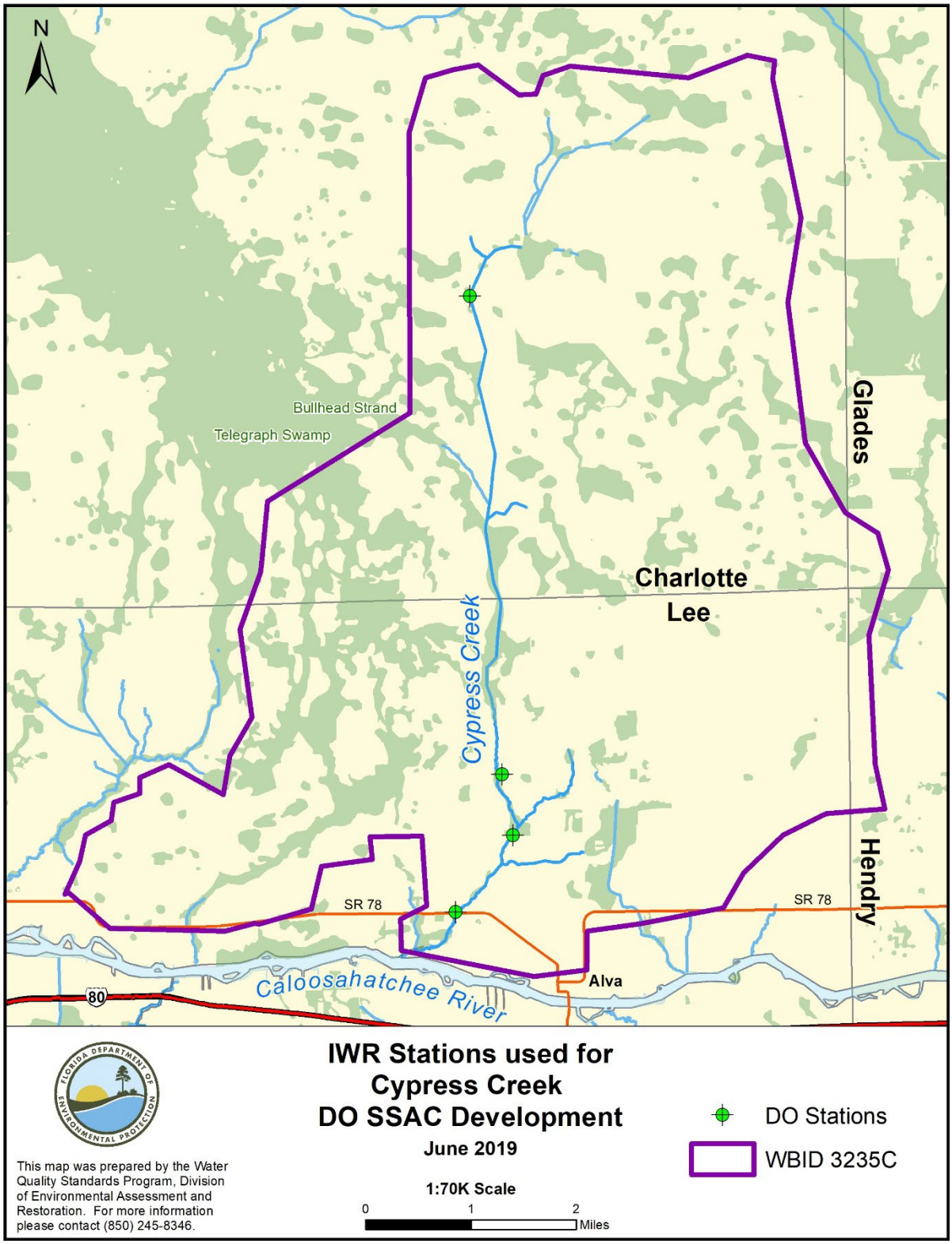

Figure 23. This map illustrates Cypress Creek and the IWR stations used to develop the proposed DO SSAC.

Table 16. Level 2 Land Use for Cypress Creek (WBID 3235C)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Acres
Residential Low Density	1100	593.29	2.31
Commercial and Services	1400	11.62	0.05
Institutional	1700	17.40	0.07
Cropland and Pastureland	2100	6374.08	24.83
Tree Crops	2200	3895.63	15.17
Nurseries and Vineyards	2400	12.54	0.05
Other Open Lands <Rural>	2600	136.79	0.53
Herbaceous	3100	235.65	0.92
Shrub and Brushland	3200	3919.90	15.27
Mixed Rangeland	3300	291.47	1.14
Upland Coniferous Forests	4100	3652.15	14.22
Upland Hardwood Forests	4200	675.86	2.63
Upland Mixed Forests	4300	458.54	1.79
Tree Plantations	4400	254.40	0.99
Streams and Waterways	5100	0.01	0.00003
Reservoirs	5300	147.57	0.57
Wetland Hardwood Forests	6100	1020.48	3.97
Wetland Coniferous Forests	6200	2226.94	8.67
Wetland Forested Mixed	6300	95.97	0.37
Vegetated Non-Forested Wetlands	6400	1645.26	6.41
Communications	8200	9.11	0.04
Total		25674.67	100

3.7.4 303(d) Assessment History

During the cycle 1 assessment (group 3 cycle 1 planning period: 1992-2001; verified period: 1/1997-6/2004), Cypress Creek was placed on the planning list for DO under assessment category 3c (enough data and information are present to determine that one or more designated uses may not be attained according to the planning list methodology). During the cycle 2 assessment (group 3 cycle 2 planning period:1997-2006; verified period: 1/2002-6/2009), Cypress Creek was moved into assessment category 4d (waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant) for DO (concentration). During cycle 3 (group 3 cycle 3 planning period: 2003-2012; verified period: 1/2008-6/2015), Cypress Creek was moved into category 4c (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant) for DO (percent saturation).

3.7.5 Biological and Water Quality Data Summary

Cypress Creek (WBID 3235C) exhibits good water quality that supports a healthy biological community. During the 2006 to 2020 period Cypress Creek supported a healthy macroinvertebrate community as evidenced by passing SCI scores. Two SCI measurements were collected during the period of record used for this assessment (2006-2020) (**Table 17**). These SCIs were conducted on 10/21/2009 and 12/3/2012, and scored 67 and 63, respectively. The average score of 65 for the two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Cypress Creek.

The average DO saturation level of 48.6% observed in Cypress Creek during the period from 2006 to 2020 is above the 38% DO saturation criterion; however, DO levels dropped below the criteria in more than 25% of the measurements. **Figure 24** provides the DO saturation levels measured in WBID 3235C since 2005. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record suggesting that the DO levels in Cypress Creek have not been adversely impacted by anthropogenic inputs during the period of record.

Summary statistics for related water quality parameters for Cypress Creek during the period from 2006 to 2020 are provided in **Table 17**. Despite the large wetland and forested areas (56.4% of the area) surrounding the Creek, Color and TOC levels are relatively low, averaging 75.7 PCU and 16.0 mg/L, respectively. During the 2006 to 2020 period, Cypress Creek chlorophyll-*a* concentrations averaged 2.9 µg/L, with a median of 0.90 µg/L. Nutrient (i.e., TN and TP) levels in the creek averaged 1.58 mg/L and 0.07 mg/L, respectively.

Table 17. Summary of water quality and biological data for Cypress Creek (WBID 3235C) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	368	2.86	8.09	0.25	0.25	0.9	2.31
Color, PCU	335	75.7	70.1	24.1	29.7	42.7	104
Specific Conductance, µmhos/cm	383	719	363	160	352	840	996
DO Saturation, %	379	48.6	15.8	28.6/**28.4**[2]	37	49.4	59.5
Total Nitrogen, mg/L	374	1.58	1.2	0.53	0.78	1.22	1.9
Total Organic Carbon, mg/L	7	15.97	4.98	8.8	11	16	20
Total Phosphorus, mg/L	374	0.07	0.06	0.02	0.03	0.05	0.09
SCI, unitless	2	65	ID	ID	ID	ID	ID

[1] Percentiles based on ranking of data.

[2] 10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.

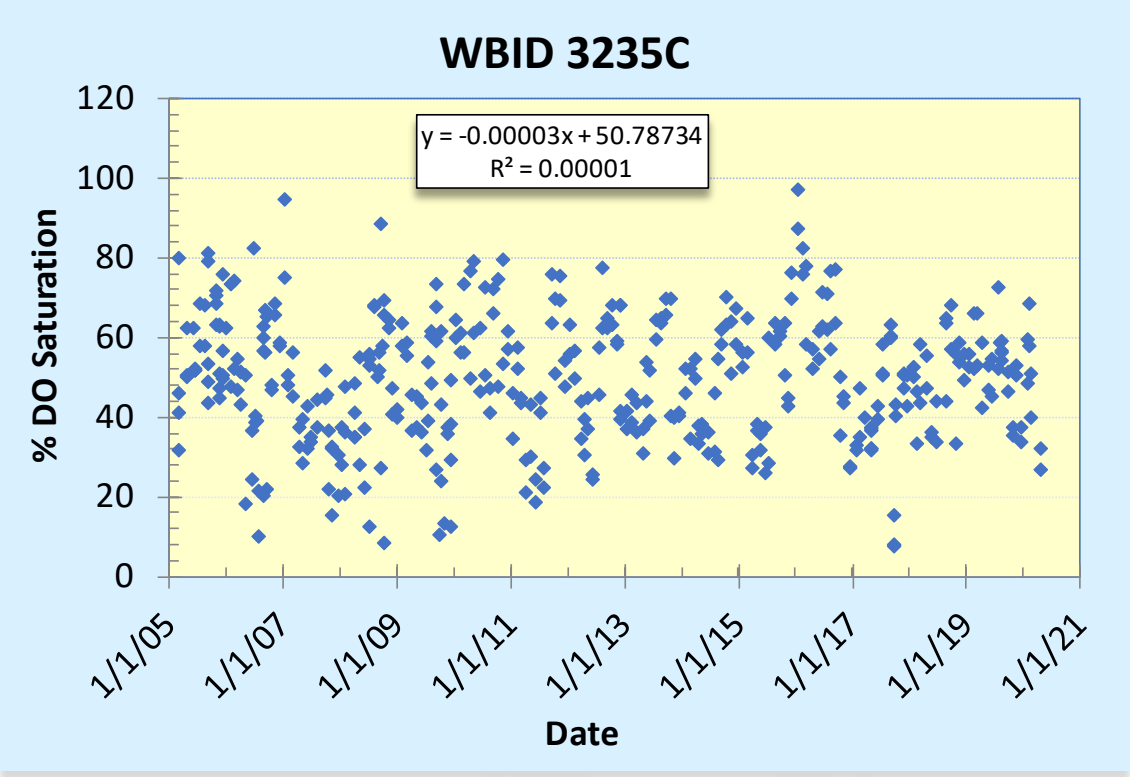

Figure 24. DO saturation levels in Cypress Creek (WBID 3235C) during the period from 1992 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no significant decreasing trend in DO levels.

3.7.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Cypress Creek during the 2006 to 2020 period, a DO saturation SSAC of 28% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the proposed SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 28% DO saturation. The proposed SSAC would apply in Cypress Creek and its tributaries from the geographic coordinates, latitude: N 26° 49' 2.61" and longitude: W -81° 36' 54.36", to the confluence with the Caloosahatchee River (**Figure 25**).

3.7.7 Downstream waters protection

Cypress Creek flows into the Caloosahatchee River. Based on the current listing status, the Caloosahatchee River downstream of Cypress Creek is not impaired for DO. Because the DO SSAC for Cypress Creek will be set at the existing water quality condition and the downstream receiving water of the Caloosahatchee River is meeting the applicable DO criteria, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

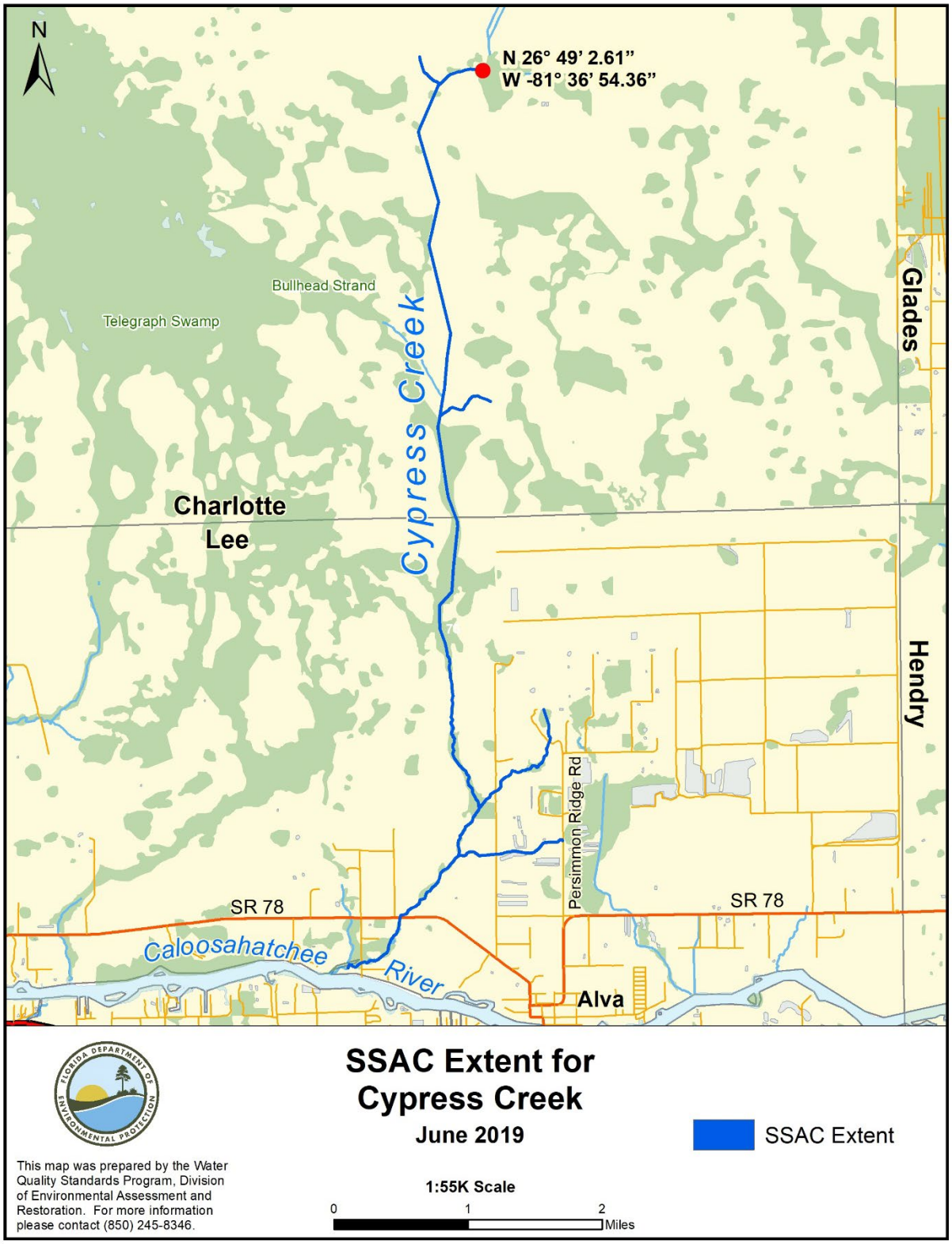

Figure 25. Map illustrating the proposed extent of the Type II DO SSAC for Cypress Creek.

3.8 Black Water Creek (WBID 2929A)

3.8.1 System Description

Black Water Creek (WBID 2929A) is a Class III freshwater stream located in Lake County in the upper St. Johns sub-basin (**Figure 26**). Black Water Creek flows east from Lake Norris to the Wekiva River, which is a tributary to the St. Johns River. Several springs occur adjacent to the Black Water Creek system. Blackwater Springs [magnitude 3, 1-10 ft^3/s (0.65-6.5 Mgal/d)[2]] and Blackwater Minor 1-4 (unknown magnitude) are located in the northern portion of the Black Water Creek WBID. Palm Springs, Blueberry Springs, and Moccasin Springs, all of which are magnitude 4 springs [less than 1 ft^3/s (0.65 Mgal/d)[1]], are located in the southern portion of the WBID. WBID 2929A contains portions of state-managed conservation lands including Lake Norris Conservation Area, Sutton Ranch Conservation Easement, Seminole State Forrest, Lower Wekiva River State Reserve, and Rock Springs Run State Reserve, and a portion of the federally managed Ocala National Forrest. Portions of several Outstanding Florida Waters (OFWs), including Wekiva-Ocala Connector Carl Proj-Western Connector, Seminole Springs/Woods, Lower Wekiva State Reserve, and Rock Springs Run State Reserve are also located within Black Water Creek's watershed.

3.8.2 Land Use

A summary of the Level 2 land use categories located within WBID 2929A is provided in **Table 18**. The area surrounding Black Creek is largely undisturbed, with 33.3% wetlands, 28.9% forest area, and another 6.2% shrub and brushland. Urban land uses encompass approximately 9% of the total acreage in this WBID, and agricultural uses (*i.e.*, mostly improved pastures) comprise another 17.3% of the total area.

[2] USGS. 1995. Springs of Florida. U.S. Geological Survey Fact Sheet FS-151-95. Available from: https://fl.water.usgs.gov/PDF_files/fs151_95_spechler.pdf

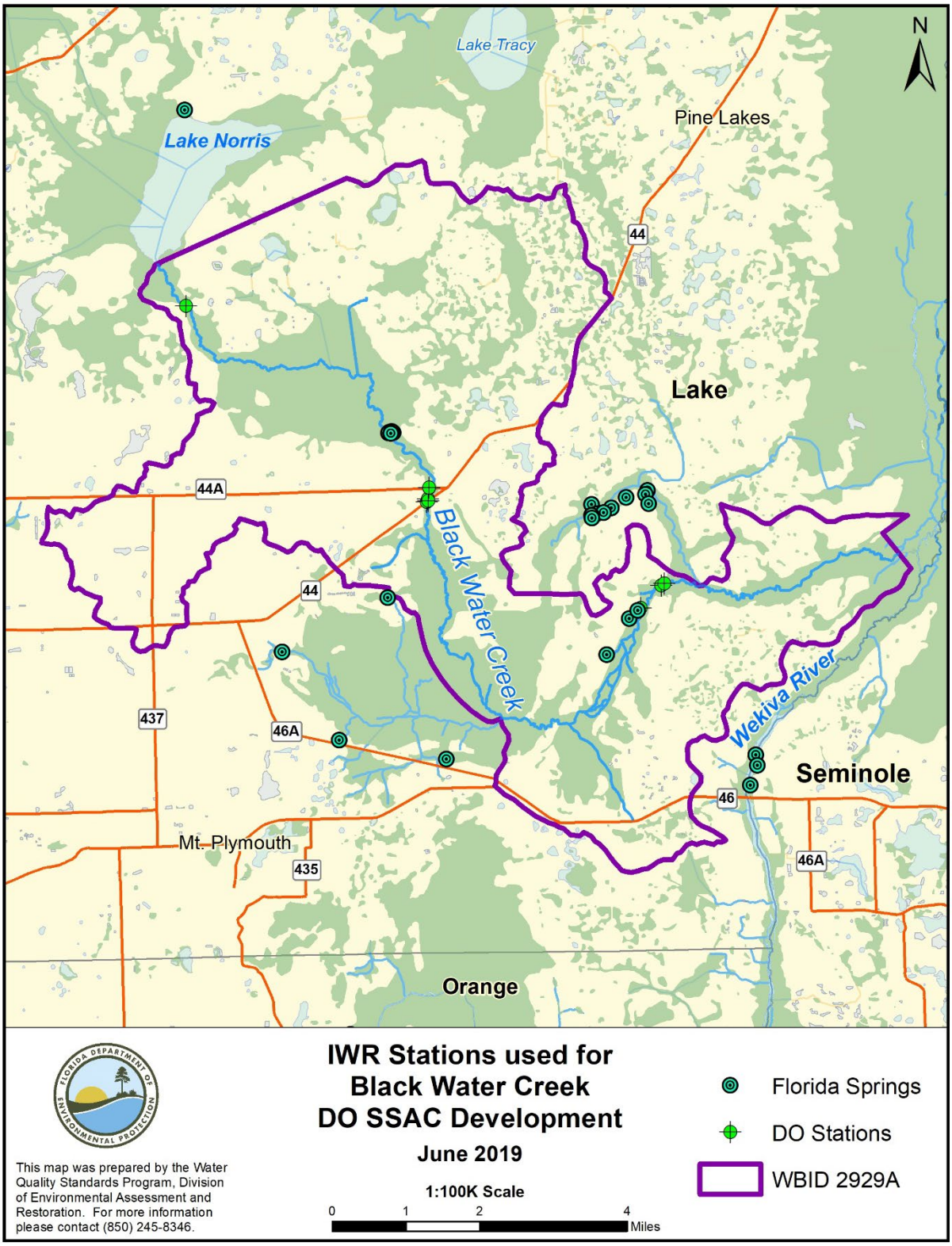

Figure 26. Map illustrating the Black Water Creek system and the IWR stations used to develop the proposed DO SSAC.

Table 18. Level 2 Land use for Black Water Creek (WBID 2929A)

Level 2 Land Use	Level 2 Land Use Code	Acres	Percent of Total Area
Residential Low Density	1100	2320.46	8.08
Residential Medium Density	1200	77.97	0.27
Commercial and Services	1400	40.78	0.14
Extractive	1600	8.25	0.03
Institutional	1700	6.42	0.02
Recreational	1800	121.17	0.42
Open Land	1900	0.50	0.002
Cropland and Pastureland	2100	3881.57	13.51
Tree Crops	2200	62.56	0.22
Feeding Operations	2300	47.92	0.17
Nurseries and Vineyards	2400	569.20	1.98
Specialty Farms	2500	397.80	1.38
Herbaceous	3100	870.87	3.03
Shrub and Brushland	3200	1768.70	6.16
Mixed Rangeland	3300	379.11	1.32
Upland Coniferous Forests	4100	3747.71	13.05
Upland Hardwood Forests	4200	502.94	1.75
Upland Mixed Forests	4300	2737.94	9.53
Tree Plantations	4400	1337.11	4.65
Streams and Waterways	5100	5.41	0.02
Lakes	5200	161.36	0.56
Reservoirs	5300	87.54	0.30
Wetland Hardwood Forests	6100	5603.25	19.51
Wetland Coniferous Forests	6200	160.82	0.56
Wetland Forested Mixed	6300	2410.05	8.39
Vegetated Non-Forested Wetlands	6400	1387.82	4.83
Disturbed Lands	7400	4.90	0.02
Transportation	8100	2.19	0.01
Communications	8200	3.78	0.01
Utilities	8300	18.86	0.07
Total		28724.97	100

Extractive Land Use

The Statewide Land Use Land Cover layer noted an area of extractive land use of approximately 8.25 acres. The extractive land use was identified as an area of sand and gravel pits and three holding ponds. Based on personal communication with Howard Hayes (DEP Mining and Mitigation Program, 4/10/18), the disturbance in this area began in approximately 2005 with most of the extraction occurring between 2008 and 2010. The extraction seems to have been for the construction of fish ponds by the property owners. No notice of mining was filed with the Department, and an Environmental Resource Permit (ERP) was not issued by the St. Johns River Water Management District for extraction in this area. As such, it is not likely that any mining activity will resume at the site. The site began revegetating by 2012, and this previous extractive land use activity is not believed to be impacting the existing DO levels in Black Water Creek.

3.8.3 Potential Sources of Anthropogenic Influence

Wastewater Facilities

No wastewater facilities were identified by the WAFR layers (sites and facilities) within the boundaries of this WBID.

Municipal Separate Storm Sewer System (MS4) permits

The NPDES Phase II MS4 permit FLR04E106 covers the entire extent of the portion of the Black Water Creek watershed applicable to this effort. The permittee for this MS4 is Lake County. It is not anticipated that this MS4 is impacting the existing DO levels in this system.

3.8.4 303(d) Assessment History

Black Water Creek was initially listed as impaired for DO under the 1998 303(d) parameters of concern. However, the creek was delisted during cycle one (group 2 cycle 1 planning period: 1991-2000; verified period: 1/1996-6/2003) and placed in assessment category 2 (attains some designated uses and insufficient or no information or data are present to determine if remaining uses are attained). It was noted that DO is naturally low and bioassessment data indicate that aquatic life use support is being maintained. During cycle 2 (group 2 cycle 2 planning period: 1996-2005; verified period:1/2001-6/2008), Black Water Creek was moved into assessment category 4c for DO (impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant). During cycle 3 (group 2 cycle 3 planning period: 2002-2011; verified period: 1/2007-6/2014), Black Water Creek was assessed against the new DO criteria, which is expressed as a percent saturation, and remained in the 4c assessment category.

3.8.5 Biological and Water Quality Data Summary

Black Water Creek is characterized by generally good water quality which supports a healthy biological community. The macroinvertebrate community in Black Water Creek has been shown to be healthy as evidenced by passing SCI scores. Four SCI measurements were collected during the period of record used for this assessment (2006-2020) (**Table 19**). The two most recent SCIs were conducted on 9/22/2010 and 12/19/2011, and scored 50 and 76, respectively. The average score of 63 for the last two SCI measurements is indicative of a healthy macroinvertebrate community that is not being adversely affected by the existing DO levels. **Appendix A** contains an additional summary of the biological data (SCI and HA scores) available for Black Water Creek.

While the average DO saturation level (i.e., 53.6%) in the Creek is well above the 38% DO saturation criterion, DO levels frequently drop below the criterion in more than 20% of the measurements made since 2006. The low DO levels are likely associated with the naturally high color (average 263 PCU) and abundance of organic matter inputs (average TOC 30.3 mg/L) from the surrounding wetlands and forested areas. **Figure 27** provides the DO saturation levels measured in WBID 2929A since 1991. A statistically significant decreasing trend in DO levels was not found, and the degree of variation and range was maintained throughout the period of record suggesting that the DO levels in Black Water Creek have not been adversely impacted by anthropogenic inputs during the period of record.

Summary statistics for related water quality parameters for Black Water Creek are provided in **Table 19**. Extensive wetland and forested areas (62.2% of the area) surrounding the Creek contribute an abundance of organic matter to the creek, result in relatively high color and TOC levels averaging 263 PCU and 30.3 mg/L, respectively. The chlorophyll-*a* levels in the creek averaged 1.3 µg/L, with a median concentration of 0.50 µg/L (**Table 19**). Nutrient (i.e., TN and TP) levels in Black Water Creek during the 2006 to 2020 period averaged 1.43 mg/L and 0.06 mg/L, respectively.

Table 19. Summary of water quality and biological data for Black Water Creek (WBID 2929A) during the period from 2006 through 2020.

Parameter	Count	Average	Standard Deviation	10th Percentile[1]	25th Percentile	Median	75th Percentile
Chlorophyll-*a* (corrected), µg/L	170	1.34	6.46	0.5	0.5	0.5	0.7
Color, PCU	171	262.8	228.1	30	70.5	200	403.9
Specific Conductance, µmhos/cm	190	395	160	164	284	400	487
DO Saturation, %	189	53.6	21.3	21.0/**26.3**[2]	39.6	56.3	71.6
Total Nitrogen, mg/L	194	1.43	0.47	0.9	1.07	1.33	1.69
Total Organic Carbon, mg/L	171	30.34	21.01	4.48	12.57	26.79	44.75
Total Phosphorus, mg/L	201	0.06	0.03	0.03	0.04	0.05	0.07
SCI, unitless	4	67	15	50	52	68	81

[1] Percentiles based on ranking of data.
[2] 10th percentile for DO saturation in bolded text was calculated based on normal distribution using specified average (mean) and standard deviation and represents the recommended DO SSAC when rounded to two significant figures.

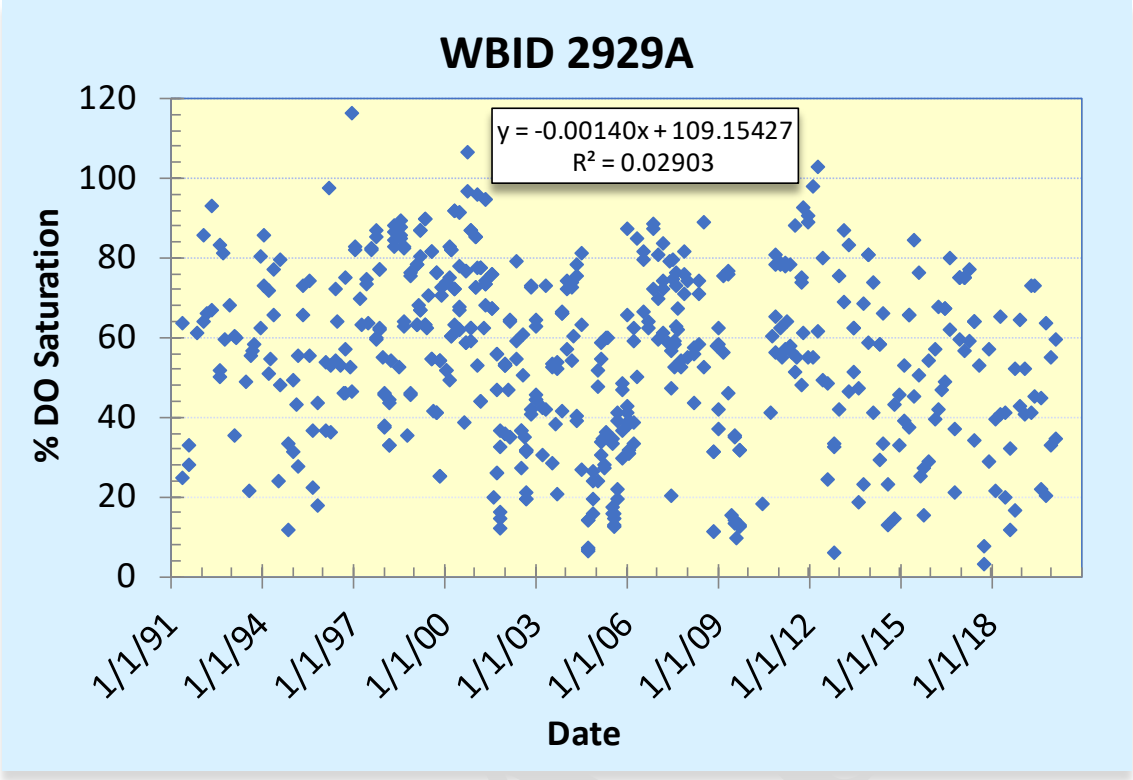

Figure 27. DO saturation levels in Black Water Creek (WBID 2929A) during the period from 1991 through 2020. The regression equation and r^2 value provided in the inset are from simple linear regression analysis and demonstrate no statistically significant decreasing trend in DO levels.

3.8.6 Proposed Type II SSAC

Based on the calculated 10th percentile of existing water quality in Black Water Creek during the 2006 to 2020 period, a DO saturation SSAC of 26% is recommended. To account for the natural variation in DO levels and to be consistent with the derivation of the SSAC, the SSAC will be applied such that no more than 10% of the measured DO levels shall be less than 26% DO saturation. The proposed SSAC would apply in Black Water Creek and its tributaries from the outlet of Lake Norris to the geographic coordinates, latitude: N 28° 51' 44.56" and longitude: W -81° 23' 3.3" (**Figure 28**).

3.8.7 Downstream waters protection

The Wekiva River, part of which (WBID 2956A) has a TMDL for TP and Nitrate-N, is downstream of Black Water Creek. Based on the current listing status, the portion of the Wekiva River downstream of Black Water Creek is not listed as impaired for DO. Because the DO SSAC for Black Water Creek will be set at the existing water quality condition and the portion of the Wekiva River downstream is meeting the applicable DO criterion, the proposed DO SSAC is not expected to have an adverse impact on any downstream waters.

Figure 28. Map illustrating the proposed extent of the Type II DO SSAC for Black Water Creek.

4.0 Summary of Recommendations

DEP evaluated waterbodies not meeting the generally applicable DO criteria and placed in the 4c assessment category (impaired for one or more criteria or designated uses, but do not require TMDL development because the impairments are not caused by a pollutant) for potential SSAC development. As a result of this evaluation, DEP recommends that the proposed Type II DO SSACs be adopted for the eight waterbodies described in this report. Although these waterbodies do not meet the generally applicable DO criteria, the existing DO levels for all of the systems have been demonstrated to support a healthy macroinvertebrate community as indicated by passing SCI scores. The SCI was used as the primary indicator of the biological health of the systems because the macroinvertebrate community has been identified as the most sensitive to decreasing DO levels and was used as the basis for the derivation of the statewide generally applicable DO criteria.

In general, the systems that were evaluated are highly colored and have a high percentage of natural land uses, such as wetlands and forests, which contribute inputs (*i.e.* organic matter) that can subsequently impact DO levels. Additionally, there are limited anthropogenic inputs (*i.e.*, urban areas, permitted discharges, etc.). Therefore, the proposed alternative criteria are believed to more appropriately represent the DO regimes in these waterbodies necessary to protect the sensitive aquatic life.

Because the proposed DO SSACs were developed based on existing DO conditions within each waterbody, their adoption is expected to result in no or minimal impacts to permitted facilities/ activities in these areas. A summary of the eight proposed Type II DO SSACs is provided in **Table 22**.

Each of the recommended DO SSACs will be applied such that no more than 10% of the measurements collected during the assessment period shall be below the specified SSAC. Attainment of the SSACs will be assessed for Impaired Waters purposes using the binomial hypothesis test described in the Impaired Waters Rule (IWR, Chapter 62-303, F.A.C.). Specifically, waterbodies will be listed if the number of samples not meeting the applicable SSAC values exceed the number of exceedances for the given sample size, as listed in Table 1 (Rule 62-303.320, F.A.C.) or Table 3 (Rule 62-303.420, F.A.C.), for the Planning and Verified Lists, respectively. Additionally, if multiple DO measurements are available for the same day, all measurements collected for the day will be averaged, with the average DO level for each day being compared to the SSAC value. No time-of-day translations will be applied to the proposed SSACs. The waters in which the proposed SSACs apply will also be assessed to determine if there is a statically significant decreasing trend in DO as described in subsections 62-302.533(5) and 62-303.420(13), F.A.C.

Table 22. Proposed Type II DO saturation SSACs and associated extents for the eight waterbodies evaluated.

WBID	Waterbody	DO SSAC Extent	Proposed Type II DO SSACs[1]
679	Black Creek	The freshwater portion of Black Creek and its tributaries from the geographic coordinates, latitude: N 30° 32' 31.73" and longitude: W -85° 59' 41.17" to the confluence with the Mitchell River	31 %
723	Stafford Creek	Stafford Creek and its tributaries from the headwaters of Stafford Creek east of Highways 275 and 71 to the confluence with the "Bayou"	46 %
1426	Pony Creek	Pony Creek and its tributaries from the headwaters north of Dean Still Road to the geographic coordinates: longitude: N 28° 19' 53.42" and longitude: W -81° 54' 27.8"	34 %
1685B	Reedy Creek	Reedy Creek from the confluence of Reedy Creek and Livingston Creek downstream to Lake Arbuckle	36 %
3240F	Daughtrey Creek	The freshwater portion of Daughtrey Creek and its tributaries from Charlotte/Lee County line to the confluence with the Caloosahatchee River	21 %
3240Q	Popash Creek	The freshwater portion of Popash Creek and its tributaries from the Charlotte/Lee County line to the confluence with the Caloosahatchee River	22 %
3235C	Cypress Creek	Cypress Creek and its tributaries from the geographic coordinates, latitude: N 26° 49' 2.61" and longitude: W -81° 36' 54.36", to the confluence with the Caloosahatchee River	28 %
2929A	Black Water Creek	Black Water Creek and its tributaries from the outlet of Lake Norris to the geographic coordinates, latitude: N 28° 51' 44.56" and longitude: W -81° 23' 3.3".	26 %

[1]The recommended DO SSACs are based on the 10th percentile for DO saturation calculated based on a normal distribution using the calculated mean and standard deviation. These SSACs will be applied such that no more than 10% of the measured DO saturation levels shall be less than these proposed values.

5.0 References

DEP. 2011. Sampling and Use of the Stream Condition Index (SCI) for Assessing Flowing Waters: A Primer. Available from: https://floridadep.gov/sites/default/files/sci-primer-102411.pdf

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Appendix A: Summary of Biological Data (SCI and HA) Collected Since 2006 by WBID.

WBID	WaterBody	Station	Parameter	Sample Date	Score
679	Black Creek	21FLPNS-32010011	SCI	3/19/07	79
679	Black Creek	21FLPNS-32010273	SCI	4/9/13	73
679	Black Creek	21FLPNS-32010273	SCI	10/17/13	78
679	Black Creek	21FLPNS-G3NW0148	SCI	3/22/18	67
679	Black Creek	21FLGW-30125	HA	5/10/06	133
679	Black Creek	21FLPNS-32010011	HA	3/19/07	136
679	Black Creek	21FLPNS-32010273	HA	4/9/13	122
679	Black Creek	21FLPNS-32010273	HA	10/17/13	133
679	Black Creek	21FLPNS-G3NW0148	HA	3/22/18	124
723	Stafford Creek	21FLPNS-723-A	SCI	4/12/12	49
723	Stafford Creek	21FLPNS-723-A	SCI	10/10/12	48
723	Stafford Creek	21FLWQA-G2WA0004	SCI	4/9/15	77
723	Stafford Creek	21FLWQA-G2WA0004	SCI	2/26/19	63
723	Stafford Creek	21FLPNS-723-A	HA	4/12/12	121
723	Stafford Creek	21FLPNS-723-A	HA	10/10/12	120
723	Stafford Creek	21FLWQA-G2WA0004	HA	4/9/15	102
723	Stafford Creek	21FLWQA-G2WA0004	HA	2/26/19	111
2929A	Blackwater Creek	21FLCEN-20010455	SCI	3/7/07	83
2929A	Blackwater Creek	21FLCEN-20010455	SCI	6/17/10	59
2929A	Blackwater Creek	21FLCEN-20010455	SCI	9/22/10	50
2929A	Blackwater Creek	21FLCEN-20011182	SCI	12/19/11	76
2929A	Blackwater Creek	21FLCEN-20010536	HA	2/7/07	116
2929A	Blackwater Creek	21FLCEN-20010455	HA	3/7/07	125
2929A	Blackwater Creek	21FLCEN-20010536	HA	12/16/08	130
2929A	Blackwater Creek	21FLCEN-20010455	HA	6/17/10	127
2929A	Blackwater Creek	21FLCEN-20010455	HA	9/22/10	128
2929A	Blackwater Creek	21FLCEN-20011182	HA	12/19/11	137
3235C	Cypress Creek	21FLFTM-28020237	SCI	10/21/09	67
3235C	Cypress Creek	21FLFTM-28020237	SCI	12/3/12	63
3235C	Cypress Creek	21FLFTM-28020237	HA	1/3/06	105
3235C	Cypress Creek	21FLFTM-28020237	HA	4/4/06	99
3235C	Cypress Creek	21FLFTM-28020237	HA	6/27/06	100
3235C	Cypress Creek	21FLFTM-28020237	HA	10/21/09	125
3235C	Cypress Creek	21FLFTM-28020237	HA	12/3/12	115
1426	Pony Creek	21FLTPA-TPPONYC01F	SCI	6/18/14	60
1426	Pony Creek	21FLTPA-TPPONYC01F	SCI	11/17/14	57
1426	Pony Creek	21FLTPA-TPPONYC01F	SCI	6/23/15	62
1426	Pony Creek	21FLTPA-TPPONYC01F	HA	6/18/14	78

WBID	WaterBody	Station	Parameter	Sample Date	Score
1426	Pony Creek	21FLTPA-TPPONYC01F	HA	11/17/14	72
1426	Pony Creek	21FLTPA-TPPONYC01F	HA	6/23/15	128
1426	Pony Creek	21FLCEN-G4CE0079	HA	4/7/16	90
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	11/1/06	71
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	12/7/07	65
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	1/15/08	77
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	4/16/09	70
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	10/27/09[2]	73
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	10/27/09[2]	79
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	2/3/10	84
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	6/22/11[2]	51
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	6/22/11[2]	62
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	9/26/12	65
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	3/12/13	77
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	12/5/16	84
1685B	Reedy Creek[1]	21FLTPA-274230948126468	SCI	3/30/17	81
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	5/8/17	81
1685B	Reedy Creek[1]	21FLCEN-26011019	SCI	1/15/19	86
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	11/1/06	133
1685B	Reedy Creek[1]	21FLTPA-274230948126468	HA	1/15/08	114
1685B	Reedy Creek[1]	21FLTPA-274230948126468	HA	4/16/09	125
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	10/27/09[2]	131
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	10/27/09[2]	131
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	2/3/10	121
1685B	Reedy Creek[1]	21FLTPA-274230948126468	HA	6/22/11	134
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	3/12/13	126
1685B	Reedy Creek[1]	21FLGW-47810	HA	7/14/15	118
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	1/21/16	110
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	12/5/16	138
1685B	Reedy Creek[1]	21FLTPA-274230948126468	HA	3/30/17	125
1685B	Reedy Creek[1]	21FLCEN-26011019	HA	1/15/19	131
3240F	Daughtrey Creek	21FLFTM-28020231	SCI	10/14/09	58
3240F	Daughtrey Creek	21FLFTM-28020231	SCI	3/28/11	60
3240F	Daughtrey Creek	21FLFTM-28020231	SCI	12/13/11	62
3240F	Daughtrey Creek	21FLFTM-28020231	SCI	11/29/16	42
3240F	Daughtrey Creek	21FLFTM-28020231	HA	10/14/09	120
3240F	Daughtrey Creek	21FLFTM-28020231	HA	3/28/11	109
3240F	Daughtrey Creek	21FLFTM-28020231	HA	12/13/11	119
3240F	Daughtrey Creek	21FLGW-42393	HA	9/19/12	95
3240F	Daughtrey Creek	21FLFTM-28020231	HA	11/29/16	100
3240Q	Popash Creek	21FLFTM-28020232	SCI	4/26/12	63

WBID	WaterBody	Station	Parameter	Sample Date	Score
3240Q	Popash Creek	21FLFTM-CALUSA0020FTM	SCI	11/6/12	35
3240Q	Popash Creek	21FLFTM-28020232	SCI	12/28/15	71
3240Q	Popash Creek	21FLFTM-G3D0079	SCI	3/28/19	60
3240Q	Popash Creek	21FLFTM-28020232	HA	4/26/12	90
3240Q	Popash Creek	21FLFTM-CALUSA0020FTM	HA	11/6/12	106
3240Q	Popash Creek	21FLGW-45794	HA	7/24/14	99
3240Q	Popash Creek	21FLFTM-28020232	HA	12/28/15	101
3240Q	Popash Creek	21FLFTM-G3D0079	HA	3/28/19	94

[1]*This system was previously named Livingston Creek and was re-named Reedy Creek during IWR Run 56.*
[2]*Duplicate samples*