



Florida Department of Environmental Protection

Everglades West Coast Basin Management Action Plan (BMAP) Stakeholder Meeting

June 16, 2015





Agenda

- Hendry Creek Update.
- Imperial River Update.
- Gordon River Update.
- Next Steps.

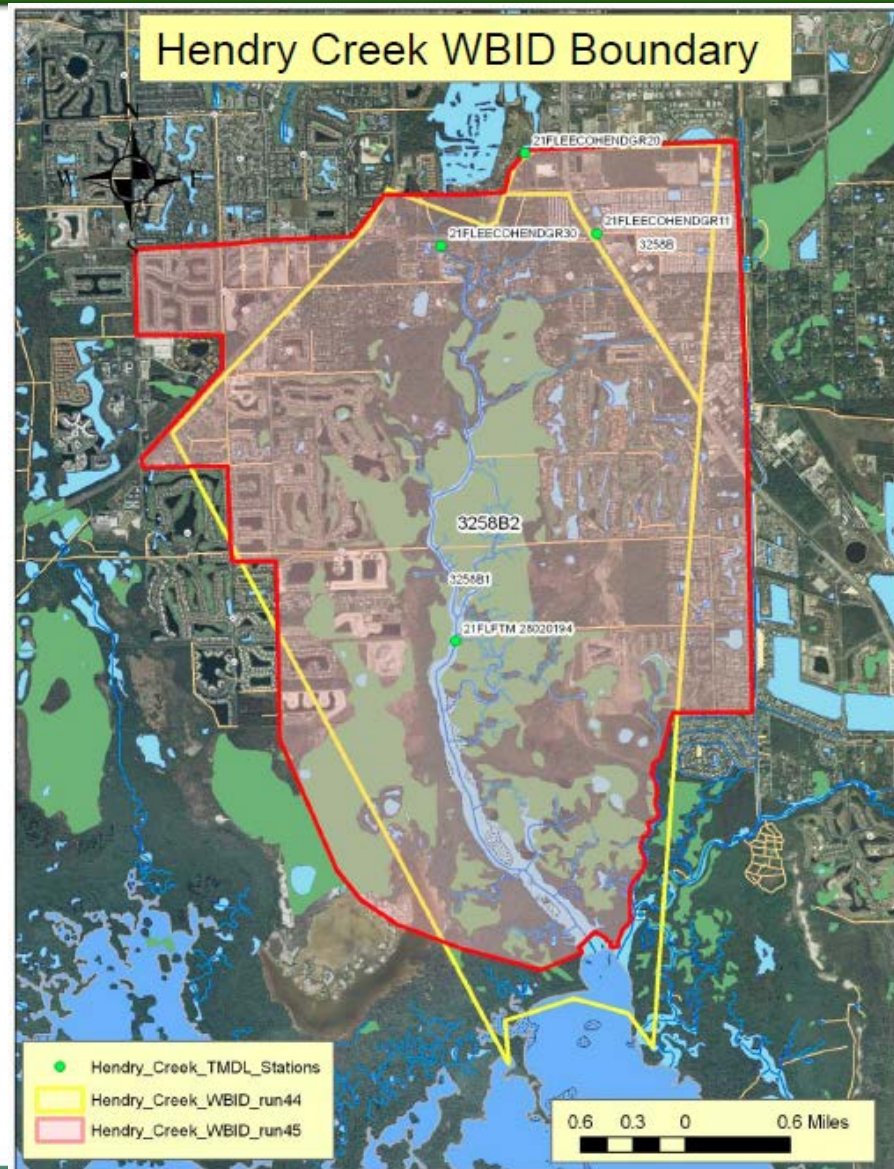


Hendry Creek



Hendry Creek - Background

- Impaired for dissolved oxygen (DO).
- Total nitrogen (TN)-causative pollutant.





Hendry Creek-Land Use

- The area immediately surrounding the downstream portion of the creek is wetlands.
- The upstream portions are residential with built-up portions.
- Land use statistics for waterbody identification (WBID) 3258B2.

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Build-up (including residential)	2985	40.0%
2000	Agriculture	110	1.5%
3000/4000	Upland Forest/Rangeland	708	9.5%
5000	Water	607	8.1%
6000	Wetlands	2880	38.6%
7000	Barren Land	6	0.1%
8000	Transportation, Communication, & Utilities	165	2.2%
	TOTAL	7462	100.0



Hendry Creek-Land Use (continued)

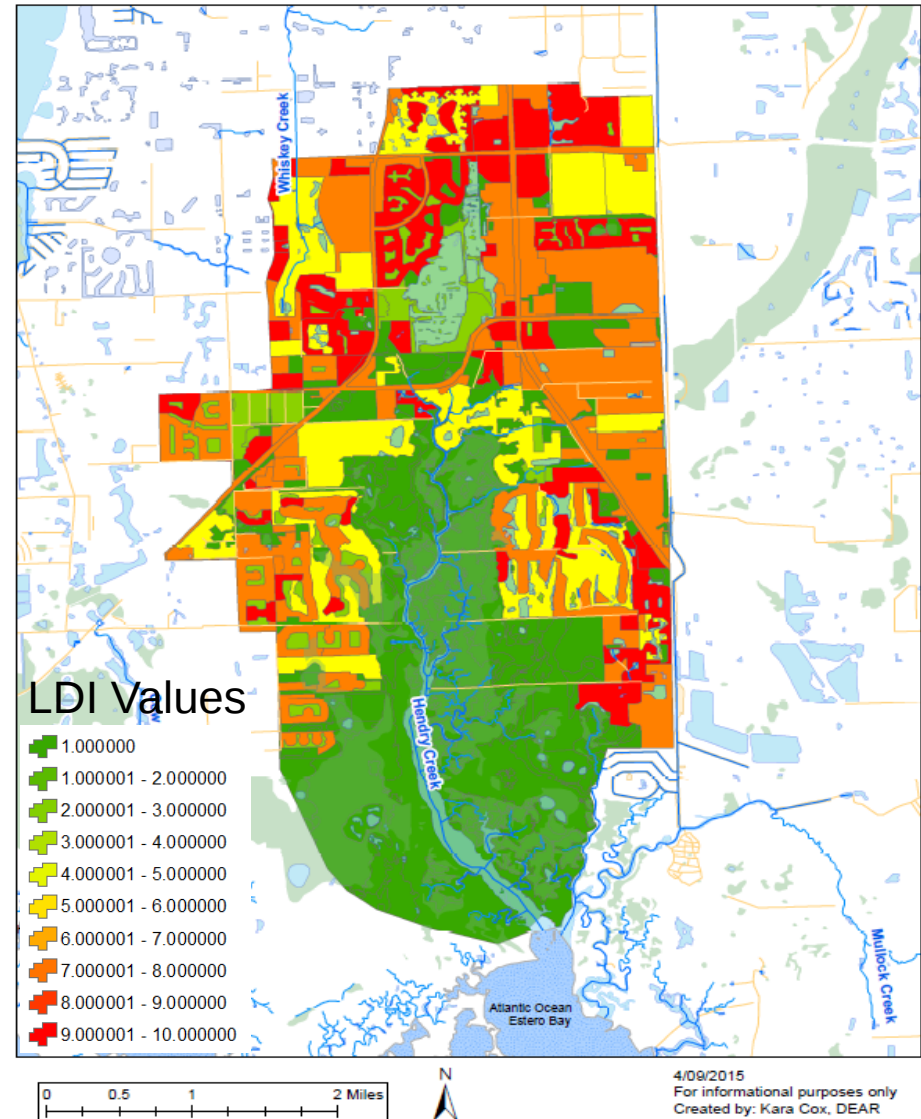
- If land use for WBID 3258B2 is combined with that of the upstream WBID (3258X), the additional urban contribution is evident.

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Build-up (including residential)	5396	51.6%
2000	Agriculture	110	1.1%
3000/4000	Upland Forest/Rangeland	767	7.3%
5000	Water	938	9.0%
6000	Wetlands	2931	28.0%
7000	Barren Land	6	0.1%
8000	Transportation, Communication, & Utilities	312	3.0%
	TOTAL	10460	100



Hendry Creek-Land Use (continued)

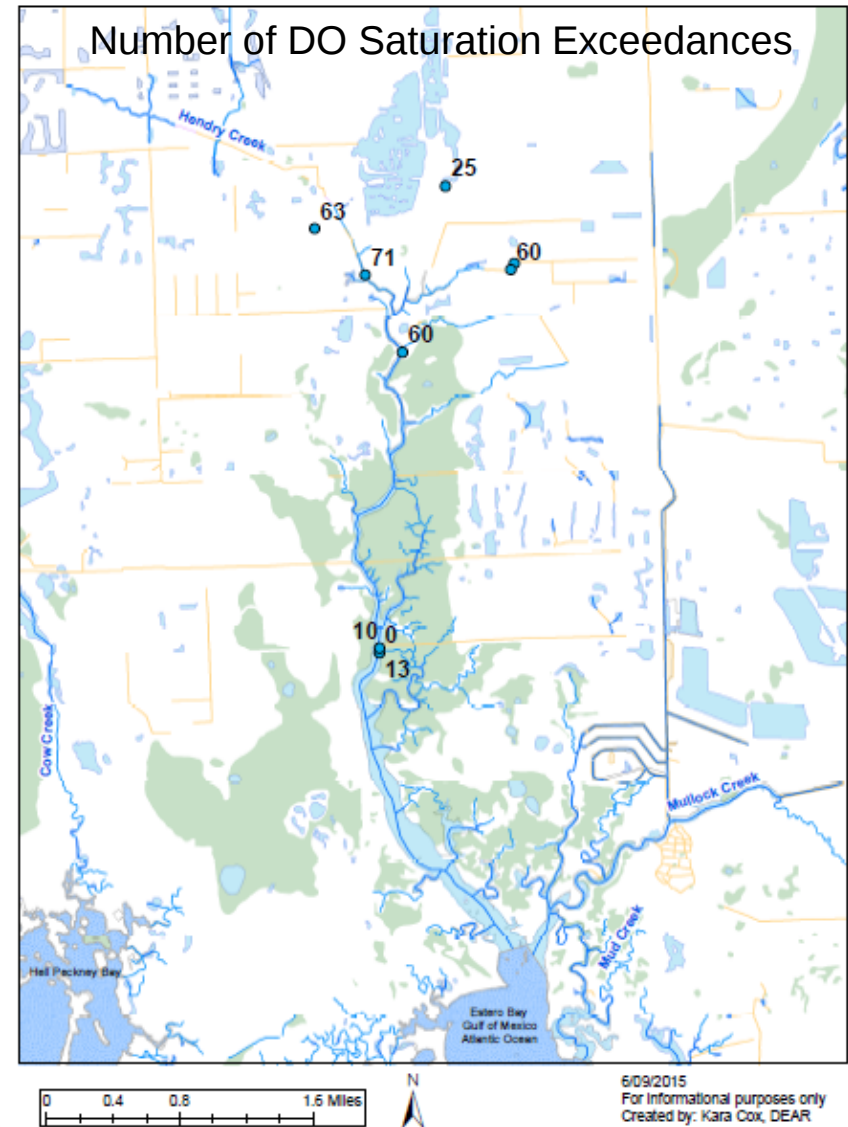
- Map of the landscape development intensity indices (LDIs) for WBIDs 3258B2 and 3258X.
 - 3258B2 LDI = 3.95.
 - 3258X LDI = 7.02.
- Land use is not consistent with a minimally disturbed (reference) condition.
- Type I site specific alternative criterion (SSAC) is not a viable option.





Hendry Creek-DO Saturation

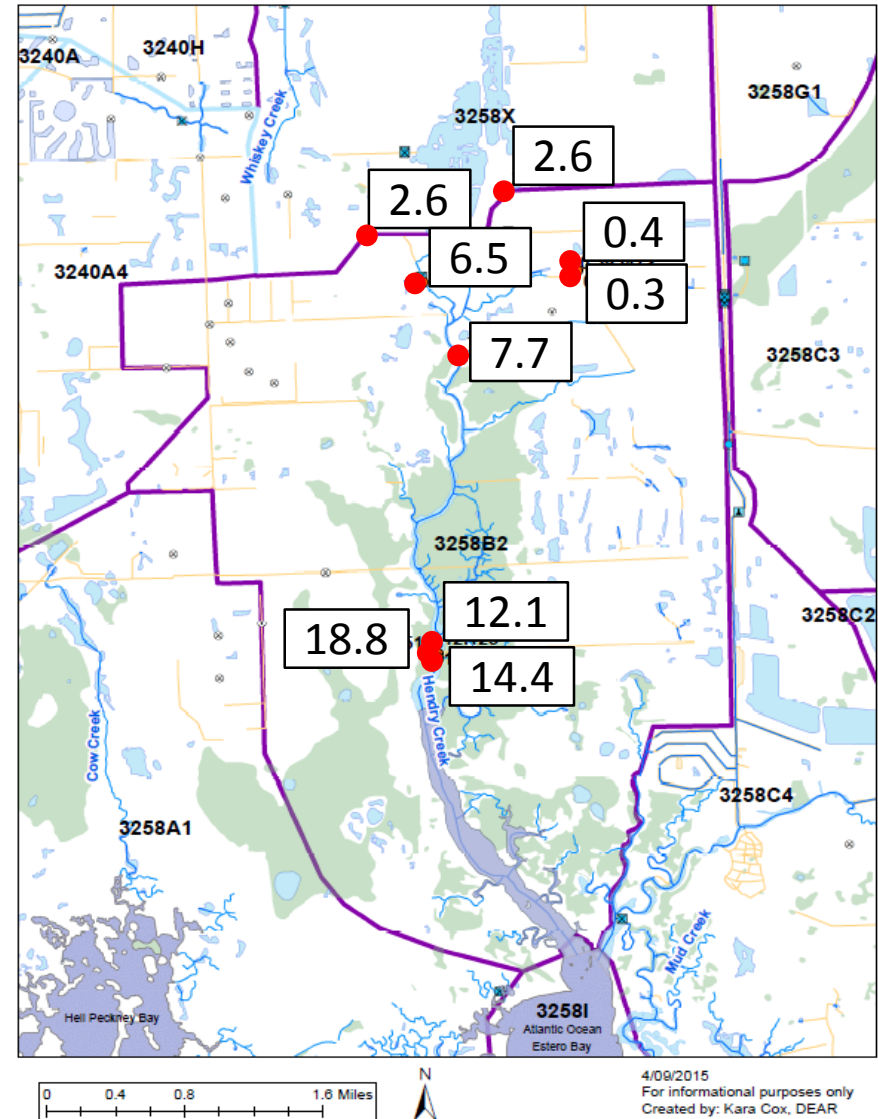
- Most DO saturation exceedances occur in the upstream reaches.
 - Only stations with at least 10 DO measurements were used to generate the map.
- High exceedance rate area coincides with the area with the highest LDI.





Hendry Creek-Salinity

- Marine downstream and fresh in upstream reaches.
- Map shows average salinity for stations that had at least 10 data points over the period of record.



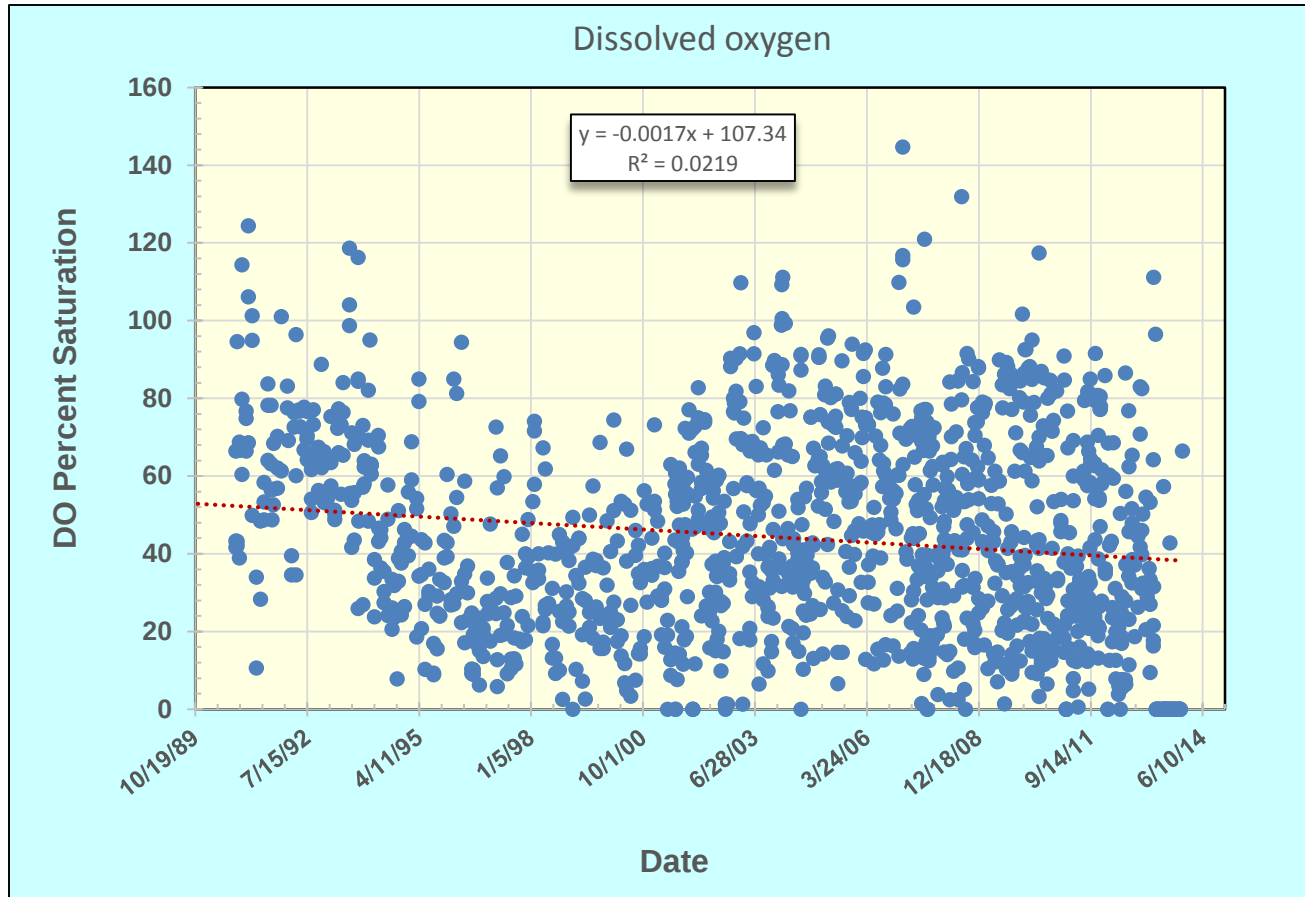


Hendry Creek-Biological Health

- Type II and III SSACs must demonstrate biological health (aquatic life) support.
 - More difficult because Hendry Creek includes freshwater, tidal, and marine segments.
 - Florida has not yet developed biological tools (indices) for tidal or marine waters.
 - There has been work on oyster health in the system; however, the Department and U.S. Environmental Protection Agency (EPA) previously concluded that oysters do not represent a sensitive endpoint for nutrients or DO.
- Currently, there is a lack of clear indication of biological health in Hendry Creek with available data.



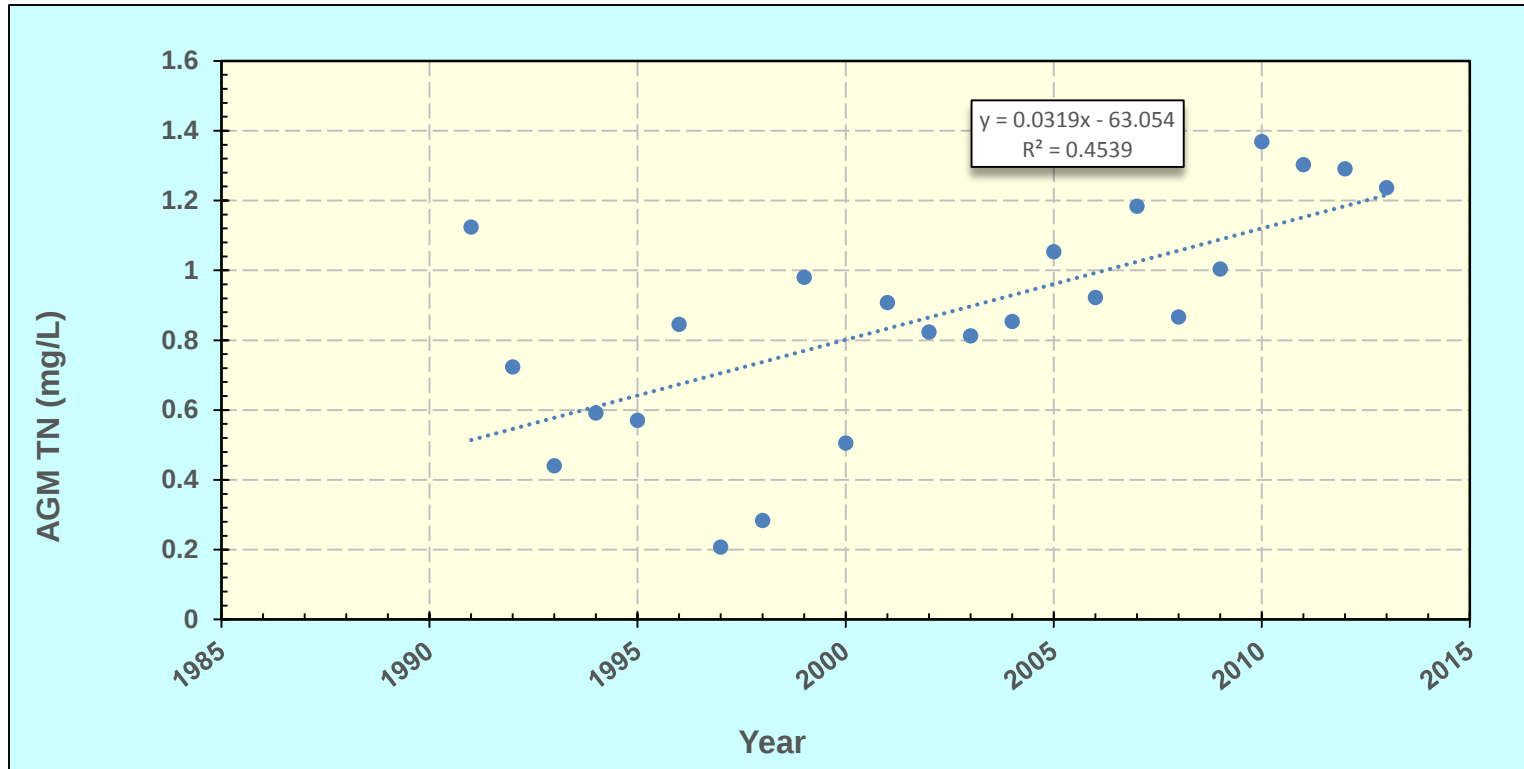
Hendry Creek-DO Saturation



No trend in DO percent saturation over the period of record.



Hendry Creek-Total Nitrogen

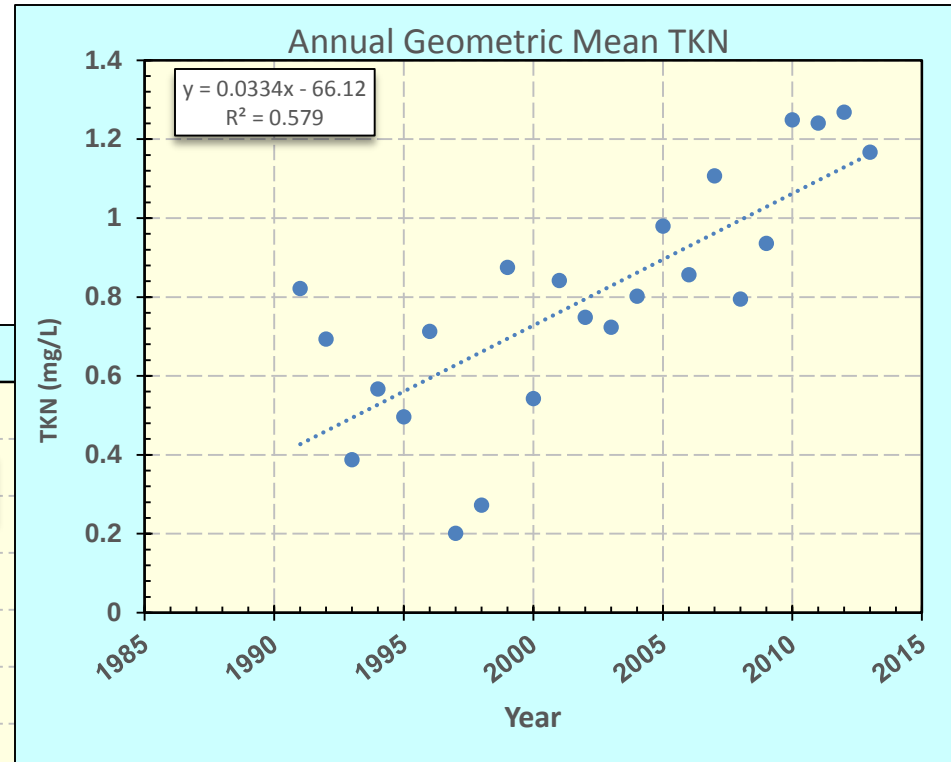
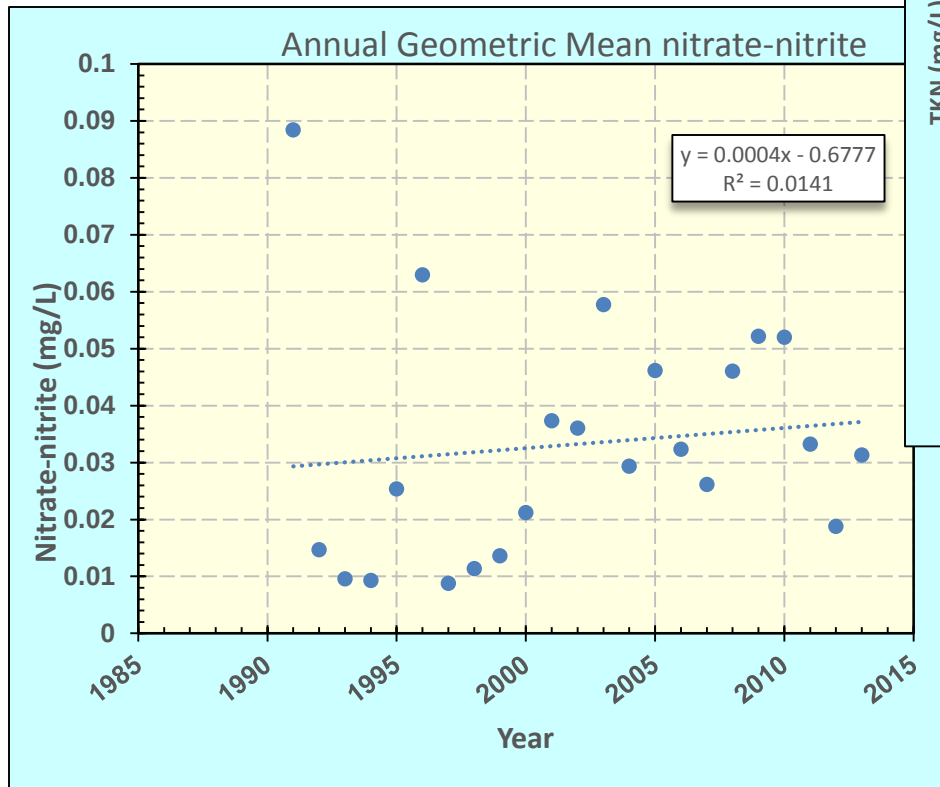


- Hendry Creek is not currently exceeding the Peninsula stream TN threshold (1.54 mg/L).
- Significant increasing trend in arithmetic-geometric mean (AGM) TN over the period of record and will soon exceed the threshold.



Hendry Creek-Nitrogen trend

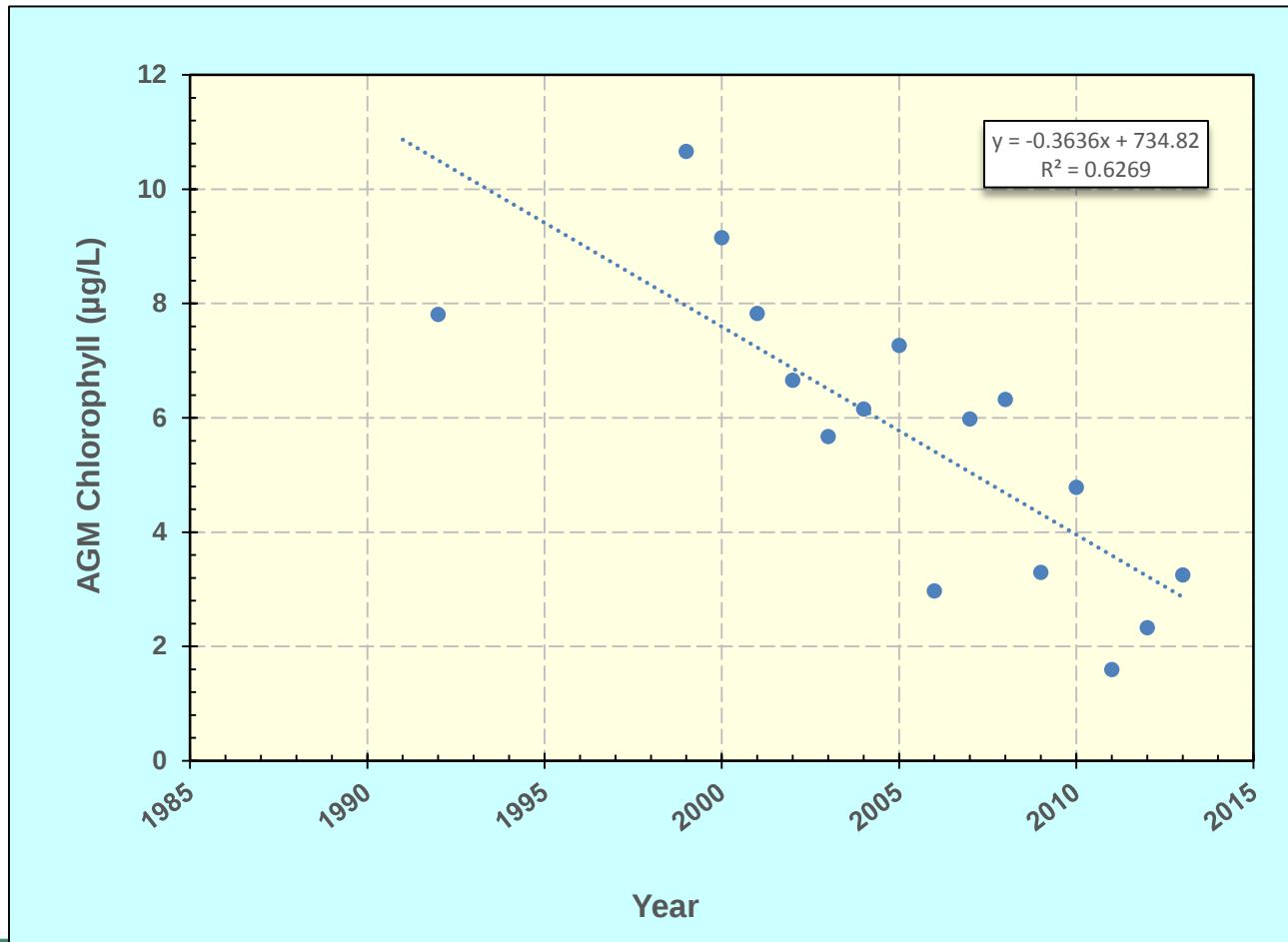
- Total Kjeldahl nitrogen (TKN) driving trend in TN.





Hendry Creek-Chlorophyll-a

- Decreasing trend in chlorophyll.
- Exceeded stream chlorophyll-a threshold of 3.2 $\mu\text{g/L}$ except in the three most recent years.





Hendry Creek-Conclusions

- Type I SSAC is not supported due to high level of landscape disturbance.
- Type II or III SSAC:
 - Limited biological data on biological health
 - Freshwater portion is likely unsuitable for stream condition index (SCI).
 - No current biological tools for tidal or marine portions.
 - Hendry Creek floral evidentiary threshold (chlorophyll-a).



Hendry Creek-Conclusions

- Increasing TN trend: WBIDs would likely be listed for TN in the future.
- Insufficient Data: Sufficient information is not currently available to support SSACs.
- Additional biological sampling could resurrect potential for plan of study.



Questions about Hendry Creek?



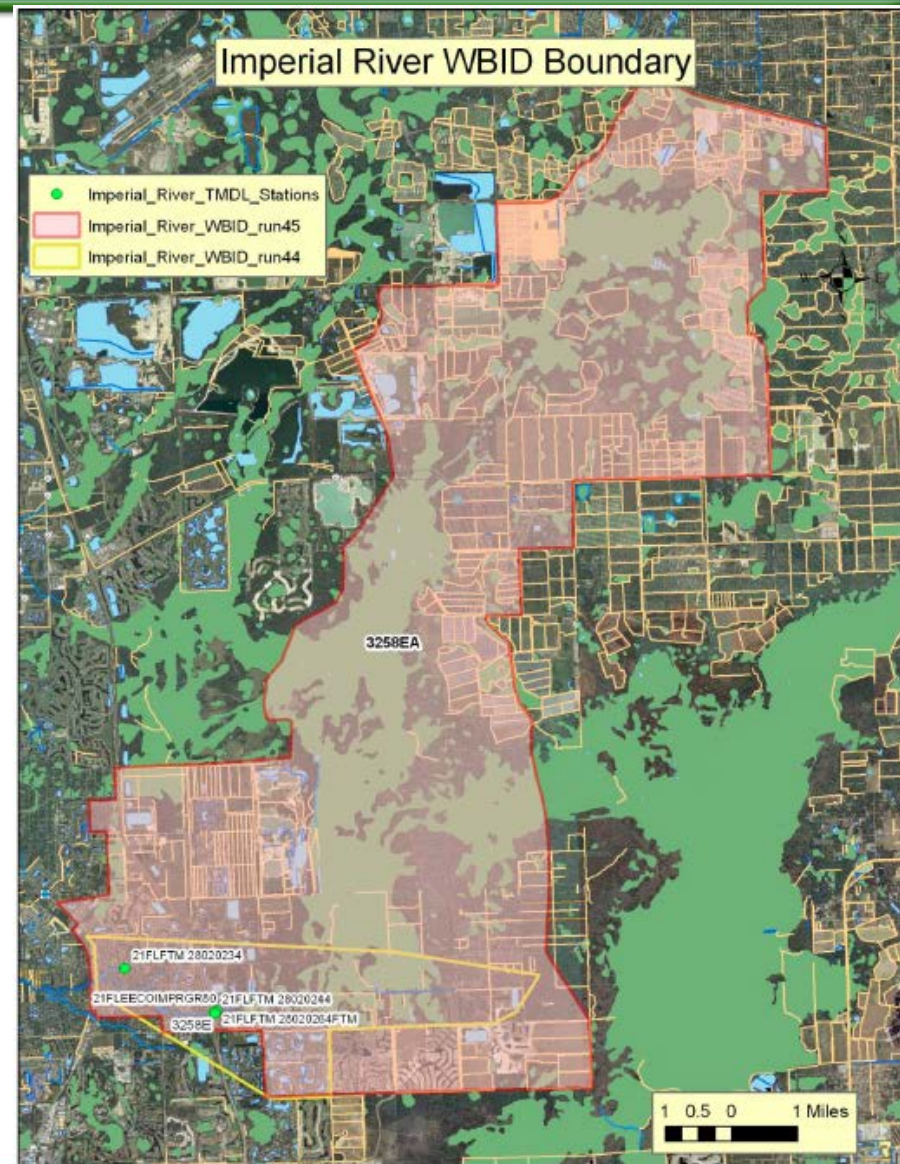


Imperial River



Imperial River-Background

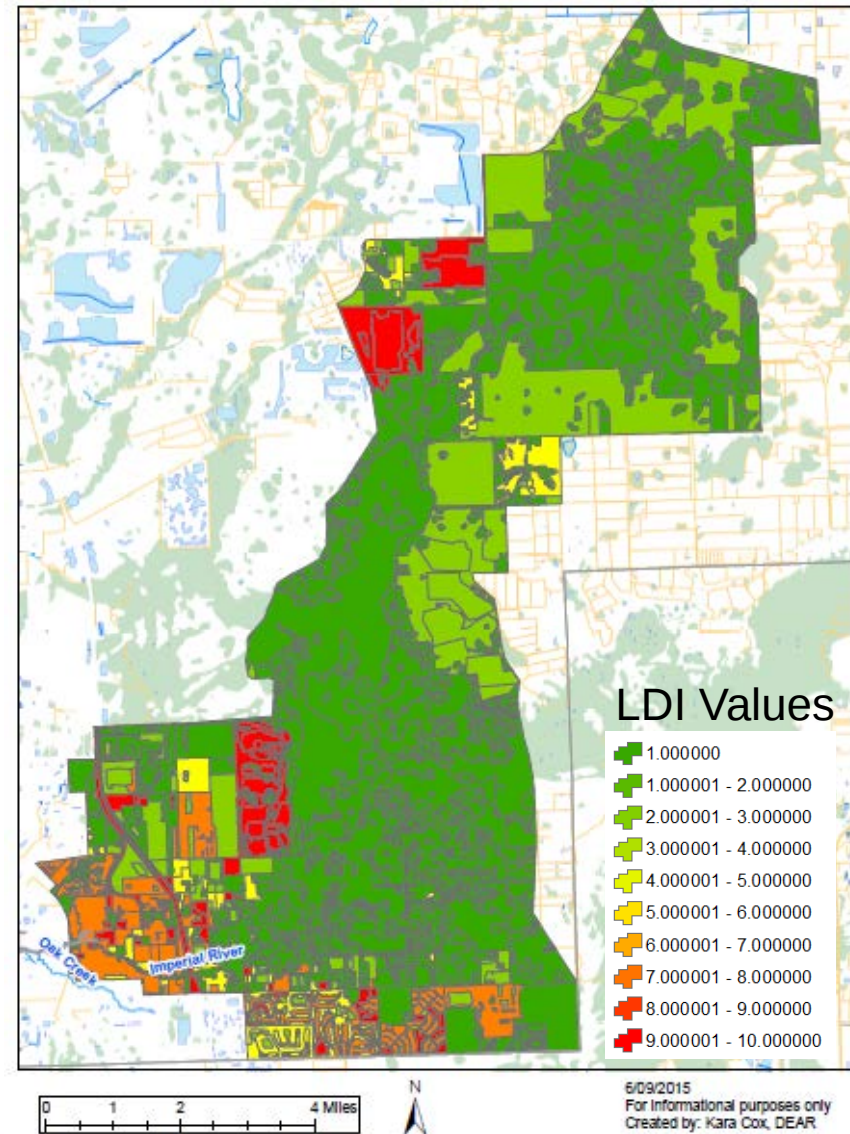
- WBID 3258EA was originally listed for DO during the 1st assessment cycle; and, again listed in the 2nd assessment cycle.
- TN was listed as the causative pollutant because the median values of TN exceeded the TN screening levels developed for the Estero Bay watershed.





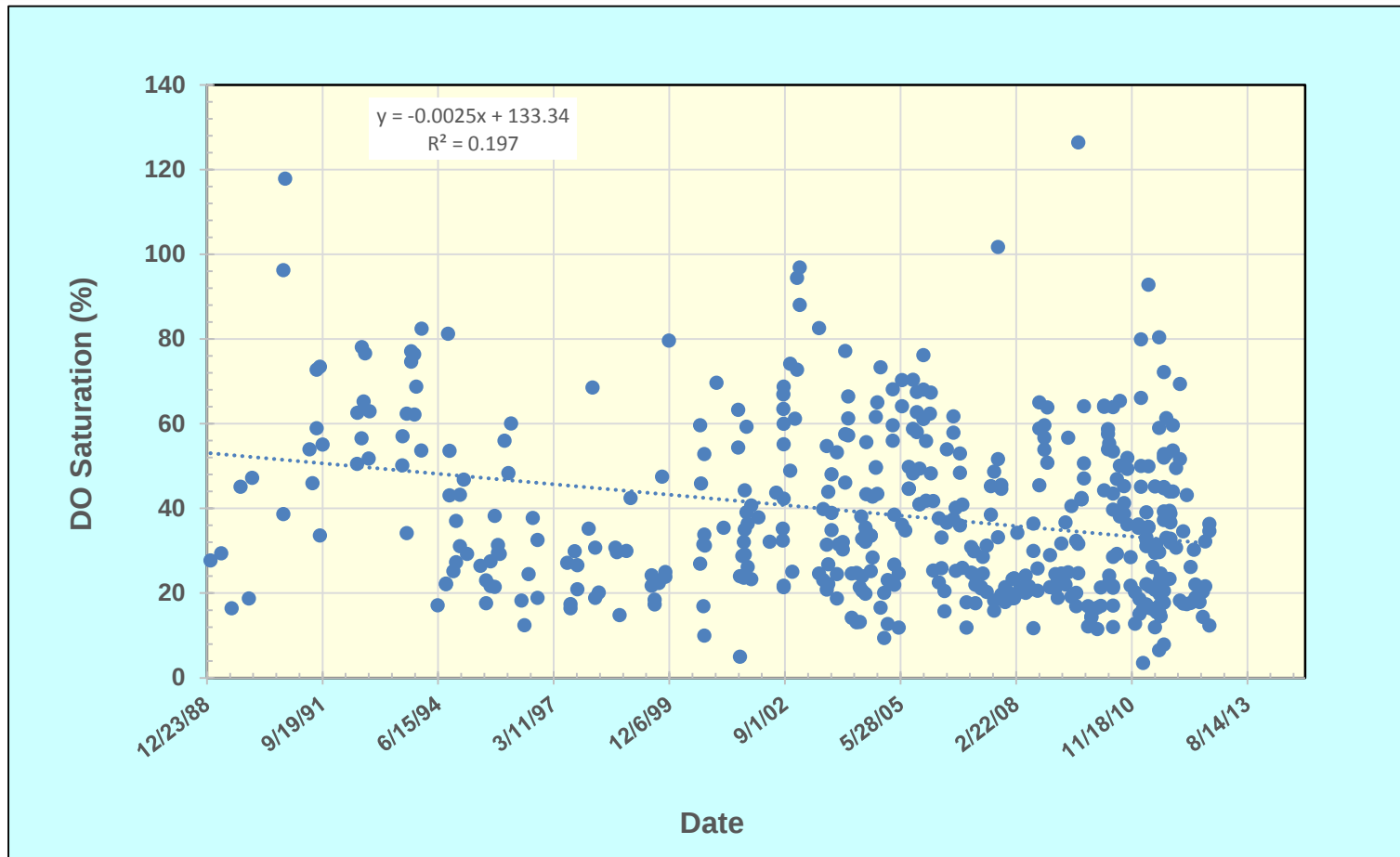
Imperial River

- The system is freshwater.
- Predominately natural watershed with urban areas immediately surrounding the actual waterbody.
- WBID 3258EA LDI=2.76
- Type I SSACs would be difficult to defend given level of development and landscape disturbance.





Imperial River-DO Saturation

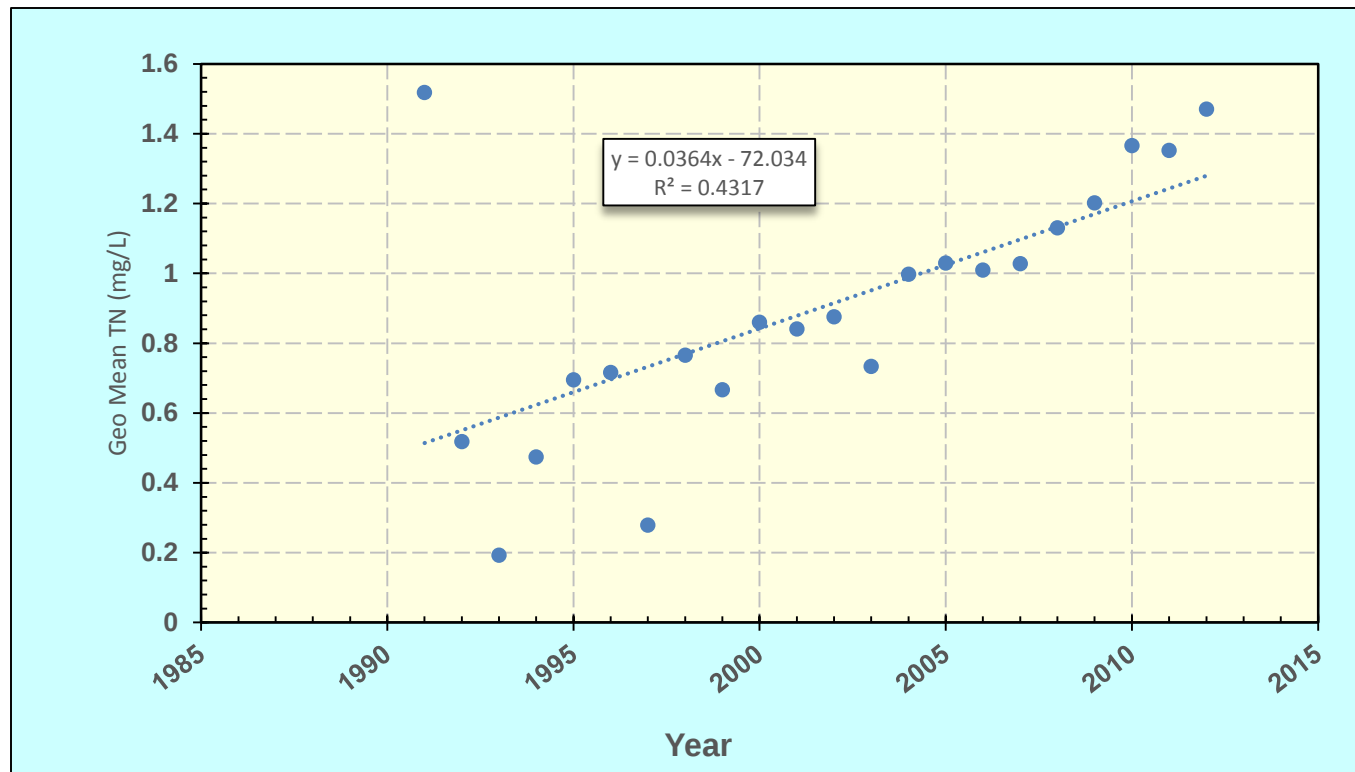


Slight decreasing trend in DO percent saturation over the period of record.



Imperial River-Total Nitrogen

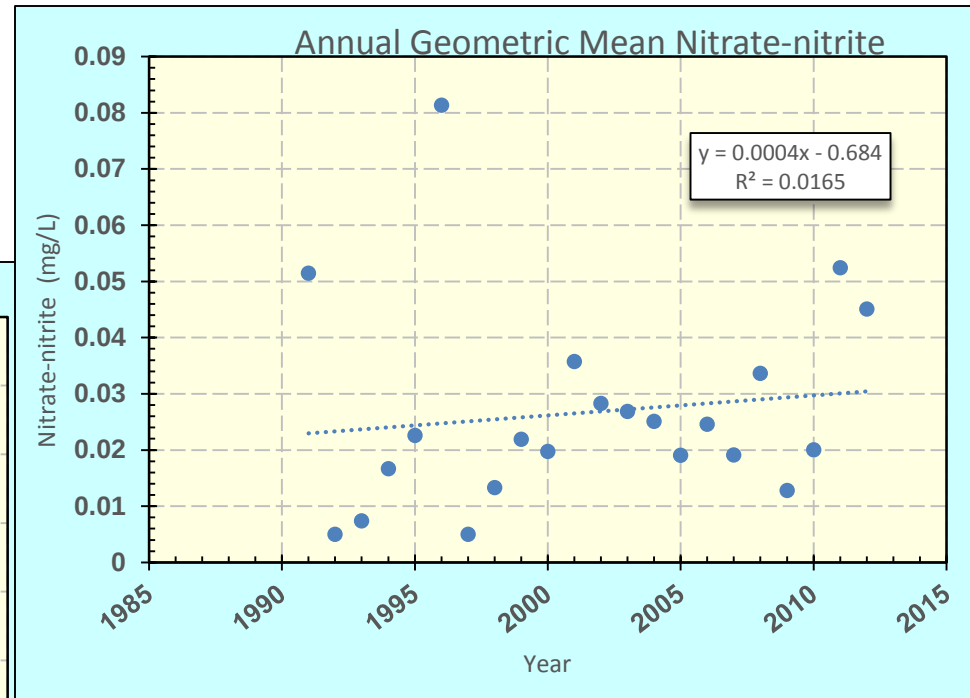
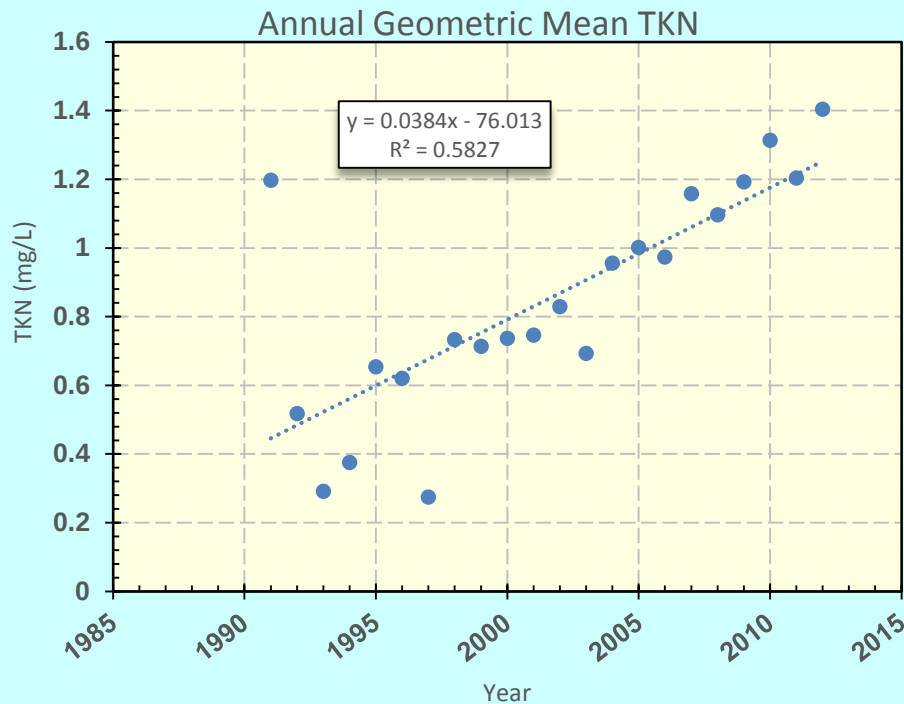
- Located in the Peninsula nutrient region. TN threshold = 1.54 mg/L. TN significantly increasing over period of record and will soon exceed threshold.





Imperial River-Nitrogen Trend

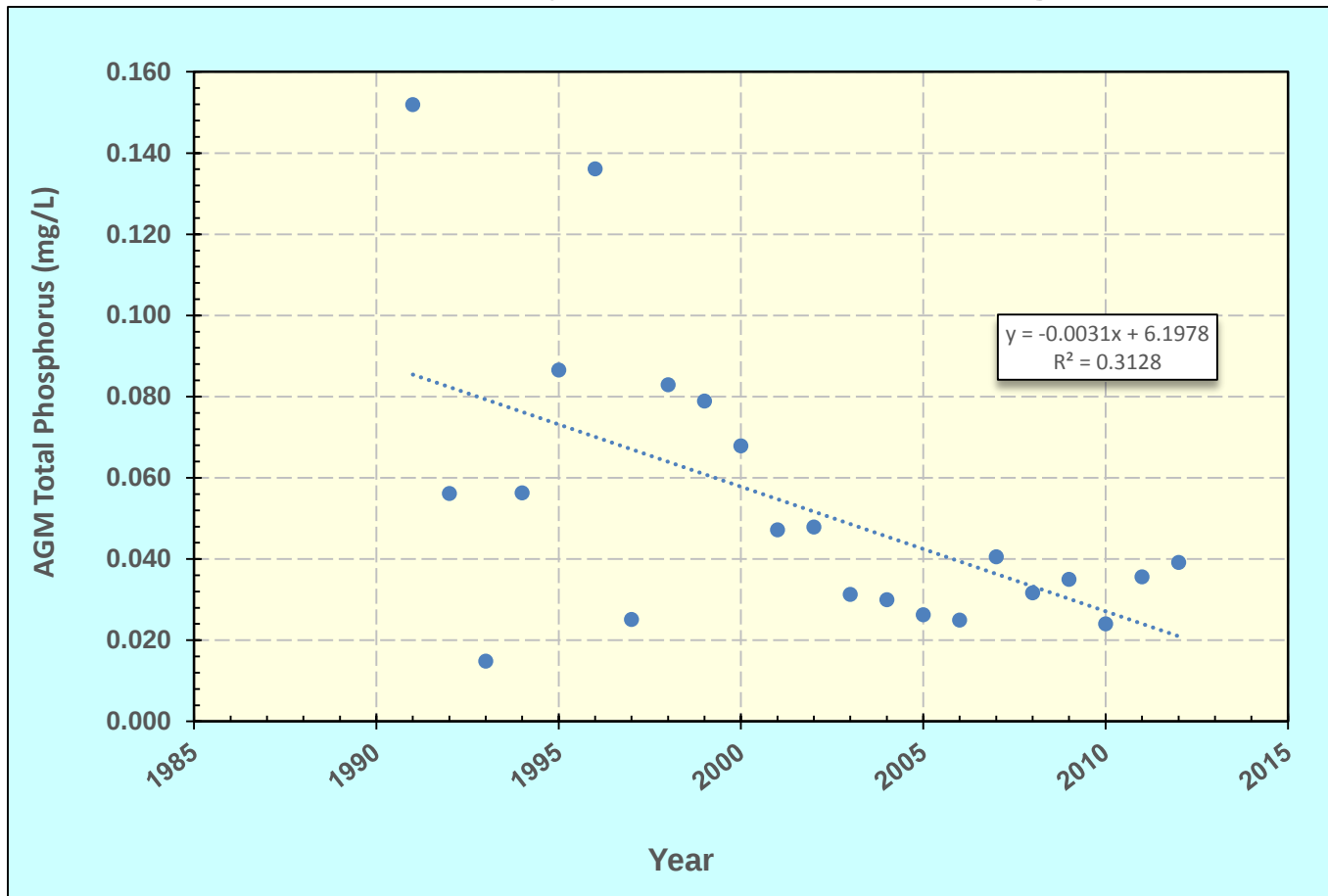
- TKN is driving the TN trend.





Imperial River-Total Phosphorus

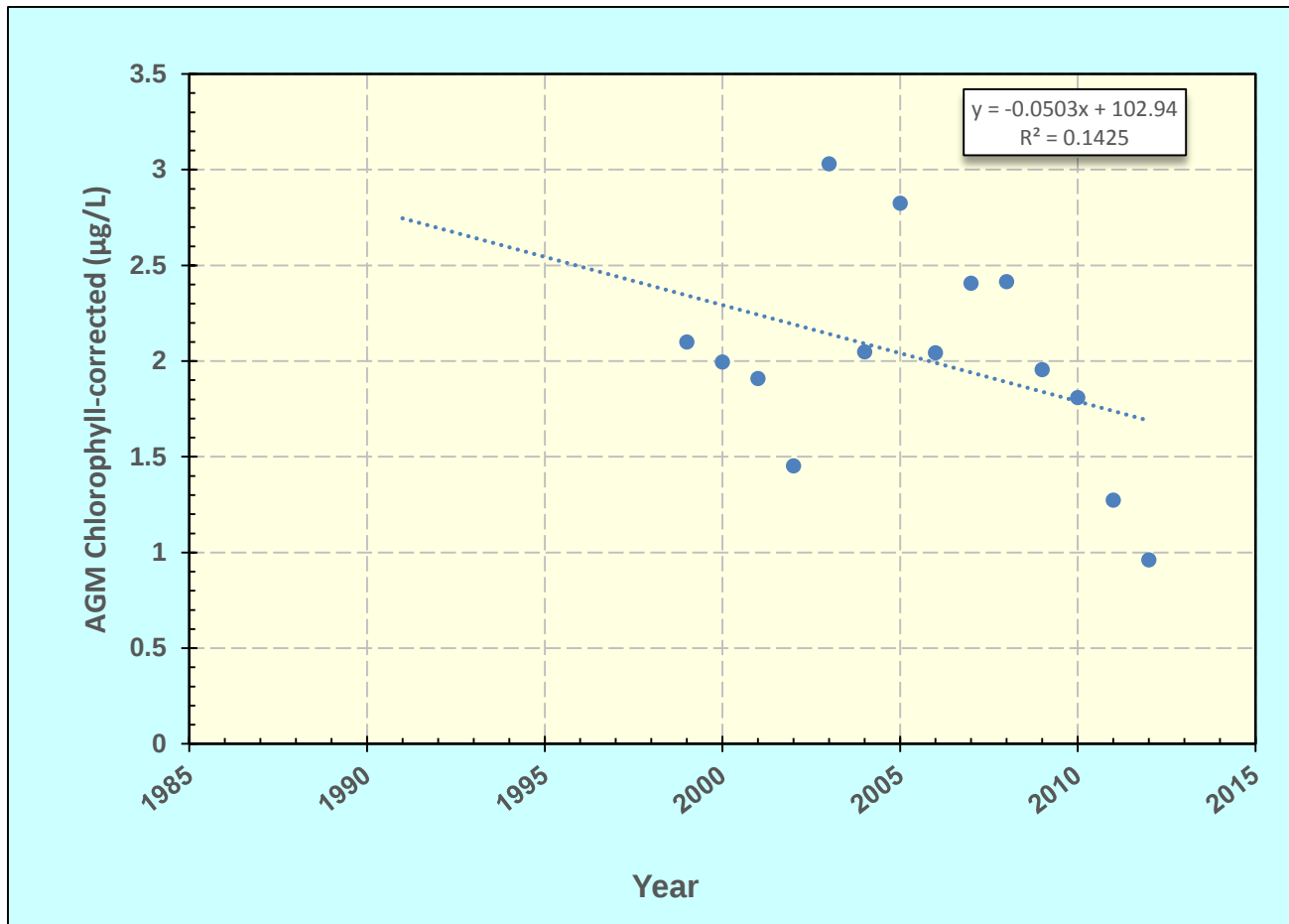
- TP decreasing over period of record.
- TP nutrient threshold for peninsula = 0.12 mg/L.





Imperial River-Chlorophyll-a

- AGM Chlorophyll-a does not exceed the stream chlorophyll a threshold (AGM 3.2 $\mu\text{g/L}$).
- Chlorophyll-a has decreased in the most recent two years.

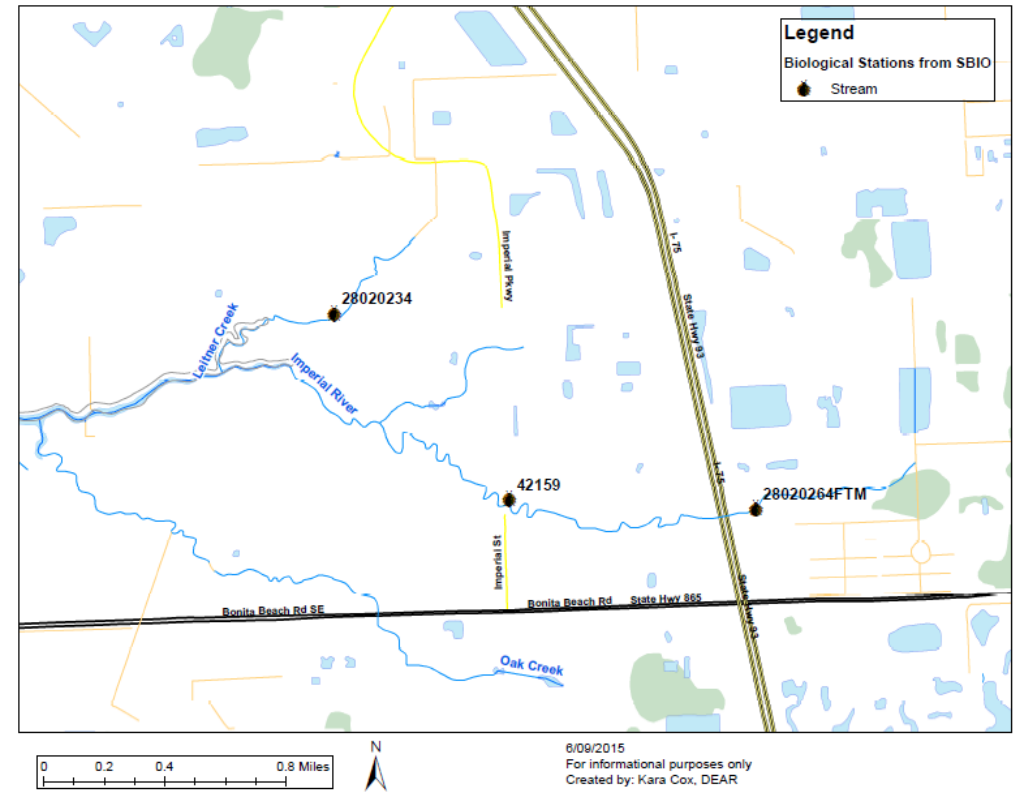




Imperial River-SCI

- Three SCIs collected.

SCI version	Date	Score	STORET Station Name
1992	9/26/2000	18- Poor	28020264 FTM
1992	10/09/2000	20- Good	28020234
1992	9/11/1996	24- Good	28020234



- Currently waiting on the results of an SCI collected in March 2015.
- An additional SCI, rapid periphyton survey (RPS), and linear vegetation survey (LVS) sampling event is scheduled for the end of June for both sites in the Imperial River and Leitner Creek.



Imperial River-Biological Health

- Currently, floral health is inconclusive.
 - LVS and RPS collected at two sites in the WBID in March 2015.
 - Exotics present (coefficient of conservatism score <2.5 and % Florida Exotics Pest Plant Council exotics is $>25\%$) in Imperial Creek and did not have at least 2m^2 in Leitner Creek.
 - No algae present at points assessed.
 - Another sample needs to be collected to fully assess present condition.
 - A bloom occurred in 2011 and identified *Oscillatoria cf. limosa* as the dominant taxa.
 - A natural substrate periphyton sample was collected in 2006 and included species indicative of a fairly normal periphyton community.



Imperial River-Conclusions

- Type I SSAC is not supported due to level of landscape disturbance.
- Type II or III SSAC:
 - Floral evidentiary thresholds require additional sampling and review.
 - Fauna (SCI).



Imperial River-Conclusions (continued)

- Additional biological monitoring may support Type II and/or III SSACs (pending results).
- Increasing TN trend: WBIDs would likely be listed for TN in the future.



Questions about Imperial River?



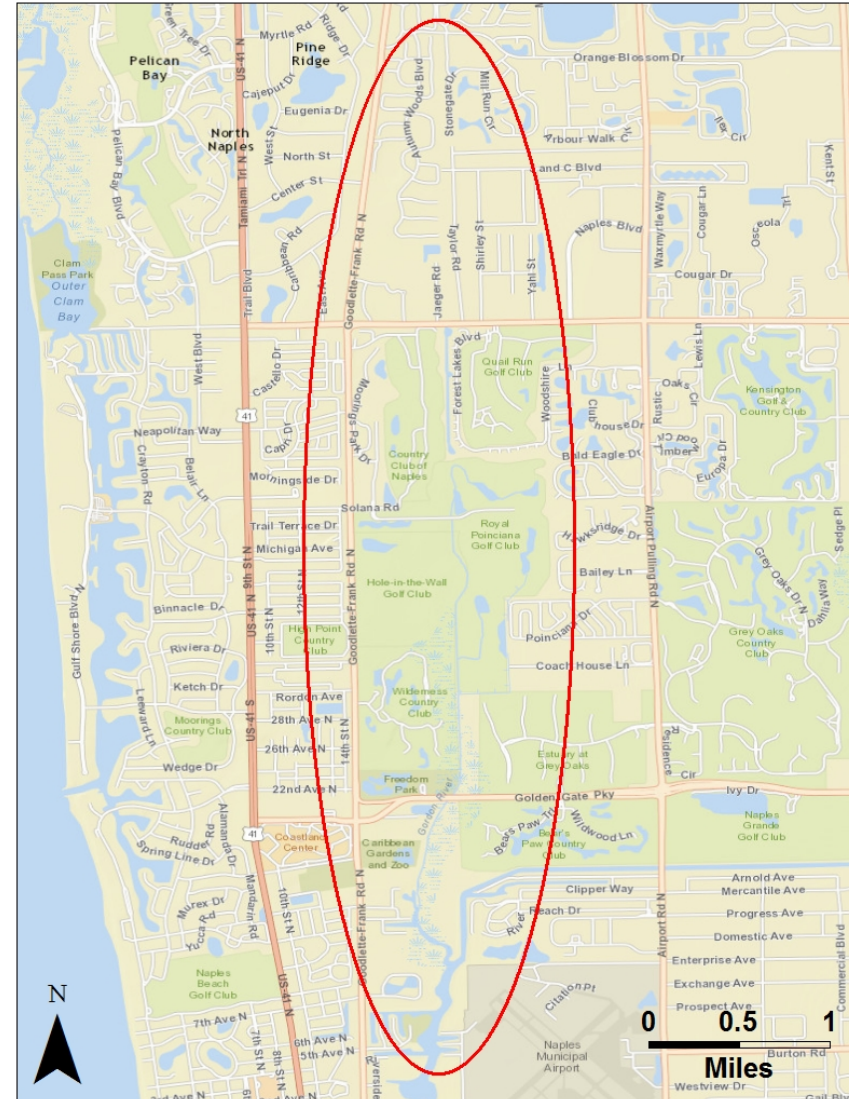


Gordon River



Gordon River

- Class III Waterbody: DO Standard 5.0 mg/L.
- Impaired Cycle One:
 - Jan. 1995 – June 2002.
- Listed in May 2004.
- Impaired Cycle Two:
 - Planning 1995 – 2002.
 - Verified 2000 – 2007.
- 2008 TMDL for Gordon River Extension:
 - WBID 3278K.

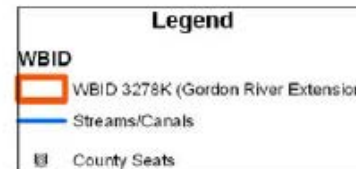
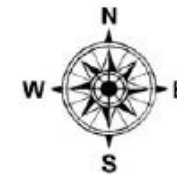
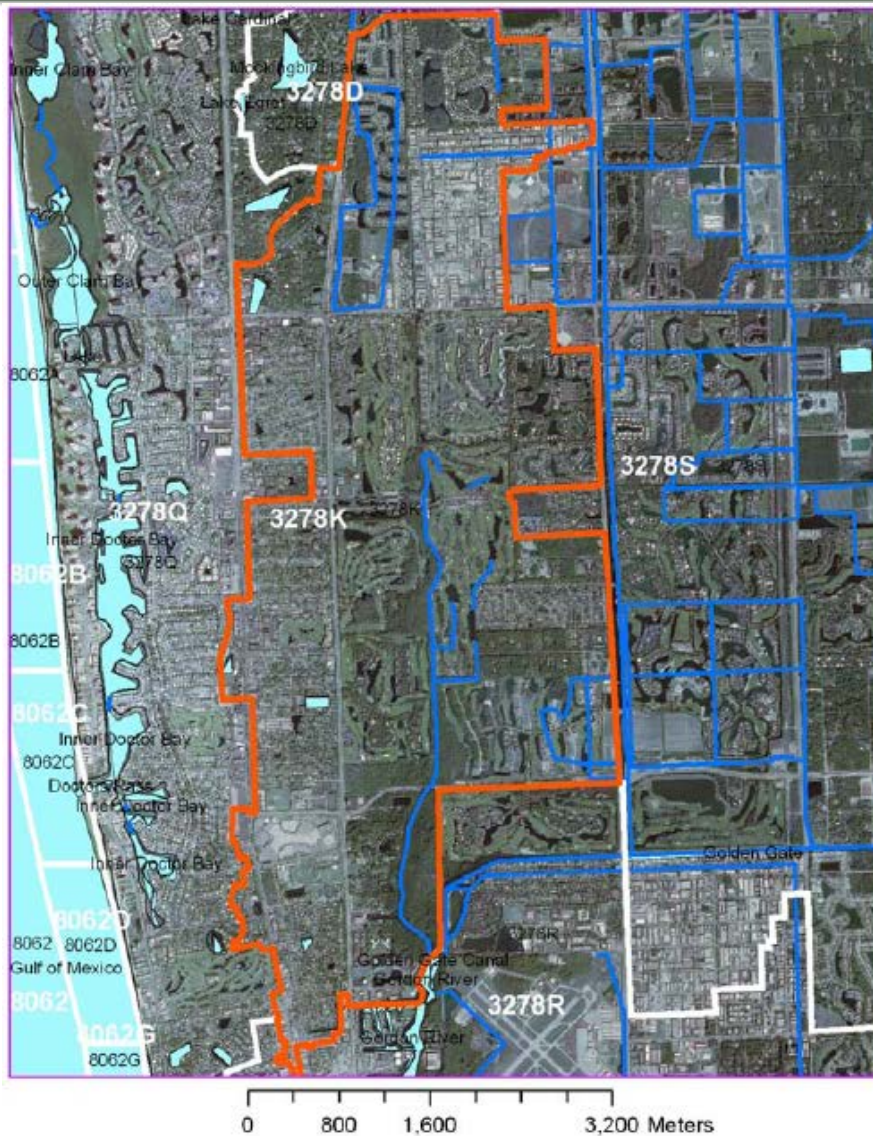




Gordon River TMDL WBID 3278K



Gordon River TMDL





Gordon River TMDL (continued)

Data Used in the Determination of the TMDL

Table 5.1. Data Collectors and Station List for the Gordon River, WBID 3278K

Station Description	STORET ID	Data Provider	First Year Sampled	Last Year Sampled	Total # of Samples in Verified Period
Gordon River Ext. at mouth of canal leading to Main Post Office	21FLSFWMBC3	Collier County	2000	2006	2,183
Gordon River above Weir at GG Parkway	21FLFTM 28030047	Department	2000	2002	148

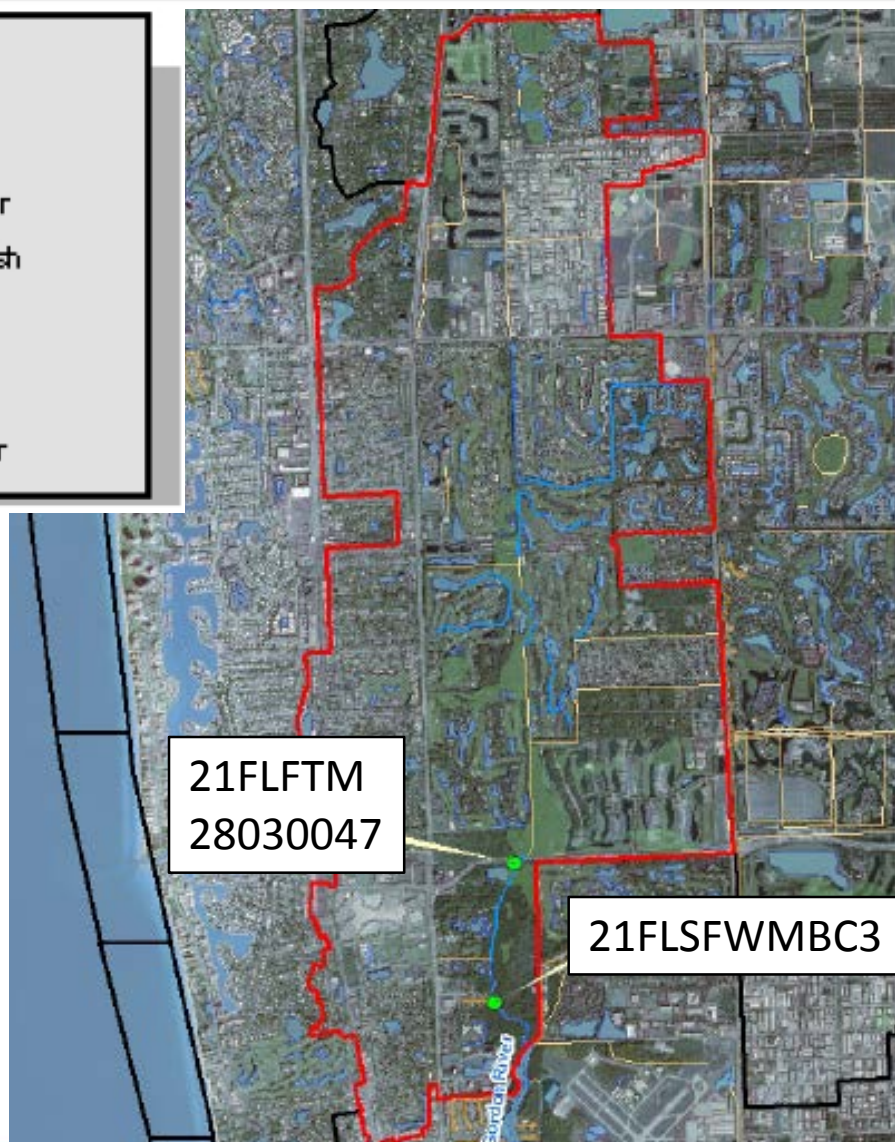
Note: Total number of samples includes data for all parameters assessed in verified period.



Gordon River TMDL (continued)

Legend

- Gordon River STORET Stations
- WB ID 3278K Gordon River
- WB ID Run 33
- NHD Waterbody
 - Canal/Ditch
 - Stream/River
 - Swamp/Marsh
 - Estuary
 - Reservoir
 - Stream/River





Gordon River TMDL (continued)

Table 2.1. Summary of DO, BOD, TP, and TN Data from Cycle 1 Verified Period Sampling (1995–2002) for the Gordon River, WBID 3278K

Parameter of Concern	Number of Samples	IWR Required Exceedances (for impairment)	Actual Number of Exceedances	Median
DO	116	17	76	3.89
BOD	6	*	*	1.05
TP	86	*	*	0.05
TN	95	*	*	0.75

Note: Data results are from IWR Run 18.
 BOD – Biological oxygen demand.
 * – No nutrient criterion exists for these parameters.

Table 2.2. Summary of DO, BOD, TP, and TN Data from Cycle 2 Verified Period Sampling (2000–07) for the Gordon River, WBID 3278K

Parameter of Concern	Number of Samples	IWR Required Exceedances (for impairment)	Actual Number of Exceedances	Median
DO	72	12	70	2.53
BOD	17	*	*	2.0
TP	66	*	*	0.07

Note: Data results are from IWR Run 32.
 * – No nutrient criterion exists for these parameters.



Gordon River TMDL (continued)

Table 6.1. TMDL Components and Current Loadings for the Gordon River, WBID 3278K

WBID	Parameter	TMDL (mg/L)	WLA		LA (% reduction)	MOS
			Wastewater (mg/L)	NPDES Stormwater (% reduction)		
3278K	TN	0.74	N/A	29%	29%	Implicit

N/A – Not applicable.

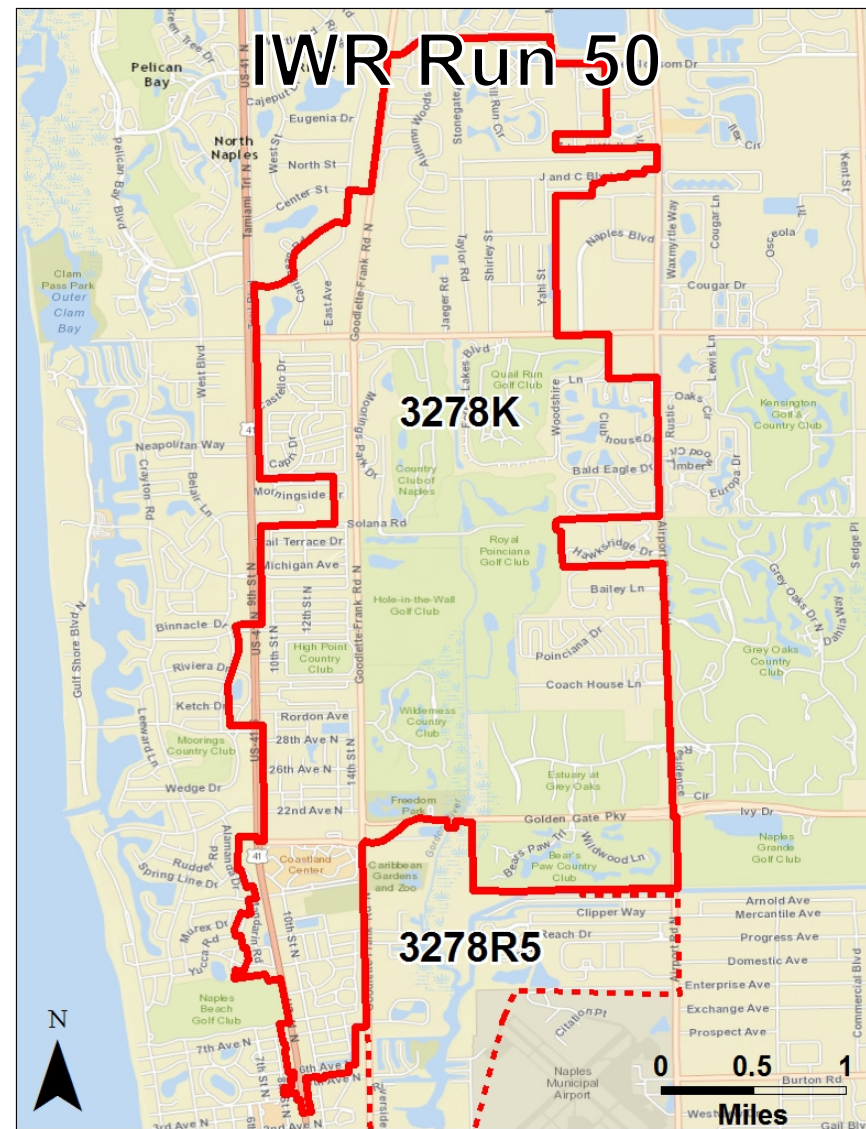
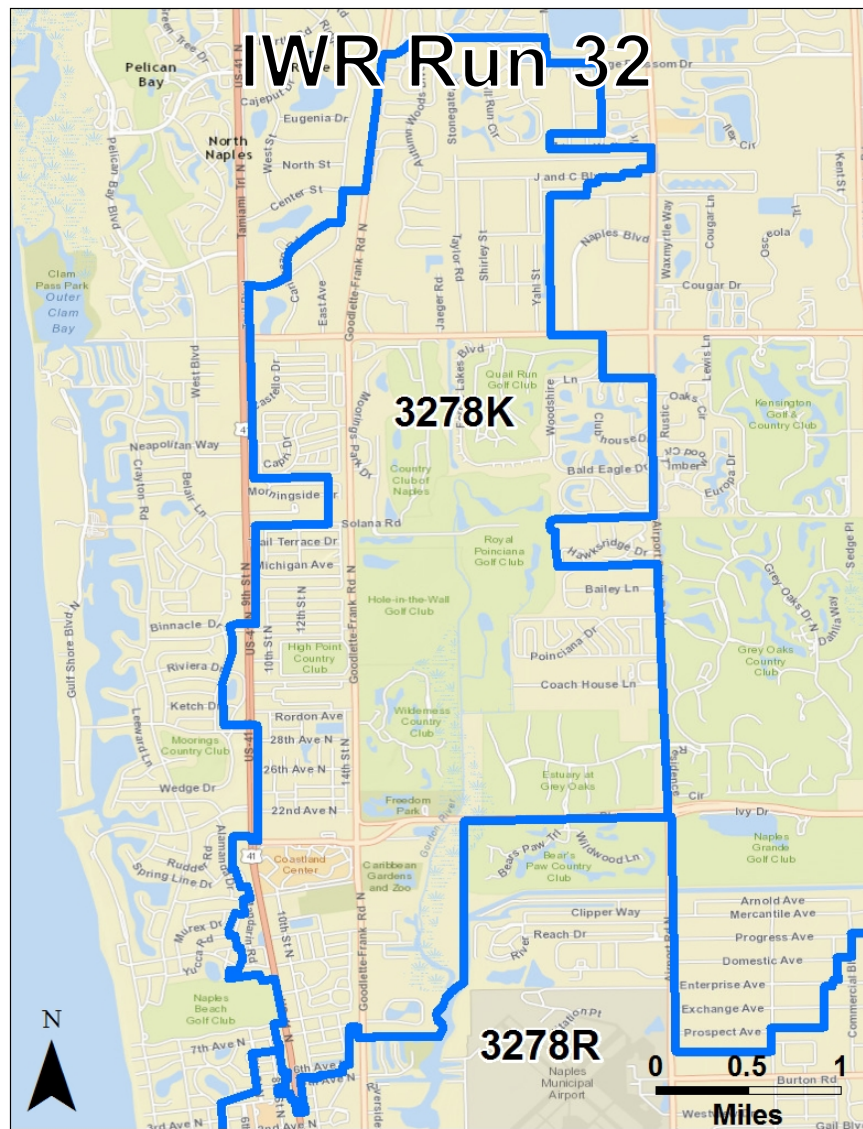
TMDL target is 29 percent reduction of TN.



Gordon River WBID Boundaries



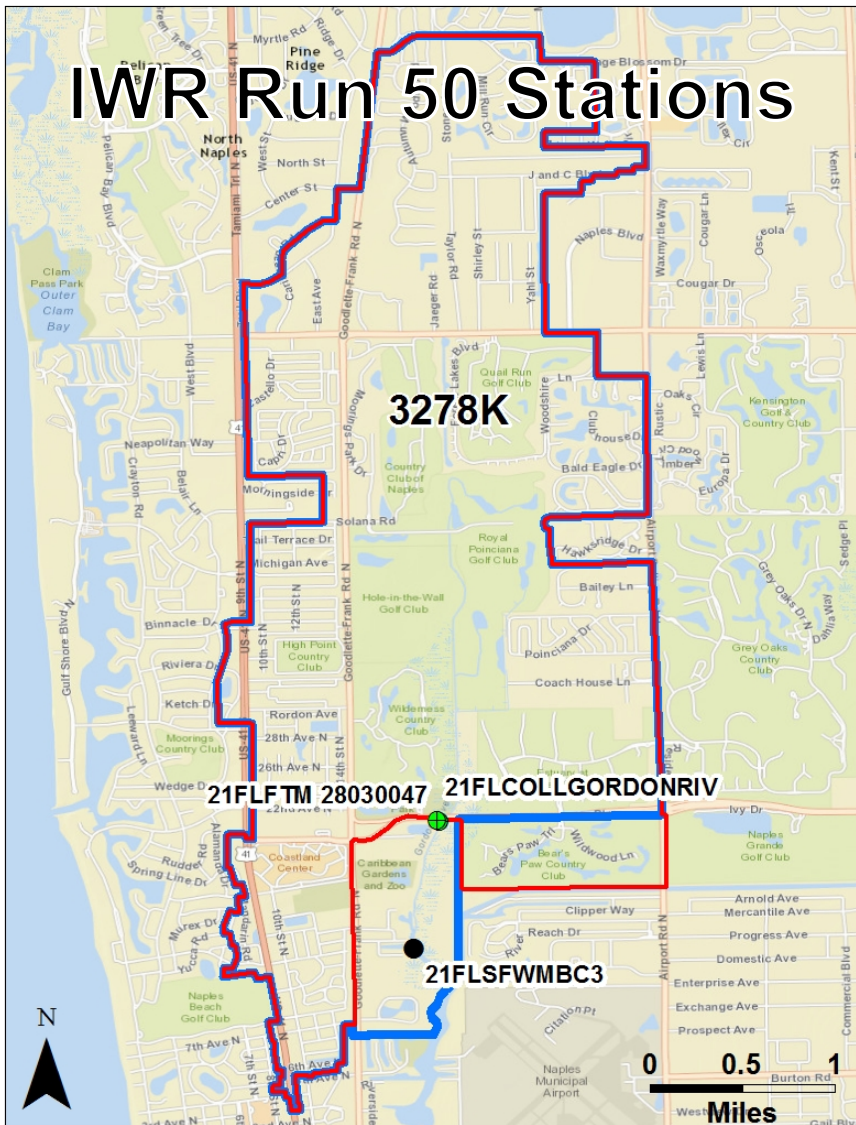
Gordon River - WBIDs



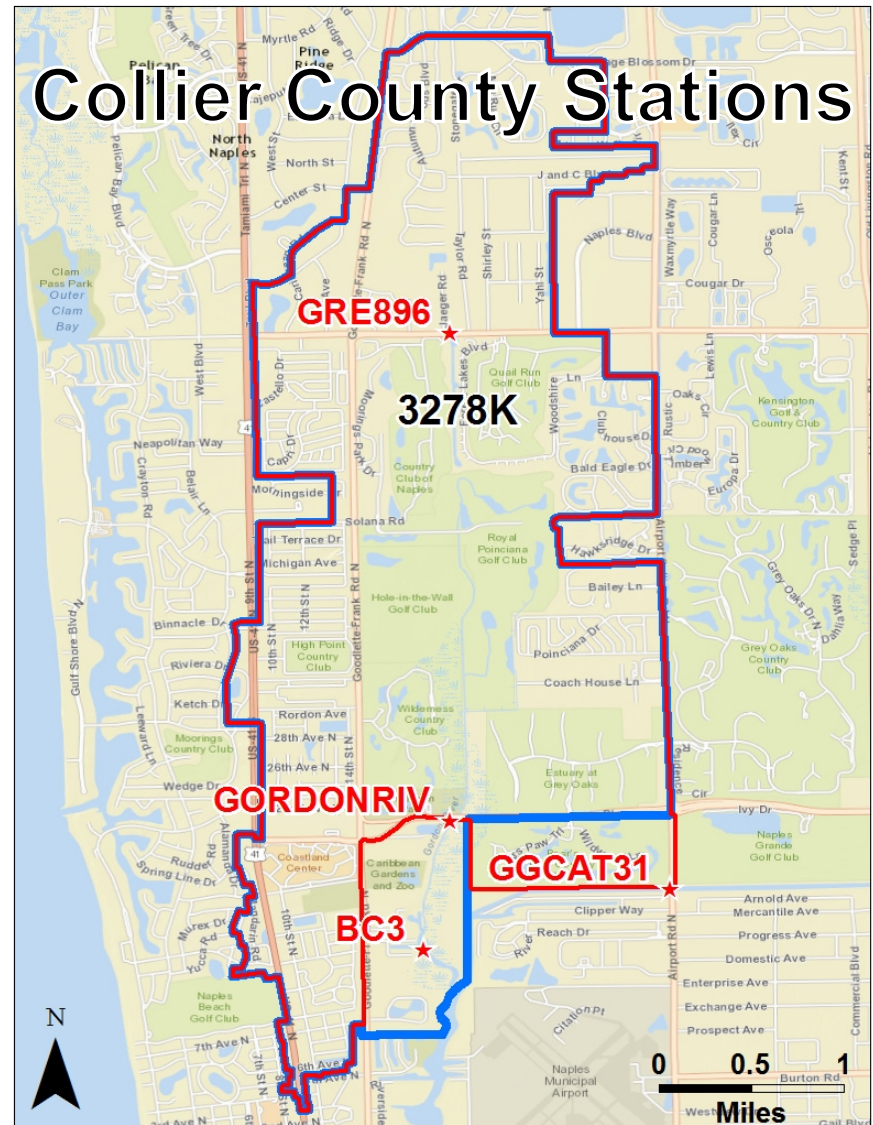


Gordon River – WBIDs (continued)

IWR Run 50 Stations



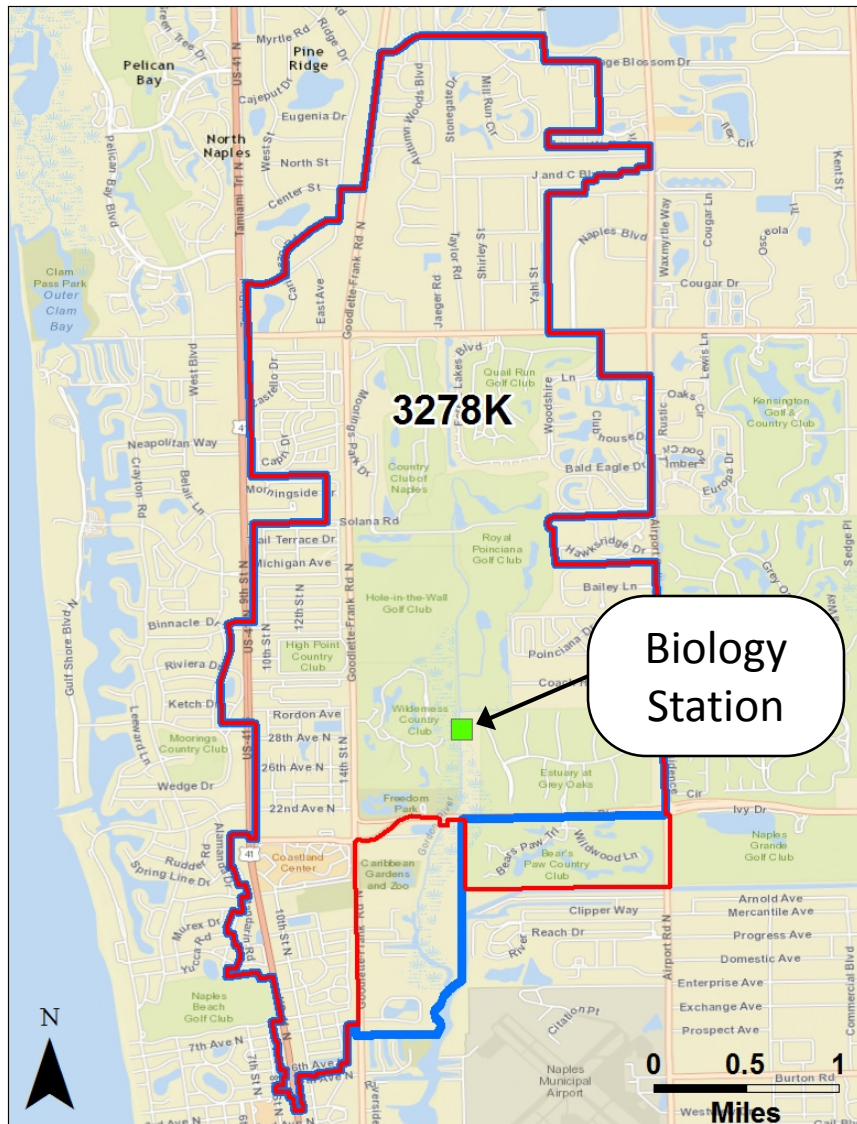
Collier County Stations





Gordon River – WBIDs (continued)

Approximate location of
2015 FDEP biology station.





Gordon River Data Needs



Gordon River - Data

- BMAP is the next step in TMDL implementation.
- Additional analyses and monitoring must be completed if developing an appropriate, site-specific DO criterion.
- Further data are necessary to optimize efforts in WBID 3278K.



Gordon River – Data (continued)

Low DO Concentrations – Potential Causes:

- Nutrients.
- Low input DO.
- Shallow water depth/high water temperatures.
- Sediment oxygen demand (SOD).
- Water column DO processes.



Gordon River – Data (continued)

Potential Data Needs:

- Water quality at multiple sites in 3278K.
- Biology data in 3278K (with water quality).
- Ground water input.
- SOD data.
- Water column DO data.



Questions about Gordon River?





Next Steps



Other Everglades West Coast TMDLs

- Additional TMDLs are planned for the Everglades West Coast Basin.
- Two year work plan TMDLs:
 - Rookery Bay.
 - Silver Strand.
 - Okaloa-Coochee.



Action Items

- Review SCI Results for Imperial River following the second sampling event.
- Evaluate feasibility of additional monitoring in 3278K and 3278R5.
- Continue ground water observations to evaluate ground water influence on the DO impairments.
- Continue water reuse study in Gordon River.



Contact Information

For additional information please contact:

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