Tallahassee Water Quality Master Plan (TMaPS)

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Project Background

- Water Quality is a priority of the City of Tallahassee
- Last multi-basin master plan was completed in 1995
- Changing regulatory environment through EPA & DEP
- Funding - local sales tax extension allocates $42.5 million over 20-year period (2020-2039)




Project Goals

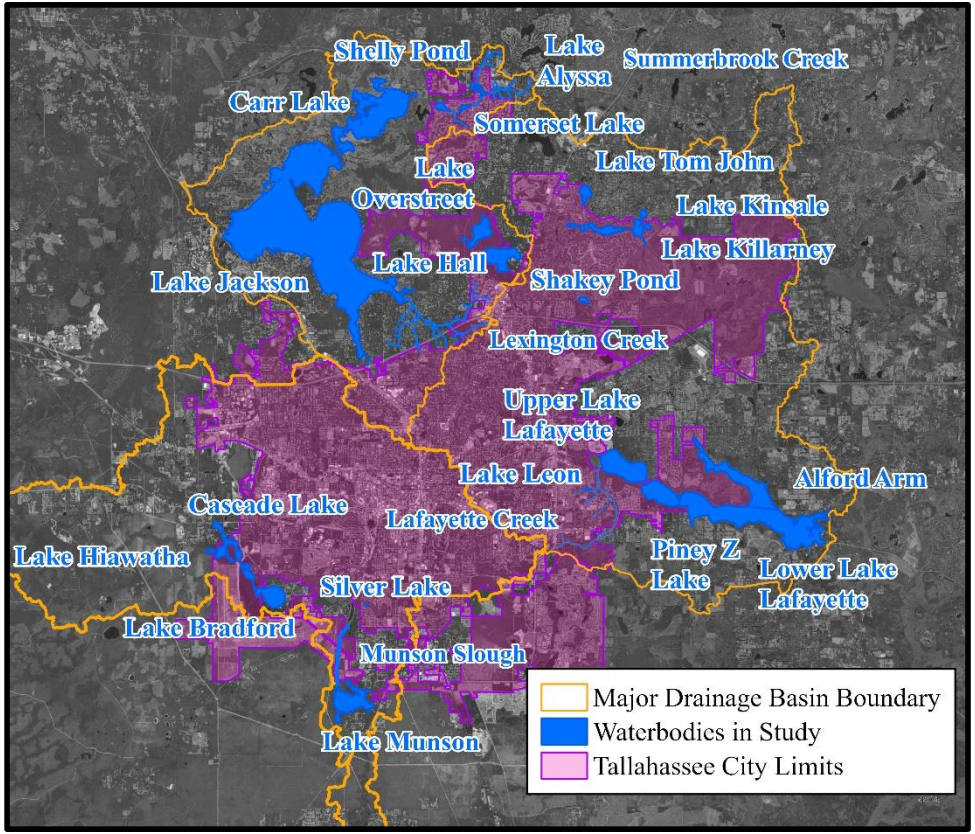
- Review & evaluate priority waterbodies
- Identify the source of stressors to these waters
- Recommend additional study where necessary
- Identify potential best management practices (structural & non-structural) to mitigate sources of surface water pollution

Project Area Overview and Focus Waterbodies

28 Waterbodies

- Three Primary Drainage Basins (Munson, Lafayette & Jackson)

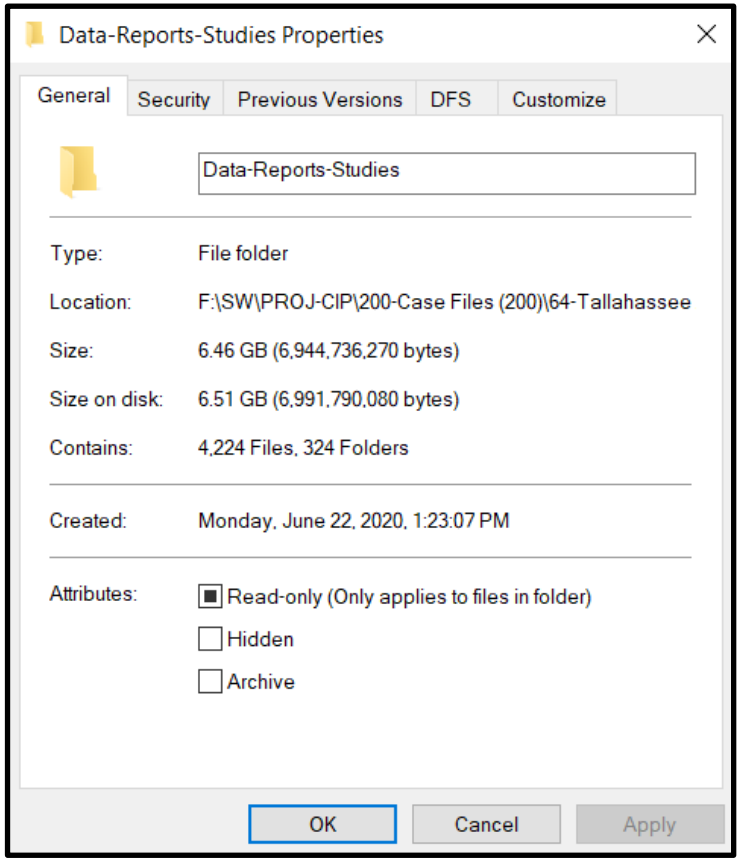
- Special waters outside the City
  - Lake Talquin
  - Wakulla Spring

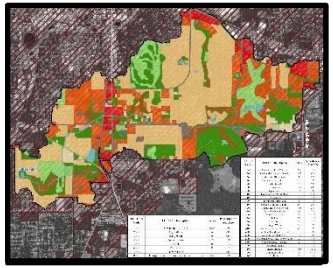


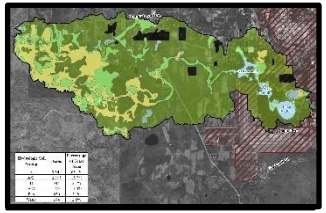
Project Components

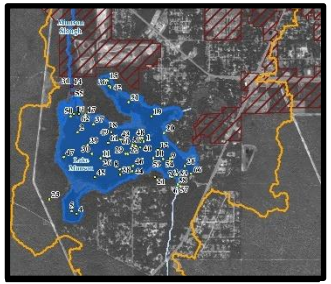
Primary Tasks

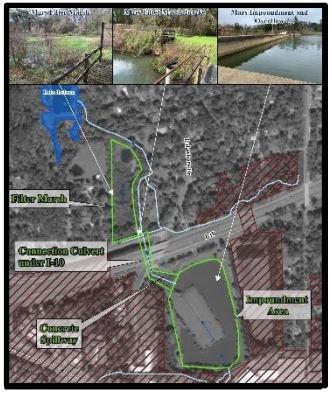
- Collection of Existing Information & Data
- Waterbody Data Review & Summary
- Water Quality Evaluation
- Water Quality Study Identification
- Identification of Potential Structural BMPs
- Identification of Potential Non-Structural BMPs
- Review of Existing Regulations
- **Public Engagement**

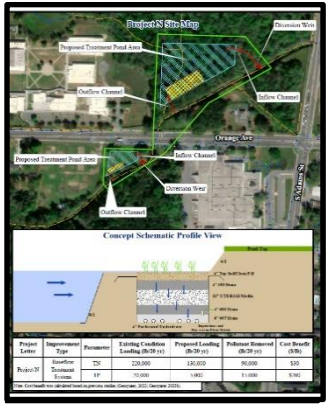












Comprehensive Data and Literature Review

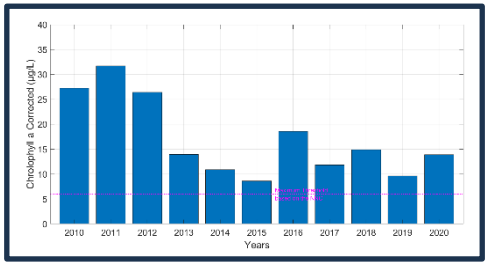
Target Waterbodies

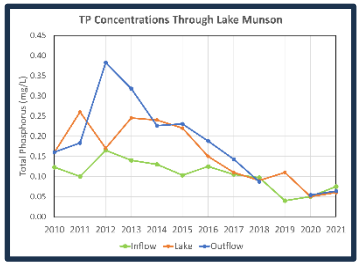
Qualitative Assessment of Sources

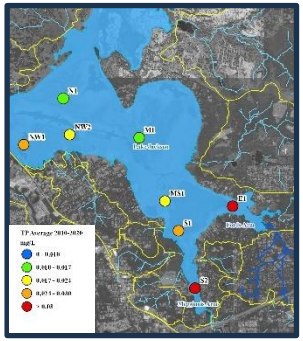
Target Sources

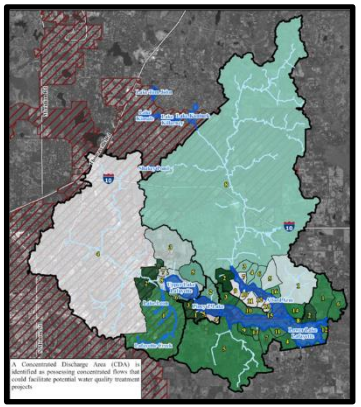
Quantification of Nutrient Loads (Hot Spots)

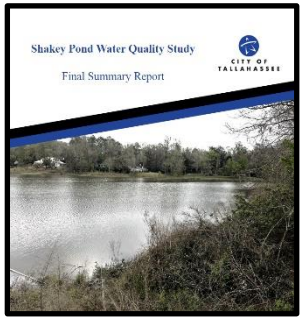
Develop Projects/Studies









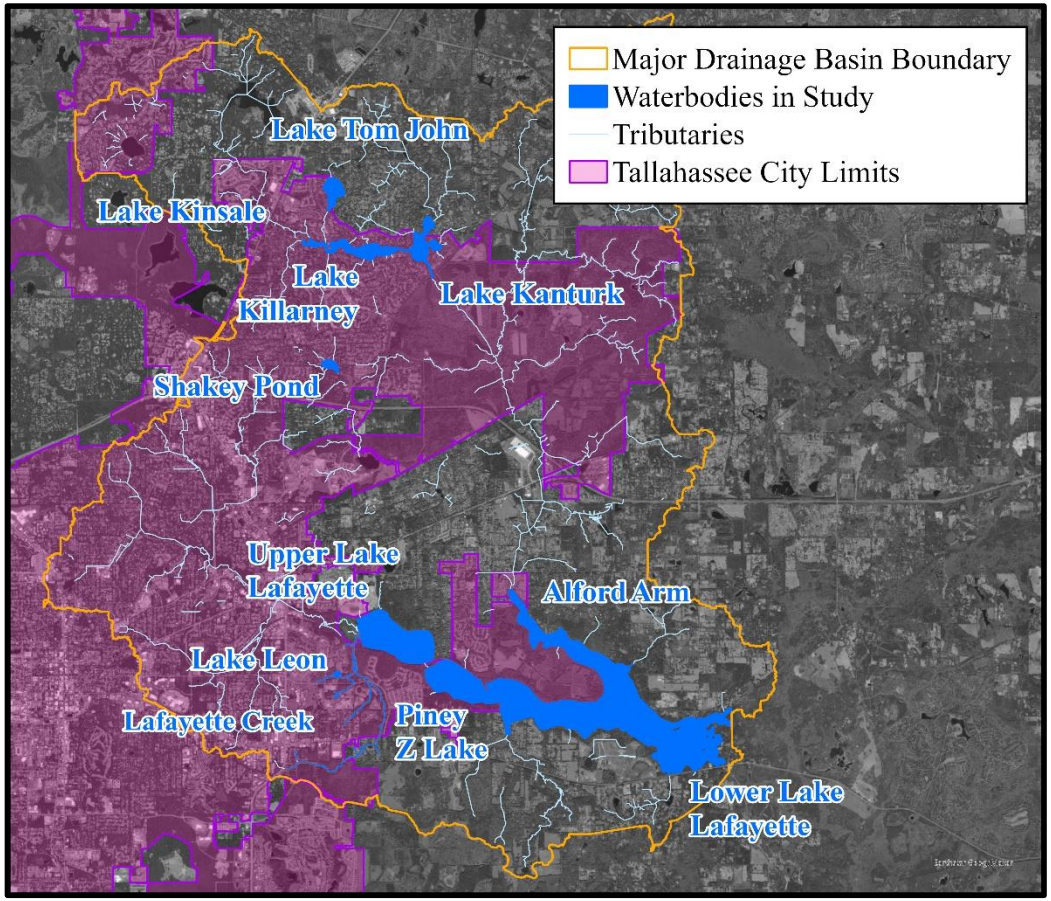


Lake Lafayette Basin

Geosyntec consultants

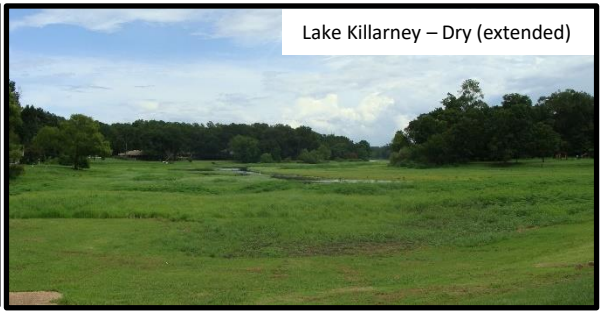
Basin and Waterbodies

- Lafayette Chain of Lakes
  - Upper Lake Lafayette
  - Piney Z Lake
  - Lower Lake Lafayette
  - Alford Arm
- Killearn Chain of Lakes
  - Lake Kinsale
  - Lake Killarney
  - Lake Kanturk
- Lake Tom John
- Shakey Pond
- Lafayette Creek
- Lake Leon



Lafayette Chain of Lakes

Killearn Chain of Lakes

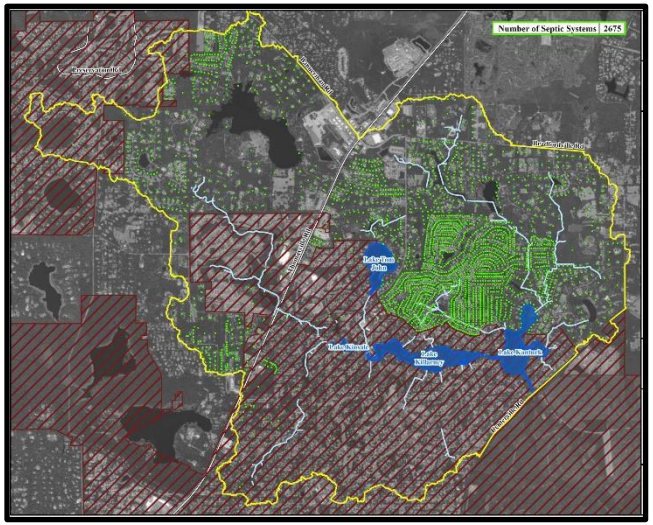


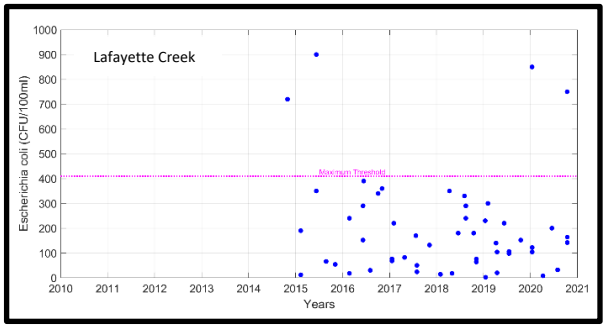
Lake Tom John, Shakey Pond, Lafayette Creek, Lake Leon

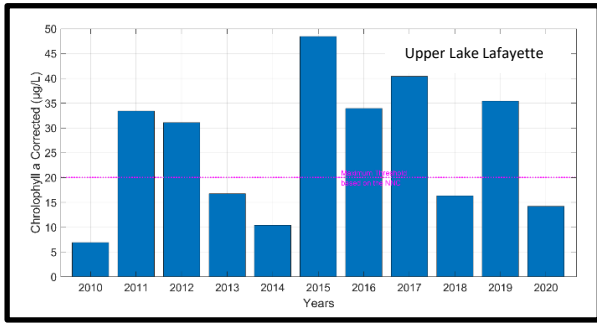
Waterbody Data Review

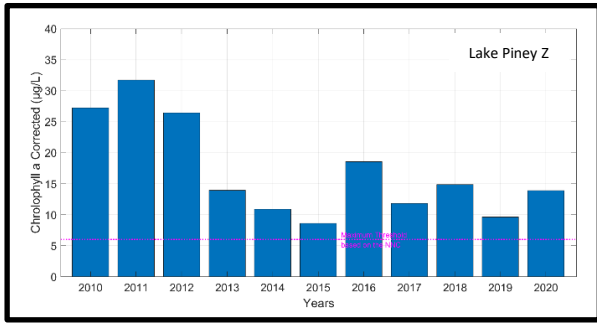
Data Types

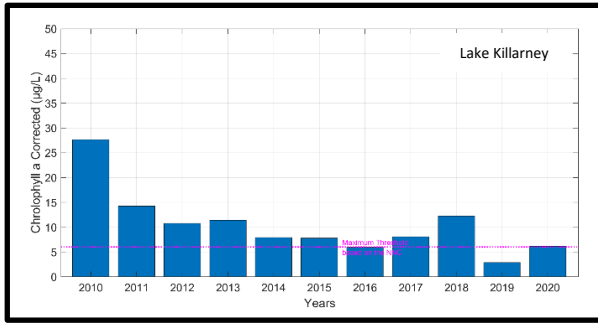
- Land Use
- Soils
- Septic Systems
- Point Sources
- Hydrologic Data
- Water Quality Data
  - Nutrients
  - Bacteria
- Biological Data
- Stormwater Treatment
- Atmospheric Deposition
- Impairment Status











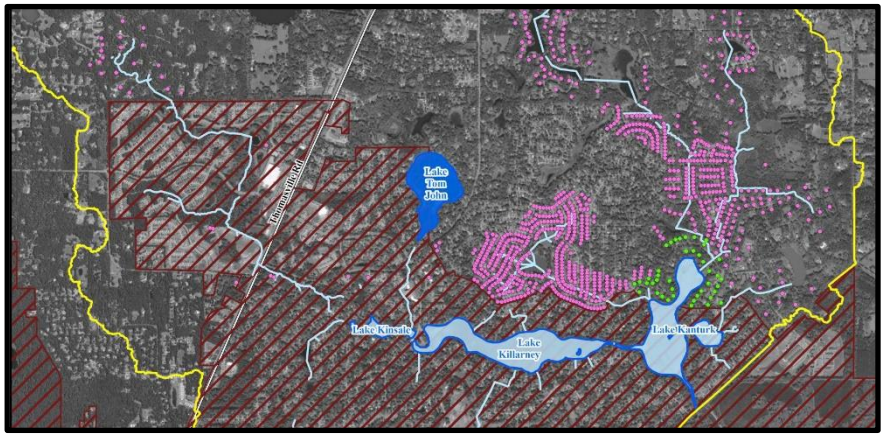
Waterbody Assessments (ranking)

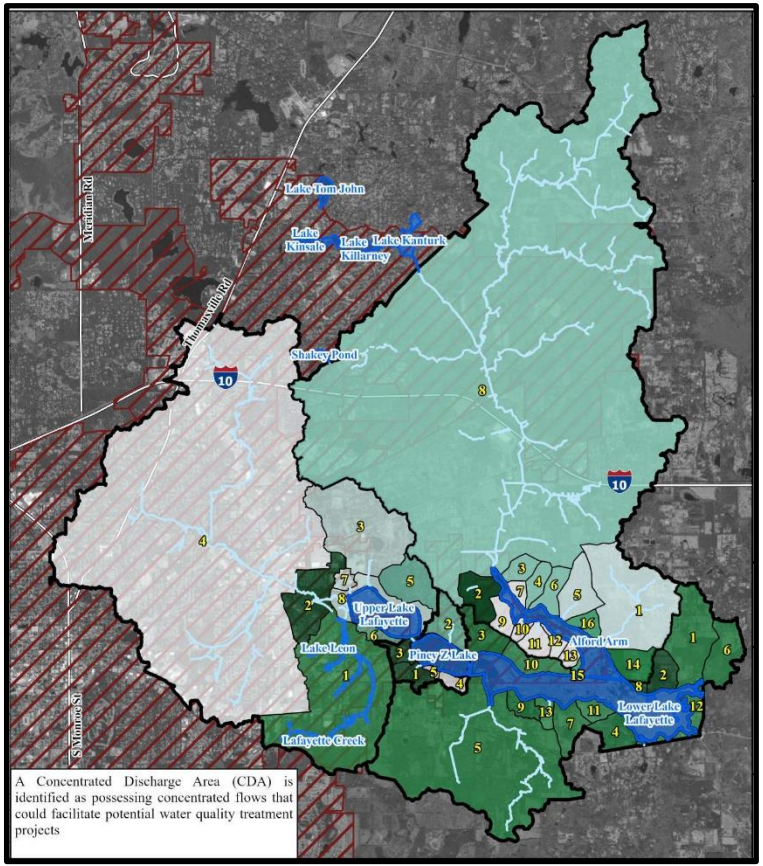
Waterbody	Impairment Status	Rank	Waterbody and Tributary WQ Analyses	Rank	(LVI or SCI)	Rank	LDI	Rank	Septic Density	Rank	Average Rank	Rank
Shakey Pond	Impaired	1	Six of seven Chl a AGMs between 2010-2020 above NNC criteria of 20 ug/L. Five TN AGMs between the minumum and maximum NNC targets, two below the minimum NNC target. Six TP AGMs from 2010 to 2020 above the maximum NNC target and one below the minimum. Most TSI values in the poor and fair ranges with a few in the good range between 2010 and 2020.	1	2 Healthy, 1 Impaired	2	Poor	1	The Shakey drainage area has very few septic tanks.	6	2.20	**1**
Upper Lake Lafayette	Impaired (Chl a, TN, TP) but TMDL Completed and RAP (4e) Completed	2	Six out of Ten Chl a AGMs between 2010-2020 above NNC criteria of 20 ug/L. All but one TN AGM below the NNC minimum, one between minimum and maximum since 2010. Eight of Ten TP AGMs from 2010 to 2020 above the NNC maximum target, remaining TP AGMs are between the mimimum and maximum targets. Numerous TSI values in the Poor range between 2010 and 2020.	2	No data	2	Mixture of Moderate and Poor, with more areas Poor.	2	Drainage has densities between 0.0 to 0.2 units per acre.	5	2.60	**2**
Lake Kanturk	Impaired (TN, TP, Chl a) but RAP (4e) Completed	3	Six of eight Chl a AGMs between 2010-2020 above NNC criteria of 6 ug/L. Three TN AGM between the maximum NNC target and 5 between the minumum and maximum NNC targets. All eight TP AGMs from 2010 to 2020 above the maximum NNC target. Some TSI values in the poor and fair ranges but most in the good range between 2010 and 2020.	4	2 Impaired	1	Mixture of Moderate and Poor in immediate area, moderate and good in upper drainage area.	4	Drainage has densities greater than 0.9	1	2.60	**2**
Lake Tom John	Impaired (TP, Chl a)	1	Three of four Chl a AGMs between 2015-2020 above NNC criteria of 6 ug/L. Three TN AGMs between the minumum and maximum and one below the minimum. All four TP AGMs from 2015 to 2020 between the minimum and maximum NNC targets. All TSI values in the good range between 2015 and 2020.	5	1 Healthy	3	Moderate	5	Drainage has densities between 0.4 to 0.5	2	3.20	**4**
Lake Kinsale	Impaired (TN, TP, Chl a) but RAP (4e) Completed	3	Seven out of ten Chl a AGMs between 2010-2020 above NNC criteria of 6 ug/L. One TN AGM above the NNC maximum, 5 between the minumum and maximum, and 4 below the minimum NNC target. All ten TP AGMs from 2010 to 2020 above the NNC maximum target. Some TSI values in the poor and fair ranges but most in the good range between 2010 and 2020.	4	No data after 2010, 2009 Impaired	1	Immediate drainage Poor with upper reaches of the watershed draining Moderate to Good.	3	Drainage has densities between 0.0 to 0.2	5	3.20	**4**
Lake Killarney	Impaired (TN, TP, Chl a) but RAP (4e) Completed	3	Eight of ten Chl a AGMs between 2010-2020 above NNC criteria of 6 ug/L. One TN AGM above the NNC maximum, 5 between the minumum and maximum, and 4 below the minimum NNC target. Eight of ten TP AGMs from 2010 to 2020 above the NNC maximum target, remaining two are just below the maximum. Some TSI values in the poor and fair ranges but most in the good range between 2010 and 2020. There is a general improving trend in the lake.	4	2 Impaired	1	Mixture of Moderate and Poor in immediate area, moderate and good in upper drainage area.	4	No septics within the immediate drainage	7	3.80	**6**
Lake Piney Z	Impaired (TN, TP, Chl a)	1	All Chl a AGMs between 2010-2020 above NNC criteria of 6 ug/L But lower values after 2012. Four out of ten TN AGMs above the maximum, all prior to 2015. From 2015 to 2020 all TN AGMs between the minimum and maximum NNC criteria. Seven of Ten TP AGMs from 2010 to 2020 above the NNC maximum with remaining between the minimum and maximum TP targets. Five of the seven were prior to 2015. Other values between the minimum and maximum NNC targets. Some TSI values in the poor range prior to 2013, after 2013 some in the fair range but most in the good range. Ranking accounts for concerns on reasonableness of NNC targets.	3	12 Healthy	4	Good	7	Drainage has densities between 0.0 to 0.1 units per acre.	6	4.20	**7**
Alford Arm	Not Impaired	4	Insufficient data between 2010 and 2020 to calculate the AGM values in any year for TN, TP or Chl a. Only year with any data was 2010.	7	No data	2	Immediate drainage good, lower drainage basin areas Moderate with upper reaches a mixture of Good and Excellent	6	Drainage has densities between 0.1 and 0.6 units per acre.	3	4.40	**8**
Lafayette Creek	Not Impaired	4	One TN AGM between 2010-2020 above the East Panhandle Stream threshold (2012) with all remaining TN AGMs well below the threshold. All TP AGMs below the the Panhandle East Stream NNC threshold. Has high bacteria at the lower station.	6	No Data	2	Good	7	Septic Densities generally near zero other than one area in upper watershed with densities between 0.06 and 0.4 but overall basin is below 0.1 units per acre	6	5.00	**9**
Lower Lake Lafayette	Not Impaired	4	TN and TP AGMs were below the NNC minimum thresholds for all years between 2010 and 2020. Chl a AGMs were below the NNC threshold of 20 ug/L for all years with AGM values down near 6 ug/L where sufficient data were available. Nearly all TSI values were in the good range with only a few data points in the fair range.	9	No data	2	Good in immediate drainage, moderate, good and excellent in larger drainage area.	8	Drainage has densities between 0.1 and 0.2 units per acre.	4	5.40	**10**
Lake Leon	Not Impaired	4	All Chl a AGMs between 2010-2020 below NNC criteria of 20 ug/L All TN AGMs below the minimum NNC target. Four out of 5 TP AGMs at or below the minimum NNC target with one between the minimum and maximum NNC targets.	8	1 Healthy, 3 Impaired	1	Good	7	Near Zero Septics in drainage area	7	5.40	**10**

Pollutant Sources and Targets for Restoration

Pollutant Sources Considered

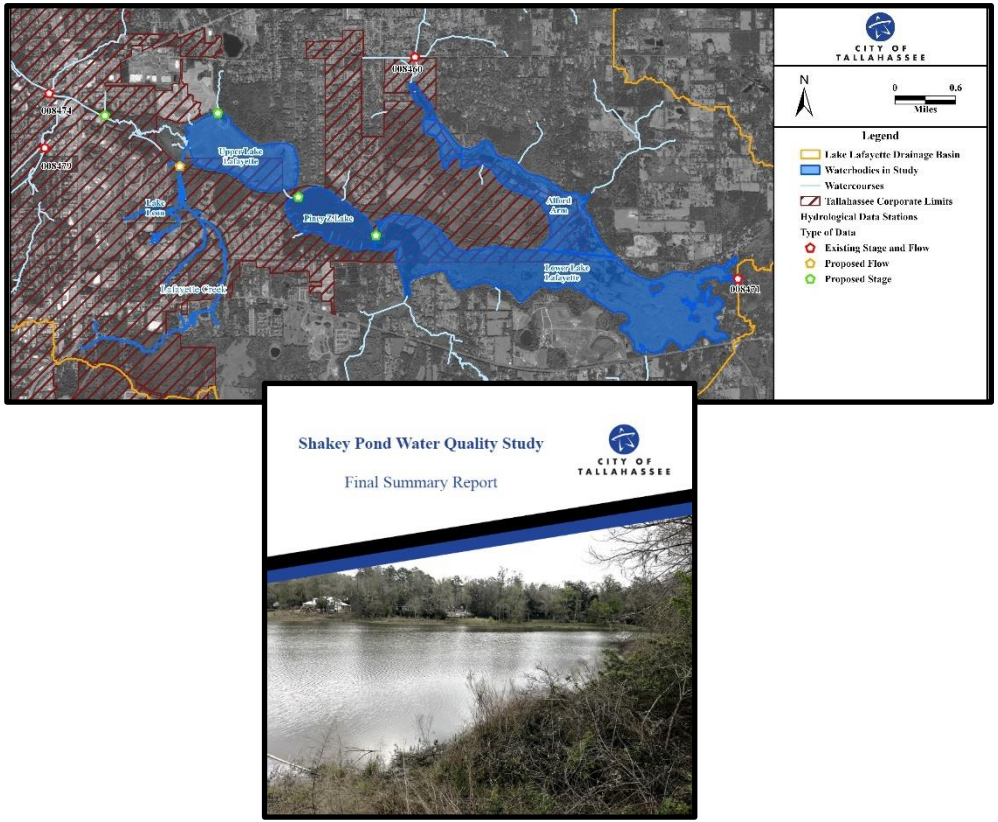
- Stormwater Runoff
- Septic Load
- Point Source Load
- Interlake Load (inflow from upstream waterbodies)
- Internal Load
- Atmospheric Deposition





Future Studies and Data Collection

- Shakey Pond - *Water Quality Assessment and Restoration Study*
- Upper Lake Lafayette - *Hydrologic Study*
- Killearn Chain of Lakes - *Hydrologic Study and SSAC*
- Lake Kanturk - *Septic Loading Study*
- Lake Tom John - *Development of Hydrologic and Nutrient Budget and SSAC*
- Piney Z Lake - *SSAC*
- Lafayette Creek - *Bacteria Sampling*

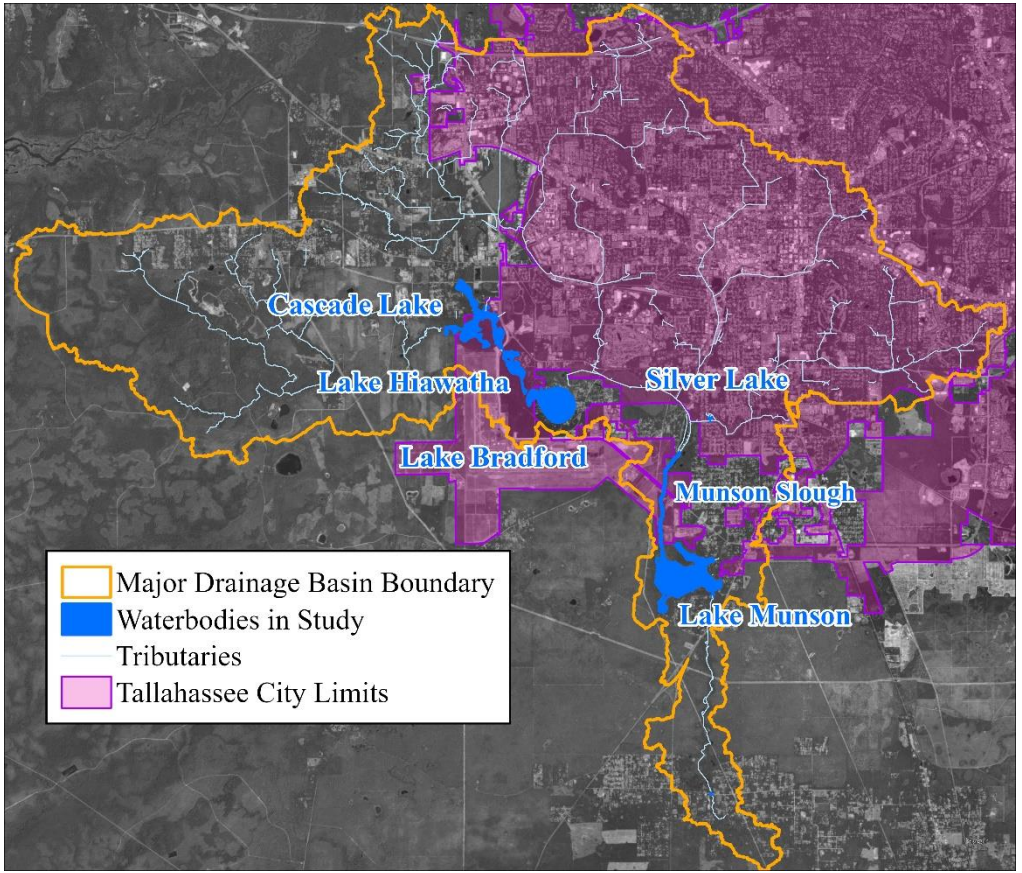


Lake Munson Basin

Geosyntec consultants

Basin and Waterbodies

- Lake Munson
- Munson Slough (downstream of Lake Henrietta)
- Bradford Chain of Lakes
  - Cascade Lake
  - Lake Hiawatha
  - Lake Bradford
- Silver Lake (and East Drainage Ditch)

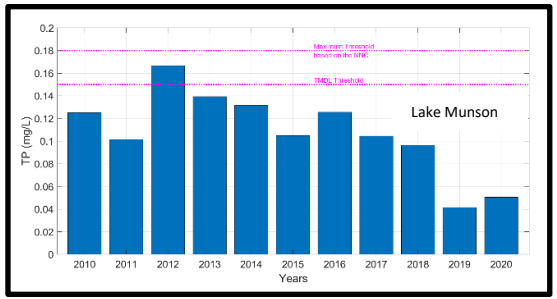


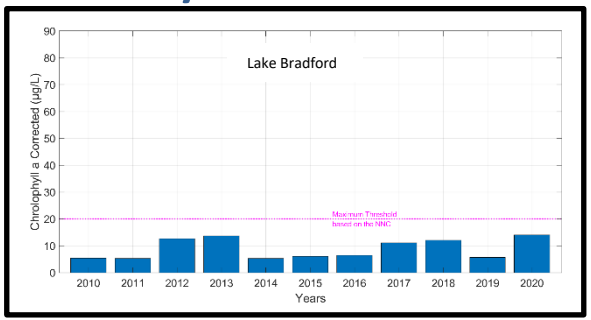
Lake Munson and Munson Slough (below Lake Henrietta)

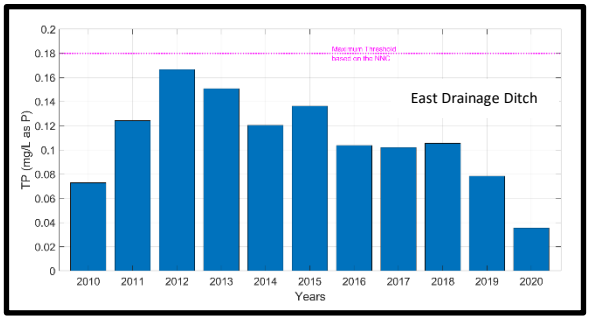
Bradford Chain of Lakes

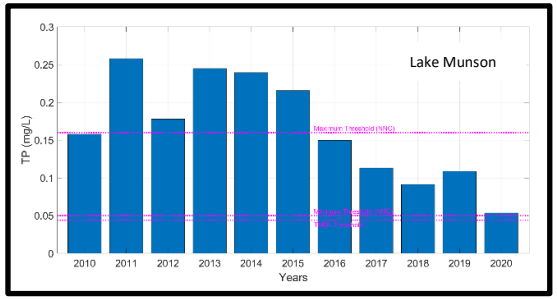
Silver Lake and East Drainage Ditch

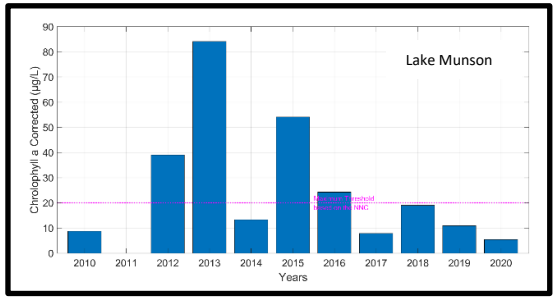
Waterbody Data Review

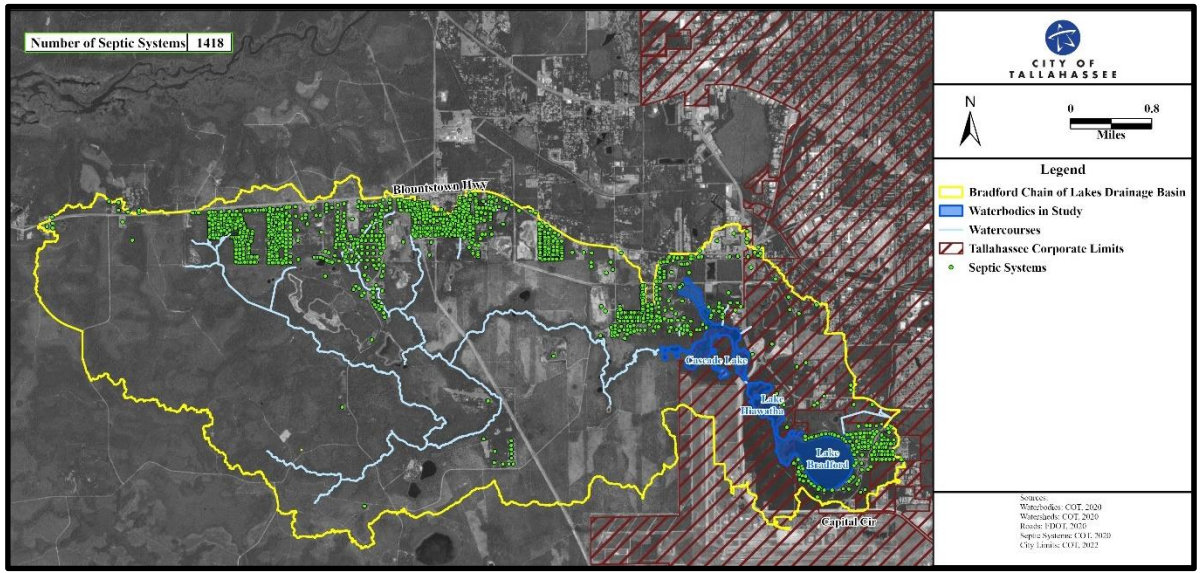












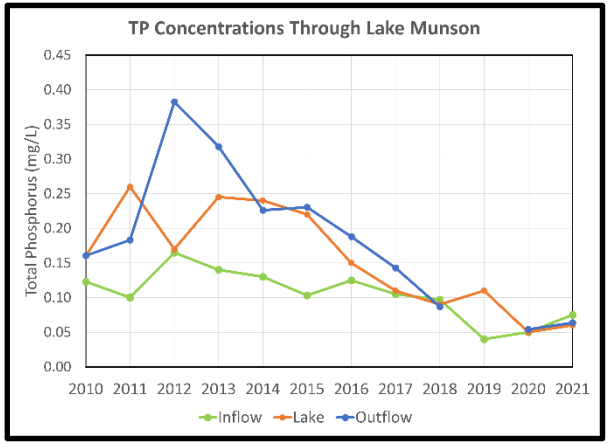
Waterbody Assessments (ranking)

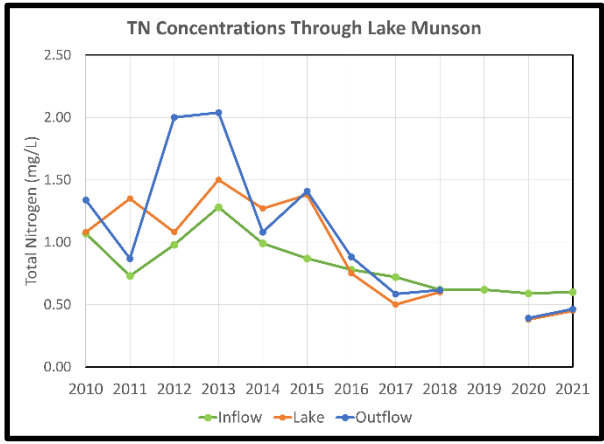
Waterbody	Impairment Status	Rank	Waterbody and Tributary WQ Analyses	Rank	Biological Data (LVI, HA or SCI)	Rank	LDI	Rank	Septic Density	Rank	Average Rank	Waterbody Rank
Lake Munson	Previously impaired for nutrients, TMDL Completed, TP levels close to the NNC and TMDL Targets	1	AGMs for TN, TP, and Chl a exceedi the TMDL criteria for many of the years since 2010. Recent TN and Chl a AGMs are below the threshold, TP AGMs, while near the TMDL threshold in 2020 are still above the target.	1	LVI: 9 Healthy, 2 Exceptional	3	Mixture of Poor, Moderate, Good, and Excellent areas drain to Lake Munson	2	Immediate areas around Lake Munson have densities between 0.16 to 0.31 units per acre.	2	1.80	**1**
Munson Slough (below Lake Henrietta)	Previously impaired for nutrients and FIB, TMDLs completed, Moved to 2t	2	In 2010 and 2013 TN AGMs were above the NNC stream threshold. From 2010 to 2016 TN levels were below the NNC threshold but above the TMDL target. 2017 to 2020 TN AGMs below the TMDL target. From 2010 to 2020 TP AGMs were below the NNC threshold. Only 1 year (2012) had values above the TMDL target.	2	HA: Marginal to Poor, SCI: 45	1	Mixture of Poor, Moderate, Good, and Excellent areas drain to Lake Munson	2	Immediate areas around Munson Slough have ranges from 0.12 to 0.31 units per acre but no system within 200 meters.	3	2.00	**2**
Silver Lake/East Drainage Ditch	Never impaired for nutrients, impaired for fecal coliform, but likely not for E. Coli.	3	TN AGMs well below the stream criteria from 2010 to the present. All TP AGM values below the stream criteria from 2010 to the present with some values between 2010 to 2015 near the criteria.	3	HA: Marginal to Poor	1	All of the drainage area to Silver Lake is rated as Moderate.	1	All areas draining to Silver Lake have densities between 0.03 and 0.06 units per acre	5	2.60	**3**
Lake Bradford	Never impaired for nutrients or bacteria	4	TN and TP AGMs were below the NNC minimum thresholds for all years. Chl-a AGMs were below the NNC threshold for all years. Highest values for all of the three Bradford Chain of Lakes waterbodies.	4	4 Healthy, 7 Exceptional	4	Bulk of area draining to the Bradford Chain of Lakes is Excellent with some areas as Good	3	Lake Bradford has relatively high density around the lake.	1	3.20	**4**
Cascade Lake	Never impaired for nutrients or bacteria	4	TN and TP AGMs were below the NNC minimum thresholds for all years. Chl-a AGMs were below the NNC threshold for all years. Lowest values for all of the three Bradford Chain of Lakes waterbodies.	6	All Exceptional	5	Bulk of area draining to the Bradford Chain of Lakes is Excellent with some areas as Good	3	Some septic areas immediately north of Cascade Lake with densities between 0.16 to 0.31 units per acre	2	4.00	**5**
Lake Hiawatha	Never impaired for nutrients or bacteria	4	TN and TP AGMs were below the NNC minimum thresholds for all years. Chl-a AGMs were below the NNC threshold for all years. AGMs were lower than Lake Bradford but higher than Cascade Lake.	5	All Exceptional	5	Bulk of area draining to the Bradford Chain of Lakes is Excellent with some areas as Good	3	Very few systems in the immediate area of Lake Hiawatha	4	4.20	**6**

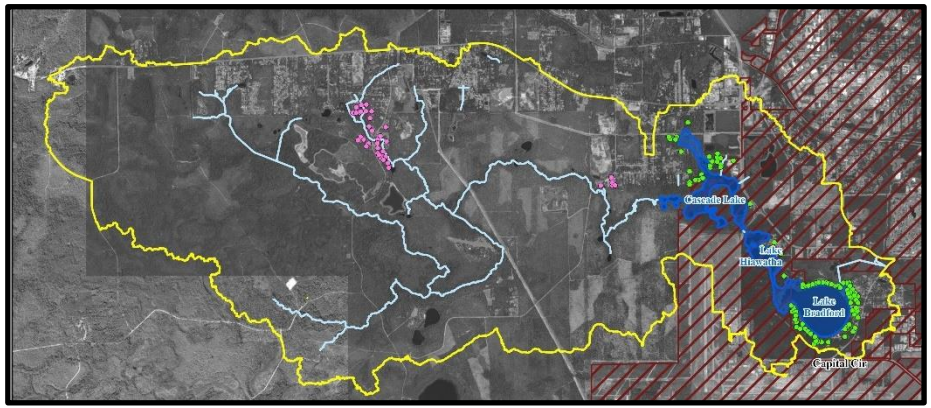
Pollutant Sources and Targets for Restoration

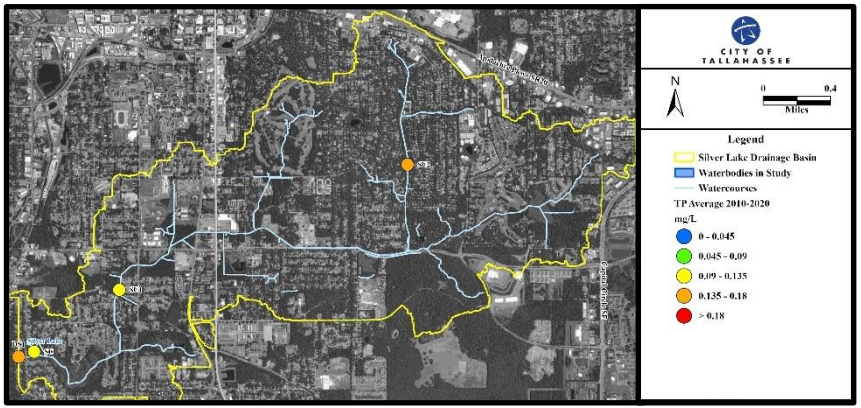
Pollutant Sources Considered

- Stormwater Runoff
- Septic Load
- Point Source Load
- Interlake Load (inflow from upstream waterbodies)
- Internal Load
- Atmospheric Deposition



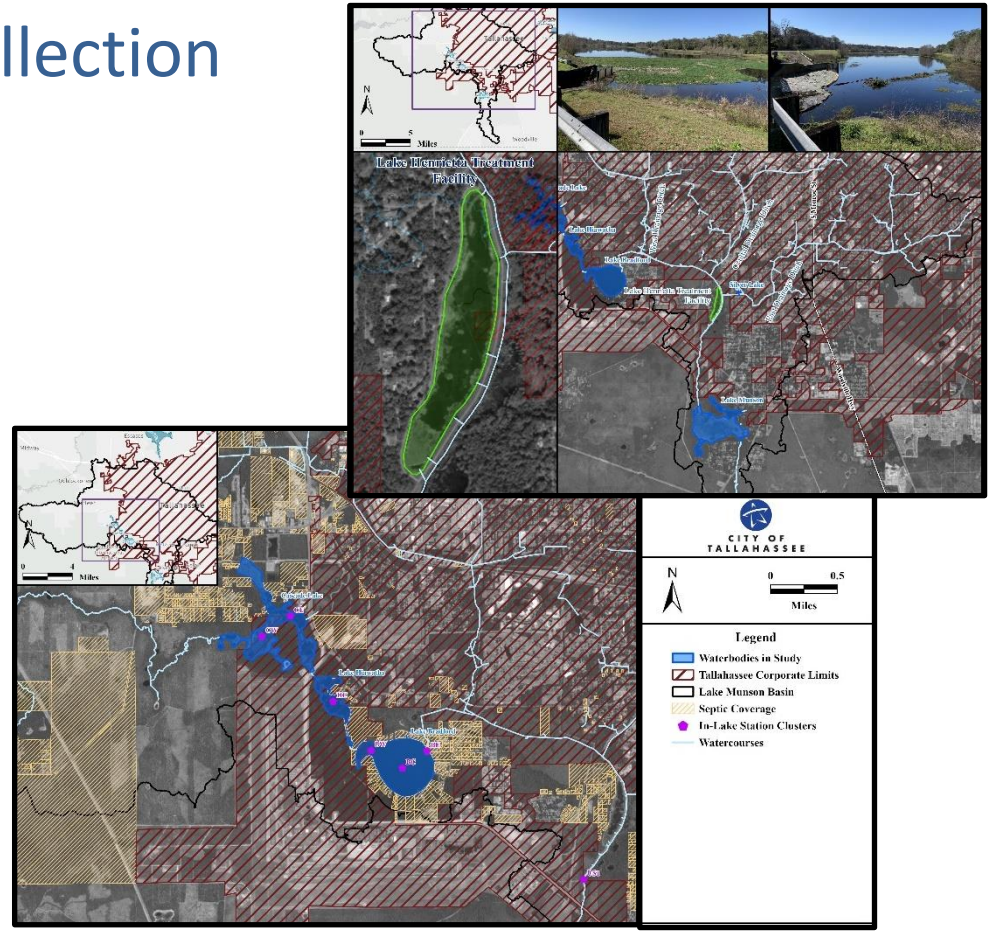






Future Studies and Data Collection

- East Ditch/Silver Lake – *Re-establish Ambient Water Quality Monitoring*
- Lake Munson – *Internal Nutrient Load Study*
- Lake Munson/Munson Slough – *Lake Henrietta Treatment Facility Inflow/Outflow Study*
- Lake Bradford – *Septic Load Study*
- Bradford Chain of Lakes – *Lead Source Assessment*

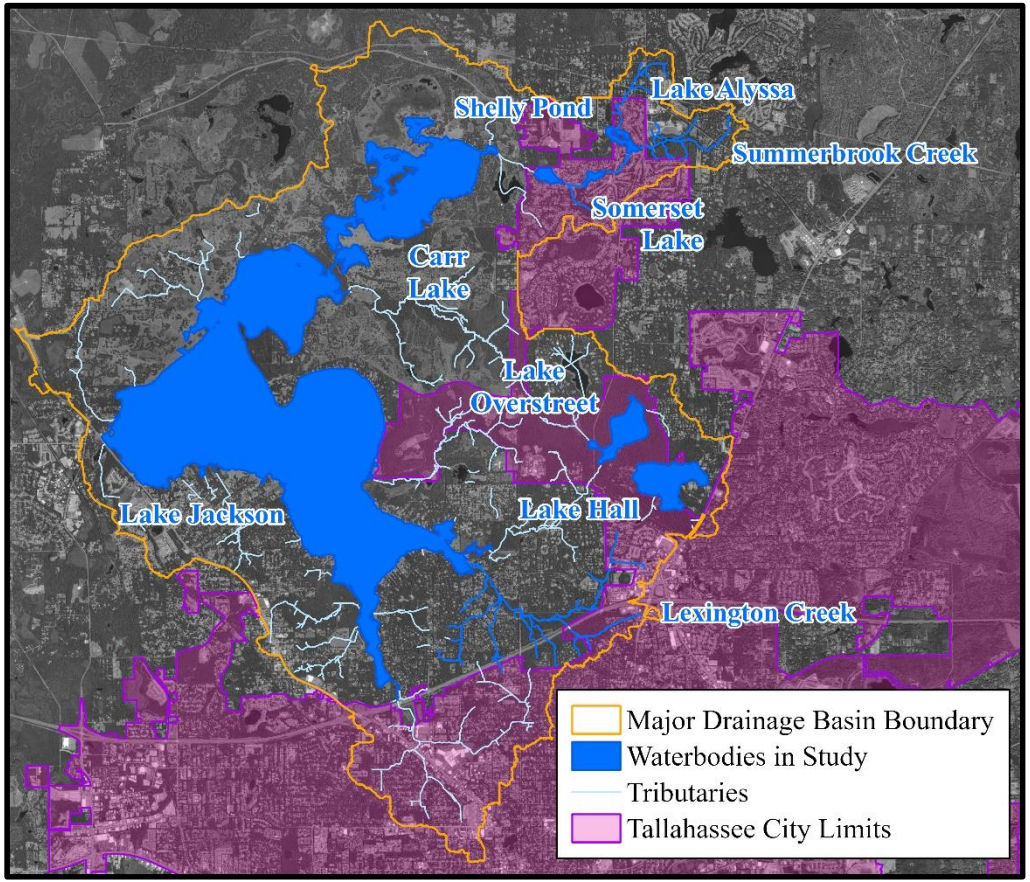


Lake Jackson Basin

Geosyntec consultants

Basin and Waterbodies

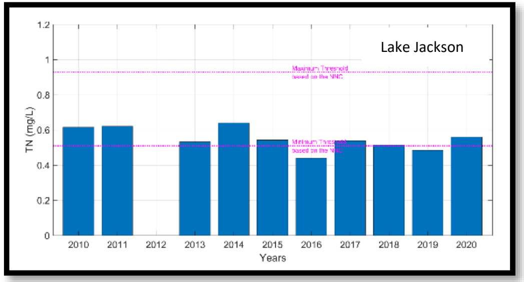
- Lake Munson
- Munson Slough (downstream of Lake Henrietta)
- Bradford Chain of Lakes
  - Cascade Lake
  - Lake Hiawatha
  - Lake Bradford
- Silver Lake (and East Drainage Ditch)

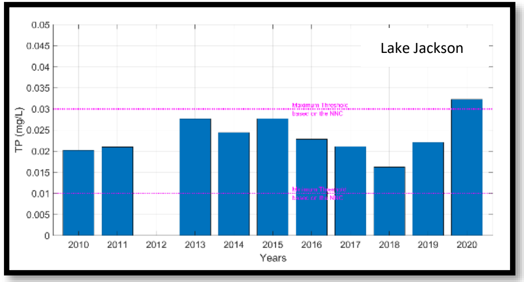


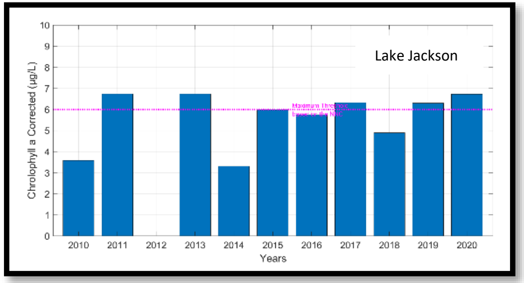
Lake Jackson and Carr Lake

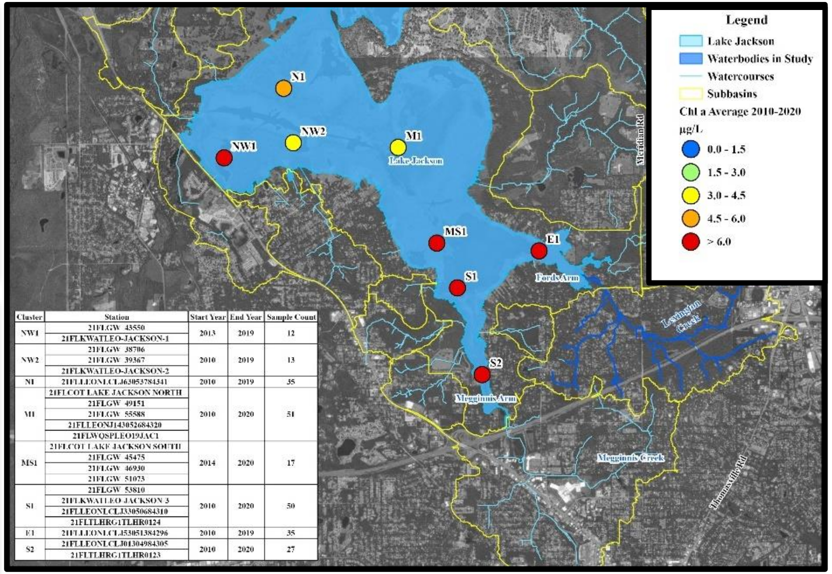
Summerbrook Chain of Lakes, Lake Hall, Lake Overstreet

Waterbody Data Review

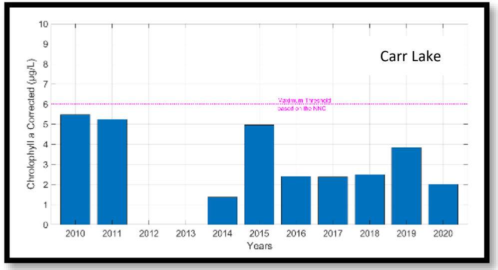


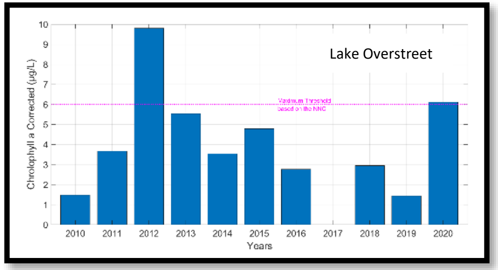


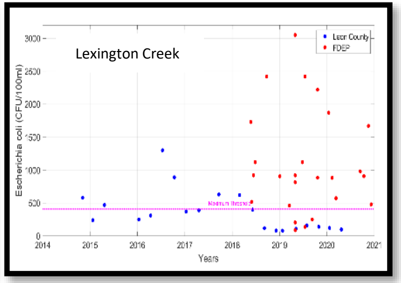


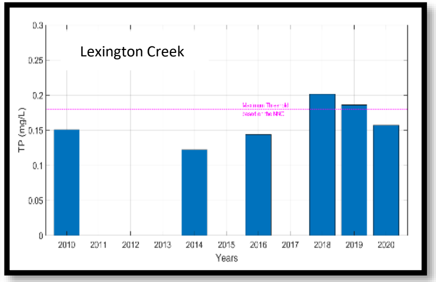


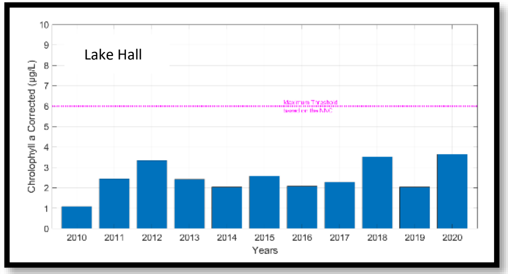
Cluster	Station	Start Year	End Year	Sample Count
NW1	21FLGW 43550 21FLKWATLEO-JACKSON-1	2013	2019	12
NW2	21FLGW 38706 21FLGW 39367 21FLKWATLEO-JACKSON-2	2010	2019	13
N1	21FLLEONLCLJ63053784341	2010	2019	35
M1	21FLCOT LAKE JACKSON NORTH 21FLGW 49151 21FLGW 55588 21FLLEONJ143052684320 21FLWQSPLEO19JAC1	2010	2020	51
MS1	21FLCOT LAKE JACKSON SOUTH 21FLGW 45475 21FLGW 46930 21FLGW 51073	2014	2020	17
S1	21FLGW 53810 21FLKWATLEO-JACKSON-3 21FLLEONLCLJ33050684310 21FLTLHRG1TLHR0124	2010	2020	50
E1	21FLLEONLCLJ53051384296	2010	2019	35
S2	21FLLEONLCLJ01304984305 21FLTLHRG1TLHR0123	2010	2020	27











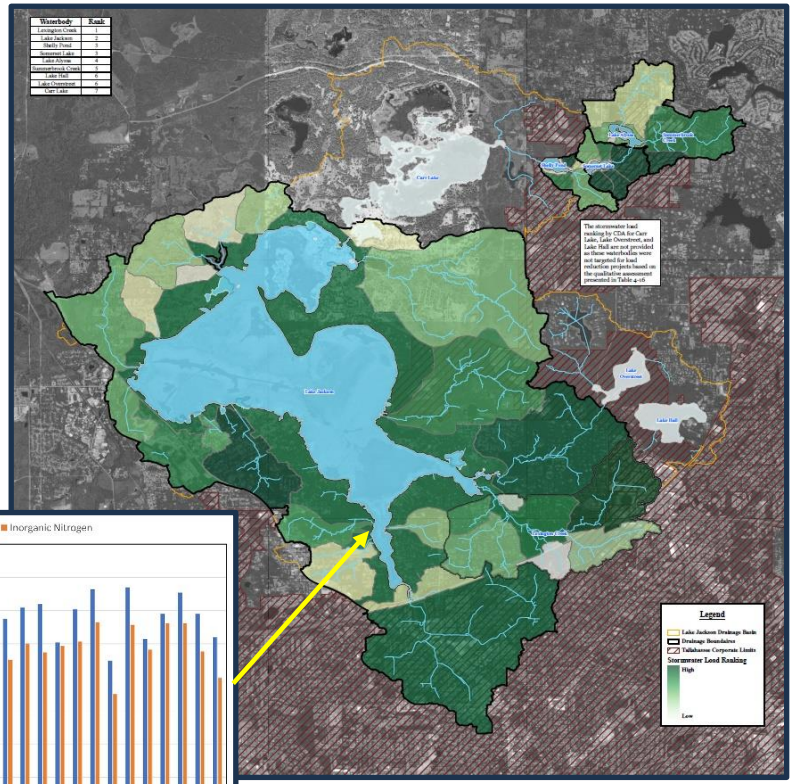
Waterbody Assessments (ranking)

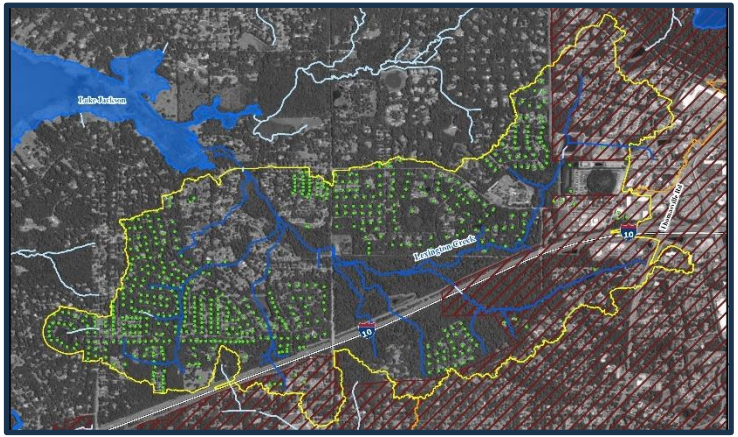
Waterbody	Impairment Status	Rank	Waterbody WQ Analyses	Rank	Biological Data (LVI or SCI)	Rank	LDI	Rank	Septic Density	Rank	Average Rank	Waterbody Rank
Lexington Creek	Impaired (bacteria)	1	TP levels above AGM stream criteria. E-Coli levels above criteria but question on validity of the data	1	Impaired and Healthy	1	Moderate	2	Upper Level (0.31-0.4)	1	1.20	**1**
Lake Jackson	Not Impaired	2	Overall lake is below but close, parts of the lake near Meginnis and Fords Arms are above the NNC thresholds	2	Mostly heathly with two years of impaired.	2	Poor - Megginnis Arm. Moderate - Fords Arm, Southwest side of lake, and Summerbrook.	1	Highest in Harbinwood, high values just around the lake (but relative). All less than 1 unit per acre	2	1.80	**2**
Summerbrook Creek and Summerbrook Chain of Lakes	Not Impaired	2	TN trending down and well below stream threshold, TP trending up but well below stream criteria, some higher E. Coli, one above 410.	3	ND	3	Moderate	2	Mid level (0.3 to 0.4)	3	2.60	**3**
Lake Overstreet	Not Impaired	2	Well below all water quality criteria, no issues	4	Healthy	4	Good	3	Lower level (0.16-0.20)	4	3.40	**4**
Carr Lake	Not Impaired	2	Nitrogen below minimum , TP between min and max some below min, Chl a all below like 2-4. TSI all good. E Coli all way low	5	Healthy	4	All excellent around the lake. Moderate in Summerbrook that drains in	4	Very low all around the lake, mid-level in Summerbrook (0.3 to 0.4 units per acre)	4	3.80	**5**
Lake Hall	Not Impaired	2	Well below all water quality criteria, no issues	6	Healthy to Exceptional	5	Good	3	Lower level (0.11-0.15)	5	4.20	**6**

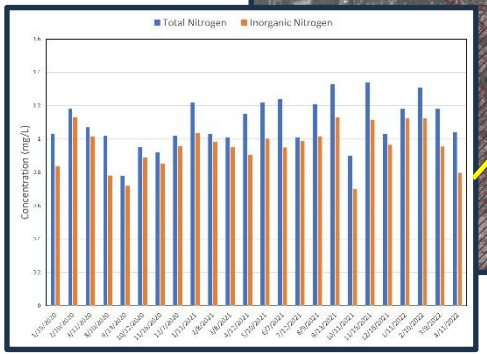
Pollutant Sources and Targets for Restoration

Pollutant Sources Considered

- Stormwater Runoff
- Septic Load
- Point Source Load
- Interlake Load (inflow from upstream waterbodies)
- Internal Load
- Atmospheric Deposition

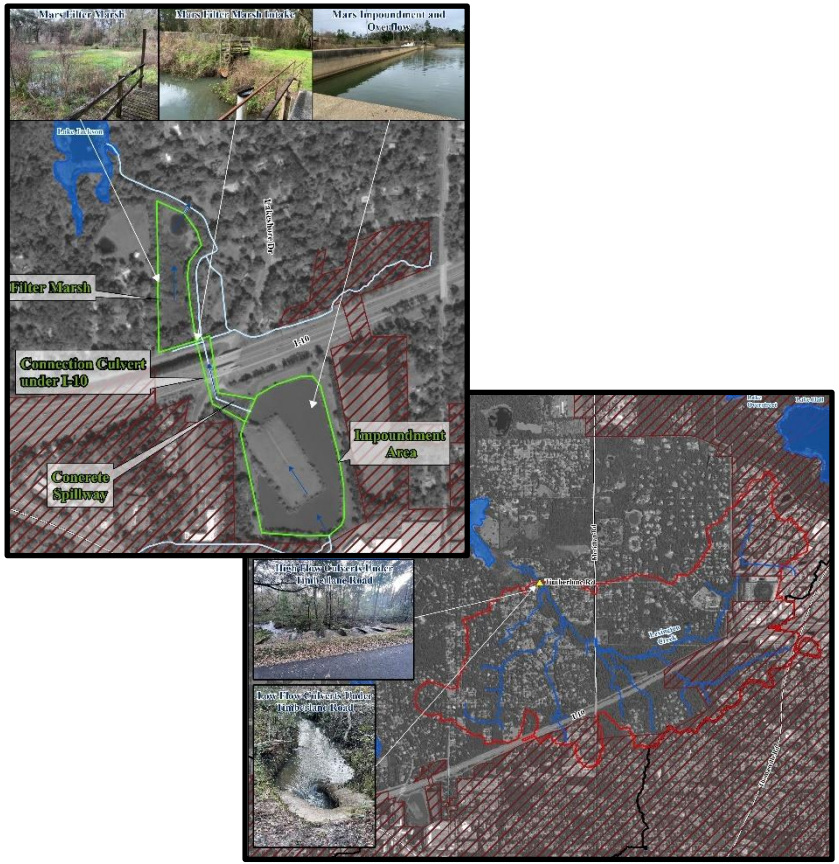






Future Studies and Data Collection

- Lake Jackson: *Re-Establish Flow Measurements in Lexington Creek*
- Lexington Creek: *FIB Source Assessment*
- Lake Jackson: *MARS Facility Restoration Study*
- Lake Jackson: *Butlers Creek and Okeeheepkee Creek Inorganic Nitrogen and FIB Source Assessment*
- Lake Jackson: *Hydrologic Budget Assessment*
- Carr Lake: *Flow Measurement and Water Quality of the Inflow from the Summerbrook Chain of Lakes*



Projects

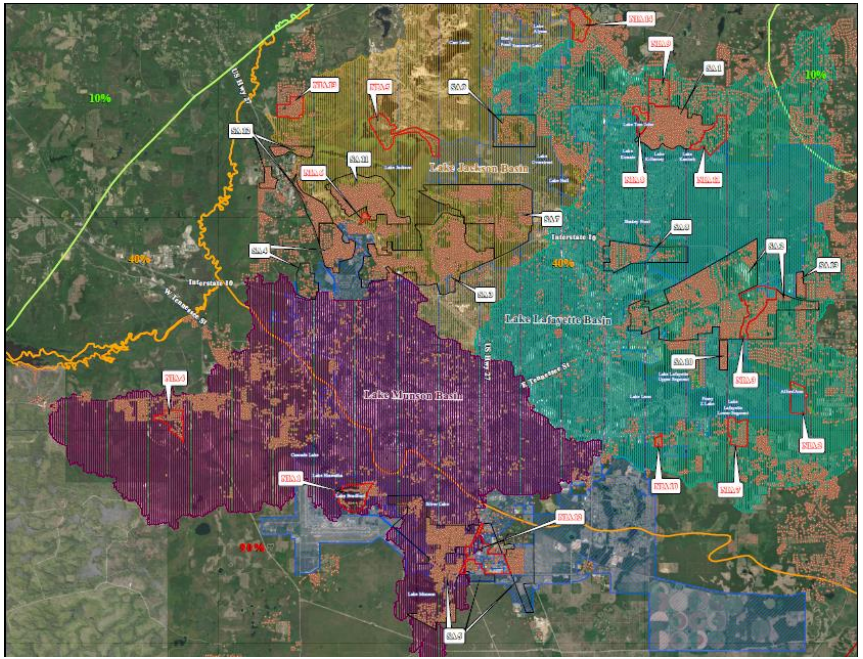
Geosyntec consultants

Non-Structural Projects

- Review and recommend updates to several existing programs and codes
  - Land Development Code (LDC) Recommended Updates
  - Comprehensive Plan Recommended Updates
  - Think About Personal Pollution Campaign (TAPP)
  - Fertilizer Ordinance Recommended Updates
  - Pet Waste Ordinance Recommended Updates
- Optimize Street Sweeping Program to maximize benefit
- Recommend enhancements for MS4

Septic to Sanitary Conversion

- Identified and prioritized a total of 27 areas based on estimated nutrient loading impact
- Focus within the Wakulla Springs BMAP primary protection zone
- Top 10 recommended for further action

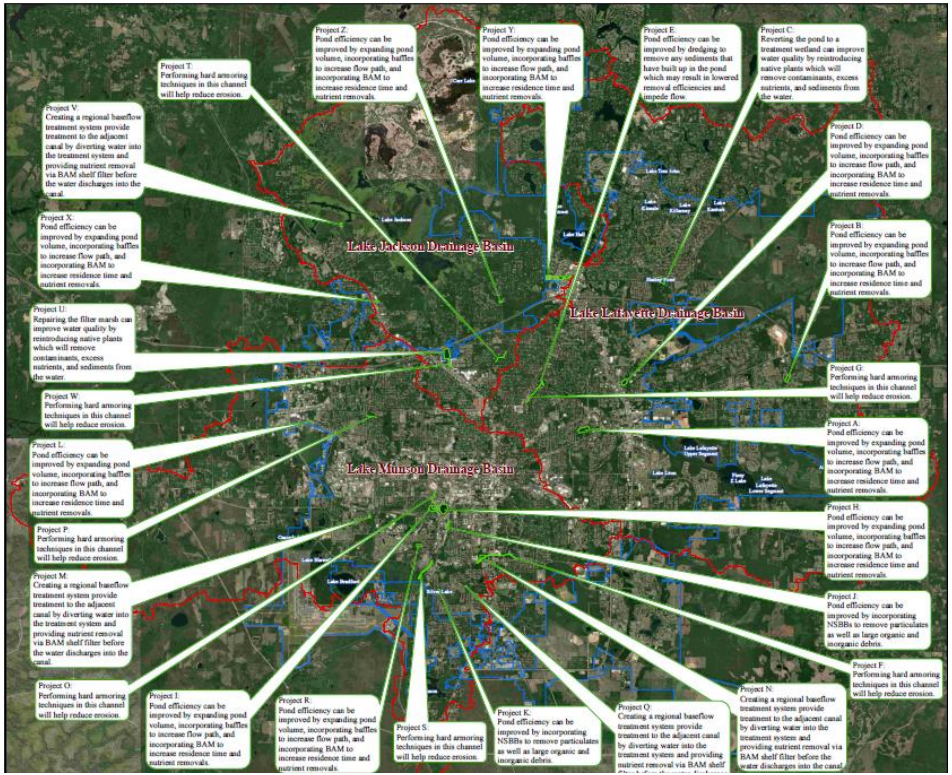


Structural Projects

- Based on the results of the hot-spot analysis structural water quality improvement projects were identified
- 26 structural projects identified
  - Enhancement of existing stormwater ponds
  - Stormwater Pond/Surface Waterbody dredging
  - Wetland Reversion
  - Channel Hard Armoring
  - Nutrient Separating Baffle Boxes (NSBB)
  - Regional Passive Baseflow Treatment Systems
  - Regional Baseflow Treatment Systems

Structural Projects

- Top projects prioritized
  - Currently underway - 4
  - Immediate consideration - 6
  - Future priority - 8



With Gratitude...

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