



*Florida Department of
Environmental Protection*

Strategic Monitoring Concepts: Purpose, Representativeness, QA, and Defensible Study Design

*Florida Department of Environmental Protection,
Division of Environmental Assessment and Restoration*



Overview of Presentation

- Strategic Monitoring
 - Evaluate Waters on Planning List (PL)
 - Considerations of representative sampling
 - Refocus to determine waterbody fates
- Quality Assurance
- Study Design Considerations
- Examples





Strategic Monitoring

“The primary focus of strategic monitoring is to collect sufficient data to verify whether waters on the planning list are in fact impaired, and to the extent possible, determine the causative pollutant for waters listed for Dissolved Oxygen or bioassessment failures.” – DEAR Sampling strategies document, 1/12/10





2010 Strategic Monitoring Guidance

- Stressed importance of representative stations
- For failed SCIs, evaluate habitat and hydrology
- Current effort takes these concepts a step further to evaluate “4D” waters



TMDL Monitoring Objectives

- TMDL Program addresses impairment due to **pollutant loading**
 - However, confounding factors, such as habitat degradation and hydrologic modification may interfere with this assessment
- The sampling location and hydrologic conditions should be chosen to provide objective information on anthropogenic pollutant loading





Listing Categories

- 5 – Impaired. Fails criteria and causative pollutant identified
- 4A- TMDL developed
- 4B – Impaired but TMDL not needed (RA)
- 4C – Fails criteria but due to natural condition (*criteria are inappropriate)
- **4D – Fails criteria but causative pollutant not found**
- 4E – Impaired but restoration ongoing





Proposed New IWR Process

- Use site specific ecosystem knowledge to better inform DEP decisions:
 - “Monitor” list – perform additional routine sampling due to data insufficiency issues (current Planning list)
 - “Study” list - carry out a diagnostic study to determine appropriate action (SSAC vs. UAA, etc.)
 - “Verified” list – Actually need a TMDL
- Redefining strategic monitoring to be the “Study” step





What Are We Trying to Accomplish?

- Use site specific knowledge and scientific reasoning to determine best monitoring strategy for waters on PL
- Collect data to:
 1. Verify whether waters on the planning list are in fact impaired (need **TMDL**);
 - If impaired for DO and/or biology, identify causative pollutant/factor
 2. If biology is healthy, pursue Site Specific Alternative Criteria development (**SSAC**);
 3. If waters were habitat limited prior to 1975, conduct Use Attainability Analysis (**UAA**) and potentially reclassify.





Florida's Water Quality Standards

- Waterbody Classifications
- Water Quality Criteria
- Antidegradation Policy





New Classification- Class III Limited

	Human Use	Aquatic Life Use
Class I	Potable/Full Body Contact	Full Support
Class II	Shellfish Consumption/Full Body Contact	Full Support
Class III	Full Body Contact	Full Support
Class III Limited	Full Body Contact potentially not possible (ditch)	Limited Aquatic Community
Class IV	Crop / Animal Protection (agricultural canals/ditches)	Not Addressed
Class V	Industrial Use	Not Addressed







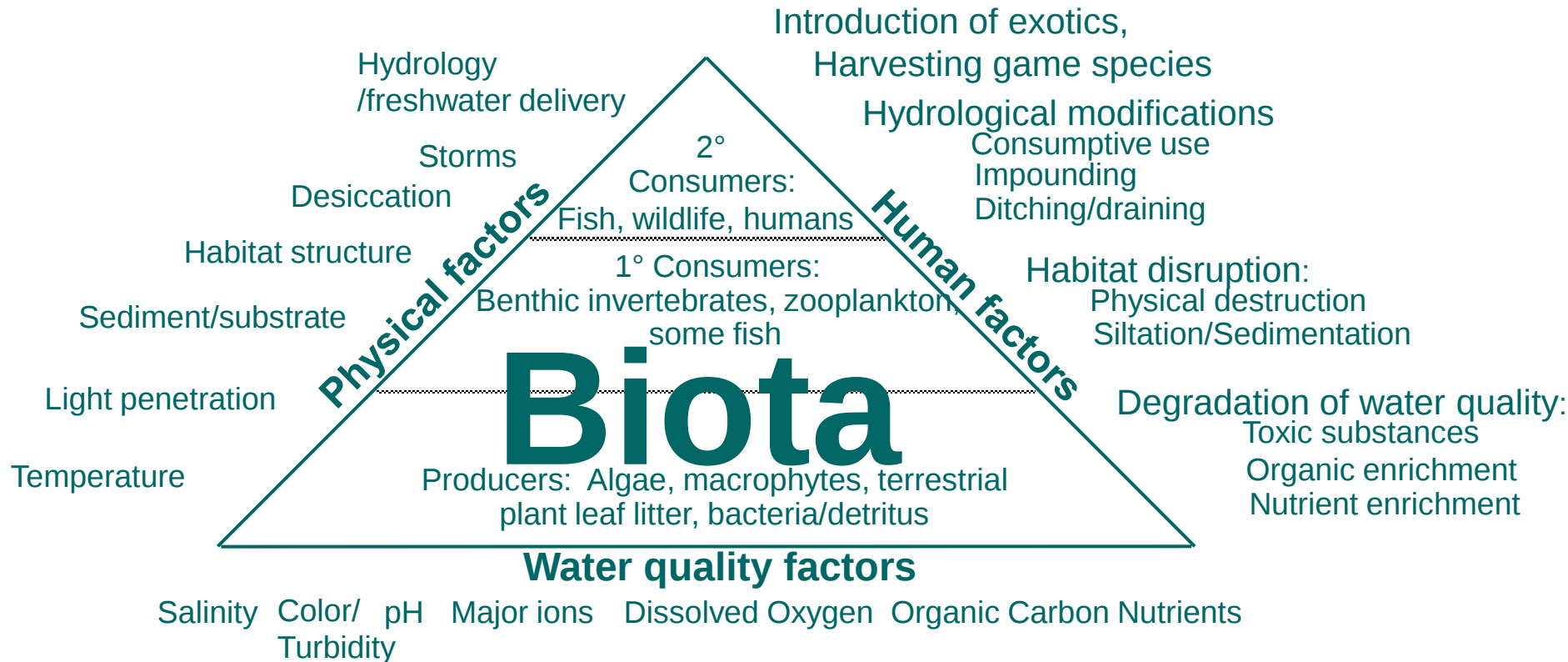
Water Quality Criteria- Intent and Reality

- Criteria are numeric or narrative goals established to protect the designated use
- Most criteria are based on laboratory toxicity tests and have not changed since 1970s
- Original target was point source compliance
- Ambient assessments much more complex
 - Some criteria do not account for natural variability and may be inaccurate (DO, iron, nutrients, etc.)





Key Ecological Considerations





Site Specific Alternative Criteria (SSAC)

- If the generic criterion is suspected to be inaccurate (waterbody is healthy), a SSAC may be warranted.
- SSACs must:
 - Fully protect the designated use (healthy, well balanced aquatic community)
 - Be based on a sound, scientific rationale
 - Protect downstream waters





SSAC Background

- Rule 62-302.800, F.A.C., allows for establishing a SSAC when an affirmative demonstration is made that an alternative criterion is more appropriate for a specified portion of waters of the state.
 - Type I SSAC is based on natural background conditions.
 - Type II SSAC must demonstrate that the criterion would fully maintain and protect human health, existing uses, and the level of water quality necessary to protect human health and existing and beneficial uses.

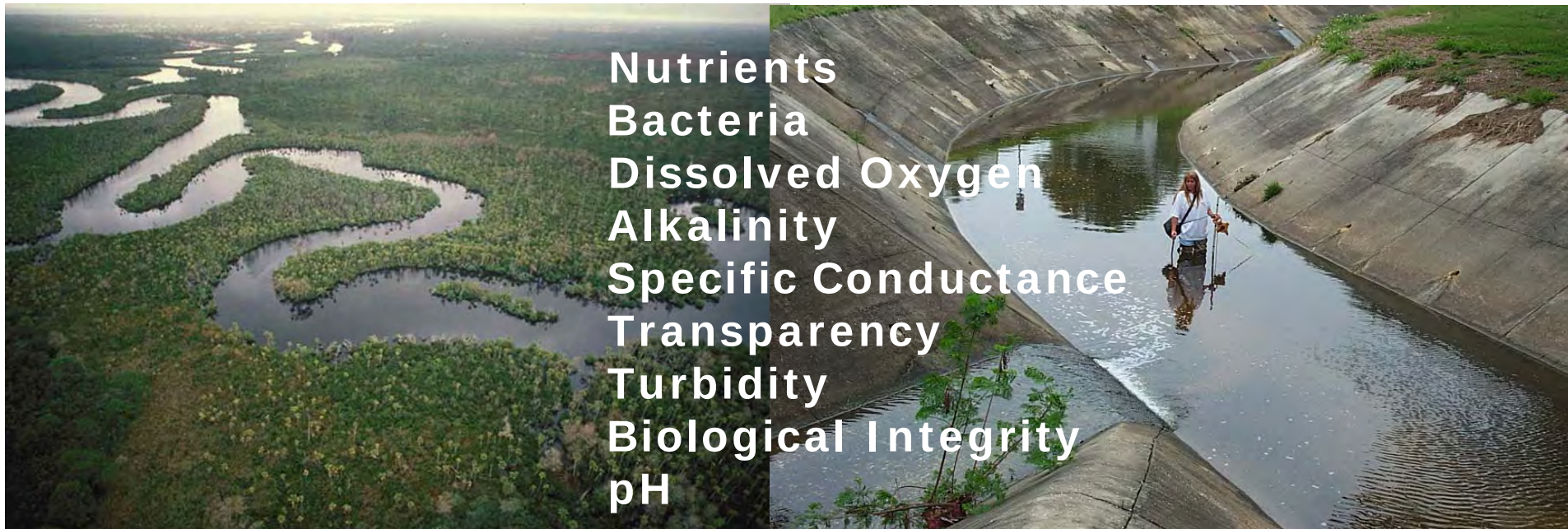




New Designated Uses Classification Structure

Class III

Class III Limited



Class III Limited waters have same criteria as Class III, except SSACs may be developed for above parameters due to lower expected aquatic life use





Determining Best Possible Use (UAA)

- **No existing use may be removed**
- Higher use expectations cannot be attained through treatment required under federal law or best management practices
- One of these 6 factors prevent a higher use:
 - ✓ Natural Water Quality
 - ✓ Natural Hydrology (i.e., routinely goes dry)
 - ✓ Human Alteration that cannot be remedied (channelization)
 - ✓ Dams, Diversions: Hydrologic Modifications
 - ✓ Natural Physical Limitations
 - ✓ Achievement of “Best Possible” Causes “Widespread Economic and Social Impact”





Waters Eligible for Class III - Limited

- Wholly artificial waters
 - Upland ditches
 - Reservoirs
 - Canals
- Altered waterbodies dredged or filled prior to November 28, 1975
 - Altered to the extent that they exhibit separate and distinct hydrologic and environmental conditions





Potential Fates for 4D Waters

1. True impairment and more work needed to find causative pollutant (will be 5)
2. Natural condition
 - Should be 4C and criteria are inappropriate for site
 - Develop Site Specific Alternative Criteria (SSAC)
3. Man-induced physical or habitat degradation caused failure.
 - Use attainability analysis (UAA) indicates that factors cannot be remedied, and reclassification to Class III Limited is appropriate.
 - UAA indicates that factors can be remedied, and restoration is appropriate





Three Way Decision Point

- Is waterbody biologically healthy (criteria or listed parameter may be inaccurate)? **SSAC**
- Is waterbody a ditch or canal built before 1975 with poor habitat and hydrology? **UAA**
- Habitat OK, biology poor, and listed parameter makes sense? **TMDL**
 - Need to identify causative pollutant for waters with low DO or failing biology





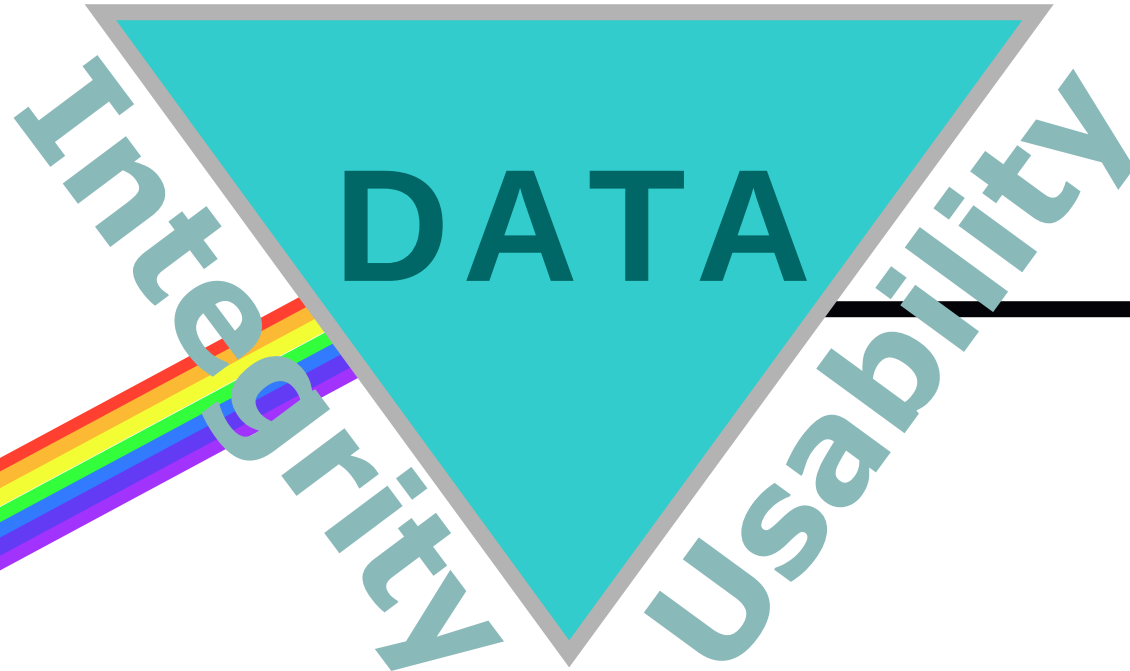
Evaluation of Waters and Data

- Waters on the 4d list
 - Evaluate data quality
 - Evaluate appropriateness of sampling
- Waters on the Strategic Monitoring list
 - Evaluate existing data (QA, appropriateness)
 - Evaluate sites upon visiting and sampling to determine which course makes sense (TMDL, SSAC, UAA)



QUALITY ASSURANCE

Quality





QA Is Everyone's Responsibility

- The QA Directive states that it is DEP's Policy to use scientifically valid and legally defensible data for protection of the environment.
- Each employee, from managers to field samplers, must ensure their work products and decisions are supported by sound science
- Adequate QA saves time and money in the long run



Easy QA Evaluation Steps

- Do the data make sense?
 - Unrealistic results, undisturbed area with “hits”, etc.
- Was the sampling site suitable?
 - Habitat, channelization (bridges), etc.
- Were hydrologic conditions appropriate?
 - Disconnected pools, flood



Easy QA Evaluation Steps

- Were DEP SOPs followed?
- Was the lab NELAC certified?
- What did data qualifiers say?
- Bottom line- **Do the samples accurately represent TMDL study objectives?**
(Impairment due to **pollutant loading**)





Representative Stations

- Data are collected for a variety of reasons
 - Ambient monitoring
 - Effects studies
- Waterbodies can be inappropriately classified (gradients between wetlands, lakes, streams)
- Evaluate site information



Spatial Considerations

- Sampling site location is critical in determining what the water quality data actually represent
 - Proper system type (wetland vs. stream, etc.)
- Channelization, obstructions (improperly placed culvert, bridges), canopy cover, etc. can influence water quality results
- Focus on pollutant loading



Temporal Considerations

- Hydrologic conditions can significantly influence results
- Disconnected pools, extreme low flow not representative
 - Leaf litter decomposition (low natural DO), soil leaching (higher nutrients), chlorophyll higher in stagnant conditions
- Hurricanes, floods can mobilize soil organic and inorganic materials
 - Metal adsorbed to soils, low DO, etc.





*Florida Department of
Environmental Protection*

Effective Study Design to Determine Appropriate Category



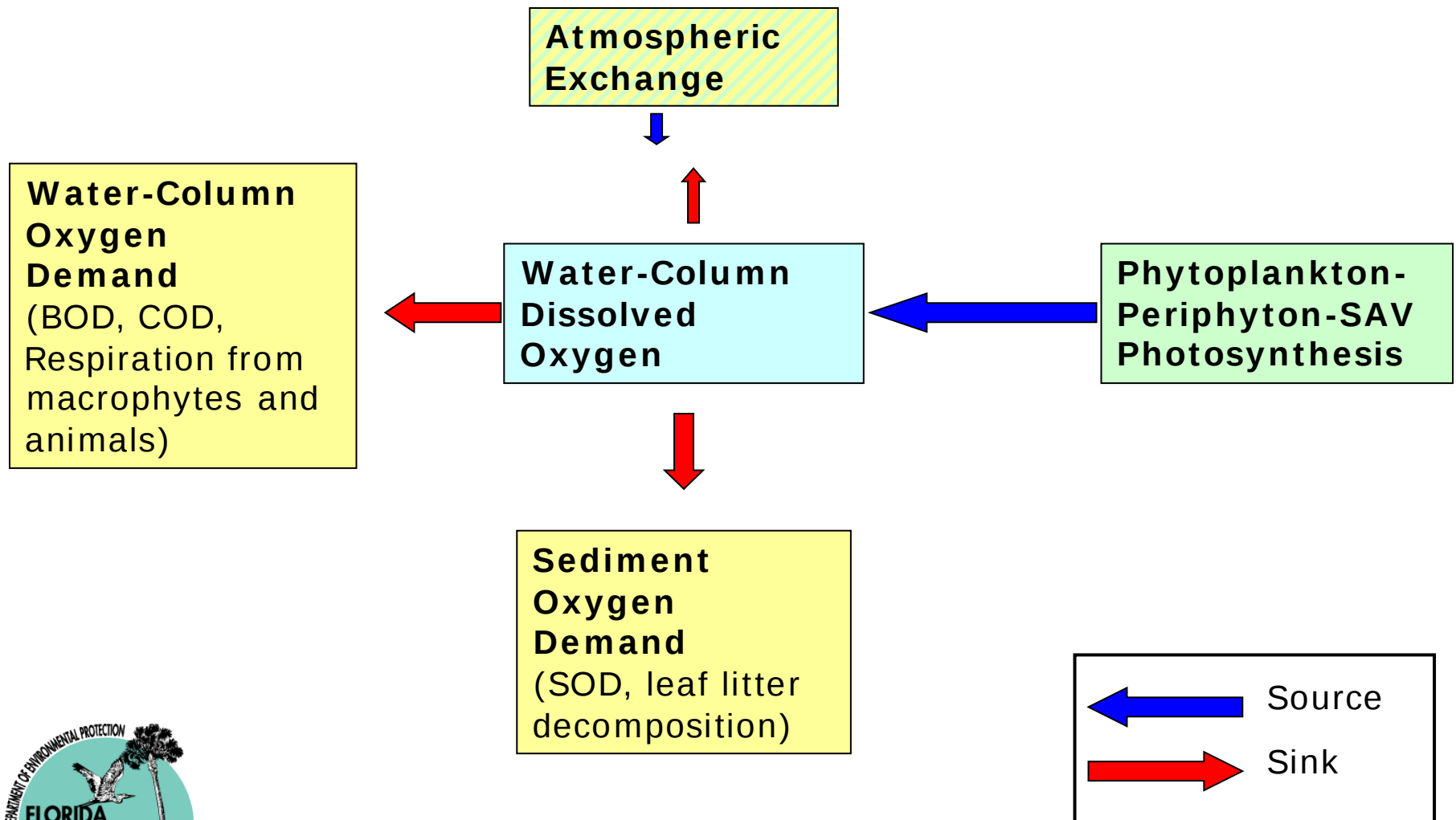
Dissolved Oxygen Example

- Original criteria developed in early 1970s, based on lab bioassays (mostly non-Florida taxa)
- FDEP has determined that the current DO criteria are in need of revision
 - Temperature dependant DO criteria from ~3 to ~6 mg/L will pass the SCI
- Many healthy systems have natural DO below the current criteria
 - Factors other than human loading are responsible





DO is a Function of Ecosystem Processes





Minimally Disturbed, Low DO Systems (e.g.)

Econfina Estuary

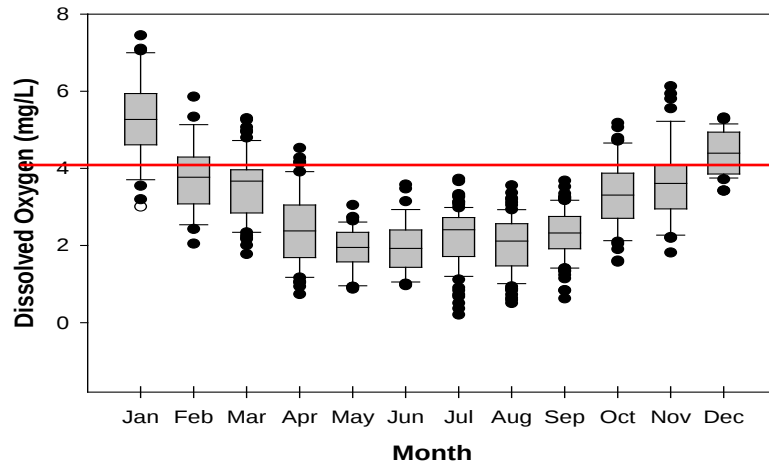
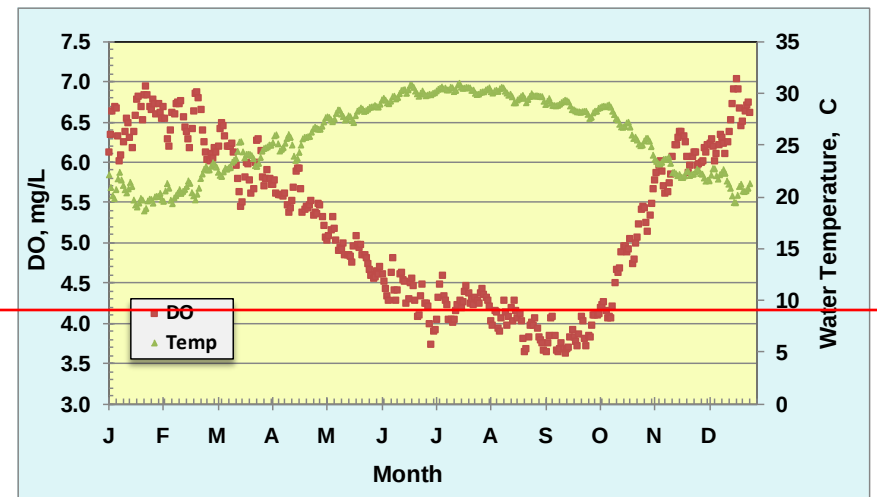


Figure 5. Monthly distribution of daily minimum dissolved oxygen concentrations at Econfina River and estuary monitoring sites.

Fakahatchee Bay



Current minimum criterion



4D Stream Assessments for DO

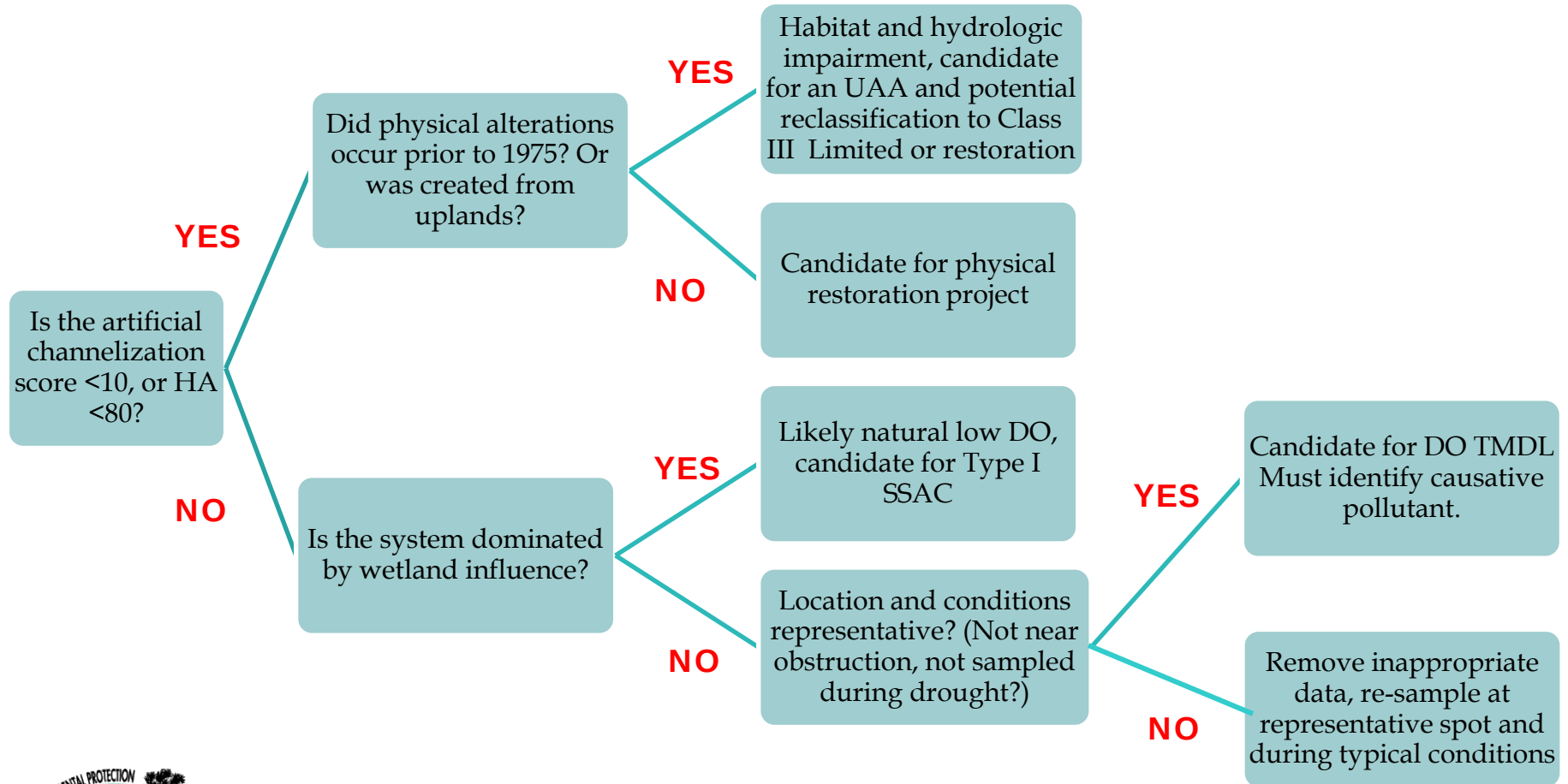
Items you will need:

- Completed Physical/Chemical Characterization Form
- Completed Habitat Assessment Form
- Hydrologic Modification Score
- Photos of Site
- Aerial Imagery of Site
- Map of Site showing NHD layer and recent Land Use
- 3 months of previous water level data from the nearest USGS Gauging Station





Scenario - Low Dissolved Oxygen





Conclusions

- Use knowledge to determine best monitoring strategy (TMDL vs. SSAC vs. UAA) for waters on the planning list
- Ensure that sampling locations and conditions meet objectives (focus on pollutant loading)
- Communicate with Watershed Assessment Section and Standards and Assessment Section to design proper course of action





Examples

- Hatchet Creek
- Fisheating Creek
- Local Examples



Hatchet Creek

- Listed for historic increase in chlorophyll *a* (3 to 5 µg/L)
- 88% natural land use, excellent biology
- Samples collected at road crossing with habitat assessment channelization score of 3, velocity score of 1
- Sampled during drought, discontinuous pools.





Hatchet Creek

What do you think?





Fisheating Creek

- Listed for low DO
- Long time reference stream, SCI scores generally over 55, SCI site ~ 2 mile upstream bridge
- Becomes wetland system near bridge, where DO data collected





What Do You Think?





District Examples

- NW
- Central
- South
- SE
- SW
- NE
- Tallahassee





*Florida Department of
Environmental Protection*

Northwest District 4D Site Examples

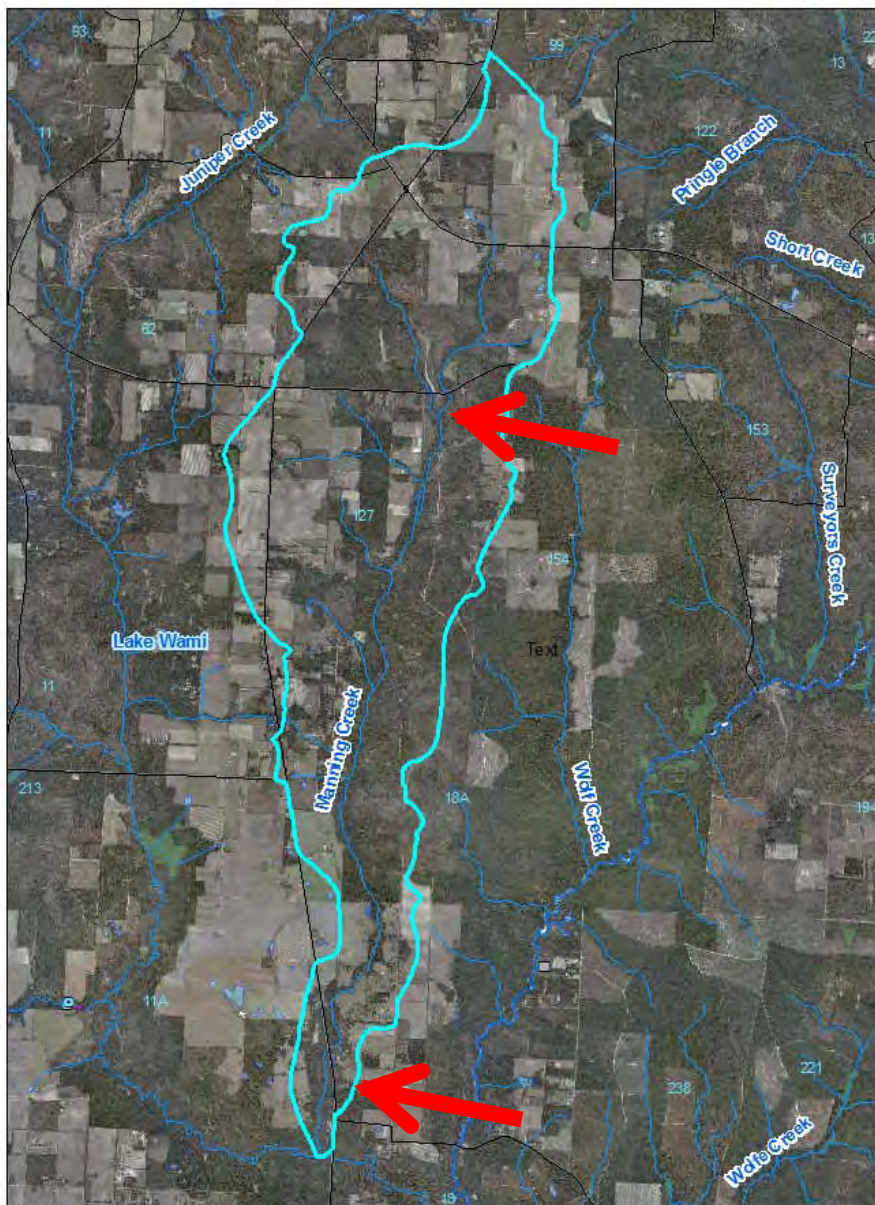


Manning Creek

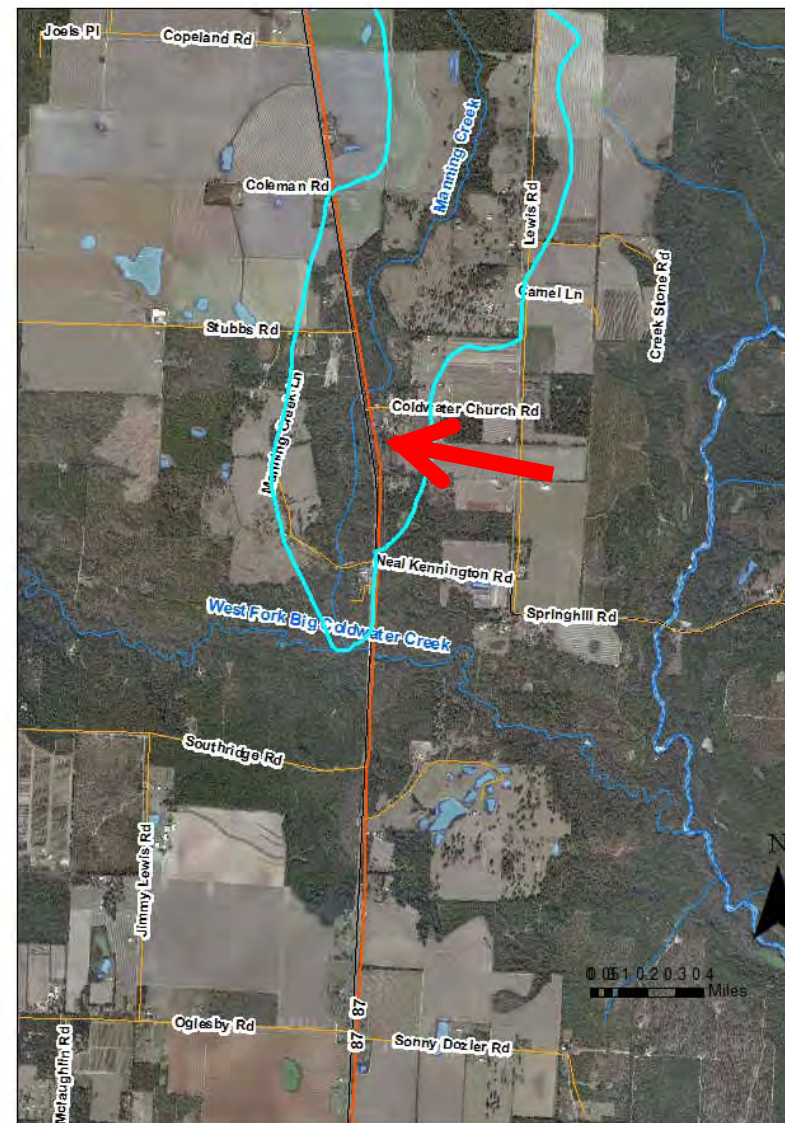
WBID 127 Blackwater River Basin

Parameter	DO/Nutrient/Biology TN,TP, BOD Median values (mg/L)	Concentration of Criterion or Threshold not met	Assessment Status	Current Category
Alkalinity		Shall not be depressed < 20 mg/L CaCO ₃	Planning list	3c
Arsenic		≤ 50 µg/L	Insufficient data	3b
Dissolved Oxygen	TN=1.15 (n=28), TP=0.02(n=28), BOD=0.72 (n=35)	≥ 5.0 mg/L	No causative pollutant	4d
Iron		≤ 1.0 mg/L	Insufficient data	3b
Nutrients (Historic Chl)	TN=1.15 (n=28), TP=0.02(n=28), BOD=0.72 (n=35)	N/A	Insufficient data	3b
pH		≥ 6, ≤ 8.5 SU	Planning list	3c
Silver		≤ 0.07 µg/L	Insufficient data	3b

Manning Creek WBID127 Aerial Imagery



0 0.5 1 2 3 4 Miles

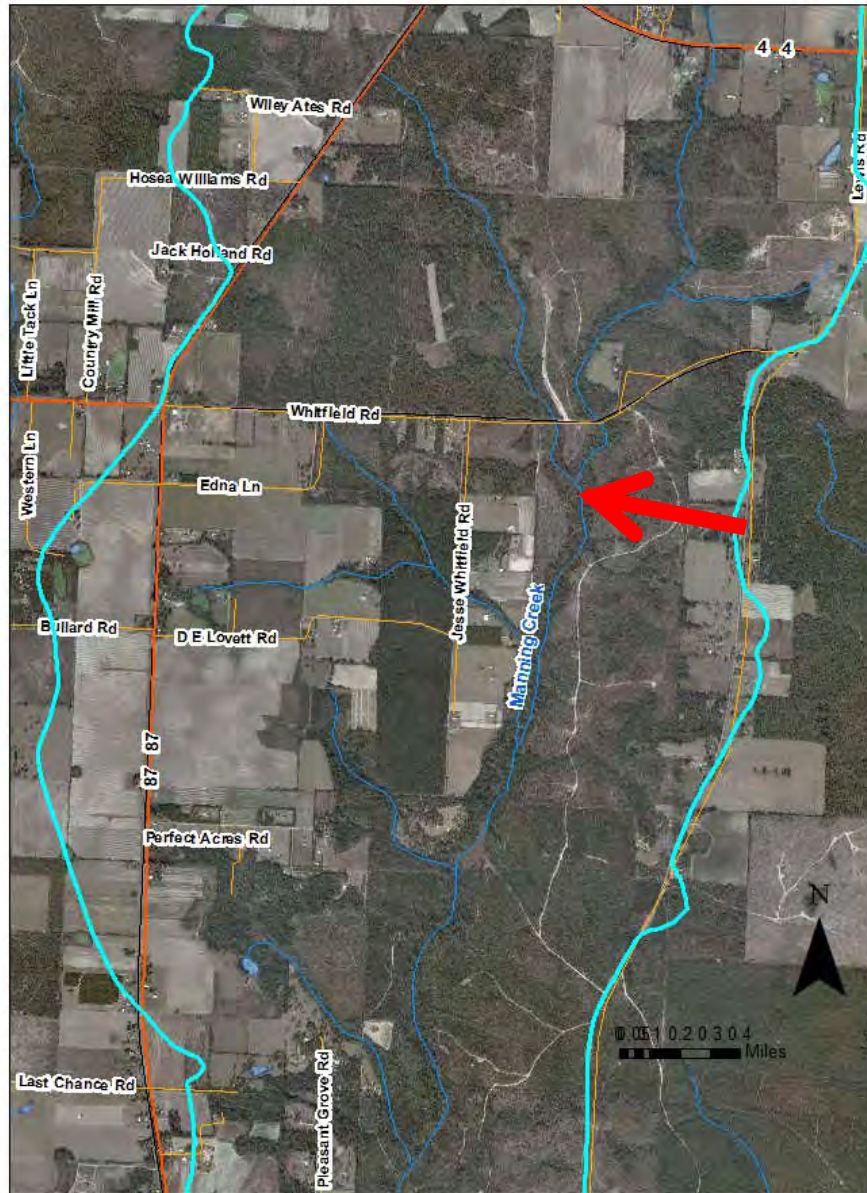


0 0.5 1 2 3 4 Miles





Manning North





Manning Creek





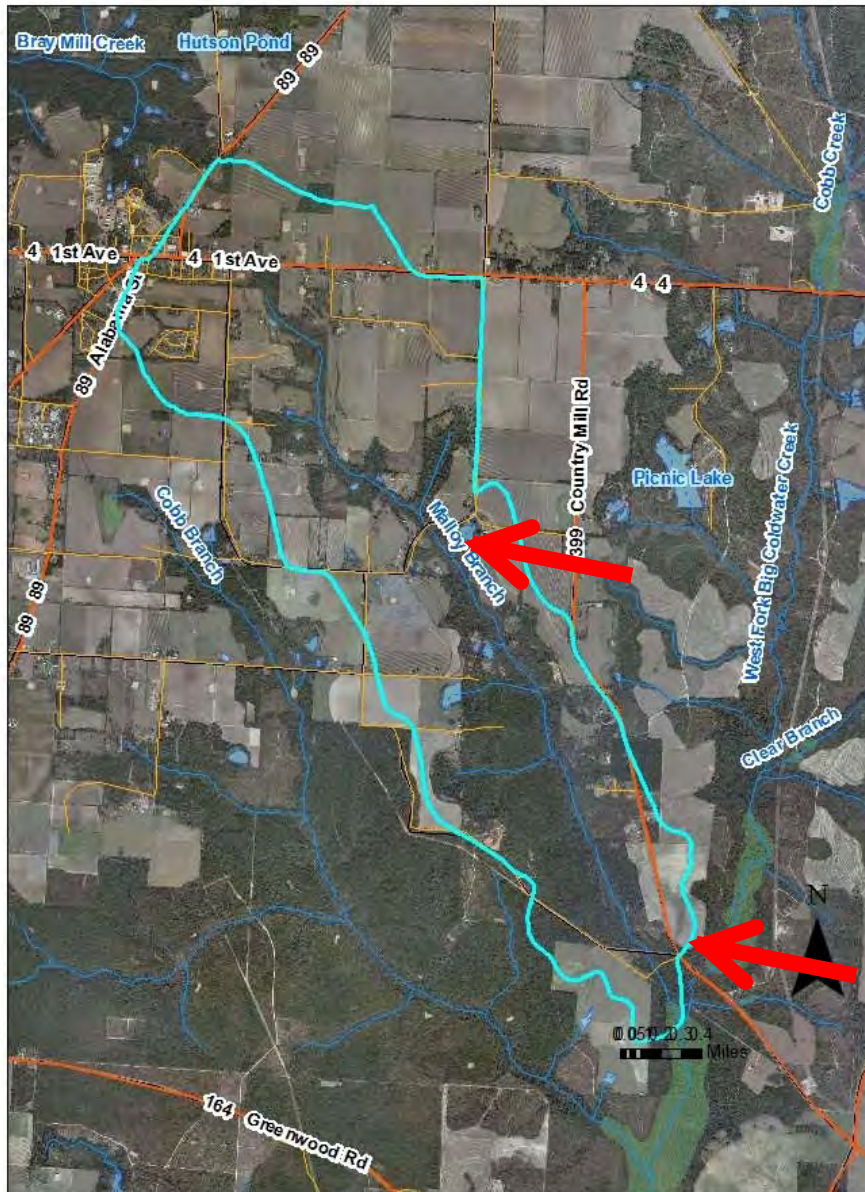
Malloy Branch

WBID 82 Blackwater River Basin

Parameter	Concentration of Criterion or Threshold not met	Planning Period # exceedances/# samples	Verified Period # of exceedances/# samples	Assessment Status	Current Category
Biology	<2 Failing Bioassessments	01/27/99 (BIORECON:fail) ; 07/19/00 (SCI: fail)	No Data	No Causative Pollutant	4 d



Malloy Branch





*Florida Department of
Environmental Protection*

Central District 4D Site Examples



WBID 1406, Big Creek Reach

WBID	Water Segment Name	Waterbody Type	Waterbody Class ¹	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Current Integrated Category - Final Assessment [†]	Current Assessment Status	Comments
1406	Big Creek Reach	Stream	3F	Biology	2	Not Impaired	pp - 1 healthy BioRecon in 1997. vp - No data. Not impaired call made based on the planning period BioRecon result.
1406	Big Creek Reach	Stream	3F	Dissolved Oxygen	5	Impaired	pp = 19 / 31 Potentially impaired; vp = 24 / 25 impaired. DO met the verification threshold and TN was identified as the causative pollutant. 11 TN measurements, median 2.04 mg/L. 15 TP measurements, median 0.05 mg/L, 11 BOD measurements, median 0.8 mg/L.



WBID 1406, Big Creek







WBID 1406, Big Creek in Lake Louisa State Park





WBID 1406, Big Creek in Lake Louisa State Park





WBID 1406, Big Creek

- Assess existing data for site
 - Biological data
 - Passed Biorecons in 1997
 - Habitat Assessments
- Assess landscape setting of site using GIS
 - Surrounding land use
 - Very little development in watershed
 - Drains Green Swamp
 - Wetlands have naturally anaerobic soils and characteristically low dissolved oxygen levels



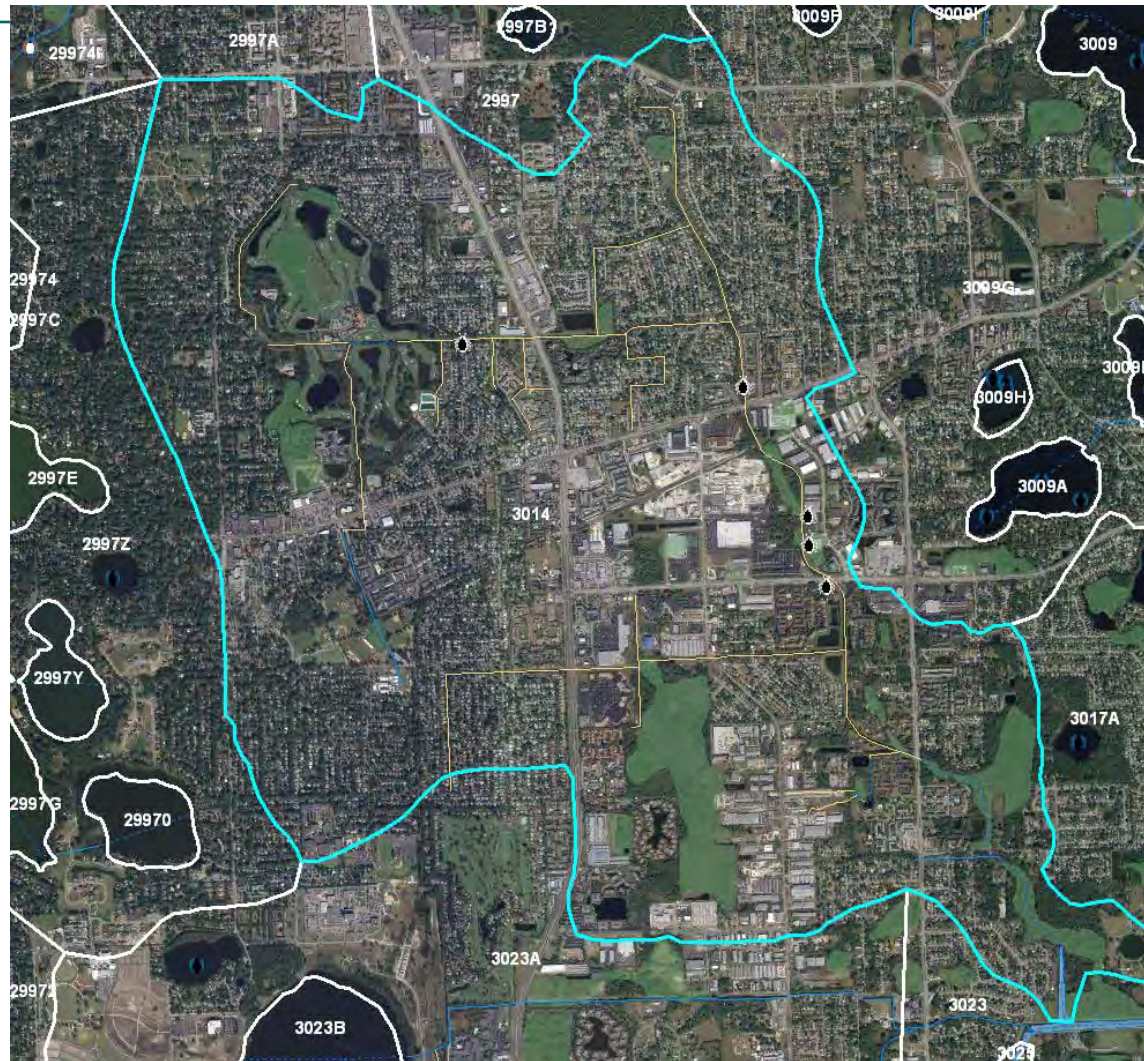


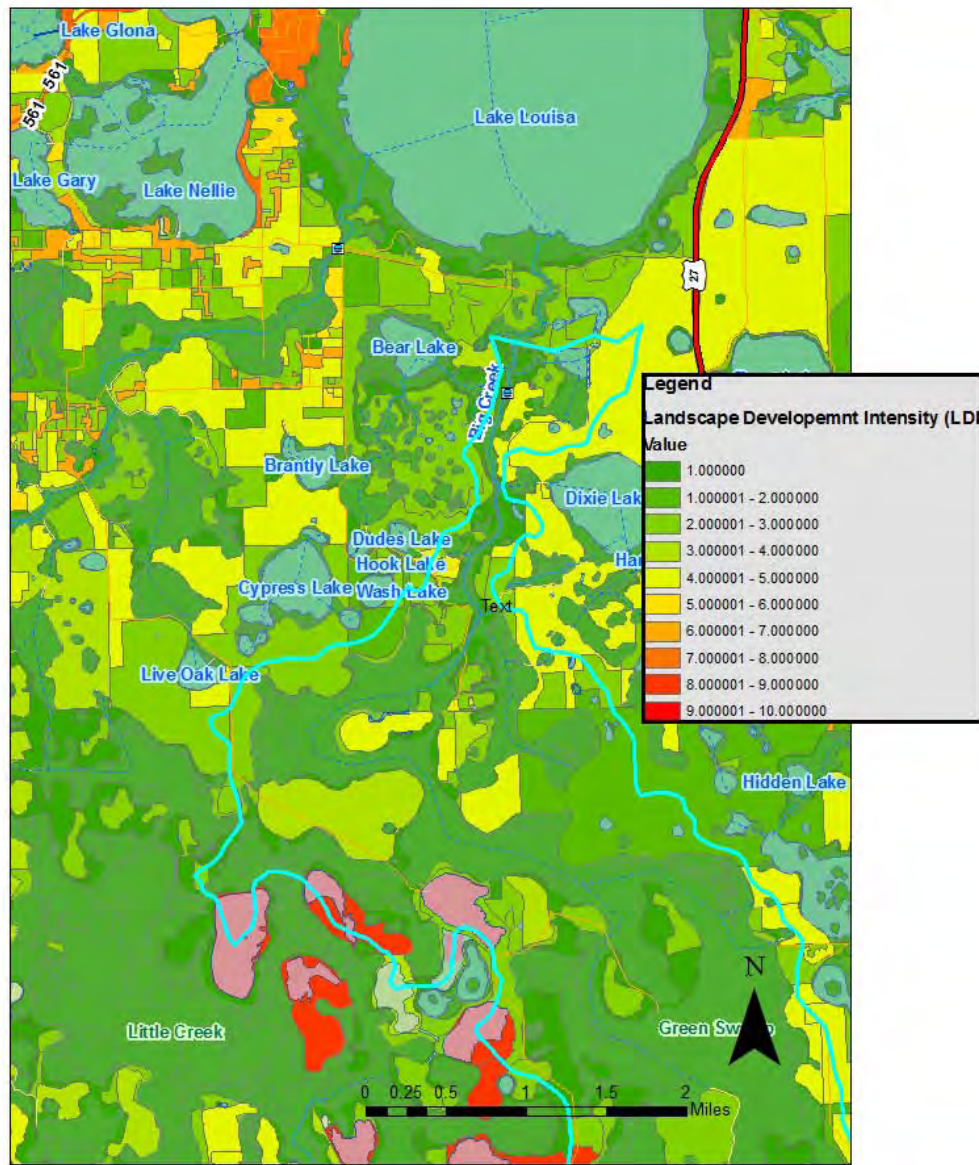
WBID 3014, Crane Strand

WBID	Water Segment Name	Waterbody Type	Waterbody Class ¹	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Current Assessment Status	Comments
3014	Crane Strand Drain	Stream	3F	Biology	Impaired	Failed bioassessment due to low DO levels. Causative pollutant believed to be BOD, mean of 14 values = 2.1 mg/L.
3014	Crane Strand Drain	Stream	3F	Dissolved Oxygen and BOD	Impaired	PP - 1/4 values below DO criterion. VP - 11/30 values below DO criterion. DO met verification threshold of IWR and BOD is causative pollutant. (BOD median = 2.25 mg/L). 30 DO values, median 5.95 mg/L, mean 6.11 mg/L, range 2.87 - 10.95 mg/L.



WBID 3014, Crane Strand







WBID 3014, Crane Strand



1996





WBID 3014, Crane Strand



2008





WBID 3014, Crane Strand



2008





WBID 3014, Crane Strand

- **Assess existing data for site**
 - Biological data
 - Most data from 1996 through present suggests the site does not support a healthy well-balanced biological community
 - Habitat Assessments
 - Average HA Score in 2008 = 63
 - Artificial channelization score = 3
- **Assess landscape setting of site using GIS**
 - Surrounding land use
 - Highly altered watershed
 - Channelization occurred in the mid-1950's prior to CWA
 - Highest Use ?





*Florida Department of
Environmental Protection*

South District 4D Site Examples



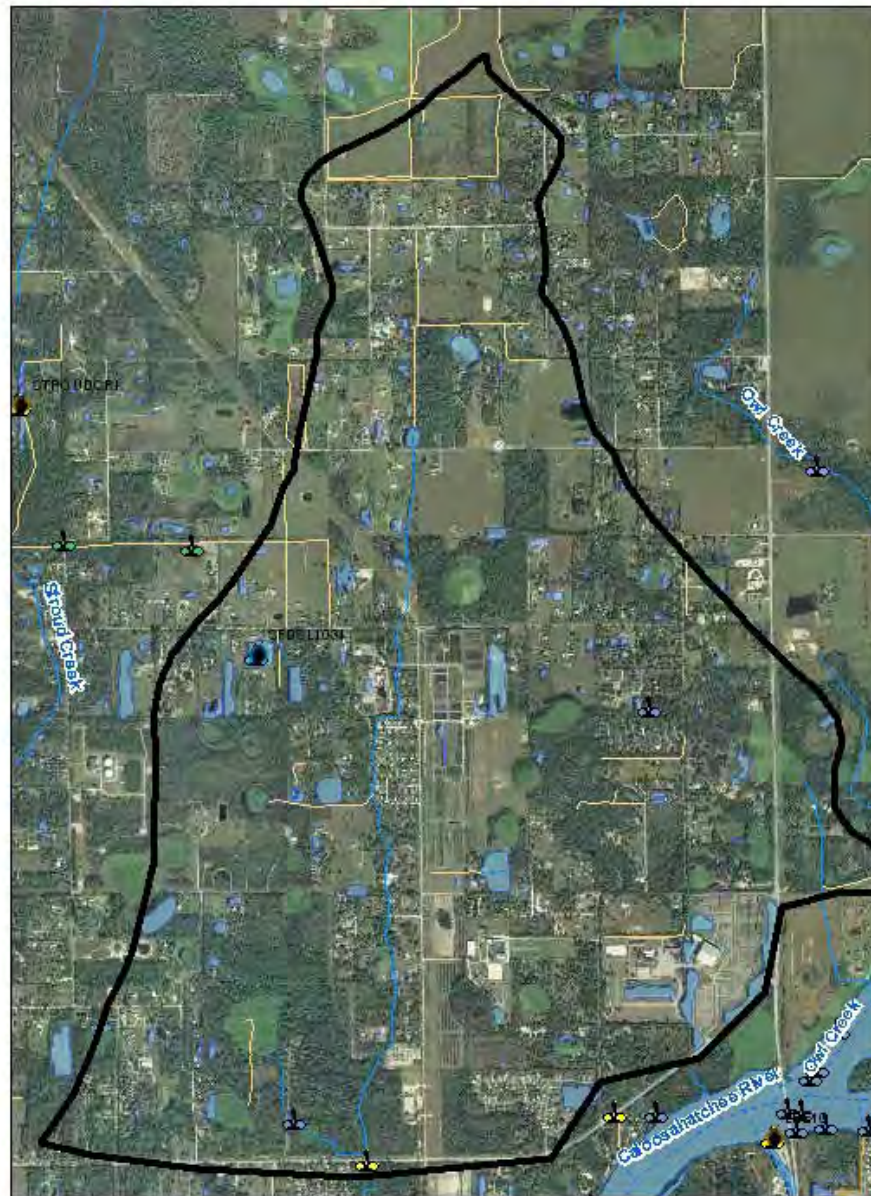
WBID 3240C1, Palm Creek

WBID	Water Segment Name	Waterbody Type	Waterbody Class ¹	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Dissolved Oxygen / Biology Pollutant of Concern	DO / Nutrient / Biology - TN, TP, BOD Median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met ³	Current EPA Integrated Report Category † - Cycle 2 Assessment ⁵	Current Integrated Category † - Final Assessment	Current Assessment Status	Planning Period Assessment Data ⁷	Verified Period Assessment Data ⁸	Comments
3240C1	Palm Creek	Stream	3F	DO		TN = 0.94 (n= 42) TP = 0.095 (n= 32) BOD= 1.4 (n= 39)	≥ 5.0 mg/L	4d	4d	No Causative Pollutant	90/106	59/73	DO exceeds the IWR threshold, however a causative pollutant cannot be identified. This is a newly created WBID from cycle 1
3240C1	Palm Creek	Stream	3F	Fecal Coliform			≤ 400 Counts / 100 mL	5	5	Impaired	56/106	39/69	Newly created WBID for Cycle 2. Verified as impaired based on data within the VP, added to 303(d) list.

Bacteria - Impaired
DO – No causative pollutant
 *No Biological Data



WBID 3240C1 Palm Creek



0 0.25 0.5 1 Miles

This map was made by Nia Wellendorf on 3/4/11 for demonstration purposes. 2005-2009 Aerial photos.



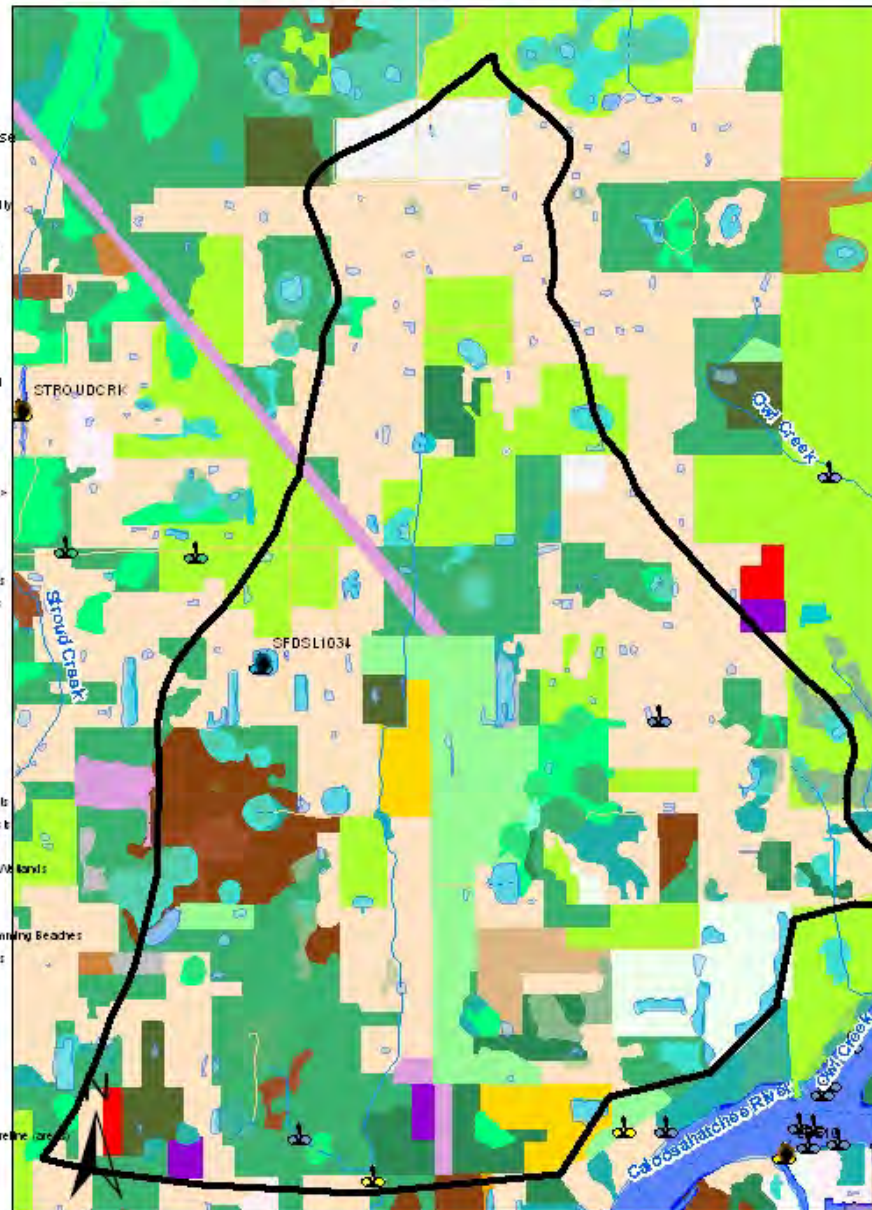
WBID 3240C1 Palm Creek

Legend

SFWMD 2004-05 Land Use

LEVEL2

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands (Rural)
- Barren Lands
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Waters
- Ozark and Gulf
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riverine Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Free Grass
- Florida Counties with Shoreline



0 0.25 0.5 1 Miles

This map was made by Nia Wellendorf on 3/4/11 for demonstration purposes. Land Uses are SFWMD 2004-2005 FLUCCS.





Palm Creek @ Aqua Vista Rd.





Palm Creek at Caloosa Woods Rd.





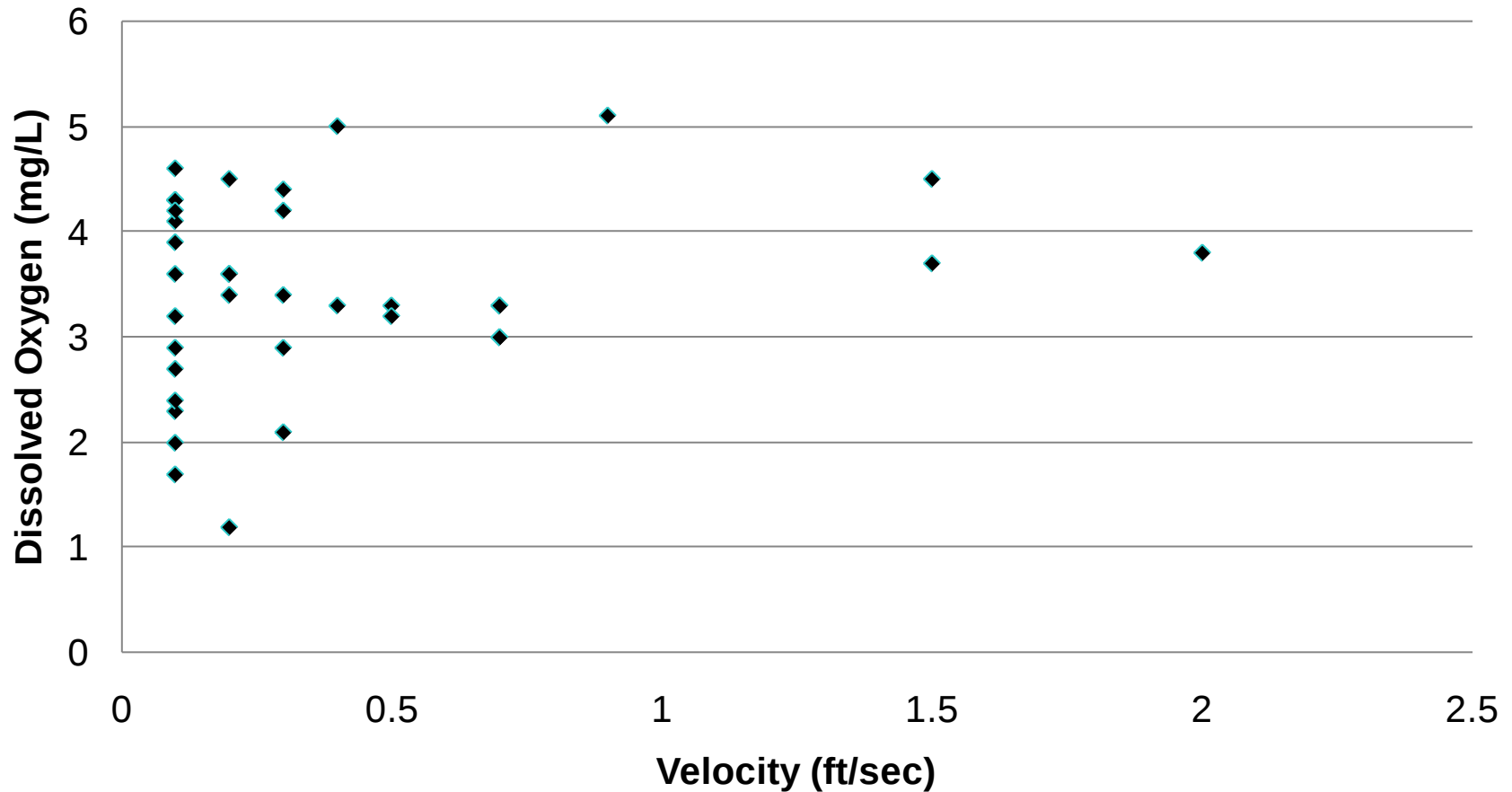
Palm Creek data summary 2007-2010

Row Labels	Count	Average	Max	Min
BOD, Biochemical oxygen demand	43	1.74	4.5	0.9
Calcium (mg/L)	6	76.58	114	26.5
Chloride (mg/L)	43	57.09	255	16.9
Chlorophyll a, corrected for pheophytin	43	4.29	18.9	0.7
Dissolved oxygen (DO) (mg/L)	43	3.25	5.1	1
Enterococcus Group Bacteria (CFU/100 ml)	43	5590.12	81000	10
Fecal Coliform (CFU/100 ml)	43	2502.86	31000	10
Hardness, Ca + Mg (mg/L)	24	263.65	361	79.5
Nitrogen ion (N) (mg/L)	43	1.07	1.9	0.19
Nitrogen, ammonia as N (mg/L)	43	0.10	0.188	0.019
Nitrogen, Kjeldahl (mg/L)	43	0.97	1.8	0.18
Nitrogen, Nitrite (NO ₂) + Nitrate (NO ₃) as N	43	0.12	0.38	0.01
pH	43	7.35	7.93	6.9
Phosphorus (mg/L)	43	0.12	0.28	0.048
Phosphorus, orthophosphate as P (mg/L)	43	0.03	0.121	0.004
Specific conductance (μS/cm)	43	622.91	1150	206
Temperature, water (°C)	43	21.95	26	14.7
Total Suspended Solids (TSS) (mg/L)	43	6.21	55.8	0.7
True Color (PCU)	43	94.05	243	41.9
Turbidity (NTU)	43	11.01	28.7	1.82
Velocity – stream (ft/sec)	36	0.40	2	0.1





Water Velocity vs. Dissolved Oxygen Palm Creek @ 78, 2007-2010 Lee Co ~ Monthly

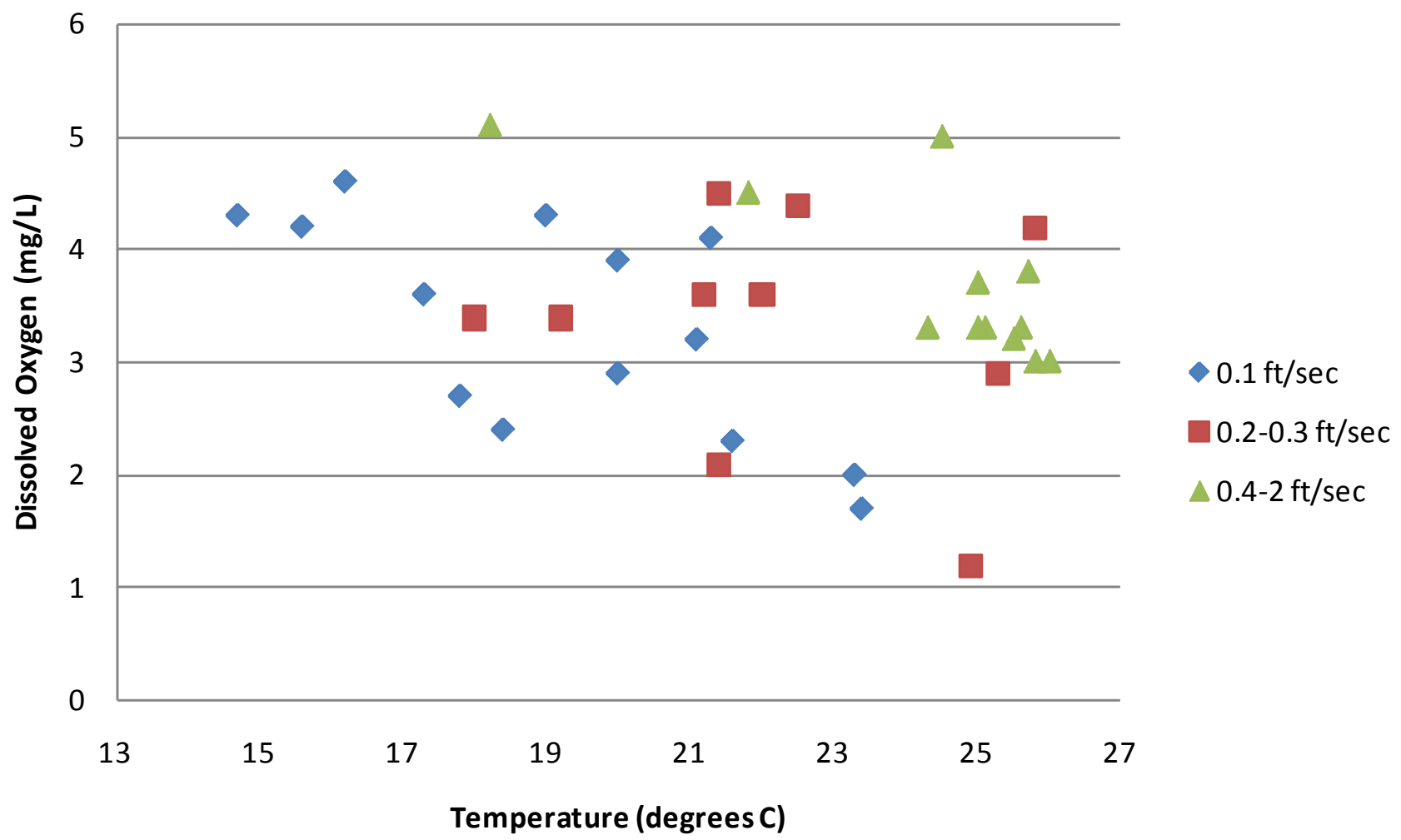


(1 ft/sec = 0.33 m/s)





Temperature vs. DO for Three Velocity Ranges





Palm Creek Review

- Assess existing data for site
 - Biological data – none; SCI not appropriate for this site due to marine influence
 - Habitat Assessments - none
- Assess landscape setting of site using GIS
 - Very low flow conditions
 - Surrounding land use - Urban
 - Channelization - Possibly
 - Potential for tidal influence - Yes





WBID 3240E, Yellow Fever Creek

WBID	Water Segment Name	Waterbody Type	Waterbody Class ¹	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Dissolved Oxygen / Biology Pollutant of Concern	DO / Nutrient / Biology - TN, TP, BOD Median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met ³	Current Integrated Category † - Final Assessment	Current Assessment Status	Planning Period Assessment Data ⁷	Verified Period Assessment Data ⁸	Comments
3240E	Yellow Fever Creek	Estuary	3M	Biology		TN = 0.74 (n= 107) TP = 0.14 (n= 107) BOD= 1 (n= 102)	< 2 Failing Bioassessments	N/A	N/A	01/21/98 (SCI: Pass) 03/15/05 (BIORECO N: Fail) 09/13/05 (BIORECO N: Fail) 08/08/06 (SCI2007: Fail)	03/15/05 (BIORECO N: Fail) 09/13/05 (BIORECO N: Fail) 08/08/06 (SCI2007: Fail)	Two of the failing biology samples appear to be from a canal within the WBID and not actually on Yellow Fever Creek that appears to have a normal sinuous pattern.
3240E	Yellow Fever Creek	Estuary	3M	Dissolved Oxygen		TN = 0.74 (n= 107) TP = 0.14 (n= 107) BOD= 1 (n= 102)	≥ 4.0 mg/L	4d	No Causative Pollutant	165/256	113/184	DO exceeds the IWR threshold, however a causative pollutant cannot be identified. This waterbody will remain on the 303(d) list.
3240E	Yellow Fever Creek	Estuary	3M	Fecal Coliform			≤ 400 Counts / 100 mL	5	Impaired	64/244	40/169	



Yellow Fever Creek



WBID 3240E Yellow Fever and East Yellow Fever





LEVEL 2

- Residential Low Density
 Residential Medium Density
 Residential High Density
 Commercial and Services
 Industrial
 Extractive
 Institutional
 Recreational
 Quiet Limit
 Grassy and Pastureland
 Low Crops
 Feeding Operations
 Nurseries and Vineyards
 Specialty Farms
 Other Open Land/Urban
 Wetlands
 Shrub and Bushland
 Wood Mangrove
 Upland Coniferous Forests
 Upland Hardwood Forests
 Tree Plantations
 Swamps and Wetlands
 Lakes
 Mangroves
 Slays and Estuaries
 Water Storage
 Strong Wastes
 Coastal Silt and Gull
 Wetland Hardwood Forests
 Wetland Coniferous Forests
 Wetland Forested Wood
 Vegetated, Non-Forested Wetland
 Non-Vegetated
 Wetland Shrub
 Beaches Other Than Sand
 Sand Other Than Beaches
 Exposed Rock
 Disturbed Land
 Reclaimed Land
 Transportation
 Communication
 Community
 Utilities
 Vegetation on Roads
 Florida Corridor with Shore

This map was made by Nia Wellendorf on 3/4/11 for demonstration purposes. Land Uses are SFWMMD 2004-2005 FLUCCS.





East Yellow Fever Creek





Yellow Fever Creek Review

- Assess existing data for site
 - Biological data – One old SCI - passed
 - SCI not always appropriate for this site due to marine influence?
 - HA – scored 111 (1 sample)
- Assess landscape setting of site using GIS
 - Very low flow conditions
 - Surrounding land use – buffered
 - Channelization – some
 - Potential for tidal influence?





East Yellow Fever Creek Review

- Assess existing data for site
 - Biological data – one failures in 2006, one failure on old SCI. SCI not appropriate for this site due to marine influence
 - HA – 66, channelization 2
- Assess landscape setting of site using GIS
 - Surrounding land use – Urban
 - Channelization – yes
 - Potential for tidal influence - Yes





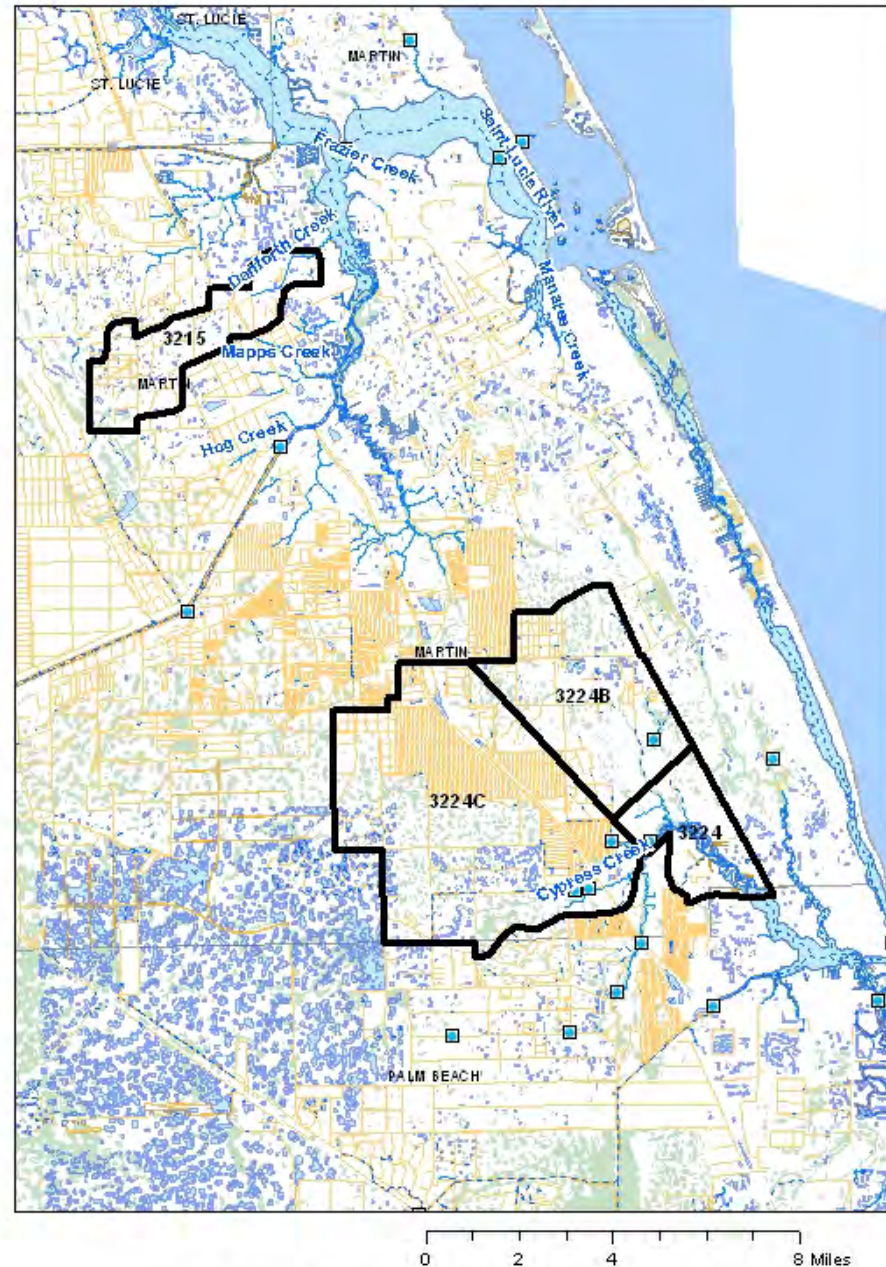
*Florida Department of
Environmental Protection*

Southeast District 4D Site Examples

SE District Examples



Selected SED 4D WBIDs



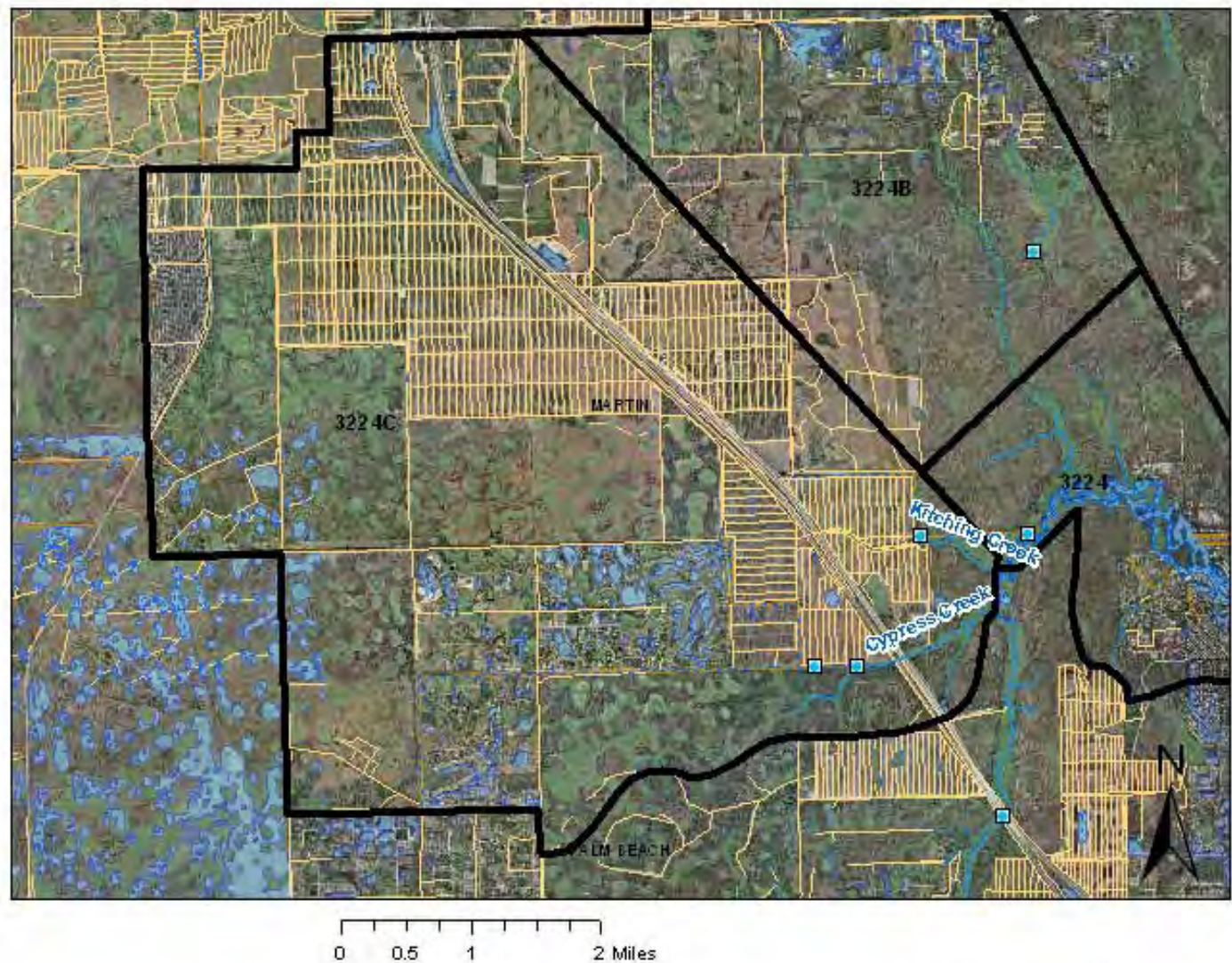
This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes.

WBID 3224C – Cypress Creek

WBID	Water Segment Name	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	DO / Nutrient / Biology - TN, TP, BOD median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met	Period of Record Assessment ³	Previous EPA Integrated Report Category † - Cycle 1 Assessment ⁴	Current EPA Integrated Report Category † - Cycle 2 Assessment ⁵	Current Integrated Report Category - Final Assessment	Current Assessment Status	Planning Period (# of Exceedances/ # of Samples) ⁷	Verified Period (# of Exceedances/ # of Samples) ⁸	Comments
3224C	Cypress Creek	Dissolved Oxygen	TN = 1.24 (n=86) TP = 0.062 (n=87) BOD = 2.0 (n=60)	≥ 5.0 mg/L	N/A	3c	4d	4d	No Causative Pollutant	49/165	21/86	DO is verified impaired but no causative pollutant could be found. TN, TP, and BOD did not exceed their respective thresholds. TN/TP median = 17.80, standard deviation of 10.87, range 5.63 - 68.59, observations 86. This assessment will be included on the 303(d) list.
3224C	Cypress Creek	Nutrients (Chlorophyll-a)	TN = 1.24 (n=86) TP = 0.062 (n=87) BOD = 2.0 (n=60)	≤ 20 µg/L	N/A	2	5	5	Impaired	1998 (6.00 µg/L) 1999 (6.14 µg/L) 2000 (6.51 µg/L) 2001 (6.40 µg/L) 2002 (12.55 µg/L) 2003 (5.54 µg/L) 2004 (36.23 µg/L)	2001 (6.40 µg/L) 2002 (12.55 µg/L) 2003 (5.54 µg/L) 2004 (36.23 µg/L) 2007 (1.38 µg/L)	The annual average Chl-a value did not exceed the IWR threshold of 20.0 µg/L in 2001, 2002, 2003, and 2007. The annual average Chl-a value exceeded the IWR threshold in 2004. Data indicate the WBID is TN and TP limited. New listing from cycle 2
3224C	Cypress Creek	Nutrients (Historic Chlorophyll-a)		< 9.33 µg/L	N/A	N/A	2	2	Not Impaired	1999 (6.14 µg/L) 2000 (6.51 µg/L) 2001 (6.40 µg/L) 2002 (12.55 µg/L) 2003 (5.54 µg/L) 2004 (36.23 µg/L)	2002 (12.55 µg/L) 2003 (5.54 µg/L) 2004 (36.23 µg/L) 2007 (1.38 µg/L)	Historic chlorophyll is one prong of the IWR nutrient assessment. Historically observed minimum value of 6.22 from 1996 - 2000. The annual Chl-a average did not exceed the minimum historical average by more than 50% in two consecutive years.



WBID 3224C, Cypress Creek



This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes with 2005-2009 Aerial Photos.

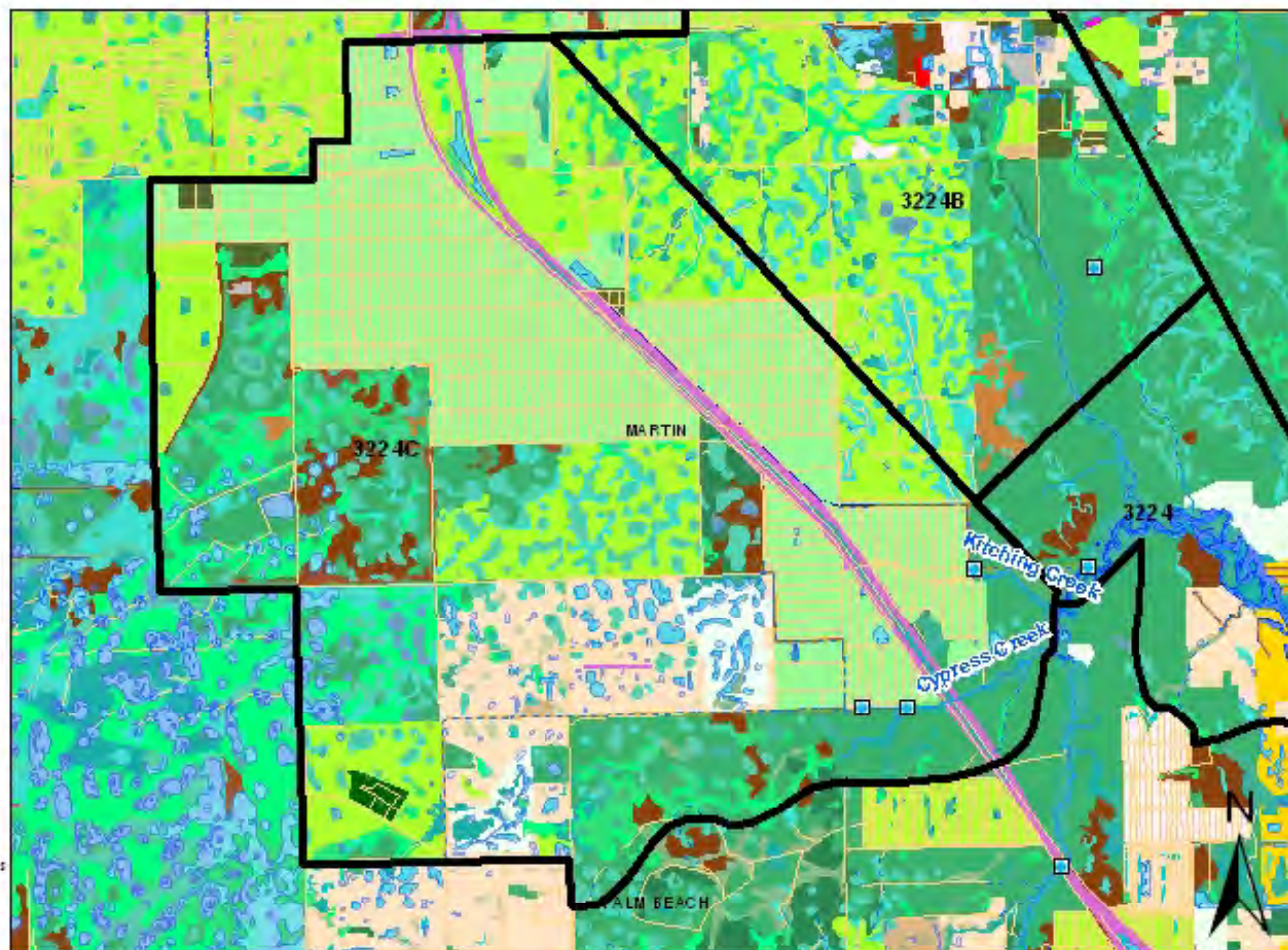


WBID 3224C, Cypress Creek - Land Use

Legend

SFWMD 2004-05 Land Use
LEVEL2

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands - Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Waters
- Oceans Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forests Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riverine Sandbars
- Transportation
- Communications
- Utilities
- Vegetation/Sea Grass



0 0.5 1 2 Miles

This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes with SFWMD 2004-2005 land use.



WBID 3215 – Danforth Creek

WBID	Water Segment Name	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	DO / Nutrient / Biology - TN, TP, BOD median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met	Period of Record Assessment ³	Previous EPA Integrated Report Category † - Cycle 1 Assessment ⁴	Current EPA Integrated Report Category † - Cycle 2 Assessment ⁵	Current Integrated Report Category - Final Assessment	Current Assessment Status	Planning Period (# of Exceedances/ # of Samples) ⁷	Verified Period (# of Exceedances/ # of Samples) ⁸	Comments
3215	Danforth Creek	Dissolved Oxygen	TN = 0.95 (n=102) TP = 0.17 (n=102)	≥ 5.0 mg/L	5	3c	4d	4d	No Causative Pollutant	49/84	58/102	DO is verified impaired but unable to determine the causative pollutants. TN and TP did not exceed their respective thresholds. No BOD data available. TN/TP median = 5.73, standard deviation of 1.53, range 3.14 - 13.81, observations 101. New listing from cycle 2. This assessment will be included on the 303(d) list.
3215	Danforth Creek	Fecal Coliform		≤ 400 Counts / 100 mL	5	N/A	3c	3c	Planning List	3/9	No Data	Based on FDEP's independent consideration and evaluation of period of record data this waterbody is being placed on the planning list; unable to determine if sufficient data were analyzed within holding times.
3215	Danforth Creek	Nutrients (Chlorophyll-a)	TN = 0.95 (n=102) TP = 0.17 (n=102)	≤ 20 µg/L	N/A	2	2	2	Not Impaired	2002 (3.66 µg/L) 2003 (3.09 µg/L) 2004 (9.40 µg/L) 2005 (6.18 µg/L)	2002 (3.66 µg/L) 2003 (3.09 µg/L) 2004 (9.40 µg/L) 2005 (6.18 µg/L) 2006 (3.93 µg/L) 2007 (5.33 µg/L)	The annual average Chl-a value did not exceed the IWR threshold of 20.0 µg/L in 2002, 2003, 2004, 2005, 2006, and 2007. Data indicate the WBID is nitrogen limited.
3215	Danforth Creek	Nutrients (Historic Chlorophyll-a)		N/A	3b	N/A	3a	3a	No Data	No Data	No Data	Historic chlorophyll is one prong of the IWR nutrient assessment. No historic Chl-a data available for analysis.



WBID 3215, Danforth Creek - sampling sites

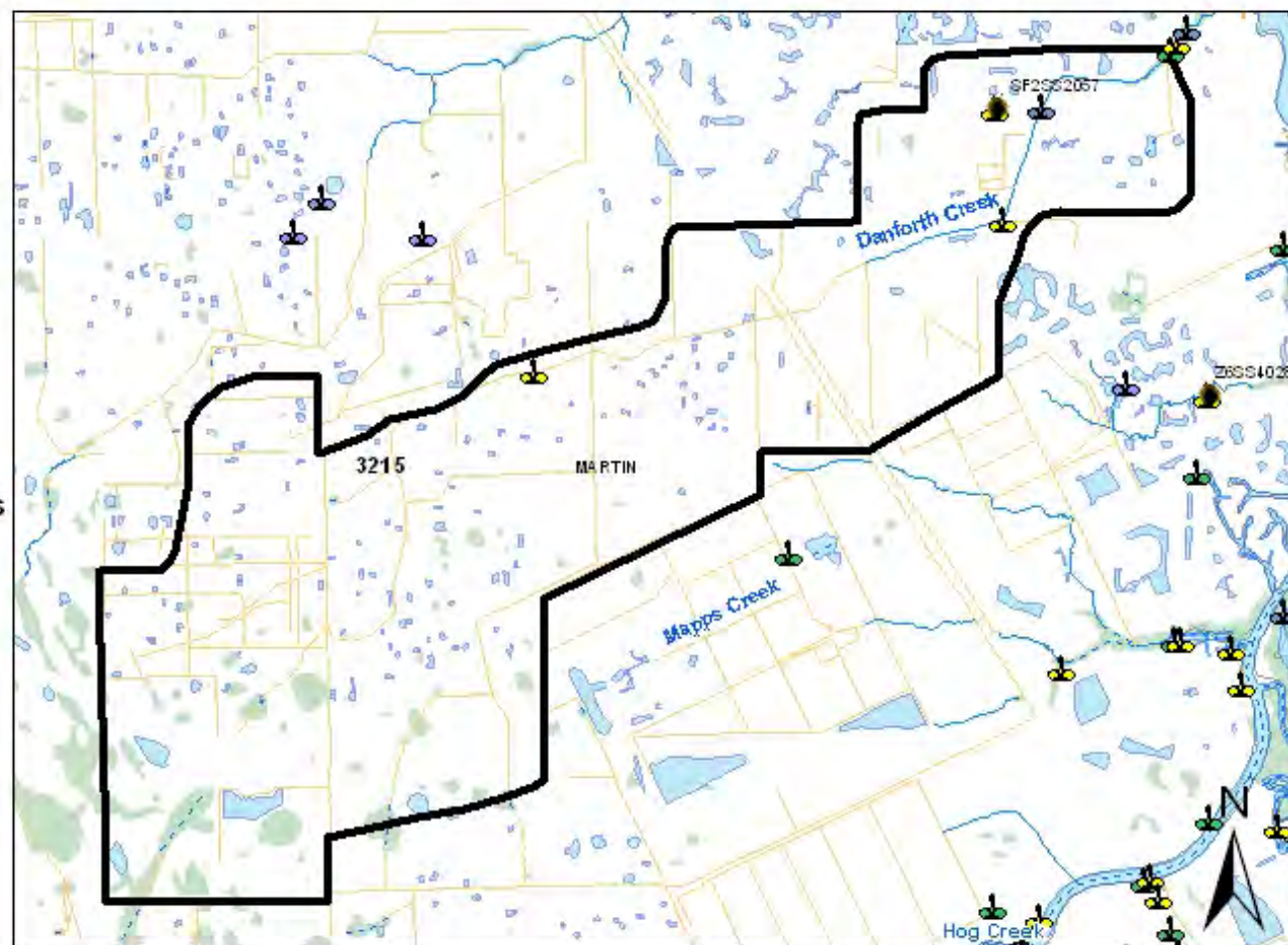
Legend

- Stream
- Canal
- Lake
- Reservoir
- Spring
- Fresh Wetland
- Salt Wetland
- Estuary
- Ocean
- Pipe

STORET Stations

Primary Type

- Canal
- Estuary
- Facility
- Lake
- Ocean
- River/Stream
- Spring
- Well
- Wetland
- Other



0 0.5 1 2 Miles

This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes.



WBID 3215 – Danforth Creek



This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes. 2005-2010 aerial photos.

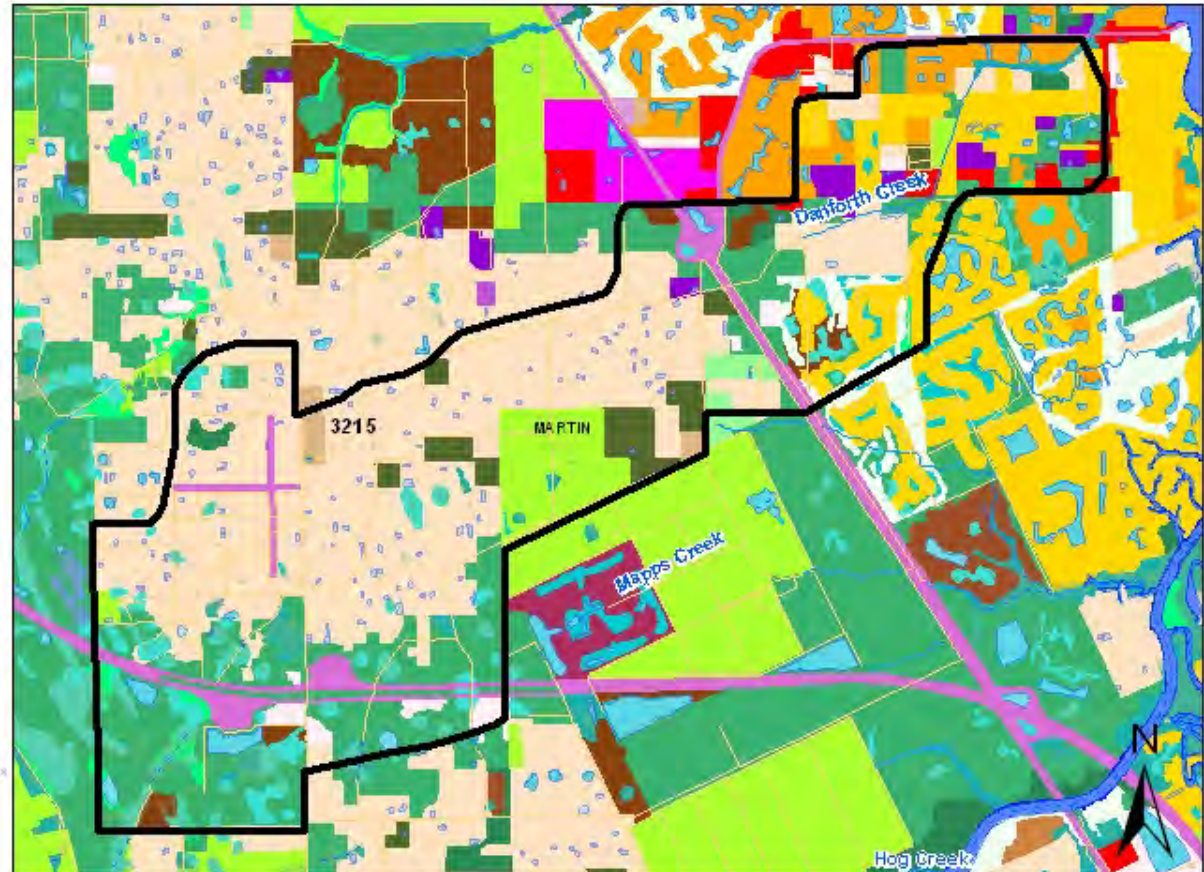


WBID 3215 – Danforth Creek

SFWM 2004-05 Land Use

LEVEL 2

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Miscellaneous
- Open Land
- Cropland and Pastureland
- Rice Cropland
- Paddocks
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands (Barren)
- Wetlands
- Shrubland
- Woodland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Marshes
- Bays and Estuaries
- Water Swamps
- Shrub Wetlands
- Open Shrub and Grass
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Wood
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches/Other Than Sleeping Beaches
- Sand/Other Than Sleeping Beaches
- Exposed Rocks
- Disturbed Lands
- Riverine Sandbars
- Transportation
- Commercial/Industrial
- Utilities
- Vegetation/Soil Gravel



This map was made by Nia Wellendorf on 3/14/11 for demonstration purposes. 2004-2005 land use.





*Florida Department of
Environmental Protection*

Southwest District 4D Site Examples



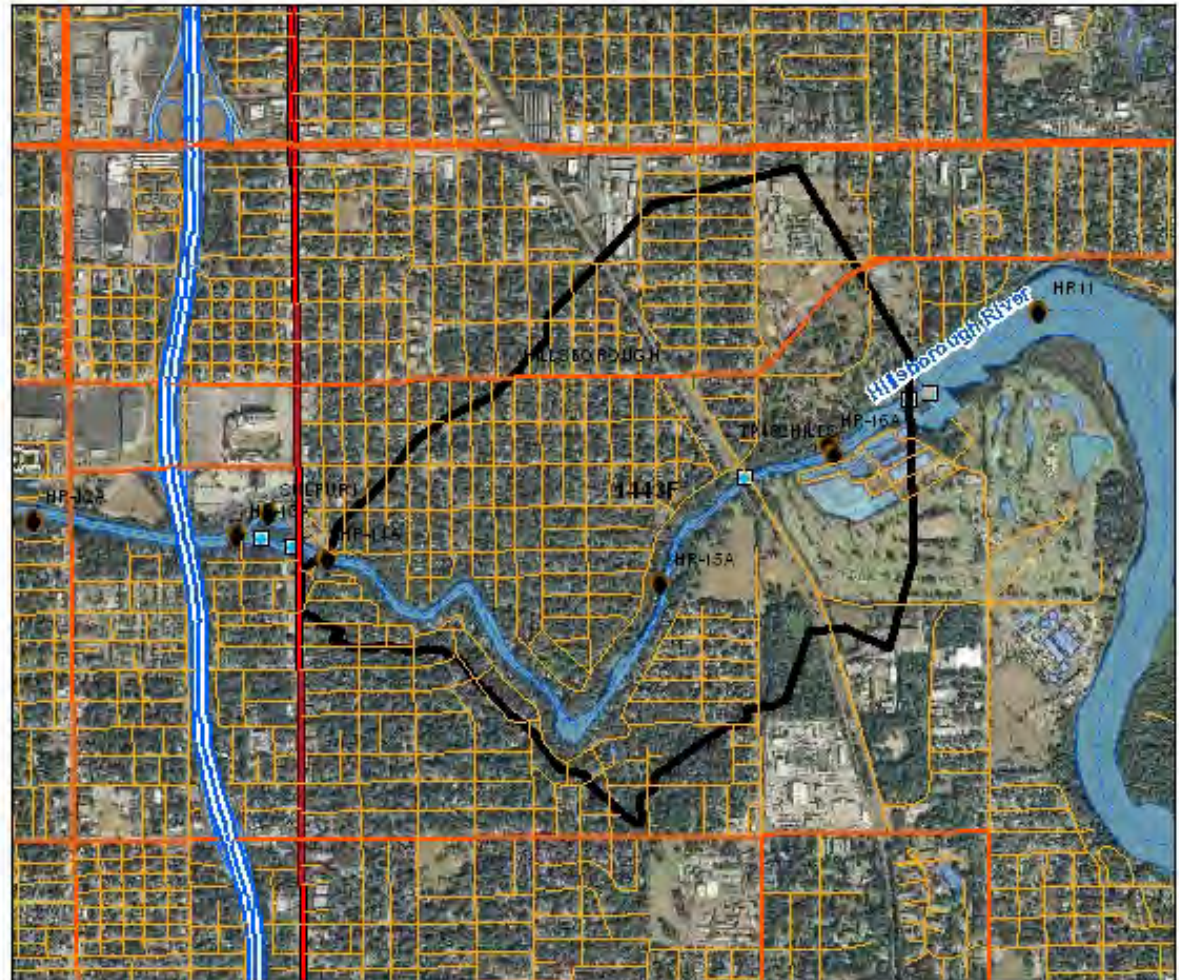
WBID 1443F Lower Hillsborough River Fresh

Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	DO / Nutrient / Biology - TN, TP, BOD median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met	Current Integrated Category - Final Assessment	Current Assessment Status	Planning Period (# of Exceedances/ # of Samples) ⁷	Verified Period (# of Exceedances/ # of Samples) ⁸	Comments
Specific Conductance		Shall not be increased more than 50% above background or to 1275 μ mhos/cm, whichever is greater.	2	Not Impaired	144/321	193/348	Several stations have significantly high conductivity due to tidal influence in Hillsborough River. Stream is meeting standards when it is predominately fresh and is tidally influenced.
Dissolved Oxygen	median TN = 0.882 (n = 105), median TP = 0.18 (n = 107), BOD median = 1.0 (n = 85).	≥ 5.0 mg/L	4d	No Causative Pollutant	141/328	117/294	There are a sufficient number of DO exceedances to place DO on the verified list. However, unable to link low DO to a causative pollutant (BOD or nutrients). This assessment will be included on the 303(d) list.
Fecal Coliform		≤ 400 Counts / 100 mL	4a	TMDL Complete	28/121	19/74	This waterbody was previously part of WBID 1443E, but was subdivided in 2005 at the request of Hillsborough County EPC. A fecal coliform TMDL was finalized by the Department in September 2004 for WBID 1443F, which addresses the bacteria impairment in WBID 1443E.

WBID 1443F, "Lower Hillsborough River Fresh"

Legend

-  Interstate
-  Primary and US Highways
-  Secondary, State and County Highways
-  Local, Neighborhood, Rural or City Street
-  4 Wheel Drive Rd
-  Other Ramp
-  Freeway Ramp
-  Service Drive
-  Ferry
-  Stream
-  Canal
-  Lake
-  Reservoir
-  Spring
-  Fresh Wetland
-  Salt Wetland
-  Estuary
-  Ocean
-  Pipe



0 0.25 0.5 1 Miles

This map was made by Nia Wellendorf on 3/15/11 for demonstration purposes with 2005-2009 Aerial Photos.

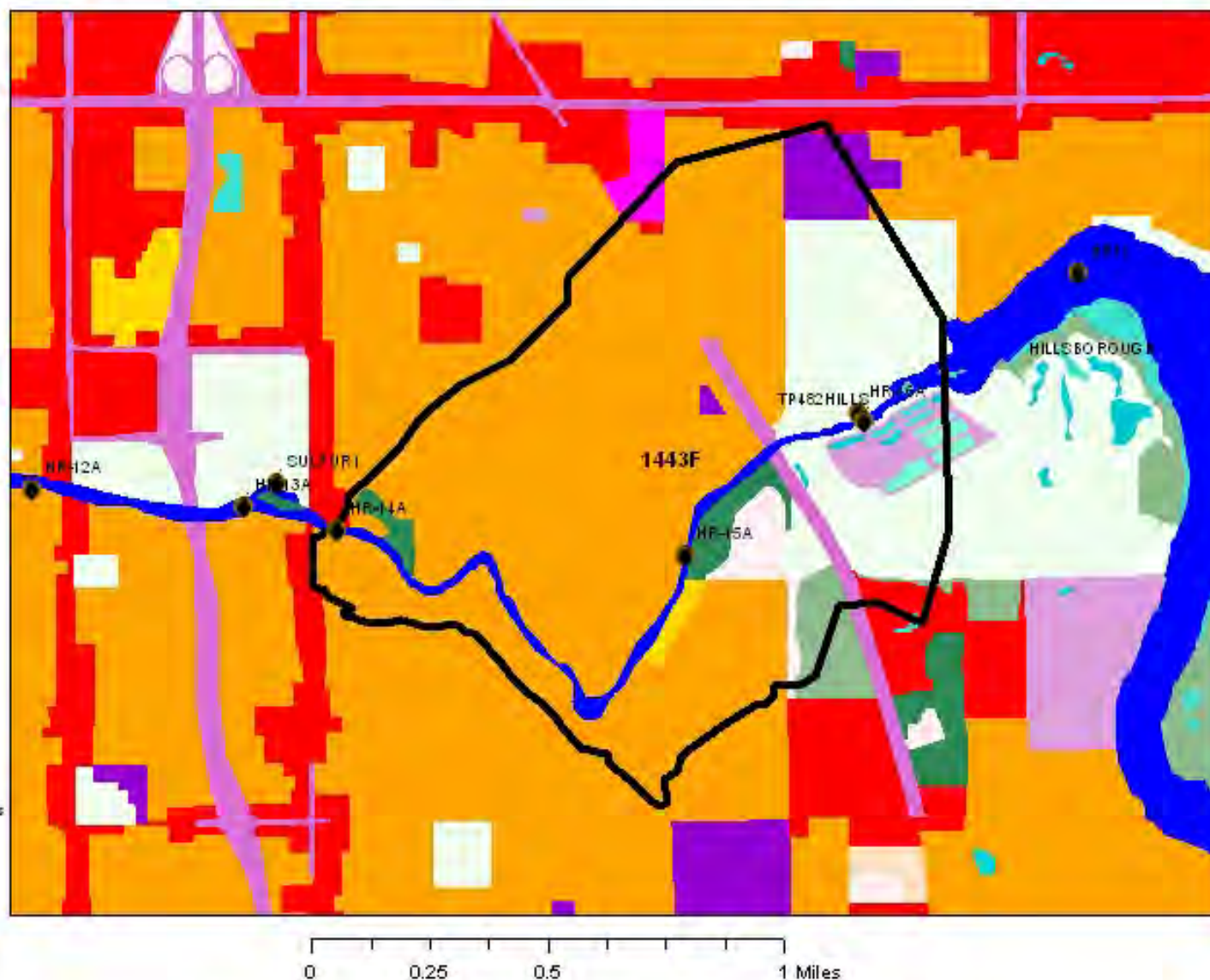
Legend

SWFWMD 2006 Land Use

FLUCCODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreation
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands < Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough/Waters
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riparian Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Ges Grass

WBID 1443F, "Lower Hillsborough River Fresh"



This map was made by Nia Wellendorf on 3/15/11 for demonstration purposes with 2006 SWFWMD land use.



WBID 1443F Lower Hillsborough River “Fresh”

- Biology
 - SCI/Biorecon not appropriate due to tidal nature
- The Scoop
 - Freshwater control causes salty and/or stagnant conditions during parts of year

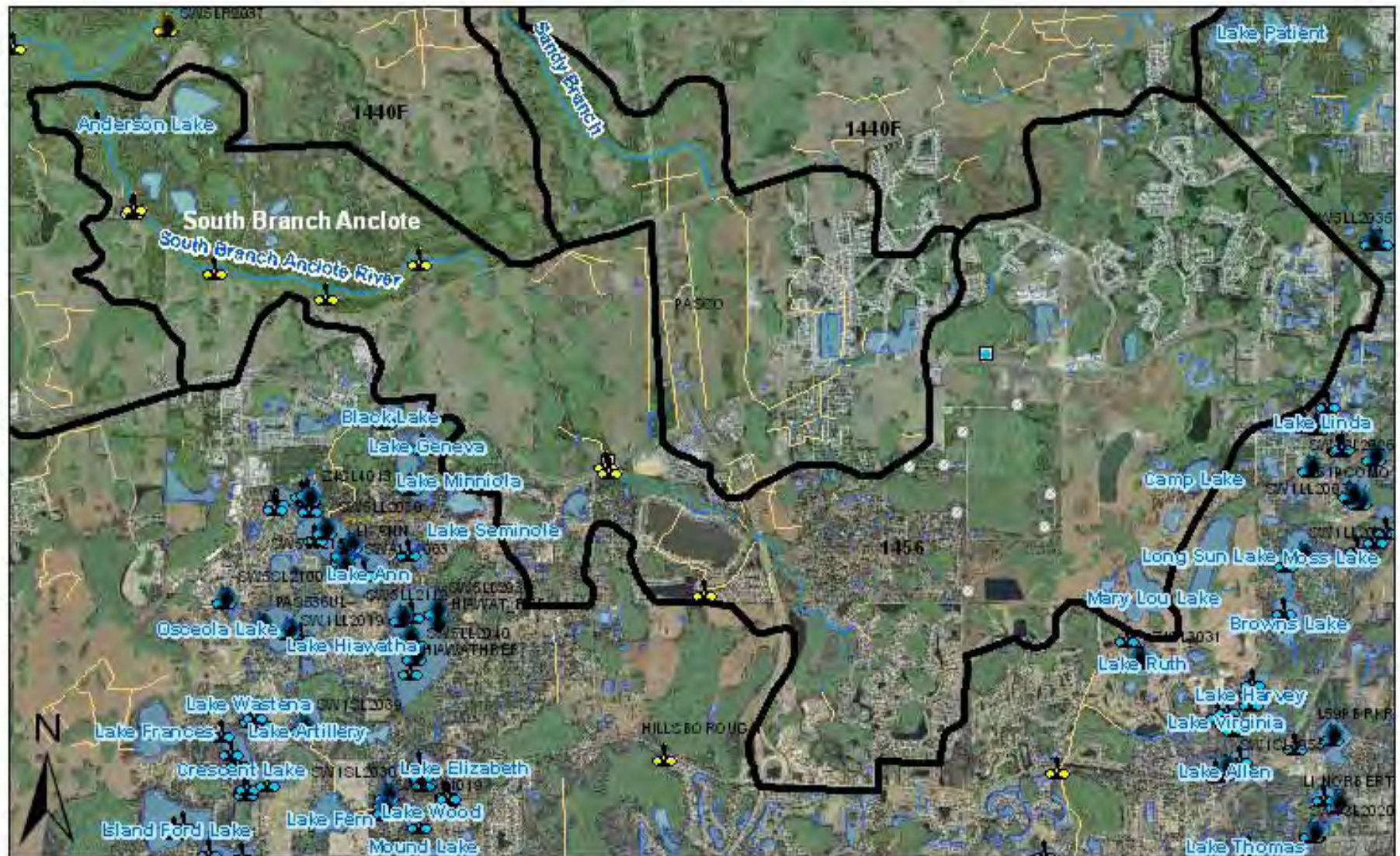




WBID 1456, South Branch Anclote

1998 303(d) Param. Of Concern	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Current Integrated Category - Final Assessment	Current Assessment Status	Comments
Dissolved Oxygen	Dissolved Oxygen	4d	No Causative Pollutant	pp = 5 / 5; vp = 21 / 32 Verified impaired. There are a sufficient number of DO violations to place DO on the verified list. However, unable to link low DO to a causative pollutant (BOD or nutrients). This waterbody will be included on the 303(d) list.
Nutrients	Nutrients (Chlorophyll-a)	3b	Delist - Insufficient Data	pp = Not impaired; vp = Not impaired No Chl-a annual means exceed 20 µg/L. Chl-a annual mean value was 4 µg/L in 2004. Total nitrogen annual median = 1.04 mg/l (26 values), total phosphorus annual median = 0.08 mg/l (27 values), and BOD median = 1 mg/l (17 values). Assessment category will be 3b because biology or site-specific data is needed to place in category 2.

WBID 1456, South Branch Anclote River



This map was made by Nia Wellendorf on 3/15/11 for demonstration purposes with 2005-2009 aerial imagery.

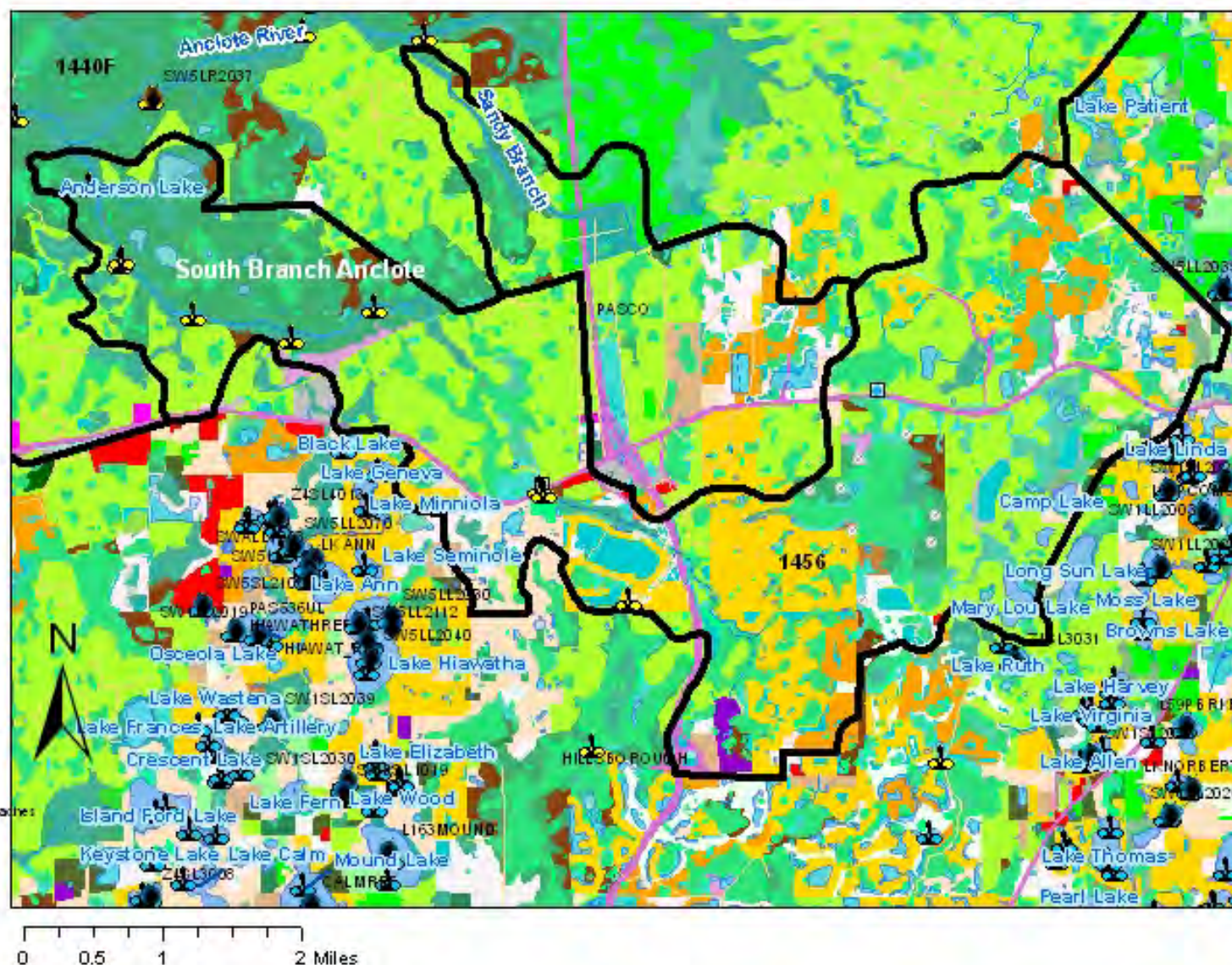
Legend

SWFWMD 2006 Land Use

FLUCCSCODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands < Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Waters
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riparian Sandbars
- Transportation
- Communications
- Utilities
- Vegetation/Sea Grass

WBID 1456, South Branch Anclote River



This map was made by Nia Wellendorf on 3/15/11 for demonstration purposes with 2006 SWFWMD land use.



WBID 1456, South Branch Anclote - downstream



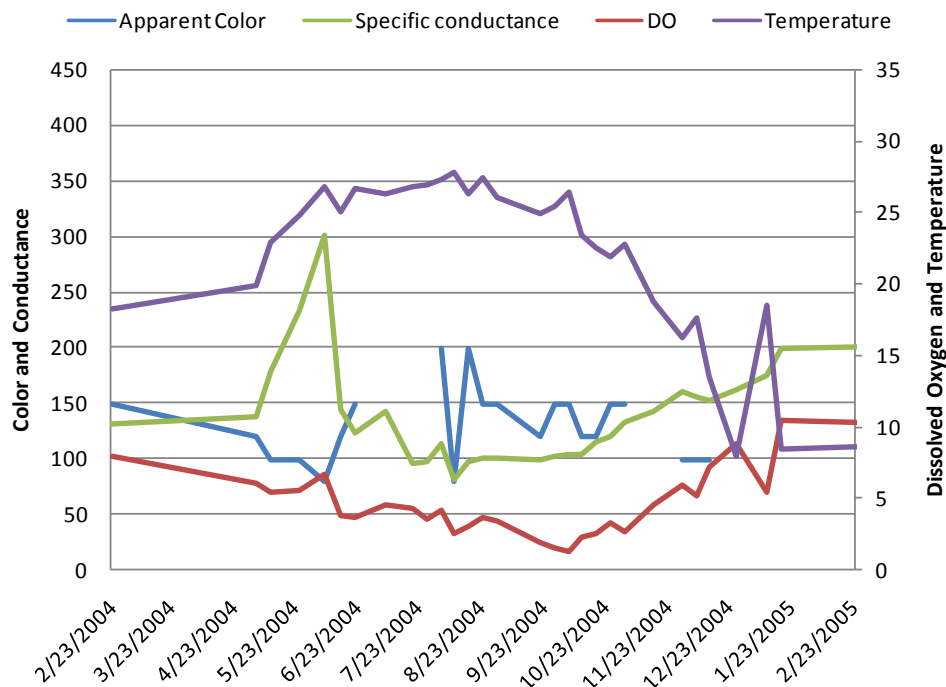


WBID 1456, South Branch Anclote

- No biological data available – Wetland system
- Water quality study from June-October 2007 on western end of WBID indicated low chlorophyll-*a* and nutrients, and low DO.
- DEP water quality data from a road crossing (at 54) in 2004 and 2009 indicate seasonal ranges of DO, conductivity, chlorophyll *a*
- January 2011 recon of western area indicated wetland conditions but high conductivity (~400)



DEP Data for South Branch Anclote at 54



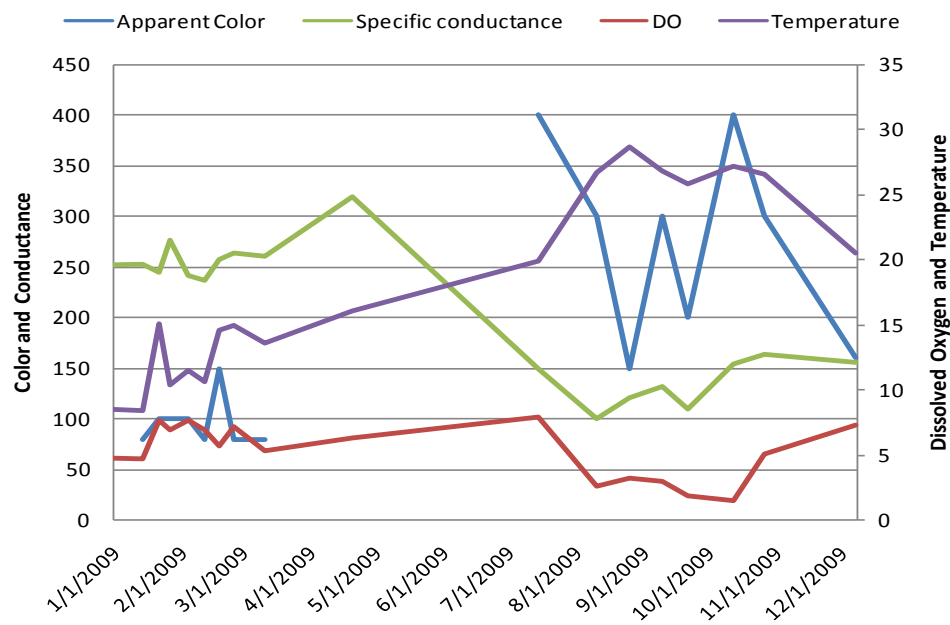
- Low DO associated with high temperature (DO SSAC)
- Higher conductivity in dry season likely due to groundwater (either seeps or land application)

2004

High chlorophyll a
(25-45) in Spring
(not shown)

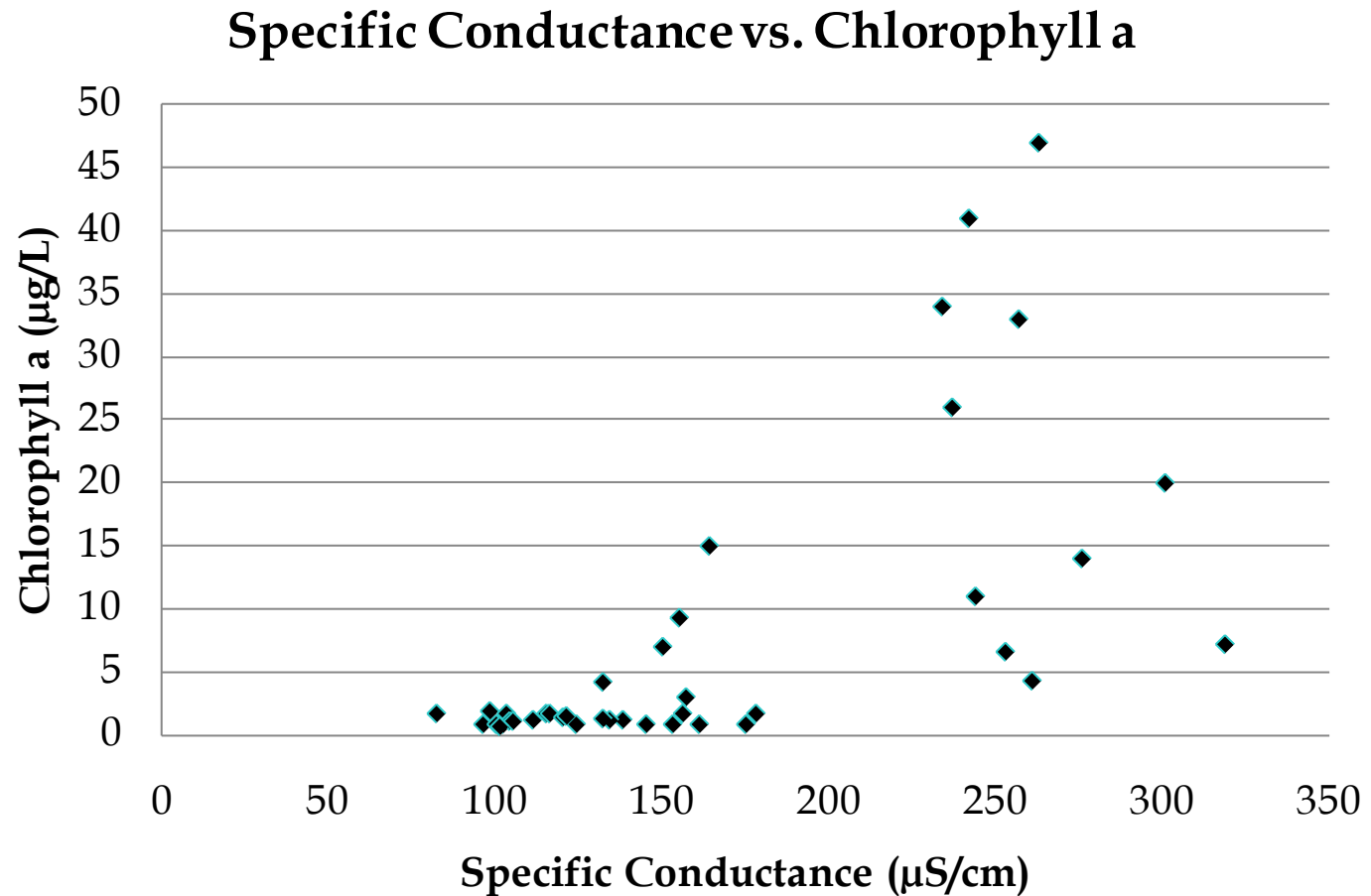
2009

DEP Data for South Branch Anclote at 54





South Branch Anclote at 54 (2004 and 2009)





*Florida Department of
Environmental Protection*

Northeast District 4D Site Examples



WBID 2245 Deep Creek

Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	DO / Nutrient / Biology - TN, TP, BOD median Values (mg/L) ²	Concentration of Criterion or Threshold Not Met	Current Integrated Category - Final Assessment	Current Assessment Status	Planning Period (# of Exceedances/ # of Samples) ⁷	Verified Period (# of Exceedances/ # of Samples) ⁸	Comments
Dissolved Oxygen	TN = 1.421 (n=10) TP = 0.235 (n=10) BOD = 2 (n=8)	≥ 5.0 mg/L	4d	No Causative Pollutant	29/58	21/46	Dissolved oxygen data exceed the verification threshold. Total phosphorus exceeded the threshold for streams; however, a direct causation between total phosphorus levels and the dissolved oxygen impairment has not been established at this time. Therefore, this WBID's assessment will be category 4d.

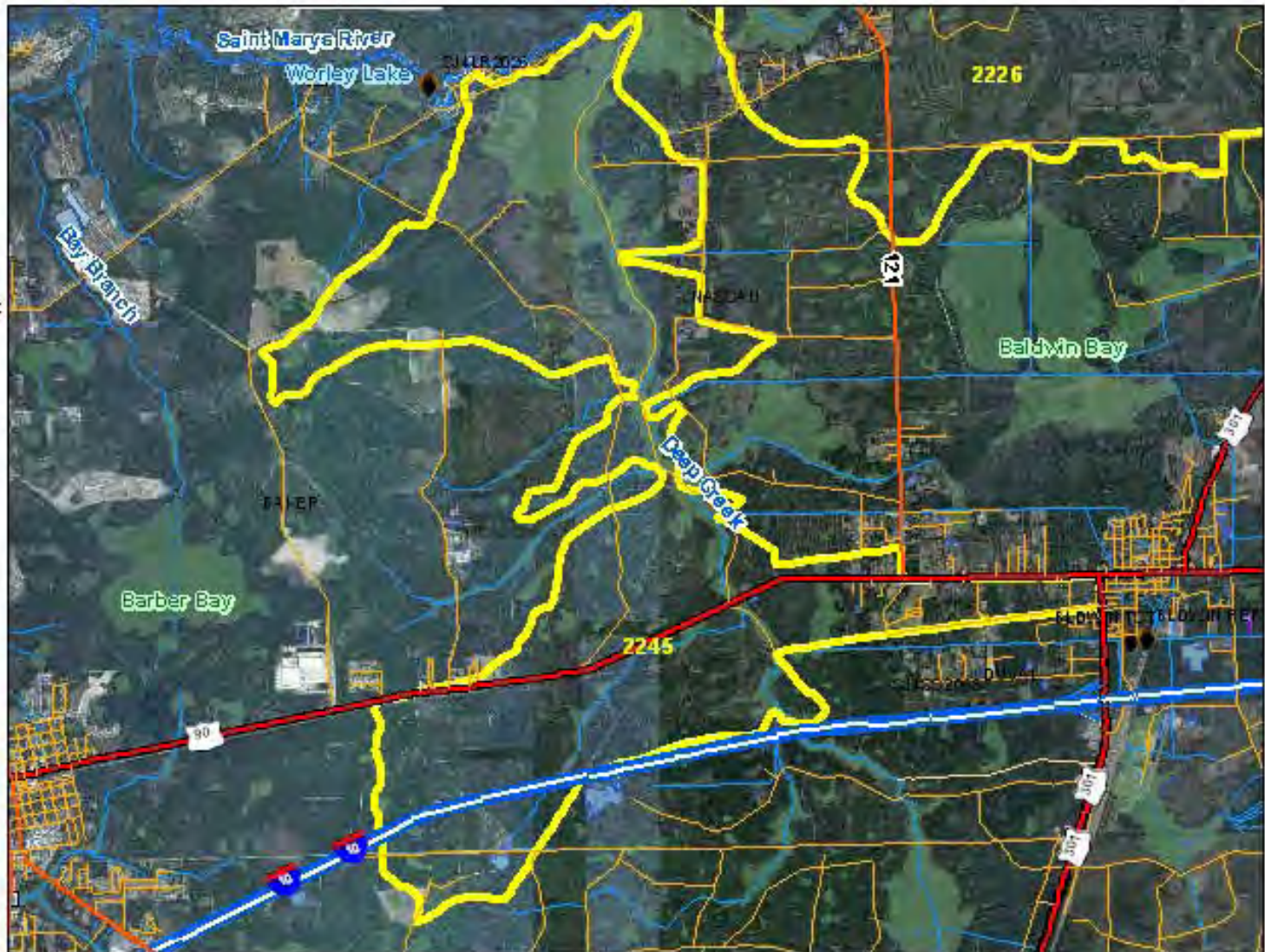
WBID 2245, Deep Creek

Legend

- Interstate
- Primary and US Highways
- Secondary, State and County Highways
- Local, Neighborhood, Rural or City Street
- 4 Wheel Drive Rd
- Other Ramp
- Freeway Ramp
- Service Drive
- Ferry
- NHDFlowline
- FType
- Artificial Path
- Canal/Ditch
- Coastline
- Connector
- Pipeline
- Stream/River
- Underground Conduit



0 0.5 1 2 Miles



This map was made by Nia Wellendorf on 4/5/11 for demonstration purposes with 2005-2009 aerial imagery.

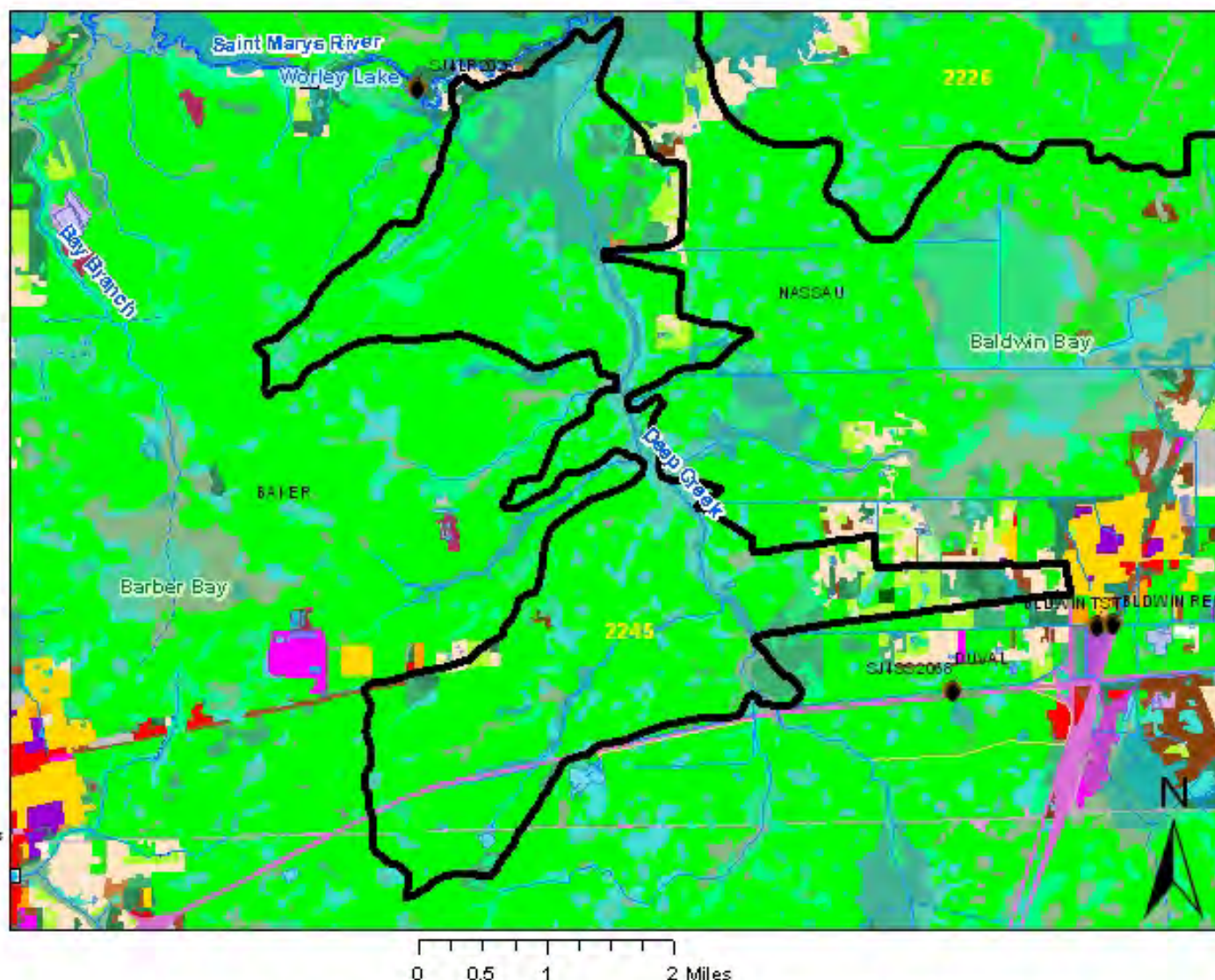
Legend

SJRWM D 2004 Land Use

LUCODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands < Rural
- Barren/Barren
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Wetlands
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riptine Canals
- Transportation
- Communications
- Utilities
- Vegetation-Grazing

WBID 2245, Deep Creek



This map was made by Nia Wellendorf on 4/5/11 for demonstration purposes with 2004 SJRWMD land use.



Water chemistry
collected in an
area that
appears to be
hydrologically
modified



This map was made by Joy Jackson for demonstration purposes with DOQQ 2004 aerial imagery.





WBID 2245 Deep Creek

- Biology
 - No biology available (using maps, discuss potential sites)
- The Scoop
 - Water quality samples for the entire WBID were taken at one location – near a major road crossing where there was obvious pooling. Samples not representative of WBID/waterbody.





WBID 2226, Brandy Branch

1998 303(d) Param. Of Concern	Parameters Assessed Using the Impaired Surface Waters Rule (IWR)	Current Integrated Category - Final Assessment	Current Assessment Status	Comments
Dissolved Oxygen	Dissolved Oxygen	4d	No Causative Pollutant	Dissolved oxygen data exceed the verification threshold, but no causative pollutant could be determined. Based on Level 1 Land Use for 2004, anthropogenic land uses represent 7.77% of the watershed. Total nitrogen, total phosphorus and biochemical oxygen demand medians are below the thresholds for streams. Excluded from period of record assessment, as it has been determined with more recent data that the WBID does not attain the standard.
Biology	Biology	4d	No Causative Pollutant	This WBID is impaired for biology; however, the impairment is due to lack of habitat in which good biology could exist rather than the presence of certain biology indicating a problem. Therefore, this WBID is being placed in category 4d.

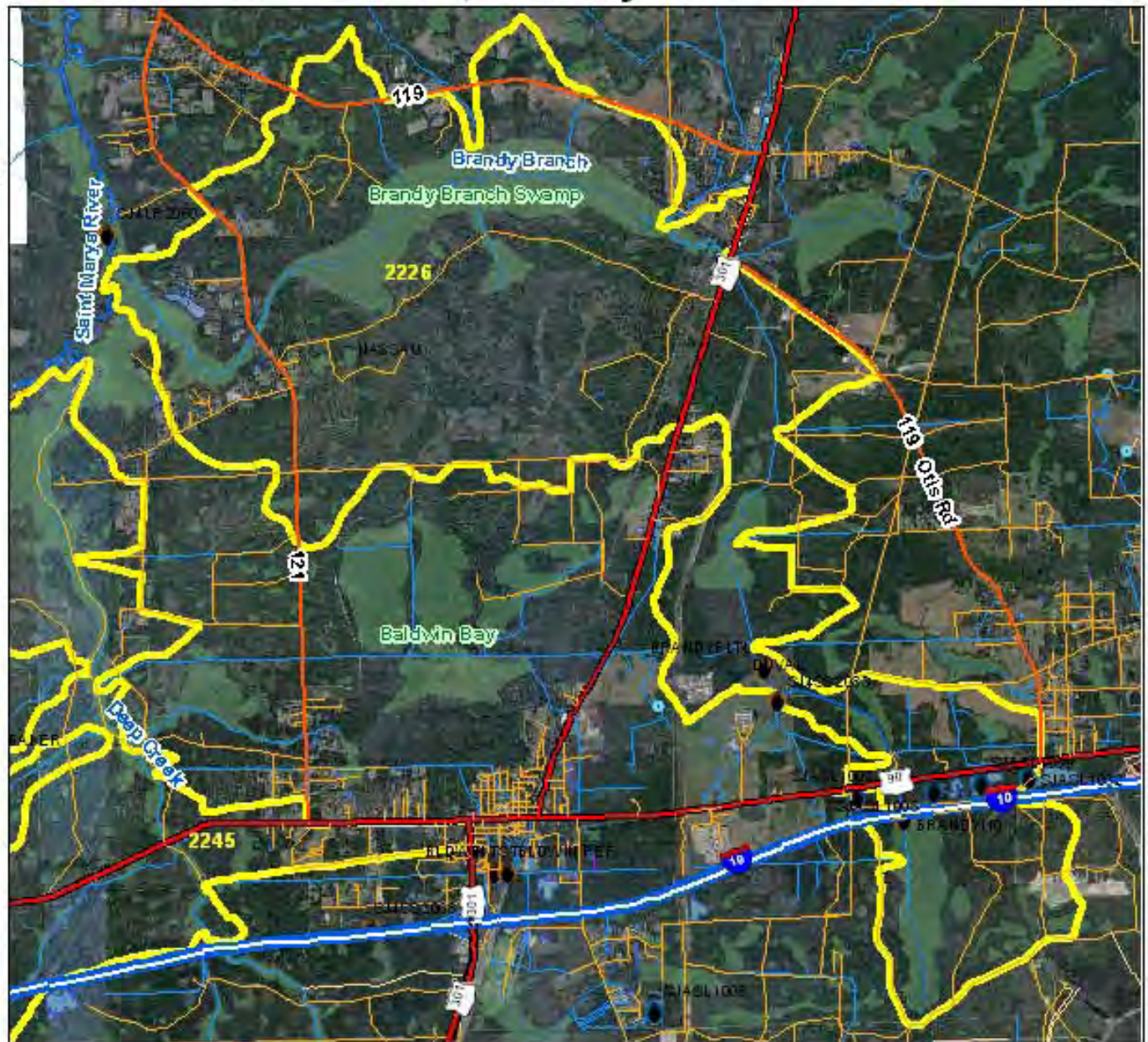
WBID 2226, Brandy Branch

Legend

- Interstate
- Primary and US Highways
- Secondary, State and County Highways
- Local, Neighborhood, Rural or City Street
- 4 Wheel Drive Rd
- Other Ramp
- Freeway/Ramp
- Service Drive
- Ferry
- NHD Flowline
- FType
- Artificial Path
- Canal/Ditch
- Coastline
- Connector
- Pipeline
- Stream/River
- Underground Conduit



0 0.5 1 2 Miles



This map was made by Nia Wellendorf on 4/5/11 for demonstration purposes with 2005-2009 aerial images.

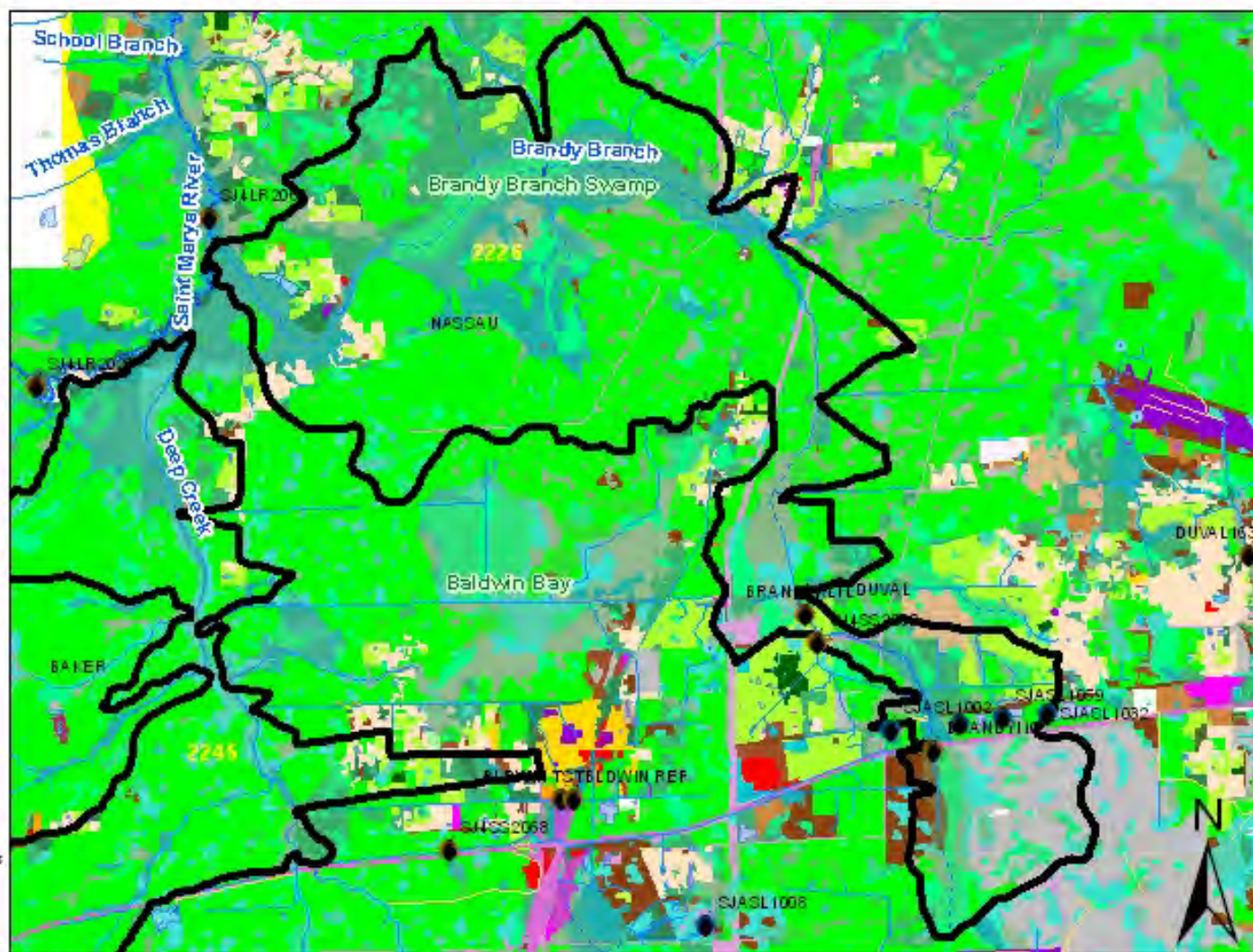
Legend

SJRWM D 2004 Land Use

LUCODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands < Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Glough Waters
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riverine Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Graass

WBID 2226, Brandy Branch



0 0.5 1 2 Miles

This map was made by Nia Wellendorf on 4/5/11 for demonstration purposes with 2004 SJRWMD land use.



WBID 2226, Brandy Branch



This map was made by Joy Jackson for demonstration purposes with DOQQ 2004 aerial imagery.





WBID 2226 Brandy Branch, SCI & HA Results

Station Description	Brandy Branch at Rails to Trails N of I-10	Brandy Branch at Rails to Trails N of I-10
STORET	19010075	19010075
Station Nickname	BRANDYRLTL	BRANDYRLTL
Sample Date	3/4/2009	12/30/2009
Bioregion	Northeast	Northeast
WBID	2226	2226
Nreps	2	2
SCI_2007	34	45
SCI_2007 Word	Category 3	Category 2
SCI_2007 Qualifier	A	A
Artificial Channelization	6	5
Bank Stability - left bank	4	4
Bank Stability - right bank	4	4
Habitat Score	93	68
Habitat Smothering	6	5
Primary Score	41	23
Riparian Buffer Zone Width - left bank	10	8
Riparian Buffer Zone Width - right bank	10	8
Riparian Zone Vegetation Quality - left bank	9	8
Riparian Zone Vegetation Quality - right bank	9	8
Secondary Score	52	45
Substrate Availability	19	4
Substrate Diversity	8	6
Water Velocity	8	8

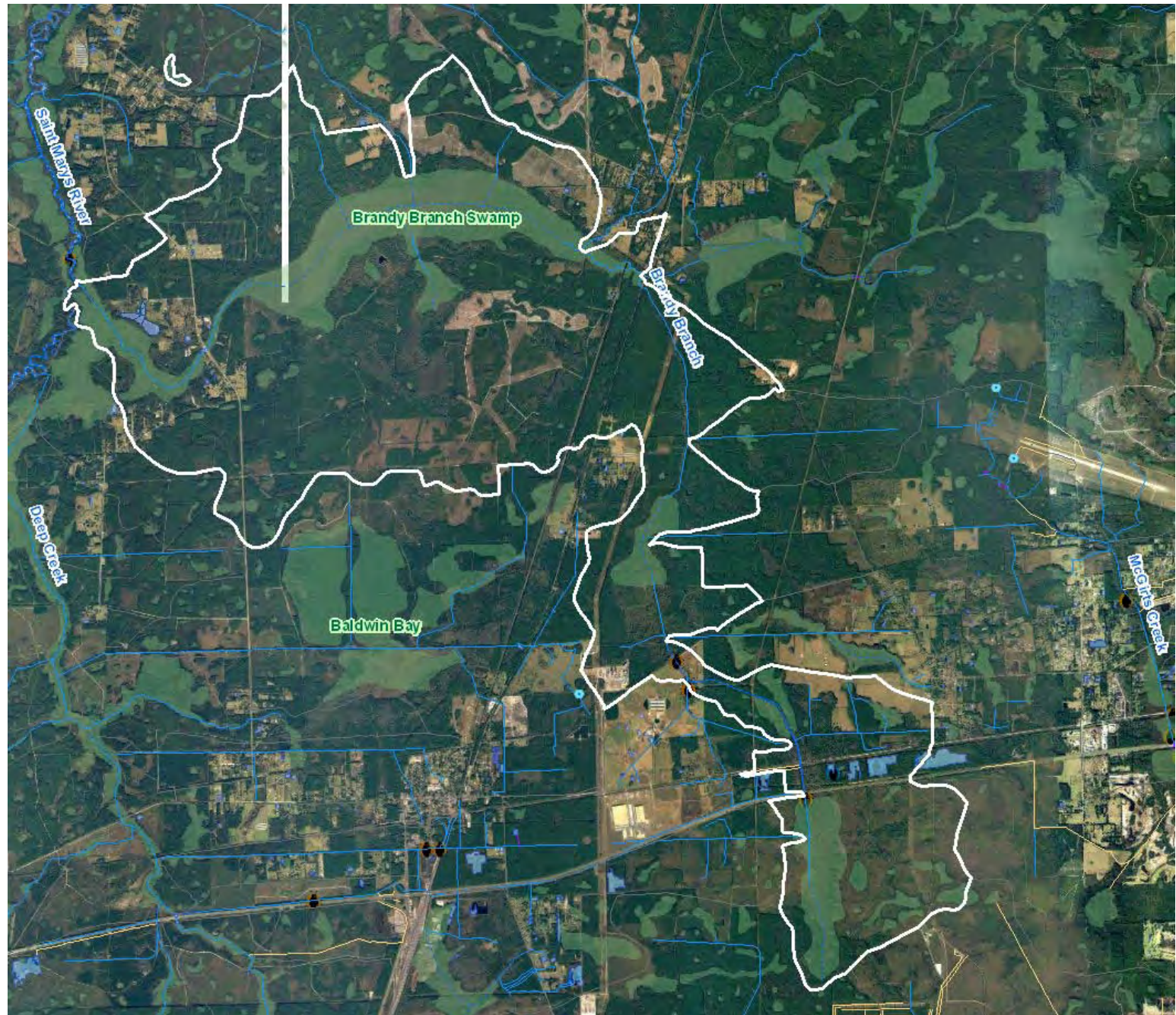




WBID 2226 Brandy Branch, BR Results

Station Description	Brandy Branch just south of I-10	Brandy Branch at Rails to Trails N of I-10
STORET	19010074	19010075
Station Nickname	BRANDYI10	BRANDYRLTL
Bioregion	Northeast	Northeast
WBID	2226	2226
Sample Date	7/6/1999	7/6/1999
Gear	D-FrameX4	D-FrameX4
Biorecon_1992	0	0
Biorecon_1992 Word	Impaired	Impaired
EPTTaxa	0	1
TotalFLIndex	5	0
TotalTaxa	10	12

Other potential sites for biology in WBID?

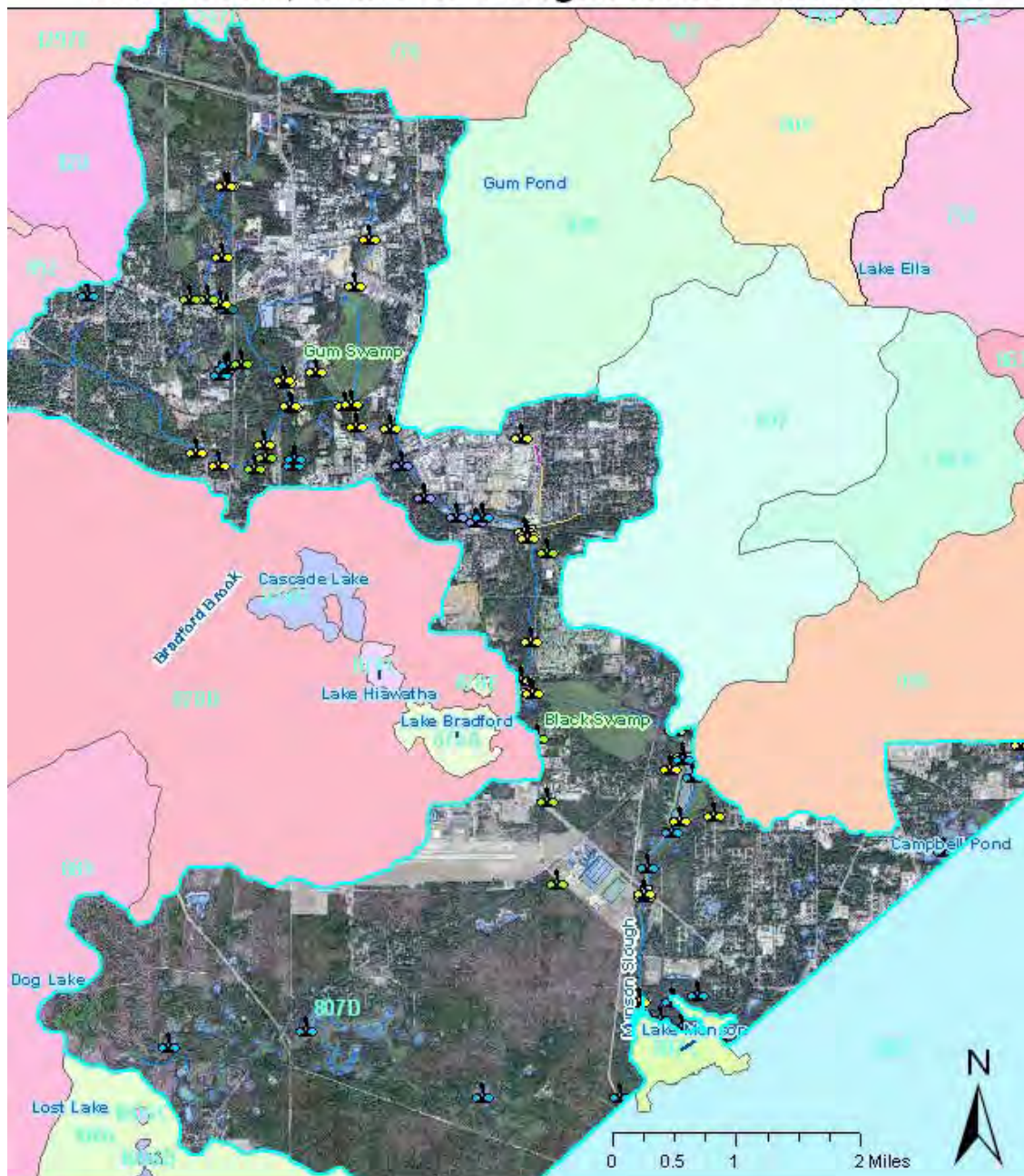


WBID 807D Munson Slough above lake

- Urban stormwater conveyance (flashy hydrology)
- Impaired for DO, Biology, Fecal Coliforms
- Below lake - Impaired for DO, Un-ionized Ammonia (insuff. bio data)
- 2008 TMDL for entire Munson Basin

Parameters Assessed	2nd Cycle Proposed Status	Final Integrated Report Category ²	Comments (# of Exceedances/ # of Samples) pp=Planning Period vp=Verified Period ⁵	Verify / Delist List
Dissolved Oxygen	Impaired	5	PP = 40 / 105; VP = 48 / 117 DO met verification thresholds of IWR, and BOD was identified as a causative pollutant. PP median TN= 0.7625mg/L (n=28), median TP=0.13mg/L (n=28), Insufficient BOD data. VP median TN= 0.927mg/L (n=103), median TP= 0.11mg/L (n=98), median BOD=2.71mg/L (n=95).	V
Fecal Coliform	Impaired	5	PP = 6 / 48; VP = 18 / 107 Fecal Coliforms meet verification threshold of the IWR based on exceedances of the Class III maximum criterion.	V
Nutrients (Chlorophyll-a)	Delist	3b	Delist. PP = Insufficient Data VP = Not Impaired. No annual means exceeded the 20 µg/L threshold for streams. 2005- 6.839 µg/L, 2006 - 12.26 µg/L. Assessment category will be 3b because biology or site-specific data is needed to place in category 2. Delist from the 1998 303(d) list.	D
Biology	Impaired	5	Failed bioassessment due to low DO levels. Causative pollutant believed to be BOD, mean of 95 values = 2.71mg/L.	

WBID 807D, Munson Slough Above Lake Munson



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2005-2009 aerial photos.

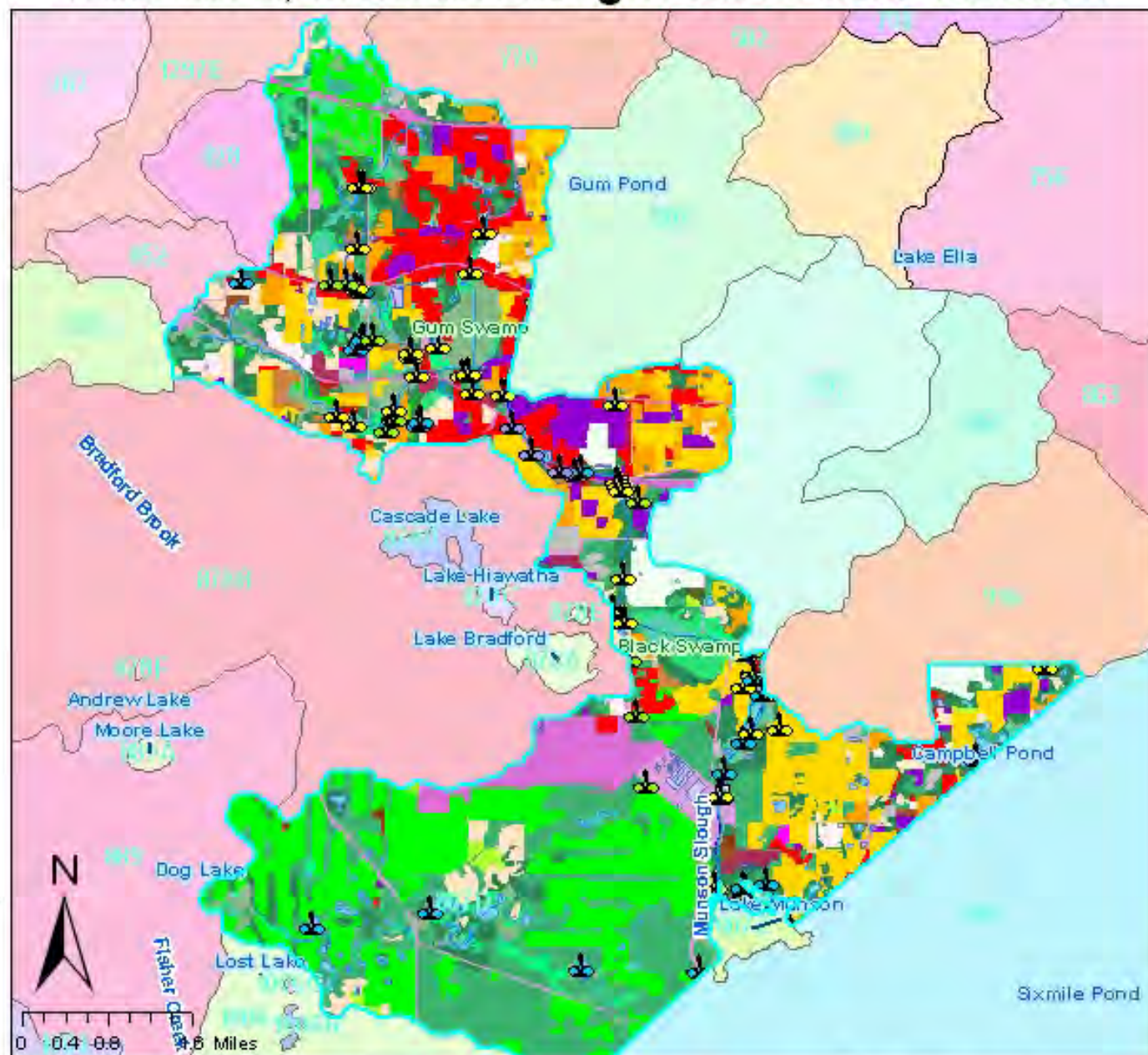
Legend

NWFWMD 2006-2007 Land Use

LANDUSE_CODE

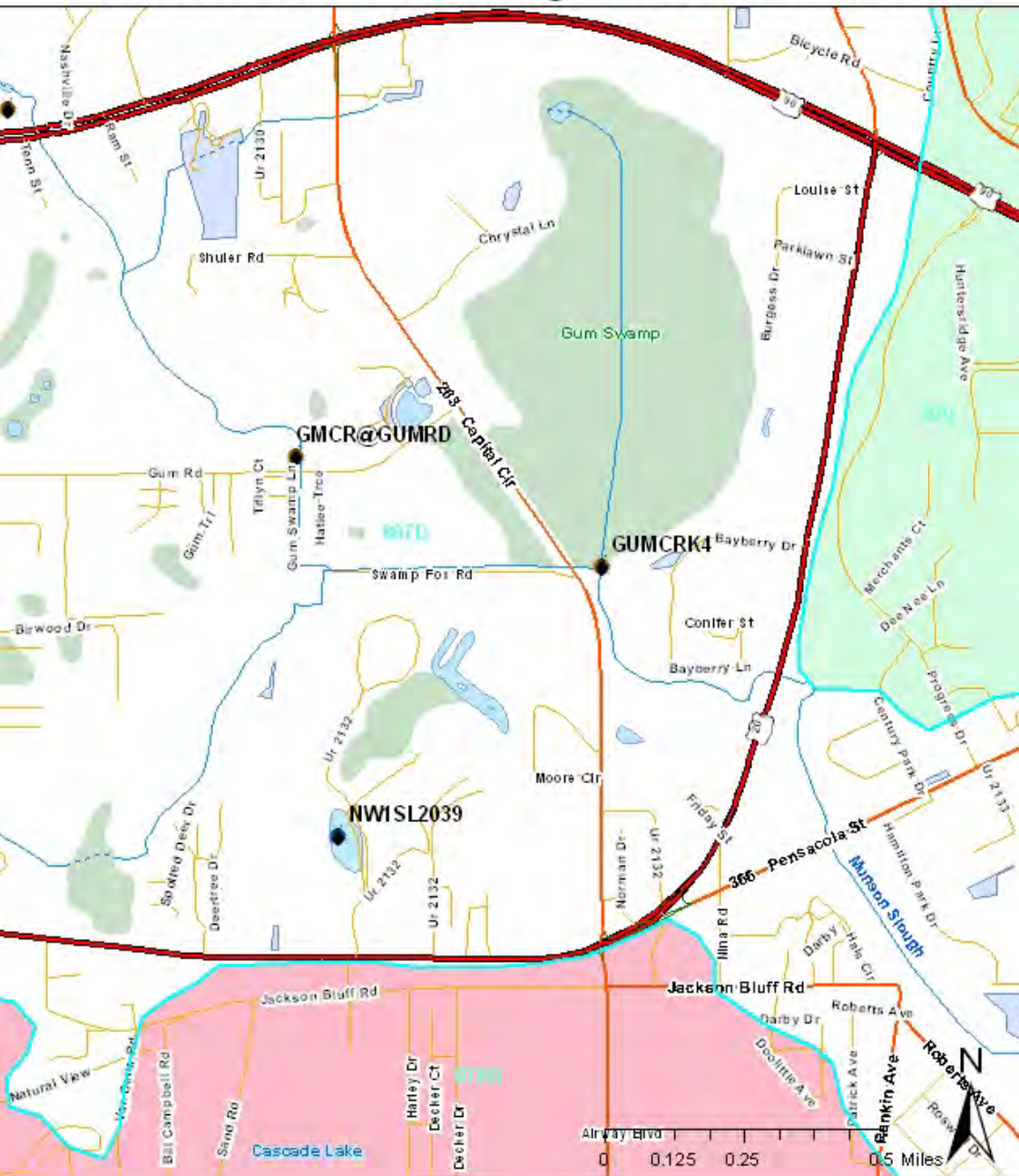
- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands < Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Waters
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riparian Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Sea Grass

WBID 807D, Munson Slough Above Lake Munson



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2006-2007 land use.

WBID 807D, Munson Slough Above Lake Munson



2 SCIs in June 2010

GMCR@GUMRD:

SCI = 38

HA = 84

Channelization = 6

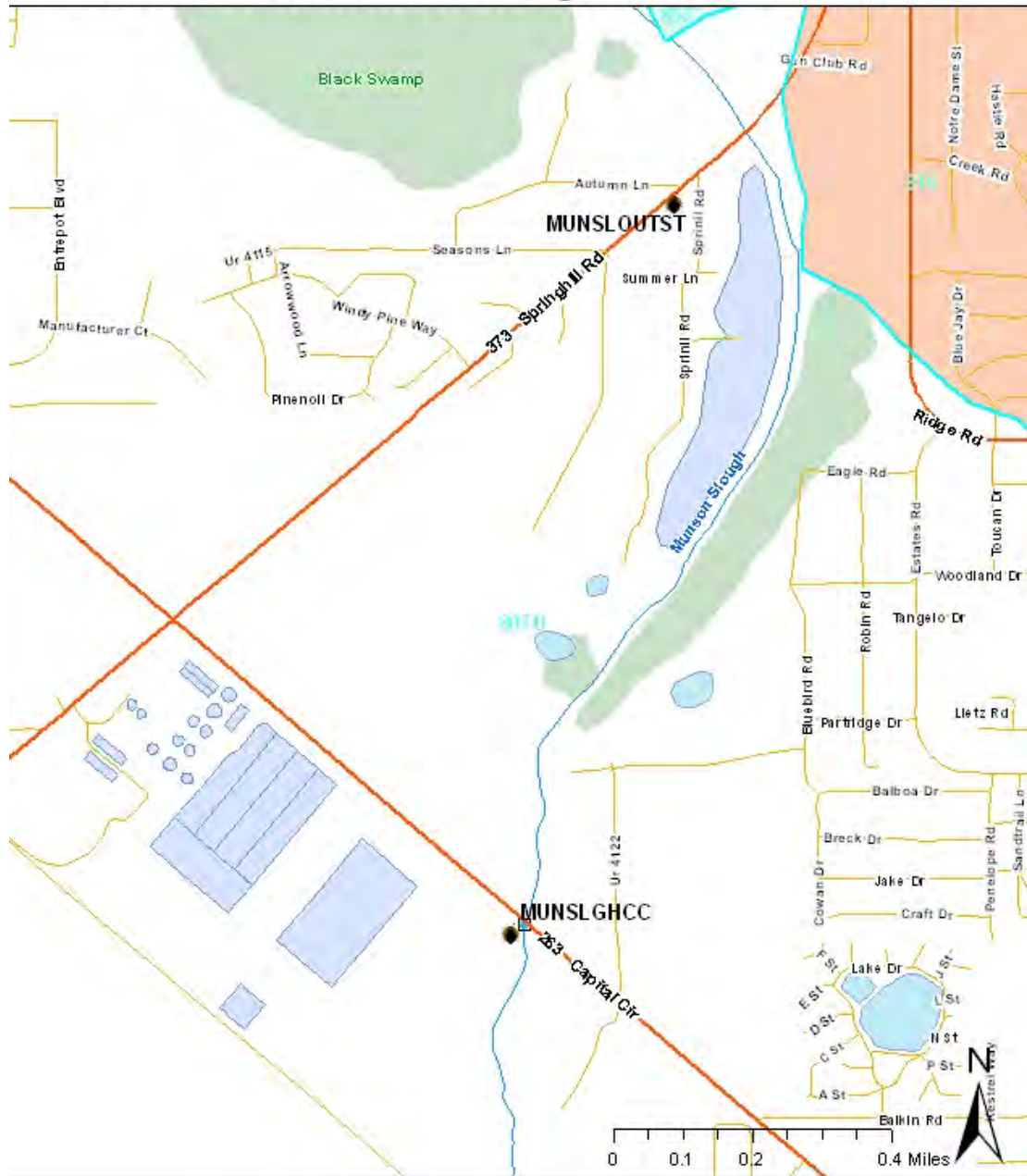
GUMCRK4

SCI = 36

HA = 42

Channelization = 6

WBID 807D, Munson Slough Above Lake Munson



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes.

BioRecons

MUNSLGHC

1995 – 0

1996 – 0

MUNSLGHC

1999 - 1

WBID 809 Meginnis Arm Run

- Urban stormwater conveyance
- No biological data

Parameters Assessed Using the Impaired Waters Rule (IWR)	2nd Cycle Proposed Status	Final Integrated Report Category ²	Comments (# of Exceedances/ # of Samples) pp=Planning Period vp=Verified Period ⁵	Verify / Delist List
Dissolved Oxygen	No Causative Pollutant	4d	PP = 10 / 22; VP = 19 / 44 DO met verification threshold of IWR, but a causative pollutant could not be determined. It was initially thought to be due to natural conditions, but after further review category 4d was determined to be more appropriate. PP median TN= 0.459mg/L (n=121), median TP=0.059mg/L (n=122), Insufficient BOD data; VP median TN= 0.4705mg/L (n=30), median TP= 0.11mg/L (n=32), median BOD= 2mg/L (n=31). This waterbody will be included on the 303(d) list.	
Nutrients (Chlorophyll-a)	Delist	3b	PP = Potentially Impaired; VP = Not Impaired. No annual average exceeds the 20 µg/L threshold for streams. Annual averages: 1995 - 21.75 µg/L, 2002 - 9.972 µg/L and 2006 - 2.278 µg/L. 49 Chl-a values, range 1-40µg/L. 30 TN values, Median 0.4705mg/L, 32 TP values, Median 0.11mg/L. TN and TP values fall below reference concentrations established for this basin. Assessment category will be 3b because biology or site-specific data is needed to place in category 2.	D
Fecal Coliform	Impaired	5	PP = 0 / 1; VP = 15 / 32 Fecal Coliforms meet verification threshold of the IWR based on exceedances of the Class III maximum criterion.	V

Legend

Waterbody IDs (WBIDs)

Group Number

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5
- Interstate
- Primary and US Highways
- Secondary, State and County Highways
- Local, Neighborhood, Rural or City Street
- 4 Wheel Drive Rd
- Other Ramp
- Free way Ramp
- Service Drive
- Ferry

NHDFlowline

FType

- Artificial Path
- Canal/Ditch
- Coastline
- Conductor
- Pipeline
- Stream River
- Underground Conduit

STORET Stations

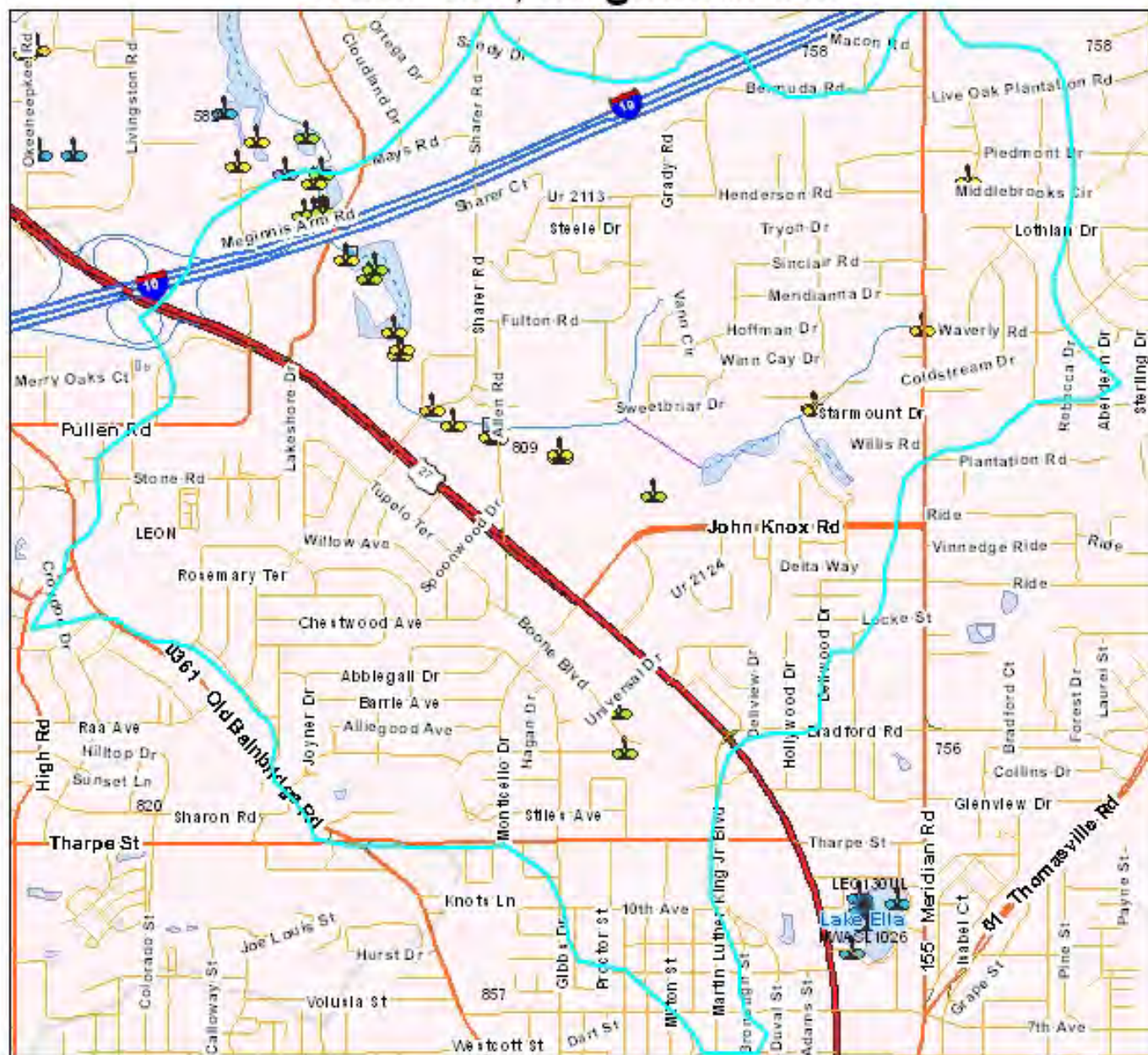
Primary Type

- Canal
- Estuary
- Facility
- Lake
- Ocean
- River/Stream
- Spring
- Well
- Wetland
- Other



0 0.125 0.25 0.5 Miles

WBID 809, Meginnis Arm



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2005-2009 aerial images.

WBID 809, Meginnis Arm

Legend

Waterbody IDs (WBIDs)

Group Number

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5

STORET Stations

Primary Type

- Canal
- Estuary
- Facility
- Lake
- Ocean
- River/Stream
- Spring
- Well
- Wetland
- Other

NHDFlowline

FType

- Artificial Path
- Canal/Ditch
- Coastline
- Connector
- Pipeline
- Stream/River
- Underground Conduit

Aerial Imagery 2005-2009

RGB

- Red: Band_1
- Green: Band_2
- Blue: Band_3



0 0.125 0.25 0.5 Miles



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2005-2009 aerial images.

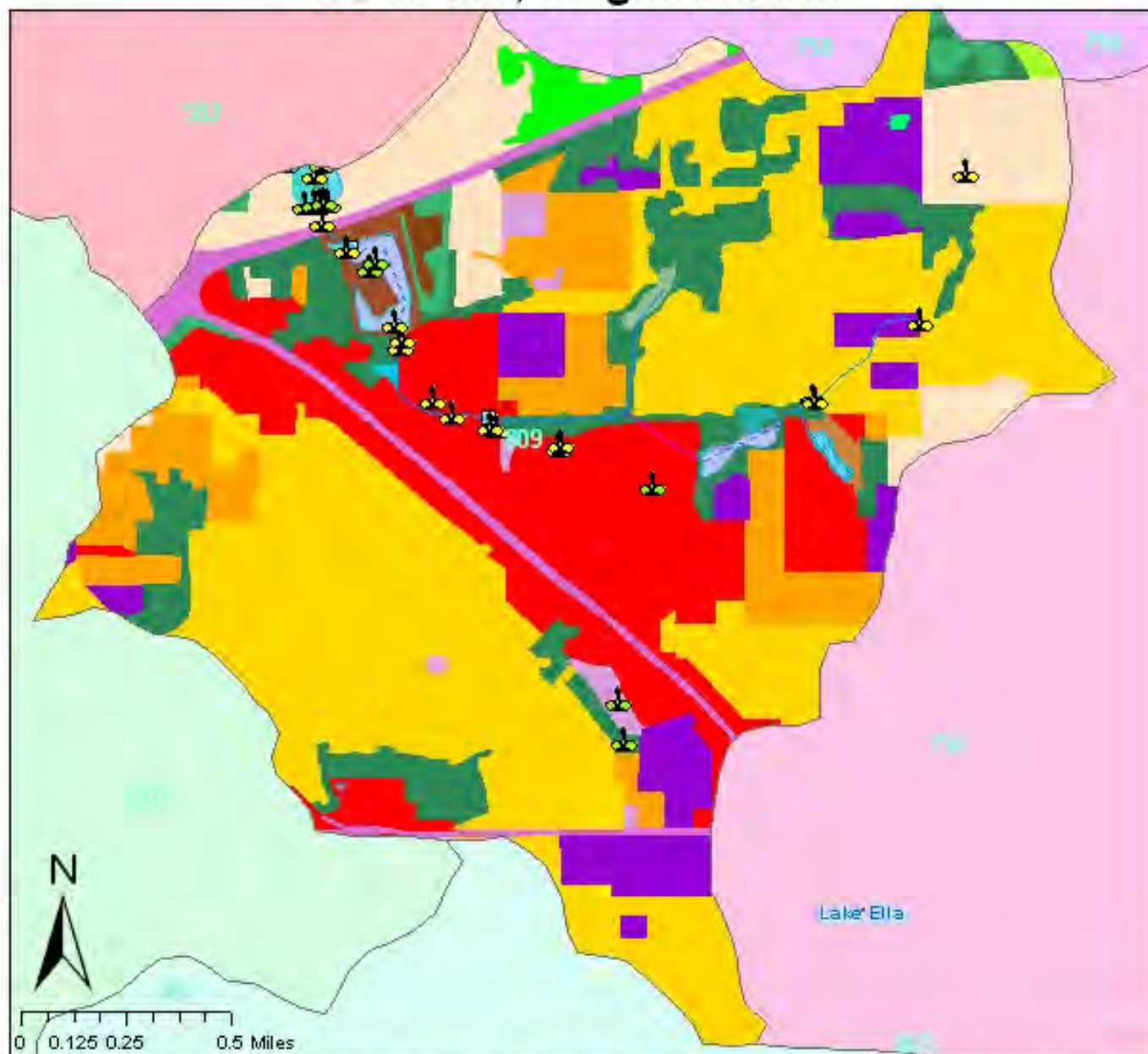
Legend

NWFWMD 2006-2007 Land Use

LANDUSE_CODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Barren
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands - Rural
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Continuous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Clough Waters
- Oceanic Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Continuous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Bioprotected Rock
- Disturbed Lands
- Riparian Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Sea Grass

WBID 809, Meginnis Arm



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2006-2007 land use.

WBID 459 Ward Creek

- Wetland area, low velocity
- Natural stream, some agricultural influence

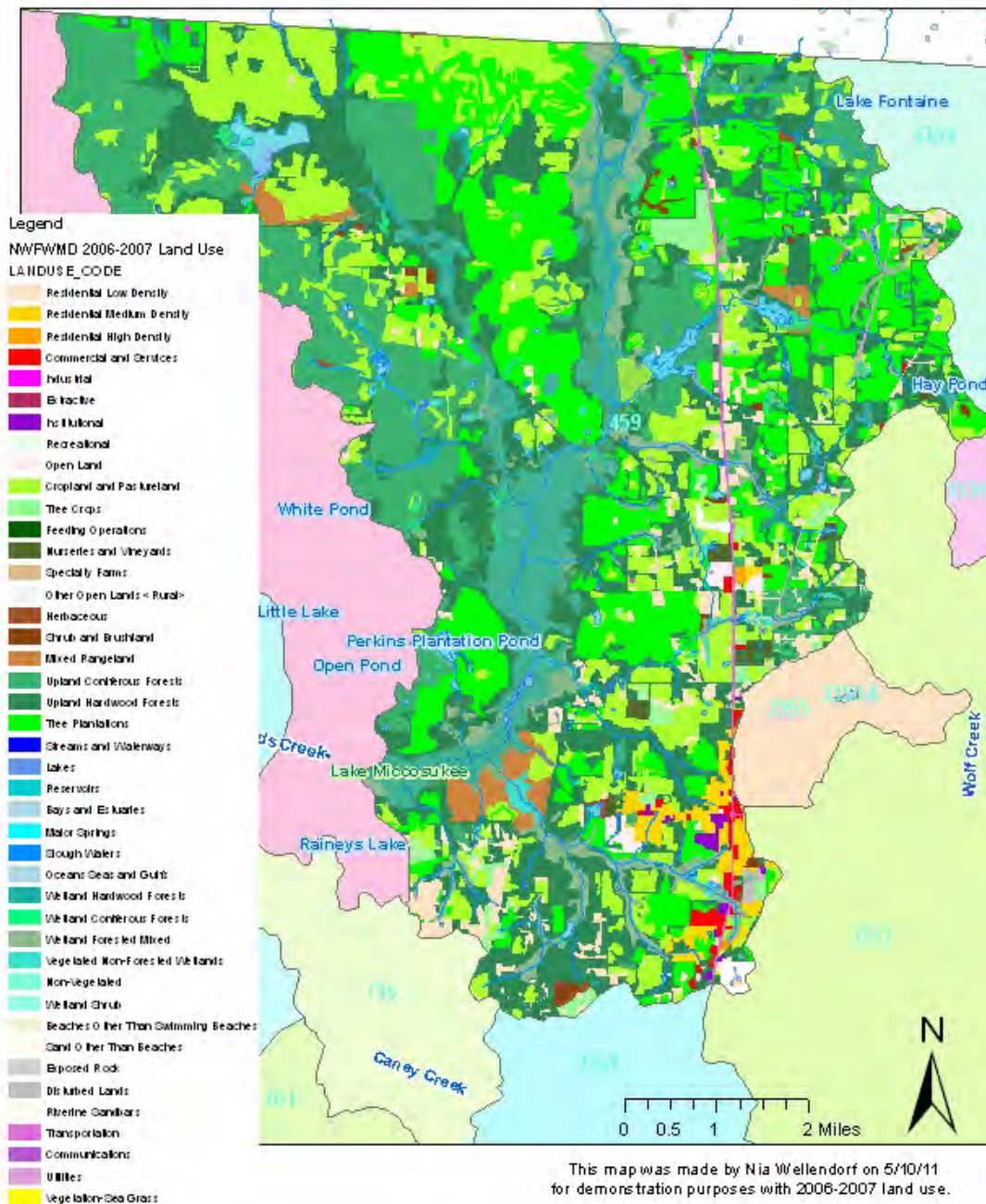
Parameters Assessed Using the Impaired Waters Rule (IWR)	2nd Cycle Proposed Status	Final Integrated Report Category ²	Comments (# of Exceedances/ # of Samples) pp=Planning Period vp=Verified Period ⁵	Verify / Delist List
Dissolved Oxygen	No Causative Pollutant	4d	PP = 33/ 64 [planning]; VP = 38/ 83 [verified] DO met verification threshold of IWR, but need to identify causative pollutant, but a causative pollutant could not be identified. TN, TP, BOD medians were all below thresholds. This has been placed on the PL pursuant to Rule 62.303.300(2), FAC. PP median TN= 0.772mg/L (n=20), median TP=0.0785mg/L (n=20), median BOD= 0.505mg/L (n=18); VP median TN= 0.9195mg/L (n=32), median TP= 0.135mg/L (n=32), median BOD= 1.85mg/L (n=26)	
Fecal Coliform	Impaired	5	PP = 7 / 19; VP = 7 / 26 Fecal Coliforms meet verification threshold of the IWR based on exceedances of the Class III maximum criterion.	V
Biology	Insufficient Data	3b	There were no SCI's or Biorecon's during the verified period.	
Nutrients (Chlorophyll-a)	Insufficient Data	3b	PP = Insufficient data to calculate any annual means; PP = Insufficient data to calculate any annual means.	

WBID 459, Ward Creek Aerial Image



This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2005-2009 aerial photos.

WBID 459, Ward Creek Land Use



Land Use

Wetlands

Forest

Tree Plantations

Crop and Pasture

Urban

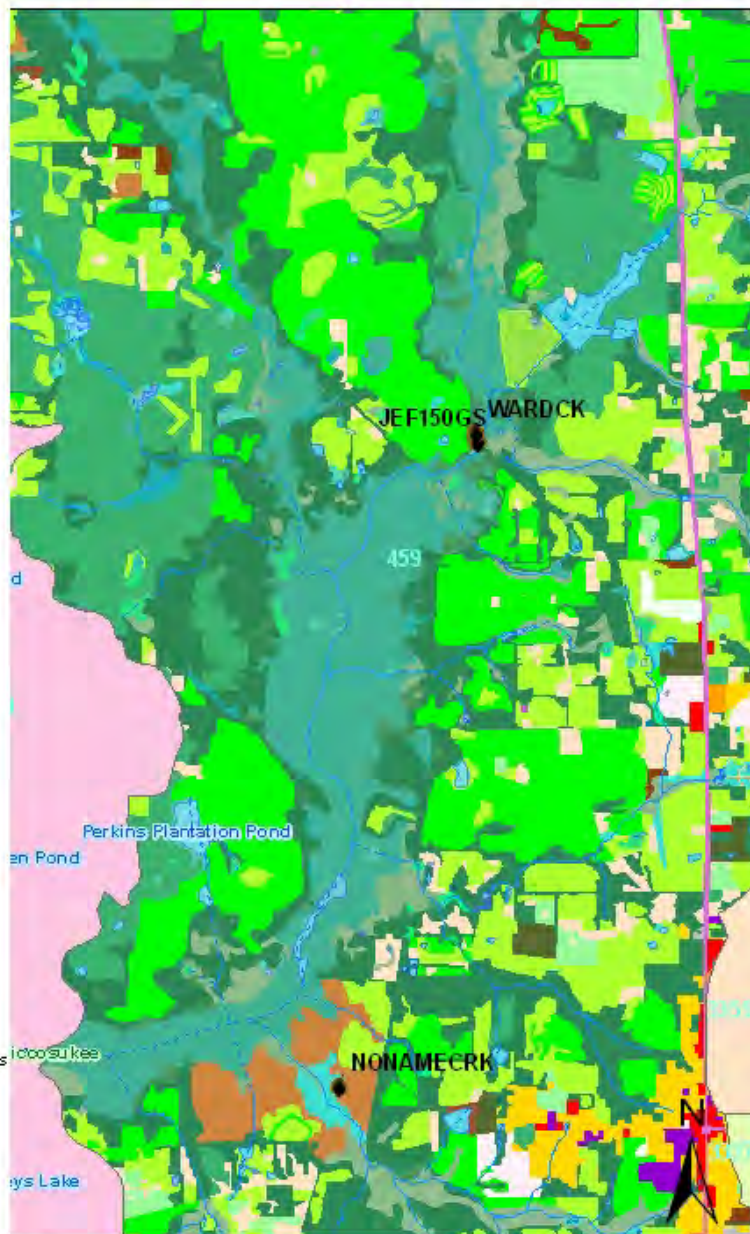
WBID 459, Ward Creek Land Use & SBIO Sites

Legend

IHFWMD 2006-2007 Land Use

LANDUSE_CODE

- Residential Low Density
- Residential Medium Density
- Residential High Density
- Commercial and Services
- Industrial
- Extractive
- Institutional
- Recreational
- Open Land
- Cropland and Pastureland
- Tree Crops
- Feeding Operations
- Nurseries and Vineyards
- Specialty Farms
- Other Open Lands <Rural>
- Herbaceous
- Shrub and Brushland
- Mixed Rangeland
- Upland Coniferous Forests
- Upland Hardwood Forests
- Tree Plantations
- Streams and Waterways
- Lakes
- Reservoirs
- Bays and Estuaries
- Major Springs
- Slough Waters
- Oceans Seas and Gulfs
- Wetland Hardwood Forests
- Wetland Coniferous Forests
- Wetland Forested Mixed
- Vegetated Non-Forested Wetlands
- Non-Vegetated
- Wetland Shrub
- Beaches Other Than Swimming Beaches
- Sand Other Than Beaches
- Exposed Rock
- Disturbed Lands
- Riverine Sandbars
- Transportation
- Communications
- Utilities
- Vegetation-Sea Grass



0 0.3 0.6 1.2 Miles

This map was made by Nia Wellendorf on 5/10/11 for demonstration purposes with 2006-2007 land use.

SCI Results

WARDCK/JEF150GS

2/97:

SCI- 13 Very Poor

6/05:

SCI- 15 Very Poor

HA – 121

Velocity Score – 2

1/06:

SCI- 13 Very Poor

HA – 113

Velocity Score – 11

(dom. by aquatic veg.)

NONAMECRK

Biorecon_1992 - 1



Contacts

- WAS:
 - Julie Espy
 - Alan Punshon
 - Keith Parmer
 - Paul Kurisko
 - David Tyler
- SAS:
 - Russ Frydenborg
 - Ken Weaver
 - Joy Jackson
 - Michael Blizzard

