



Florida Department of Environmental Protection

Water Quality Restoration Program

Everglades West Coast (EWC) Basin Management Action Plan Annual Meeting

February 22, 2017

Sara Davis, Basin Coordinator





Agenda

- Overview of the 2016 EWC BMAP Annual Progress Report.
- Activities during the reporting period.
- Monitoring program update.
- Next steps.
- Comments.



Florida Department of Environmental Protection

Overview of the EWC BMAP 2016 Annual Progress Report





2016 EWC Annual Report

- Total Maximum Daily Load (TMDL) adopted in 2008.
 - Total nitrogen (TN) reductions.
 - Dissolved oxygen (DO) impairments.
- Basin management action plan (BMAP) adopted in 2012.
- Fourth annual report compiled.
- Reporting period: December 2015 – November 2016

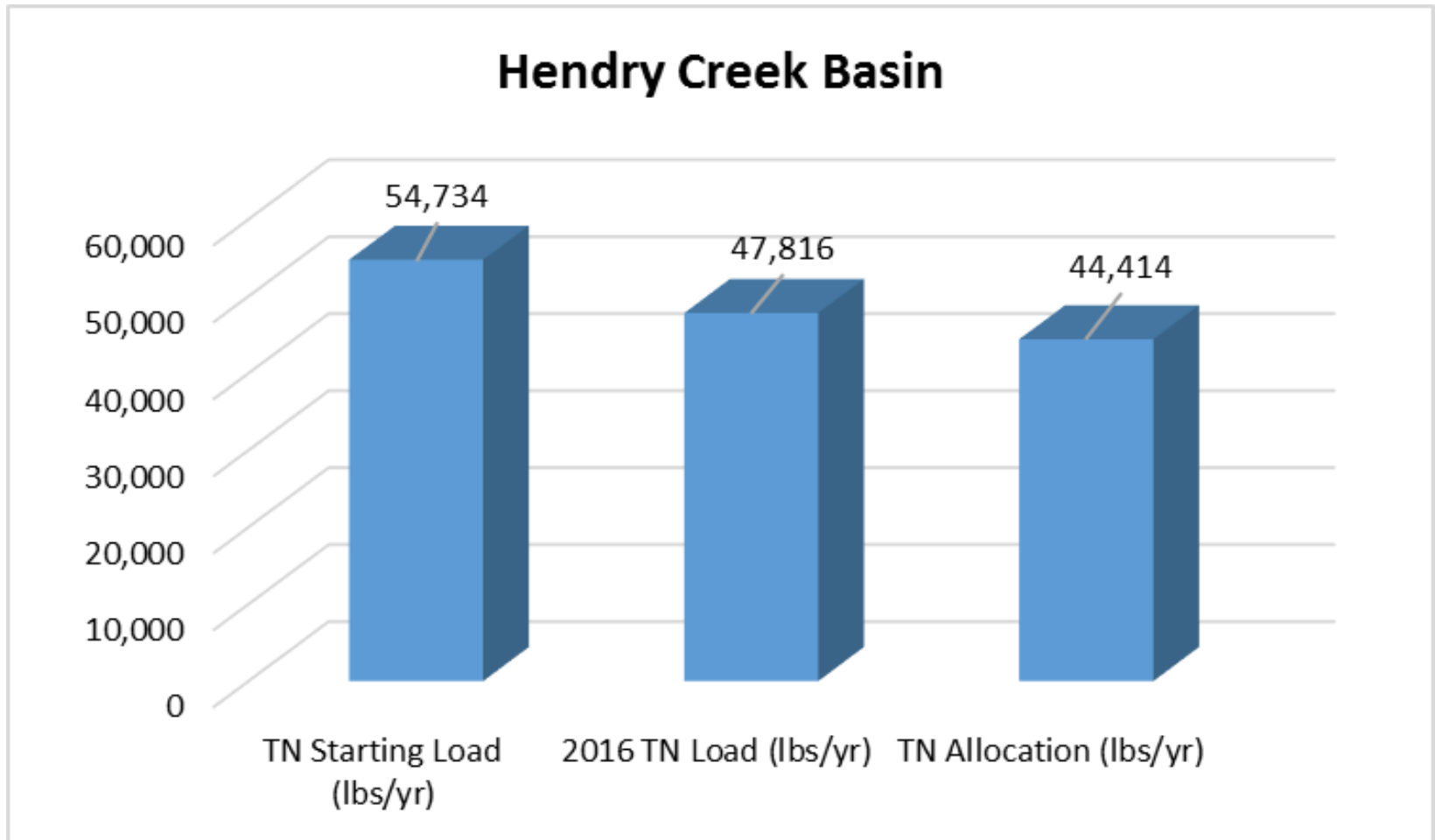


Reductions Achieved

- For Hendry Creek, 67 % of the necessary TN reductions have been achieved.
- For Imperial River, 26 % of the necessary TN reductions have been achieved.



Hendry Creek Progress Toward the TN TMDL





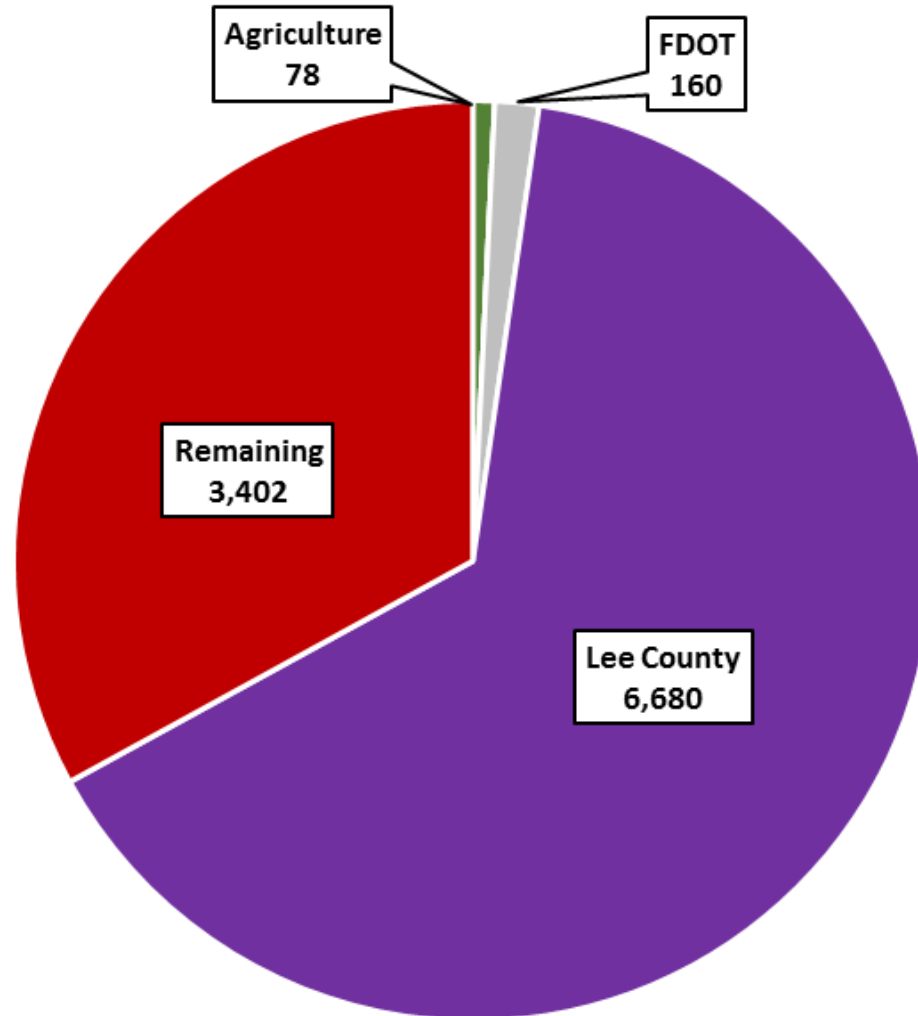
Hendry Creek Progress Toward the TN TMDL

Lead Entity	TN Allocation (lbs/yr)	TN Reduction to date (lbs/yr)	Percent of Allocation Achieved
Agriculture	173	78	45 %
FDOT	63	160	254 %
Lee County	10,084	6,680	66 %
Total	10,320	6,918	67 %



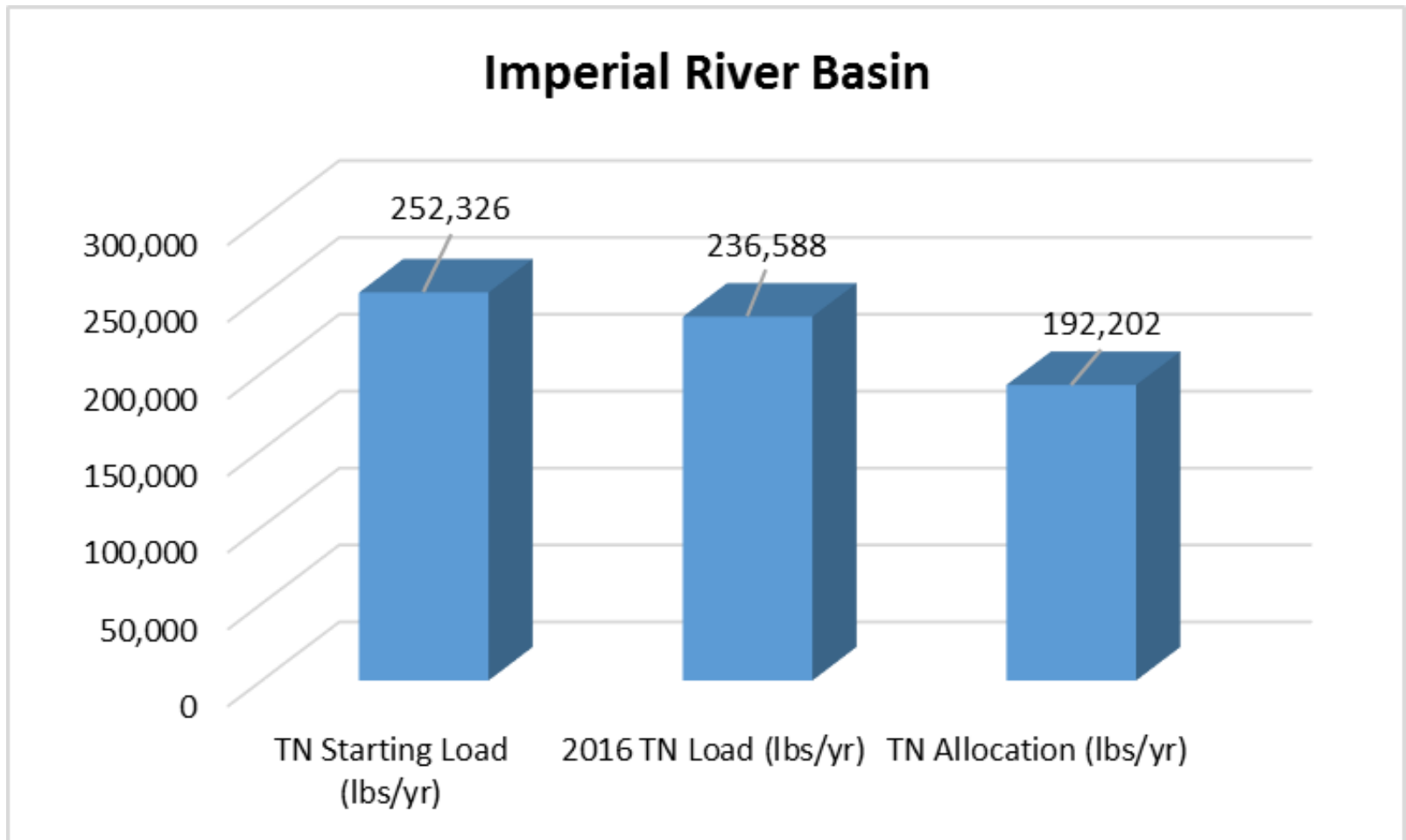
Hendry Creek Progress Toward the TN TMDL

TN Reductions
(lbs/yr)
including
completed
and submitted
projects.





Imperial River Progress Toward the TN TMDL





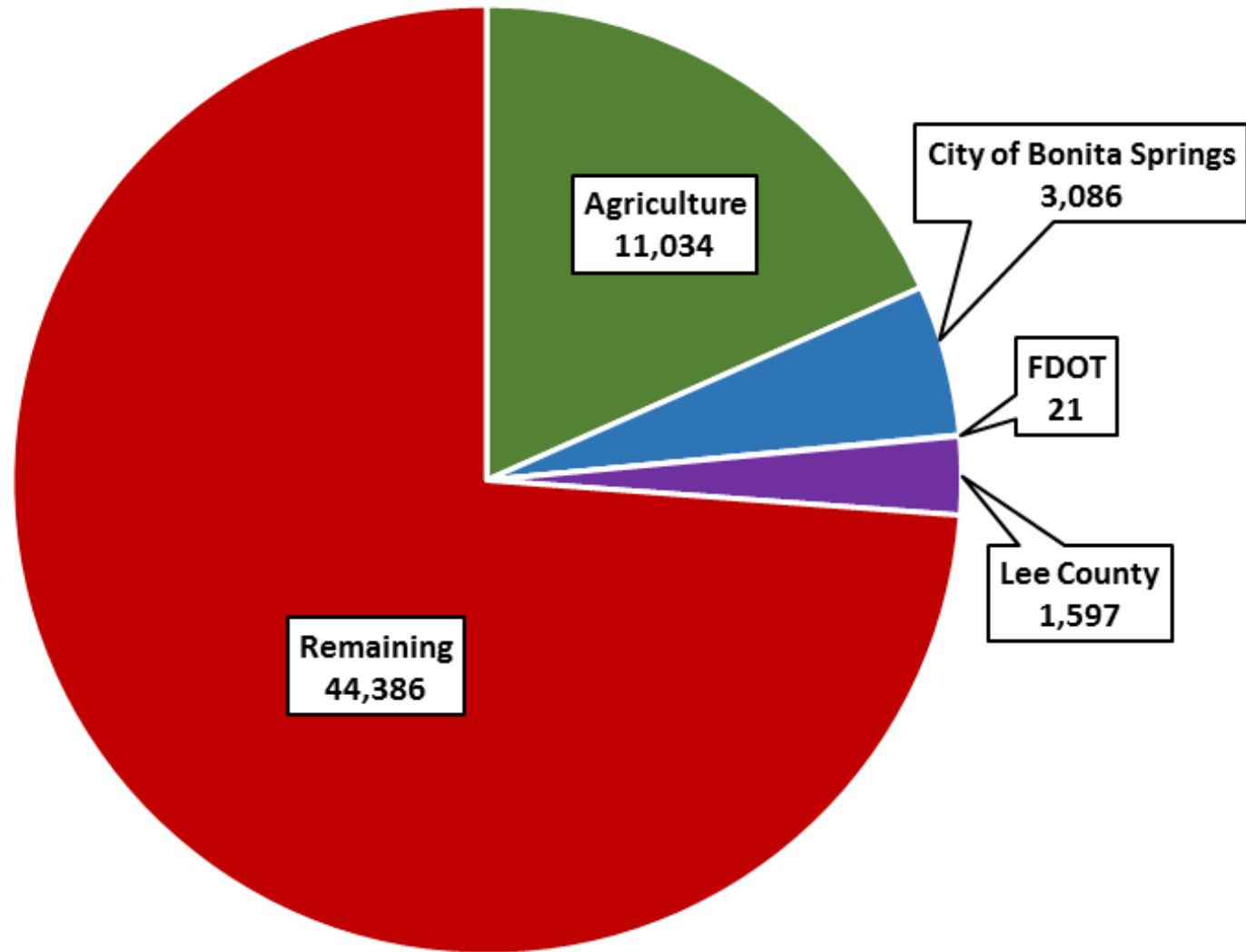
Imperial River Progress Toward the TN TMDL

Lead Entity	TN Allocation (lbs/yr)	TN Reduction to date (lbs/yr)	Percent of Allocation Achieved
Agriculture	48,570	11,034	23 %
Bonita Springs	9,903	3,086	31 %
FDOT	95	21	22 %
Lee County	1,556	1,597	103 %
Total	60,124	15,738	26 %



Imperial River Progress Toward the TN TMDL

TN Reductions
(lbs/yr)
including
completed
and submitted
projects.





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Hendry Creek Activities During the Reporting Period





2016 Activities

- Various ongoing efforts continue:
 - Public education.
 - Street sweeping and maintenance.
 - Local ordinances for source control.
 - Agricultural producers are required to enroll in best management practices (BMPs) or conduct monitoring.



2016 Activities (continued)

“Fertilize Smart” Billboard in Lee County

(Gladiolus Drive, 0.1
mile west of US 41)





2016 Activities (continued)

Lakes Park Filter Marsh in Lee County





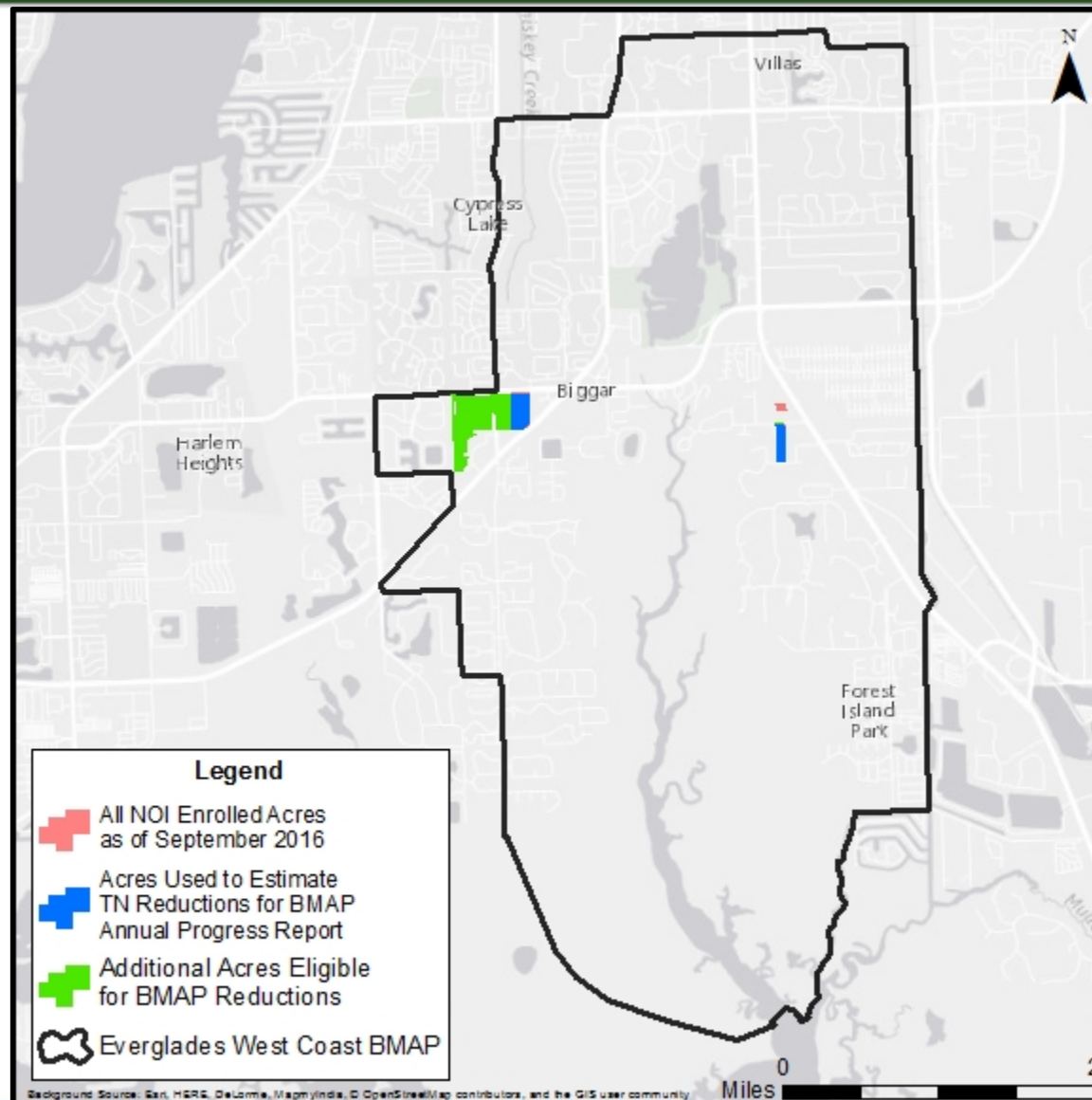
Hendry Creek Agricultural Lands Enrollment

Category	Acres
Total Agricultural Acres in BMAP	98
FDACS Adjusted Agricultural Acres in BMAP	91
BMAP Phase I FDACS Enrollment Goal (50%)	45
Enrolled Acres Used for TN Reduction Estimates	27
BMAP Phase I remaining acres to enroll	18
Total Remaining Acres To Enroll	71

Estimated TN Reduction: 78 lbs/yr



Hendry Creek Agricultural Lands Enrollment





Florida Department of Environmental Protection

Imperial River Activities During the Reporting Period





2016 Activities

- City of Bonita Springs
 - Downtown redevelopment drainage project (BS-11).
 - Septic system removal (BS-12).
 - Increased street sweeping (BS-8).
- Agriculture
 - Increased enrollments.
- Various ongoing efforts continue
 - Public education.
 - Street sweeping and maintenance.
 - Local ordinances for source control.



2016 Activities (continued)

**Lee County, City of
Bonita Springs**

WETPLAN Workshop
advertisement in
Florida Weekly
(week of March 2-8,
2016)



The advertisement is set against a background image of a pond with a concrete walkway and some reeds. It features a green leaf logo with a blue circle around it, the text "WETPLAN", and two websites: www.wetplan.org and www.FNPSCoccoloba.org. A yellow oval in the top right corner says "FREE Workshop". The main headline is "Does Your Pond Need Help?". The event details are: "Tuesday, March 8, 1-4pm", "Bonita Springs City Hall", "9101 Bonita Beach Road", "Bonita Springs, FL 34135". At the bottom right are two logos: "Charlotte Harbor National Estuary Program" and "City of Bonita Springs Florida".

FREE Workshop

WETPLAN
www.wetplan.org
www.FNPSCoccoloba.org

Does Your Pond Need Help?

Tuesday, March 8, 1-4pm
Bonita Springs City Hall
9101 Bonita Beach Road
Bonita Springs, FL 34135

Charlotte Harbor
National Estuary Program

City of Bonita Springs
Florida



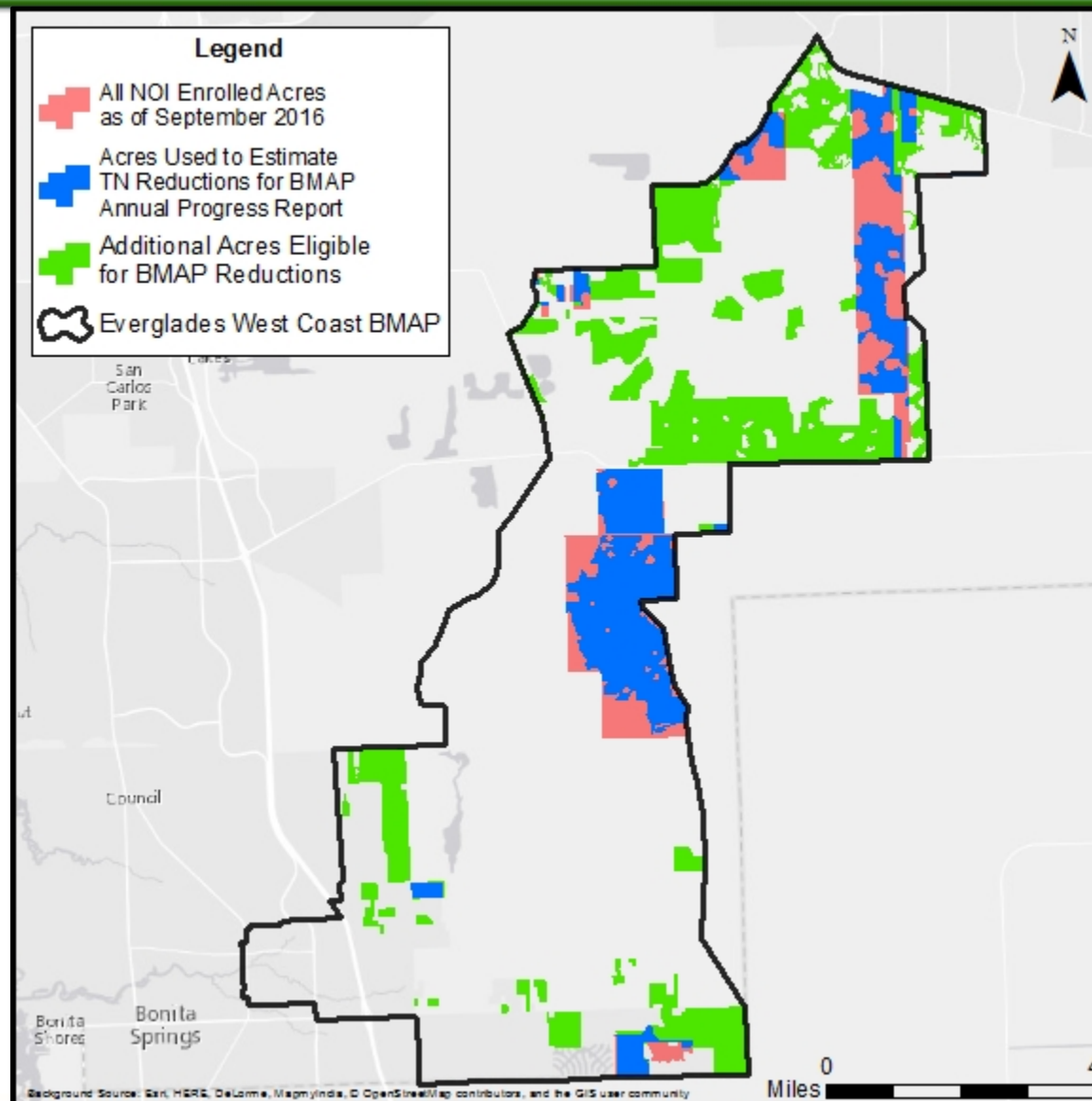
Imperial River Agricultural Lands Enrollment

Category	Acres
Total Agricultural Acres in BMAP	11,605
FDACS-Adjusted Acres for Enrollment	6,586
BMAP Phase I FDACS Enrollment Goal (50%)	3,293
Enrolled Acres Used for TN Reduction Calculation	4,466
BMAP Phase I Remaining Acres to Enroll	0
Total Remaining Acres to Enroll	2,120

Estimated TN Reduction: 11,034 lbs/yr



Imperial River Agricultural Lands Enrollment





Summary of Imperial River Reductions in Reporting Period

December 2015 to November 2016

Entity	Project Number	Project Name	TN Reduction (lbs/yr)
City of Bonita Springs	BS-11	Downtown Redevelopment Drainage Project	To be Determined
City of Bonita Springs	BS-12	Septic System Removal	912
		Total Reductions in Reporting Period	912



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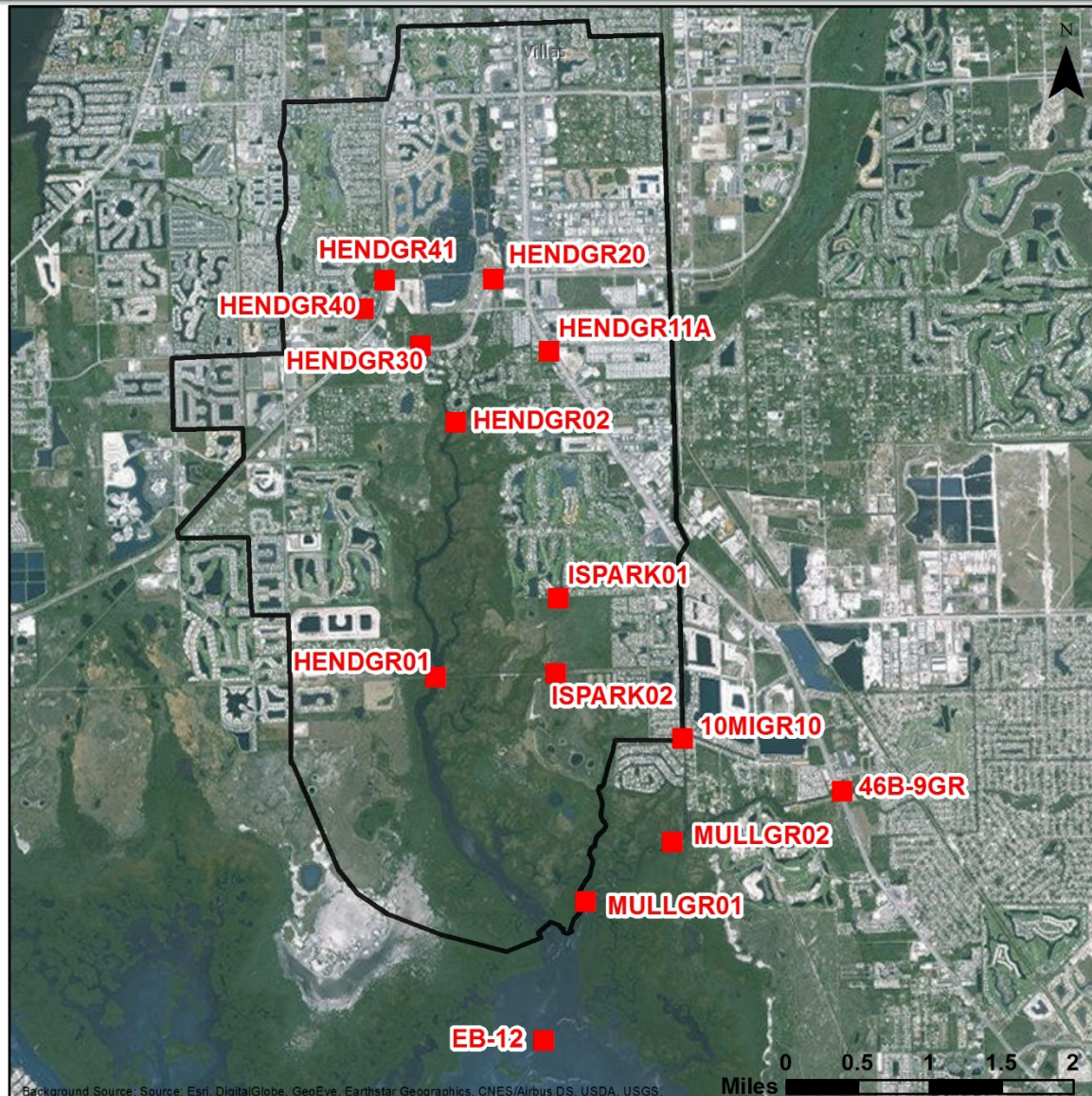
Monitoring Program Update





Monitoring – Hendry Creek

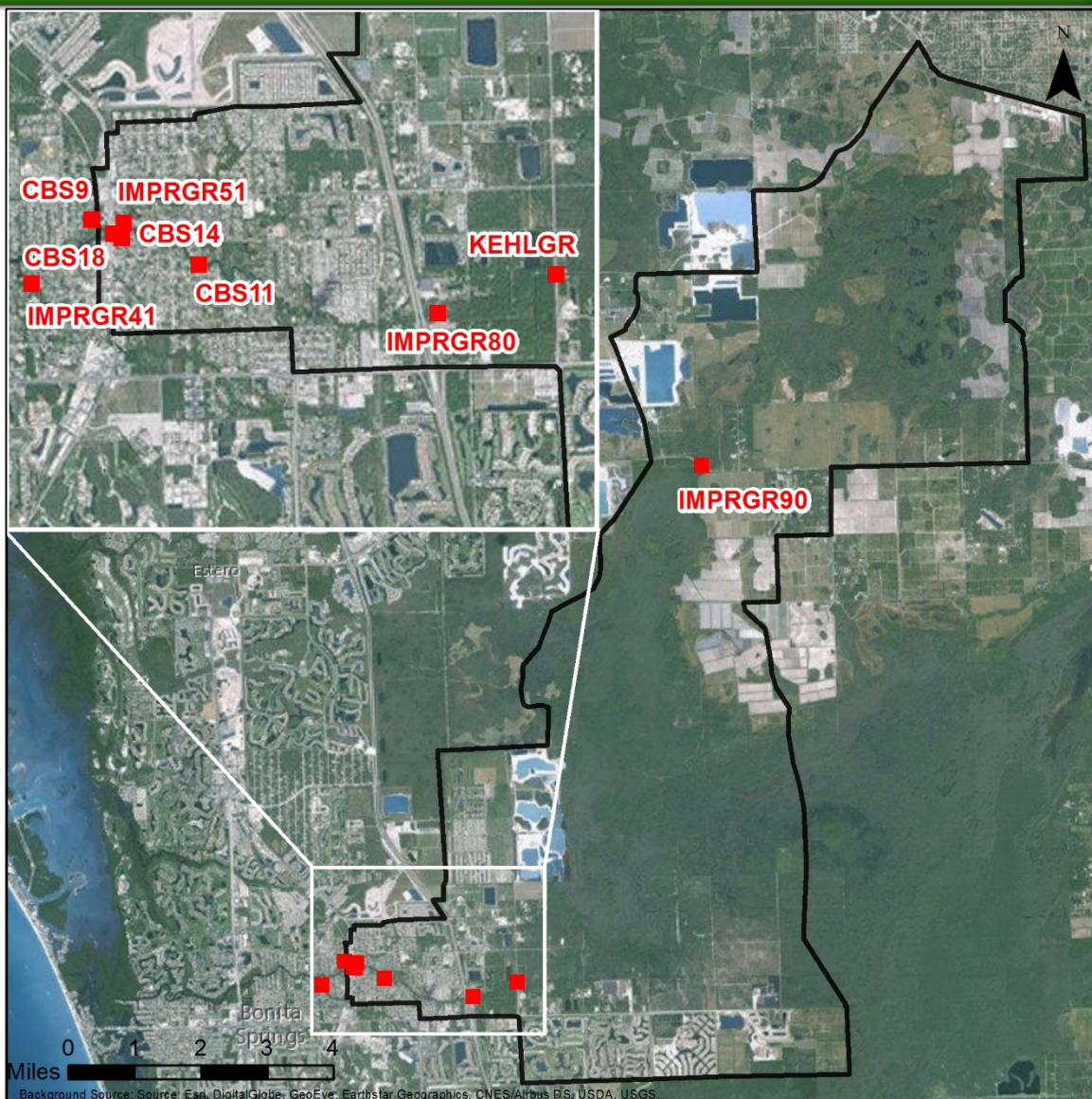
- Hendry Creek water quality monitoring is being conducted by:
 - Lee County.
 - DEP-South Regional Operations Center (ROC).





Monitoring – Imperial River

- Imperial River water quality monitoring is being conducted by:
 - City of Bonita Springs.
 - Lee County.
 - DEP-South ROC.





Water Quality (WQ) Analyses

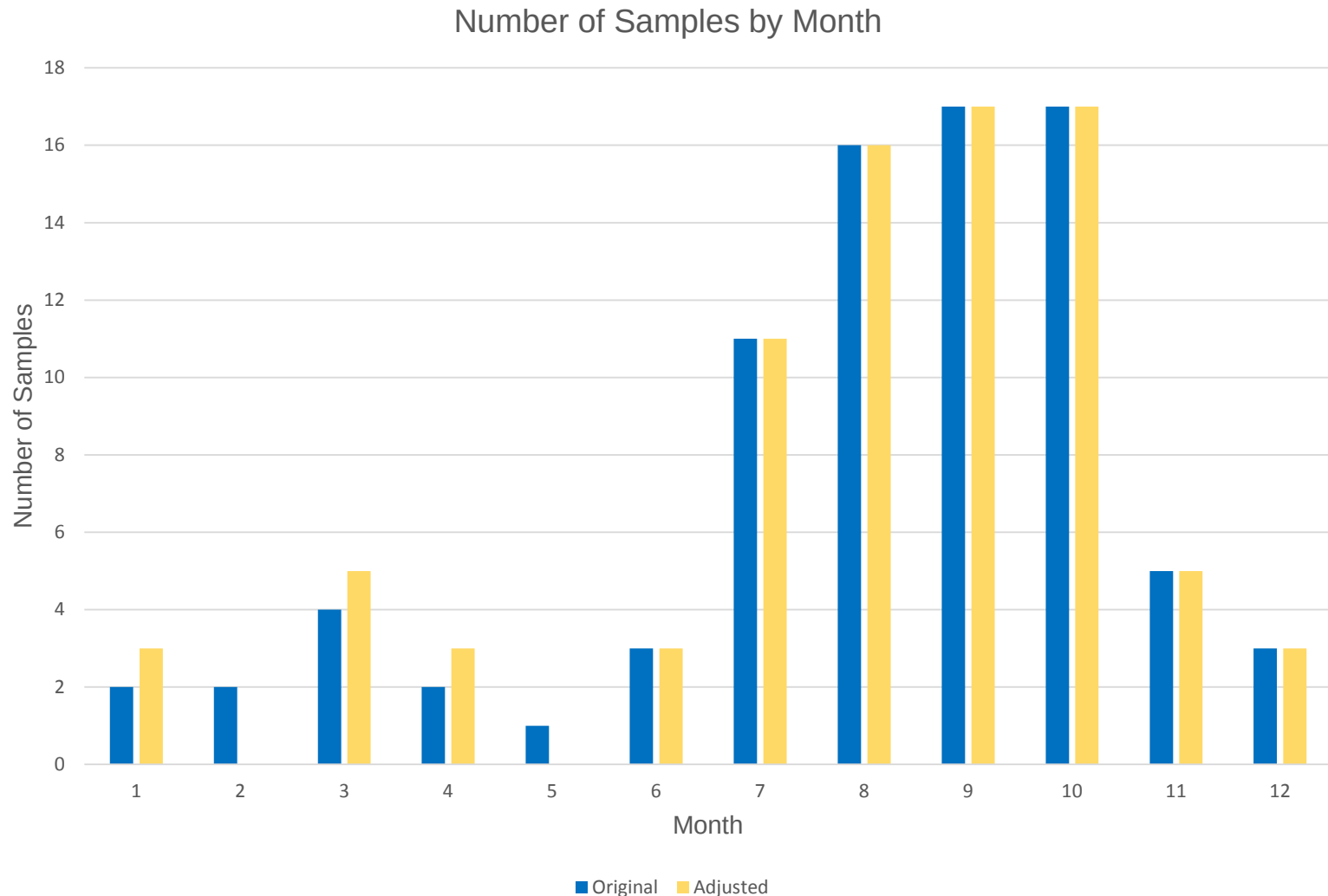
Trend Analysis Methods

- Seasonal Mann-Kendall trend analysis
 - Individual stations using original frequency and incorporating season (attributed to the month that the sample was collected) as a factor.
- Regional Mann-Kendall trend analysis
 - Aggregate stations into Hendry Creek or Imperial River as regions using original frequency with region as a factor.
 - Hendry Creek or Imperial River as regions using data aggregated into annual geometric means (AGMs) and then analyzed with region as a factor.
 - Both Calendar Year and Water Year were used for AGM analysis.



Data Distribution to Assess Seasonal Variation

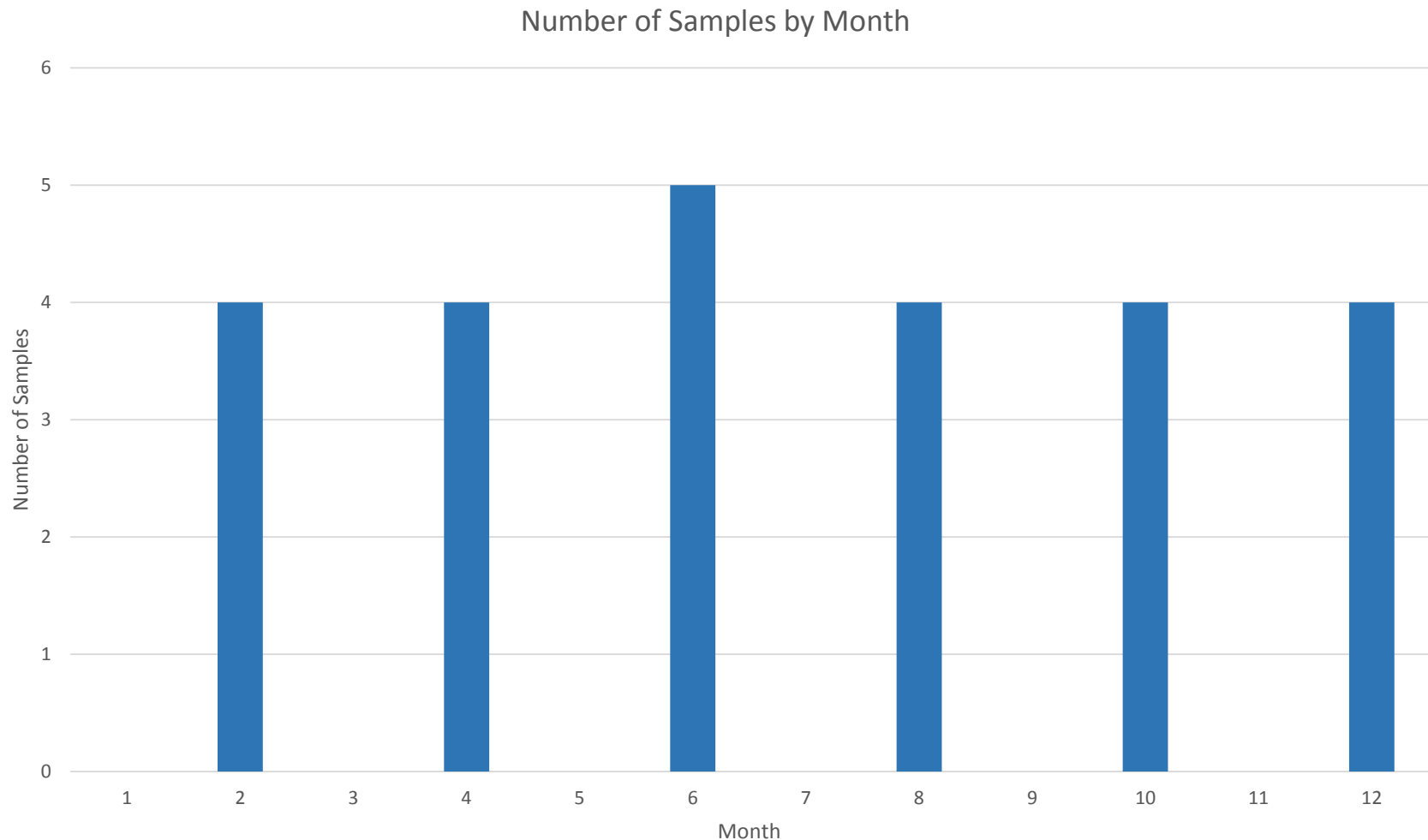
Example of Uneven Distribution of Samples per Season (Month)





Data Distribution to Assess Seasonal Variation

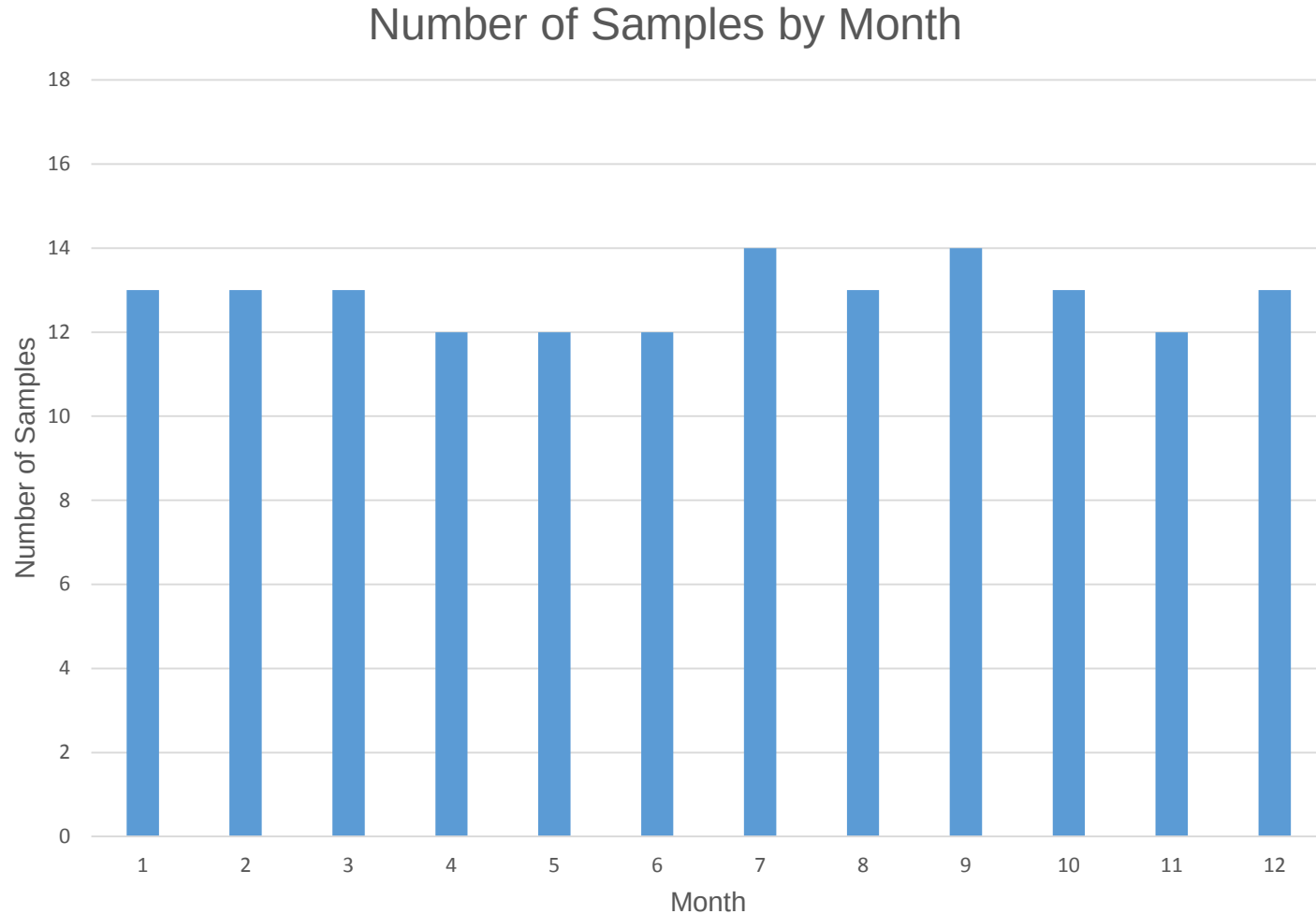
Example of Even Distribution of Samples per Season (Month)





Data Distribution to Assess Seasonal Variation

Example of Even Distribution of Samples per Season (Month)





Hendry Creek Data Availability

Agency	Station	Tier	Period of Record
FDEP & Lee County	HENDGR01**	1	6/10/2010–2/16/2016
FDEP & Lee County	HENDGR02**	1	3/4/2003–2/16/2016
Lee County	HENDGR11A	1	7/22/2008–3/21/2016
Lee County	HENDGR30	1	1/13/2000–3/21/2016
Lee County	HENDGR40	1	8/14/2007–3/21/2016
Lee County	HENDGR41	1	10/19/2011–3/21/2016

** Stations will continue to only be sampled every other month.



Seasonal Trend Analysis Results – Hendry Creek



Seasonal Mann-Kendall Trend Analysis Results - Hendry

WBID	Station	Parameter	POR Start	POR End	N (# of Samples)	Tau	P-value	Slope	Trend Test Interpretation
3258B2	HENDGR01	TN (mg/L)	6/10/2010	2/16/2016	25	-0.150	0.5115	-0.000054	No significant trend
3258I	HENDGR02	TN (mg/L)	3/4/2003	2/16/2016	115	0.185	0.0210	0.000062	Increasing trend
3258B2	HENDGR11A	TN (mg/L)	7/22/2008	3/21/2016	64	-0.165	0.1605	-0.000107	No significant trend
3258B4	HENDGR30	TN (mg/L)	1/13/2000	3/21/2016	202	0.151	0.0036	0.000047	Increasing trend
3258B2	HENDGR40	TN (mg/L)	8/14/2007	3/21/2016	102	-0.117	0.1443	-0.000065	No significant trend
3258X	HENDGR41	TN (mg/L)	10/19/2011	3/21/2016	52	-0.261	0.0546	-0.000175	No significant trend

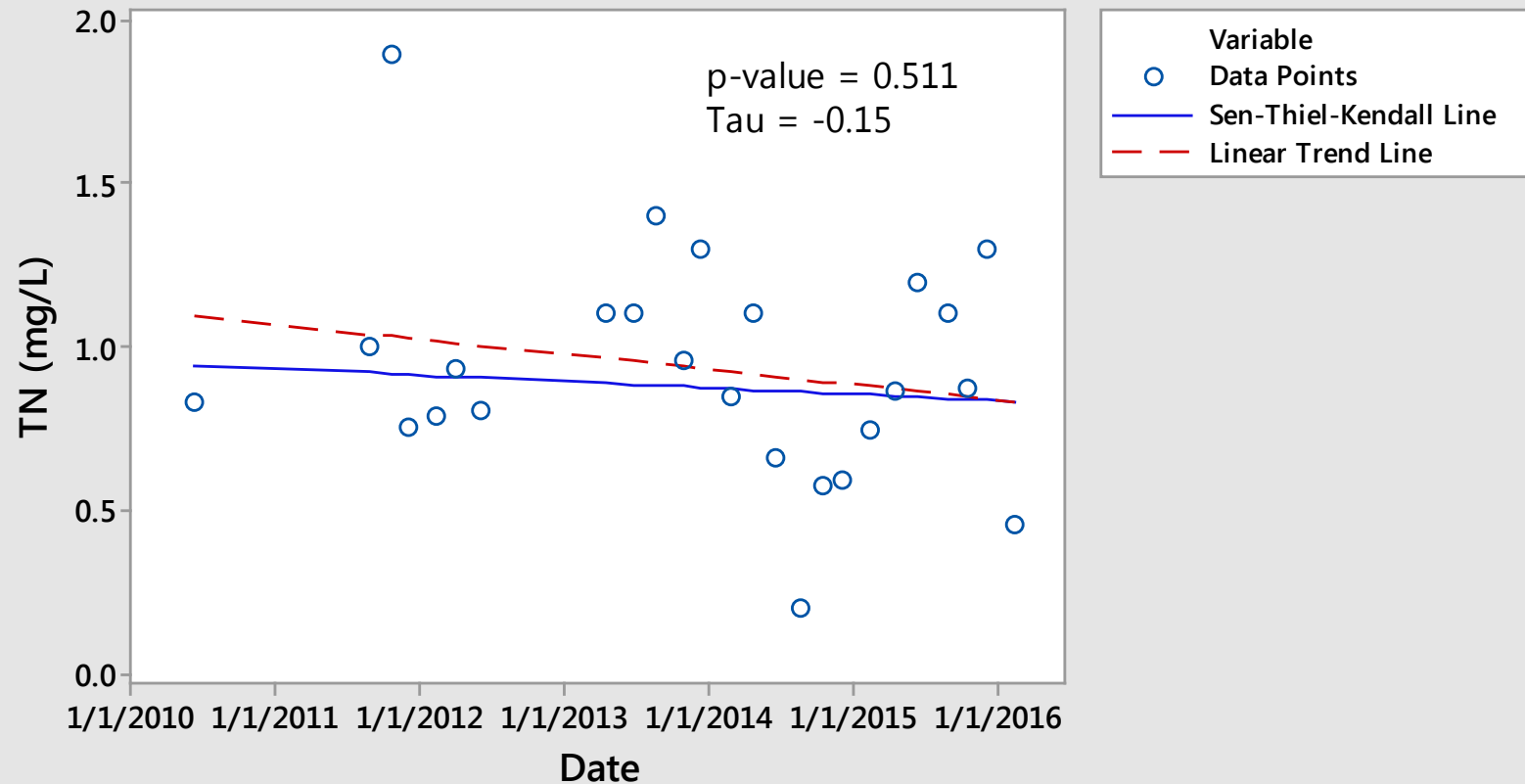
Note: Bolded P-values indicate statistical significance ($p < 0.05$).



WBID 3258B2 / Station HENDGR01

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station HENDGR01 Total Nitrogen (TN)

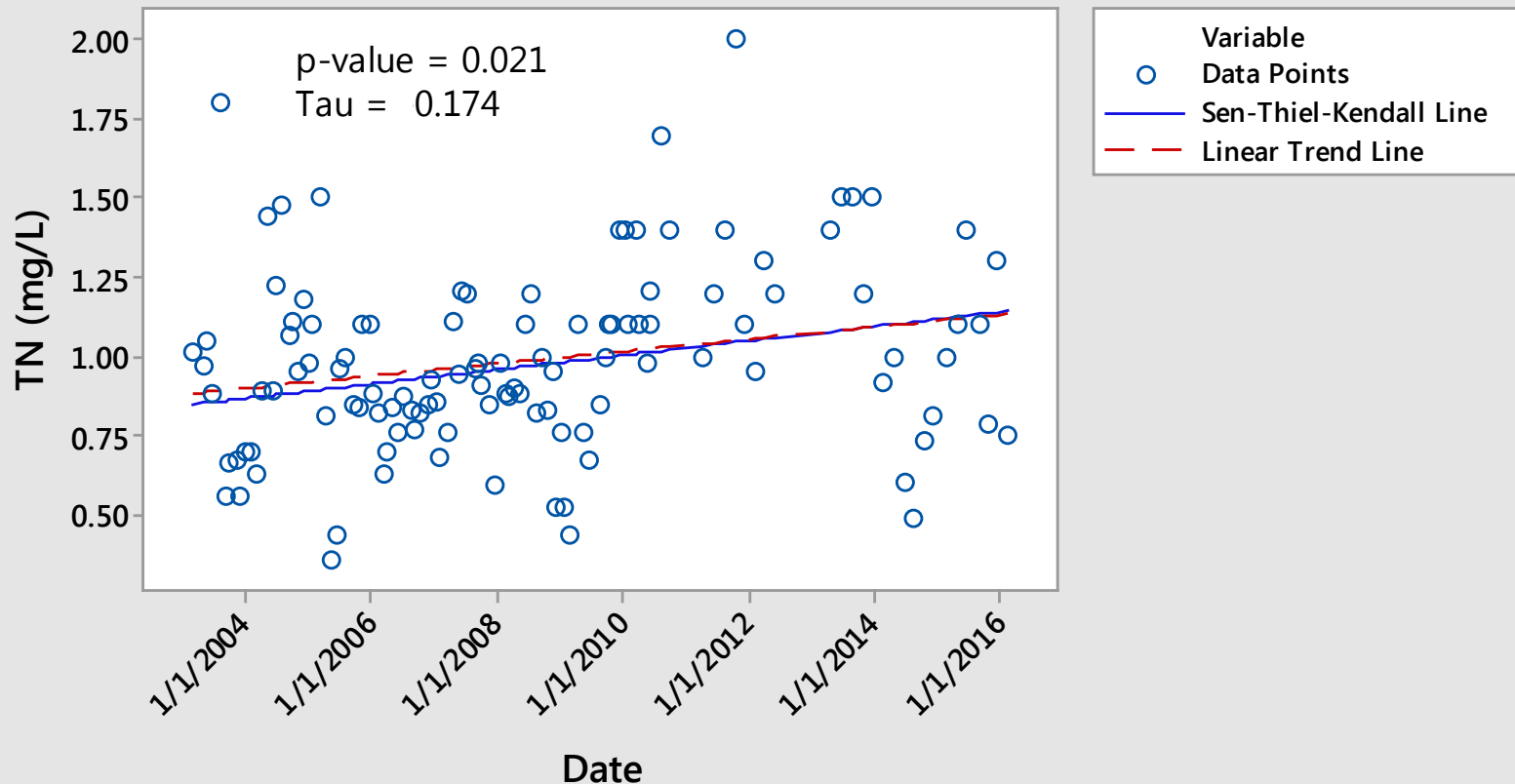




WBID 3258I / Station HENDGR02

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station HENDGR02 Total Nitrogen (TN)

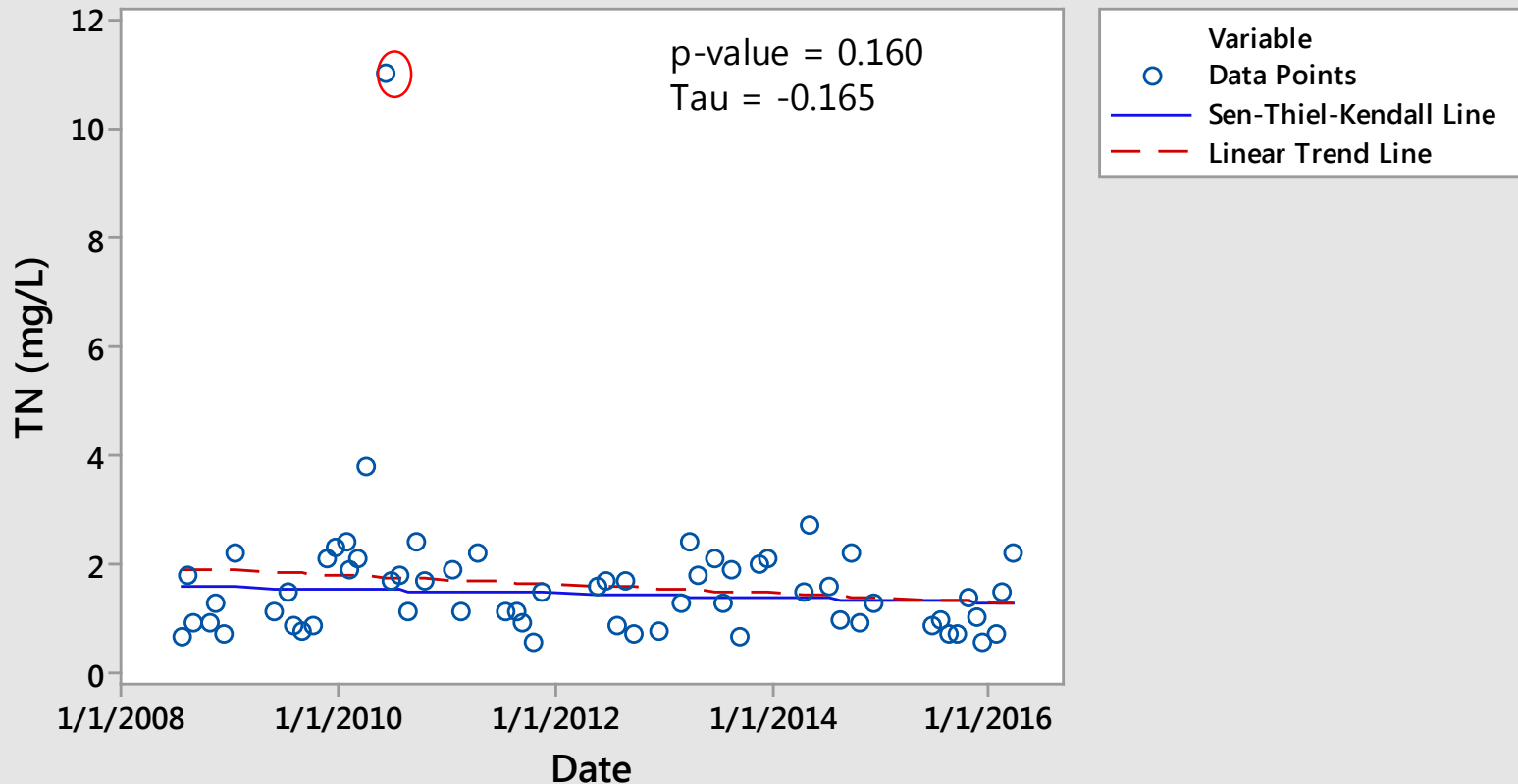




WBID 3258B2 / Station HENDGR11A

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station HENDGR11A Total Nitrogen (TN)

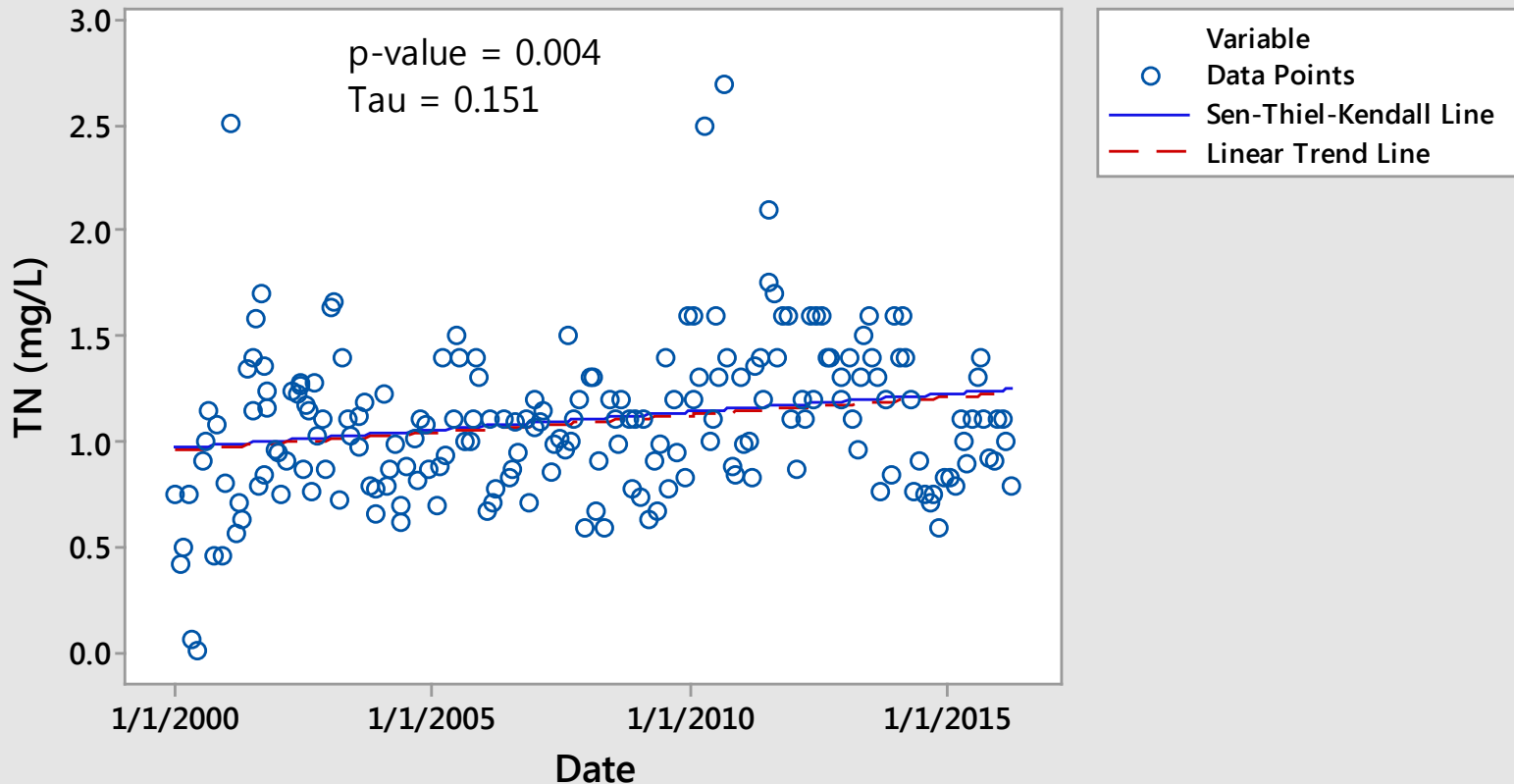




WBID 3258B2 / Station HENDGR30

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station HENDGR30 Total Nitrogen (TN)





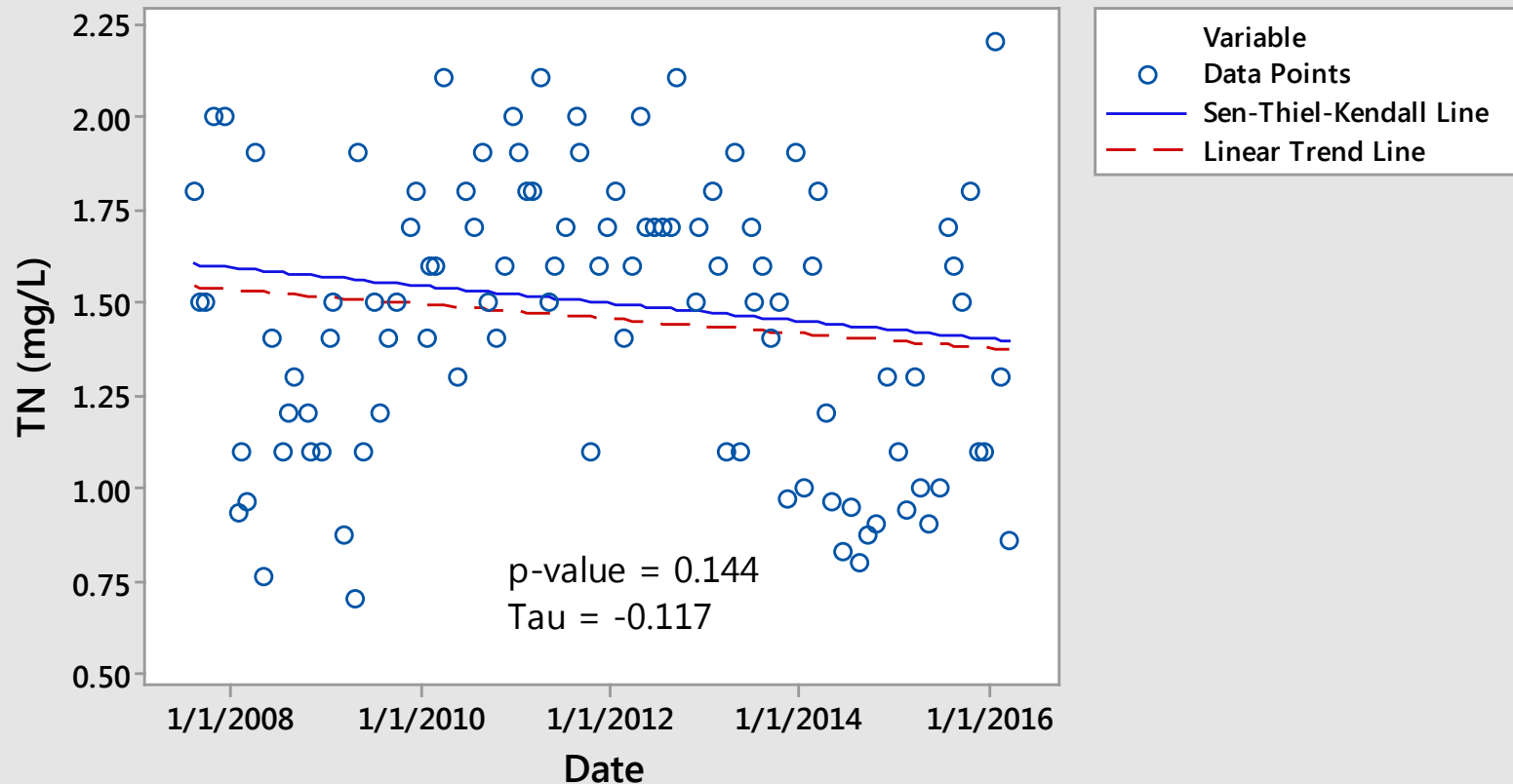
WBID 3258B2 / Station HENDGR40

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis

Station HENDGR40

Total Nitrogen (TN)





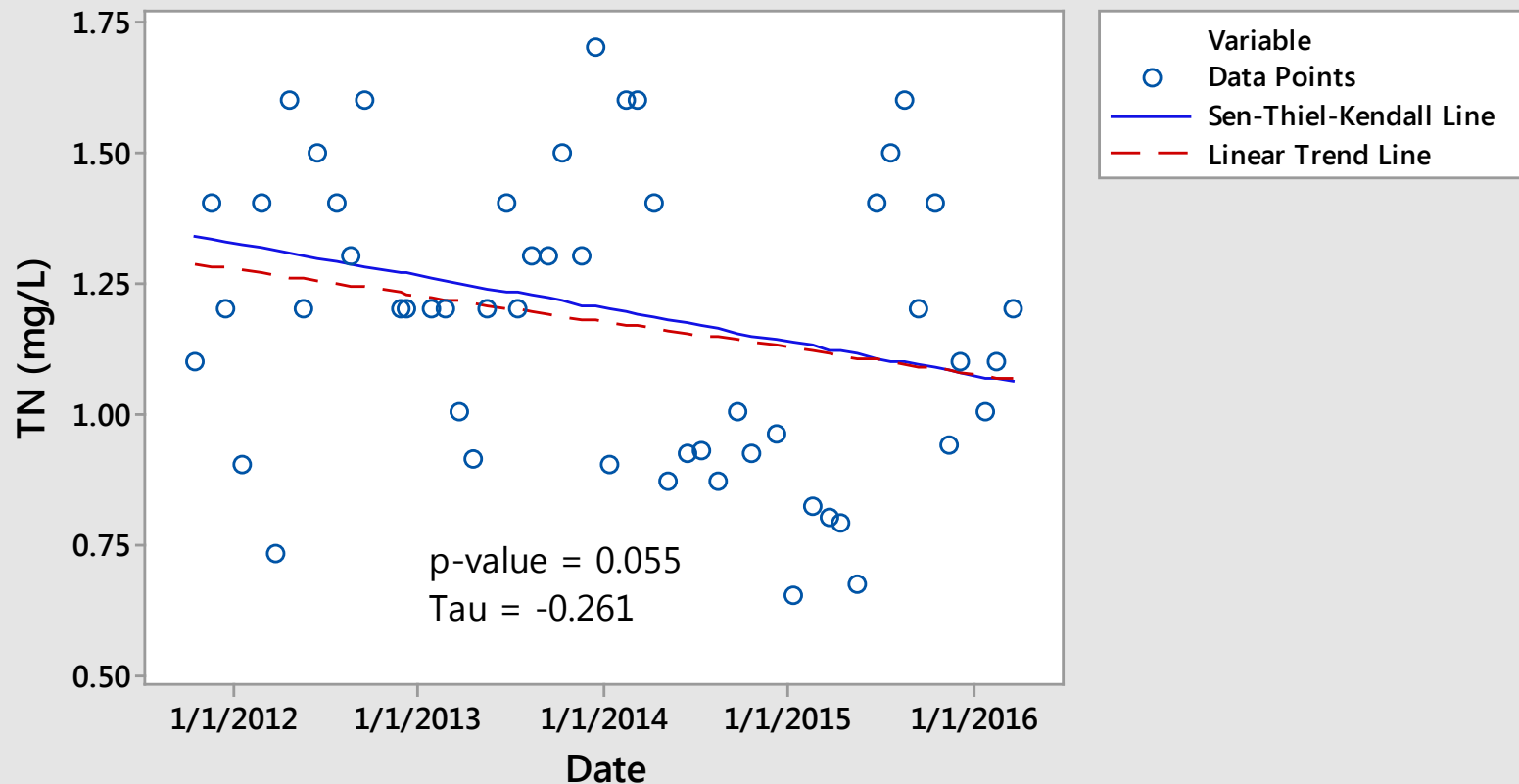
WBID 3258X / Station HENDGR41

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis

Station HENDGR41

Total Nitrogen (TN)

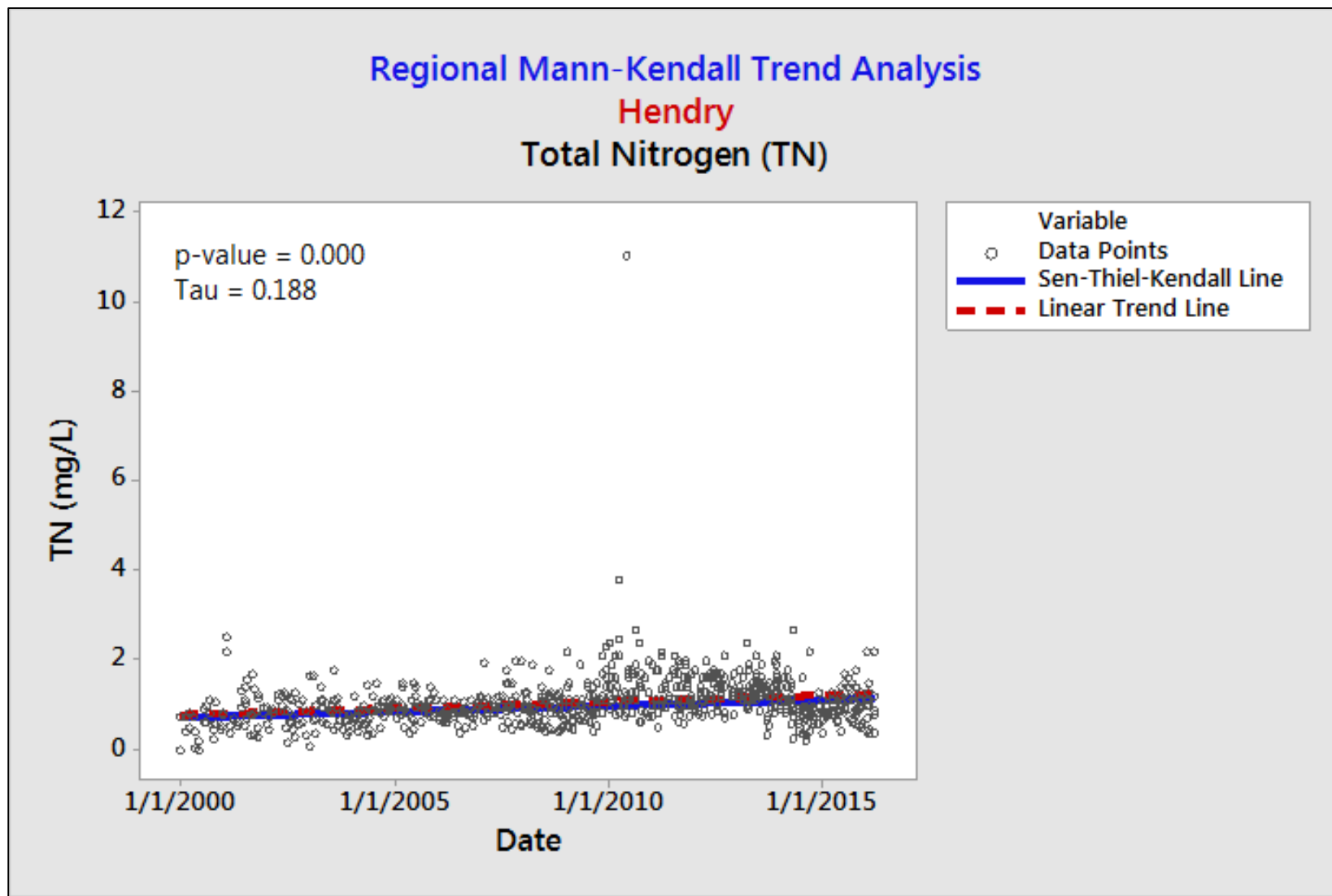




Regional Trend Analysis Results – Hendry Creek



Total Nitrogen Regional Trend Analysis (Hendry all points)



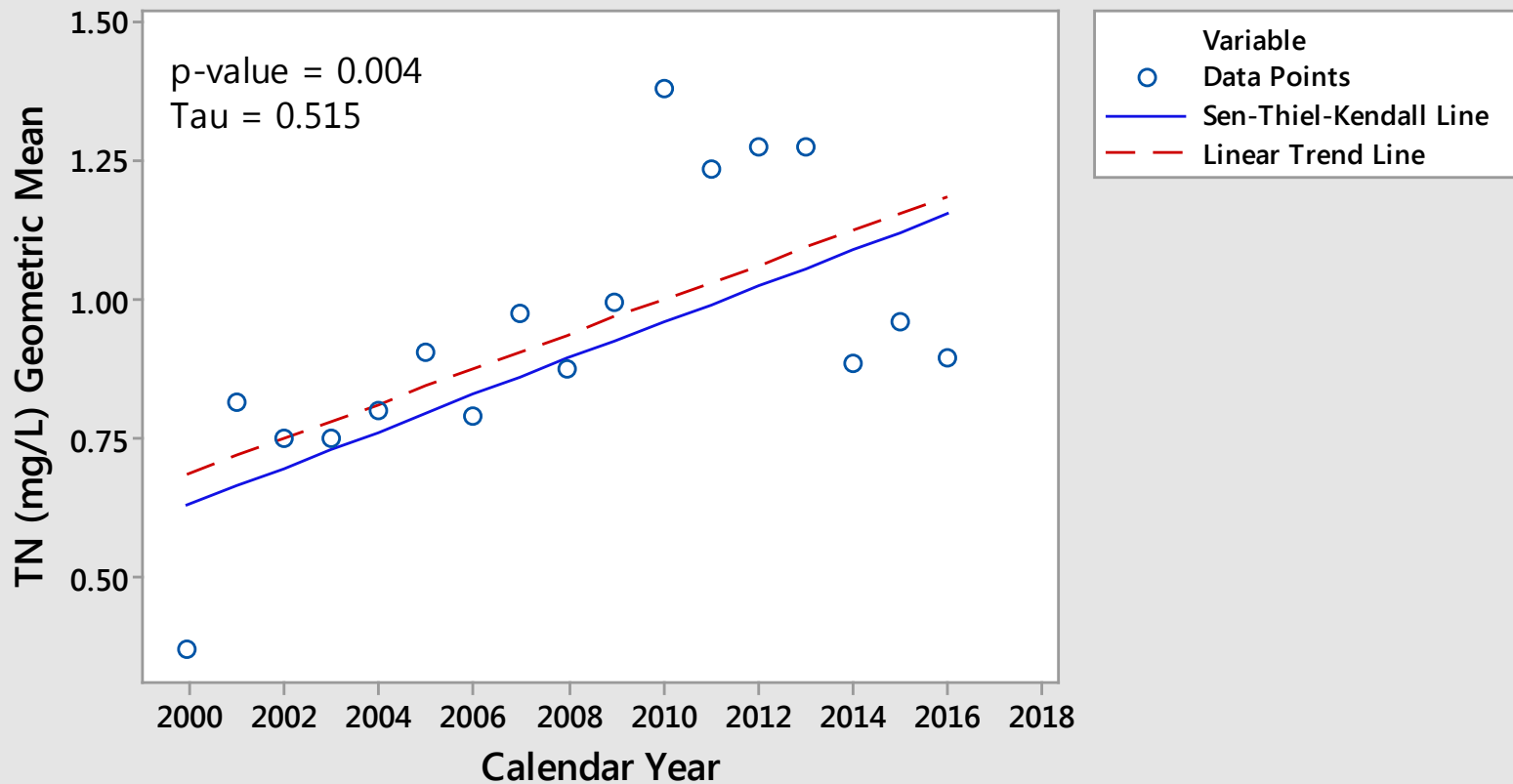


Total Nitrogen Regional Trend Analysis (CY AGM) - Hendry

Regional Mann-Kendall Trend Analysis

Hendry

Total Nitrogen (TN)



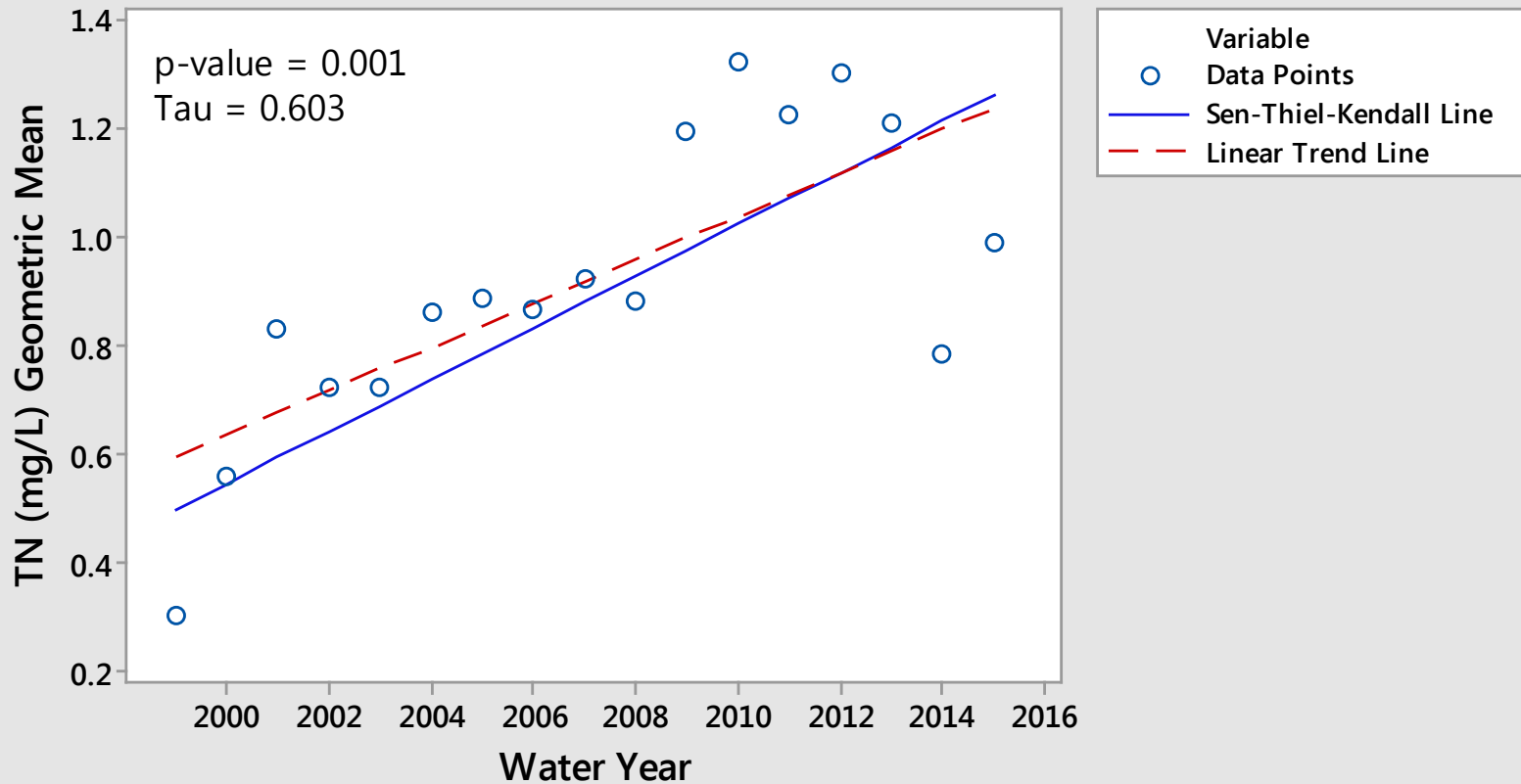


Total Nitrogen Regional Trend Analysis (WY AGM) - Hendry

Regional Mann-Kendall Trend Analysis

Hendry

Total Nitrogen (TN)





Regional Mann-Kendall Trend Analysis Results - Hendry

Data Type	Period	Parameter	POR Start	POR End	Number of Samples	Tau	P-value	Slope	Trend Test Interpretation
All Points	Varying Frequencies	TN (mg/L)	1/13/2000	3/21/2016	759	0.188	<0.00001	0.000071	Increasing trend overall
Geometric Mean	Calendar Year	TN (mg/L)	1/13/2000	3/21/2016	17	0.515	0.0045	0.032702	Increasing trend overall
Geometric Mean	Water Year	TN (mg/L)	1/13/2000	3/21/2016	17	0.603	0.0008	0.047761	Increasing trend overall



Imperial River Data Availability

Basin	Station	Tier	Period of Record
Lee County	IMPRGR80	1	1/15/2004–3/10/2016
Bonita Springs	CBS 11	1	8/18/2009–3/17/2016
Bonita Springs	CBS 18	1	10/26/2011–3/17/2016
Lee County	IMPRGR51	1	10/12/2011–3/10/2016
Lee County	IMPRGR90**	1	8/30/2000–3/7/2016

** Stations will continue to only be sampled every other month.



Seasonal Trend Analysis Results – Imperial River



Seasonal Mann-Kendall Trend Analysis Results - Imperial

WBID	Station	Parameter	POR Start	POR End	N (# of Samples)	Tau	P-value	Slope	Trend Test Interpretation
3258EA	IMPRGR51	TN (mg/L)	10/12/2011	3/10/2016	53	-0.413	0.0016	-0.000385	Decreasing trend
3258EA	IMPRGR80	TN (mg/L)	1/15/2004	3/10/2016	147	0.305	<0.00001	0.000154	Increasing trend
3258EA	IMPRGR90	TN (mg/L)	8/30/2000	3/7/2016	83	0.317	0.0005	0.000126	Increasing trend
3258EA	CBS 11	TN (mg/L)	8/18/2009	3/17/2016	67	0.261	0.0188	0.000052	Increasing trend
3258EA	CBS 18	TN (mg/L)	10/26/2011	3/17/2016	41	0.379	0.0214	0.000089	Increasing trend

Note: Bolded P-values indicate statistical significance ($p < 0.05$).

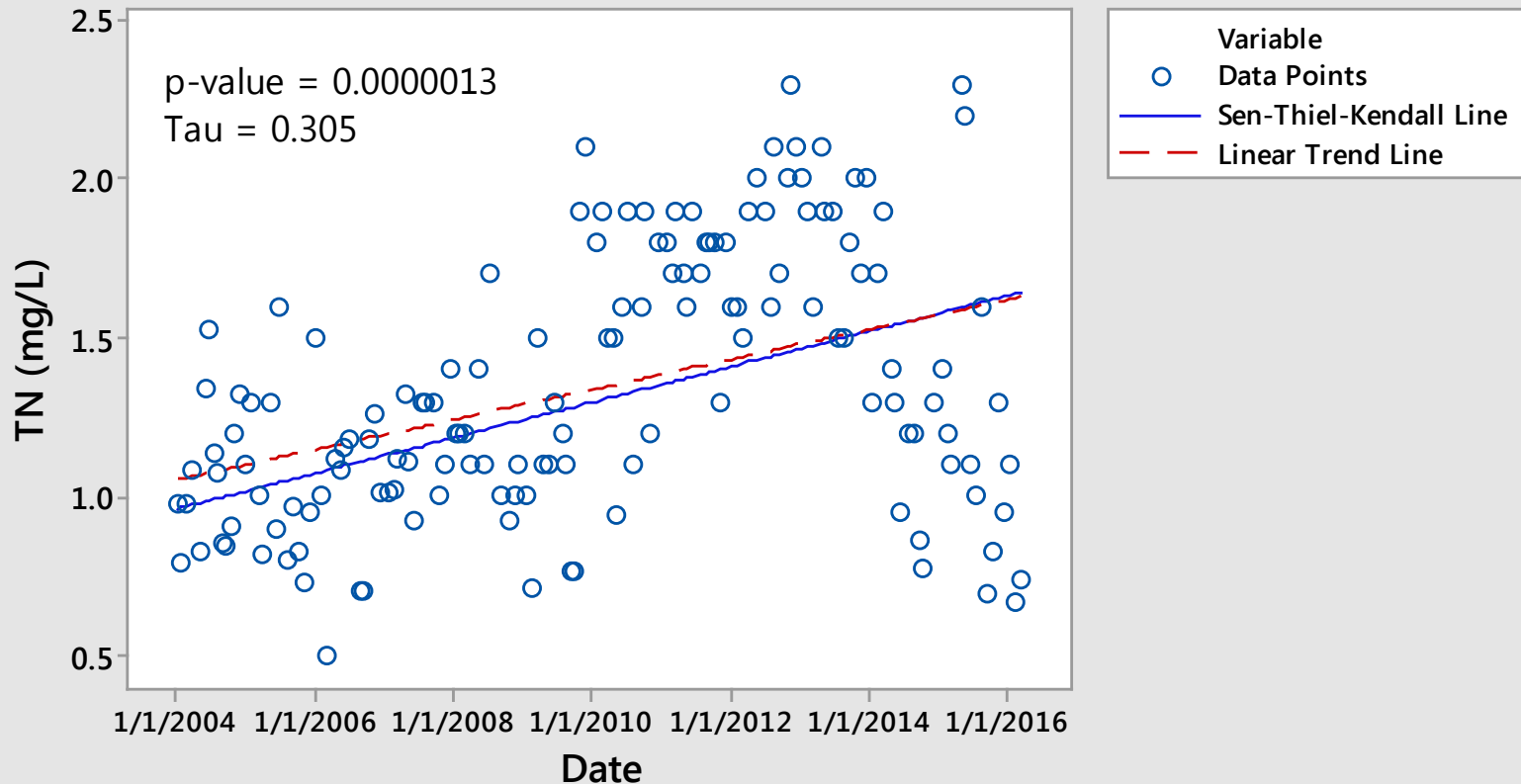




WBID 3258EA / Station IMPRGR80

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station IMPRGR80 Total Nitrogen (TN)

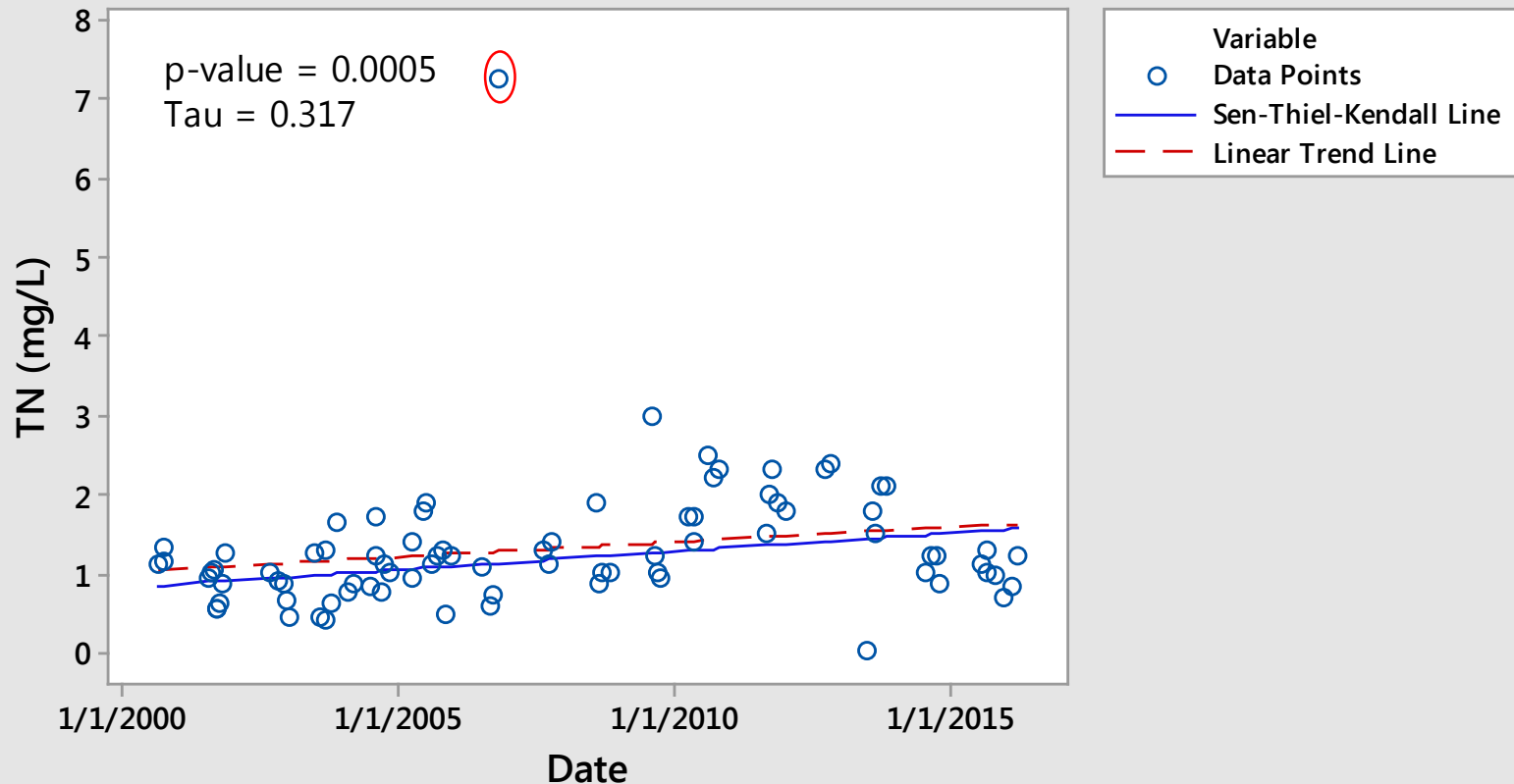




WBID 3258EA / Station IMPRGR90

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis Station IMPRGR90 Total Nitrogen (TN)





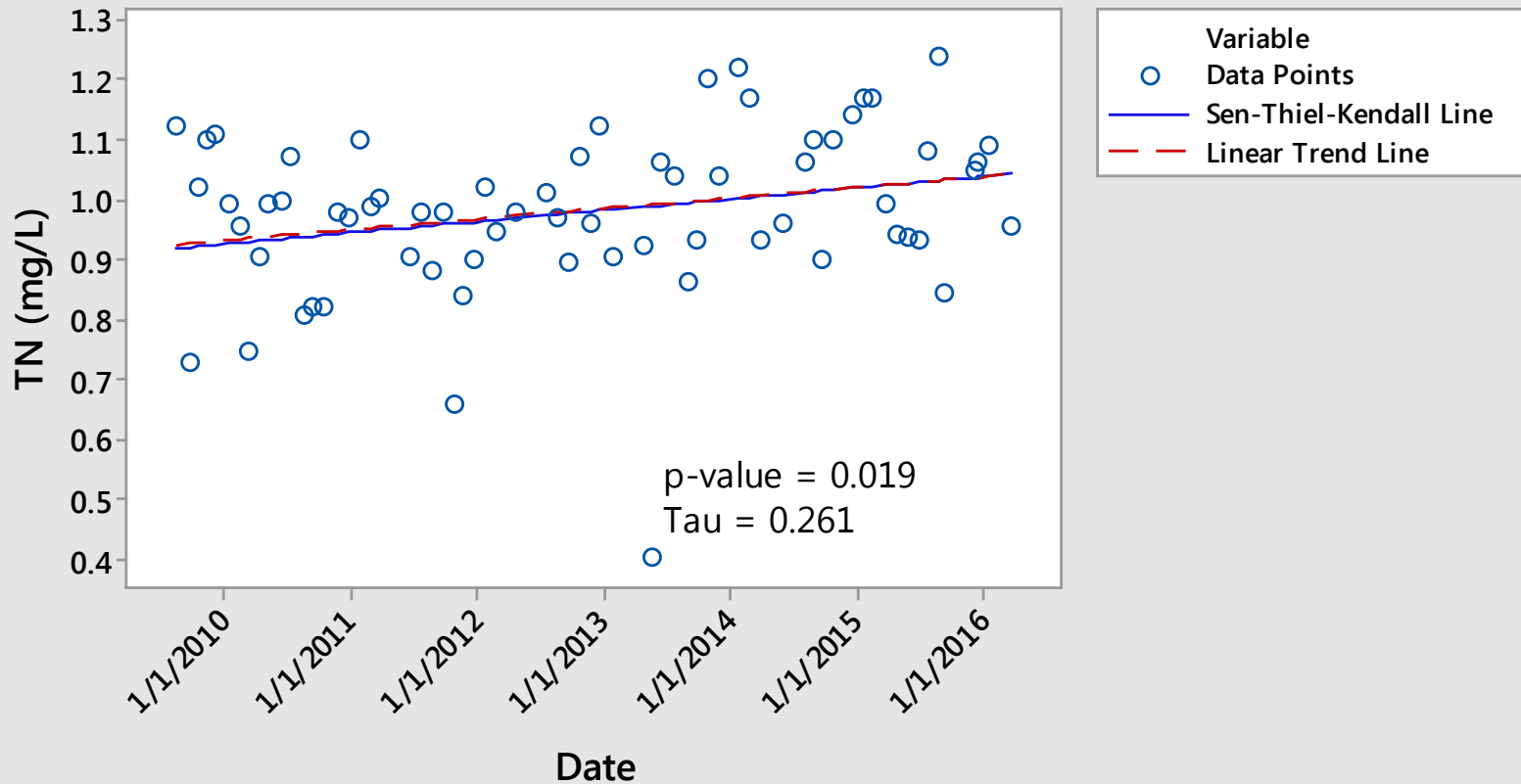
WBID 3258EA / Station CBS 11

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis

Station CBS 11

Total Nitrogen (TN)





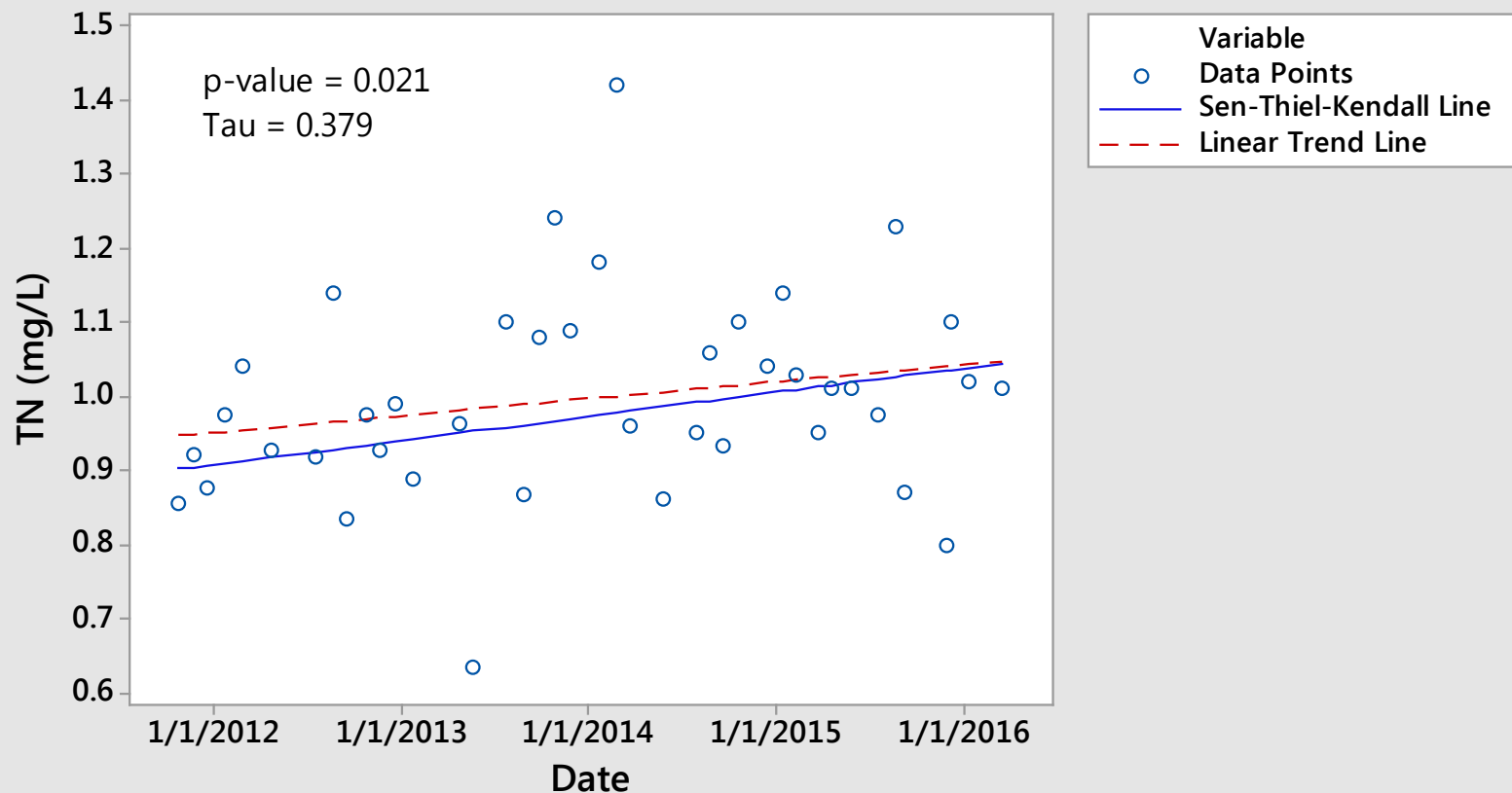
WBID 3258EA / Station CBS 18

Total Nitrogen Seasonal Trend Analysis

Seasonal Mann-Kendall Trend Analysis

Station CBS 18

Total Nitrogen (TN)

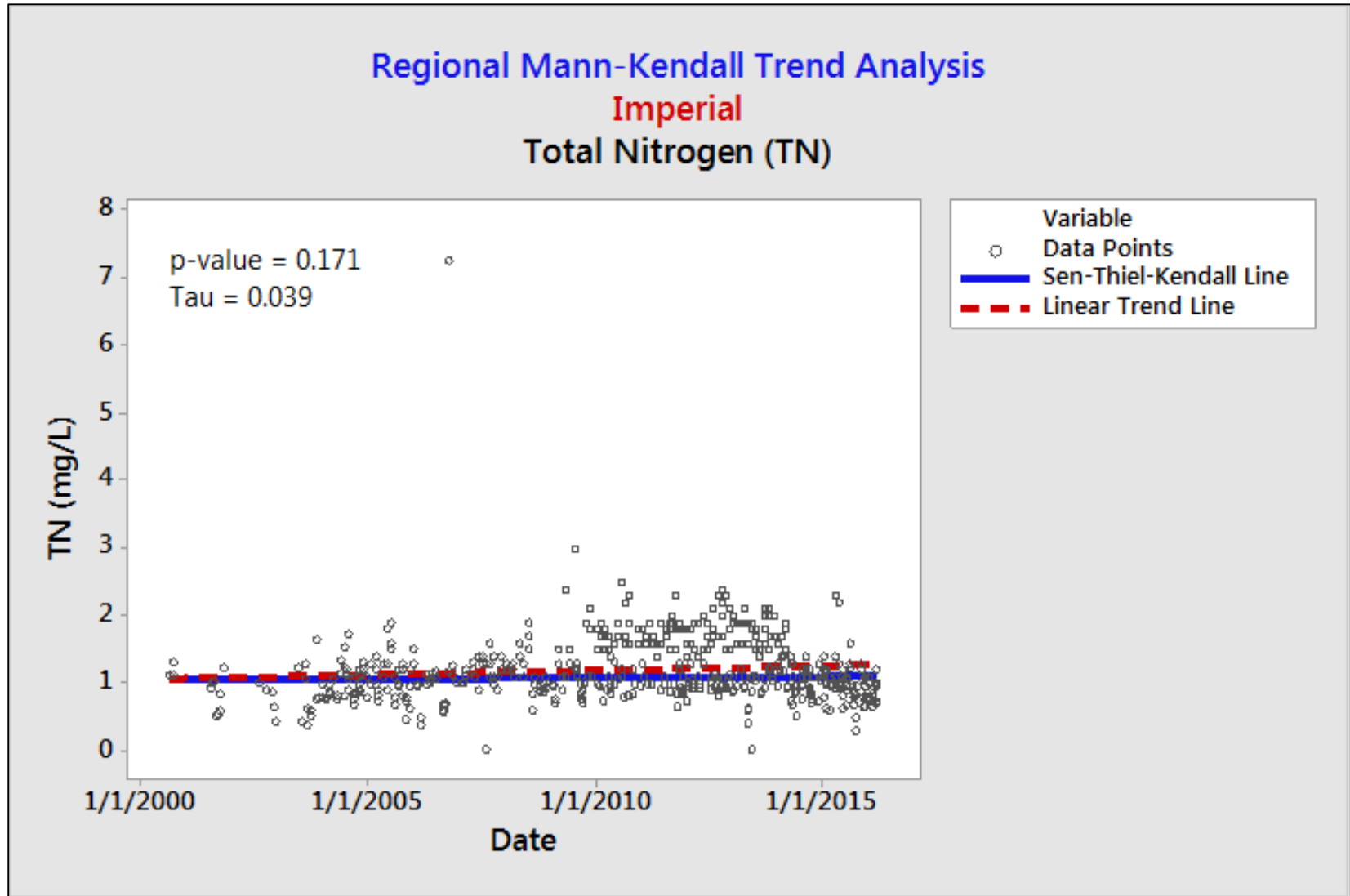




Regional Trend Analysis Results – Imperial River



Total Nitrogen Regional Trend Analysis (Imperial all points)



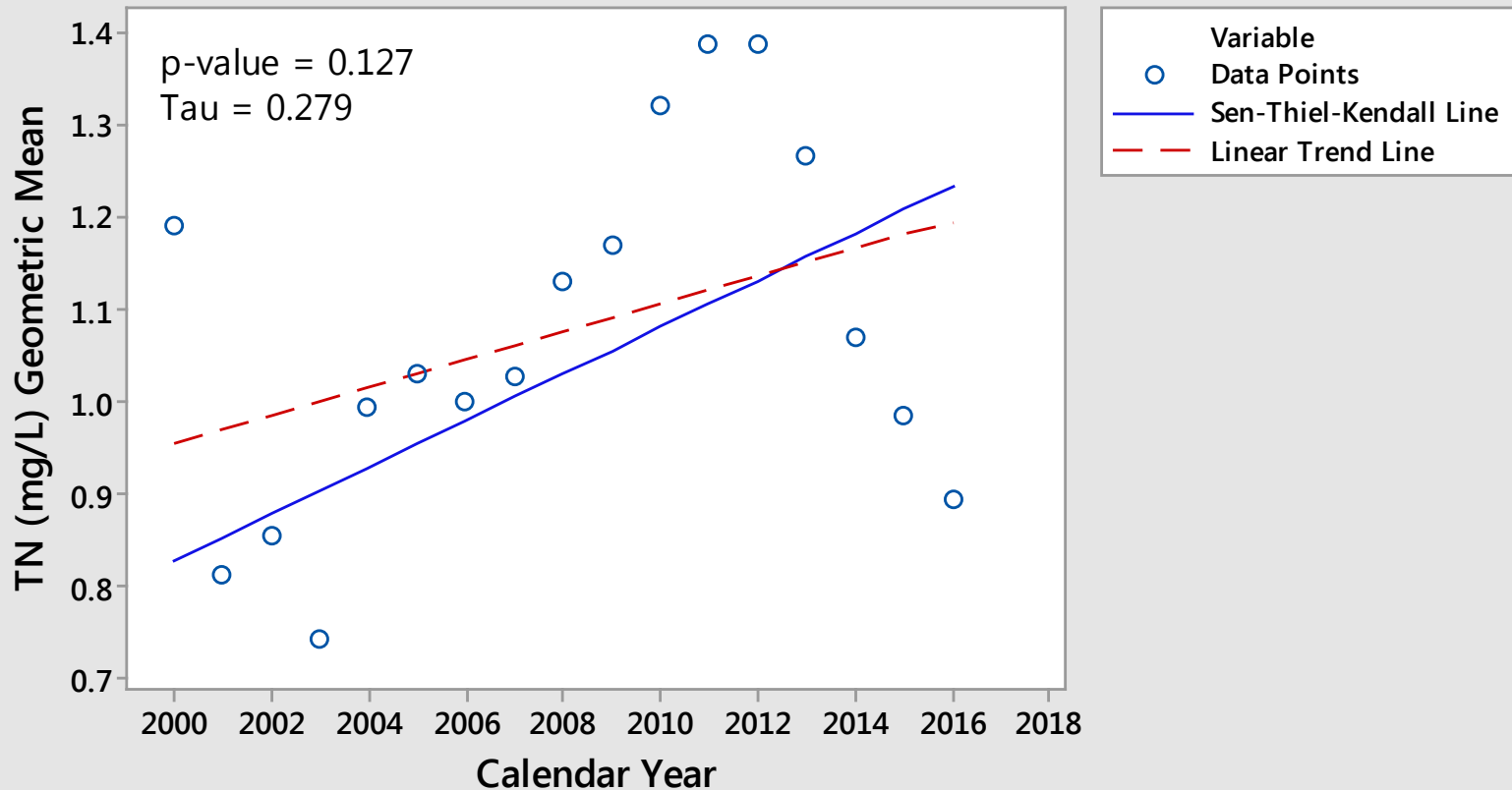


Total Nitrogen Regional Trend Analysis (CY AGM) - Imperial

Regional Mann-Kendall Trend Analysis

Imperial

Total Nitrogen (TN)



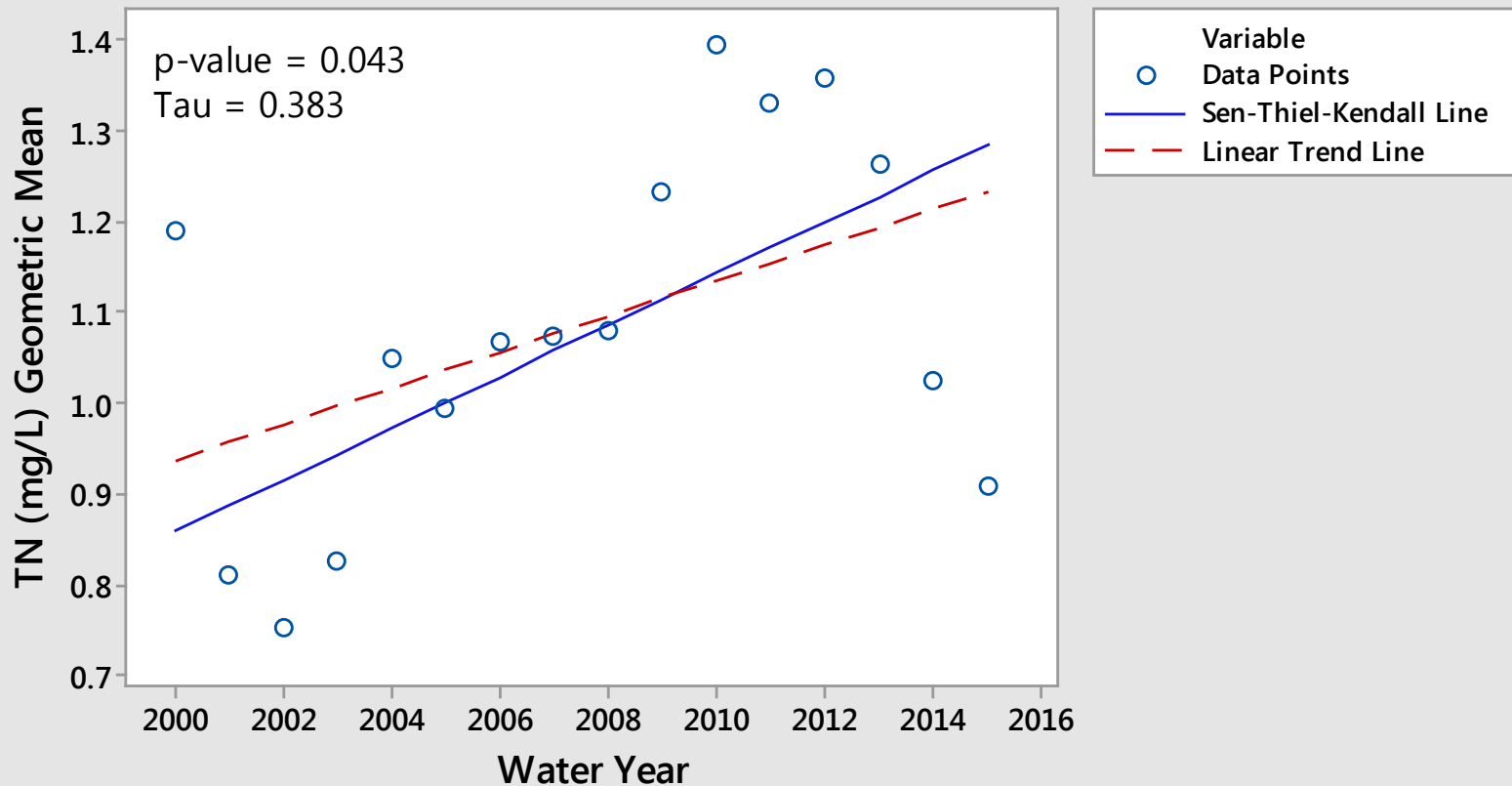


Total Nitrogen Regional Trend Analysis (WY AGM) - Imperial

Regional Mann-Kendall Trend Analysis

Imperial

Total Nitrogen (TN)





Regional Mann-Kendall Trend Analysis Results - Imperial

Data Type	Period	Parameter	POR Start	POR End	Number of Samples	Tau	P-value	Slope	Trend Test Interpretation
All Points	Varying Frequencies	TN (mg/L)	8/30/2000	3/17/2016	547	0.039	0.1706	0.000010	No significant trend overall
Geometric Mean	Calendar Year	TN (mg/L)	8/30/2000	3/17/2016	17	0.279	0.1275	0.025399	No significant trend overall
Geometric Mean	Water Year	TN (mg/L)	8/30/2000	3/17/2016	16	0.383	0.0428	0.028500	Increasing trend overall



Questions?





Monitoring - WIN

Watershed Information Network (WIN) is almost here!

- WIN is the replacement for Florida STORET.
- WIN data must meet minimum quality standards.
- WIN will be open for data uploads in spring 2017.





WIN, cont.

Through **December 2017:**

- Upload data collected prior to July 2017.
- Upload existing data that do not meet WIN Minimum Data Quality Standards (MDQS).
- Corrections for data already in Florida STORET.

After **December 2017:**

- All data will need to come to WIN!



WIN, cont.

We need to work together to get all pertinent data uploaded for use in future analyses.

More information at

<http://publicfiles.dep.state.fl.us/DEAR/storet/WIN> Communication

Denise Miller, Environmental Administrator
850-245-8516, Denise.Miller@dep.state.fl.us

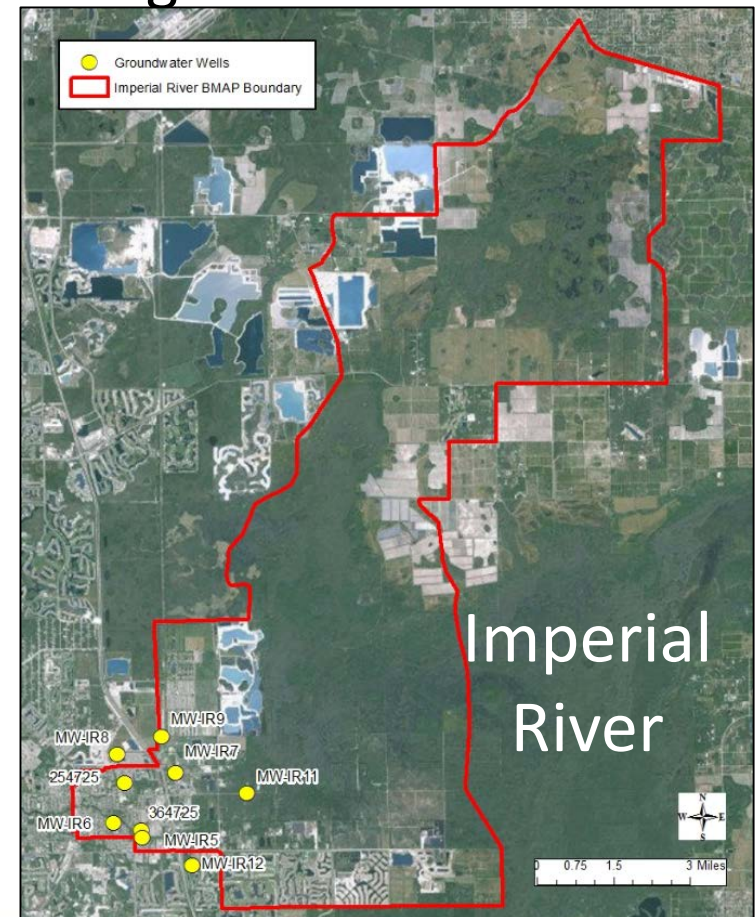
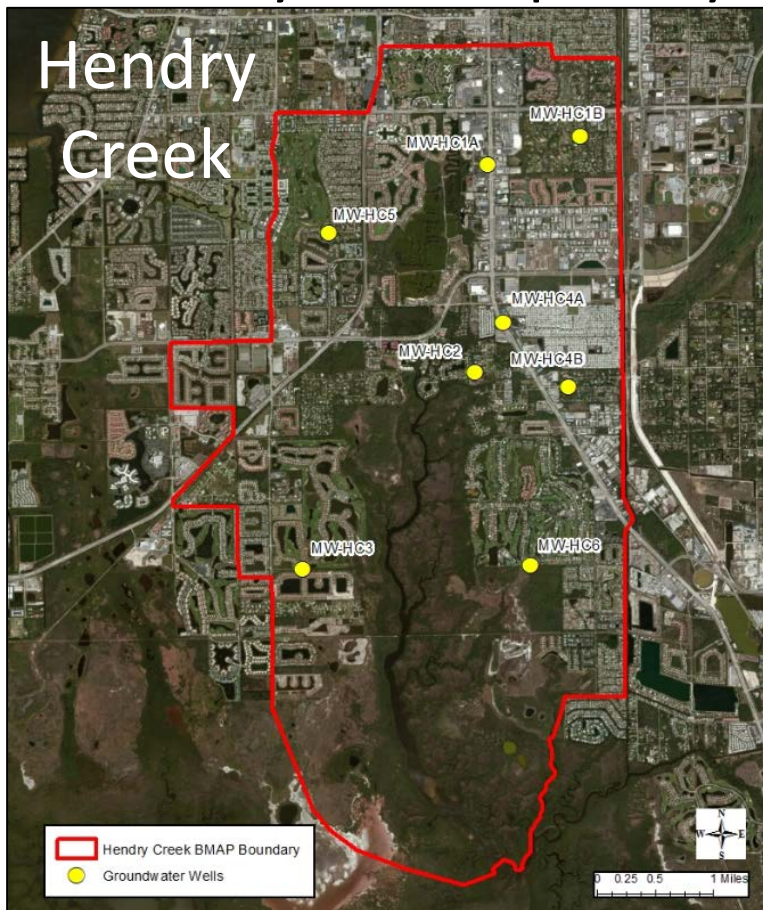
STORET/WIN Coordinators:

District	Coordinator	Phone	E-mail
Central & Statewide	Tommy Adams	850-245-8467	Thomas.l.adams@dep.state.fl.us
Northeast & Northwest	Justin Nelson	850-245-8510	Justin.m.nelson@dep.state.fl.us
South	Kyle Ferris	850-245-8049	Kyle.ferris@dep.state.fl.us
Southeast	Vilma Quant	850-245-8544	Vilma.quant@dep.state.fl.us
Southwest	Lisa Schwenning	850-245-8509	Lisa.Schwenning@dep.state.fl.us



Groundwater Study

- Collection and analyses of quarterly groundwater samples between March 2014 and March 2016.
- February 2017 report by DEP Site Investigation Section.





Groundwater Study

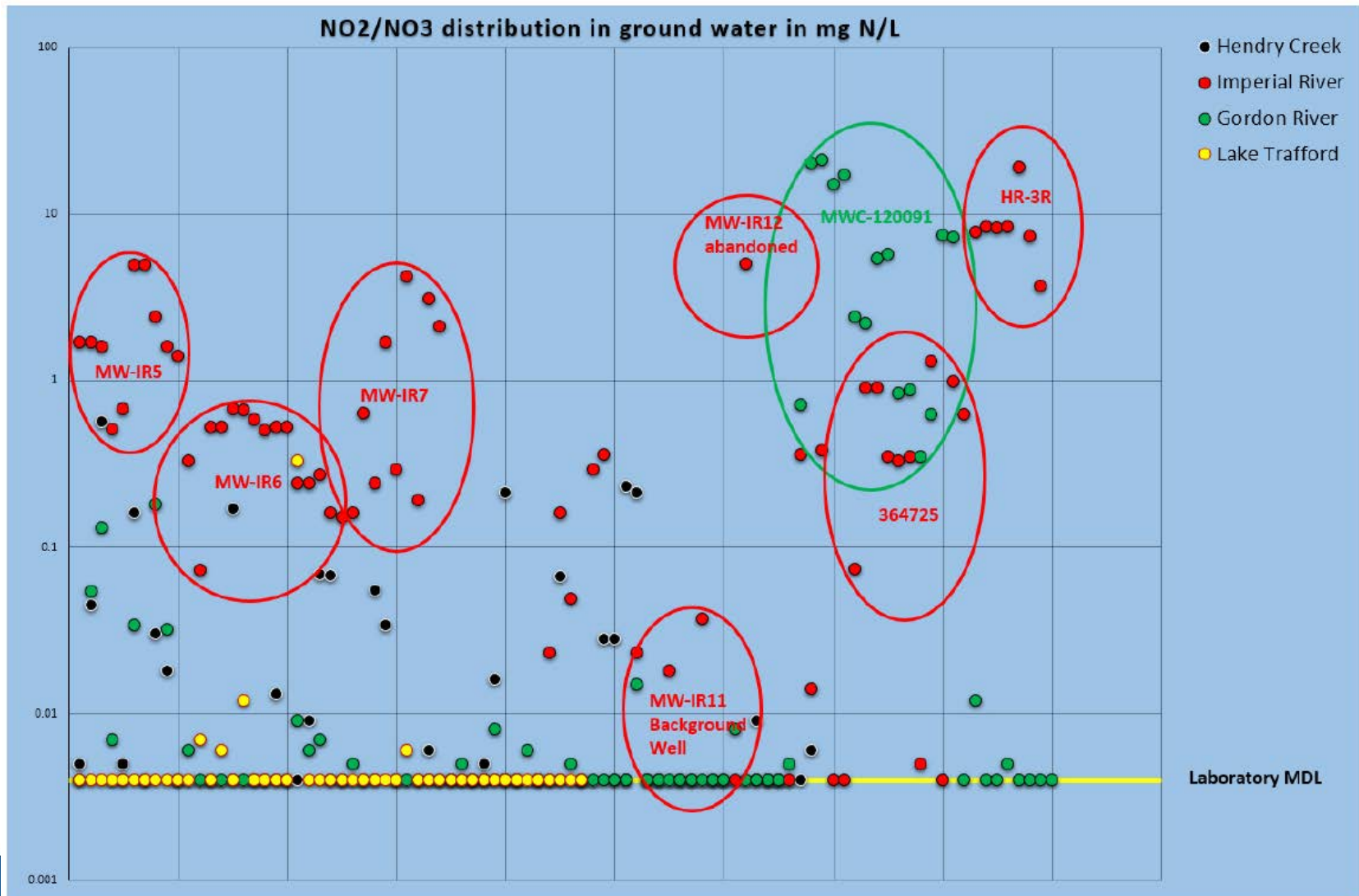
Range and average value of groundwater parameters for each well group

Well Group	Temperature ° Centigrade	Specific Conductance mS/cm	pH standard units	DO % saturation	ORP mV
Hendry Creek	15.1 – 30.8 Avg. 25.7	258 – 3858 Avg. 1291	6.05 – 7.72 Avg. 6.83	0.2 – 33 Avg. 9.6	-233 – 106 Avg. -101
Imperial River	19.9 – 30.6 Avg. 26.0	150 – 1048 Avg. 551	6.21 – 7.68 Avg. 6.99	0.01 – 89 Avg. 13.8	-231 – 140 Avg. -32
Gordon River	18.7 – 32.2 Avg. 25.9	227 – 5871 Avg. 1305	5.75 – 7.26 Avg. 6.75	0.08 – 36.3 Avg. 9.7	-312 – 71 Avg. -120
Lake Trafford	14.6 – 28.8 Avg. 24.9	84 – 1060 Avg. 423	5.37 – 7.17 Avg. 6.38	1.5 – 46.7 Avg. 9.8	-192 – -10 Avg. -72



Groundwater Study – Nitrite + Nitrate (NO_2/NO_3)

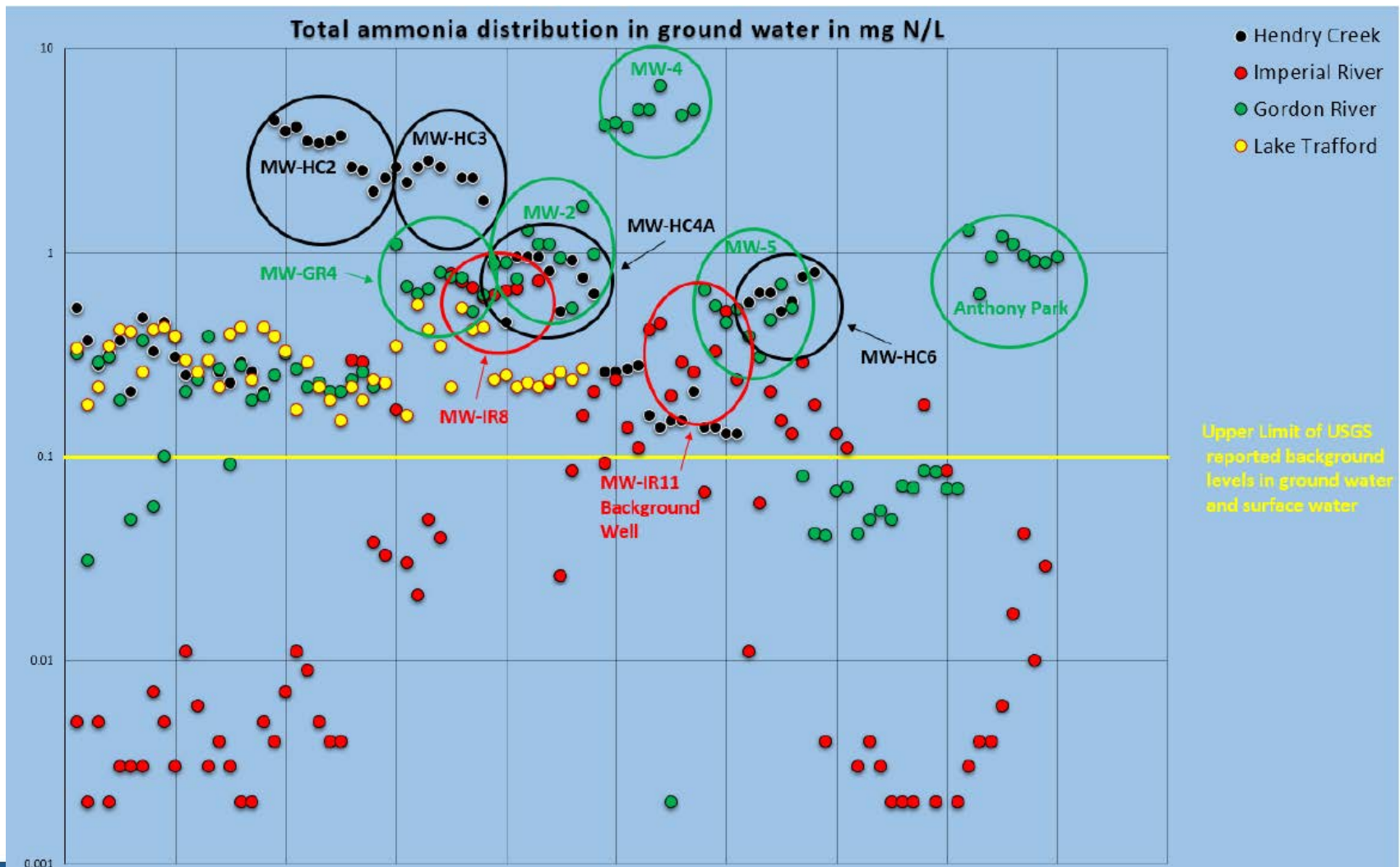
NO_2/NO_3 distribution in groundwater in mg N/L





Groundwater Study – Ammonia (NH_3)

Total ammonia distribution in groundwater in mg N/L





Groundwater Study – Surface Water Samples

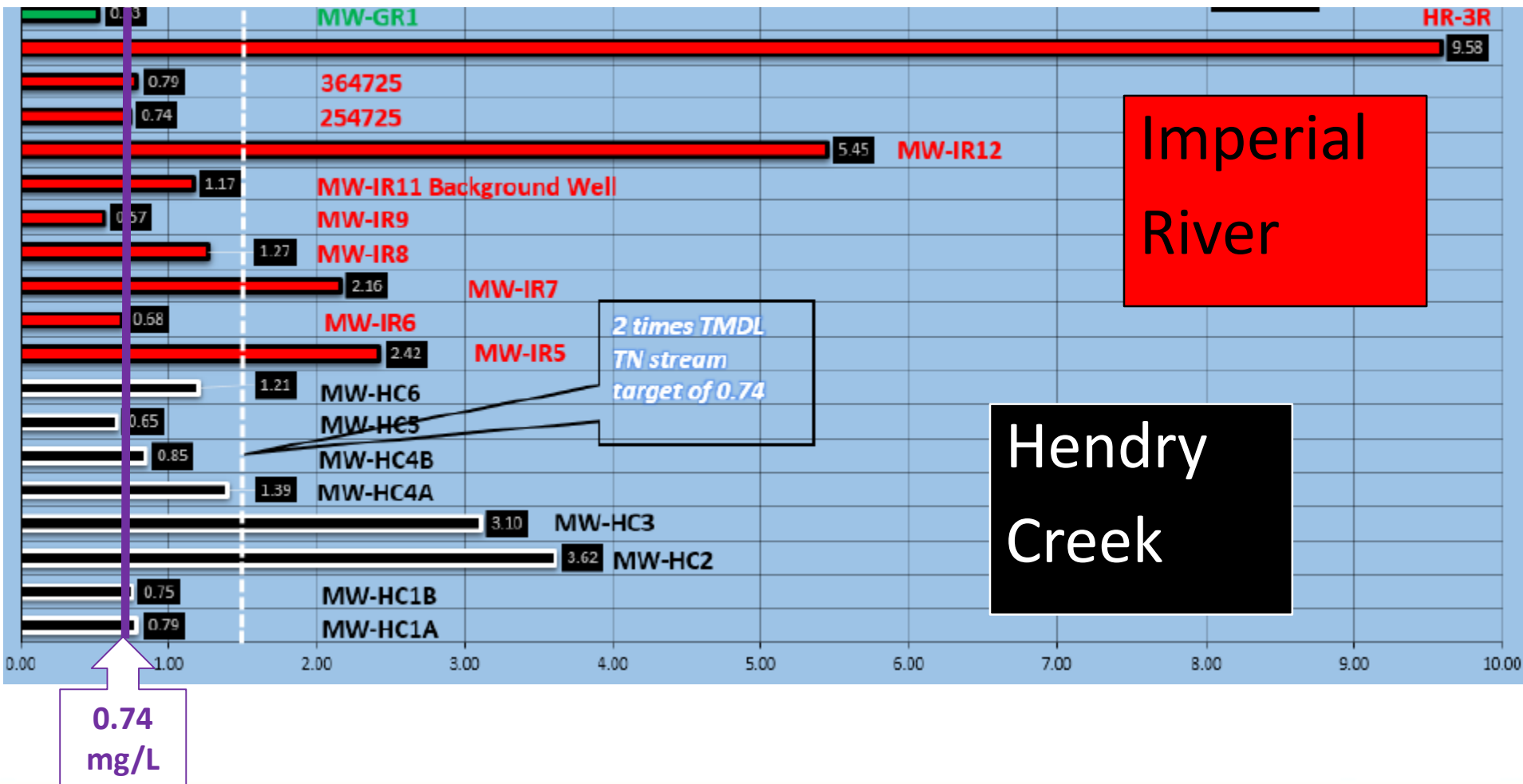
Analytical results and select groundwater parameters from the surface water sampling

Sample ID	Nitrite/Nitrate mg N/L	Ammonia mg N/L	Total Nitrogen mg N/L	Sucralose ug/L	Total Phosphorus ~ mg P/L	DO %/mg/L	ORP mV	Location
HC- Canal	0.12	0.31	1.32	3.9	0.12	59.1/4.66	34.9	In canal adjacent to HC-6 in golf course community
IR-9 Canal	0.22	0.033	1.05	0.32	0.026	17.4/1.46	41.3	In canal adjacent to IR-9
Imperial River	0.17	0.13	1.17	0.029	0.029	28.3/2.43	31.6	River adjacent to MW-IR5



Groundwater Study – Summary

TN average concentration in groundwater (mg N/L)





Groundwater Study – Summary (continued)

- Direct discharge of low DO groundwater to canals or streams could be an influence on DO concentrations in these waters.
- The form of nitrogen that is typically most prevalent in groundwater samples is NO_2/NO_3 , but levels are low to non-detect.
- TP was not determined to be a causative pollutant impacting Hendry Creek or the Imperial River.





Florida Department of Environmental Protection

Next Steps





New Requirements

- Revisions to Section 373.4595, Florida Statutes (F.S.) during 2016 legislative session.
- Additional reporting.
 - New statewide TMDL and BMAP progress report.
- New elements for all new or revised BMAPs.
 - Additional project information.
 - Additional funding information.



Action Items

- Comments on the draft annual report due Wednesday, March 8, 2017.
- Storage and Retrieval (STORET) database uploads completed.
- Continue water quality analyses.
- Continue project information collection.



Contact Information

For additional information please contact:

Sara Davis, Basin Coordinator

850-245-8825

Sara.C.Davis@dep.state.fl.us



Questions?

