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# **STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT**



**PERMIT YEAR TWELVE**

March 2014 – March 2015

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SUBMITTED IN ACCORDANCE WITH THE REQUIREMENTS OF  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

**PERMIT NUMBER ALR040003**



## City of Auburn

Home of Auburn University

### **CITY OF AUBURN**

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEMS (NPDES)**

**PERMIT NUMBER ALR040003**

**MUNICIPAL STORMWATER PROGRAM ANNUAL REPORT**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

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3-4-2015

Date

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## FOREWORD

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### FOREWORD:

The mission of the Watershed Division of the Water Resource Management Department of the City of Auburn is, first and foremost, to protect, preserve, and restore the chemical, biological, and physical integrity of our local water resources. And, although the City's comprehensive Stormwater Management Program is managed by the Watershed Division, the long term success of the program will ultimately be determined by its ability to strengthen the resolve and desire of the entire community toward this same objective. This report is drafted with this understanding and therefore reflects the summary of the efforts of the community of Auburn as much as it does those of the staff of the City of Auburn. Although there are many success stories and much progress made in 2014, many challenges and concerns remain, not the least of which is the continued status of impairment of three of the City's principal water resources; Saugahatchee Creek (Nutrients), Parkerson's Mill Creek (Pathogens), and Moore's Mill Creek (Siltation). We will continue to improve upon and develop our Stormwater Management Plan in the coming years, focusing on building and expanding upon the program's strengths and identifying and implementing strategies for addressing threats to our local water resources.

### WATERSHED DIVISION STAFF:



**Daniel Ballard, PLA | Watershed Division Manager**

Education: Bachelor of Science in Zoology & Master of Landscape Architecture

Certifications/Licensure: Registered Professional Landscape Architect, Alabama #772



**Dustin "Dusty" Kimbrow | Watershed Program Coordinator**

Education: Bachelor of Arts in Geography (magna cum laude) & Master of Science in Geography

Certifications/Licensure: Qualified Credentialed Inspector, Alabama



**Ronald "Ron" McCurry | Stormwater Coordinator**

Education: Bachelor of Science in Building Science & Master of Community Planning

Certifications/Licensure: Qualified Credentialed Inspector, Alabama

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**STORMWATER MANAGEMENT PROGRAM  
ANNUAL REPORT**



City of Auburn

**PERMIT YEAR TWELVE**

March 2014 - March 2015

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**PROGRAM EVALUATION & EXECUTIVE SUMMARY**

The City of Auburn is now entering its thirteenth year as a regulated owner/operator of a small municipal separate storm sewer system, and the fifth year under the current permit cycle. Over eight of these past thirteen years the City's Stormwater Management Program (SWMP) has generally been managed and operated with the same number of staff and with the same operational budget. Over this same time period the City's physical infrastructure and population has continued to experience rapid growth, with the population increasing by approximately 25% every ten years. This rapid urbanization, which began many years before the promulgation of Phase II of the NPDES program, has presented challenges to the City's SWMP, both in the form of legacy impacts to our water resources and in the form of the ever-evolving dynamics of the impacts of urban and suburban growth on local hydrologic conditions. The most outward physical evidence of these challenges is the continued status of impairment of three of the City's principal water resources; Saugahatchee Creek, Moore's Mill Creek, and Parkerson's Mill Creek. Furthermore, the diversity of impairment (nutrients, siltation, & pathogens respectively) between these waters highlights the complexity and uniqueness of the impacts of urbanization on our watersheds and underscores the need for prescriptive and strategic plans for protection, preservation, and restoration. The City's SWMP provides the framework for accomplishing this through both targeted regulations and policies (ex. requirement of Water Quality Plans for developments discharging to impaired waters) and through the implementation of other targeted structural and non-structural control measures as required by the City's MS4 Permit and/or as outlined in the City's Stormwater Management Plan or any of the three approved Watershed Management Plans.

This report outlines, in detail, how the City is operating its SWMP and how it records and documents measurable success. Additionally, this report demonstrates how innovation, partnerships, collaboration, and dedication to a common mission can and



have permitted the City to expand the capacity of its SWMP services to a growing population at little to no increased costs for nearly a decade. These partnerships, many of which started in the formative years of the program, are the foundation of the City's SWMP and have grown to include Auburn University, Save our Saugahatchee (SOS), Friends of Chewacla Creek and Uphapee Creek (ChewUp), Alabama Water Watch (AWW), the City of Opelika, the City of Smiths Station, Lee County Highway Department, and Auburn City Schools. Some of the successes and accomplishments of the program in 2014, many of which would not be possible without these partners, include:

- Authored and distributed over 20 articles related to stormwater and watershed management in the City's OpenLine Newsletter, which is distributed monthly to over 18,000 customers.
- Established a quarterly Lunch & Learn program to educate City staff about various topics, research, and advances related to stormwater and watershed management. This program began in July, with two well-attended sessions offered in 2014.
- Continued regular quarterly meetings of the thirteenth year of the ALOAS organization and authored and distributed two jointly produced educational brochures.
- Maintained a very active outreach presence by giving thirteen diverse presentations to a variety of different organizations.
- Began creating what will soon become the City's Water Quality Monitoring Public Viewer Application/Webpage. This webpage will allow the general public to view and download water quality data obtained by the City from over 40 monitoring locations. The projected completion date for this project is March of 2015.
- Maintained an active presence on the City's website and began looking at website improvements.
- Designed and constructed three bioretention cells/gardens on City property and designed and constructed a 150 linear foot streambank stabilization project on Parkerson's Mill Creek.
- Cleaned over 15,000 miles of City streets with regenerative air street sweepers, accounting for nearly 1,000 tons of sediment, debris, and trash removed from City streets.

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- Recycled over 20,000 pounds of household hazardous waste, over 2,400,000 pounds of newspaper, cardboard, glass, and plastic trash, and over 1,200 gallons of used cooking oil/grease.
- Hosted the 11<sup>th</sup> annual City of Auburn and Lee County Highway Department Erosion and Sediment Control Workshop. This workshop was attended by more than 70 local developers, designers, engineers, and contractors.
- Performed 1,490 Erosion and Sediment Control inspections, resulting in 535 enforcement letters and six 72-Hour Notices of Violation (NOV's).
- Began development of a mobile Erosion and Sediment Control Inspection application, which will improve the efficiency of the inspection process and enforcement procedures.
- Completed the first phase of the City's Outfall Reconnaissance Inventory program, which involved the field survey of all receiving waters located in the City's MS4 jurisdiction and mapping and assessment of all storm sewer outfalls.
- Supported and participated in numerous community education and outreach opportunities, including Earth Week, the Lee County Water Festival, storm drain marking, etc.
- Continued to implement numerous recommendations outlined in the Natural Systems section of the City's Comp Plan 2030.
- Continued the weekly monitoring of 40 stations throughout the City for turbidity, adding dissolved oxygen, temperature, pH, and specific conductance in 2014.
- Continued continuous monitoring of upstream/downstream locations with two Hydrolab DS5 multiparameter water quality sondes.
- Developed and began the implementation of a multi-phased Source Water Monitoring Plan.
- Continued to finance USGS stream gaging operations on both Saugahatchee and Chewacla Creeks.
- Completed the twelfth year of conservation measures outlined in the Chewacla Creek Safe Harbor Agreement.
- Reduced sanitary sewer overflows (SSO's) by over 60% over the last six years.

*Goals for the Upcoming Year*

The Watershed Division regularly evaluates the effectiveness and efficiency of its operations, both from a permit compliance perspective as well as a mission/objectives perspective. This allows staff to identify elements of the SWMP that are working, those that are not, and those that need or warrant modification. Staff work to continue those services that they determine effective, eliminate those that are not, and establish goals for improving those that could be. Below is a list of items determined as goals for 2015.

- Increase public education and awareness through additional storm drain marking activities, involvement with our local schools and other education and outreach initiatives;
- Continue implementation of the Outfall Reconnaissance Inventory Program. This should include continued updating of the outfall inventory and continued development of a monitoring plan to evaluate each flowing outfall;
- Continue improving upon the City Erosion and Sediment Control Inspection and Enforcement Program. This should include improvements in efficiency of the inspection-enforcement process via the mobile application and improvements in lot-level controls via improved coordination with Codes Enforcement;
- Complete and publish the City’s Water Quality Monitoring Public Viewer Application;
- Review and revise the City’s SWMP and Water Quality Monitoring Plan;
- Continue the implementation and enhancement of the City’s comprehensive water quality monitoring database that houses data from the City’s various water quality monitoring programs;
- Continue promotion and implementation of low impact development/green infrastructure principles and best management practices;
- Continue the City’s newly created quarterly Lunch & Learn program;
- Implement the City of Auburn Rainwater Harvesting Program;
- Begin development of a Green Infrastructure Database;
- and, design and install at least one green infrastructure element on City property.

## **I. INTRODUCTION**

In response to the National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Regulations, the City of Auburn (City) applied for and received an NPDES permit for stormwater discharges from the Alabama Department of Environmental Management (ADEM) on May 14, 2003. The initial permit expired in March 2008 and was reissued by ADEM effective February 1, 2011. This permit (ALR040003) was modified on February 24<sup>th</sup>, 2012 and is included in this report.

This report is being submitted to the ADEM pursuant to Part V; paragraph C of NPDES Permit ALR040003.

This annual report is the City's twelfth report, and fourth under the reissued permit, and covers the reporting period from March 2014 through March 2015. The stormwater program outlined in this report is patterned after the program submitted to and approved by ADEM in March 2003 in the City of Auburn's Notice of Intent (NOI) and in accordance with the City's Stormwater Management Plan that was updated and submitted to ADEM in July 2011.

## II. SITE DESCRIPTION

The City of Auburn is located in East Central Alabama. A map of the City is provided in Appendix B. The Auburn, Alabama urbanized area encompasses 50.27 square miles per the 2010 U.S. Census. Approximately 26.80 square miles of the Auburn City Limits are located within this urbanized area. The current population of Auburn is approximately 58,582 per the 2013 U.S. Census. There are approximately 286 miles of creeks and streams flowing through Auburn, approximately 667 lakes, ponds, and other open waters, and +/- 370 acres of wetland. From the most recent City storm drainage system inventory, the storm drainage system contains approximately 126 linear miles of storm pipe. The City is updating its stormwater infrastructure inventory on a routine basis using the City's survey crew, as well as private surveyors.

### *Geographic Context*

The City of Auburn is situated within a unique transitional zone between the Piedmont and Coastal Plain physiographic regions of the Southeastern United States (Figure 1). More specifically, the City is located within the Level IV sub-ecoregion known as the Southern Outer Piedmont. This ecoregion is generally characterized as having lower elevations, less relief, and less precipitation than that exhibited in other regions of the Piedmont. Overstory cover type within this region consists mostly of mixed deciduous (oak, gum, hickory) and mixed coniferous (pines, firs, spruces, etc.) with the presence of numerous monotypic pine plantations scattered throughout. Specific to these transitional areas in the southeast is the presence of the “fall line”, the geographic divide between the Piedmont and Coastal Plain. More information can be found at the link provided below. The City's presence within this transitional area between the piedmont and coastal plain regions provides for a unique hydrogeomorphic diversity of water features within a relatively small geographic area. This diversity is exemplified in the abundance and variety of stream channel features, varying substrate composition, and variety of aquatic habitats. For example, streams in central Auburn generally exhibit piedmont characteristics, such as strong riffle/pool complex formation and cobble/gravel substrate composition, yet they cascade to a coastal plain dynamic of long runs and sandy substrates as they flow to the western and southern extents of the City. Similarly, the topography of each of the contributing watersheds follows the same pattern of increasing coastal plain-like features to the west and south of the City.

Link to a map of Alabama's physiographic regions:

[http://alabamamaps.ua.edu/contemporarymaps/alabama/physical/al\\_physio.pdf](http://alabamamaps.ua.edu/contemporarymaps/alabama/physical/al_physio.pdf)

### **III. KNOWN OR SUSPECTED WATER QUALITY PROBLEMS**

The City's municipal separate storm sewer system (MS4) discharges into streams located in three primary (10-digit HUC) watersheds; Saugahatchee Creek Watershed, Uphapee Creek Watershed, and Chewacla Creek Watershed. Smaller watersheds of the Saugahatchee Creek Watershed to which portions of the City's MS4 discharge include the Loblockee Creek Watershed and the Little Loblockee Creek Watershed. Smaller watersheds of the Chewacla Creek Watershed to which portions of the City's MS4 discharge include Parkerson's Mill Creek, Moore's Mill Creek, and Town Creek. The only smaller watershed of the Uphapee Creek Watershed to which portions of the City's MS4 discharge include the Choctafaula Creek Watershed.

Moore's Mill Creek was placed on the draft 303(d) list in 1998 and has been listed on the final 303(d) lists from 2002 to present. Known water quality concerns within the jurisdictional area were identified as stream siltation resulting from sedimentation deriving from local development within the Moore's Mill Creek watershed and in-stream erosion. The ADEM 2014 303(d) list projects a TMDL to be drafted in 2017. The Moore's Mill Creek Watershed Management Plan was drafted and finalized in May of 2008.

The Saugahatchee Embayment, where Saugahatchee Creek discharges into Yates Lake, was placed on the final 303(d) lists from 1996 to 2008. The Embayment was listed on the 303(d) lists primarily for nutrient enrichment. ADEM and the USEPA issued the final Total Maximum Daily Load (TMDL) for nutrients and organic enrichment/dissolved oxygen for Pepperell Branch and the Saugahatchee Embayment in April 2008. Implementation of the stormwater TMDL is addressed in the City's Phase II Permit that was issued on February 1, 2011 (modified on February 24<sup>th</sup>, 2012) and the City's updated Stormwater Management Plan that was submitted to ADEM in July 2011. The Saugahatchee Watershed Management Plan was drafted and finalized in February of 2005.

Parkerson's's Mill Creek, from its source to Chewacla Creek, was placed on the final 303(d) list in 2008 and 2010. Known water quality concerns within the jurisdictional area were identified as pathogens resulting from urban runoff, storm sewers, and illicit discharges. A TMDL for Parkerson's's Mill Creek was issued by ADEM in September 2011. Implementation of this stormwater TMDL is addressed in the City's Phase II Permit issued on February 1, 2011 (modified on February 24<sup>th</sup>, 2012) and the City's updated Stormwater Management Plan that was submitted to ADEM in July 2011. The Parkerson's Mill Creek Watershed Management Plan was drafted and finalized in December of 2011.

#### **IV. RESPONSIBLE PARTY**

The City's Stormwater Management Program (SWMP) is implemented by several programs operating under various departments within the City's organization. Components of the SWMP and each department's respective responsibilities are as follows:

- Environmental Services Department – Operates the recycling and composting program; Operates and manages the street sweeping program; Hosts the annual Household Hazardous Waste Collection Day program;
- Parks and Recreation Department – Hosts annual Earth Day activities and conducts the annual Arbor Day Tree Giveaway program; Manages the City's Greenway/Greenspace Program;
- Planning Department – Assists with reviewing and approving low impact development projects; Manages CompPlan 2030 and future land use planning efforts;
- Public Safety Department, Codes Enforcement Division – Monitors residential and commercial construction;
- Public Works Department – Performs maintenance of stormwater infrastructure and assists with inspections of residential and commercial construction; Performs annual detention pond inspections;
- Water Resource Management Department – Monitors residential and commercial construction and conducts erosion and sediment control inspections; Manages water quality sampling program; Manages public education and outreach program; Assists the Public Works Department with annual detention pond inspections; Manages overall SWMP and compliance with Phase II Stormwater Permit.

When the City began its Phase II program, coordination and implementation of the individual SWMP was the responsibility of the Public Works Department. In October 2005, management of the stormwater program was transferred from the Public Works Department to the Water Resource Management Department, under a newly created Watershed Division. The intent of the move was to manage water supply operations, wastewater operations, and stormwater operations from a watershed perspective for all components that impact water quality within the City.

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The person responsible for the coordination and implementation of the individual SWMP is as follows:

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**V. STORMWATER MANAGEMENT PROGRAM COMPONENTS**

The Phase II stormwater regulations require operators of small Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas to develop and implement stormwater management programs employing best management practices (BMPs) to adequately address six minimum control measures. The control measures include:

- Public Education and Outreach;
- Public Involvement/Participation;
- Illicit Discharge Detection and Elimination;
- Construction Site Stormwater Runoff Control;
- Post-Construction Stormwater Management; and
- Pollution Prevention/Good Housekeeping for Municipal Operations.

In March 2003, the City submitted to ADEM a Notice of Intent (NOI) to implement a SWMP under the Phase II stormwater regulations. The City updated its SWMP in 2011 to comply with the reissued Phase II Permit and submitted it to ADEM in July 2011. The goals and details of the City's program are outlined in the updated SWMP. At the end of permit year twelve, and the fourth year under the reissued permit, all program components outlined in the SWMP have been implemented. The City will be reviewing and updating its SWMP and Water Quality Monitoring Plan during calendar year 2015.

## VI. PUBLIC EDUCATION AND OUTREACH ON STORMWATER IMPACTS

### A. Articles in the City Newsletter “Open Line”

Open Line is a monthly newsletter mailed to Auburn citizens through their utility bill. Articles and messages contained in the newsletter reach a large and diverse group of citizens. The goal for articles in Open Line is to produce two (2) articles per year. During the twelfth permit year, a total of twenty (20) articles were published in which stormwater related issues were highlighted or affected:

- *Christmas Tree Recycling Program reminder – January 2014*
- *Holiday box recycling reminder – January 2014*
- *March 22<sup>nd</sup> Big Event Day Proclaimed – February 2014*
- *Household Hazardous Waste Collection Day Announced – April 2014*
- *City of Auburn Tree City Recognition – April 2014*
- *Trash Amnesty Week Announced – May 2014*
- *City recognized for Comp Plan 2030 – July 2014*
- *Help Prevent Stormwater Pollution Announcement – October 2014*
- *Flood protection and preparation information (11 separate articles) – October 2014*
- *Auburn Recycling Program – December 2014*



Copies of these articles can be downloaded from the City’s website at <http://www.auburnalabama.org/openline/>.



**B. Brochure Publications**

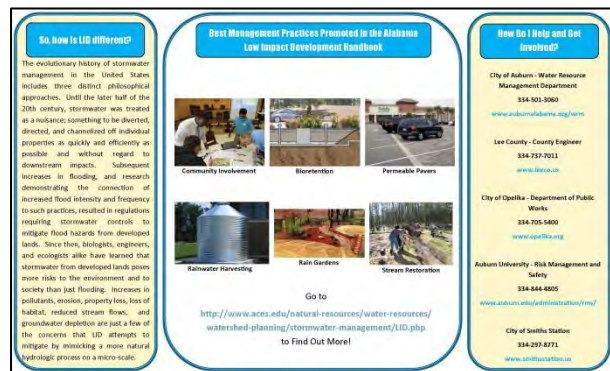
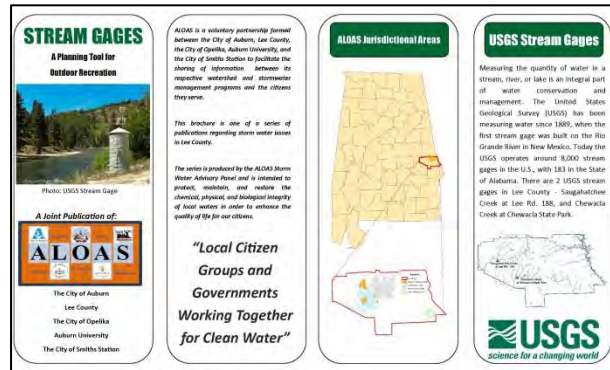
Pamphlets and brochures are an effective way to present and explain stormwater issues. Unlike other communication vehicles, pamphlets and brochures can be distributed in many locations without requiring staffing and the location of distribution can specifically target the audience you are trying to reach. The goal for brochure publications is to produce two (2) brochures per year. During the twelfth permit year, two (2) brochures were published with several other brochures made available for distribution by the City. Brochures provided by the City over the past year include the following brochures published by the Auburn, Lee County, Opelika, Auburn University and Smiths Station (ALOAS) Citizen Advisory Group:

- USGS Stream Gaging Program
- Alabama Low Impact Development Manual

Copies of these brochures can be downloaded from the City’s website at:  
<http://www.auburnalabama.org/wrm-watershed/Default.aspx?PageID=211>

**Additional Brochures Distributed:**

- Washing Cars (Alabama Clean Water Partnership (ALCWP))
- Changing Oil (ALCWP)
- Pets (ALCWP)
- Fertilizing (ALCWP)
- Saugahatchee Creek Watershed: Past, Present and Future (Saugahatchee Watershed Management Plan Group (SWaMP))
- Fats, Oils and Grease Recycling Program (City of Auburn)
- ALOAS brochures from previous years



**C. Website**

Citizens can go to the City’s website to obtain information on items of local interest. The web page is accessible 24 hours per day and can serve citizens that do not have the time or the ability to physically meet with staff during normal working hours.

The goal for the website was to develop a Phase II Stormwater section on the existing website in 2003 and post that website in 2004. This goal was met a year early when the Phase II Stormwater website was posted in March 2003. City stormwater policies, ordinances, design manuals and links to related sites (ADEM and EPA) have been posted and are available to the public.

The City’s Stormwater website was moved from the Public Works Department home page to the Water Resource Management Department home page in 2005. The Stormwater website was updated in 2014 to include new ALOAS brochures and work is currently underway on a public viewer application for the City’s various Water Quality Monitoring programs. In 2014, the Stormwater website was visited 433 times by 350 unique users/viewers.



For more information on the website please visit:

<http://www.auburnalabama.org/wrm-watershed>

**D. Public Presentations**

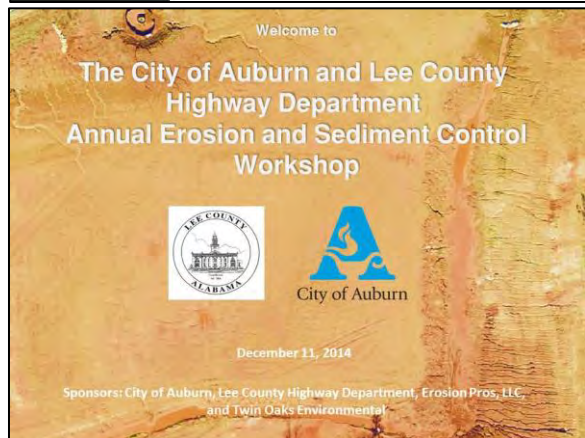
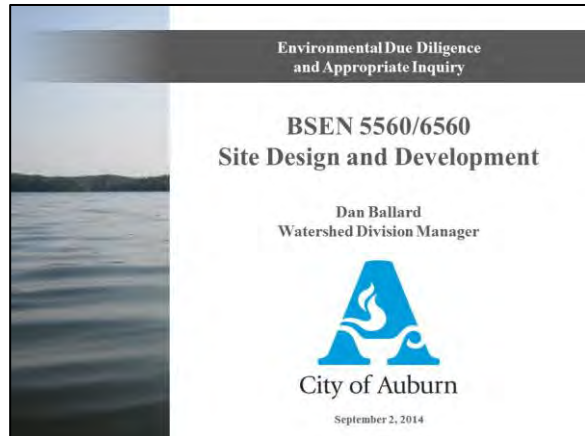
The City provides staff and/or resources to perform presentations for various groups and public meetings. Typically presentations are offered in PowerPoint format and the topics are chosen by the organization requesting the information.

Thirteen (13) presentations were made during the twelfth permit year. Presentations were given at various conferences and to various groups, including the Alabama Water Resources Conference, Save Our Saughatchee/Friends of Chewacla and Uphabee, a Clemson University Stormwater Delegation, Auburn University Biosystems and Civil Engineering classes and City officials.

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Presentations prepared and provided by City staff over the past calendar year include:

- Careers in Water Resource Management; Students of the first annual Auburn University Stream Team; Auburn University, AL (July 2014)
  - Two Presentations
- The City of Auburn, Alabama Erosion and Sediment Control Program; The City of Auburn Erosion and Sediment Control Workshop; Auburn, Alabama (December 2014)
- Environmental Due Dilligence for Site Development; Auburn University Biosystems Engineering class; Auburn University, AL (September 2014)
- City of Auburn, Alabama: Outfall Reconnaissance Clemson University Stormwater Delegation; Auburn University, AL (August 2014)
- City of Auburn, Alabama: Outfall Reconnaissance Inventory Program; Alabama Water Resources Conference; Orange Beach, AL (September 2014)
- Watersheds of Auburn and the Opportunity of the Extension of the Alabama Scenic River Trails; City of Auburn officials; Auburn, AL (April 2014)
- Water Resource Management; Citizens' Planning Academy; Auburn, AL (October 2014)
- Design Communications and Design Visualization; Auburn University Biosystems Engineering class; Auburn University, AL (December 2014)
- The City of Auburn's Watershed and Stormwater Management Program; Auburn University



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Master of Landscape Architecture Faculty Meeting; Auburn University, AL (March 2014)

- Green Codes and Ordinances; Alabama Clean Water Partnership Conference; Montgomery, AL (February 2014)
- City of Auburn WRM Department; One to a delegation from Mongolia and the second to the Osher Lifelong Learning Institute at Auburn University; Auburn, AL (August 26, 2014 and September 22, 2014 respectively)

### **E. Workshops/Training Hosted**

In an effort to educate contractors, developers, engineers, and staff, the City has initiated a series of workshops. The content of the workshops focuses on local stormwater issues of concern. Workshops/training hosted by the City over the past year include:

- **Erosion and Sediment Control Workshop (December 2014)** – The City and Lee County hosted its eleventh annual Erosion and Sediment Control Workshop on December 11, 2014. The purpose of the Workshop is to educate and interact with local engineers, developers and contractors who are governed by the City’s Erosion and Sediment Control Ordinance, the ADEM stormwater regulations, and the United States Environmental Protection Agency (EPA) regulations. This past year’s speakers included Dr. Wesley Zech from Auburn University’s College of Engineering, Mr. Joel Seawell from Erosion Pros and Dan Ballard and Ron McCurry from the City of Auburn. Both Mr. Seawell and Dr. Zech focused on current and innovative erosion and sediment control technologies, while Dan Ballard and Ron McCurry’s presentation focused on the City’s local Erosion and Sediment Control Inspection and Enforcement Program. A field demonstration of the latest technologies in erosion and sediment control was provided by Twin Oaks Environmental, a local erosion and sediment control contractor. Approximately 70-75 developers, contractors, engineers and City personnel attended the workshop.
- 
- **Materials Handling/Spill Prevention Training** – With the assistance of Mr. Tom McCauley, Auburn University’s Environmental Risk Management, the Water Resource Management Department conducted an informal review of its applicable facilities for proper Spill Prevention, Control and Countermeasures (SPCC) in October 2013. The City began addressing some of the

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recommendations that resulted from that review in 2014, including improving general housekeeping, storage, & labeling procedures at the Bailey-Alexander Water and Sewer Complex, repainting of the above-ground fuel storage tanks at the Public Works Construction Division Facility, and annual training of two Public Works staff in Spill Prevention Control & Countermeasures.

- **Quarterly Lunch & Learn Workshops**

– The Water Resource Management Department hosted two “Lunch & Learn” Workshops in 2014. The Lunch and Learn Program is a new and ongoing education and outreach initiative, providing opportunities for staff from all City departments to learn about advances in research, technologies, and practices related to stormwater management. John Curry of



Trimble/Hydro Engineering Solutions gave a presentation on Innovative Trimble Technologies for Stormwater Management in July 2014 and James Cherry of the United States Corp of Engineers gave a presentation on Section 404 of the Clean Water Act in November 2014. Each of these workshops was attended by 12-14 City personnel, with opportunities for Q&A and general discussion accompanying each presentation.

- **Webcasts & Webinars** – The Water Resource Management Department regularly schedules and participates in online webinars and webcasts training opportunities. In 2014, stormwater and watershed-related webinars/webcasts attended by City staff included topics such as stormwater financing, retrofitting of existing stormwater infrastructure for water quality, green infrastructure, testing and evaluating stormwater products, complete streets, and source water contamination preparedness.

### F. **Composting and Recycling Center/Household Grease Recycling Program**

The City of Auburn has been operating a curbside recycling program since 1987. In addition to curbside recycling, the City maintains a drop-off center for recyclables. The *RecycleAuburn* drop-off center is located across from the Fleet Services Complex at 365-A North Donahue Drive. These operations allow citizens of Auburn to recycle waste instead of disposing of it in the landfill. The



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Water Resource Management Department initiated a Household Grease Recycling Program in 2009 with containers and bins located at the recycling center. This program provides citizens with a mechanism to properly dispose of household grease and is targeted at reducing potential sanitary sewer overflows. In 2011, the Water Resource Management Department launched a curbside household grease recycling program that provides residents with an opportunity to collect their household grease and have it picked up by City personnel at their residence. **Approximately 4,625 gallons of used cooking oil/grease have been collected since implementation of the program began in March 2009, with 1,269 of those gallons collected in 2014.** For more information on our household grease recycling program, please visit:

<http://www.auburnalabama.org/wrm-sewer/Default.aspx?PageID=186>.

In addition, the City maintains a Compost Demonstration Site that serves as an example of how homeowners can easily incorporate a home composting operation into a normal backyard setting. The site features six backyard compost units. The units range from a simple pile to a concrete bin. The exhibits take the public through the process of how to compost and recycle materials for garden use and encourage these practices. For more information on recycling of waste, please visit:



<http://www.auburnalabama.org/es/>.

**G. Storm Drain Marking Project**

In cooperation with the Auburn University Sustainability Initiative, the City initiated a storm drain marking program in 2007. School children within the City of Auburn were asked to submit designs for the original markers that were to be placed in the Saugahatchee Creek, Town Creek and Moore’s Mill Creek watersheds. A number of the students’ designs were selected





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for use. In 2010, the City of Auburn solicited new marker designs from children in the local school system. Winners were selected in April 2010 and had the opportunity to meet Mayor Ham to showcase their artwork. The local newspaper also ran an article on the project in April 2010. In 2009, the City developed a storm drain marking kit program that allows citizens to pick up a bag of materials containing all of the items needed to mark storm drains in their neighborhoods. Once the drains are marked, the citizen returns any unused materials to the Water Resource Management Department as well as a map showing the storm drains that were marked. In 2014, markers were installed by a variety of local interest groups including Auburn University Honors Students, Auburn University Service Learning Students, Auburn City Schools JROTC students, and a number of local citizens. During 2012 - 2013, the City hosted its third Storm Drain Marker Design Competition. This competition invites all 3<sup>rd</sup> – 5<sup>th</sup> grade elementary students to compete in designing the City's next storm drain markers. Winners were selected in March 2013 and each student received their award (a plaque with the storm drain marker they designed and a newspaper article published in the local paper) during a special presentation with the Mayor at City Hall. The City will continue to host these design competitions until all storm drains in the City have been marked. In 2014, approximately **150** markers were installed. Since implementation of the program began approximately **1,756** markers have been installed, representing approximately **54 percent** of all the documented storm drains in the City of Auburn.



### H. Ogletree Elementary School Earth Day Field Activities

This event is an all-day natural resource education and outreach initiative organized by the teachers of Ogletree Elementary School for 3<sup>rd</sup> – 5<sup>th</sup> grade students. It is typically held at Chewacla State Park, and includes a variety of outdoor education and recreation activities. Water Resource Management staff have given presentations to the students and teachers about watershed and stormwater management, water quality and water quality monitoring, and aquatic biology. Students and their teachers are given a basic, hands-on



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introduction to water quality monitoring, along with information about non-point source and point source pollution prevention and reduction and tips on water conservation. Due to scheduling conflicts with the Auburn City Schools, this event was not held in 2014. Ogletree Elementary School has already contacted the City about participating in this event in 2015, which is tentatively schedules for May 5-7.

### I. Streamside Classroom Initiative

In an effort to educate and raise awareness in our community about the need to protect local streams, the City of Auburn, ALOAS (citizen stormwater advisory committee), Save Our Saugahatchee (S.O.S.) and Auburn City Schools have joined together to provide streamside classroom activities. The event was not held in 2013 or 2014 due to being unable to work out a time with the school to have the event. The program, geared to sixth graders, focuses on providing students with a background in the type of habitat expected to sustain a healthy stream. The students conduct a chemical analysis of the stream and compare the results with that of a biological assessment of the same stream. The City of Auburn participates by providing funding for transportation of the students to and from the stream site as well as for having appropriate restroom facilities on site. The City will work with S.O.S. and Auburn City Schools to have an event in 2015.



### J. Exploring Alabama's Living Streams Workshop

In June of 2014 Pick Elementary School hosted an Exploring Alabama's Living Streams (EALS) Workshop to help promote the use of the EALS curriculum for 4<sup>th</sup>-12<sup>th</sup> graders. The EALS curriculum targets middle and high school age students and is meant to serve as a “*foundational guide for longer time periods by bringing in materials that complement classroom learning objectives*”. This workshop was intended to familiarize teachers with the EALS curriculum and water quality monitoring and to demonstrate how it can be incorporated into the existing core science curriculum. More information about this program can be found at [http://www.alabamawaterwatch.org/environmental\\_education/eals.html](http://www.alabamawaterwatch.org/environmental_education/eals.html).

**Exploring Alabama's Living Streams Workshop**

The Exploring Alabama's Living Streams curriculum provides educators (formal and volunteers) with hands-on activities for teaching students about the aquatic insects of Alabama, and the story they tell about water quality in our streams and rivers. Participants will learn how to do a stream bioassessment with students.

When: Tuesday, June 3<sup>rd</sup> 9am – 5pm  
Wednesday, June 4<sup>th</sup> 9am – 12pm

Where: Pick Elementary School  
1220 N. College St.  
Auburn, AL 36830

For more information and to register:  
<http://lhamat.com/EALS-Auburn>  
or call the Alabama Water Watch Office at 334-844-4785  
(pre-registration required)

- EALS is correlated to the Alabama Science Standards (4<sup>th</sup>-12<sup>th</sup> grades), Project Wet, and the Discovering Alabama (AFT Series)
- AMST Affiliates Program
- Continuing Education Units are available through Auburn University

Alabama Water Watch

Alabama 4-H

**K. Rain Garden Design Workshop**

In cooperation with the ALOAS advisory group the Alabama Cooperative Extension System held a rain garden design workshop on July 22<sup>nd</sup>, 2014. This workshop presented methods for sizing and designing rain gardens, detailed property construction techniques, and gave participants the opportunity to gain hands-on experience in rain garden design and installation. The workshop culminated with the installation of a rain garden at a local single-family residential household in Auburn, Alabama. approximately 20 citizens.



This workshop was attended by

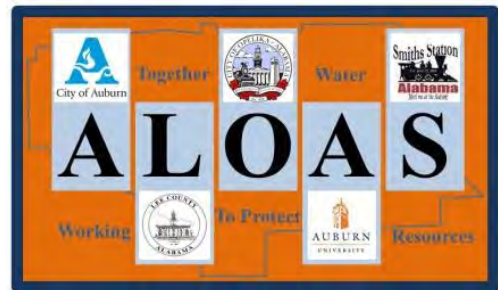
## VII. PUBLIC INVOLVEMENT/PARTICIPATION

### A. Citizens Advisory Committee

Both the EPA and ADEM recommend that the public be included in developing, implementing, and reviewing stormwater management programs through the establishment of a citizens advisory committee. Communities that encourage citizens representing diverse backgrounds and interests to participate in the development of stormwater management programs are far more likely to gain community support during the implementation process.



**ALOAS CITIZENS STORMWATER ADVISORY COMMITTEE** (2001-present) - **ALOAS** is a Citizens' Advisory Committee that serves Auburn, Lee County, Opelika, Auburn University and Smiths Station. It meets on a quarterly basis to review and provide public input on current policies, brochure content, educational material, and proposed ordinances. Prior to 2012, the Citizens Advisory Group was known as ALOA. In 2012, the City of Smiths Station joined the group and the group renamed itself ALOAS to include the addition of Smiths Station. ALOAS meets quarterly throughout the year, with **four meetings held in 2014**.



In 2014, ALOAS produced two brochures. The two brochures produced were titled *Alabama's Low Impact Development Manual* and *USGS Stream Gaging Program*. These brochures are available to the citizens of Auburn and can be obtained at City Hall, the Bailey-Alexander Water and Sewer Complex or by contacting the Water Resource Management Department at (334) 501-3060. The brochures can also be downloaded from the City's website at <http://www.auburnalabama.org/wrm-watershed/Default.aspx?PageID=211>.

### B. Watershed Organizations

Regional watershed organizations bring together representatives from utilities, private industry, environmental awareness groups, farmers and branches of government to coordinate individual efforts, share information and plan for water resource and

aquatic life protection. The regional approach allows participating entities to expand upon individual efforts in order to maximize limited resources. These organizations also allow for the sharing of ideas, lessons-learned, and development of professional networks.

**Lower Tallapoosa River Basin/Clean Water Partnership** (2001-present) - The City actively participates in the Lower Tallapoosa River Basin Clean Water Partnership and on technical sub-committees to assist and guide the development and implementation of a watershed management plan. The organization meets on a quarterly basis. In 2014, as a member of the Clean Water Partnership (CWP), the City participated in quarterly meetings, gave a presentation at the Alabama Clean Water Partnership Conference titled “*Green Codes and Ordinances*” and also hosted a quarterly meeting of the CWP’s Tallapoosa Steering Committee at the City of Auburn Hubert and Grace Harris Senior Center on November 6, 2014.



**Saugahatchee Watershed Management Plan Group (SWaMP)** (February 2004 – 2013) - Over the course of nearly ten (10) years, the City of Auburn actively participated in the SWaMP group along with other stakeholders in the Saugahatchee Creek watershed to implement best management practices recommended in the watershed management plan for the watershed that encompasses parts of Lee, Macon and Tallapoosa Counties. The stakeholder group was made up of representatives from the Cities of Auburn and Opelika, MeadWestvaco, Inc., Save Our Saugahatchee (S.O.S.), the Natural Resources Conservation Service (NRCS), the Alabama Cooperative Extension Service (ACES), the Lower Tallapoosa River Basin Clean Water Partnership (LTCWP) and Auburn University. The plan was finalized and submitted to the ADEM in March 2005. The SWaMP group received Phase I implementation funding from ADEM in 2007. SWaMP completed the first three (3) years of implementation (Phase I) in January 2010. Funding for Phase I of the implementation plan expired in 2010 and SWaMP applied for, and was awarded, a Phase II implementation program grant in January 2011 and expired in December 2013. A final report on Phase I Implementation was submitted to the ADEM in March 2010 and a final report on Phase II Implementation in December 2013. **Although SWaMP is no longer an active organization, the partnerships and networks that development as a result continue and have influenced and inspired numerous other water quality initiatives.** Some of the activities performed as a result of SWaMP are:

- Smart Yards Incentive Program – Implementation of a program to provide funding assistance to homeowners in Auburn to install landscape BMPs on their property aimed at reducing stormwater runoff and potential pollutant

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contributions. SWaMP worked with approximately 10 homeowners in the past year to install stormwater BMPs on their property.

- Rain Garden Workshops (2013) – SWaMP facilitated three (3) workshops in 2013. Workshops involved installing rain gardens at local residences in Auburn. Participants were educated on the importance of stormwater management, as well as the proper design, installation and maintenance of a rain garden.
- Rainwater Harvesting Workshop (April 2013) – Hosted in conjunction with the Alabama Cooperative Extension Service and Auburn University. Thirty (30) participants learned the basics of rainwater harvesting at this workshop.



**Parkerson’s Mill Creek Watershed Management Plan Group** (March 2010 – present) - Parkerson’s Mill Creek was placed on Alabama’s 303(d) List of Impaired Waters for pathogens in 2007 and a pathogen TMDL for the Parkerson’s’s Mill Creek Watershed was subsequently approved by ADEM in July 2011. Beginning in March 2010, the City has actively participated as a stakeholder in the development of the Parkerson’s’s Mill Creek Watershed Management Plan for the past six (6) years. This Plan was made possible through a Clean Water Act Section 319(h) grant from the United States EPA and ADEM. The Plan’s purpose is to outline a framework of BMP’s for restoring water quality in Parkerson’s Mill Creek by addressing impacts from non-point source pollution (stormwater runoff). The Plan was submitted to ADEM for approval in late 2010 and implementation funding was received from ADEM in 2011. The City will continue to be involved as a stakeholder in the implementation of the Parkerson’s Mill Creek Watershed Management Plan. An update on Parkerson’s Mill Creek Watershed Management Plan activities completed in 2014 can be found below:



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- Construction was completed in April 2014 for the City of Auburn Softball Complex stream project (150 lf). Project components included 75 linear feet of toe-wood, boulder vanes, stormwater outfall protection, and native vegetation. (32°33'21.38"N, 85°30'43.48"W)



- The Corley Courtyard Stormwater Education Plaza was completed in August 2014. Two- 6 foot deep, 1,500 ft<sup>2</sup> bioretention cells were constructed and educational signs will be installed in Fall 2014. It will serve as an outdoor teaching classroom for Biosystems Engineering faculty, students, campus visitors, Extension workshops, and campus Sustainability Academic Program tours. An Honors College Biosystems Engineering student was responsible for the original design and concept as part of the honors college requirements and curriculum. Post-storm event sampling will be analyzed and described by Biosystems faculty and students to evaluate pollutant removal. The first storm event sample was very low turbidity. Nutrient analysis has not yet been performed.
- The PMC project assisted with a 350 linear foot stream restoration project in the stream headwaters as part of the newly completed Auburn University Wellness Kitchen. PMC grant dollars were used to purchase educational signage. Auburn University Facilities and Athletics funded the actual restoration design, construction, and vegetation. Future improvement of the stream is included in the Auburn University Campus Master Plan and the Landscape Master Plan.



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For more information on the Parkerson’s Mill Creek Watershed Management Plan, please visit <http://www.aces.edu/waterquality/pmc.htm>.

**C. City of Auburn Earth Week 2014/Household Hazardous Waste Collection Day**

Earth Day is a week-long event in the City of Auburn. Over the last several years, City departments have worked to create and implement a week of environmental activities and events aimed at educating citizens of all ages of the importance of protecting our environment. In conjunction with Earth Week 2014, the City hosted its 10<sup>th</sup> Annual Household Hazardous Waste Collection Day. This annual event is a favorite among Auburn residents. Each year, the City allows its customers to drop off hazardous household chemicals at a collection site free of charge. The items are then disposed of in a safe manner, eliminating the possibility of these items being improperly dumped in local creeks and streams. The 2014 Household Hazardous Waste Collection Day yielded approximately **20,000 pounds (10 tons) of waste collected!** Additional Earth Week 2014 activities included:



- Educational Activities for 2<sup>nd</sup> Graders including the NRCS Enviroscape model and other demonstrations
- Educational Demonstration for Auburn High School students, and;
- Various public library activities centered around Earth Week.



**D. Website Hotline**

In an effort to provide the general public with an additional means of reporting potential erosion control violations, the City launched the “On-Line Hotline” in March 2003. Citizens now have the ability to log on to the website 24 hours a day and provide information on suspected violations. The information is forwarded to the Water Resource Management Department and an investigation is initiated. The website hotline has proven to be a valuable tool over the course of the past ten years by assisting City personnel in responding to citizens’ concerns. For more information concerning the hotline, please visit <http://www.auburnalabama.org/wrm-watershed/>.

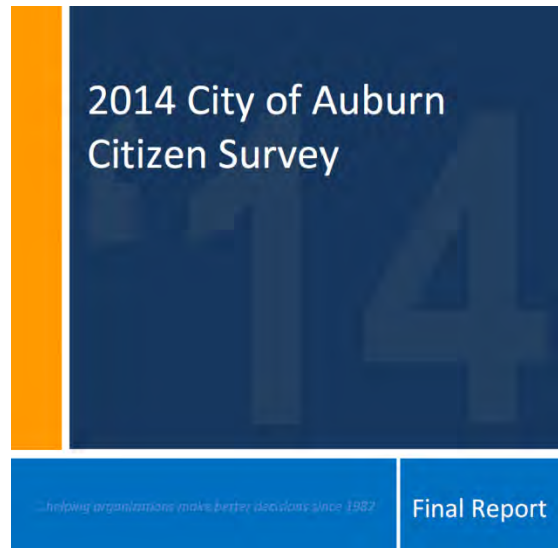


**E. Arbor Day Tree Give Away**

The planting of trees improves water quality by reducing stormwater runoff and erosion while facilitating nutrient removal. In celebration of Alabama’s Arbor Day and to encourage the reforestation of the City’s urban landscape, the City’s Tree Commission sponsors a tree giveaway. The Commission gave away **750 Yellow Poplar seedlings and 750 Florida Maple seedlings** at the annual 2014 Arbor Day Tree Giveaway. The City also gave away **1,000 Dogwood seedlings** at the 2014 Christmas parade.

**F. City of Auburn Citizen Survey**

The citizen survey is an annual survey of a statistical cross section of randomly selected members of the community. The survey asks questions on issues of governmental performance and community priorities and is a means of encouraging citizens to participate in local government. In 2014, the survey contained several questions that were directly or indirectly related to stormwater issues. The questions covered issues such as infrastructure maintenance, trash collection, yard waste disposal, recycling, natural resource protection, greenspace initiatives and future growth planning. Once again in 2014, the City received very high satisfaction levels in most areas.



To view the Citizen survey, please visit: <http://www.auburnalabama.org/survey>.

**G. Newspaper Articles**

Newspaper articles covering local stormwater/environmental issues are a means for disseminating information to a large and diverse group of residents most directly impacted by these issues. Informative articles provide the reader with an independent point of view. The reader is not forced to rely on information generated by a single source (i.e. City through the newsletter Open Line or brochures).

The City is fortunate to have a local daily publication. The Opelika-Auburn News is a regional daily newspaper that covers local events and is widely read by residents of Lee County. A weekly newspaper publication, the Auburn Villager, began circulation

in 2007. Articles are documented in an Access database for reference purposes. A listing of articles and publication dates is included in Appendix C of this report.

## **H. Greenspace Advisory Board/Greenspace Master Plan**

The Auburn Greenspace Advisory Board (GAB) was created by a City Council resolution in 2002. Its objective was to identify potential areas for future property acquisitions for parks, recreation facility projects, and greenways. Once identified, these properties could be purchased and/or protected from development.

In 2003, the GAB recommended a Greenspace/Greenway Master Plan for the City. It was adopted in December 2003 by the City Council and has been utilized by the Planning Commission in connection with approval of projects. The GAB revised the initial Plan to include a vast expansion of the proposed greenspace/greenway areas. This first amendment to the Greenspace/Greenway Master Plan was adopted by the City Council in October 2004.



This plan has resulted in the acquisition of several hundred acres of property located in environmentally sensitive areas. The greenspace/greenway areas include proposed bikeways and trails along existing and new roads and along waterways located within the City's growth boundary. Areas along waterways may be improved with natural trails and will be preserved by the dedication of conservation easements in developments or the acquisition of property by the City. The City did not acquire any new lands dedicated as Greenspace in 2014. However, the City began performing a feasibility analysis of implementing a combined Blueway/Greenway along Saugahatchee Creek (general alignment as identified in Greenway Master Plan).

## **I. Auburn Interactive Growth Model**

In 2007 – 2008, the City, through its Planning Department, contracted with a firm to develop the Auburn Interactive Growth Model (AIGM), a tool the City utilizes to make informed planning decisions. Detailed inventories were conducted for current development such as housing unit by type, population by age groups and retail space by gross area. A demographic forecasting model was developed as well as models for other uses that will provide guidance for future land use allocations. The AIGM

also forecasts the spatial distribution of the population over time and the apportionment of land uses necessary to meet the needs of the population. The Planning Department updates the AIGM annually. Since its initial completion, the AIGM's population projections have been used in projecting water and sewer demand, future traffic, regional growth, school growth and as the foundation of the Future Land Use Plan component of CompPlan 2030. In 2014 the AIGM results were used to help develop the framework of the pending Downtown Master Plan and will be used to quantify future demand for the upcoming Parks, Recreation and Culture Master Plan.

**J. CompPlan 2030**

In 2009, the City's Planning Department began development of CompPlan 2030, a comprehensive plan to guide future development in Auburn. CompPlan 2030 focuses on the following key areas: current and future land use, and how land



use and the built environment affects our natural resources, schools, parks, utilities, civic facilities and transportation. The Plan provides guidance for future planning based on public input, analysis of current and future conditions, and best practices. A series of public meetings was held in 2009 and 2010 to allow citizens to share their ideas for Auburn's future, giving citizens a voice in the development of the plan. The Future Land Use Plan provides parcel-level recommendations for the type and scale of new development for the next twenty years, and is the product of a strategy to promote infill development and growth in downtown Auburn. The Future Land Use Plan element of CompPlan 2030 replaces the 2004 Future Land Use Plan. The Natural Systems and Utility sections of CompPlan 2030 provide recommendations for water conservation and stormwater management. The plan was adopted by the Auburn City Council on October 4, 2011 and City Departments are now working to integrate components of the Plan into their operations. As a result of the implementation strategy, the Future Land Use Plan was updated in 2014 for the Exit 50 area and the Opelika Road Corridor. In addition, a new building type to encourage infill development has been fully integrated into the Zoning Ordinance. The implementation is ongoing. For more information on CompPlan 2030, please visit <http://www.auburnalabama.org/Compplan2030/Default.aspx?PageID=248> or contact Matt Mosley at [mmosley@auburnalabama.org](mailto:mmosley@auburnalabama.org).

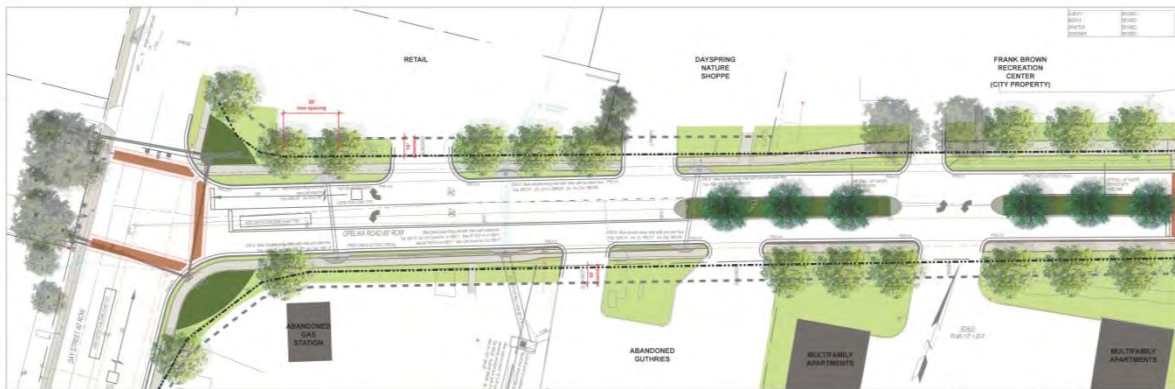
**K. Renew Opelika Road**

Renew Opelika Road is the corridor plan for Opelika Road. During the CompPlan 2030 Process, the Opelika Road area was identified as one of the City's most important commercial corridors, and as a prime candidate for reinvestment. A new

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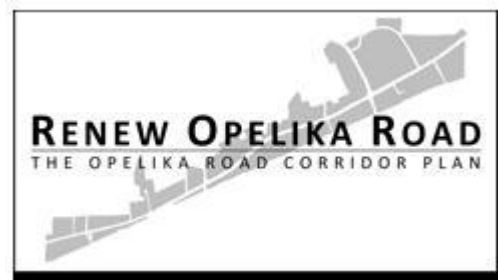
plan for the corridor is needed because a successful corridor depends on the quality of the public realm and the businesses, institutions and residences that are adjacent to it. The Opelika Road corridor, in its current condition, does not possess a character that reflects as well on the community as it could. In addition, the Corridor Plan emphasizes the importance of focusing on infill development, and the Opelika Road corridor contains a large number of infill sites.

The City retained Design Workshop, Inc. to provide planning services to develop the Renew Opelika Road plan. Key to the planning process was an extensive process of public engagement. Hundreds of people participated, either in one of three public



meeting opportunities or through online surveys.

The final outcome of Renew Opelika Road is a plan to guide the future development of Opelika Road and help ensure the area's future commercial vitality. The plan helps answer questions of how the community and City can support Auburn's existing businesses and attract new destinations for residents. The plan also illustrates the most effective way to improve traffic flow, pedestrian accessibility and the overall look and feel that citizens envision for the Auburn community. Several options regarding stormwater treatment along Opelika Road were included for public input during the planning process. The plan was adopted by Auburn City Council on August 20<sup>th</sup>, 2013. Plan implementation is underway and has already yielded results. The zoning along the corridor has been modified per the recommendations of the Plan. Streetscape redesign for the first phase (Gay Street to Ross Street) is underway and is expected to be completed in May, 2015. For more information on the Renew Opelika Road Plan, please visit <http://www.auburnalabama.org/renew/Main.aspx>.



**L. Lee County Water Festival**

On May 9, 2014, the eleventh annual Lee County Water Festival was held on the campus of Auburn University. Over 1,500 fourth graders from schools in the Lee County area attended the one-day event. The primary purpose of the event is to educate young people on the importance of our water resources and the role each of us plays in conserving our water. During the event, students learned about water filtration, aquifers, and the water cycle through hands-on activities such as



building an edible aquifer, making a water cycle bracelet, and building a mini-filtration unit. Volunteers from the City of Auburn, the Auburn Water Works Board, the City of Opelika, and other local groups helped make this past year’s event a huge success. The Auburn Water Works Board also helped to sponsor the 2014 Water Festival by providing a monetary donation in the amount of **\$3,000**. Planning is currently underway for the 2015 Water Festival, which is scheduled to be held at the Beard-Eaves Memorial Coliseum at Auburn University in March 2015.



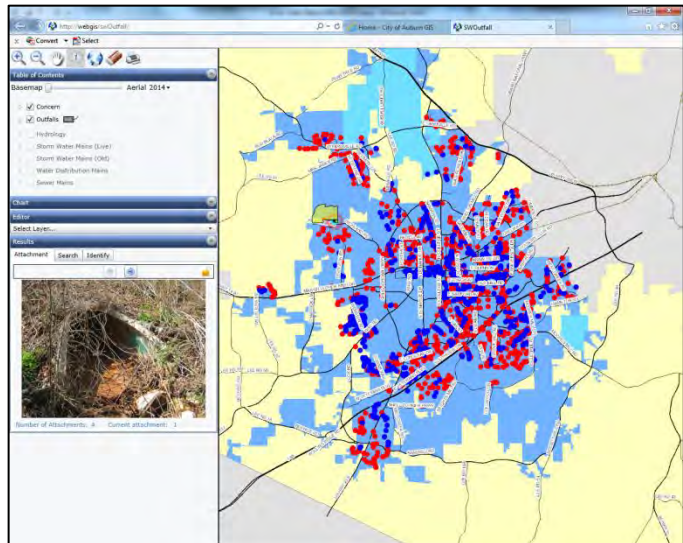


The City of Auburn has responded to several cases of reported illicit discharges in 2014. These cases involved illicit discharges of sanitary sewer overflows, private sewer liftstation overflows, washing of paint into storm drains, dumping of asphalt into stream channels, and storm/sanitary sewer cross connections. In each instance, the illicit discharge was traced back to its source and the violator was given a notice of violation and informed

of the penalties for violating the City’s Illicit Discharge Ordinance. In each incident, the City was able to ensure proper cleanup and corrective actions taken.

### C. Stormwater Outfall Reconnaissance Inventory

In 2009, the Water Resource Management Department began a stormwater outfall reconnaissance inventory (ORI) program. The purpose of this ORI program is to familiarize staff with all receiving waters within the City limits, conduct an inspection of each stormwater outfall and prepare detailed documentation of each stormwater outfall in that basin so that water quality concerns are documented and corrective



actions planned. City staff are able to document any current illicit discharges and provide more detailed location information concerning existing outfalls. The City’s ORI program is patterned on recommendations outlined in the *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection and Dr. Robert Pitt, October 2004). The City’s goal is to inspect each watershed on a 5 - 6 year rotation. In calendar year 2014 staff completed field survey work in the Town Creek watershed, including the mapping and assessment of 301 outfalls. In addition, staff documented approximately two hundred six (206) concerns or potential concerns as part of the ORI program in 2014. To date, the Department has inspected approximately **two hundred forty (240) miles of stream and documented approximately one thousand two hundred twenty-eight (1,228) stormwater outfalls** in the Saugahatchee, Parkerson’s Mill, Moore’s Mill and Town Creek Watersheds. Staff

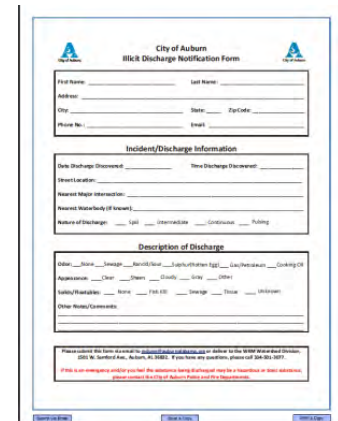
have also inspected approximately one hundred fifty (150) sanitary sewer aerial creek crossings and identified approximately eight hundred fifty eight (858) concerns or potential concerns during the ORI program.

The Water Resource Management Department collaborated with the City’s Information Technology (IT) Department GIS Division in 2010 to develop a stormwater outfall tracking tool that allows for easy management, access and viewing of data collected during the ORI program. Staff from multiple departments can view the data assimilated by this application and can utilize that information to monitor progress at addressing concerns identified by field survey. This tool/application was updated in 2014. A screenshot of this tool can be seen above

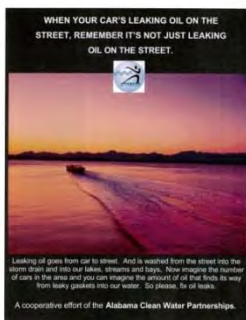
The City gave a presentation on its ORI program at the Alabama Water Resources Conference in Orange Beach, AL in September 2014. The ORI program is just one example of the measures the City has taken in creating and sustaining an efficient, effective and innovative stormwater management program, with the ultimate goal of protecting our local water resources. Staff are currently working to draft a water quality monitoring plan to evaluate the water quality of each outfall.

**D. Illicit Discharge Hotline and Reporting Form**

In 2008, the Water Resource Management Department developed an illicit discharge reporting form that residents can download, complete and e-mail back to the Department upon discovering a potential illicit discharge. This document is located on the Illicit Discharge Website, giving residents instant and 24-hour access to the form. This form assists the Department in tracking and responding to illicit discharges. This form can be downloaded from the City’s website at <http://www.auburnalabama.org/wrm-watershed/>. No forms were submitted in 2014.



**E. Public Education on Illicit Discharges and Improper Disposal**



The Alabama Clean Water Partnership, in association with ADEM and other environmental groups, has produced a series of public service announcements featuring the “Nerdy Man”. The City of Auburn has obtained materials for distribution from the Clean Water Partnership and provides them free to the public through its information centers located at City Hall, the Bailey-Alexander Water and Sewer Complex and the Development Services Building. These materials can also be obtained by contacting the Water Resource Management Department at (334) 501-3074. The City also routinely places articles in the City newsletter, Open Line, to educate citizens on illicit discharges.



## **F. Inspection of Drainage System**

The Public Works Department conducts routine inspections of its drainage system in order to maintain free flowing conditions. During this process, key stream sections, bridges, and culverts are inspected and routine maintenance is conducted. As areas are identified for maintenance, the work is listed on the maintenance schedule and a crew is assigned to perform the task. Water Resource Management staff are also documenting areas of concern during ORI inspections. These areas of concern are documented and placed in the stormwater outfall tracking database. In 2014, the City's public works department **cleared/cleaned over 280 storm sewer outfalls** of debris, sediment, and trash.

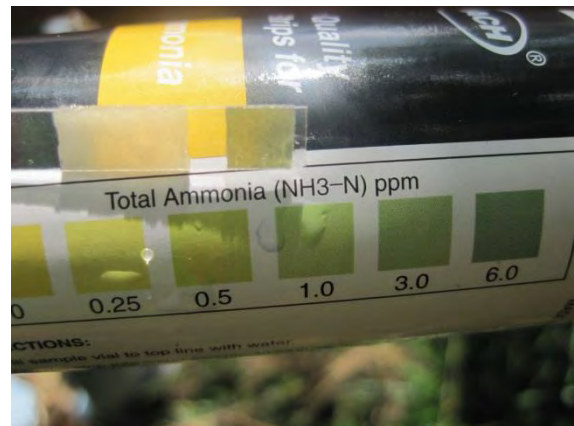
## **G. Hazardous Waste Emergency Response Team**

The City maintains a mutual aid agreement with the City of Opelika to share some of the cost of operating an emergency response vehicle equipped to handle hazardous waste spills. The agreement provides the City with the ability to properly identify and address hazardous or potentially hazardous spills.

## **H. Water Sampling Program**

In 2004, the City of Auburn began a water quality monitoring program in an effort to analyze the effectiveness of stormwater best management practices (BMPs) on active construction sites within the City. This program has been significantly expanded over the past 10 years to include a diverse range of monitoring programs and more in-depth water quality monitoring.

The water quality monitoring programs now includes 1) weekly monitoring of 40 permanent reference stations in local streams for turbidity, temperature, conductivity, dissolved oxygen, and pH, 2) continuous monitoring at two locations, rotated on an annual basis between 10 permanent reference stations, on principal streams for turbidity, temperature, pH, conductivity, ORP, dissolved oxygen, salinity, and TDS, 3) monitoring of ammonia concentrations to facilitate illicit discharge source identification and tracking, 4) monitoring of physical, nutrient, pathogen, and mineral parameters at 14 permanent stations in the City's source water watershed, 5) monitoring of physical, mineral, and biological parameters below the City's source water, 6) monitoring of nutrient and chemical parameters of first flush samples taken from five reference landcover sites, and 7) nutrient monitoring in Saugahatchee Creek. Monitoring associated with



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programs 6 and 7 have been temporarily ceased while staff evaluate the utility and effectiveness of the monitoring strategies.



In 2014, more than **1,700 turbidity samples** were collected and analyzed (40 permanent reference stations), bringing the total number of turbidity samples collected and analyzed since 2006 to **over 17,500**. Additionally, the City's continuous water quality monitoring performed via two HACH Hydrolab DS5 Water Quality Sondes generated over **250,000 unique water quality measurements**. Monitoring of ammonia concentration for the facilitating of illicit discharge identification and source tracking was performed at eight (8) locations in 2014, resulting in the identification, isolation, and repair of one (1) illicit discharge of sanitary sewage.



**For additional information concerning the City's Water Quality Monitoring Program, please see the 2014 Annual Water Quality Monitoring Report included in Appendix E. This Water Quality Monitoring Report is being submitted in accordance with Part V of NPDES General Permit ALR040003 that was issued February 1, 2011 (revised on February 24, 2012).**

## **IX. CONSTRUCTION SITE STORMWATER RUNOFF CONTROL**

### **A. Erosion and Sediment Control Ordinance**

The City, in conjunction with the City of Opelika and Auburn University, adopted the Erosion and Sediment Control Policy drafted by the ALOA Citizens Advisory Committee in 2003. The policy provides for a regional set of rules that can be applied to contractors, developers and engineers in the area.

The Auburn City Council approved additions to the City’s Erosion and Sediment Control Ordinance in 2005 to establish protocol for enforcement of the Ordinance and to enable City personnel to issue citations to developers/contractors in violation of the Ordinance. The enforcement mechanisms have proven to be a valuable tool in ensuring compliance with the Ordinance.

### **B. Erosion Control Inspections**

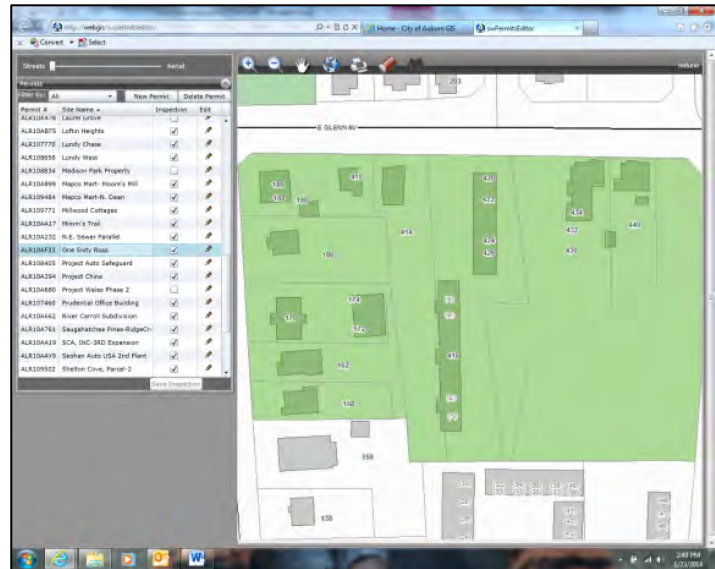


The City, in an effort to patrol the management of erosion and sediment control measures on active construction sites, initiated a construction site inspection program in 2003. The inspection program is designed to identify deficiencies in erosion control and initiate corrective action. Approximately **1,490 site erosion and sediment control inspections** were performed in 2014, resulting in **535 enforcement letters and 6 72-**

**Hour Notices of Violation.** This is an increase from the 745 inspections that were conducted the previous year. This increase in inspections is primarily attributed to an increase in development activity and increases in annual rainfall observed between 2012 and 2014. The City’s Water Resource Management Department maintains copies of the inspection reports in an electronic format.

### C. Erosion Control Inspection Software

In 2011, staff from the City’s Water Resource Management Department and Information Technology Department created an electronic erosion and sediment control inspection software program. This software gives staff the ability to fill out electronic copies of the erosion control inspection checklist using handheld units while in the field performing inspections. Once the inspection is completed, the report and photos can be uploaded to a desktop PC using a desktop version of the software. The desktop software has the capability to automatically generate letters and photos for mailing to the permit holder. This inspection software, which includes both the field software and the desktop software, has saved staff considerable time in performing inspections during the past three (3) years and provides staff with the ability to communicate deficiencies to the permit holder in a timelier manner. A screenshot of the desktop application is included in this section.



### D. Residential Erosion Control

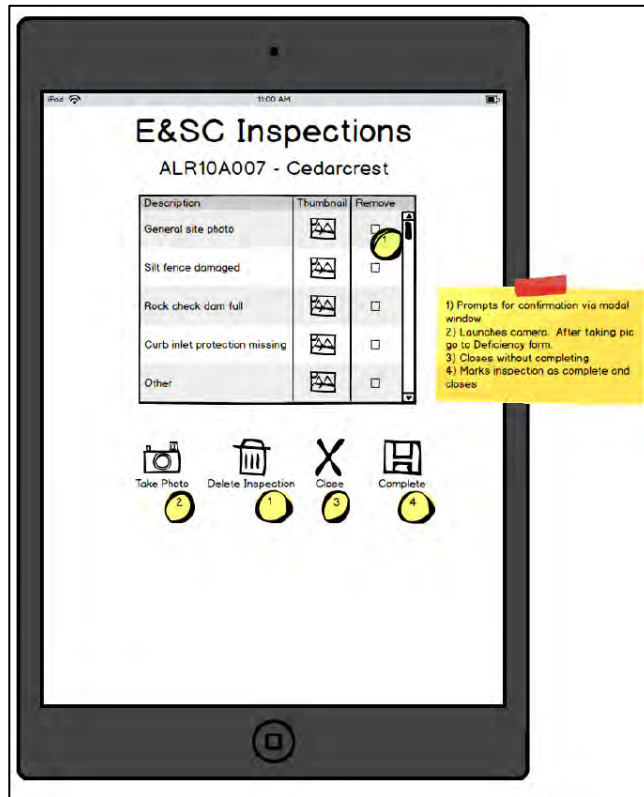
The City’s Public Safety Department Codes Enforcement Division conducts an initial site inspection for all building construction in Auburn. Lots requesting the initial inspection must have a construction entrance and other necessary best management practices (BMPs) in place prior to authorize foundation construction. Deficiencies noted during the initial inspection are relayed to the building permit applicant for correction.



The City’s Public Safety Department Codes Enforcement Division also maintains a database of complaints received in association with erosion resulting from residential construction. The complaints are routed to enforcement officers or to Water Resource Management Department staff who investigate the complaint and pursue

corrective actions with the responsible parties. Water Resource Management Department personnel also do routine checks of home construction in Auburn to ensure compliance with the City’s Erosion and Sediment Control Ordinance.

**E. Added Elements to Erosion and Sediment Control**



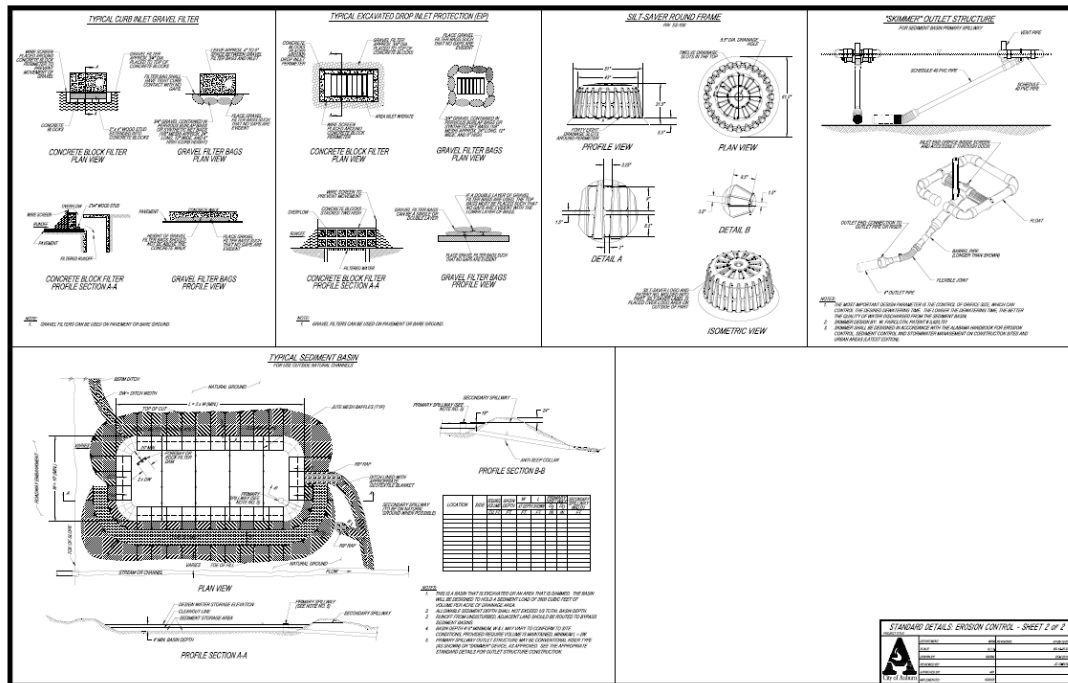
In 2014 the City began work on development of an updated Erosion and Sediment Control Inspection and Enforcement application to be used with handheld devices (smartphones & tablet PC’s). This application will allow inspectors to instantly deliver results from erosion control inspections to the responsible parties upon completion and from the field. Additionally, the new application will automatically generate enforcement letters based off of the inspector’s field notes, greatly improving the efficiency of the inspection and enforcement process.

In conjunction with approval of the Water Resource Management

Design and Construction Manual (discussed in Section X of report), the City changed the permitting process whereby erosion and sediment control BMPs are installed effective January 1, 2011. The City now issues an Erosion and Sediment Control Permit that allows for minimal clearing to install the approved BMPs onsite. This minimizes the clearing and grading work that sometimes occurred in the past prior to getting the site BMPs installed.

**F. Erosion and Sediment Control Design**

The City revised its standard erosion and sediment control details in 2010 to include a more detailed sediment basin design. The Alabama Handbook was revised in 2009 to include significant changes in design guidelines for sediment basins. The primary changes revolve around the use of baffles during construction and skimming devices for basin dewatering from the surface of the water column. The City has implemented this change in its standard details, as well as in its requirements for new developments within the City. In addition, the new construction stormwater general permit issued by ADEM in 2011 promotes the using of skimming devices by requiring mechanisms that dewater from the top of the water column in the basin.



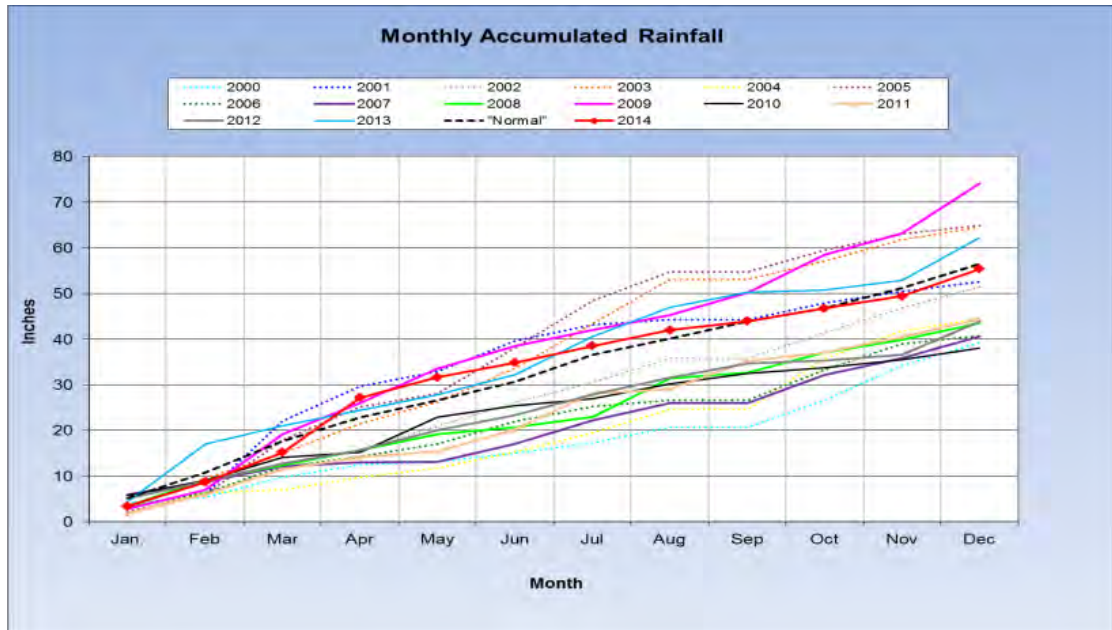
In 2013, the City also began allowing Georgia DOT Type C silt fence with a polypropylene mesh backing for reinforcement, commonly referred to as C-POP silt fence, as an approved alternative to Alabama DOT Type A silt fence. The C-POP silt fence is easier to install than Type A silt fence, thus helping to reduce costs, while still achieving adequate sediment capture.

**G. Rainfall Data Collection**

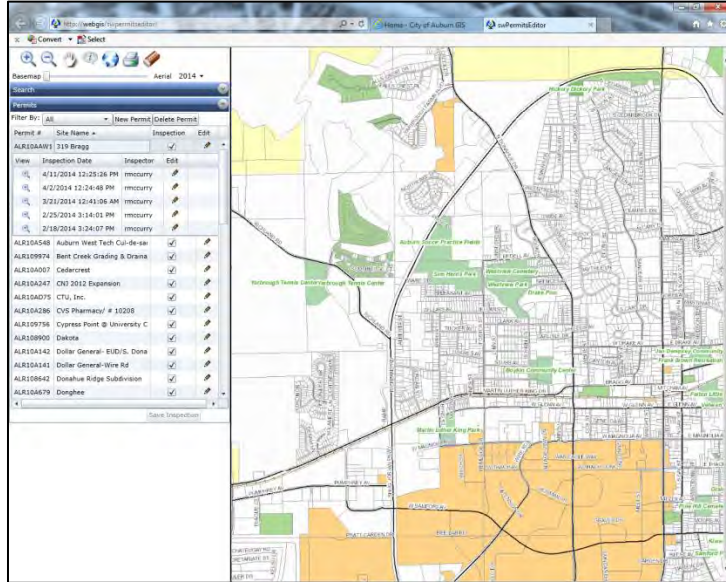
In 2005, the City began maintaining historical rainfall data records. The data is obtained through a subscription to the Agricultural Weather Information System (AWIS) website. AWIS records daily weather data from the NOAA weather station at the Auburn University Regional Airport. The City collects the data on a routine basis and enters it into an Excel spreadsheet, enabling the City to analyze rainfall

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patterns and trends. The City has AWIS data dating back to 1976. The City records daily rainfall data at its two water pollution control facilities. In addition, the Auburn Water Works Board also has rain gauges located at Lake Ogletree and the James Estes Water Treatment Plant that provide daily rainfall records. In 2008, the City contracted with a local consultant (RainWave) to provide real-time rainfall data utilizing Doppler radar imagery at five predetermined locations selected by the City. Additionally, in 2008, the City created a GIS rainfall distribution analysis tool that allows staff to map rainfall patterns across the City. The real-time rainfall data and the rainfall distribution analysis tool allows staff to perform erosion and sediment control inspections more efficiently. There was a wide variability in rainfall reported across the City in 2014, from a low of 45.3 inches reported at the City’s Peartree RainWave Station to a high of 55.39 inches reported at the Auburn University Regional Airport. Additional details regarding rainfall in 2014 can be found in the Water Quality Monitoring Report included in Appendix E of this report.



## H. ADEM Construction Stormwater Permit Tracking Tool



In 2010, the Water Resource Management Department worked with assistance from the City’s Information Technology Department to create a GIS-based tool that allows tracking of ADEM construction stormwater permits for developments within the City of Auburn. The tracking tool generates automatic emails that are sent to staff on a bi-weekly basis with notifications of expired permits, permits

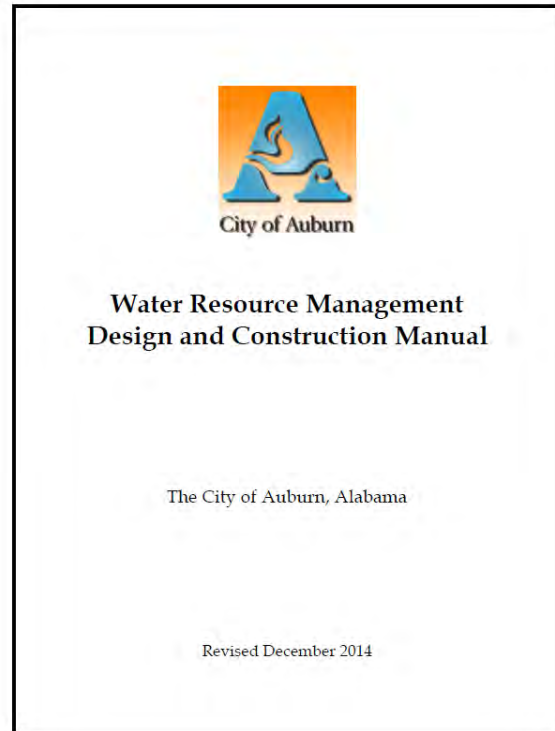
that are within thirty (30) days of expiration and permits that are within sixty (60) days of expiration. This allows staff to track permits in an efficient manner and to send notifications to permit holders who have expired permits or permits nearing expiration. In 2011, the permit tracking tool was incorporated into the Erosion and Sediment Control Software described earlier in this section.



**X. POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT**

**A. Engineering Design and Construction Manuals**

In April 2003, the City of Auburn published a Stormwater Design Manual that effectively addressed stormwater runoff controls required for sites greater than one acre. The manual identified project requirements and specifications for new infrastructure and also addressed the requirements for stormwater system sizing and stormwater runoff control/detention. During its implementation, the manual proved to be a very successful tool for the City and developers. The Water Resource Management Department contracted with CH2M Hill to develop an Engineering Design Manual in 2008 that includes engineering design criteria for sewer and water infrastructure, as well as stormwater BMPs for water quality protection



such as rain gardens and stormwater wetlands. The Water Resource Management Design Manual also simplifies the City’s regulations regarding restrictions on development in steep slope areas. The Public Works Department also developed a comprehensive Engineering Design Manual. The Stormwater Design Manual has been updated and included as an appendix in the Public Works Manual. Both the Public Works and Water Resource Management Design and Construction Manuals were adopted by the City Council in November 2010 and became effective on January 1, 2011. Revisions/amendments to the Manuals were adopted in 2011, 2013, and 2014. Reviews of these manuals are performed annually during the first fiscal quarter (October-December).

**B. Stream Buffer Regulations**

As part of the Erosion and Sediment Control Ordinance adopted by the City Council in July 2002, a minimum 25-foot non-disturbed vegetative buffer zone was required for new developments on “blue line” streams and creeks identified on USGS 7.5 minute topographic maps. In May 2006, the City Council adopted new Stream Buffer regulations. The 2006 buffer regulations were based on a managed-use type buffer rather than a strict non-disturbed buffer approach. The 2006 regulations implement a 3-zoned buffer (streamside zone, managed use zone and upland zone) with the width of the buffer being based on the drainage area of the stream. A copy of the 2006 regulations can be found under Article IV in the City’s Zoning Ordinance on the City’s website. Approximately 656 acres of riparian corridors have been set aside since the adoption of the new regulations. In 2014, the City evaluated stream buffers on six (6) properties, resulting in approximately 6.2 acres of riparian buffer protection. The table below provides the City’s current stream buffer requirements.



Stream Buffer Requirements				
Drainage Area (Watershed) Designation	Streamside Zone	Managed Use Zone	Upland Zone	Total Buffer Width on each side of Stream
< 100 acres	25 feet	None	10 feet	35 feet
≥ 100 acres and ≤ 300 acres	25 feet	None	20 feet	45 feet
≥ 300 acres and ≤ 640 acres	25 feet	20 feet	10 feet	55 feet
≥ 640 acres	25 feet	50 feet	25 feet	100 feet

### C. Detention Pond Inspections

Existing detention ponds need periodic inspections to evaluate the maintenance and operation of these vital components of the City’s drainage system. Because vast quantities of stormwater are collected and passed through these detention ponds every year, inspections of these facilities can identify potential problems and illicit discharges.



The Public Works Department and the Water Resource Management Department conduct annual inspections of all detention ponds (public and private) listed in the stormwater database. Upon inspection, the owner of the pond is notified of any corrective action needed. Enforcement measures are taken if the owner does not address the items listed in the report. Approximately **two hundred eighty four (284) detention ponds were inspected** by the City in 2014.

### D. Conservation Subdivision Regulations

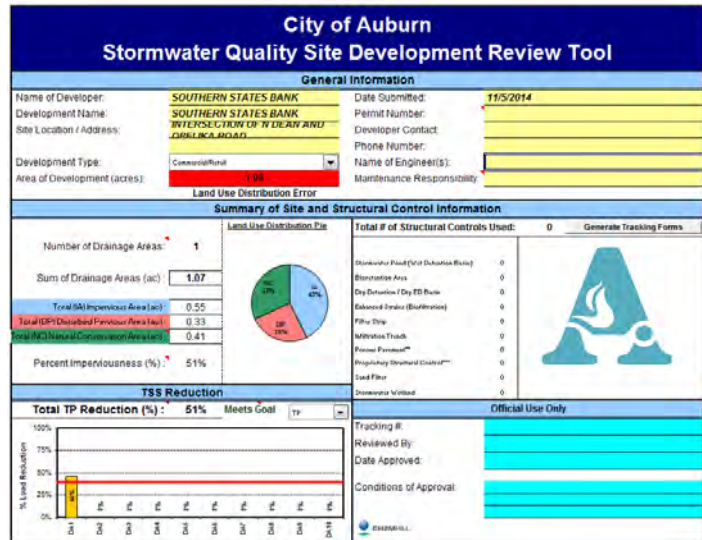
In 2006, staff members from the Planning Department, Water Resource Management Department, Public Works Department and Parks and Recreation Department began developing conservation subdivision regulations to aid in the protection of local water resources. These regulations were approved by the Auburn City Council in 2007. The regulations promote water resource protection through the setting aside of open space and concentrating development away from water resources. The ordinance and subdivision regulations promote the use of low impact design concepts to protect natural resources in the Auburn area. These regulations can be downloaded from the City’s website at <http://www.auburnalabama.org/pl/>. While developer interest for conservation subdivisions has not been strong to this point, the City continues to promote conservation subdivisions and low impact development principles for developments within the City of Auburn.



**E. Site Development Review Tool**

In 2006, the Water Resource Management Department contracted with CH2M Hill to develop a Site Development Review Tool (Tool) that could be utilized by local engineers when designing stormwater BMPs on developments within the City. This Tool was modeled on a similar tool created by CH2M Hill for Gwinnett County, Georgia.

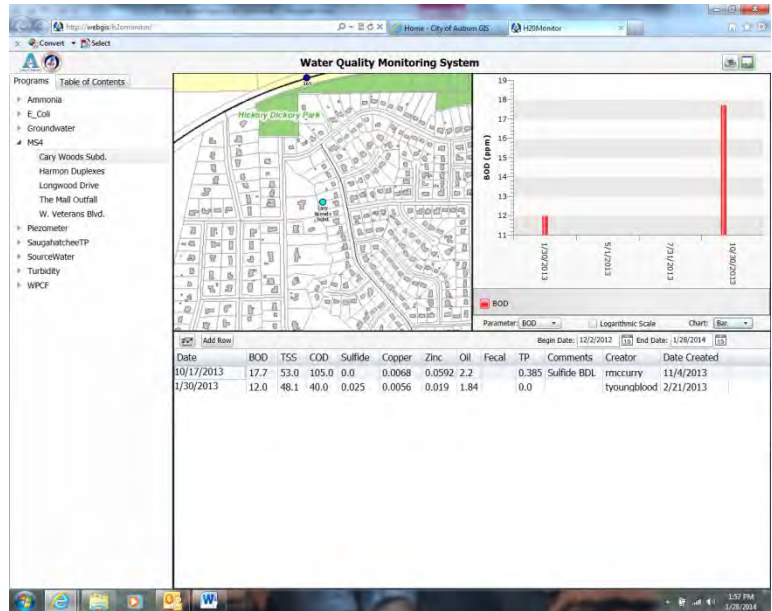
The Tool was developed using a Microsoft Excel platform and can be used by engineers and developers to design and incorporate structural stormwater BMPs for developments within Auburn’s planning jurisdiction boundaries and to maximize the efficiency of runoff pollutant management following construction of developments. This Tool can also be used to meet the target pollutant removal efficiencies outlined in the City’s Conservation Subdivision Regulations.



The Tool provides pollutant removal estimates for site specific conditions based on removal efficiencies for a variety of stormwater BMPs including detention ponds, bioretention areas (i.e. rain gardens) and stormwater wetlands. This Tool analyzes a variety of stormwater pollutants including nutrients (phosphorus and nitrogen) and total suspended solids. City staff utilize the Tool during the plan review process to analyze development impacts on water quality within its water supply protection area (Lake Ogletree watershed). This Tool is also used by engineers when submitting water quality plans for developments located in the Saugahatchee Creek Watershed as part of its compliance with the total phosphorus TMDL for the Saugahatchee Creek watershed. A copy of the Tool can be downloaded at <http://www.auburnalabama.org/wrm-watershed>.

**F. MS4 Outfall Water Quality Monitoring**

In 2007, the Water Resource Management Department initiated a program to evaluate and compare post-construction runoff water quality from various types of development. The types of development analyzed include low, medium and high density residential, commercial and industrial. Samples are collected each quarter during rainfall events



and then delivered to a local lab to be analyzed for a variety of pollutants such as E-coli, suspended solids, nutrients and oils and grease. Staff attempt to collect “first flush” samples in an effort to obtain the most representative runoff samples. This data is used by Water Resource Management staff to develop trends, document illicit discharges and to make future decisions regarding post-construction stormwater BMPs. No samples were collected during 2014, as staff are currently evaluating the utility of this monitoring program.

**G. Bailey-Alexander Water and Sewer Complex Bioretention Garden**



The City of Auburn Water Resource Management designed and constructed a bioretention garden at its Bailey-Alexander Water and Sewer Complex in 2014. This bioretention garden treats stormwater runoff from approximately 2,500 square feet of metal rooftop. The infiltration bed is approximately 37.5 feet long by 6 feet wide by 3 feet deep and incorporates more than 220 square feet of geotextile, 300 cubic feet of sand, 25 cubic feet

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of silty clay soil, and 25 cubic feet of organic compost. For more information concerning this project, please contact Daniel Ballard at [d Ballard@auburnalabama.org](mailto:d Ballard@auburnalabama.org) or by phone at 334-501-7367.

**H. Softball Complex Parkerson’s Mill Creek Stream Stabilization Project**

The WRM Department, in conjunction with the Alabama Cooperative Extension Service, completed construction of the Softball Complex Streambank Stabilization Project in April of 2014. This project involved the demolition and removal of approximately 2,000 square feet of existing hard armor along an outside meander bend of the mainstem channel of Parkerson’s Mill Creek, the construction of approximately 165 linear feet of bankfull bench, the construction of one boulder vane structure, one boulder step-pool complex, and the installation of approximately 50 linear feet of toe-wood. Additionally, more than 500 live stakes were planted along with numerous native hardwood and grass species. For more information concerning this project, please contact Daniel Ballard at [d Ballard@auburnalabama.org](mailto:d Ballard@auburnalabama.org) or by phone at 334-501-7367.



**I. Downtown Auburn Bioretention Cells**



In January of 2014 the City completed the construction of the first phase of the Downtown Pedestrian and Parking Improvement Project. As part of this project, the City installed two (2) two-hundred (200) square foot bioretention gardens to treat stormwater runoff coming from a small overflow lot and additional rooftop runoff from an adjacent building. This project was designed by City staff and constructed by Hudmon

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Construction, Inc. For more information concerning this project, please contact Daniel Ballard at [dballard@auburnalabama.org](mailto:dballard@auburnalabama.org) or by phone at 334-501-7367.

## **XI. POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS**

### **A. Stormwater Management Training**

The City of Auburn continues to develop a training program that provides the Water Resource Management Department and other City departments with information on the proper methods for implementing site control measures on all municipal projects. City personnel also attend a variety of stormwater/water quality related conferences, workshops and seminars annually.

Training opportunities in 2014 included:

- **Alabama’s Water Environment Association Annual Conference (April 2014)** – This 4-day conference sponsored by Alabama’s Water Environment Association, state membership association of the Water Environment Federation (WEF), focuses on stormwater, water quality, and wastewater treatment issues. Three (3) City employees (Matt Dunn, Mikel Thomspson, and Eric Carson) attended the 2014 conference, attending technical sessions as well as vendor exhibits.
- **Alabama Water Resources Conference (September 2014)** – In September 2014, two (2) City employees (Daniel Ballard and Dustin Kimbrow) attended and presented at the 2014 Alabama Water Resources Conference held in Orange Beach, AL. This annual conference focuses on a variety of water resource issues in Alabama and provides an opportunity to network with others to discuss these issues. Mr. Ballard’s presentation focused on the City’s ORI Program.
- **WEFTEC 2014 (October 2014)** – This 4-day conference, sponsored by the Water Environment Federation, is one of the premier water quality conferences in the world. WEFTEC 2014 was held in New Orleans, LA. One (1) City employee (Matt Dunn) attended this conference and attended technical sessions related to watershed protection, water quality, stormwater BMPs and wastewater treatment.
- **Erosion and Sediment Control Workshop (December 2014)** – The City of Auburn hosted a workshop for developers, contractors, engineers and City personnel to educate attendees on the City’s Erosion and Sediment Control Program, as well as federal and state regulations. Over seventy (70) developers, contractors, engineers, and City personnel attended the workshop.
- **ADEM Nonpoint Source Conference (January 2014 & January 2015)** - In January 2015, three (3) City employees (Daniel Ballard, Ron McCurry, and Dustin Kimbrow) attended ADEM’s 26<sup>th</sup> annual Nonpoint Source Conference



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in Montgomery, AL. This one (1) day conference focuses on nonpoint source stormwater issues in Alabama.

- **Qualified Credentialed Inspector Training** – On average, 12 to 14 City employees maintain Qualified Credentialed Inspector (QCI) certification. This certification requires annual refresher training, for which all QCI certified personnel must perform in order to retain certification. In addition to QCI certified staff, the City has numerous professionals who qualify as Qualified Credentialed Professionals (QCP) through existing certifications.
- **Innovative Erosion and Sediment Control Research & Field Day** – In May of 2014 three City staff attended the Alabama Technology Transfer Center’s seminar on innovative erosion and sediment control design and installation.

### **B. Spill Response and Prevention Training**

The City of Auburn has developed an in-house spill response training program. The Water Resource Management Department conducted an informal review of its applicable facilities for proper Spill Prevention, Control and Countermeasures (SPCC) in October 2013. Staff from Water Resource Management, Public Works and Environmental Services were assisted by Tom McCauley (Auburn University Office of Risk Management) in identifying any concerns associated with existing handling, storage, management, and disposal of potentially hazardous chemicals. Opportunities for improvement were documented and conveyed to the appropriate personnel.



### **C. Risk Management Manual**

The City’s Human Resources Department has developed a manual outlining specific requirements/policies for dealing with hazardous chemicals. Topic 12 (titled Hazard Communication Program) of the City’s Risk Management Manual specifically requires City personnel to receive training on hazardous chemicals used. Safety Data Sheets (SDS) identifying personal protective equipment, permissible exposure limits (PEL) and Threshold Limit Values (TLV) are required for all hazardous chemicals used. The Hazard Communication Program was adopted as part of the Risk Management Manual.

**D. Municipal Operations Recycling**

It has been standard policy to encourage individual Departments to participate in the City’s recycling program. Recyclable waste generated through City activities is collected and processed through the City’s recycling center located on Donahue Drive.

2014 Calendar YR	
RecycleAuburn Tonnage Report	
Item	Total Tons
Newspaper	232.28
Green Glass	42.84
Clear Glass	101.35
Brown Glass	94.68
Aluminum Cans	34.55
Cardboard	332.06
Cardboard Downtown	134.1
Steel	11.38
Magazines/Telephone Books	89.19
Mixed Paper	76.37
Plastics	97.05
Computers/Electronics	No Data
Batteries	No Data
Scrap Metal	21.26
<b>Total</b>	<b>1267.11</b>
<b>Monthly Average</b>	<b>105.59</b>

**E. Street Sweeping**

Regular street sweeping has been proven as an effective means to reduce overall pollutant loading from roads and storm sewer systems. The Environmental Services Department of the City currently performs street sweeping measures on a monthly basis throughout numerous roadways within the City. One (1) mechanical and two (2) regenerative-air/vacuum sweepers are used to perform this service. Regular street sweeping measures such as these have been shown to reduce total phosphorus loading from roadways by 1.4 to 20 percent and total suspended solids by 4 to 45 percent, with variability seen in frequency of sweeping and machine type (Breault et. al., 2003). In 2014, the Environmental Services Department swept approximately **15,019 miles** of streets and parking lots within the City, thereby removing approximately **997 tons** of leaves and debris from the road.

**F. Alabama Certified Pesticides Applicator**

The Parks and Recreation Department of the City maintains trained and certified personnel in the application of pesticides, including restricted-use pesticides. Although qualified to do so, the Parks and Recreation Department has not used any restricted-use pesticides in the previous decade. In order to maintain certification with the State of Alabama, the staff must document and complete 30 continuing education units (CEUs) over a three-year period. CEUs are earned at various conferences and workshops such as the Alabama Turfgrass Conference, Alabama Department of Transportation workshops, the Sports Turf Short Course and the Alabama Urban Forestry Association’s Annual Conference. The CEUs cover the application of pesticides, information on the proper use of fertilizers and other chemicals typically used to maintain athletic fields, and best management practices for trees/shrubs/turf that are intended to reduce the need for pesticides, fertilizers and irrigation.

## **XII. STORMWATER INFRASTRUCTURE IMPROVEMENTS**

In 2014, the Public Works Department continued to make considerable progress toward installing, rehabilitating and upgrading stormwater infrastructure within the City of Auburn. A listing of projects completed in 2014, as well as projects under construction and design, is included below.

### **A. Stormwater Infrastructure Projects Completed**

Projects completed in permit year twelve include:

- North College Street Sidewalk – This project involves the installation of 24 LF of 15-inch RCP, 24 LF of 18-inch RCP, 24 LF of 24-inch RCP, 8 LF of 30-inch RCP, 8 headwalls, 1 area inlet, and 1 junction box.
- Moores Mill Road Resurfacing Project – This project consisted of the installation of 67 LF of 24-inch RCP, 37 LF of 18-inch RCP, and 45 LF of 15-inch RCP. This project also included removal and replacement of the existing triple barrel 8'x6' culvert, constructing two single wing inlets, four double wing inlets and two junction boxes.
- Ross Street/Chewacla Drive Resurfacing Project - This project consisted of the installation of 73 LF of 15-inch RCP and the removal and replacement of two single wing inlets.
- Auburn Technology Park West Innovation Drive Extension – The project involved the installation of 182 LF of 18-inch RCP, approximately 200 LF of 8' x 8' box culvert, 2 partial single wing inlets, 1 double wing inlet, and 1 headwall.

### **B. Stormwater Infrastructure Projects Under Construction**

- Renew Opelika Road Phase 1 – This project will involve the installation of 200 LF of 24-inch RCP, 400 LF of 18-inch RCP, 3 single wing inlets, 10 double wing inlets, and 5 junction boxes. This work was previously identified as the Guthrie's Drainage project; however, the scope on that property was reduced and included in the Opelika Road Phase 1 project.

### **C. Stormwater Infrastructure Projects Under Design and/or Consideration**

- Opelika Road and East University Drive Intersection Improvement Project – This project will involve the installation of 307 LF of 18-inch Pipe, 131 LF of 24-inch Pipe, 11 LF of 30-inch Pipe, 262 LF of 36-inch pipe, 6 junction boxes, 5 single wing inlets, 3 double wing inlets, and 4 grate inlets. The

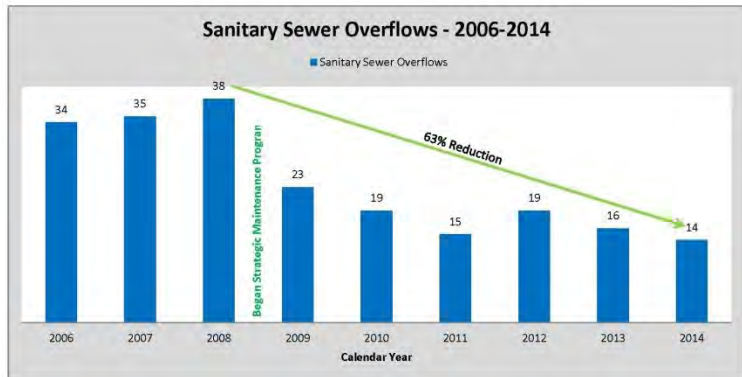
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project also includes removal of 770 LF of pipe, 8 inlets, and 4 junction boxes.

- South College Street and Longleaf Drive Intersection Improvement Project – This project will involve the installation of 132 LF of 18-inch Pipe, 111 LF of 24-inch pipe, 2 junction boxes, 2 single wing inlets, and 1 grate inlet. The project also includes removal of 140 LF of pipe and 2 inlets.
- Moores Mill Road Bridge Replacement Project - This project will involve the installation of 80 LF of 12-inch Slotted Drain Pipe, 3500 LF of 18-inch Pipe, 192 LF of 24-inch pipe, 117 LF of 30-inch pipe, 304 LF of 60-inch pipe, 31 LF of 44” x 27”-inch pipe, 297 LF of 59” x 36”-inch pipe, 8 junction boxes, 32 single wing inlets, 5 double wing inlets, and 19 headwalls. The project also includes removal of 1001 LF of pipe, 7 inlets, and 19 headwalls.
- North College Street Streetscape Project - This project will involve the installation of 20 LF of 12-inch HDPE Pipe, 84 LF of 18-inch pipe, 2 junction boxes and 2 double wing inlets.

**D. Sanitary Sewer Rehabilitation Projects**

Several years ago, the City began implementation of a program to identify and rehabilitate aging sanitary sewer infrastructure in the City of Auburn. The primary purpose of this program is to rehabilitate aging infrastructure, prevent sanitary sewer overflows (SSOs) and reduce inflow and infiltration (I/I). The City completed one (1) sewer system evaluation survey (SSES) in 2014 to identify potential I/I issues in Northside Sewer Basin 5 (vicinity of Highway 14 and Shug Jordan Parkway),



completed construction of one (1) sanitary sewer rehabilitation project to rehabilitate aging infrastructure and address I/I on Ross Street between Glenn Avenue and Magnolia Avenue, and began construction of one (1) additional sanitary sewer rehabilitation project in Southside Sewer Basin 17 (vicinity of Woodfield Drive, North Gay Street, South College Street) to rehabilitate aging infrastructure and address I/I. The City plans to design and construct additional sanitary sewer improvements in 2015 to address these issues. The water quality of the City’s local water resources can be improved through the City’s efforts to target and reduce SSOs and excessive I/I. Efforts to rehabilitate aging infrastructure have reduced sanitary sewer overflows by over sixty (60) percent since 2006.

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## **APPENDIX A**

### **2011 PHASE II STORMWATER PERMIT**



# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT GENERAL PERMIT

DISCHARGE AUTHORIZED: STORMWATER DISCHARGES FROM REGULATED SMALL  
MUNICIPAL SEPARATE STORM SEWER SYSTEMS

AREA OF COVERAGE: THE STATE OF ALABAMA

PERMIT NUMBER: ALR040003

RECEIVING WATERS: ALL WATERS OF THE STATE OF ALABAMA

*In accordance with and subject to the provisions of the Federal Water Pollution Control Act, as amended, 33 U.S.C. §§1251-1378 (the "FWPCA"), the Alabama Water Pollution Control Act, as amended, Code of Alabama 1975, §§ 22-22-1 to 22-22-14 (the "AWPCA"), the Alabama Environmental Management Act, as amended, Code of Alabama 1975, §§22-22A-1 to 22-22A-15, and rules and regulations adopted thereunder, and subject further to the terms and conditions set forth in this permit, the Permittee is hereby authorized to discharge into the above-named receiving waters.*

ISSUANCE DATE: JANUARY 31, 2011

EFFECTIVE DATE: FEBRUARY 1, 2011

MODIFICATION DATE: FEBRUARY 24, 2012

EXPIRATION DATE: JANUARY 31, 2016

*Glenda L. Dean*  
Alabama Department of Environmental Management

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## **PART I Coverage Under This General Permit**

### **A. Permit Coverage**

This permit covers all the areas within the State of Alabama.

### **B. Eligibility**

1. This permit authorizes discharges of storm water from small municipal separate storm sewer systems (MS4s), as defined in 40 CFR Part 122.26(b) (16). You are authorized to discharge under these terms and conditions of this general permit if you:
  - (a) Own or operate a small MS4 within the permit area described in Section A,
  - (b) Are not a "large" or "medium" MS4 as described in 40 CFR Part 122.26(b) (4) or (7),
  - (c) Submit a Notice of Intent (NOI) in accordance with Part II of this permit, and
  - (d) Either:
    - (i) Are located fully or partially within an urbanized area as determined by the latest Decennial Census by the Bureau of Census, or
    - (ii) Are designated for permit authorization by the Environmental Protection Agency (EPA) and the Department pursuant to 40 CFR Part 122.32(a) (2).
2. This permit authorizes the following non- storm water discharges provided: (1) they do not cause or contribute to a violation of water quality standards; (2) they have been determined not to be substantial contributors of pollutants to a particular small MS4 applying for coverage under this permit and that is implementing the storm water management program set forth in this permit:
  - (a) Water line flushing
  - (b) Landscape irrigation
  - (c) Diverted stream flows
  - (d) Uncontaminated ground water infiltration (Infiltration is defined as water other than wastewater that enters a sewer system, including foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.)
  - (e) Uncontaminated pumped groundwater
  - (f) Discharges from potable water sources
  - (g) Foundation drains
  - (h) Air conditioning condensate
  - (i) Irrigation water (not consisting of treated, or untreated, wastewater)
  - (j) Rising ground water
  - (k) Springs
  - (l) Water from crawl space pumps
  - (m) Footing drains
  - (n) Lawn watering runoff
  - (o) Individual residential car washing
  - (p) Residual street wash water
  - (q) Discharge or flows from firefighting activities (including fire hydrant flushing)
  - (r) Flows from riparian habitats and wetlands
  - (s) Dechlorinated swimming pool discharges, and
  - (t) Discharge authorized by and in compliance with a separate NPDES permit

### **C. Limitations of Coverage**

The following discharges are not authorized by this permit:

1. Discharges that are mixed with sources of non- storm water unless such non-storm water discharges are:
  - (a) In compliance with a separate NPDES permit, or
  - (b) Determined by the Department not to be a significant contributor of pollutants to waters of the State.
2. Storm water discharges associated with industrial activity as defined in 40 CFR Part 122.26(b) (14) (i)-(ix) and (xi);
3. Storm water discharges associated with construction activity as defined in 40 CFR Part 122.26(b) (14) (x) or 40 CFR 122.26(b)(15) and subject to Alabama Department of Environmental Management (ADEM) Admin. Code r. 335-6-12;
4. Storm water discharges currently covered under another NPDES Permit;
5. Discharges to territorial seas, contiguous zone, and the oceans unless such discharges are in compliance with the ocean discharge criteria of 40 CFR Part 125, Subpart M;
6. Discharges that would cause or contribute to instream exceedances of water quality standards; Your storm water management program (SWMP) must include a description of the Best Management Practices (BMPs) that you will be using to ensure that this will not occur. The Department may require corrective action or an application for an individual permit or alternative general permit if an MS4 is determined to cause an instream exceedance of water quality standards;
7. Discharges of any pollutant into any water for which a total maximum daily load (TMDL) has been approved or developed by EPA unless your discharge is consistent with the TMDL; This eligibility condition applies at the time you submit a NOI for coverage. If conditions change after you have permit coverage, you may remain covered by the permit provided you comply with the applicable requirements of Part IV.D. You must incorporate any limitations, conditions and requirements applicable to your discharges, including monitoring frequency and reporting required, into your SWMP in order to be eligible for permit coverage. For discharges not eligible for coverage under this permit, you must apply for and receive an individual or other applicable general NPDES permit prior to discharging;
8. This permit does not relieve entities that cause illicit discharges, including spills, of oils or hazardous substances, from responsibilities and liabilities under State and Federal law and regulations pertaining to those discharges.

### **D. Obtaining Authorization**

1. To be authorized to discharge storm water from small MS4s, you must submit a notice of intent (NOI) and a description of your SWMP in accordance with the deadlines presented in Part II of this permit.
2. You must submit the information required in Part II on the latest version of the NOI form (or photocopy thereof). Your NOI must be signed and dated in accordance with Part VI of this permit.
3. No discharge under the general permit may commence until the discharger receives the Department's acknowledgement of the notice of intent (NOI) and approval of the coverage of the discharge by the general permit. The Department may deny coverage under this permit and require submittal of an application for an individual NPDES permit based on a review of the NOI.

4. Where the operator changes, or where a new operator is added after submittal of an NOI under Part II, a new NOI must be submitted in accordance with Part II within thirty (30) days of the change or addition.
5. For areas annexed into your MS4 area after you received coverage under this general permit, the first annual report submitted after the annexation must include the updates to your SWMP, as appropriate.

Note: If the Department notifies the dischargers (directly, by the public notice, or by making information available on the Internet) of other NOI form options that become available at a later date (e.g., electronic submission of forms), you may take advantage of those options to satisfy the NOI use and submittal requirements in Part II.

## **E. Implementation**

1. This permit requires implementation of the MS4 Program under the State and Federal NPDES Regulations. MS4s shall modify their programs if and when water quality considerations warrant greater attention or prescriptiveness in specific components of the municipal program.
2. If a small MS4 operator implements the six minimum control measures in Section 122.34(b) and the discharges are determined to cause or contribute to non-attainment of an applicable water quality standard as evidenced by the State of Alabama's 303(d) list or an EPA-approved or developed Total Maximum Daily Load (TMDL), the operator must tailor its BMPs within the scope of the six minimum control measures to address the pollutants of concern.
3. Existing MS4s, unless otherwise stated within this permit, shall implement each of the minimum control measures outlined in Part III.B. of this permit within 180 days. New MS4s, unless otherwise stated in this permit, shall implement the minimum control measures outlined in Part III.B. of this permit within 365 days of the effective date of coverage. However, where new or revised ordinances are required to implement any of the minimum control measures, such ordinances shall be enacted within 730 days from the effective date of coverage.

## **PART II Notice of Intent (NOI) Requirements**

### **A. Deadlines for Applications**

1. If you are automatically designated under 40 CFR Part 122.32(a)(1) or designated by the Department, then to request recoveage, you are required to submit an NOI or an application for an individual permit and a description of your SWMP within 90 days before the expiration of this permit.
2. If you are designated by the Department after the date of permit issuance, then you are required to submit an NOI or an application for an individual permit and a description of your SWMP within 180 days upon notification.
3. You are not prohibited from submitting an NOI after the dates provided in Part II.A. If a NOI is submitted after the dates provided in Part II.A, your authorization is only for discharges that occur after permit coverage is granted. The Department reserves the right to take appropriate enforcement actions for any unpermitted discharges.
4. Within six months of the date of issuance of coverage under this permit, all operators of regulated small MS4s shall submit a storm water management program (SWMP) Plan to the Department. A SWMP Plan can be submitted electronically in a .PDF format, or in another prescribed manner acceptable to the Department that contains all necessary components.

### **B. Continuation of the Expired General Permit**

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the ADEM Admin. Code r. 335-6-6 and remain in force and effect if the Permittee re-applies for coverage as required under Part II of this Permit. Any Permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

1. Reissuance or replacement of this permit, at which time you must comply with the Notice of Intent conditions of the new permit to maintain authorization to discharge; or
2. Issuance of an individual permit for your discharges; or
3. A formal permit decision by the Department not to reissue this general permit, at which time you must seek coverage under an alternative general permit or an individual permit.

### **C. Contents of the Notice of Intent**

The Notice(s) of Intent must be signed in accordance with Part VI of this permit and must include the following information:

1. Information on the Permittee:
  - (a) The name of the regulated entity, specifying the contact person and responsible official, mailing address, telephone number, and email address (optional); and
  - (b) An indication of whether you are a Federal, State, County, Municipal or other public entity.
2. Information on the municipal separate storm sewer system:
  - (a) The Urbanized Area or Core Municipality (if you are not located in an Urbanized Area) where your system is located; the name of your organization, county(ies), city(ies), or town(s) where your MS4 is located, and the latitude and longitude of an approximate center of your MS4;

- (b) The name of the major receiving water(s) and an indication of whether any of your receiving waters are included on the latest 303(d) list, included in an EPA-approved Total Maximum Daily Load (TMDL), or otherwise designated by the Department as being impaired. If you have discharges to 303(d), or TMDL waters, a certification that your SWMP complies with the requirements of Part IV.D.;
  - (c) If you are relying on another governmental entity, regulated under the storm water regulations (40 CFR Part 122.26 & 122.32) to satisfy one or more of your permit obligations (see Part III), the identity of that entity(ies) and the elements(s) they will be implementing. The Permittee remains responsible for compliance if the other entity fails to fully perform the permit obligation, and may be subject to enforcement action if neither the Permittee nor the other entity fully performs the permit obligation; and
  - (d) If you are relying on the Department for enforcement of erosion and sediment controls on qualifying construction sites in accordance with Part III.B.4(c),
3. Information on your chosen best management practices (BMPs) and the measurable goals for each of the storm water minimum control measures in Part III of this permit, your time frame for implementing each of the BMPs, and the person or persons responsible for implementing or coordinating your SWMP.

**D. Where to Submit**

1. You are to submit your NOI or individual application, and SWMP or a description of your SWMP as allowed under Part II.A.2., signed in accordance with the signatory requirements of Section VI of this permit, to the Department at the following address:

**Alabama Department of Environmental Management  
Water Division  
Post Office Box 301463  
Montgomery, Alabama 36130-1463**

Certified and Registered Mail shall be addressed to:

**Alabama Department of Environmental Management  
Water Division  
1400 Coliseum Boulevard  
Montgomery, Alabama 36110-2059**

**E. Co-Permittees Under a Single Notice of Intent (NOI)**

You may partner with other MS4s to develop and implement your SWMP. You may also jointly submit an NOI with one or more MS4s. The description of your SWMP must clearly describe which permittees are responsible for implementing each of the control measures.

## **PART III Storm Water Management Program (SWMP) for Small MS4s**

### **A. Requirements**

1. You must develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from your small MS4 to the maximum extent practicable (MEP) to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act. The SWMP should include management practices; control techniques and system, design, and engineering methods; and such other provisions as the Department may determine appropriate for the control of such pollutants as follows:
  - (a) The BMPs that you or another entity will implement for each of the storm water minimum control measures (Any technical information developed for the SWMP associated with system, design, and engineering methods must be prepared by a professional engineer, presently registered to practice in the State as required by Alabama Department of Environmental Management (ADEM) Admin. Code r. 335-6-3.);
  - (b) Coordination among entities covered under this small MS4 permit may be necessary to comply with the conditions of the SWMP. The SWMP shall include, where applicable, condition mechanisms among entities covered under this permit to encourage coordinated storm water related policies, programs, and projects within adjoining or shared areas. Entities covered under the small MS4 permit include: municipalities, transportation agencies, universities, colleges, hospitals, prisons, and military bases;
  - (c) The measurable goals for each of the BMPs including, as appropriate, the months and years in which you will undertake required actions, including interim milestones and the frequency of the action. Information about developing measurable goals can be found on the USEPA's website: <http://cfpub.epa.gov/npdes/stormwater/measureablegoals/part3.cfm>;
  - (d) The person or persons responsible for implementing or coordinating the BMPs for your SWMP, and
  - (e) Subject to the five-year limitation noted under Part III.A.1.b. of this paragraph, extensions of milestones may be granted for good cause shown. Failure to implement effective BMPs is not good cause to extend milestones.
2. The SWMP must include the following information for each of the six minimum control measures described in Section III.B. of this permit:
  - (a) The Permittee must develop a storm water management program designed to reduce the discharge of pollutants from your small municipal separate storm sewer system to the maximum extent practicable (MEP) to protect water quality and satisfy the appropriate requirements of the Clean Water Act.
  - (b) The Permittee shall use all known, available, and reasonable methods of prevention, control and treatment (BMPs) to prevent and control storm water pollution from entering waters of the State of Alabama.

### **B. Minimum Control Measures**

You shall consider the use of Low Impact Development (LID)/Green Infrastructure where feasible to assist in attaining the six minimum control measures. Information on Low Impact Development (LID)/Green Infrastructure is available on the following website: <http://epa.gov/nps/lid>. The six minimum control measures that must be included in your SWMP are:

1. Public Education and Outreach on Storm Water Impacts

- (a) Permit requirement: The Permittee must implement a public education and outreach program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff to the maximum extent practicable. This program is the continuous implementation in the areas served by the MS4 as established in the previous permit cycle, if applicable.
- (b) Documentation: The Permittee must document the methodology for the development of a storm water public education and outreach program. The rationale statement should be included in the SWMP and annual report and must address the overall public education program and the individual BMPs, measurable goals and responsible persons for your program. The rationale statement must include the following information, at a minimum:
- (i) How the Permittee plans to inform individuals and households about the steps they can take to reduce storm water pollution.
  - (ii) How the Permittee plans to inform individuals and groups on how to become involved in the storm water program (with activities such as local stream, lake, and beach restoration activities).
  - (iii) Who are the target audiences for the education program who are likely to have significant storm water impacts (including commercial, industrial, and institutional entities) and why those target audiences were selected.
  - (iv) What are the target pollutant sources the Permittee's public education program is designed to address.
  - (v) What is the outreach strategy, including how the Permittee plans to inform the target audiences, the mechanisms and activities (e.g., printed brochures, newspapers, media, workshops, etc.) the Permittee will use to reach the target audiences, and how many people does the Permittee expect to reach by the Permittee's outreach strategy over the permit term.
  - (vi) Who is responsible for overall management and implementation of your storm water public education and outreach program and, if different, who is responsible for each of the BMPs identified for this program.
  - (vii) How will the Permittee evaluate the overall success of this minimum measure.
- (c) Education and outreach efforts shall be prioritized to target the following audiences and subject areas:
- (i) General Public
    - General impacts of storm water flows into surface waters.
    - Impacts from impervious surfaces.
    - Source control BMPs and environmental stewardship actions and opportunities in the areas of pet waste, vehicle maintenance, landscaping, and rain water reuse.
  - (ii) General Public, Businesses, Including Home-Based and Mobile Businesses
    - BMPs for use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials.
    - Impacts of illicit discharges and how to report them.
  - (iii) Homeowners, Landscapers, and Property Managers
    - Yard care techniques that protect water quality.
    - BMPs for use and storage of pesticides and fertilizers.
    - BMPs for carpet cleaning and auto repair and maintenance.
    - Runoff reduction techniques, including site design, pervious paving, retention of forests, and mature trees.
    - Storm water pond maintenance.

- (iv) Engineers, Contractors, Developers, Review Staff, and Land Use Planners
  - Technical standards for construction site sediment and erosion control.
  - Runoff reduction techniques, including site design, pervious pavement, alternative parking lot design, retention of forests and mature trees.
  - Storm water treatment and flow control BMPS.
  - Impacts of increased storm water flows into receiving water bodies.

## 2. Public Involvement/Participation

The SWMP shall include ongoing activities for public involvement through mechanisms such as advisory councils, watershed associations, committees, participation on rate structures, stewardship programs, and environmental related activities. The Permittee shall implement a process to facilitate opportunities for direct action, education, and volunteer programs such as storm drain stenciling, urban stream cleanup, and volunteer monitoring.

- (a) Permit requirement: The Permittee must at a minimum, comply with applicable State and local public notice requirements when implementing a public involvement/participation program.
- (b) Documentation: The Permittee shall consider development of opportunities for the public to participate in the decision making process involving the development and update of the SWMP. The Permittee must document the methodology for the development of the public involvement/participation program. The methodology should include a rationale statement in the SWMP and annual report and must address the overall public involvement/participation program and document individual BMPs, measurable goals, and responsible persons for implementing the program. The rationale statement must include the following information, at a minimum:
  - (i) How the Permittee has involved the public in the development and submittal of the storm water management program.
  - (ii) What is the Permittee's plan to actively involve the public in the development and implementation of the program.
  - (iii) The target audiences for the public involvement program, including a description of the audiences' demographic characteristic. The Permittees are encouraged to actively involve all potentially affected stakeholder groups, including commercial and industrial businesses, trade associations, environmental groups, homeowners associations, and educational organizations, among others.
  - (iv) What are the types of public involvement activities included in the program. Where appropriate, consider the following types of public involvement activities:
    - Citizen representative on a storm water management panel.
    - Public hearings.
    - Working with citizen volunteers willing to educate others about the program.
    - Storm drain marking, stenciling, and tagging, volunteer monitoring or stream/lake/beach clean-up activities.
  - (v) Who is responsible for overall management and implementation of the Permittee's storm water public involvement/participation program and, if different, who is responsible for each of the BMPs identified for this program.
  - (vi) How the Permittee will evaluate the success of this minimum measure, including how the Permittee selected the measurable goal for each minimum measure.



(vii) The Permittee shall make their SWMP and their annual reports required under this permit available to the public when requested. The current SWMP and the latest annual report should be posted on the Permittee's website, if available. To comply with the posting requirement, if a Permittee does not maintain a website, they may submit the updated SWMP and annual report to the Department for electronic distribution when requested in accordance with the Department's public records process.

3. Illicit Discharge Detection and Elimination (IDDE)

(a) Permit requirement: The Permittee must:

- (i) The SWMP shall include an ongoing program to detect and eliminate illicit discharges (as defined in 40 CFR Part 122.26(b)(2)) into the Permittee's small MS4, and improper disposal, including spills not under the purview of another responding authority, into the MS4 owned or operated by the Permittee, to the maximum extent practicable.
- (ii) The Permittee's existing storm sewer map(s) that were created during the first permit cycle shall be updated on an annual basis and shall include the following: location of all outfalls and the names and location of all waters of the State that receive discharges from those outfalls; structural BMPs owned, operated, and maintained by boundaries of the Permittee's watershed. The Permittee may also opt to include land use on the map(s). In the process of updating the map(s) the following should be added: storm water outfalls which become known; an update of known connections to the MS4 authorized or allowed by the Permittee after the effective date of permit coverage; any geographic areas which may discharge storm water into the Permittee's MS4, which may not be located within the municipal boundary. Newly permitted MS4s must develop a storm sewer system map(s) with the following requirements as stated above in B.3.(a)(2);
- (iii) To the extent allowable under State and local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system that are not listed in Part I.B. and implement appropriate enforcement procedures and actions. The ordinance or other regulatory mechanism shall include escalating enforcement procedures and actions. The Permittee shall develop an enforcement strategy and implement the enforcement provisions of the ordinance or other regulatory mechanism. The ordinance or other regulatory mechanism shall be reviewed on an annual basis and updated when necessary;
- (iv) The Permittee shall also implement a program to review and update their IDDE ordinance or other regulatory mechanism to prohibit and eliminate illegal discharges and/or dumping into the Permittee's MS4. The ordinance or other regulatory mechanism shall be reviewed on an annual basis and updated when necessary. Newly permitted MS4s shall develop the aforementioned program. This program shall include:
  - Procedures for locating priority areas likely to have illicit discharges, including at a minimum, evaluating land uses associated with business/industrial activities present; areas where complaints have been registered in the past; and areas with storage of large quantities of materials that could result in spills;
  - Field assessment activities, including visual inspections of priority outfalls identified in (a) above, during dry weather and for the purpose of verifying the outfall locations, identifying previously unknown outfalls, and detecting illicit discharges;

- (v) Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste;
  - (vi) Address the following categories of non-storm discharges or flows (i.e., illicit discharges) only if the Department identifies them as significant contributors of pollutants to your small MS4: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (infiltration is defined as water other than wastewater that enters a sewer system, including foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering run-off, individual residential car washing, flows from riparian habitats and wetlands, discharge or flows from firefighting activities (to include fire hydrant flushing); dechlorinated swimming pool discharges, and residual street wash water, discharge authorized by and in compliance with a separate NPDES permit; and
  - (vii) The Permittee may also develop a list of other similar occasional incidental non-storm water discharges (e.g. non-commercial or charity car washes, etc.) that will not be addressed as illicit discharges. These non-storm water discharges must not be reasonably expected (based on information available to the permittees) to be significant sources of pollutants to the municipal separate storm sewer system, because of either the nature of the discharges or conditions you have established for allowing these discharges to your MS4 (e.g., a charity car wash with appropriate controls on frequency, proximity to impaired waterbodies, BMPs on the wash water, etc.). You must document in your SWMP any local controls or conditions placed on the discharges. The Permittee must include a provision prohibiting any individual non-storm water discharge that is determined to be contributing significant amounts of pollutants to your MS4.
- (b) Documentation: The Permittee must document your methodology for the development of a storm water illicit discharge detection and elimination program. The rationale statement should be included in the SWMP and annual report and must address the overall illicit discharge detection and elimination program and the individual BMPs, measurable goals, and responsible persons for the Permittee's program. The rationale statement must include the following information, at a minimum:
- (i) How the Permittee will develop a storm water map showing the location of all outfalls, to include the latitude and longitude, and the names and location of all receiving waters. Describe the sources of information the Permittee used for the maps, and how you plan to verify the outfall locations with field surveys. If already completed, describe how you developed this map. Also, the Permittee must submit an updated map with each annual report unless there are no changes to the map that was previously submitted. When there are no changes to the map, the annual report must state this.
  - (ii) The mechanism (ordinance or other regulatory mechanism) you will use to effectively prohibit illicit discharges into the MS4 and why you chose that mechanism. If the Permittee needs to develop this mechanism, describe the plan and a schedule to do so. If the ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the program.
  - (iii) The plan to ensure through appropriate enforcement procedures and actions that the illicit discharge ordinance (or other regulatory mechanism) is implemented.

- (iv) The plan to detect and address illicit discharges to your system, including discharges from illegal dumping and spills. The Permittee's plan must include, to the extent practicable, dry weather field screening for non-storm water flows and field tests of chemical parameters you selected as indicators of discharge sources. The plan must also address on-site sewage disposal systems that flow into the storm drainage system. The description must address the following, at a minimum:
  - Procedures for locating priority areas which includes areas with higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines, for example) or ambient sampling to locate impacted reaches.
  - Procedures for tracing the source of an illicit discharge, including the specific techniques you will use to detect the location of the source.
  - Procedures for removing the source of the illicit discharge.
  - Procedures for program evaluation and assessment.
- (v) How the Permittee plans to inform the public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. Include in the description how this plan will coordinate with the public education minimum measure and the pollution prevention/good housekeeping minimum measure programs.
- (vi) Who is responsible for overall management and implementation of the illicit discharge detection and elimination program and, if different, who is responsible for each of the BMPs identified for this program.
- (vii) How the Permittee will evaluate the success of this minimum measure, including how the Permittee selected the measurable goal for each minimum measure.

#### 4. Construction Site Storm Water Runoff Control

- (a) Within 730 days from the effective date of coverage under this permit, all Permittees must develop, implement, and enforce a program to reduce, to the maximum extent practicable, pollutants in any storm water runoff to the regulated MS4 from qualifying construction sites.
- (b) The SWMP must include the following components for construction site storm water runoff control:
  - (i) To the extent allowable under State law, an ordinance or other regulatory mechanism to require erosion and sediment controls, sanctions to ensure compliance, and to provide all other authorities needed to implement the requirements of Part III.B.4. of this permit.
  - (ii) A training program for MS4 site inspection staff in the identification of appropriate construction best management practices (example: QCI training in accordance with ADEM Admin Code. r. 335-6-12 or the Alabama Construction Site General Permit);
  - (iii) Procedures for the periodic inspection of qualifying construction sites to verify the use of appropriate erosion and sediment control practices that are consistent with the *Alabama Handbook for Erosion Control, Sediment Control, And Stormwater Management on Construction Sites and Urban Areas* published by the Alabama Soil and Water Conservation Committee (hereinafter the "Alabama Handbook"). The frequency and prioritization of inspection activities shall be documented in the SWMP and must include a minimum inspection frequency of once each month for priority construction sites.
  - (iv) Specific procedures for construction site plan (including erosion prevention and sediment controls) review and approval: The MS4 procedures must include an evaluation of plan completeness and overall BMP effectiveness.

- (v) Procedures to notify ADEM of non-compliant construction sites discovered during periodic inspections. The notification must provide, at a minimum, the specific location of the construction project, the name and contact information from the owner or operator, and a summary of the site deficiencies.
- (c) ADEM implements a State-wide NPDES construction storm water regulatory program. As provided by 40 CFR Part 122.35(b), the Permittee may rely on ADEM for the setting of standards for appropriate erosion controls and sediment controls for qualifying construction sites and for enforcement of such controls. If not relying on ADEM's program, then the Permittee must include the following, at a minimum, in its SWMP:
- (i) Requirements for construction site operators to implement appropriate erosion and sediment control BMPs consistent with the Alabama Handbook for Erosion Control, Sediment Control, And Stormwater Management on Construction Sites and Urban Areas published by the Alabama Soil and Water Conservation Committee (hereinafter the "Alabama Handbook").
  - (ii) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.
  - (iii) Development and implementation of an enforcement strategy that includes escalating enforcement remedies to respond to issues of non-compliance.
  - (iv) An enforcement tracking system designed to record instances of non-compliance and the MS4's responding actions. The enforcement case documentation should include:
    - Name of owner/operator;
    - Location of construction project or industrial facility;
    - Description of violation;
    - Small MS4 General NPDES Permit
    - Required schedule for returning to compliance;
    - Description of enforcement response used, including escalated responses if repeat violations occur or violations are not resolved in a timely manner;
    - Accompanying documentation of enforcement response (e.g., notices of noncompliance, notices of violations, etc.);
    - Any referrals to different departments or agencies;
    - Date violation was resolved.
- (d) The Permittee must keep records of all inspections (i.e. inspection reports), site plan reviews and employee training required by Part III.4.(b).
- (e) The Permittee must document the decision process for the development of a construction site storm water control program. The rationale statement should be included in the SWMP and annual report and must address the overall construction site storm water control program and the individual BMPs, measurable goals, and responsible persons for the Permittee's program. The rationale statement must include the following information, at a minimum:
- (i) The mechanism (ordinance or other regulatory mechanism, as allowed in accordance with 40 CFR 122.34(b)(4)(ii)(A)), the Permittee will use to require erosion and sediment controls at construction sites and why the Permittee chose that mechanism. If the Permittee needs to develop this mechanism, describe the plan and a schedule to do so. If the ordinance or regulatory mechanism is already developed, include a copy of the relevant sections within the SWMP description.

- (ii) Plan to ensure compliance with the erosion and sediment control regulatory mechanism, including the sanctions and enforcement mechanisms the Permittee will use to ensure compliance. Describe the procedures for when the Permittee will use certain sanctions. Possible sanctions include non-monetary penalties (such as stop work orders), fines, bonding requirements, and/or permit denials for non-compliance.
  - (iii) The requirements for construction site operators to implement appropriate erosion and sediment control BMPs and control waste at construction sites that may cause adverse impacts to water quality. Such waste includes discarded building materials, concrete truck washouts, chemicals, litter, and sanitary waste.
  - (iv) The procedures for plan review, including the review of pre-construction site plans, which incorporate consideration of potential water quality impacts. For construction projects that discharge the pollutant or pollutants of concern to a water body that is listed on the State of Alabama's 303(d) list or has an EPA approved or EPA developed TMDL, you must follow the requirements of Part IV.D. of this permit.
  - (v) The procedures for receipt and consideration of information submitted by the public. Consider coordinating this requirement with the public education program.
  - (vi) The procedures for site inspection and enforcement of control measures, including how the Permittee will prioritize sites for inspection.
  - (vii) Who is responsible for overall management and implementation of the Permittee's construction site storm water control program and, if different, who is responsible for each of the BMPs identified for this program.
  - (viii) Describe how the Permittee will evaluate the success of this minimum measure, including how the Permittee selected the measurable goals for each of the BMPs.
5. Post-Construction Storm water management in new Development and Redevelopment
- Post-Construction Stormwater Management refers to the activities that take place after construction occurs, and includes structural and non-structural controls to obtain permanent stormwater management over the life of the property's use. All Permittees must implement the requirements of Part III.B.5. within 730 days from the effective date of coverage.
- (a) The Permittee shall develop and implement project review, approval, and enforcement procedures for qualifying new development and redevelopment projects. Further requirements for project review and approval are as follows:
    - (i) Develop procedures for the site-plan review and approval process and a required re-approval process when changes to post-construction controls are required.
    - (ii) Develop procedures for a post-construction process to demonstrate and document that post-construction stormwater measures have been installed per design specifications, which includes enforceable procedures for bringing noncompliant projects into compliance.
  - (b) The Permittee must develop and implement strategies which include a combination of structural and/or non-structural BMPs designed to ensure, to the maximum extent practicable, that the volume and velocity of pre-construction stormwater runoff is not significantly exceeded. A design rainfall event with an intensity up to that of a 2yr-24hr storm event shall be the basis for the design and implementation of post-construction BMPs.
  - (c) To the extent allowable under State law, the Permittee must develop and institute the use of an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects.

- (d) The Permittee must develop procedures for development site plan review and approval to ensure post-construction BMPs are addressed.
- (e) The Permittee must ensure adequate long-term operation and maintenance of BMPs. The MS4 shall require a maintenance agreement and provide verification of maintenance provisions of post-construction management practices. These agreements shall allow the MS4, or its designee, to conduct inspections of the management practices and also account for transfer of responsibility in leases and/or deed transfers. Verification shall include one or more of the following as applicable:
- (i) The developer's signed statement accepting responsibility for maintenance until the maintenance responsibility is legally transferred to another party; and/or
  - (ii) Written conditions in the sales or lease agreement that require the recipient to assume responsibility for maintenance; and/or
  - (iii) Written conditions in project conditions, covenants and restrictions for residential properties assigning maintenance responsibilities to a home owner's association, or other appropriate group, for maintenance of structural and treatment control management practices; and/or
  - (iv) Any other legally enforceable agreement that assigns permanent responsibility for maintenance of structural or treatment control management practices.
- (f) The Permittee shall review and evaluate policies and ordinances related to building codes, or other local regulations, with a goal of identifying regulatory and policy impediments to the installation of green infrastructure and low-impact development techniques.
- (g) The Permittee must document the decision process for the development of a post-construction SWMP. The rationale statement should be included in the SWMP and annual report and must address the overall post-construction SWMP and the individual BMPs, measurable goals, and responsible persons for the Permittee's program. The rationale statement must include the following information, at a minimum:
- (i) The program to address storm water runoff from new development and redevelopment projects. Include in this description any specific priority areas for this program.
  - (ii) How the program will be specifically tailored for the Permittee's local community, minimize water quality impacts, and attempt to maintain pre-development runoff conditions.
  - (iii) Any non-structural BMPs in the program, including, as appropriate:
    - Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation.
    - Policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure.
    - Education programs for developers and the public about project designs that minimize water quality impacts.
    - Other measures such as: minimization of the percentage of impervious areas after development, and source control measures often thought as good housekeeping, preventative maintenance and spill prevention.
  - (iv) Any structural BMPs in the program, including, as appropriate:
    - Storage practices such as wet ponds, and extended-detention outlet structures.

- Filtration practices such as grassed swales, bioretention cells, sand filters and filter strips.
  - Infiltration practices such as infiltration basin and infiltration trenches.
- (v) The mechanisms (ordinance or other regulatory mechanisms) the Permittee will use to address post-construction runoff from new development and redevelopments and the rationale for that mechanism. If the Permittee needs to develop a mechanism, describe the plan and a schedule to do so. If the ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the program.
- (vi) How you will ensure the long-term operation and maintenance (O&M) of the selected BMPs. Options to help ensure that future O&M responsibilities are clearly identified include an agreement between the Permittee and another party such as the post-development landowners or regional authorities.
- (vii) How the Permittee will evaluate the success of this minimum measure.

6. Pollution Prevention/Good Housekeeping for Municipal Operations

- (a) The Permittee must develop and implement a program for pollution prevention/good housekeeping for municipal operations.
- (b) The Permittee must develop and implement an employee training program that uses training materials that are available from EPA, the State or other organizations and is designed to prevent and reduce storm water pollution, to the maximum extent practicable, from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, storm water system maintenance, and all other applicable municipal operations.
- (c) Documentation: The Permittee must document the methodology for the development of a pollution prevention/good housekeeping program for municipal operations. The rationale statement should be included in the SWMP and annual report and must address both the overall pollution prevention/good housekeeping program; the individual BMPs measurable goals, and responsible persons for the Permittee's program. The rationale statement must include the following information, at a minimum:
- (i) The operation and maintenance program to prevent or reduce pollutant runoff from the Permittee's municipal operations. The program should list the municipal operations and industrial activities that are impacted by this operation and maintenance program.
- (ii) Any government employee training program the Permittee will use to prevent and reduce the storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance. Describe any existing, available materials the Permittee plans to use. Describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure.
- (iii) The program should address the following areas, at a minimum:
- Maintenance activities, maintenance schedules, and long-term inspection procedures for controls to reduce floatables and other pollutants to your MS4.
  - Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, recycling collection centers, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations, and snow disposal areas you operate.

- Procedures for the proper disposal of waste removed from your MS4 and your municipal operations, including materials such as dredge spoil, accumulated sediments, floatables, and other debris.
  - Procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices.
- (iv) Who is responsible for overall management and implementation of the Permittee's pollution prevention/good housekeeping program and, if different, who is responsible for each of the BMPs identified for this program.
- (v) How the Permittee will evaluate the success of this minimum measure, including how you selected the measurable goals for each of the BMPs.



## **PART IV Special Conditions**

### **A. Sharing Minimum Measure Responsibility and Coordination Between MS4s**

1. If you are relying on another MS4 regulated under the storm water regulations or the Department to satisfy one or more of your permit obligations, you must note that fact in your storm water management program. This other entity must, in fact, implement the control measure(s); the measure of component thereof, must be at least as stringent as the corresponding NPDES permit requirement; and the other entity, unless it is the Department, must agree to implement the control measure on your behalf. This agreement between the two or more parties must be documented in writing in the storm water management plan and be retained by the Permittee for the duration of this permit, including any automatic extensions of the permit term. Except as provided by Part IV.A.2, the Permittee remains responsible for compliance with this Permit if the other entity fails to implement the permit requirement.
2. If the Permittee is relying on the Department for enforcement of erosion and sediment controls on qualifying construction sites and has included that information in the NOI as required by Part II.C.2.(d), the Permittee is not responsible for taking enforcement action or for implementing the requirements of Part III.B.4(c) of this permit in the event the Department receives notification of non-compliant construction sites from the Permittee as required by Part III.B.4(b)(v).
3. Coordination among entities covered under the small MS4 general permit may be necessary to comply with certain conditions of the SWMP. The SWMP shall include, when applicable:
  - (a) Coordination mechanisms among entities covered under the small MS4 general permit to encourage coordinated storm water related policies, programs and projects within adjoining or shared areas. Entities covered under the small MS4 permit include, municipalities, transportation agencies, universities, colleges, hospitals, prisons, and military bases.
  - (b) Coordination mechanisms shall specify roles and responsibilities for the control of pollutants between physically interconnected MS4s permittees covered by the small MS4 general permit.
  - (c) Coordination mechanisms shall coordinate storm water management activities for shared water bodies among permittees to avoid conflicting plans, policies and regulations.
  - (d) The SWMP shall include coordination mechanisms among departments within each Permittee to eliminate barriers to compliance with the terms of this permit.

### **B. Reviewing and Updating Storm Water Management Programs**

1. SWMP Review: You must do an annual review of your SWMP in conjunction with preparation of the annual report required under Part V.
2. SWMP Update: You may change your SWMP during the life of the permit in accordance with the following procedures:
  - (a) Changes adding (but not subtracting or replacing) components, controls, or requirements to the SWMP may be made at any time upon written notification to the Department. These changes must be documented in the annual report.
  - (b) Changes replacing an ineffective or unfeasible components, control measures, or requirements specifically identified in the SWMP, with an alternate component, control measures, or requirements may be requested at any time. Unless denied by the Department, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented sixty (60) days from submittal of the request. If the request is denied, the Department will send you a written response giving a reason for the decision. Your modification requests must include the following:

- (i) An analysis of why the components, control measures or requirements is ineffective or infeasible (including cost prohibitive),
  - (ii) Expectations on the effectiveness of the replacement components, control measures or requirements, and
  - (iii) An analysis of why the replacement components, control measures or requirements are expected to achieve the goals of the components, control measures or requirements to be replaced.
- (c) Change requests or notifications must be made in writing and signed in accordance with Part VI.
3. SWMP Updates Required by the Department: The SWMP shall be updated as part of the re-coverage process for subsequently issued MS4 general permits. In addition, the Department may require changes to the SWMP as needed to:
- (a) Meet the conditions of the permit;
  - (b) Address impacts on receiving water quality caused, or contributed to, by discharges from the municipal separate storm sewer system;
  - (c) Include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements; or
  - (d) Include such other conditions deemed necessary by the Department to comply with the goals and requirements of the Clean Water Act.
  - (e) Include additional control measures when a Total Maximum Daily Load (TMDL) and/or a 303(d) impairment has been specified for a receiving waterbody, if applicable or if the SWMP proves inadequate in reducing pollutants in storm water run-off;
  - (f) Changes requested by the Department must be made in writing, set forth the time schedule for you to develop the changes, and offer you the opportunity to propose alternative program changes to meet the objective of the requested modification. All changes required by the Department will be made in accordance with 40 CFR Part 124.5, 40 CFR Part 122.62, or as appropriate 40 CFR Part 122.63.
4. Transfer of Ownership, Operational Authority, or Responsibility for SWMP Implementation: You must implement the SWMP on all new areas added to your portion of the municipal separate storm sewer system (or for which you become responsible for implementation of storm water quality controls) as expeditiously as practicable, but not later than one (1) year from addition of the new areas. Implementation may be accomplished in a phased manner to allow additional time for controls that cannot be implemented immediately.
- (a) Within ninety (90) days of a transfer of ownership, operational authority, or responsibility for SWMP implementation, you must have a plan for implementing your SWMP in all affected areas. The plan may include schedules for implementation. Information on all new annexed areas and any resulting updates required to the SWMP must be included in the annual report.
  - (b) Only those portions of the SWMPs specifically required as permit conditions shall be subject to the modification requirements of 40 CFR Part 124.5. Addition of components, controls, or requirements by the Permittee(s) and replacement of an ineffective or infeasible BMP implementing a required component of the SWMP with an alternate BMP expected to achieve the goals of the original BMP shall be considered minor changes to the SWMP and not modifications to the permit.

### **C. Discharge Compliance with Water Quality Standards**

This general permit requires, at a minimum, that permittees develop, implement and enforce a storm water management program designed to reduce the discharge of pollutants to the maximum extent practicable. Full implementation of BMPs, using all known, available, and reasonable methods of prevention, control and treatment to prevent and control storm water pollution from

entering waters of the State of Alabama is considered an acceptable effort to reduce pollutants from the municipal storm drain system to the maximum extent practicable.

## **D. Discharge to Impaired Waters**

### **1. 303(d) Listed Waters**

This permit does not authorize new sources or new discharges of pollutants of concern to impaired waters unless consistent with an EPA approved or EPA developed Total Maximum Daily Load (TMDL) and applicable State law. Impaired waters are those that do not meet applicable water quality standards and are identified on the State of Alabama's 303(d) list. Pollutants of concern are those pollutants for which the water body is listed as impaired and which contribute to the listed impairment.

- (a) You must determine whether the discharge from any part of the MS4 contributes to a waterbody that is included on the latest 303(d) list or designated by the Department as impaired or is included in an EPA approved or EPA developed TMDL. If you have discharges meeting this criterion, you must comply with Part IV.D., if you do not, Part IV.D. does not apply to you.
  - (b) MS4s that discharge into a receiving water which is listed on the State of Alabama's 303(d) list of impaired waters, and with discharges that contain the pollutant(s) for which the water body is impaired, must within six (6) months of the Final 303(d) list approval, document in the SWMP how the BMPs will control the discharge of the pollutant(s) of concern, and must ensure that the discharge will not cause or contribute to the impairment. A monitoring plan to assess the effectiveness of the BMPs in achieving the wasteload allocations must also be included in the SWMP.
  - (c) If your MS4 discharges to a waterbody described above, you must also determine whether a total maximum daily load (TMDL) has been developed by EPA or approved by EPA for the listed waterbody. If a TMDL is approved during this permit cycle by USEPA for any waterbody into which an MS4 discharges, the MS4 must review the applicable TMDL to see if it includes requirements for control of storm water discharges. Within six (6) months of the date of a final TMDL issuance, the MS4 must notify the Department on how it will modify its storm water management program to include best management practices specifically targeted to achieve the wasteload allocations prescribed by the TMDL. The MS4 must include a monitoring component in the SWMP to assess the effectiveness of the BMPs in achieving the wasteload allocations.
- ### **2. Discharging into Waters with EPA Approved or EPA Developed TMDLs**
- (a) Determine whether the EPA approved or EPA developed TMDL is for a pollutant likely to be found in storm water discharges from your MS4.
  - (b) Determine whether the TMDL includes a pollutant allocation or other performance requirements specifically for storm water discharge from your MS4.
  - (c) Determine whether the TMDL addresses a flow regime likely to occur during periods of storm water discharge.
  - (d) After the determinations above have been made and if it is found that your MS4 must implement specific allocations provisions of the TMDL, assess whether the allocations are being met through implementation of existing storm water control measures or if additional control measures are necessary.
  - (e) Involve the public in accordance with Part III.B.2. of a decision that existing storm water control measures are meeting the allocations or the additional control measures that you determine are necessary.

- (f) Document all control measures currently being implemented or planned to be implemented. Also include a schedule of implementation for all planned controls. Document the calculations or other evidence that shows that the allocations will be met.
- (g) If a TMDL contains requirements for control of pollutants from the MS4 storm water discharges, then the SWMP must include BMPs specifically targeted to achieve the wasteload allocations prescribed by the TMDL. A monitoring plan to assess the effectiveness of the BMPs in achieving the wasteload allocations must also be included in the SWMP. Implementation of the monitoring plan in accordance with Part V.A.2 will determine whether the storm water controls are adequate to meet the TMDL allocations.
- (h) If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions. Continue Paragraphs IV.D.2.d.-h. until two continuous monitoring cycles, as defined in the approved monitoring plan in accordance with Part V.A.2., show that the TMDL allocations are being met or that water quality (WQ) standards are being met.

#### **E. Requiring an Individual Permit**

The Department may require any person authorized by this permit to apply for and/or obtain an individual NPDES permit. When the Department requires application for an individual NPDES permit, the Department will notify the Permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form and a statement setting a deadline for the Permittee to file the application.

## **PART V Monitoring, Recordkeeping, and Reporting**

### **A. Monitoring**

1. You must evaluate program compliance, the appropriateness of identified BMPs, and progress toward achieving identified measurable goals. If you discharge to an impaired water or to a water for which a TMDL has been approved by EPA, you may have monitoring requirements under Part IV.D.
2. When you conduct monitoring at your permitted small MS4, you are required to comply with the following:
  - (a) Submit the monitoring plan. The proposed monitoring plan and any subsequent revision proposed must be submitted to the Department six (6) months from the date of coverage of this permit and annually, thereafter, concurrent with the SWMP Annual Report submittal for approval.
  - (b) Representative monitoring. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
  - (c) Test Procedures. Analysis must be conducted according to test procedures approved by EPA under 40 CFR Part 136. When an EPA approved test procedure for analysis of a pollutant does not exist, the Director or his designee shall approve the procedure to be used.
3. Records of monitoring information shall include:
  - (a) The date, exact place, and time of sampling or measurements;
  - (b) The name(s) of the individual(s) who performed the sampling or measurements;
  - (c) The date(s) analyses were performed;
  - (d) The names of the individuals who performed the analyses;
  - (e) The analytical techniques or methods used; and
  - (f) The results of such analyses.
4. Discharge Monitoring Report. Monitoring results must be reported with the SWMP Annual Report and shall be reported in accordance with Part V.C.f. and the monitoring plan approved in Part V.A.2.a.

### **B. Record keeping**

1. You must retain required records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of monitoring reports, a copy of the NPDES permit, and records of all data used to complete the application (NOI) for this permit, for a period of at least three years from the date of the sample, measurement, report or application, or for the term of this permit, whichever is longer. This period may be extended by request of the Department at any time.
2. You must submit your records to the Department only when specifically asked to do so. You must retain a description of the SWMP required by this permit (including a copy of the permit language) at a location accessible to the Department. You must make your records, including the notice of intent (NOI) and the description of the SWMP, available to the public if requested to do so in writing.

### **C. Reporting**

1. You must submit annual reports to the Department each year by March 31st. Annual Reports should cover the year (April 1 through March 31) prior to the submittal date. (For example, Annual Reports submitted March 31, 2011 should cover the time period of April 1, 2010

through March 31, 2011). If an entity comes under coverage for the first time after the issuance of this permit, then the first annual report should cover from the time coverage begins until the required submittal date of March 31. The report must include:

- (a) The status of your compliance with permit conditions, an assessment of the appropriateness of the identified BMPs, progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and the measurable goals for each of the minimum control measures;
- (b) Results of information collected and analyzed, if any, during the reporting period, including any monitoring data used to assess the success of the program at reducing the discharge of pollutants to the MEP;
- (c) A summary of the storm water activities you plan to undertake during the next reporting cycle (including an implementation schedule);
- (d) Proposed changes to your SWMP, including changes to any BMPs or any identified measurable goals that apply to the program elements;
- (e) Notice that you are relying on another government entity to satisfy some of your permit obligations (if applicable); and
- (f) All monitoring results collected during the previous year in accordance with Part V, if applicable. The monitoring reports shall be submitted in a format acceptable to the Department.

## **PART VI Standard Permit Conditions**

### **A. Duty to Comply**

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of CWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

### **B. Continuation of the Expired General Permit**

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the ADEM Admin. Code r. 335-6-6 and remain in force and effect if the permittee reapplies for coverage as required under Part II of this Permit. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

1. Reissuance or replacement of this permit, at which time you must comply with the Notice of Intent conditions of the new permit to maintain authorization to discharge; or
2. Issuance of an individual permit for your discharges; or
3. A formal permit decision by the Department not to reissue this general permit, at which time you must seek coverage under an alternative general permit or an individual permit.

### **C. Need to Halt or Reduce Activity Not a Defense**

It shall not be a defense for you in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

### **D. Duty to Mitigate**

You must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

### **E. Duty to Provide Information**

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, suspending, or terminating the permit or to determine compliance with the permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by the permit.

### **F. Other Information**

If you become aware that you have failed to submit any relevant facts in your Notice of Intent or submitted incorrect information in the Notice of Intent or in any other report to the Department, you must promptly submit such facts or information.

### **G. Signatory Requirements**

All Notices of Intent, reports, certifications, or information submitted to the Department, or that this permit requires be maintained by you shall be signed and certified as follows:

1. Notice of Intent. All Notices of Intent shall be signed by a responsible official as set forth in ADEM Admin. Code r. 335-6-6-.09.

2. Reports and other information. All reports required by the permit and other information requested by the Department or authorized representative of the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
  - (a) Signed authorization. The authorization is made in writing by a person described above and submitted to the Department.
  - (b) Authorization with specified responsibility. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility for environmental matters for the regulated entity.
3. Changes to authorization. If an authorization is no longer accurate because a different operator has the responsibility for the overall operation of the MS4, a new authorization satisfying the requirement of Part VI.G.2.b. above must be submitted to the Department prior to or together with any reports or information, and to be signed by an authorized representative.
4. Certification. Any person signing documents under Part VI.F.1-2. above shall make the following certification:

*"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

## **H. Property Rights**

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, nor it does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations

## **I. Proper Operation and Maintenance**

You must at all time properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by you to achieve compliance with the conditions of this permit and with the conditions of your SWMP. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by you only when the operation is necessary to achieve compliance with the conditions of the permit.

## **J. Inspection and Entry**

1. You must allow the Department or an authorized representative upon the presentation of credentials and other documents as may be required by law, to do any of the following:
  - (a) Enter your premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
  - (b) Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;
  - (c) Inspect at reasonable times any facilities or equipment (including monitoring and control equipment) practices, or operations regulated or required under this permit; and
  - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.



## **K. Permit Actions**

This permit may be modified, revoked and reissued, or terminated for cause. Your filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

## **L. Permit Transfers**

This permit is not transferable to any person except after notice to the Department. The Department may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Act.

## **M. Anticipated Noncompliance**

You must give advance notice to the Department of any planned changes in the permitted small MS4 or activity which may result in noncompliance with this permit.

## **N. Compliance with Statutes and Rules**

1. The permit is issued under ADEM Admin. Code r. 335-6-6. All provisions of this chapter that are applicable to this permit are hereby made a part of this permit.
2. This permit does not authorize the noncompliance with or violation of any laws of the State of Alabama or the United States of America or any regulations or rules implementing such laws.

## **O. Severability**

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall be affected thereby.

## **P. Bypass Prohibition**

Bypass (see 40 CFR 122.41(m)) is prohibited and enforcement action may be taken against a regulated entity for a bypass; unless:

1. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during the normal periods of equipment downtime. This condition is not satisfied if the regulated entity should, in the exercise of reasonable engineering judgment, have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.
3. The Permittee submits a written request for authorization to bypass to the Director at least ten (10) days prior to the anticipated bypass (if possible), the Permittee is granted such authorization, and the Permittee complies with any conditions imposed by the Director to minimize any adverse impact on human health or the environment resulting from the bypass.

The Permittee has the burden of establishing that each of the conditions of Part VI.O. have been met to qualify for an exception to the general prohibition against bypassing and an exemption, where applicable, from the discharge specified in this permit.

## **Q. Upset Conditions**

An upset (see 40 CFR 122.41(n)) constitutes an affirmative defense to an action brought for noncompliance with technology-based permit limitations if a regulated entity shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

1. An upset occurred and the Permittee can identify the specific cause(s) of the upset;
2. The Permittee's facility was being properly operated at the time of the upset; and
3. The Permittee promptly took all reasonable steps to minimize any adverse impact on human health or the environment resulting from the upset.

The Permittee has the burden of establishing that each of the conditions of Part VI.P. of this permit have been met to qualify for an exemption from the discharge specified in this permit.

## **R. Procedures for Modification or Revocation**

Permit modification or revocation will be conducted according to ADEM Admin. Code r. 335-6-6-.17.

## **S. Re-opener Clause**

If there is evidence indicating potential or realized impacts on water quality due to storm water discharge covered by this permit, the regulated entity may be required to obtain an individual permit or an alternative general permit or the permit may be modified to include different limitations and/or requirements.

## **T. Definitions**

All definitions contained in Part VI shall apply to this permit and are incorporated herein by reference. For convenience, simplified explanations of some regulatory/statutory definitions have been provided, but in the event of a conflict, the definition found in the Statute or Regulation takes precedence.

1. Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
2. Control Measure as used in this permit, refers to any Best Management practice or other method used to prevent or reduce the discharge of pollutants to waters of the State.
3. CWA or The Act means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq.
4. Discharge, when used without a qualifier, refers to "discharge of a pollutant" as defined as ADEM Admin. Code r. 335-6-6-.02(m).
5. Green Infrastructure refers to systems and practices that use or mimic natural processes to infiltrate, evapotranspire (the return of water to the atmosphere either through evaporation or by plants), or reuse storm water or runoff on the site where it is generated.
6. Low Impact Development (LID) is an approach to land development (or re-development) that works with nature to manage storm water as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat storm water as a resource rather than a waste product.

7. Illicit Connection means any man-made conveyance connecting an illicit discharge directly to municipal separate storm sewer.
8. Illicit Discharge is defined at 40 CFR Part 122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of storm water, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.
9. Indian Country, as defined in 18 USC 1151, means (a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation; (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a State, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same. This definition includes all land held in trust for an Indian tribe.
10. MEP is an acronym for "Maximum Extent Practicable," the technology-based discharge standard for municipal separate storm sewer systems to reduce pollutants in storm water discharges that was established by CWA Section 402(p). A discussion of MEP as it applies to small MS4s is found at 40 CFR Part 122.34.
11. MS4 is an acronym for "Municipal Separate Storm Sewer System" and is used to refer to either a large, medium, or small municipal separate storm sewer system. The term is used to refer to either the system operated by a single entity or a group of systems within an area that are operated by multiple entities.
12. Municipal Separate Storm System is defined at 40 CFR Part 122.26(b)(8) and means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying storm water; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined in ADEM Admin. Code r. 335-6-6-.02(nn).
13. NOI is an acronym for "Notice of Intent" to be covered by this permit and is the mechanism used to "register" for coverage under a general permit.
14. Department means the Alabama Department of Environmental Management or an authorized representative.
15. Priority construction site means any qualifying construction site in an area where the MS4 discharges to a waterbody which is listed on the most recently approved 303(d) list of impaired waters for turbidity, siltation, or sedimentation, any waterbody for which a TMDL has been finalized or approved by EPA for turbidity, siltation, or sedimentation, any waterbody assigned the Outstanding Alabama Water use classification in accordance with ADEM Admin. Code r. 335-6-10-.09, and any waterbody assigned a special designation in accordance with 335-6-10-.10.
16. Qualifying Construction Site means any construction activity that results in a total land disturbance of one or more acres and activities that disturb less than one acre but are part of a larger common plan of development or sale that would disturb one or more acres. Qualifying construction sites do not include land disturbances conducted by entities under the jurisdiction and supervision of the Alabama Public Service Commission.
17. Qualifying New Development and Redevelopment means any site after 730 days from the effective date of permit coverage that results from the disturbance of one acre or more of land or the disturbance of less than one acre of land if part of a larger common plan of development or sale that is greater than one acre. Qualifying new development and

redevelopment does not include land disturbances conducted by entities under the jurisdiction and supervision of the Alabama Public Service Commission.

18. Small municipal separate storm sewer system is defined at 40 CFR Part 122.26(b)(16) and refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to water of the United States, but is not defined as "large" or "medium" municipal separate storm sewer system. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.
19. Storm water is defined at 40 CFR Part 122.26(b) (13) and means storm water runoff, snow melt runoff, and surface runoff and drainage.
20. Storm Water Management Program (SWMP) refers to a comprehensive program to manage the quality of storm water discharged from the municipal separate storm sewer system.
21. SWMP is an acronym for "Storm Water Management Program."
22. Total Maximum Daily Load (TMDL) means the calculated maximum permissible pollutant loading to a waterbody at which water quality standards can be maintained. The sum of wasteload allocations (WLAs) and load allocations (LAs) for any given pollutant.
23. "You" and "Your" as used in this permit is intended to refer to the Permittee, the operator, or the discharger as the context indicates and that party's responsibilities (e.g., the city, the country, the flood control district, the U.S. Air Force, etc.).

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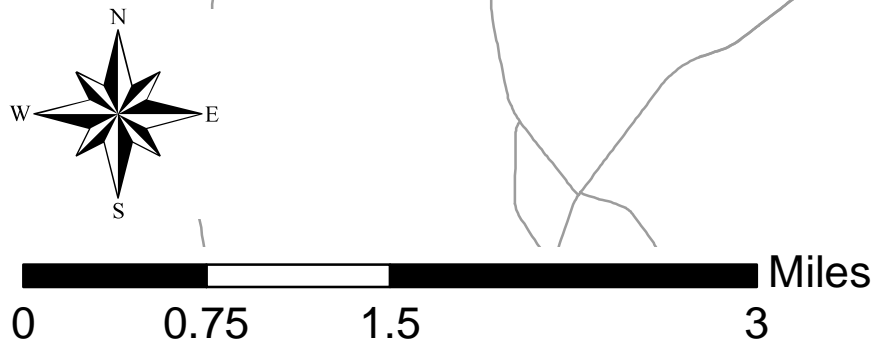
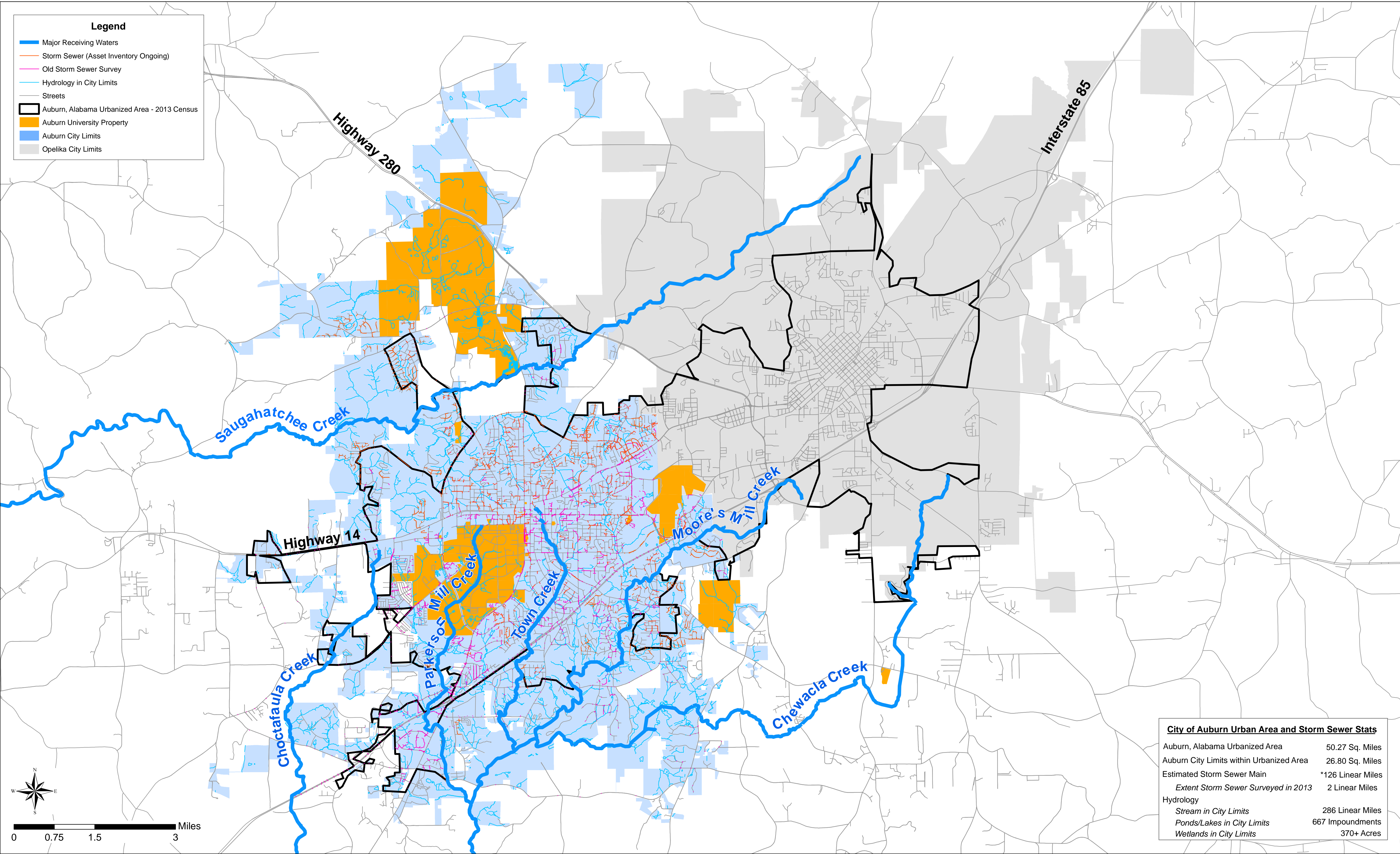
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## **APPENDIX B**

### **URBANIZED AREA MAP**

**Legend**

- Major Receiving Waters
- Storm Sewer (Asset Inventory Ongoing)
- Old Storm Sewer Survey
- Hydrology in City Limits
- Streets
- Auburn, Alabama Urbanized Area - 2013 Census
- Auburn University Property
- Auburn City Limits
- Opelika City Limits



**City of Auburn Urban Area and Storm Sewer Stats**

Auburn, Alabama Urbanized Area	50.27 Sq. Miles
Auburn City Limits within Urbanized Area	26.80 Sq. Miles
Estimated Storm Sewer Main	*126 Linear Miles
Extent Storm Sewer Surveyed in 2013	2 Linear Miles
<b>Hydrology</b>	
Stream in City Limits	286 Linear Miles
Ponds/Lakes in City Limits	667 Impoundments
Wetlands in City Limits	370+ Acres

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## **APPENDIX C**

### **NEWSPAPER PUBLICATIONS - 2014**

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Home > News > Lee County

# Fourth-graders learn conservation and recycling at Water Festival

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Posted: Friday, May 9, 2014 4:43 pm | Updated: 4:50 pm, Fri May 9, 2014.

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Sara Falligant | Opelika-Auburn News | [Twitter](#)



Sara Falligant/Opelika-Auburn News

More than 750 fourth-graders from across Lee County got hands-on experience with water conservation and recycling at the annual Water Festival.

Students memorized the water cycle by making beaded bracelets, learned about groundwater with an edible aquifer and purified brackish water using plastic soda bottles. Paul Cash, a magician from California, also entertained the fourth-graders with an environmental magic show that emphasized water recycling.

"We did a study on what age would retain it the most and carry it through their lives," said Smiths Station City Clerk Jerry Bentley. "Fourth grade was it."

Now in its 10th year, the Water Festival aims to educate students and their families about surface water and groundwater. Traditionally, the festival has welcomed roughly 2,000 students from Lee County, Auburn and Opelika Schools. However, the majority of students that filled Auburn University's Haley Center for Friday's Water Festival were Lee County fourth-graders.

Throughout the morning volunteers engaged students in hands-on activities.

"All of the instructors are volunteers," Bentley said. "They're from all walks of life."

Retired teachers, Auburn University staff, city water and sewer workers and Smiths Station High School National Honor Society students lead the fourth-graders through activity stations.

Matt Dunn, assistant direct for the City of Auburn's Water Resource Management Department, helped the children create miniature filtration systems. Students poured brown water through gravel and sand in plastic soda bottles.

"They're always very excited, especially when you take

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the dirty water and it comes out clean at the end," Dunn said, adding most don't know what the water goes through to make it out of their faucets. "To me, that's always such an important part of this. ...There are a lot of things that go into that before the water is there for them to drink."

At the edible aquifer station, students learned about permeable and impermeable surfaces using ice cream, chocolate sprinkles soda and ice.

Groups also strung multicolored beads to make bracelets that represent the steps of the water cycle.

"They put together the bracelet based on the cycle of water, and there's a little critter (bead) in the middle," Bentley said.

Finally, the fourth-graders were mesmerized with the interactive magic show. Cash transformed motor oil into water and recycled scraps of paper into a newspaper page.

"We had four amazing lessons on the water cycle," said East Smiths Station Elementary School teacher Lykesia Truss. "They really enjoyed it."

### Employment

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## Auburn University will host climate change lecture

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Posted: Friday, April 18, 2014 4:37 pm | Updated: 4:38 pm, Fri Apr 18, 2014.



JAY HARE / DOTHAN EAGLE

Choctawhatchee Riverkeeper founder Michael William Mullen will speak at Auburn University next week.

### Special to the News

AUBURN UNIVERSITY – Choctawhatchee Riverkeeper Mike Mullen will present a free, public lecture titled “Climate Change is Real, Dangerous, and Deadly: If the Deniers Win, We All Lose!” next week in Auburn.

He will give his lecture in Langdon Hall at Auburn University at 7 p.m. Wednesday. Mullen has more than 30 years of professional experience in environmental fields related to water quality, aquatic ecology and watershed management. He also has participated in environmental consulting, research and education.

Before retiring from Troy University in 2006, Mullen was involved in water quality monitoring and research for 10 years. He taught both undergraduate- and graduate-level classes in erosion and sediment control and stormwater management.

“Climate change may well be the defining issue of our time,” said Mike Kensler, director of the Office of Sustainability at Auburn. “We are thrilled to have Mike Mullen on campus to present the latest scientific findings and explain how citizens can make a difference in tackling this challenge.”

The Choctawhatchee Riverkeeper is part of the national Waterkeeper Alliance and, led by Mullen, is an organization with the mission to protect and restore the ecological health of the Choctawhatchee River and surrounding systems that constitute the watershed.

The Choctawhatchee originates as two separate forks in Barbour County. The east fork flows through Henry County and joins the west fork in eastern Dale County, about four miles above Newton. The unified river then flows southwest through Dale and Geneva counties into Florida, collecting tributaries along the way. It terminates

at Choctawhatchee Bay, which empties into the Gulf of Mexico at East Pass near Destin, Fla.

The event is part of the Office of Sustainability's celebration of Earth Week and Campus Conversations program.

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# Parkerson Mill Creek on Auburn campus gets makeover

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Posted: Thursday, July 31, 2014 12:09 pm | Updated: 11:55 am, Tue Sep 9, 2014.

Tori Rivers | Auburn University

A small creek that winds past the football and baseball fields and old coliseum of Auburn University has been transformed this summer from eyesore to outdoor classroom.

The push to complete construction and campus restoration projects before fall typically marks the end of summer semesters at Auburn University. A summer project this year was the restoration of a section of Parkerson Mill Creek that runs through Auburn's campus near the South Donahue Residence Hall and the Beard-Eaves-Memorial Coliseum.

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Through the years, this particular section had become overgrown and unsightly.

"Parkerson Mill Creek has been a project on the table for more than 10 years," said Charlene Lebleu, associate professor of the landscape architecture program. "When I first came to campus 10 years ago, I was told there was a creek that went through campus, but I could not find it."

"Parkerson Mill Creek was a fenced-in, grown-up ditch that no one really even knew was here and just kind of avoided," said Ben Burmester, campus planner for Facilities Management. "From an aesthetic point of view the restoration is a huge improvement. A second benefit is just improving the water quality. Environmental management that we do on campus is part of the role we have as stewards of the land."

The campus master plan, which was approved in 2013, established natural resource management areas around Parkerson Mill Creek. The \$300,000 project is university funded, mostly through bonds and athletic support. The creek restoration included widening the floodplains, cleaning out the stream, seeding and landscaping the surrounding grounds and adding an outdoor classroom. The project was timed to coincide with the completion of the nearby Auburn Wellness Kitchen in July.

"This stream restoration created an opportunity to understand more about water resources and the impacts that we can have on a stream and then a river and then eventually Mobile Bay, just by taking some small steps," said Eve Brantley, an associate professor in the Department of Crop, Soil and Environmental Sciences and the state water resources specialist for the Alabama Cooperative Extension System.

"Working on this stream segment will introduce people to an innovative way to manage streams for habitat, water quality improvement and aesthetics," Brantley said. "Especially right here in the core of campus, it brings it to a place where people can get to the stream and understand it is more than just a ditch. It is a vibrant, full-of-life water body."

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Brantley noted that the improvements to the creek have enhanced the social and ecological functions, enhanced the biological livability of the landscape made the area available for environmental research. The outdoor classroom aspect of the restoration presents the opportunity for student learning.

As part of an urban landscape, storm water is shunted directly to the stream, increasing water volume and causing the stream base to fall apart. The restoration created a more stable stream base to prevent the destruction of sidewalks and buildings. In-stream structures were also added, which helps flow water energy and keep it to the center of the stream channel, which deters the erosive energy from irritating the stream bank. The project also maximized the floodplains, which helps store floodwaters and transform contaminants that are in the water into less harmful constituents. This cleans up the water downstream.

The restoration brought students, faculty and visitors together to understand more about water resources. This project incorporated experts in engineering, horticulture, soil science, environmental sciences, landscape architecture and urban planning.

"Several organizations, Facilities Management and the Sustainability Initiative are all working together to increase our sustainability across campus, not only through creek restoration, but through cisterns, rain gardens, permeable paving and other types of best management practices for storm water," Lebleu said.

Parkerson Mill Creek runs through the heart of campus. People will now know where it is and they can congregate at this living stream.

"We now have a stream on campus that is a more highly functioning ecological unit, right here next to our athletic units and our academic units," Brantley said. "I have a real sense of pride that we've taken the steps to look at managing our resources in a new way, in a better way, knowing that there will be adjustments and there will be lessons learned, but that's what life is all about, learning new ways to do things and then sharing it with others. I couldn't be more proud and happier that we've taken this step."

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Posted in [Auburnuniversity](#), [Local](#) on Thursday, July 31, 2014 12:09 pm. Updated: 11:55 am.

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Rainwater runoff from your roof or landscape soaks into the ground and often collects near your home against basement walls, crawl spaces, or in the soil beneath your home's foundation. Basement and crawl space flooding can lead to mosquito breeding, termite damage, dangerous mold and mildew growth, or worse, your foundation settling and cracking.

Damp, musty smells and wet walls are signs that water is getting into your basement or crawl space. Don't ignore the problem or attempt a quick-and-dirty solution that won't correct the situation long-term. Certain temporary fixes can actually make the problem worse.

Luckily, there are do-it-yourself drainage kits available, such as Flo-Well and EZ-Drain, which are usually better performing and easier to install than a traditional, gravel dry well or French drain. However, when dealing with more complex drainage issues, consider hiring a contractor.

"Just be sure to check online ratings and references to ensure you're going with someone qualified and experienced," stresses Larsen.

### Neighbor Runoff

Water flows from higher to lower ground, so drainage problems are likely if your property is lower than neighboring properties. In general, neighbors are not responsible for water runoff onto your property unless alterations to their landscape have changed the natural flow of water. This unsuspecting threat can cause a variety of serious drainage problems.

Larsen recommends visiting [www.ndspro.com](http://www.ndspro.com) for free resources and videos, product recommendations, installation instructions, and links to local home improvement retailers where you can find the right tools. To speak to "Dr. Drainage," directly, call 888-825-4716.

Ignoring standing water in and around your home won't make the problem disappear. This spring, be proactive. Invest a moderate amount of time and money into smart home drainage solutions to protect your property long-term.

Social sharing buttons: Facebook, Twitter (0), LinkedIn (0), Pinterest (0), Email (0)

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Posted in on Monday, March 31, 2014 12:00 am. Updated: 4:58 pm.

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  - Opelika woman in custody for manslaughter

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### Web Poll

Should police officers turn their backs in protest to New York Mayor Bill de Blasio after the deaths of NYPD officers Rafael Ramos and Wenjian Liu?

NYPD Commissioner William Bratton has asked that officers refrain from acting disrespectfully toward the mayor.

Yes  No

Vote

View Results

### Latest E-Edition

**OPELIKA-AUBURN NEWS**

Auburn's Ke Ross Miller takes the long road to play in SEC

Lee County prepares for cold weather this week

Body found in Auburn creek: Investigation still ongoing

**AU TIGER TAGS**

Alabama 893BCS AUBURN

Actor-minister guest speaker for MLK event

Teachers, police team up to keep kids safe

Bridal EXPO NEWS

### Calendar Of Events

More Events | Submit an Event

**AU Men's Basketball at Vanderbilt**  
Tue, Jan 06, 8:00 pm CST  
Nashville, TN

**AA Meeting**  
Wed, Jan 07, 12:00 pm CST  
Mount Vernon Baptist Church, Auburn

**Nature Walks**

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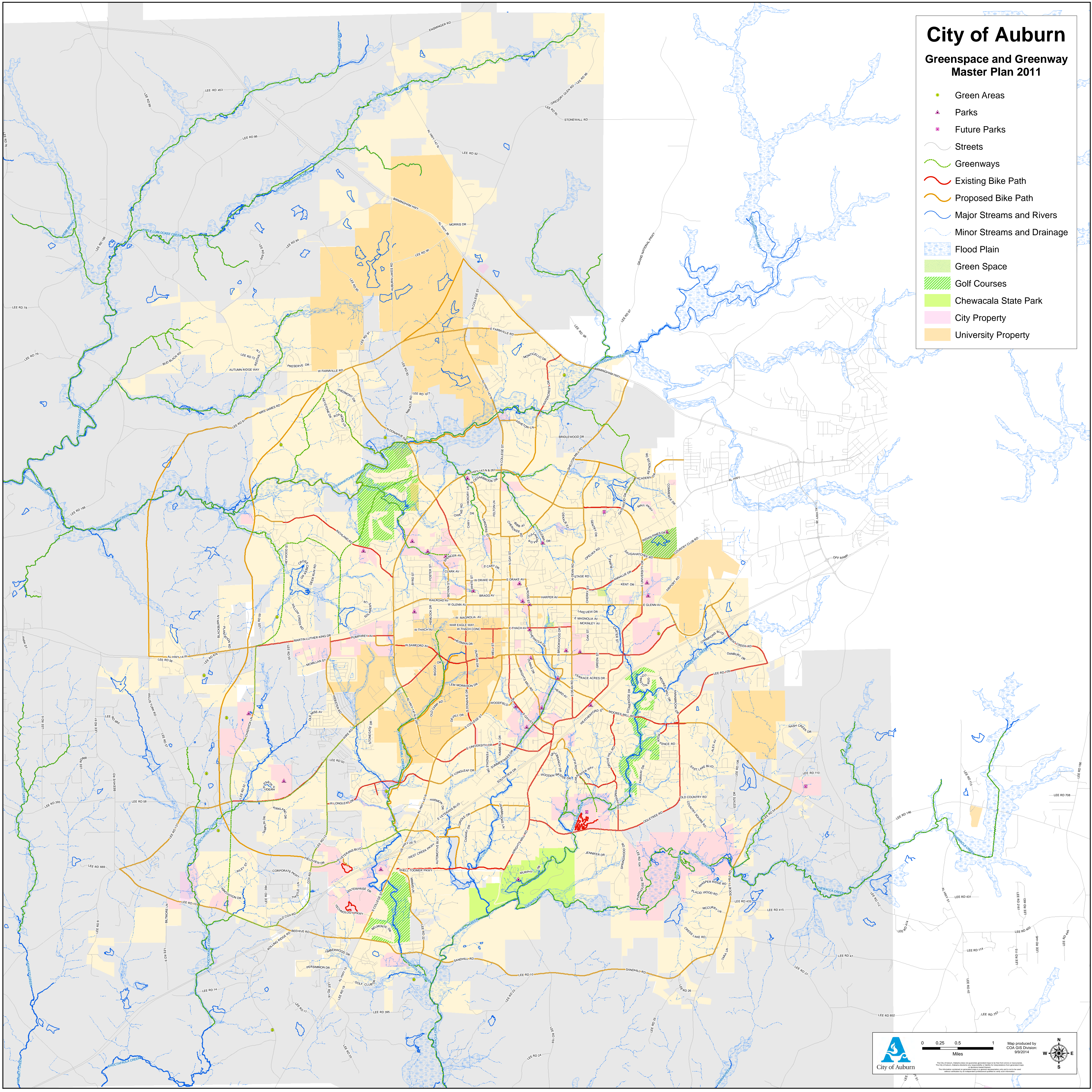
## **APPENDIX D**

# **GREEN SPACE AND GREEN WAY MASTER PLAN**

# City of Auburn

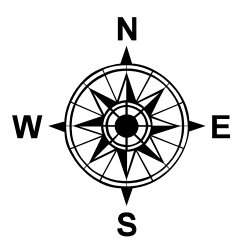

## Greenspace and Greenway Master Plan 2011

- Green Areas
- ▲ Parks
- Future Parks
- Streets
- Greenways
- Existing Bike Path
- Proposed Bike Path
- Major Streams and Rivers
- Minor Streams and Drainage
- ▨ Flood Plain
- Green Space
- ▨ Golf Courses
- Chewacala State Park
- City Property
- University Property



0 0.25 0.5 1 Miles

Map produced by COA GIS Division 9/9/2014





---

**APPENDIX E**

**2014 STORMWATER QUALITY MONITORING  
REPORT**

CITY OF AUBURN, ALABAMA

# Annual Surface Water Quality Monitoring Report



City of Auburn

**2014 Monitoring Year**

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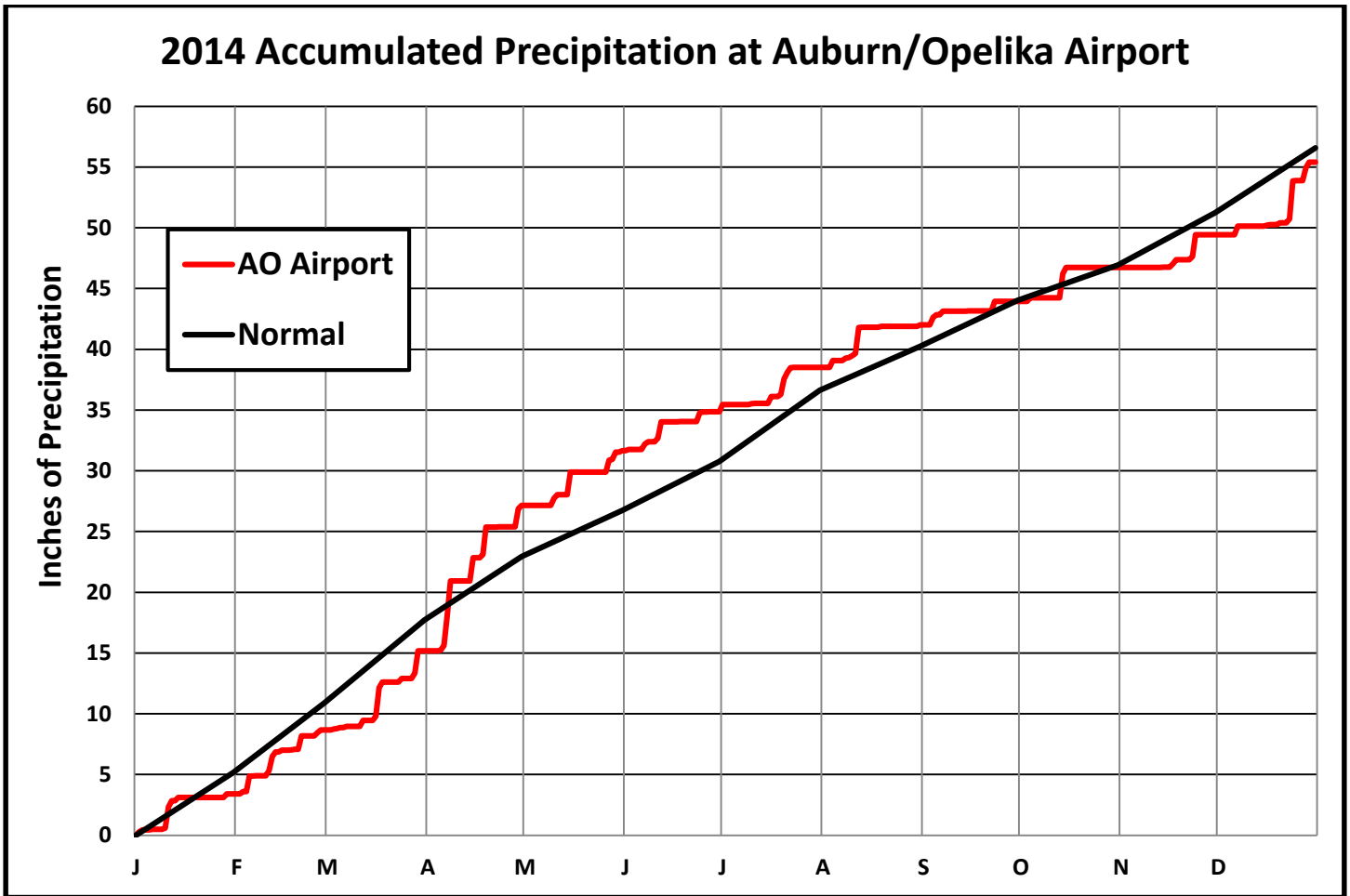
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## 1.0 Introduction

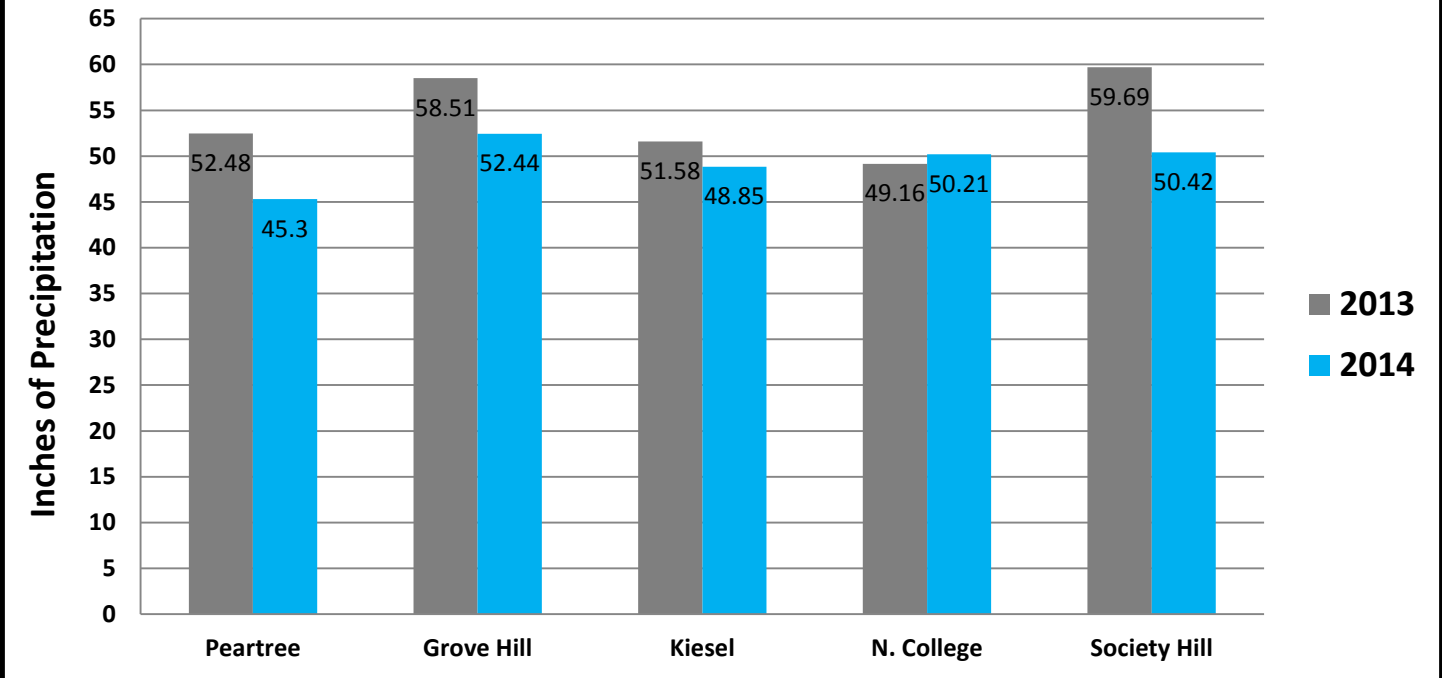
The City of Auburn has been voluntarily collecting water quality data on its various surrounding water resources since 1989. Although initial efforts were primarily concentrated on source water quality monitoring in the Lake Ogletree reservoir basin of Chewacla Creek, the City's water quality monitoring has expanded to include a wide variety of monitoring programs that are used to guide its efforts of assessment, protection, and, when necessary, restoration of water quality. These programs include monitoring for physical, chemical, mineral, and biological indicators of water quality, with many monitoring efforts managed and operated in-house. This report presents the results of the water quality monitoring and analysis for the calendar year 2014, and includes notes and comments by Water Resource Management Staff.

### 1.1 Precipitation Data 2014



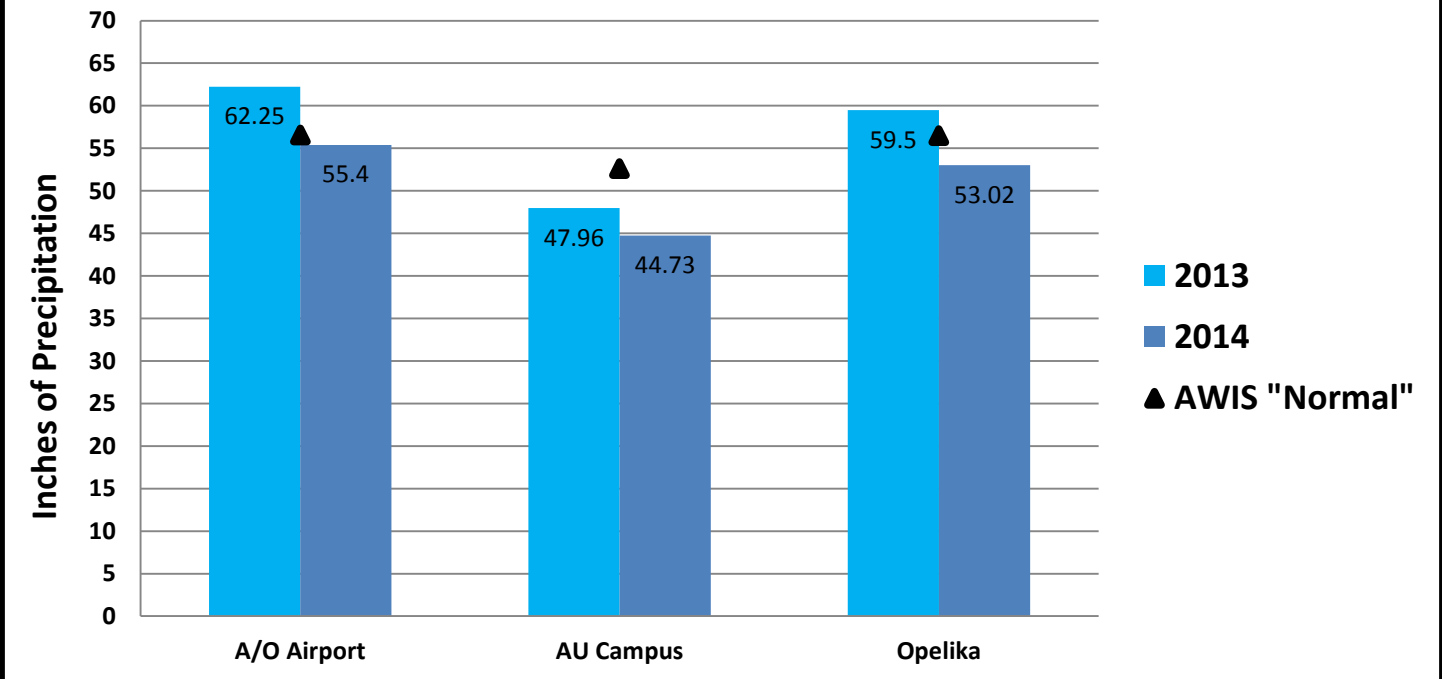
Monthly Accumulated Precipitation at Auburn/Opelika Airport

### 2013-2014 Accumulated Precipitation at Rainwave Stations



2013 – 2014 Accumulated Precipitation at Rainwave Stations

### 2013-2014 Accumulated Precipitation at AWIS Stations



2013-2014 Accumulated Precipitation at AWIS Stations

## 2.0 Water Quality Monitoring

### 2.1 Purpose

Sediment plays an important role in the biological, chemical, and physical health of streams, lakes, wetlands, and other waterbodies. However, excess siltation can cause increases in stream temperatures, decreases in the passage of light through the water column, decreased dissolved oxygen, issues with color, clogging of fish and aquatic invertebrate gills, destruction of habitat, increased nutrient loading, channel and pond aggradation, and decreased recreational use. Therefore, it is important that we understand the various sources of sediment to these ecosystems and that we monitor and control any potential sources that would otherwise exceed the natural carrying capacity of the waterbody. Therein is the primary purpose for which the City of Auburn (hereafter the City) conducts weekly monitoring for turbidity. In addition, this weekly monitoring provides invaluable observations of other potential water quality concerns such as illegal dumping, illicit discharge violations, unauthorized construction activity, unauthorized stream buffer encroachment, etc. These data also support and enhance the effectiveness of the City's Construction Site Erosion and Sediment Control Inspection and Enforcement Program.

### 2.2 Definitions and Methods

Turbidity is the measure of the degree of transparency of a fluid as it affects the ability of light to pass through. Although it is not a direct measurement of sediment or Total Suspended Solids (TSS) within the water column, it has been identified as a useful surrogate indicator for monitoring sediment pollution in stormwater runoff from active construction sites and is often the monitoring parameter of choice for regulatory agencies. Currently, the Alabama Department of Environmental Management (ADEM) water quality criteria states that *"There shall be no turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of waters or interfere with any beneficial uses which they serve. Furthermore, in no case shall turbidity exceed 50 Nephelometric units above background"*. Turbidity levels are most commonly measured using a turbidity meter which measures the amount of scattered light as it is passed through a sample at a 90° angle. The resulting numerical value is called a nephelometric turbidity unit (NTU) of which increasing values represent a decrease in light penetration through the sample. The City uses a LaMotte 2020 WE turbidimeter to measure turbidity.

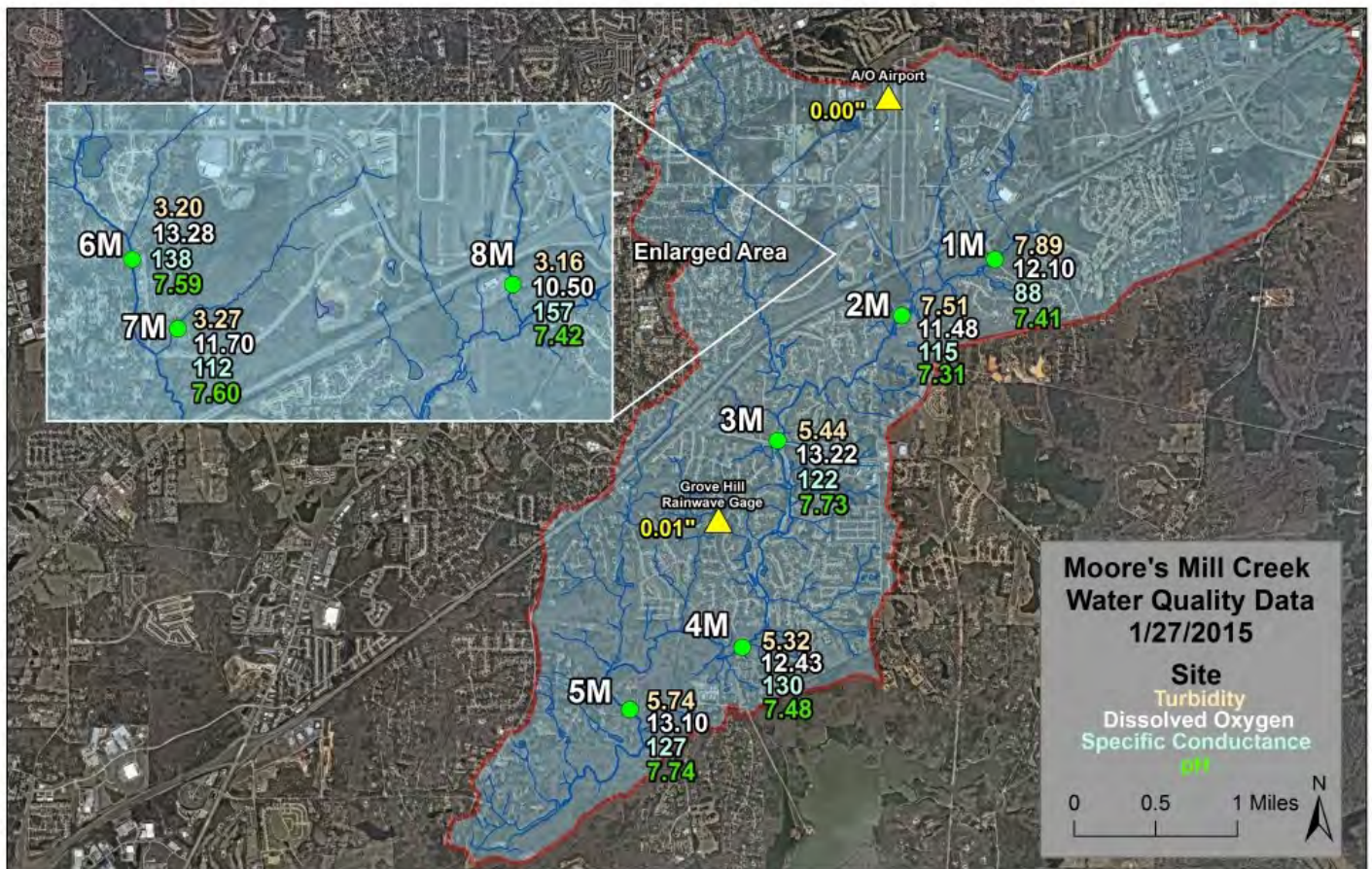
The 2014 monitoring year represents the ninth full year that the City has conducted weekly turbidity measurements at 40 stations throughout its MS4 jurisdiction. At present, this amounts to over 15,820 unique data points for which to evaluate water quality. As with previous years, data from each individual watershed is evaluated independently by monitoring station and collectively as a representative watershed group. Each station's data is also evaluated against any neighboring upstream station, thereby assisting in the identification of potential sources of sediment. Turbidity monitoring locations were strategically chosen to allow for both monitoring of the effectiveness of erosion and sediment control at construction sites and also to analyze potential trends within each watershed. Each location is sampled on a weekly basis for assessment of seasonal baseline variations and, when possible, during storm events for indications of failing construction site best management practices (BMP's).

The City began measuring physical and chemical parameters at each station in September 2014 using a YSI Professional Plus water quality meter <http://www.ysi.com/productsdetail.php?Professional-Plus-18>. These data are presented in map format on a watershed scale to staff in the Water Resource Management department on a weekly basis (Figure 4.). Presenting the data on a map allows Water Resource Management (WRM) staff to observe both trends and anomalies in a geospatial context. WRM staff use these data to develop water quality

“signatures” for each site, dependent upon both season and antecedent precipitation. In addition to turbidity, the following parameters are collected on a weekly basis:

- Water Temperature – A measure of how hot or cool a substance is. For most designated uses, State Water Quality Criteria requires that temperature not exceed 90° Fahrenheit.
- pH – A measure of how basic or how acidic a substance is. For most designated uses, State Water Quality Criteria requires pH to be between 6.0 and 8.5.
- Dissolved Oxygen – A measure of the concentration of oxygen in its dissolved form within a substance. For most designated uses, State Water Quality Criteria requires dissolved oxygen to be a minimum of 5 mg/L except under “extreme conditions”.
- Specific Conductance – A measure of a substance’s ability to pass an electrical current. There are currently no State Water Quality Criteria for conductivity. Conductivity is directly correlated to the amount of dissolved ions within a substance and is a useful indicator of potential illicit discharges.

Quality control/quality assurance is an integral part of a successful water quality monitoring program. In order to develop a dependable database of water quality measurements for each sample site, WRM Staff calibrate all water quality instruments prior to field use. A detailed calibration log is filled out each time an instrument is calibrated. WRM staff also utilize field sheets to document sample site characteristics and observations such as stream color, geomorphic setting (riffle, pool, etc.), channel substrate and grain size, sample site location relative to the road crossing, sample time, and weather conditions.

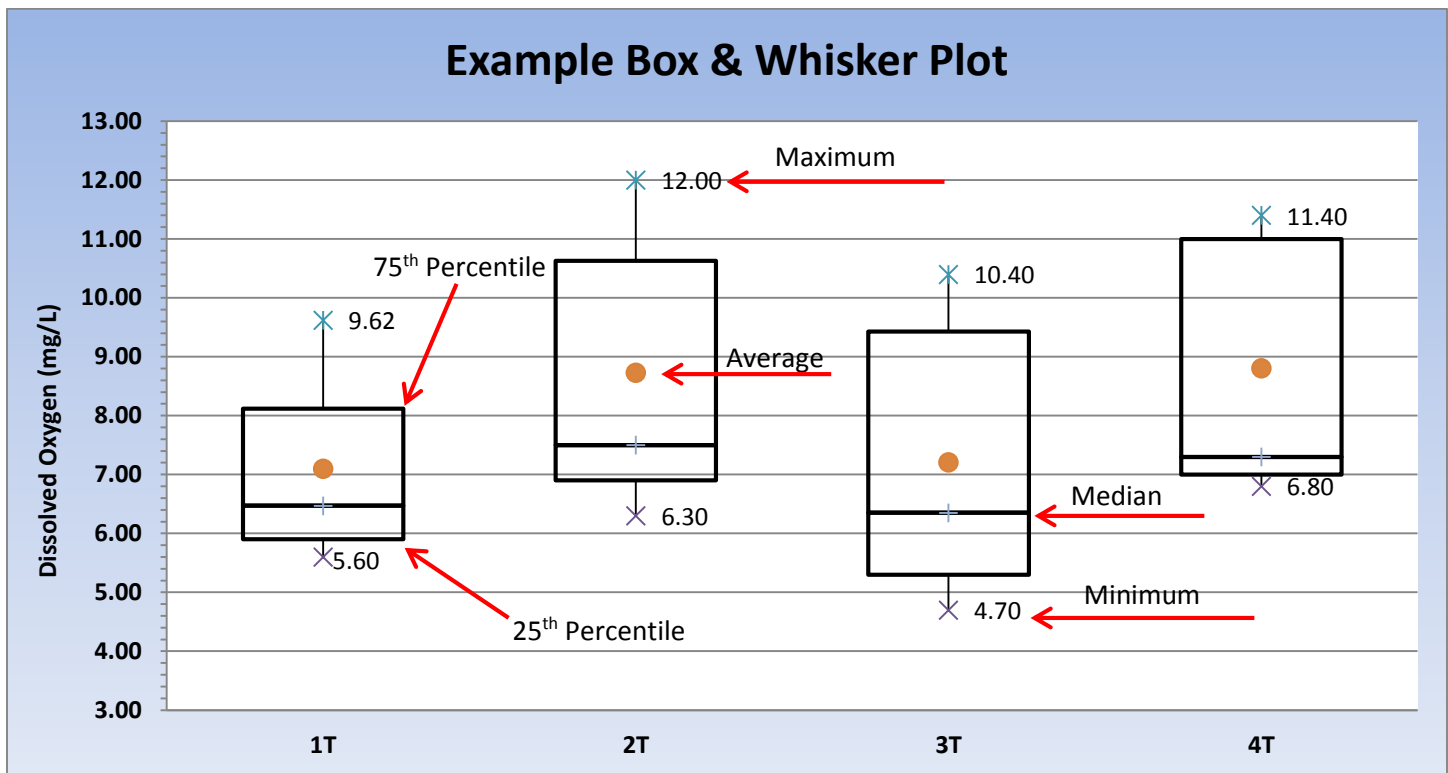


Example of a Weekly Water Quality Map distributed to WRM Staff



## 2.3 Turbidity Summary 2014

In general, turbidity at the majority of all stations exhibited a sustained trend of decreasing values for the seventh consecutive year. These decreases are seen in the minimum, median, average, and maximum values. No single factor can independently be attributed to these decreases. Rather, it is more than likely a combination of rainfall intensity and accumulation patterns (effecting stream flows), decreased construction activity and/or patterns of construction, increased stabilization of existing construction projects, increased professional education about erosion and sediment control, and increased erosion and sediment control inspection and enforcement that influenced this trend. In order to avoid any oversimplification, further data evaluation and discussion at a watershed and individual station-level is provided below.



Example Box and Whisker Plot

## 2.4 Water Quality Monitoring Sites

### Chewacla Creek Watershed

A total of 340 independent water quality measurements were collected in the Chewacla Creek watershed in 2014. Weekly sampling of turbidity (172 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (44 samples), pH (44 samples), specific conductance (44 samples), and dissolved oxygen (36 samples) began in September 2014.

### Monitoring Station Locations and Notes:

**Station 1CW** – Latitude 32, 35, 3.874 N; Longitude 85, 25, 55.243 W. Station 1CW is located along Moore’s Mill Road, immediately east of the entrance to Bent Brooke Subdivision.

**Station 2CW** – Latitude 32, 34, 25.519 N; Longitude 85, 25, 6.579 W. Station 2CW is located along Moore’s Mill Road, between CR 107/Estate Drive and Society Hill Road.

**Station 4CW** – Latitude 32, 33, 21.85 N; Longitude 85, 24, 46.51 W. Station 4CW is located at the crossing of CR 027 with Chewacla Creek. 4CW is a reference station used to evaluate turbidity as it enters Auburn’s Phase II jurisdiction and discharges to Lake Ogletree.

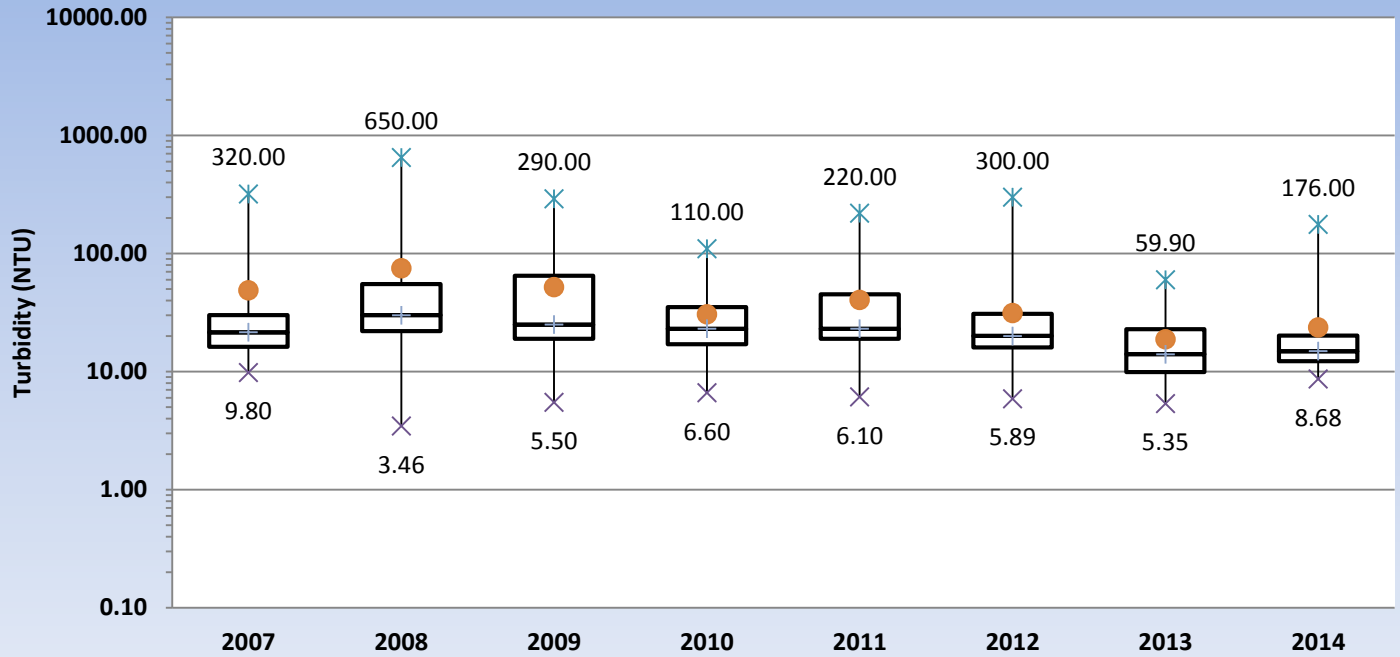
**Station 5CW** – Latitude 32, 32, 52.236 N; Longitude 85, 28, 1.713 W. Station 5CW is located ½ mile downstream of the Lake Ogletree spillway and upstream of the Martin-Marietta Quarry discharge. 5CW is also a reference station monitored to evaluate turbidity within Chewacla Creek as it is discharged from Lake Ogletree, and before it leaves Auburn’s Phase II jurisdiction. The relatively low values exhibited at this station can be attributed to the TSS removal provided by Lake Ogletree. Beaver activity near this station, as observed by staff, is a potential contributor to elevated turbidity during both baseflow and storm event monitoring.

*\*See Insert for Maps of All Water Quality Monitoring Locations*

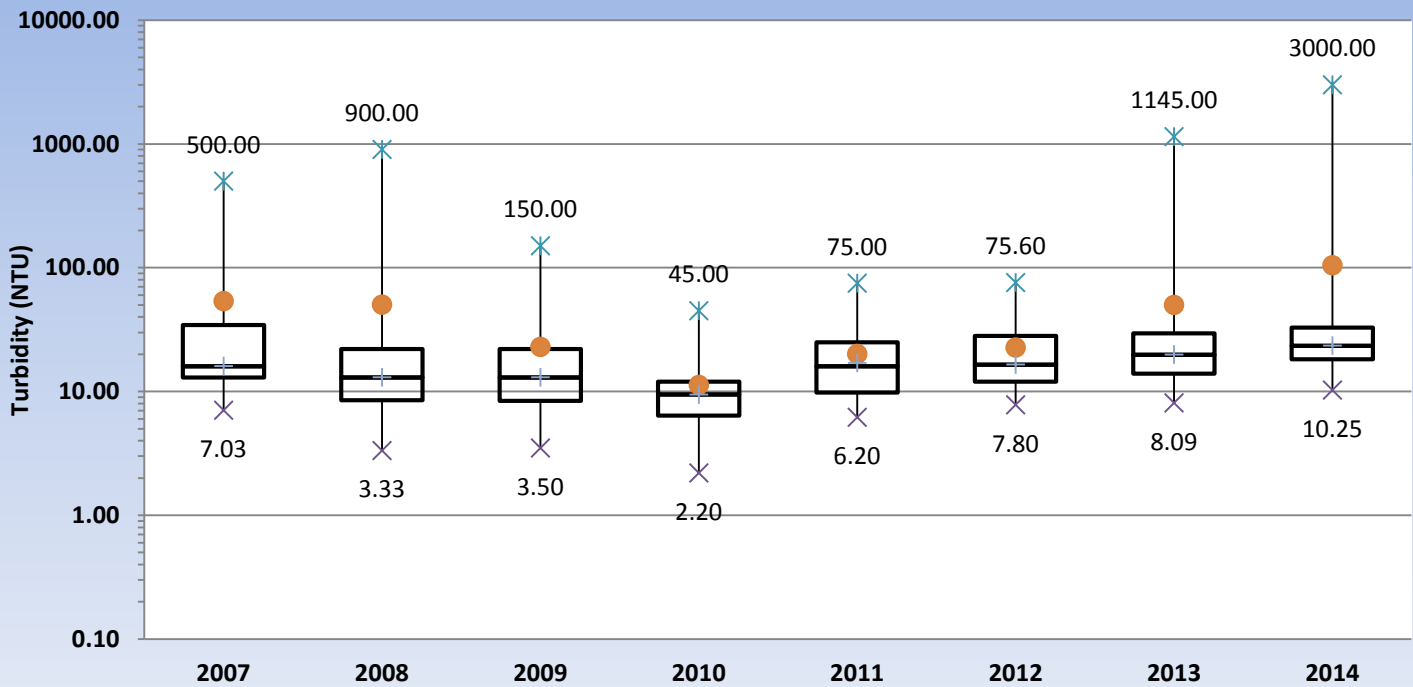
Eight Year Statistical Analysis of Turbidity Data for the Chewacla Creek Watershed

	1CW							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	9.80	3.46	5.50	6.60	6.10	5.89	5.35	8.68
<b>MAX</b>	320.00	650.00	290.00	110.00	220.00	300.00	59.90	176.00
<b>AVG</b>	48.69	74.92	51.93	30.55	40.41	31.27	18.82	23.67
<b>MEDIAN</b>	21.50	30.00	25.00	23.00	23.00	20.00	14.00	14.90
	2CW							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	7.03	3.33	3.50	2.20	6.20	7.80	8.09	10.25
<b>MAX</b>	500.00	900.00	150.00	45.00	75.00	75.60	1145.00	3000
<b>AVG</b>	53.56	50.12	22.93	11.26	20.11	22.59	49.96	104.32
<b>MEDIAN</b>	16.00	13.00	13.00	9.45	17.00	16.50	19.80	23.4
	4CW							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	4.33	4.70	3.70	3.90	4.40	2.50	3.04	2.54
<b>MAX</b>	400.00	1950.00	350.00	55.00	170.00	80.30	50.60	63.50
<b>AVG</b>	31.27	70.69	29.22	11.66	19.22	13.12	10.52	10.91
<b>MEDIAN</b>	16.50	18.00	13.00	9.50	13.50	11.00	8.03	7.36
	5CW							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	1.40	0.95	1.30	1.10	1.30	0.93	0.52	0.1
<b>MAX</b>	55.00	33.00	95.00	23.00	19.00	8.60	28.17	57.03
<b>AVG</b>	7.02	4.68	8.51	4.26	3.59	3.33	5.21	6.90
<b>MEDIAN</b>	3.50	3.40	4.20	3.00	2.50	2.92	2.63	2.05

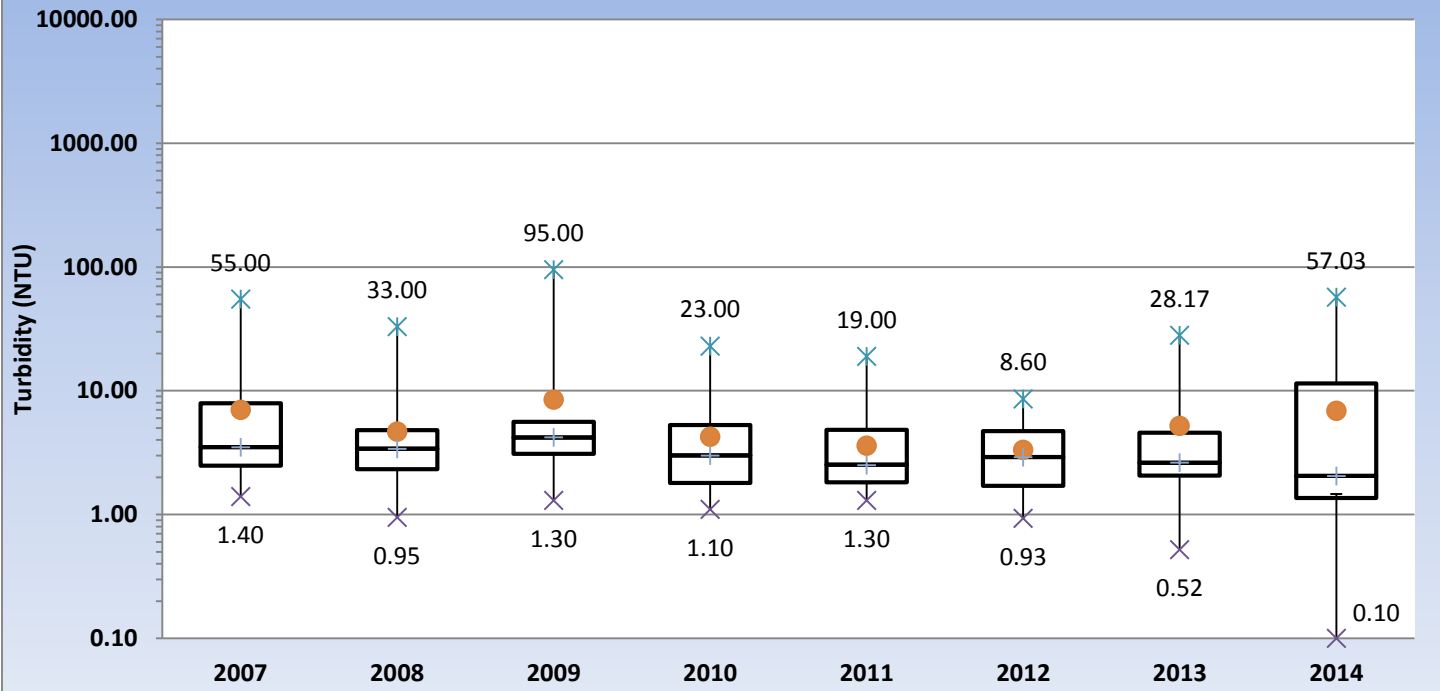
## 1CW 2007 - 2014



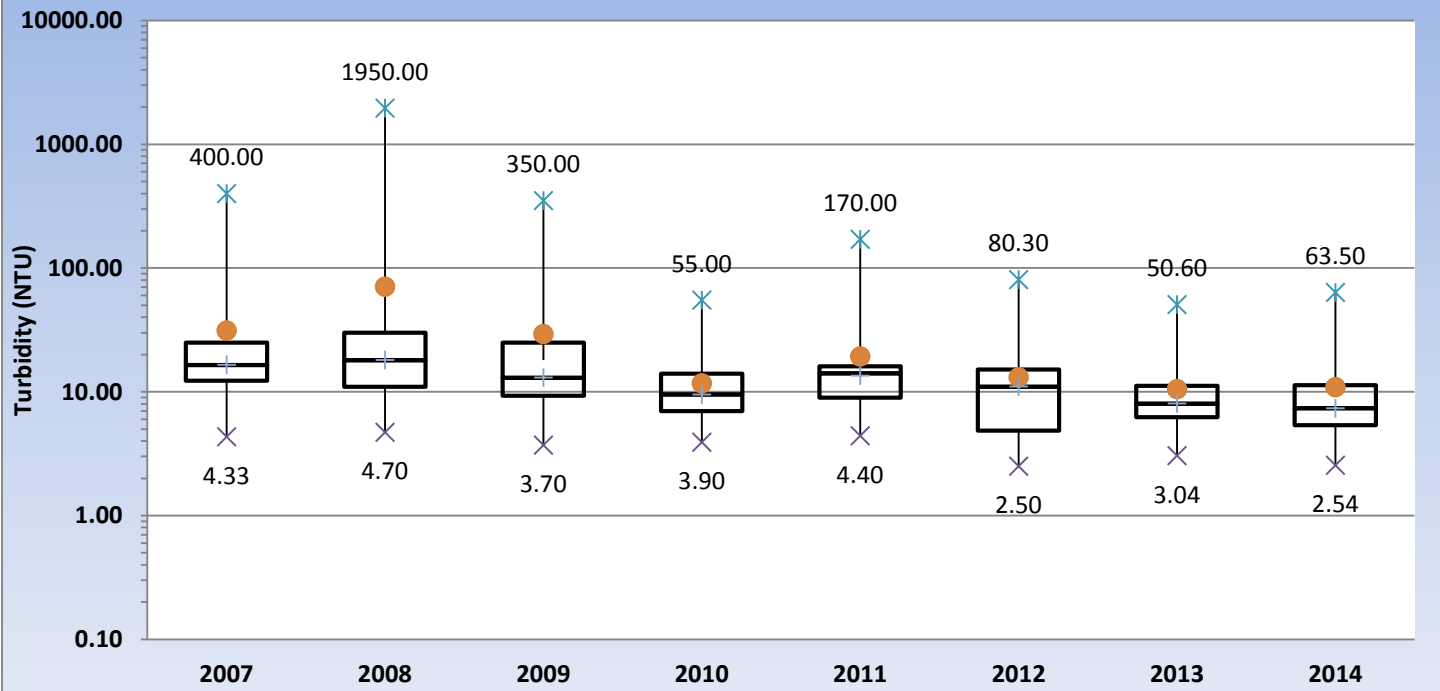
## 2CW 2007 - 2014



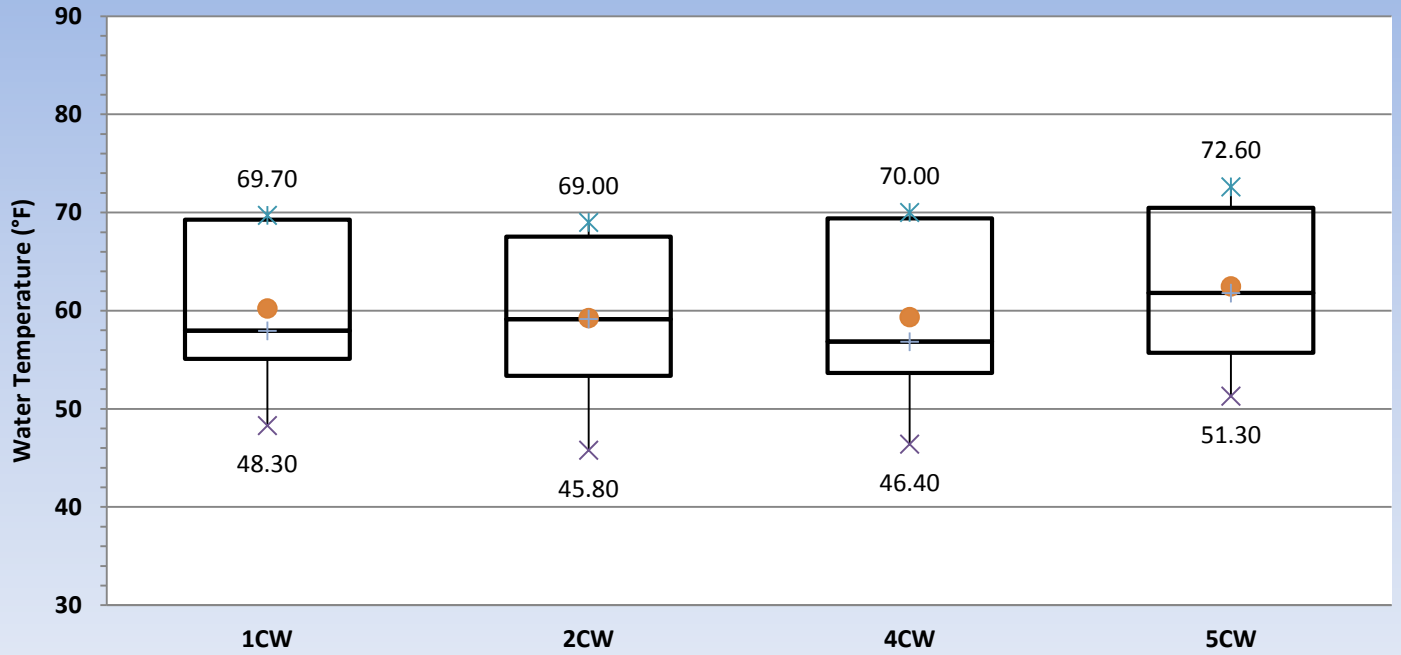
### 5CW 2007 - 2014



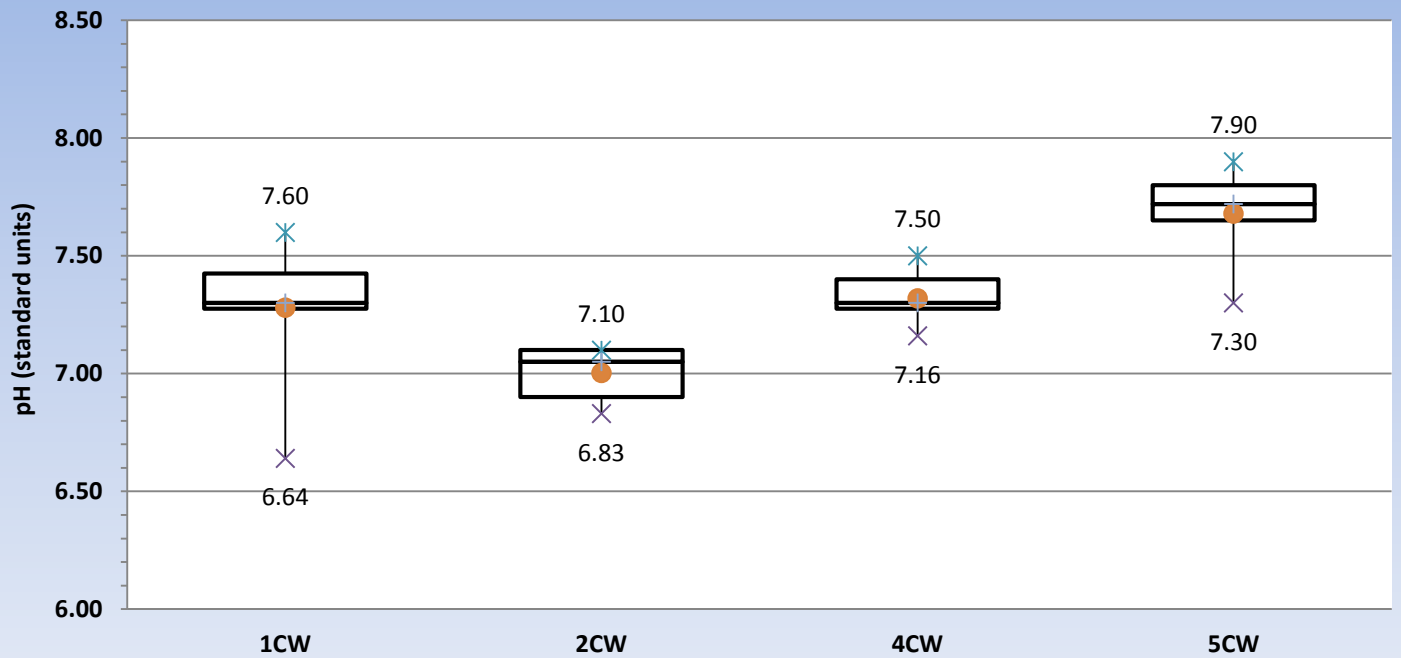
### 4CW 2007 - 2014



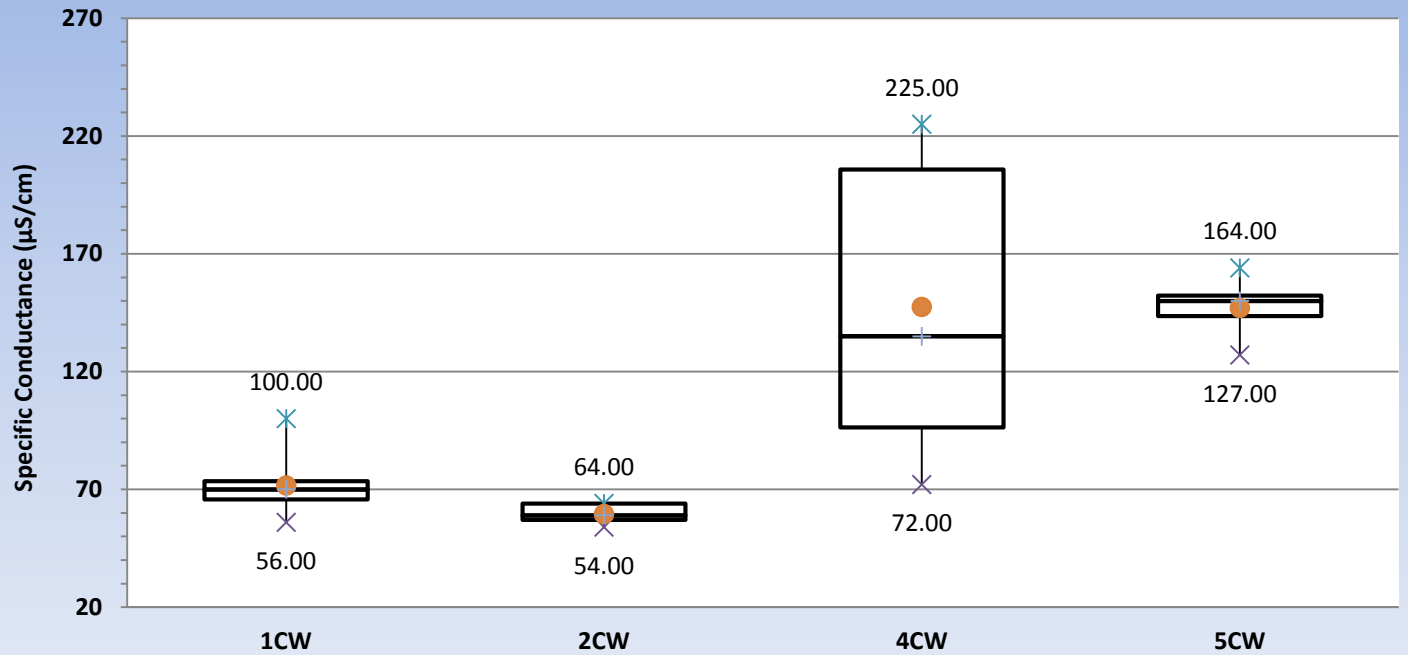
## Chewacla Creek Sites 2014 Water Temperature



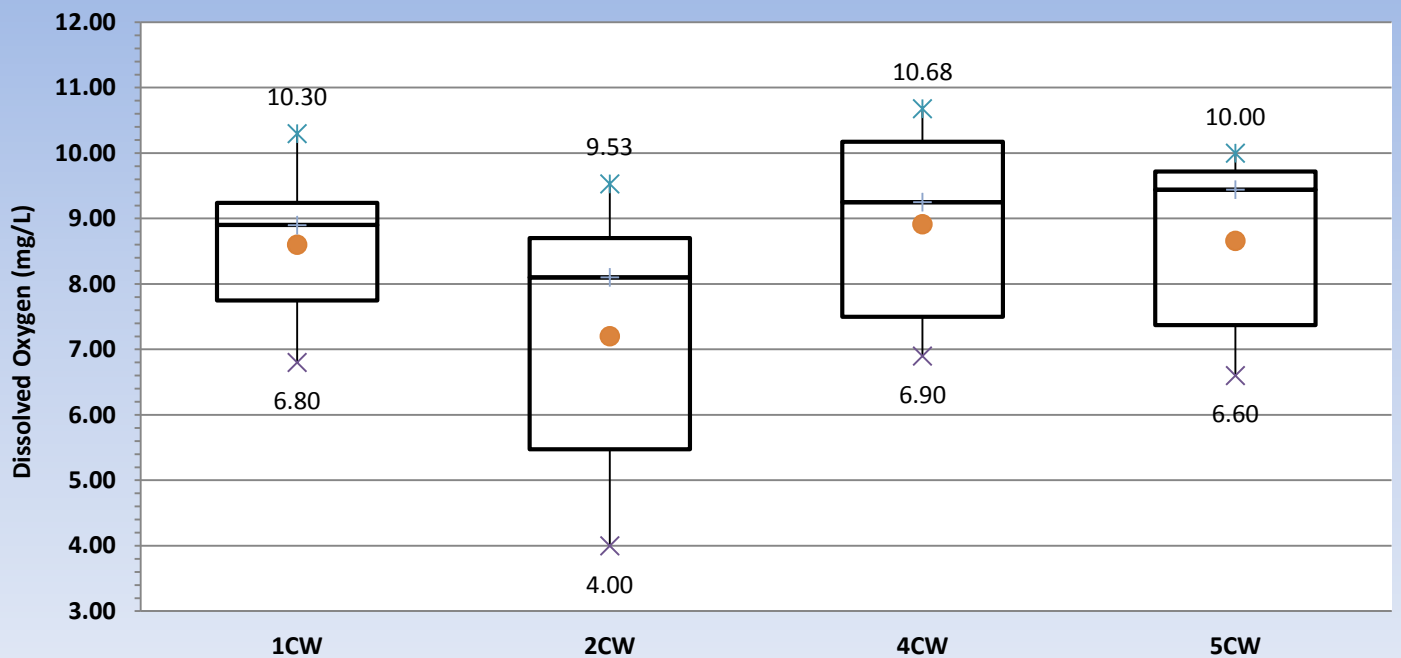
## Chewacla Creek Sites 2014 pH



## Chewacla Creek Sites 2014 Specific Conductance



## Chewacla Creek Sites 2014 Dissolved Oxygen



## Choctafaula Creek Watershed

A total of 255 independent water quality measurements were collected in the Choctafaula Creek watershed in 2014. Weekly sampling of turbidity (129 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (33 samples), pH (33 samples), specific conductance (33 samples), and dissolved oxygen (27 samples) began in September 2014.

Landcover within the Choctafaula Creek watershed consists of mostly forest and pasture, with relatively little urban/suburban development. This is generally reflected in the turbidity data, as the Choctafaula stations often exhibit lower turbidity than the other streams within the City's MS4 jurisdiction. Noteworthy activity within this basin is the continued construction of the City of Auburn Technology Park West. This is an ongoing development located off Beehive Road, between Stations 1CH and 4CH. To date, there has been no recorded significant increase in turbidity downstream from the Auburn Technology Park West.

### **Monitoring Station Locations and Notes:**

**Station 1CH** – Latitude 32, 34, 8.089 N; Longitude 85, 32, 41.169 W. Station 1CH is located on main stem Choctafaula Creek along Wire Road, immediately east of Talheim Street.

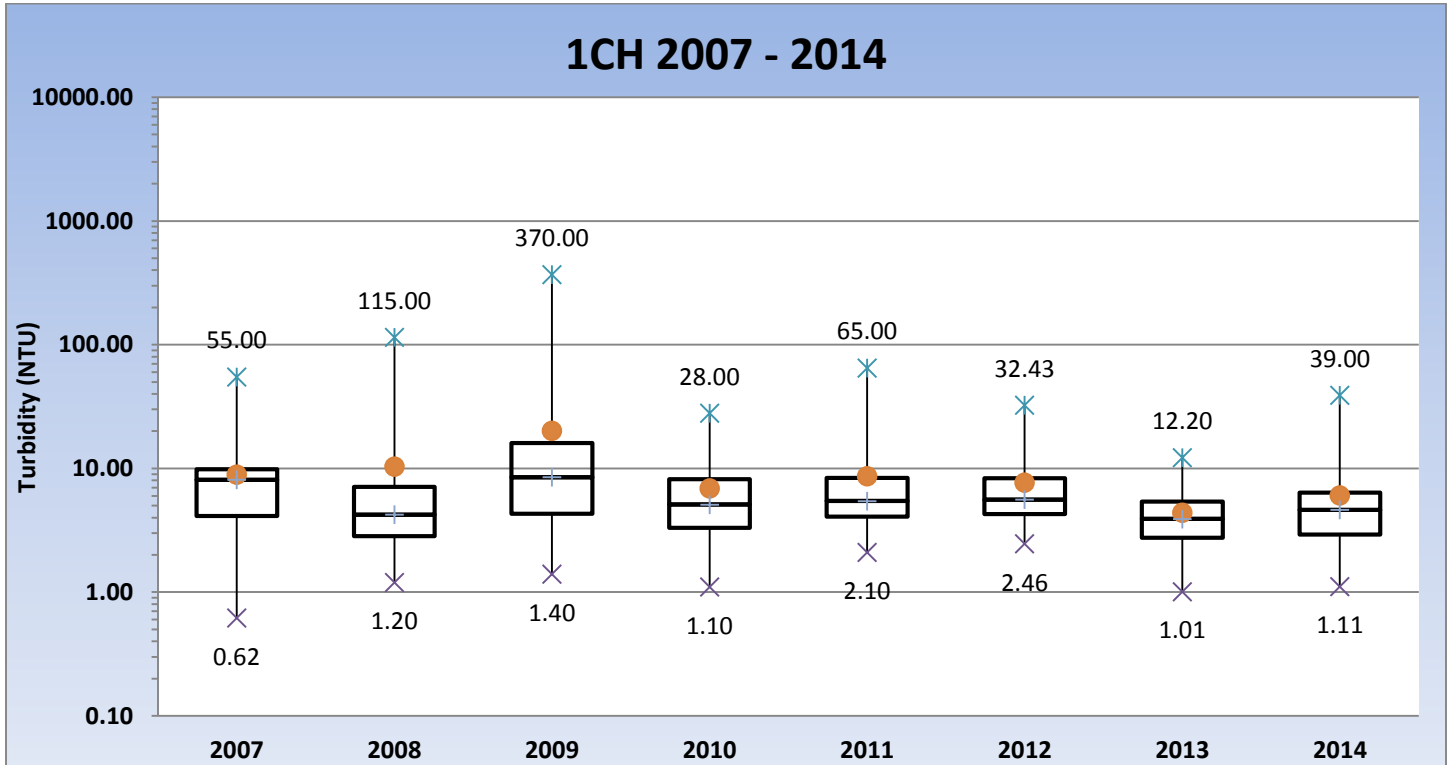
**Station 2CH** – Latitude 32, 34, 3.928 N; Longitude 85, 33, 21.503 W. Station 2CH is located on an unnamed tributary of Choctafaula Creek as it crosses under Wire Road, immediately east of CR 57. 2CH also receives flow from a mostly rural, forested basin and therefore generally exhibits low baseline and storm event turbidity values.

**Station 4CH** – Latitude 32, 32, 51.901 N; Longitude 85, 33, 19.14 W. Station 4CH is located on main stem Choctafaula Creek, as it crosses under Beehive Road, immediately west of the City of Auburn Tech Park West.

*\*See Insert for Maps of All Water Quality Monitoring Locations*

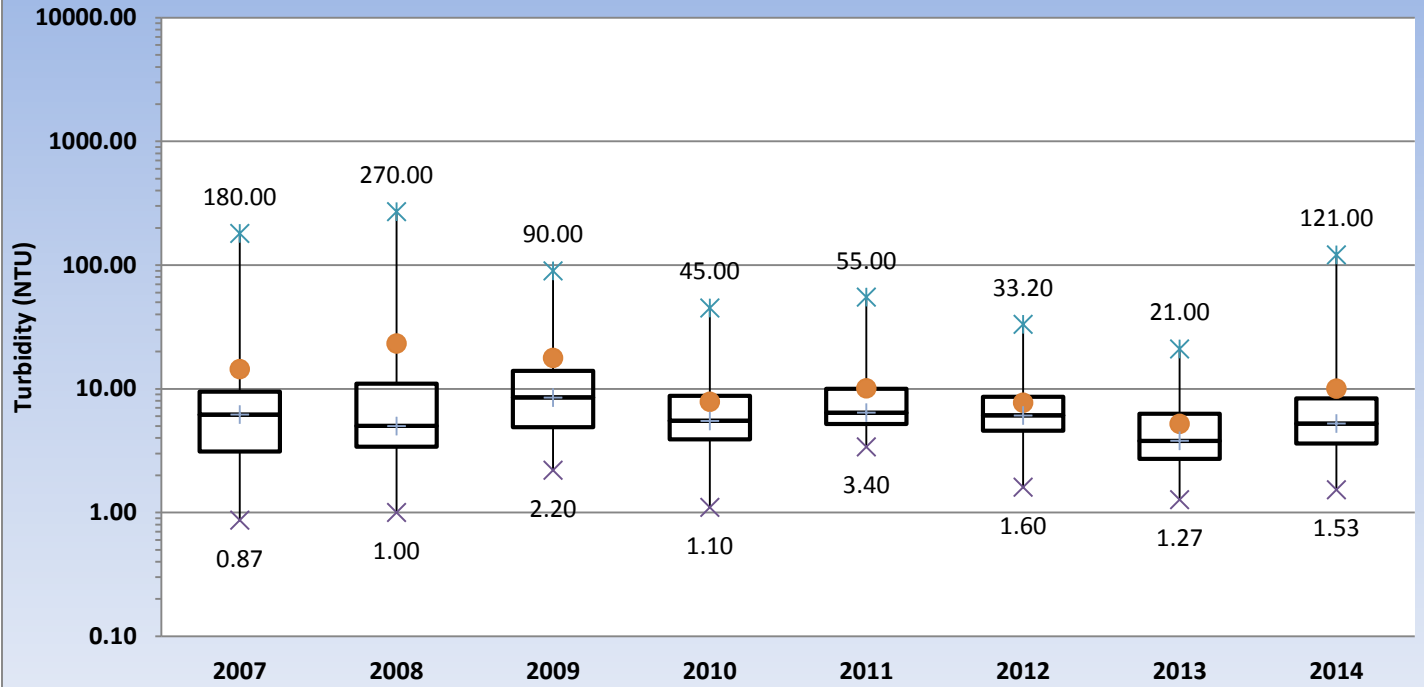
## Eight Year Statistical Analysis of Turbidity Data for the Choctafaula Creek Watershed

	1CH							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.62	1.20	1.40	1.10	2.10	2.46	1.01	1.11
<b>MAX</b>	55.00	115.00	370.00	28.00	65.00	32.43	12.20	39.00
<b>AVG</b>	8.92	10.37	20.15	6.91	8.64	7.67	4.38	6.07
<b>MEDIAN</b>	8.10	4.23	8.50	5.10	5.45	5.60	3.90	4.63
	2CH							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	1.27	1.07	1.30	0.98	1.20	0.91	0.23	0.10
<b>MAX</b>	240.00	110.00	350.00	24.00	130.00	88.30	11.40	111.00
<b>AVG</b>	15.02	8.61	13.92	4.44	8.48	7.95	3.46	9.28
<b>MEDIAN</b>	8.23	3.36	4.10	2.80	3.40	4.20	2.88	3.31
	4CH							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.87	1.00	2.20	1.10	3.40	1.60	1.27	1.53
<b>MAX</b>	180.00	270.00	90.00	45.00	55.00	33.20	21.00	121.00
<b>AVG</b>	14.46	23.25	17.73	7.85	10.08	7.74	5.21	10.06
<b>MEDIAN</b>	6.18	5.00	8.50	5.50	6.40	6.09	3.79	5.24

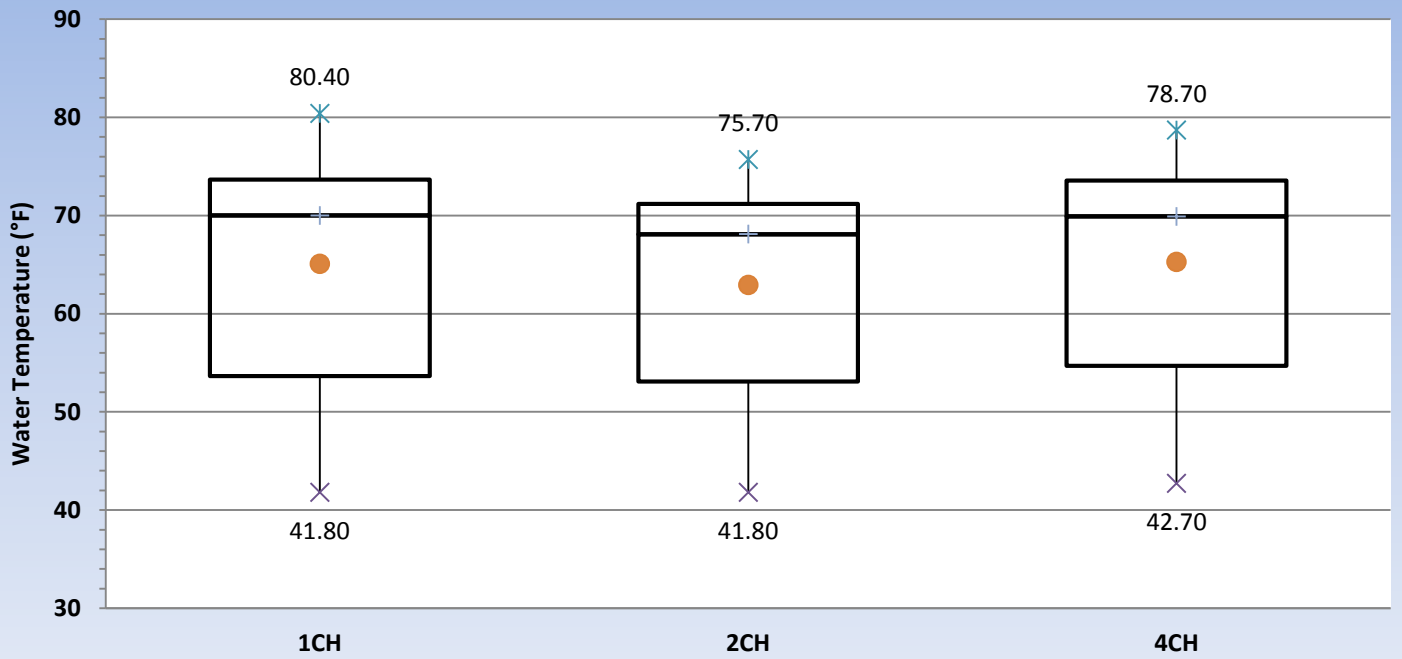




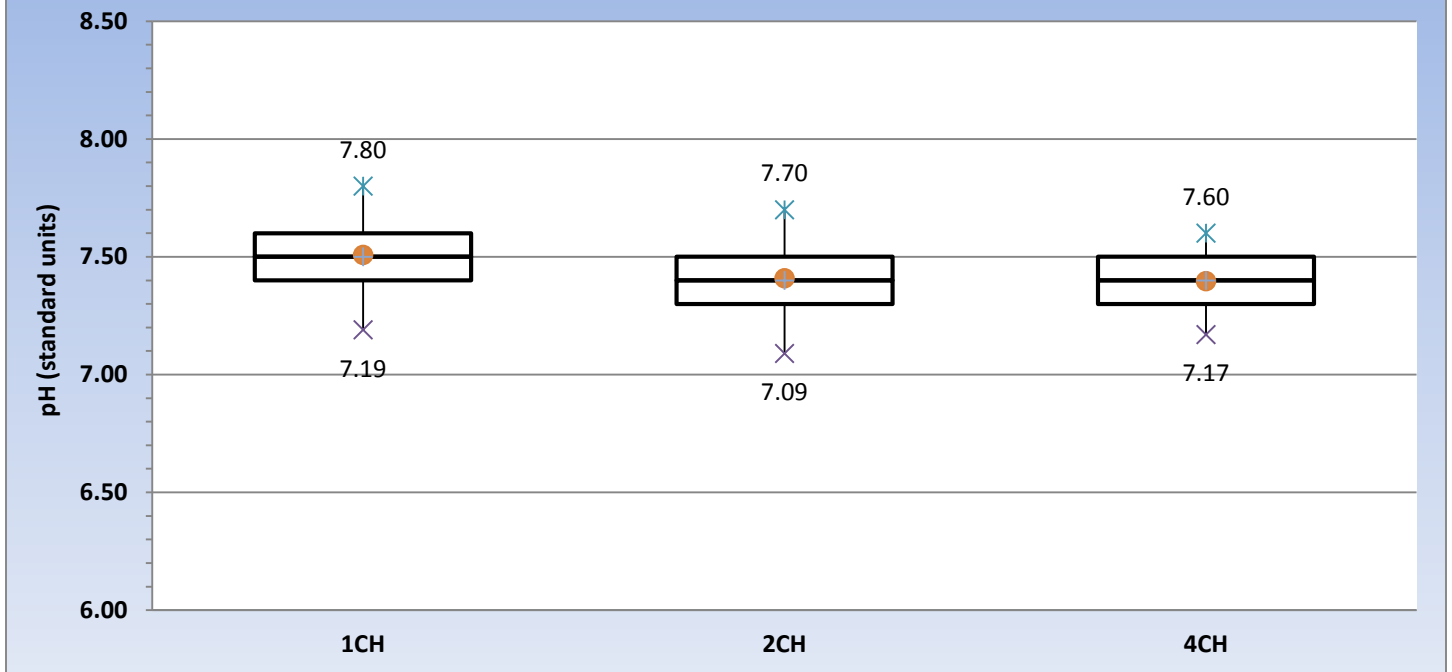
### 4CH 2007 - 2014



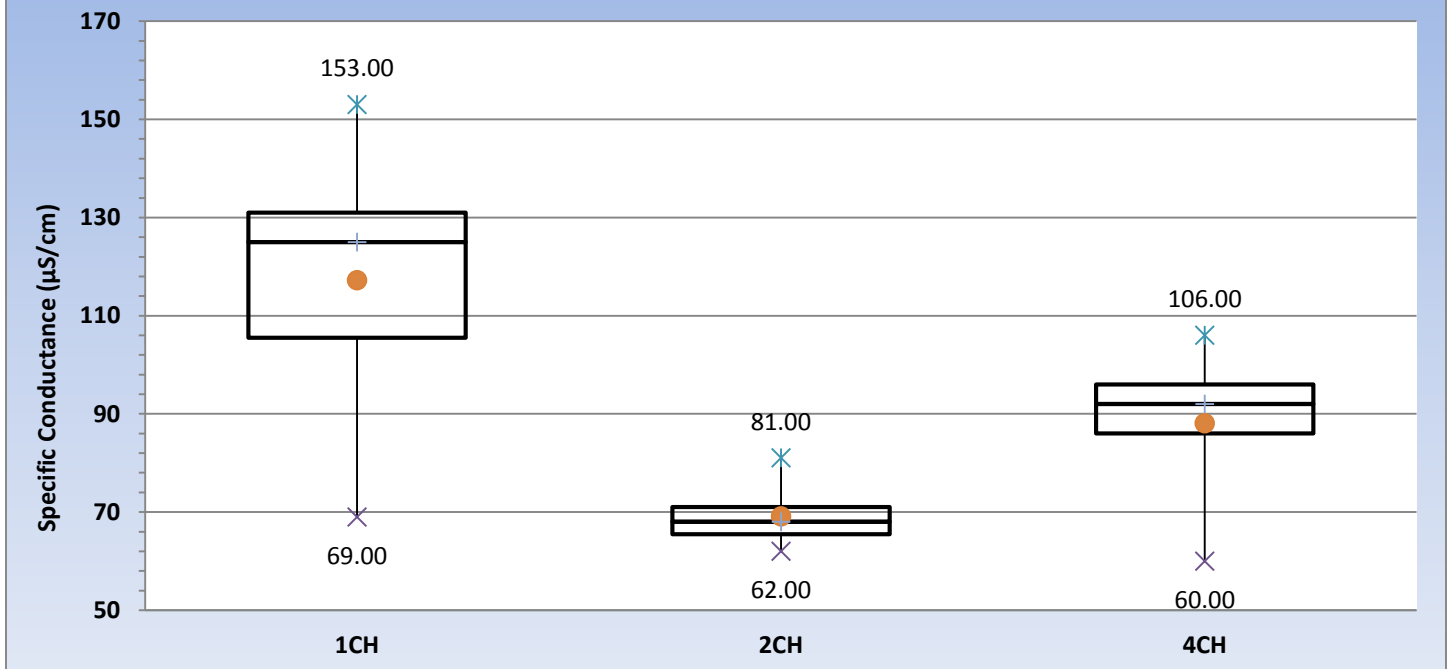
### Choctafaula Creek Sites 2014 Water Temperature



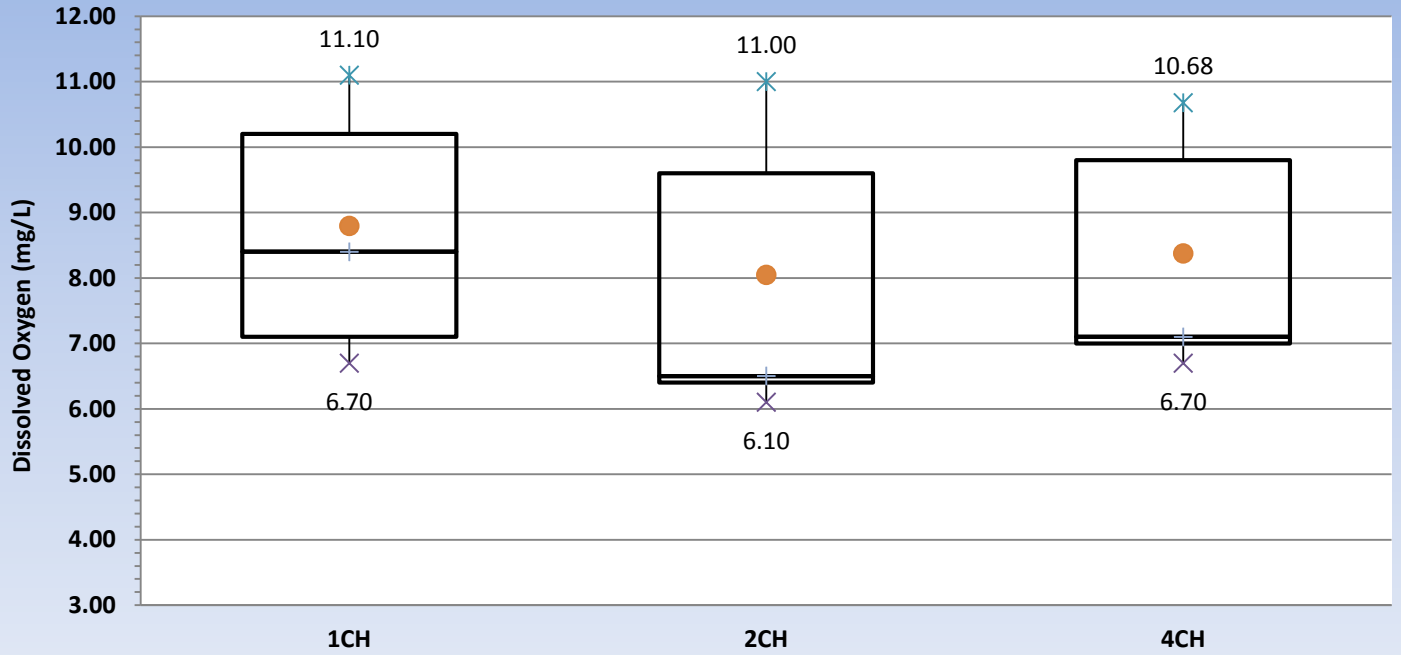
## Choctafaula Creek Sites 2014 pH



## Choctafaula Creek Sites 2014 Specific Conductance



# Choctafaula Creek Sites 2014 Dissolved Oxygen



## Moore's Mill Creek Watershed

A total of 688 independent water quality measurements were collected in the Moore's Mill Creek watershed in 2014. Weekly sampling of turbidity (344 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (90 samples), pH (90 samples), specific conductance (90 samples), and dissolved oxygen (74 samples) began in September 2014.

Moore's Mill Creek remains on the ADEM list of impaired waters for siltation, with a TMDL expected to be drafted in 2017. Therefore, monitoring of turbidity within Moore's Mill Creek is of critical importance in determining the potential sources of excess sediment loading and in evaluating opportunities for protection, enhancement, and restoration. Although the annual minimum, maximum, and average for each station on Moore's Mill Creek are consistently greater than comparative stations in other watersheds, a decreasing trend has been recorded at every station (except 7M) for the last six consecutive years. These data are positive evidence that water quality is improving in Moore's Mill Creek and that increased efforts by the City to improve erosion and sediment control have potentially contributed to this improvement.

### **Monitoring Station Locations and Notes:**

**1M** – Latitude 32, 36, 8.253 N; Longitude 85, 25, 35.563 W. Station 1M is the farthest upstream monitoring location on Moore's Mill Creek, and is located at Bent Creek Road. This station is representative of water quality as it enters the City's Phase II jurisdiction. There are currently no active construction or development activities upstream of this site within the City's MS4 jurisdiction.

**2M** – Latitude 32, 35, 50.808 N; Longitude 85, 26, 9.911 W. Station 2M is located on Moore's Mill Creek off Bonny Glen Road. 2M is downstream of the unnamed tributary that drains the Auburn University Regional Airport (AUO).

**3M** – Latitude 32, 35, 10.371 N; Longitude 85, 26, 58.62 W. Station 3M is located on Moore's Mill Creek at Moore's Mill Road.

**4M** – Latitude 32, 34, 4.675 N; Longitude 85, 27, 12.574 W. Station 4M is located on Moore's Mill Creek at Windway Road.

**5M** – Latitude 32, 33, 44.879 N; Longitude 85, 27, 54.706 W. Station 5M is the final downstream station on Moore's Mill Creek at Ogletree Road.

**6M** – Latitude 32, 36, 11.560 N; Longitude 85, 27, 11.520 W. 6M is located on an unnamed tributary to Moore's Mill Creek as it crosses under Old Mill Rd. near East University Dr.

**7M** – Latitude 32, 36, 0.433 N; Longitude 85, 27, 2.378 W. 7M is also located on an unnamed tributary to Moore's Mill Creek as it crosses under Jockish Road.

**8M** – Latitude 32, 36, 8.200 N; Longitude 85, 25, 56.680 W. 8M is located on an unnamed tributary to Moore's Mill Creek at Champions Blvd below AUO Airport.

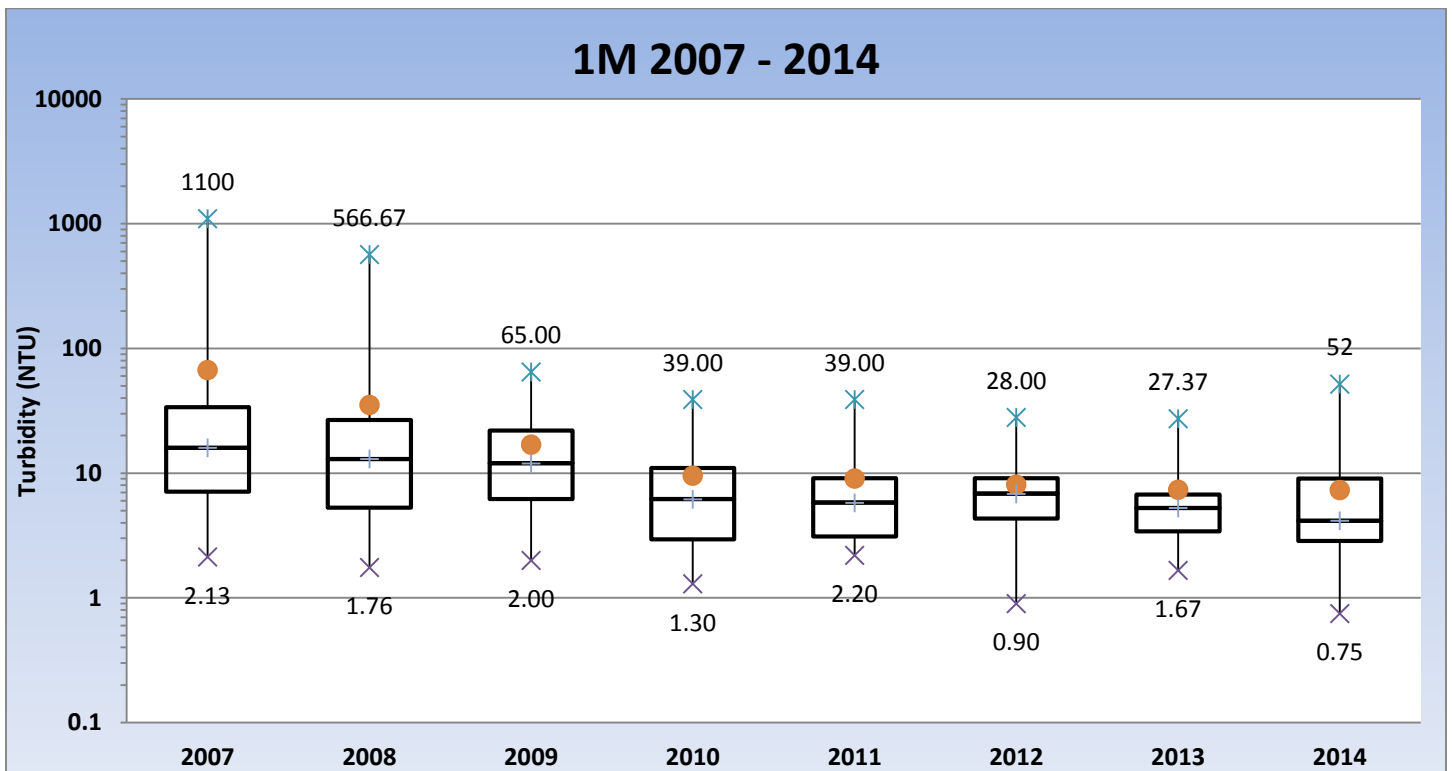
*\*See Insert for Maps of All Water Quality Monitoring Locations*

Eight Year Statistical Analysis of Turbidity Data for Moore's Mill Creek

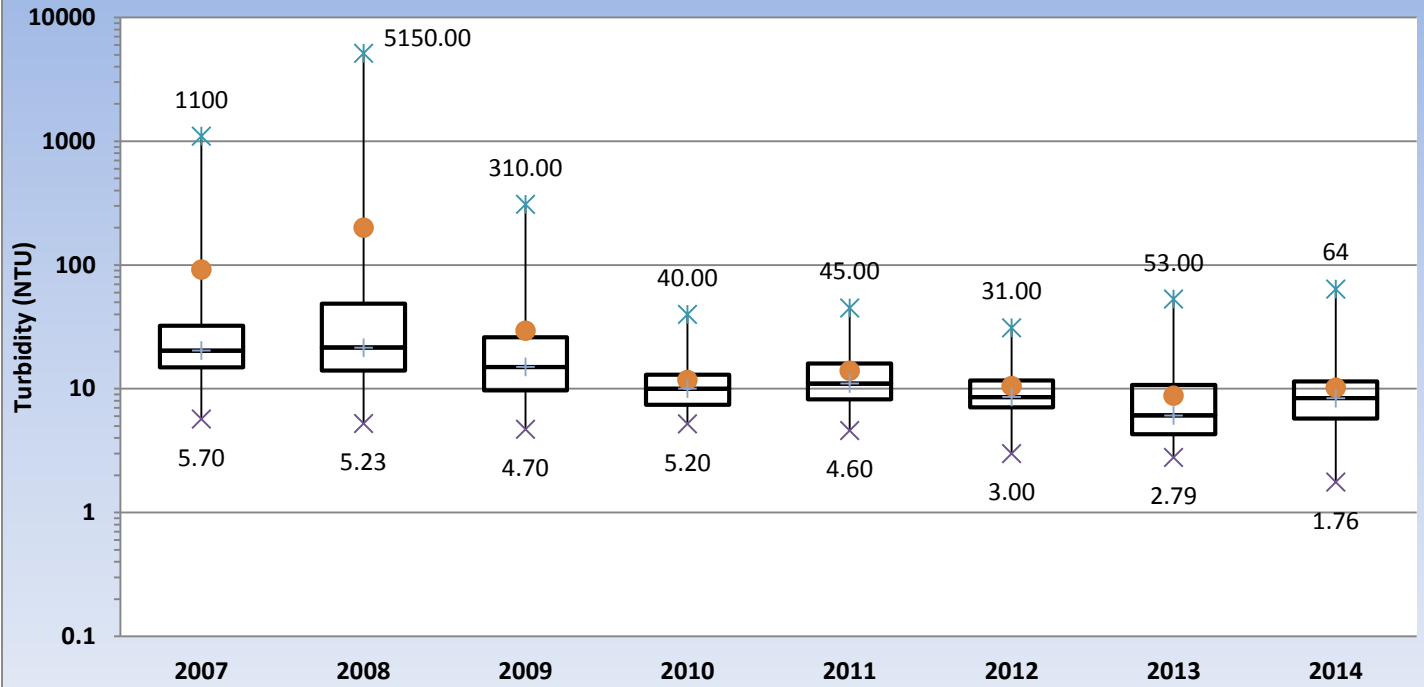
	1M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	2.13	1.76	2.00	1.30	2.20	0.90	1.67	0.75
<b>MAX</b>	1100.00	566.67	65.00	39.00	39.00	28.00	27.37	52.00
<b>AVG</b>	67.32	35.27	17.01	9.56	9.07	8.10	7.39	7.36
<b>MEDIAN</b>	16.00	13.00	12.00	6.20	5.80	6.85	5.27	4.15
	2M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	5.70	5.23	4.70	5.20	4.60	3.00	2.79	1.76
<b>MAX</b>	1100.00	5150.00	310.00	40.00	45.00	31.00	53.00	64.00
<b>AVG</b>	91.56	200.40	29.51	11.79	14.00	10.51	8.80	10.24
<b>MEDIAN</b>	20.34	21.50	15.00	10.00	11.00	8.59	6.10	8.39
	3M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	3.33	3.20	4.40	2.10	3.30	2.40	2.16	1.59
<b>MAX</b>	717.00	2200.00	250.00	70.00	50.00	57.10	30.20	84.30
<b>AVG</b>	55.42	82.11	30.75	10.90	11.33	11.53	6.76	10.51
<b>MEDIAN</b>	12.00	12.00	15.00	7.80	7.50	7.74	4.49	5.19
	4M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	3.37	5.23	4.20	2.80	4.20	2.81	3.01	2.37
<b>MAX</b>	750.00	1100.00	200.00	90.00	95.00	110.00	34.80	153.00
<b>AVG</b>	58.31	73.42	29.02	14.33	14.66	13.69	8.19	12.80
<b>MEDIAN</b>	14.00	12.50	14.00	10.45	9.60	8.71	5.84	6.47
	5M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	2.03	4.36	4.90	3.40	2.00	1.67	2.53	3.78
<b>MAX</b>	483.33	3200.00	320.00	170.00	85.00	50.20	31.77	205.00
<b>AVG</b>	57.84	92.97	34.26	14.88	15.43	11.57	8.17	14.55
<b>MEDIAN</b>	13.50	12.00	14.00	7.90	9.50	8.45	5.72	6.87

## Eight Year Statistical Analysis of Turbidity Data for Moore's Mill Creek Tributaries

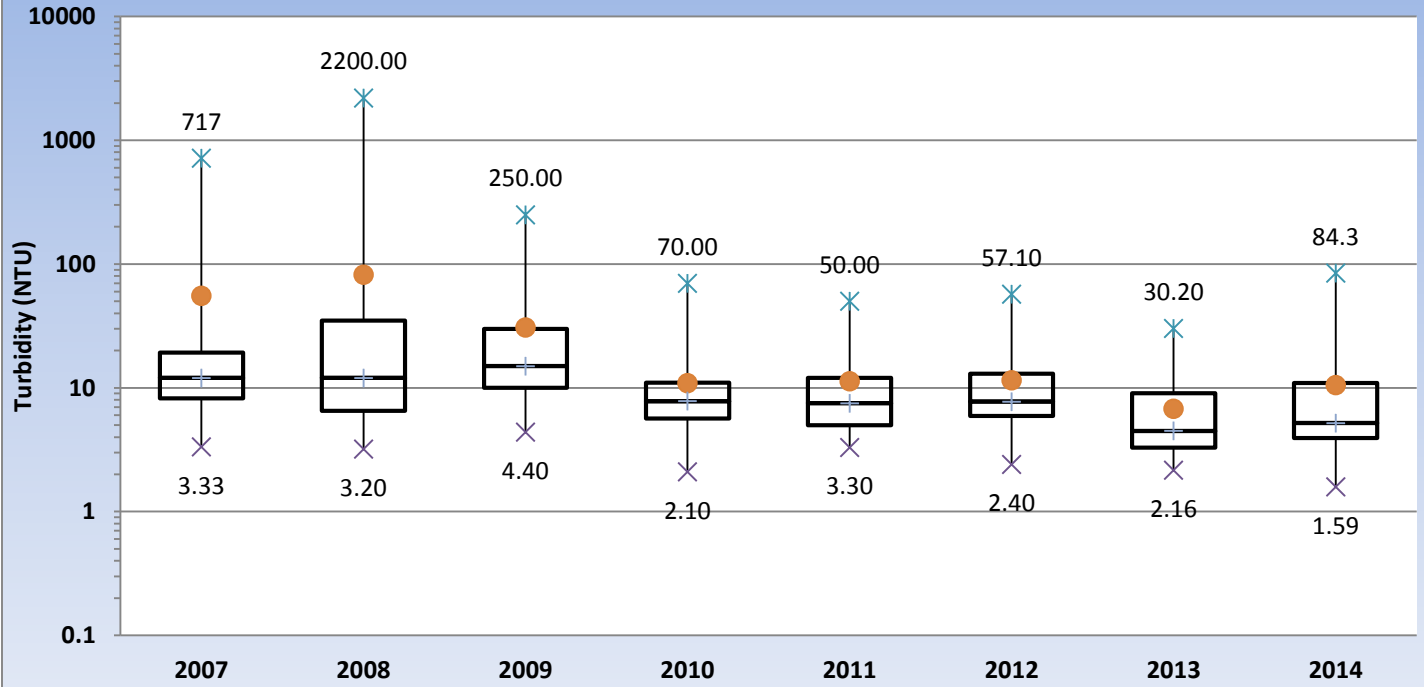
	6M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.63	0.87	1.70	1.90	1.90	1.05	0.19	0.17
<b>MAX</b>	61.67	140.00	75.00	19.00	40.00	24.80	76.00	194.00
<b>AVG</b>	10.51	14.89	10.40	5.68	9.17	6.99	6.26	9.95
<b>MEDIAN</b>	6.90	6.42	6.20	4.45	5.80	5.70	3.30	3.83
	7M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.75	1.80	2.70	2.80	1.60	1.53	1.11	0.10
<b>MAX</b>	330.00	350.00	290.00	600.00	200.00	1225.00	147.00	293.00
<b>AVG</b>	39.41	42.60	34.20	35.03	23.11	53.03	9.64	12.26
<b>MEDIAN</b>	6.37	7.83	9.90	11.50	9.20	8.50	4.40	2.92
	8M							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	7.57	4.17	6.00	3.10	4.80	2.58	2.37	1.67
<b>MAX</b>	1100.00	4200.00	500.00	38.00	42.00	94.00	38.00	192.00
<b>AVG</b>	105.81	199.15	42.78	10.02	12.87	14.92	8.73	14.40
<b>MEDIAN</b>	17.50	21.00	16.00	7.00	10.00	10.12	5.58	6.33



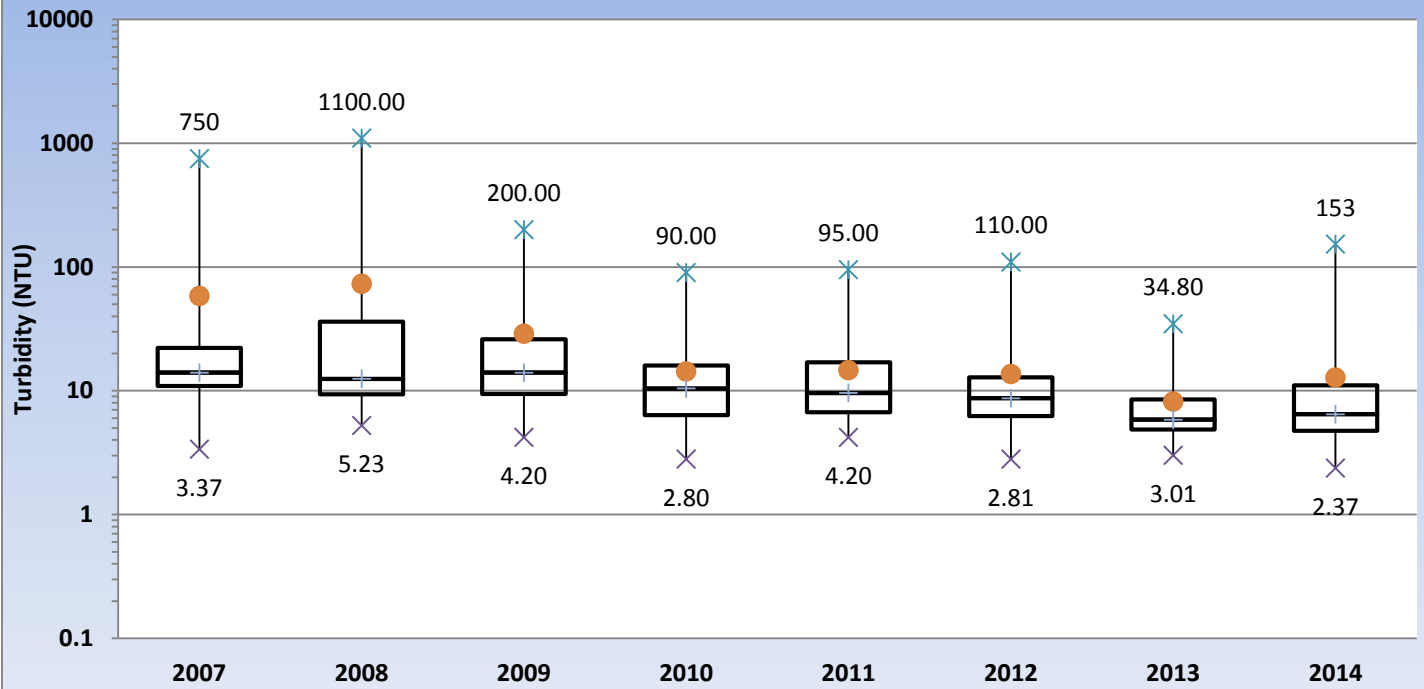
## 2M 2007 - 2014



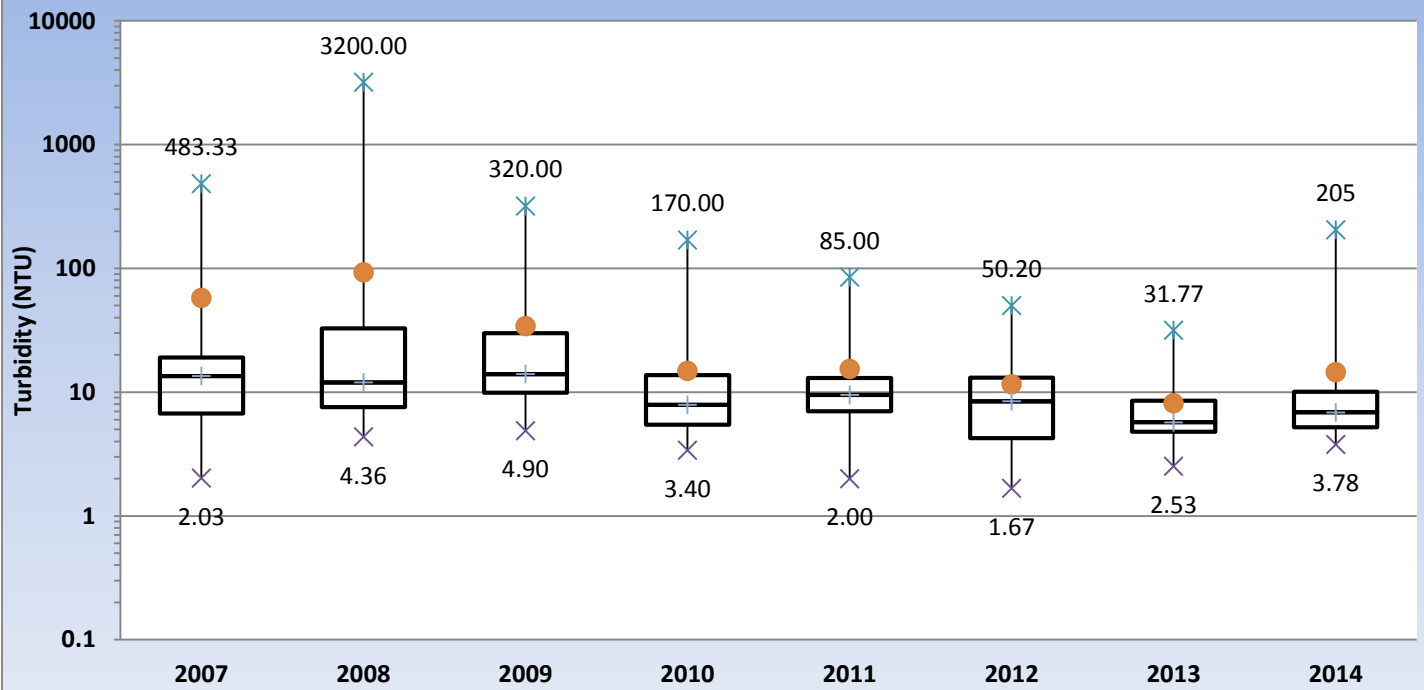
## 3M 2007 - 2014



### 4M 2007 - 2014

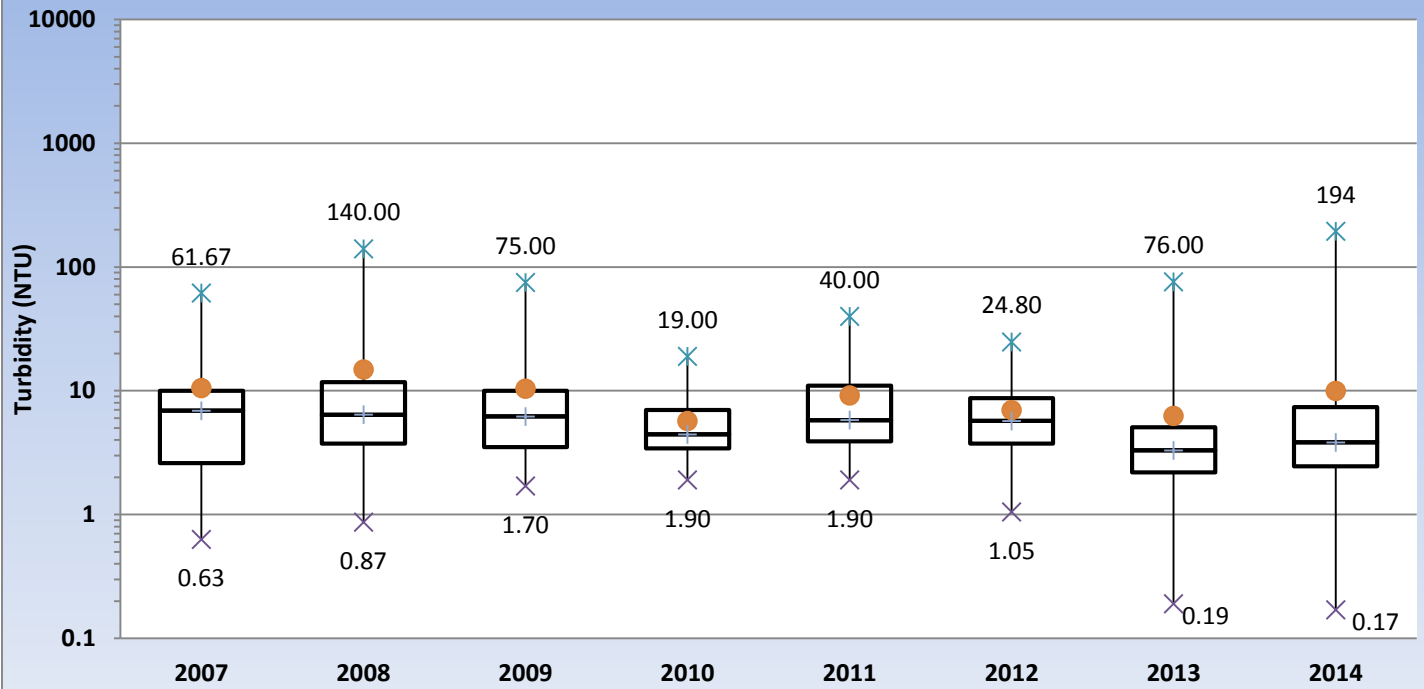


### 5M 2007 - 2014

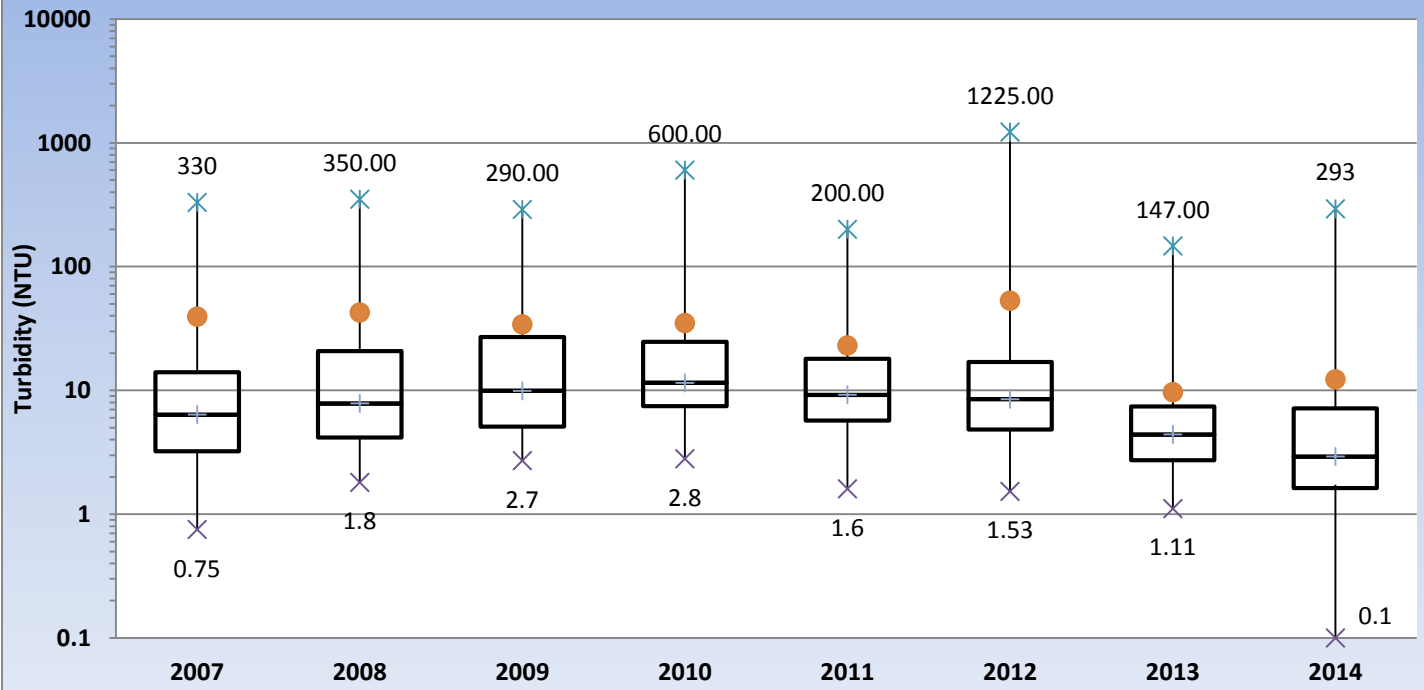




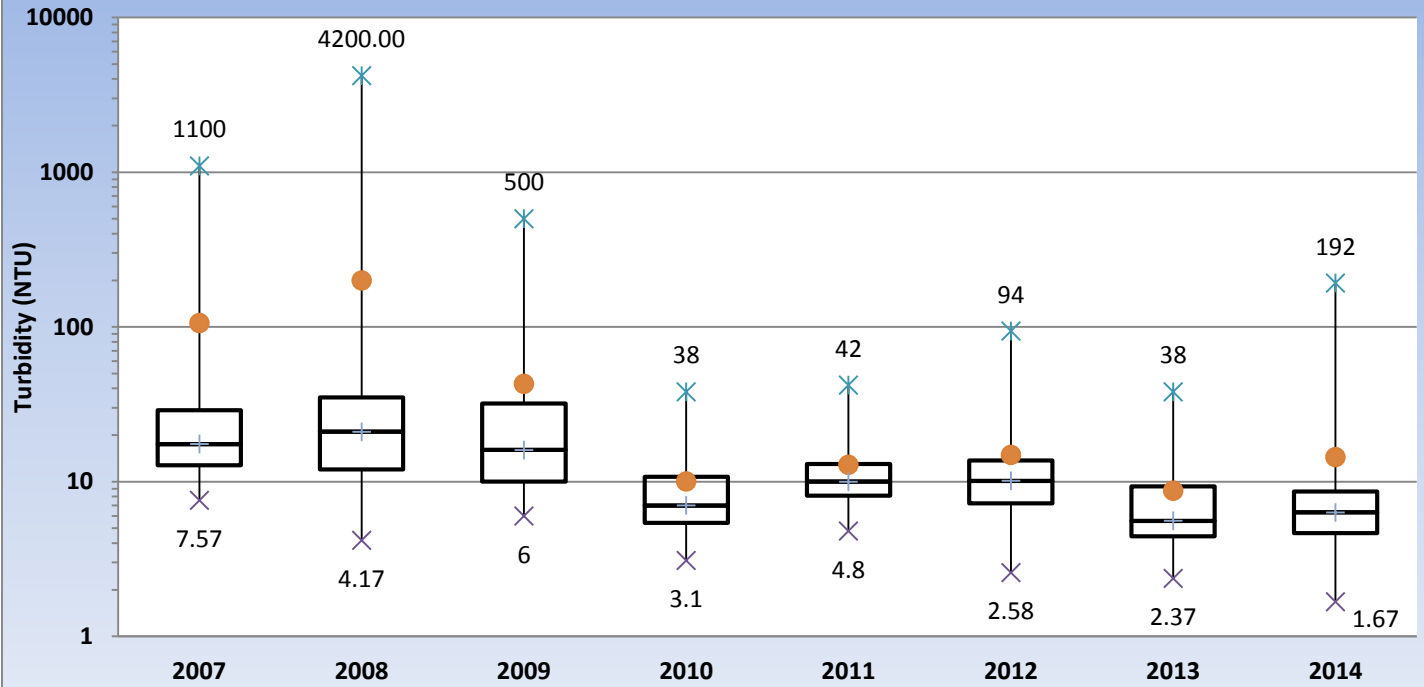
### 6M 2007 - 2014



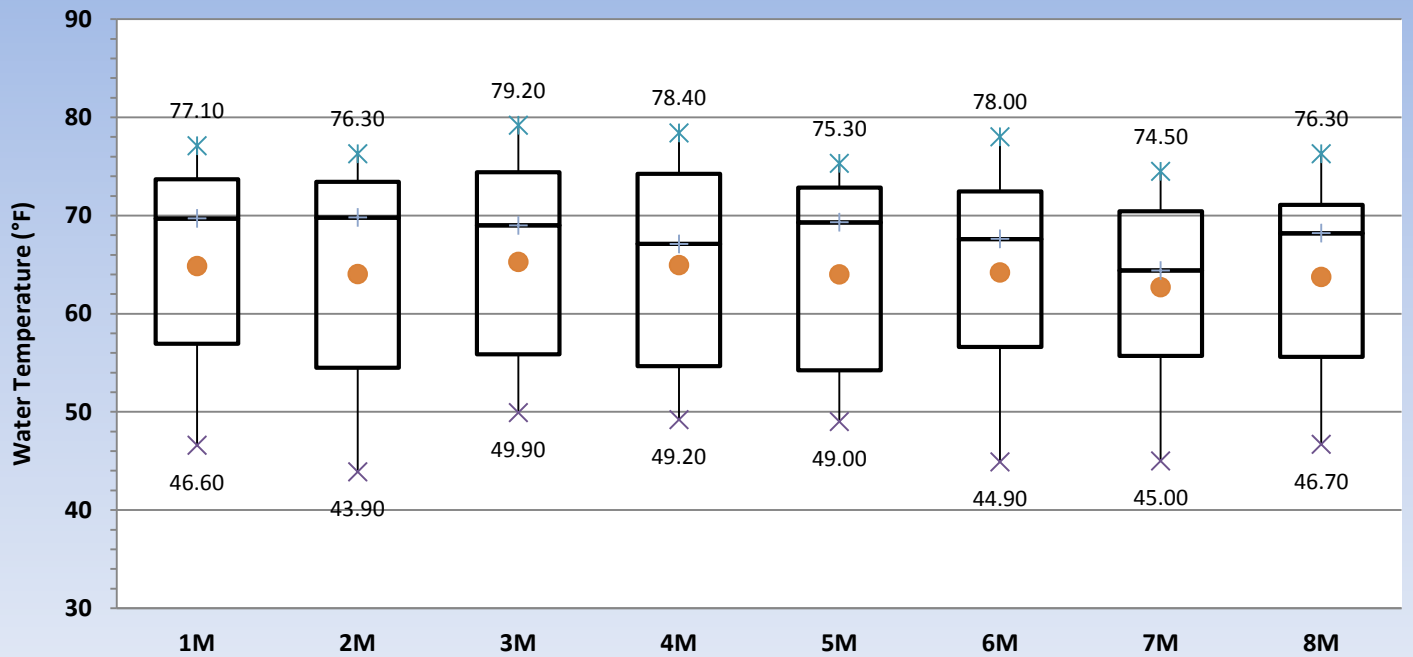
### 7M 2007 - 2014



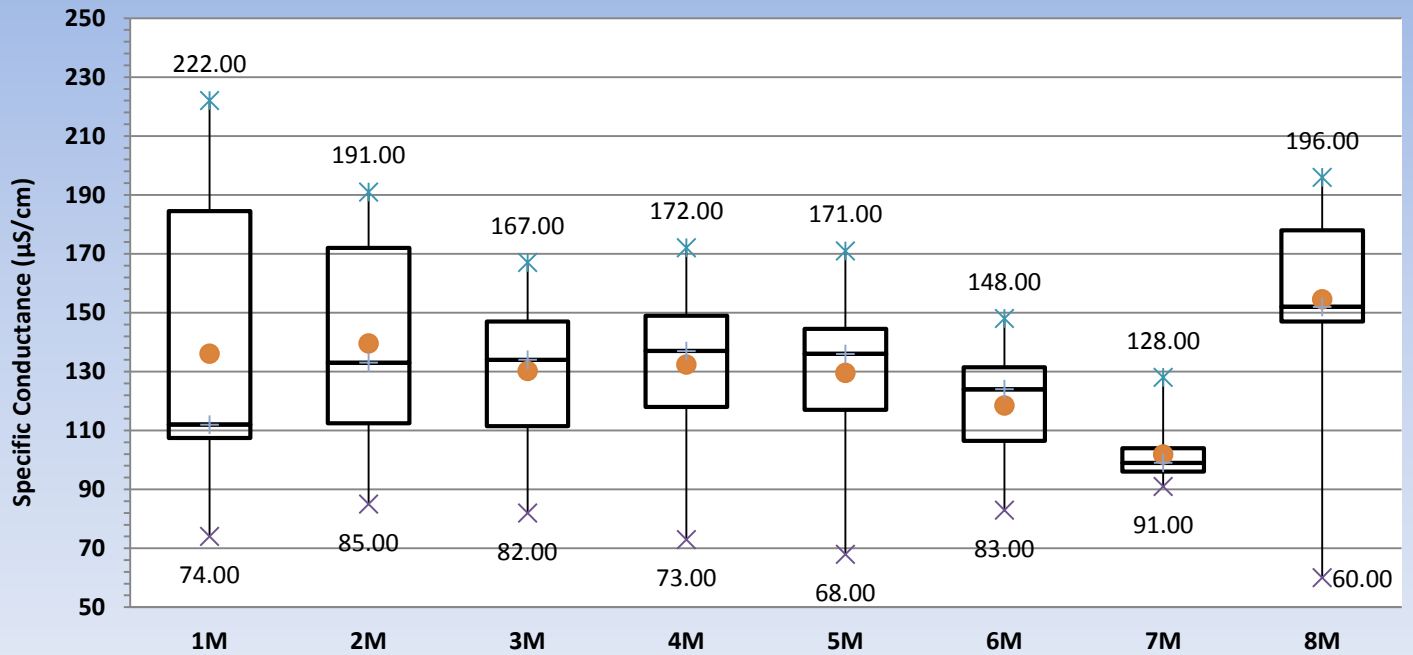
## 8M 2007 - 2014



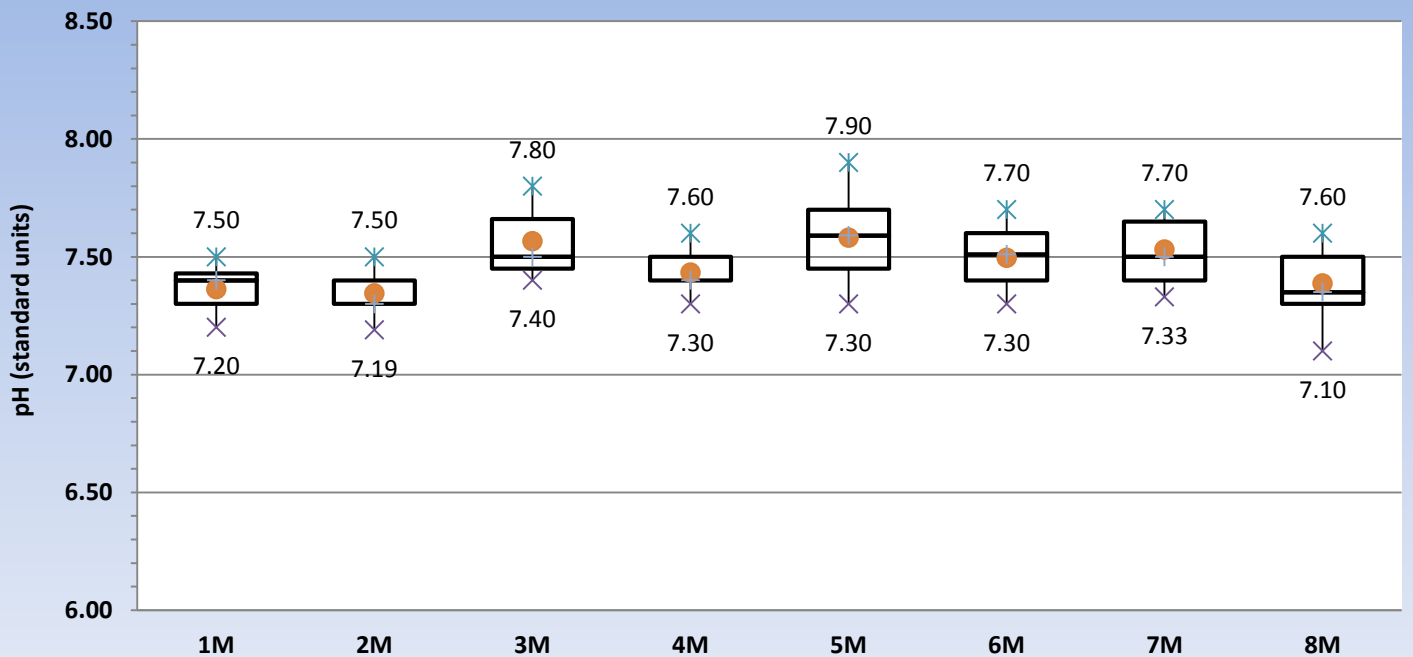
## Moore's Mill Creek Sites 2014 Water Temperature



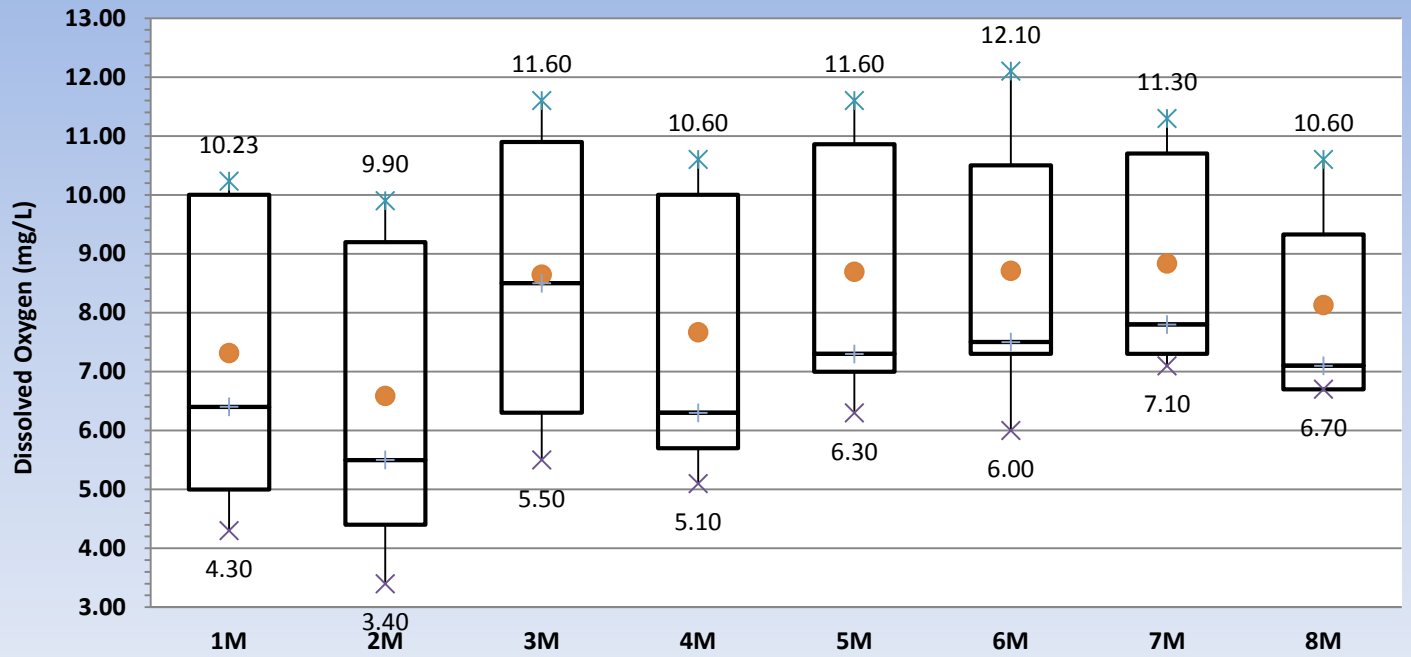
## Moore's Mill Creek Sites 2014 Specific Conductance



## Moore's Mill Creek Sites 2014 pH



# Moore's Mill Creek Sites 2014 Dissolved Oxygen



## Parkerson's Mill Creek Watershed

A total of 597 independent water quality measurements were collected in the Moore's Mill Creek watershed in 2014. Weekly sampling of turbidity (301 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (78 samples), pH (78 samples), specific conductance (76 samples), and dissolved oxygen (64 samples) began in September 2014.

### Monitoring Station Locations and Notes:

**1P** – Latitude 32, 35, 33.627 N; Longitude 85, 29, 45.826 W. Station 1P is the furthest upstream monitoring location on Parkerson's Mill Creek (located at the Lem Morrison Road crossing).

**2P** – Latitude 32, 34, 21.948 N; Longitude 85, 30, 24.979 W. Station 2P is located on Parkerson's Mill Creek main stem at the eastern most W. Longleaf Drive crossing.

**3P** – Latitude 32, 33, 44.574 N; Longitude 85, 30, 25.114 W. Station 3P is located on Parkerson's Mill Creek main stem at the W. Veterans Boulevard crossing.

**4P** – Latitude 32, 32, 13.799 N; Longitude 85, 30, 21.591 W. Station 4P is the furthest downstream monitoring location on Parkerson's Mill Creek main stem and is located at the CR 10/Sandhill Road crossing.

**5P** – Latitude 32, 35, 8.48 N; Longitude 85, 30, 10.446 W. Station 5P is located on Parkerson's Mill Creek main stem just downstream of Station 1P, at the Shug Jordan Parkway Crossing.

**6P** – Latitude 32, 35, 3.567 N; Longitude 85, 31, 0.914 W. Station 6P is located on an unnamed tributary near the intersection of Wire and Webster Roads.

**7P** – Latitude 32, 34, 22.578 N; Longitude 85, 30, 38.989 W. Station 7P is located downstream of Station P6 at the western most crossing on W. Longleaf Drive.

*\*See Insert for Maps of All Water Quality Monitoring Locations*

### Eight Year Statistical Analysis of Turbidity Data for Parkerson's Mill Creek

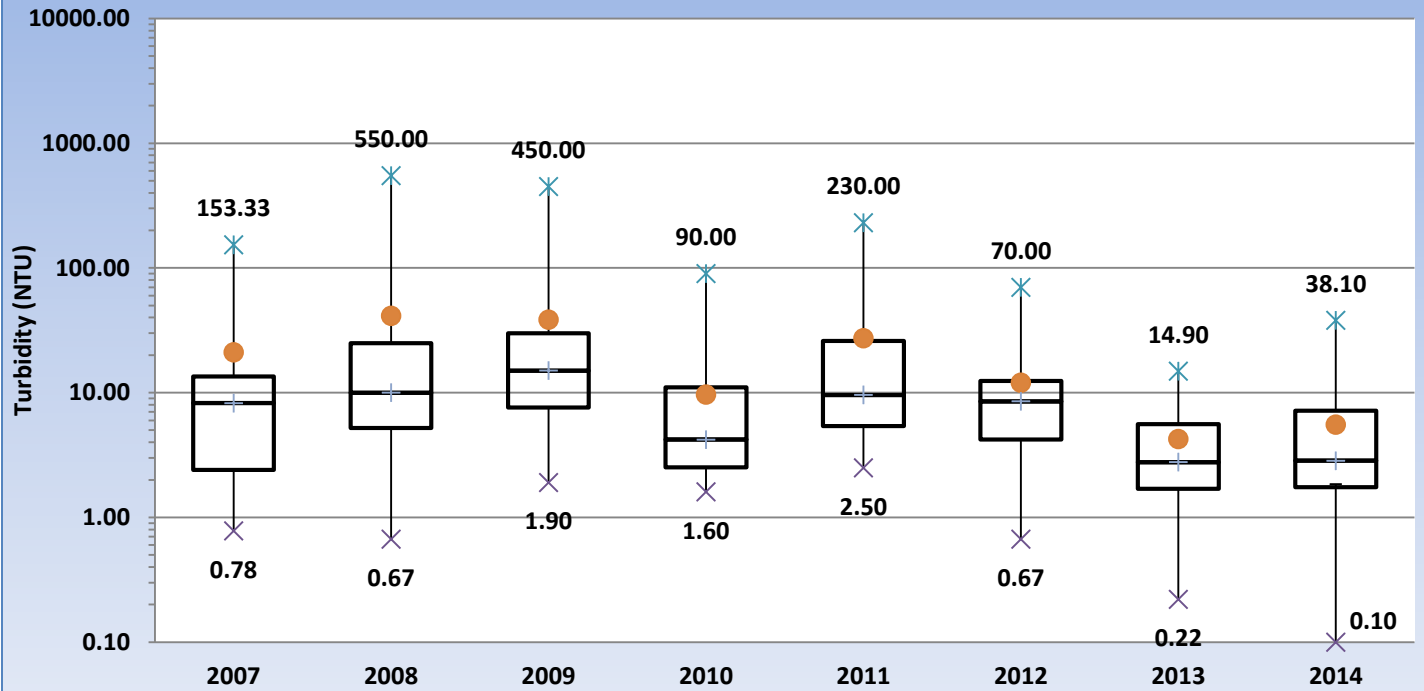
	1P							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.78	0.67	1.90	1.60	2.50	0.67	0.22	0.00
<b>MAX</b>	153.33	550.00	450.00	90.00	230.00	70.00	14.90	38.10
<b>AVG</b>	21.07	41.29	38.48	9.66	27.31	12.02	4.24	5.53
<b>MEDIAN</b>	8.24	10.00	15.00	4.20	9.60	8.53	2.77	2.85
	2P							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.60	1.66	1.60	0.90	1.70	0.53	0.47	0.10
<b>MAX</b>	200.00	370.00	70.00	33.00	100.00	52.00	14.90	78.10
<b>AVG</b>	21.78	34.80	18.70	6.87	16.64	9.83	4.43	8.55
<b>MEDIAN</b>	7.48	8.38	12.00	5.40	6.60	6.79	2.51	4.33
	3P							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	1.30	1.70	1.10	1.20	2.00	1.17	0.69	0.12

<b>MAX</b>	240.00	1800.00	80.00	65.00	85.00	700.00	16.70	73.30
<b>AVG</b>	28.08	71.16	16.53	7.97	14.86	23.04	5.74	10.48
<b>MEDIAN</b>	8.72	7.57	9.00	4.95	7.10	7.15	3.60	4.92
	<b>4P</b>							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.78	0.46	3.10	0.85	1.50	0.73	0.30	1.00
<b>MAX</b>	333.33	330.00	150.00	38.00	130.00	163.00	24.20	160.00
<b>AVG</b>	31.63	37.58	24.02	8.68	18.11	12.59	6.55	14.96
<b>MEDIAN</b>	9.27	6.69	11.00	5.45	7.70	8.15	4.50	6.40
	<b>5P</b>							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.40	0.70	2.50	1.20	2.30	0.53	0.27	0.00
<b>MAX</b>	160.00	450.00	360.00	29.00	100.00	45.00	16.87	75.00
<b>AVG</b>	20.07	39.02	36.77	6.94	18.78	10.35	4.96	7.90
<b>MEDIAN</b>	7.40	9.55	14.00	4.60	9.00	8.89	2.53	4.32

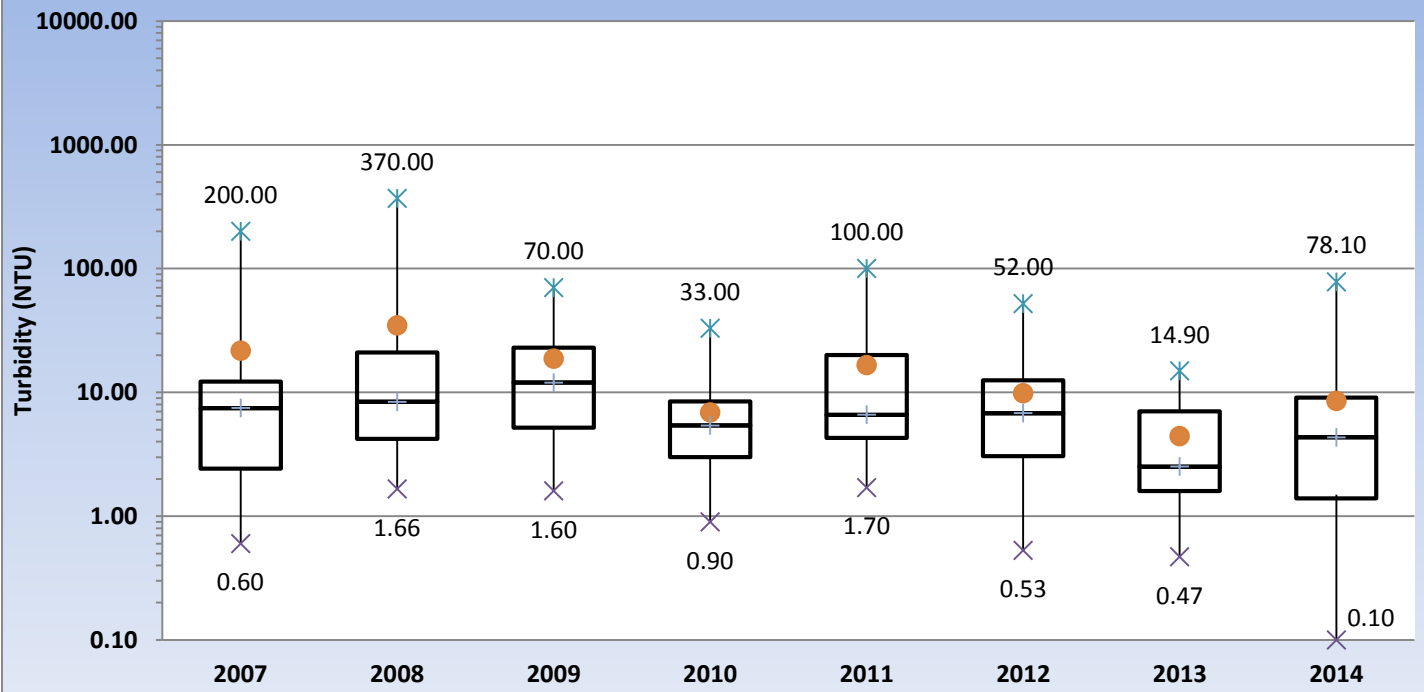
Eight Year Statistical Analysis of Turbidity Data for Parkerson's Mill Creek Tributaries

	<b>6P</b>							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.83	1.40	1.30	2.10	1.80	1.40	2.94	4.28
<b>MAX</b>	220.00	220.00	60.00	17.00	33.00	51.40	36.83	57.30
<b>AVG</b>	27.33	24.97	9.70	5.21	8.42	7.30	11.66	11.88
<b>MEDIAN</b>	12.00	7.13	6.20	4.80	5.60	5.40	10.93	8.13
	<b>7P</b>							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	1.30	1.43	2.00	2.70	2.40	1.97	1.40	0.45
<b>MAX</b>	346.67	390.00	65.00	40.00	65.00	109.00	23.00	148.00
<b>AVG</b>	36.85	32.17	11.89	8.23	14.89	11.72	6.45	11.94
<b>MEDIAN</b>	11.00	7.57	6.30	5.80	9.25	6.64	5.40	5.58

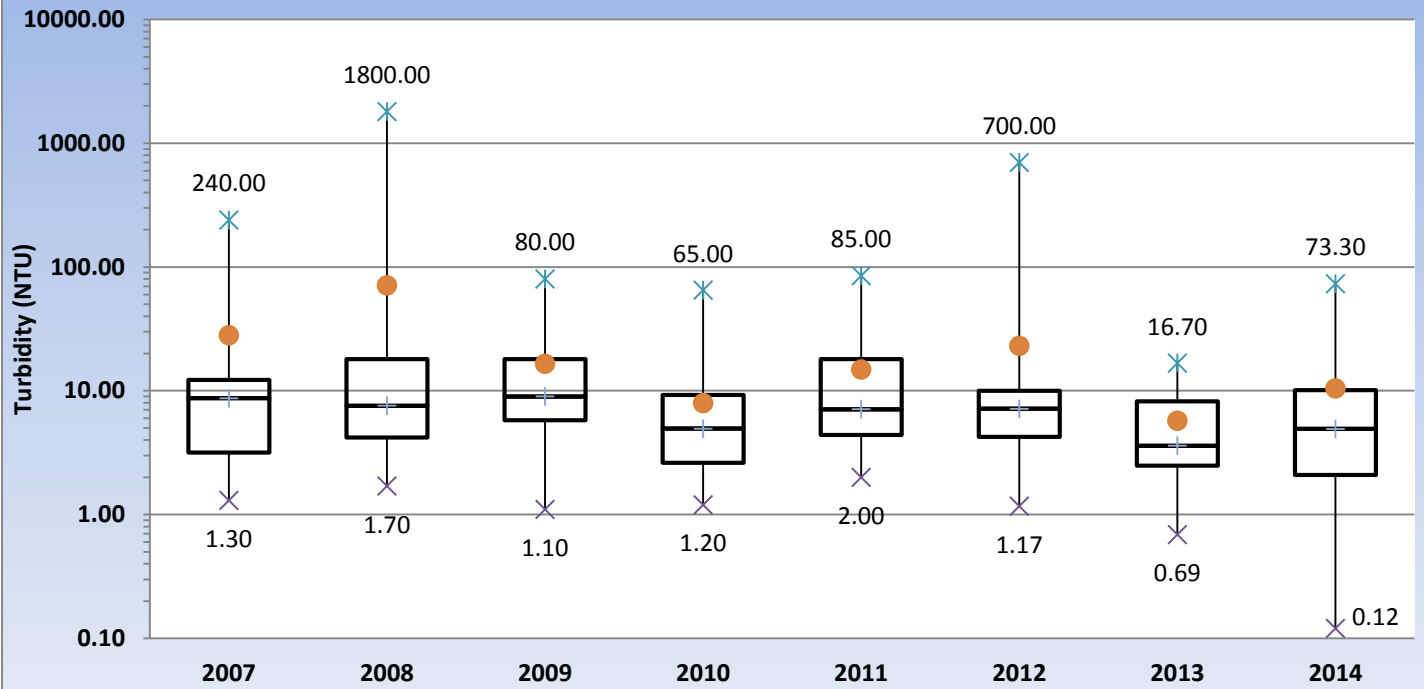
### 1P 2007 - 2014



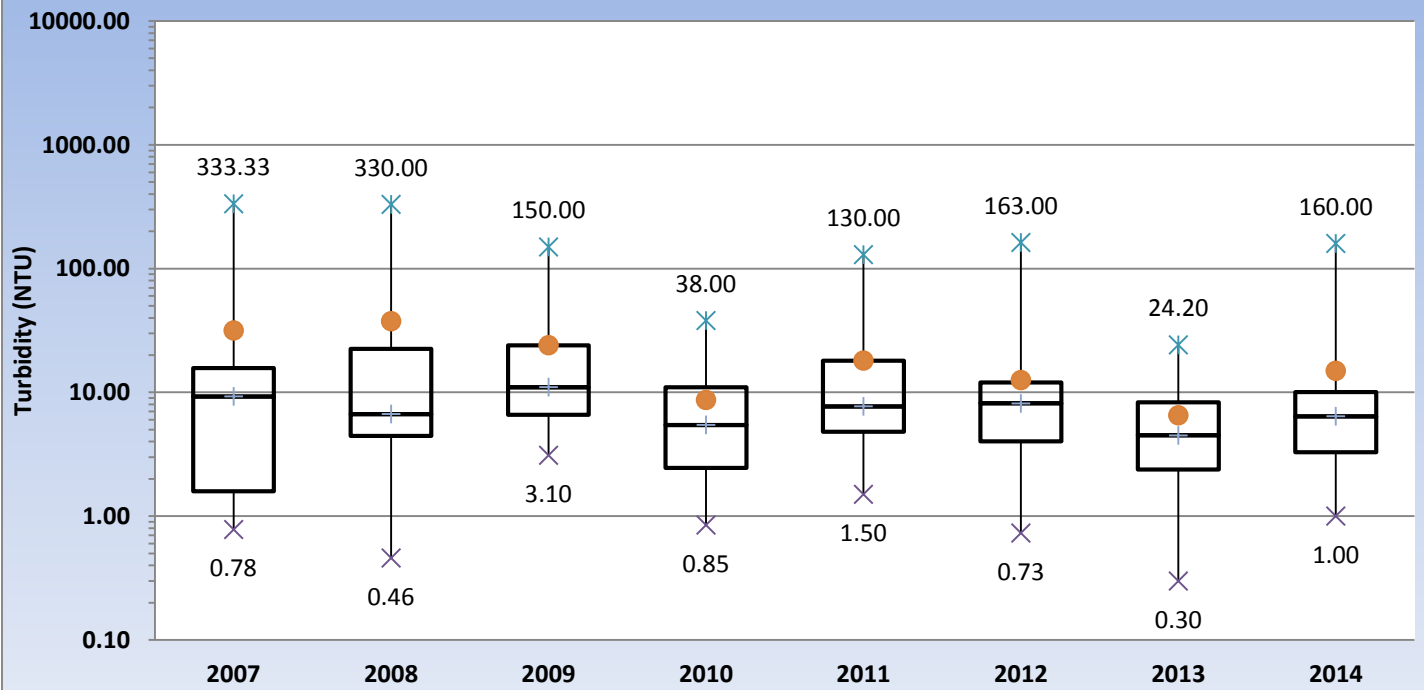
### 2P 2007 - 2014



### 3P 2007 - 2014

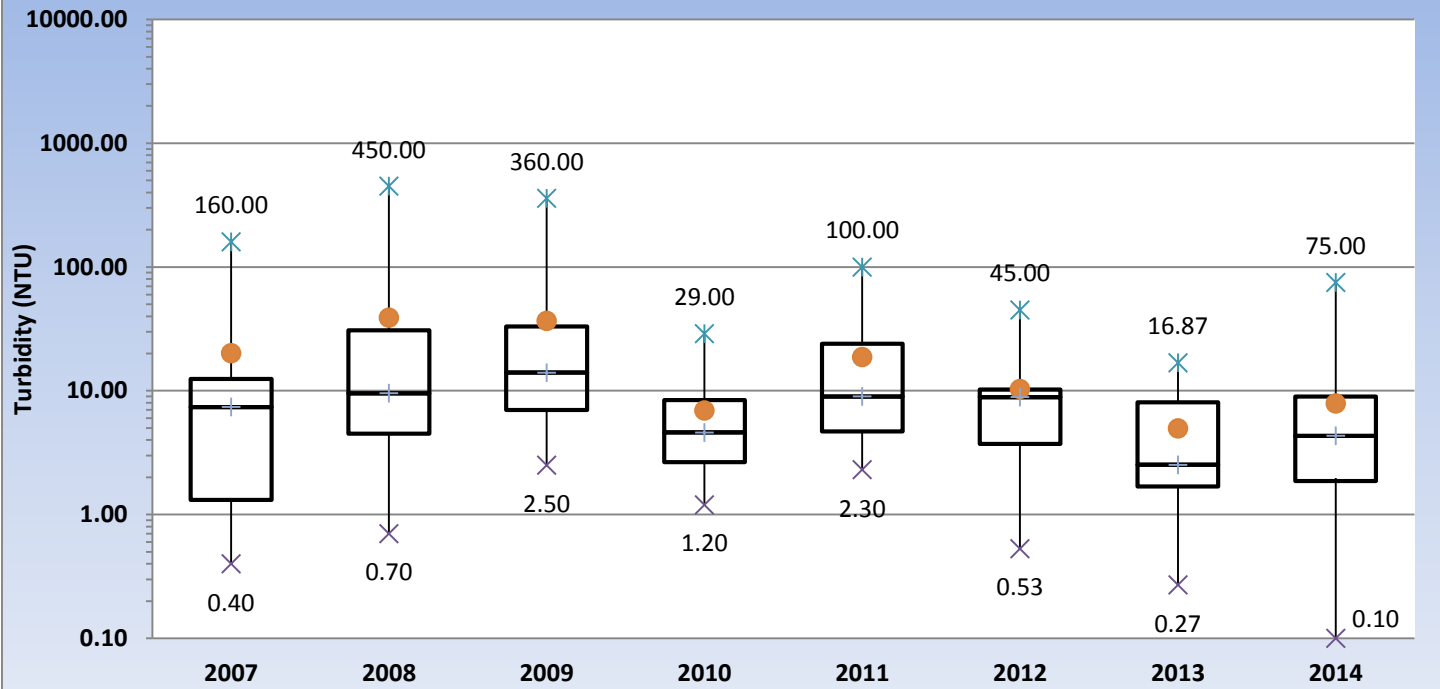


### 4P 2007 - 2014

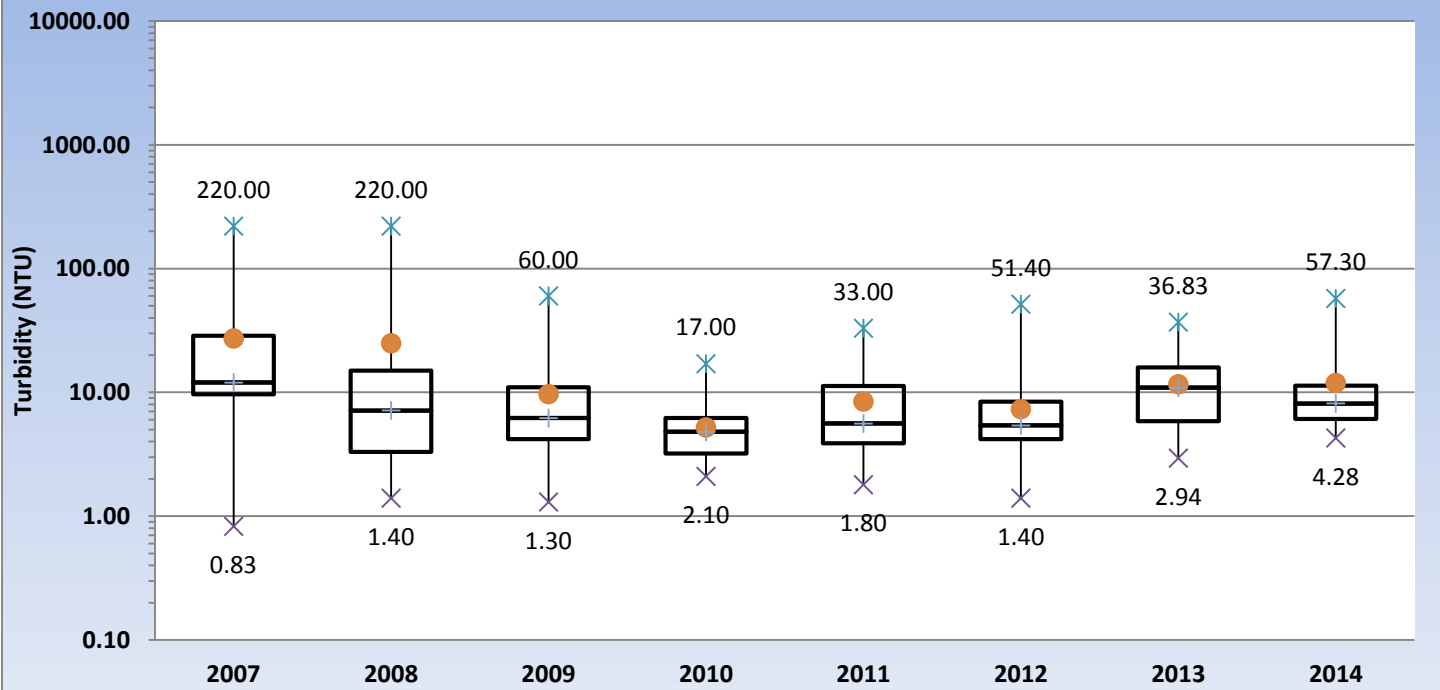




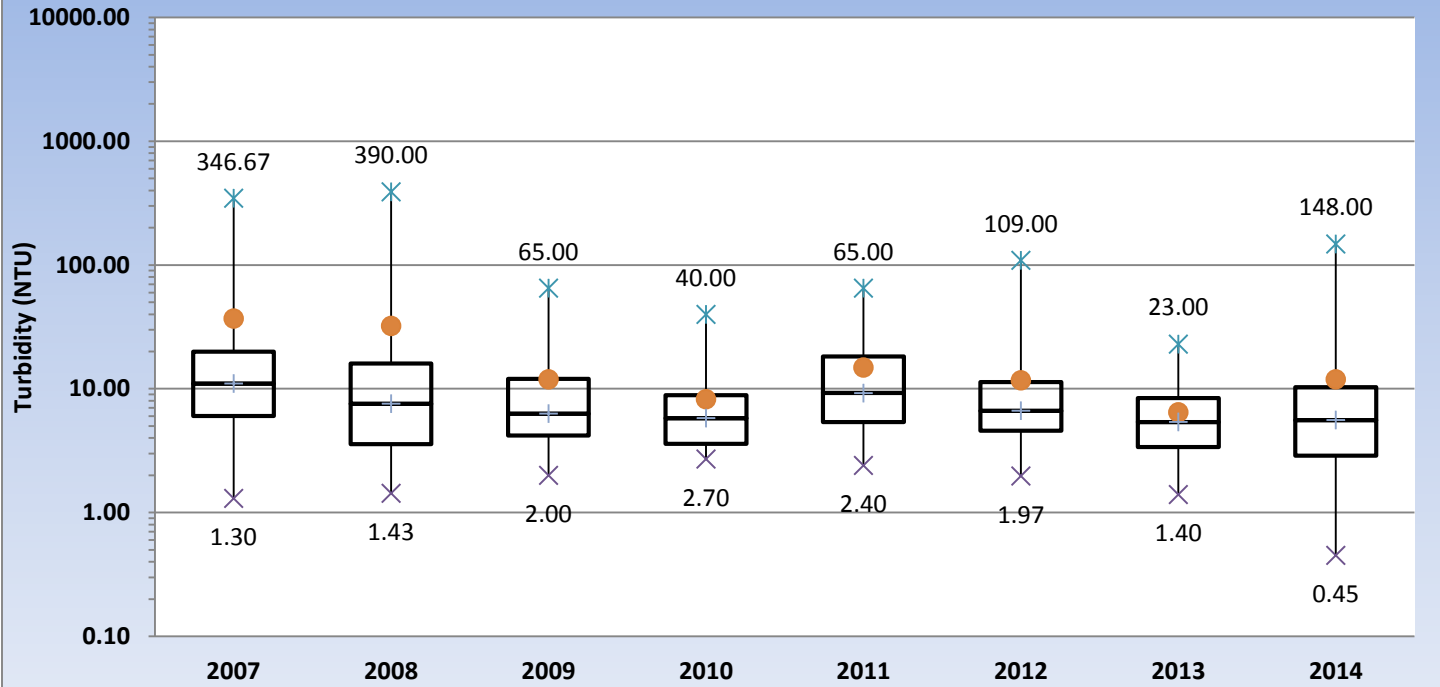
### 5P 2007 - 2014



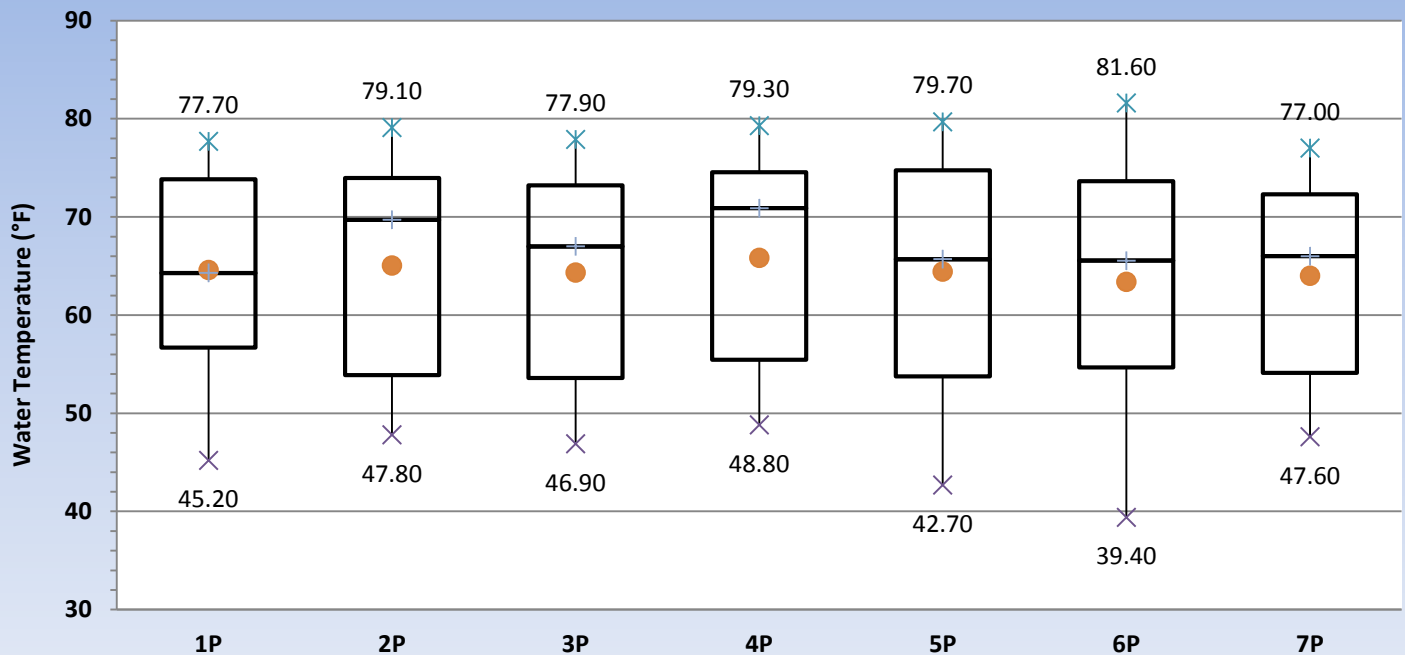
### 6P 2007 - 2014



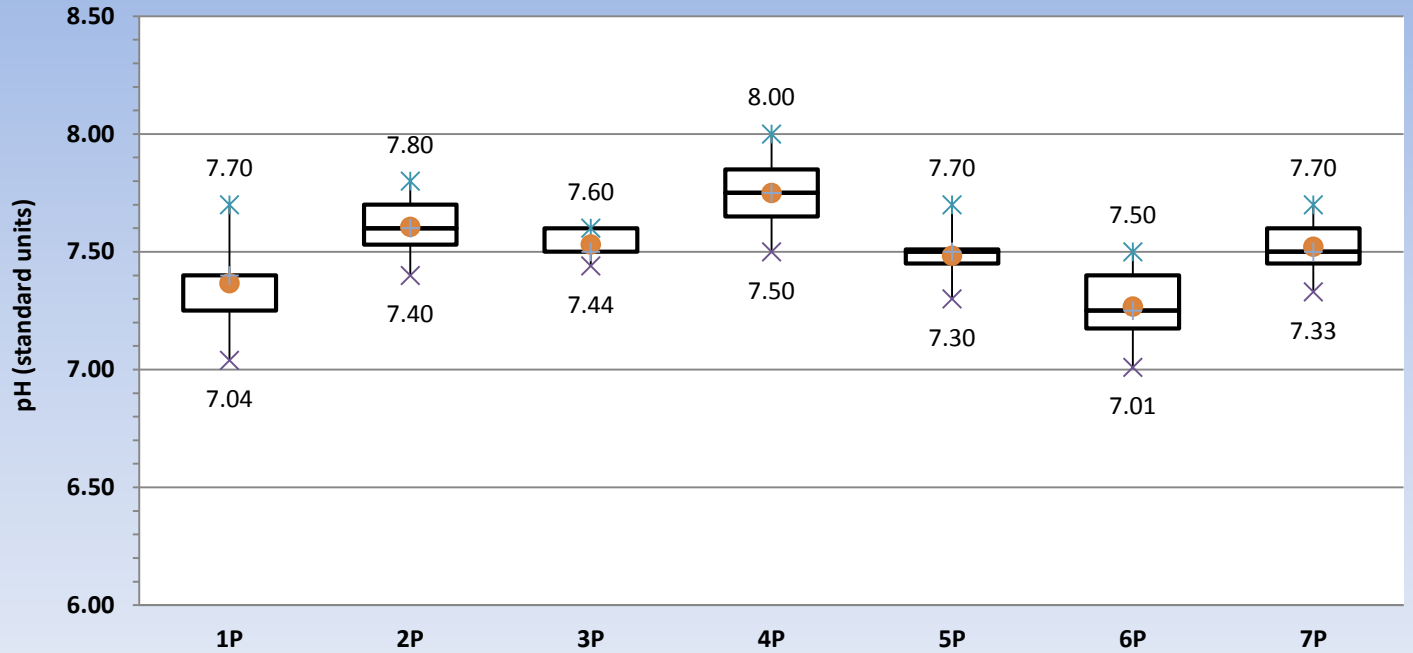
### 7P 2007 - 2014



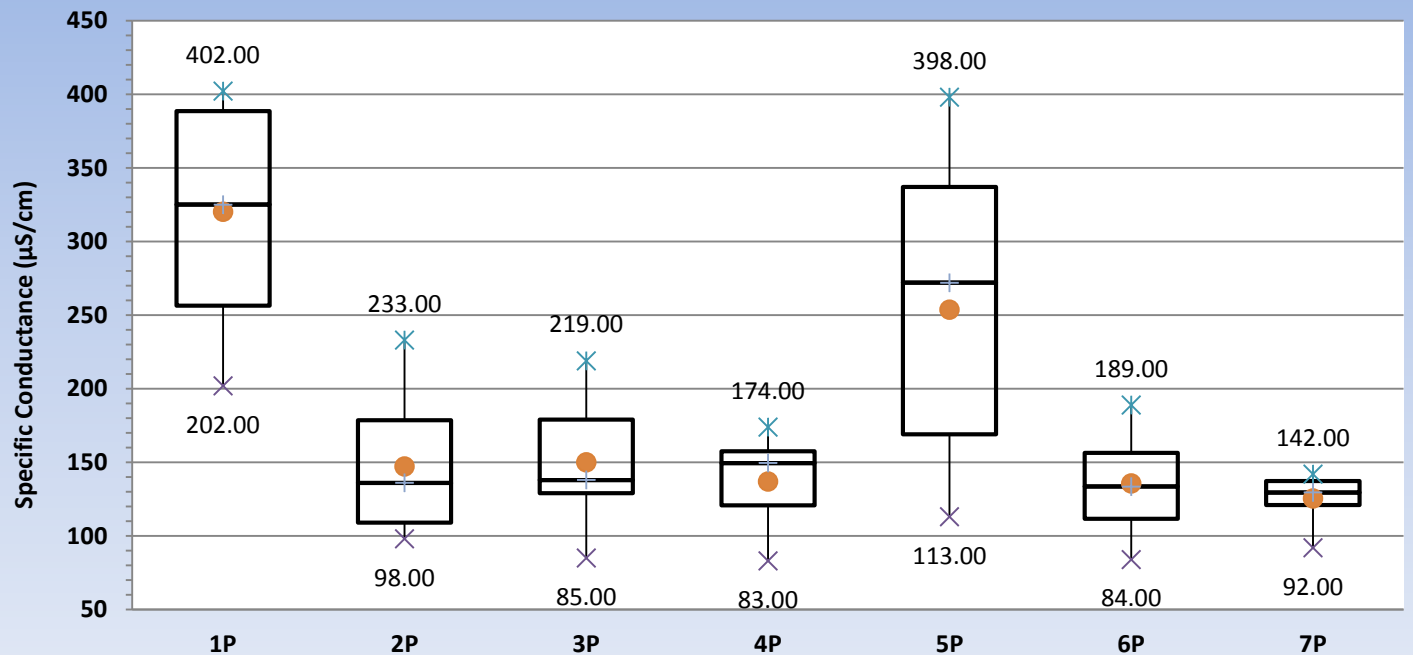
### Parkerson's Mill Creek Sites 2014 Water Temperature



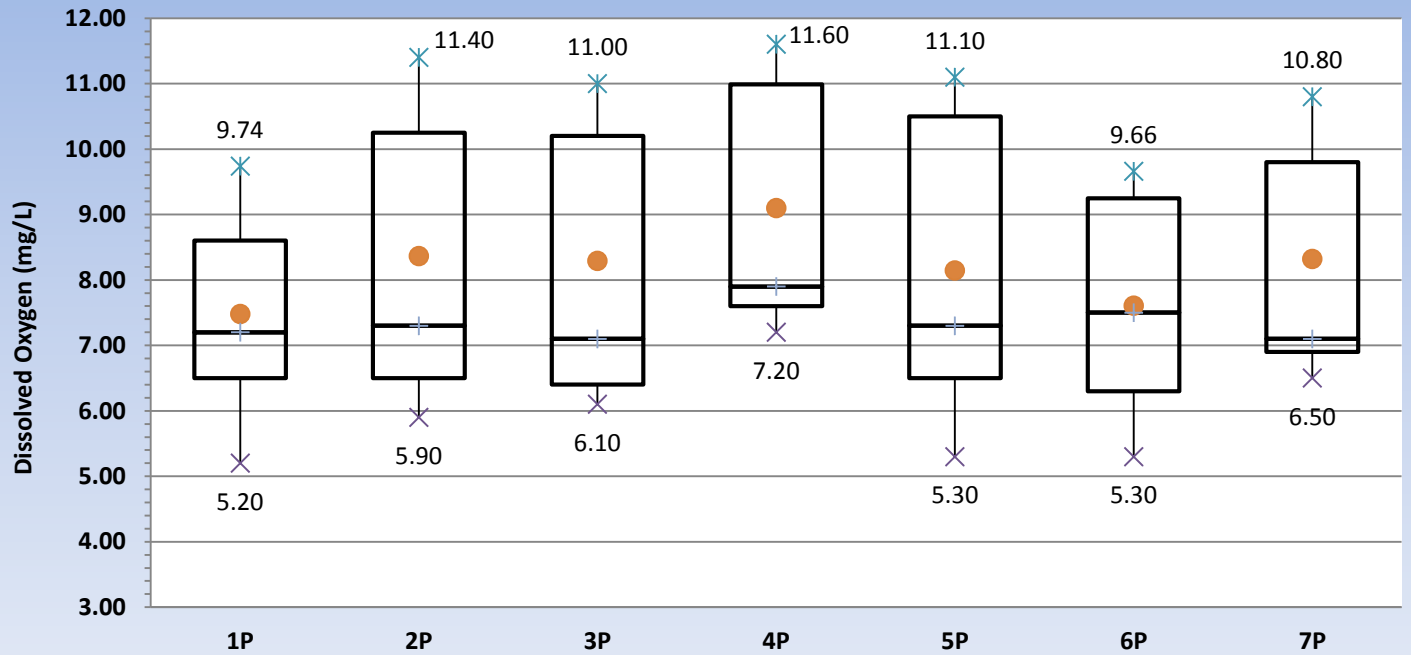
## Parkerson's Mill Creek Sites 2014 pH



## Parkerson's Mill Creek Sites 2014 Specific Conductance



# Parkerson's Mill Creek Sites 2014 Dissolved Oxygen



## Saugahatchee Creek Watershed

A total of 1252 independent water quality measurements were collected in the Moore's Mill Creek watershed in 2014. Weekly sampling of turbidity (602 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (172 samples), pH (172 samples), specific conductance (170 samples), and dissolved oxygen (136 samples) began in September 2014.

### **Monitoring Station Locations and Notes:**

**1S** – Latitude 32, 39, 28.708 N; Longitude 85, 27, 33.229 W. Station 1S is the furthest upstream monitoring location on Saugahatchee Creek main stem and is located at the US Highway 280 crossing. All construction activities contributing to this station are located outside of the City's MS4 jurisdiction.

**2S** – Latitude 32, 38, 54.075 N; Longitude 85, 28, 56.552 W. Station 2S is located on Saugahatchee Creek main stem at the N. College Street/AL 147 crossing.

**3S** – Latitude 32, 38, 32.179 N; Longitude 85, 30, 14.658 W. Station 3S is located on Saugahatchee Creek main stem at the N. Donahue Drive/CR 182 crossing.

**4S** - Latitude 32, 37, 40.252 N; Longitude 85, 32, 51.6 W Station 4S is the furthest downstream monitoring location on Saugahatchee Creek main stem and is located immediately upstream of the Northside Water Pollution Control Facility (WPCF).

**5S** – Latitude 32, 37, 30.273 N; Longitude 85, 32, 45.009 W. Station 5S is located on an unnamed tributary to Saugahatchee Creek immediately west of the Northside Water Pollution Control Facility.

**6S** – Latitude 32, 37, 48.368 N; Longitude 85, 27, 7.52 W. Station 6S is located on an unnamed tributary at the Gatewood Drive crossing near Uncle Bob's Storage.

**7S** – Latitude 32, 38, 10.933 N; Longitude 85, 27, 56.368 W. Station 7S is located downstream of 15S on an unnamed tributary to Saugahatchee Creek at the Shelton Mill Road crossing near The City Church (formerly Victory Prayer Center).

**8S** – Latitude 32, 37, 30.543 N; Longitude 85, 28, 27.074 W. Station 8S is located on an unnamed tributary to Saugahatchee Creek at the Shelton Mill Road crossing near the Covenant Presbyterian Church.

**12S** – Latitude 32, 38, 10.167 N; Longitude 85, 28, 54.883 W. Station 12S is located on an unnamed tributary to Saugahatchee Creek downstream of 8S near the intersection of N. College Street/AL 147 and Shug Jordan Parkway.

**14S** – Latitude 32, 39, 28.523 N; Longitude 85, 32, 13.711 W. Station 14S is located on W. Farmville Road on an unnamed tributary to Loblockee Creek at the discharge of the primary spillway of The Preserve pond.

**15S** – Latitude 32, 38, 6.51 N; Longitude 85, 27, 34.675 W. Station 15S is located on an unnamed tributary to Saugahatchee Creek at N. Dean Road, just downstream of 6S.

**16S** – Latitude 32, 38, 10.238 N; Longitude 85, 29, 20.643 W. Station 16S is located on the same unnamed tributary as 8S and 12S and is downstream of 12S along Shug Jordan Parkway.

**17S** – Latitude 32, 39, 15.106 N; Longitude 85, 32, 1.977 W. Station 17S is located on an unnamed tributary at the discharge of the primary spillway of the Shadow Woods pond (in Shadow Woods Subdivision off Mrs. James Road/CR 081).

**18S** – Latitude 32, 39, 53.844 N; Longitude 85, 28, 51.164 W. 18S is located on an unnamed tributary along Farmville Road, immediately downstream of Tuscany Hills.

*\*See Insert for Maps of All Water Quality Monitoring Locations*

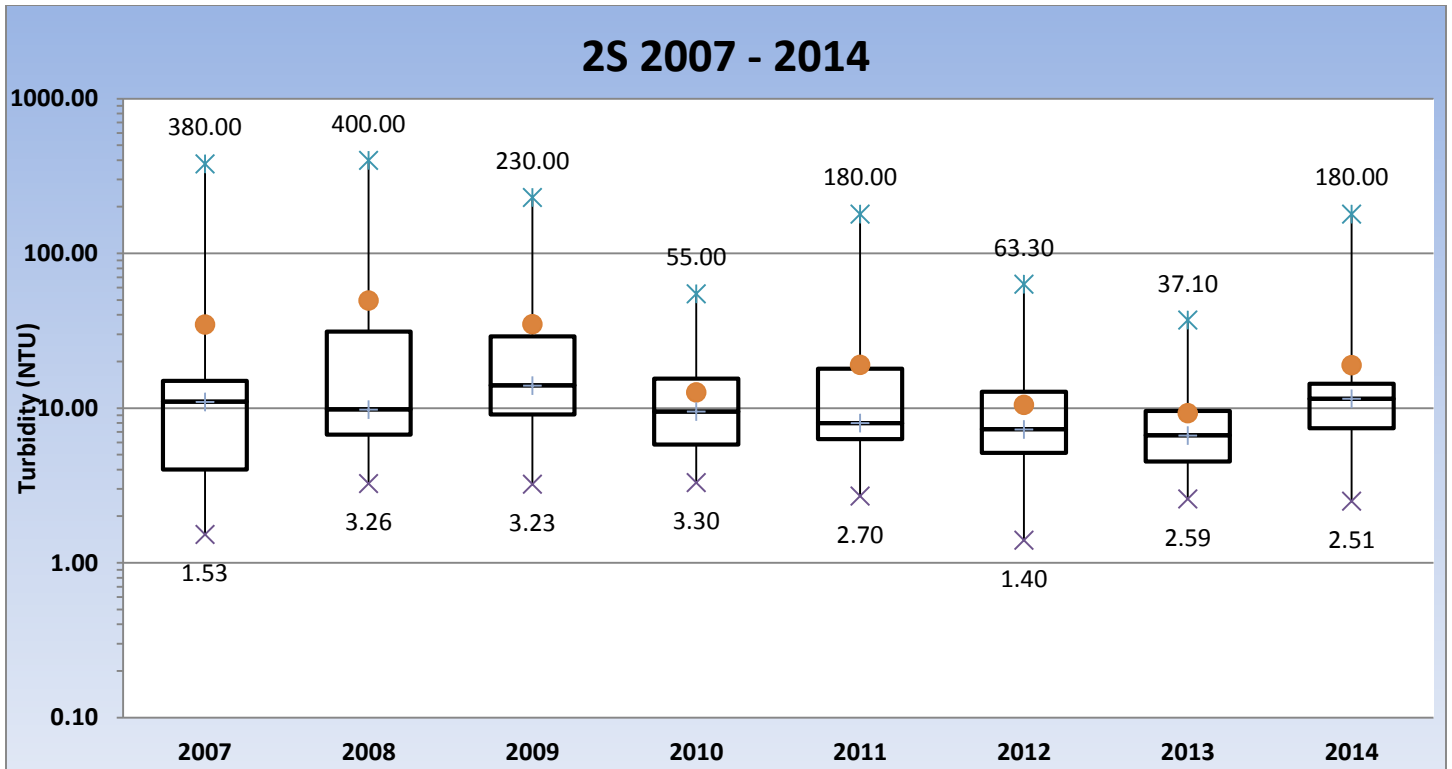
**Eight Year Statistical Analysis of Turbidity Data for Saugahatchee Creek**

	<b>1S</b>							
	<b><u>2007</u></b>	<b><u>2008</u></b>	<b><u>2009</u></b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>
<b>MIN</b>	1.00	2.66	2.46	2.20	2.40	1.25	2.16	2.03
<b>MAX</b>	327.67	450.00	200.00	40.00	110.00	44.70	20.57	88.50
<b>AVG</b>	30.55	49.54	28.28	11.22	12.69	7.42	6.71	11.44
<b>MEDIAN</b>	10.50	8.85	12.00	7.80	6.40	5.29	5.47	7.86
	<b>2S</b>							
	<b><u>2007</u></b>	<b><u>2008</u></b>	<b><u>2009</u></b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>
<b>MIN</b>	1.53	3.26	3.23	3.30	2.70	1.40	2.59	2.51
<b>MAX</b>	380.00	400.00	230.00	55.00	180.00	63.30	37.10	180.00
<b>AVG</b>	34.83	49.72	34.85	12.69	19.09	10.53	9.28	19.00
<b>MEDIAN</b>	11.00	9.80	14.00	9.50	8.00	7.30	6.67	11.50
	<b>3S</b>							
	<b><u>2007</u></b>	<b><u>2008</u></b>	<b><u>2009</u></b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>
<b>MIN</b>	1.90	3.90	3.30	4.20	3.00	1.60	1.97	2.49
<b>MAX</b>	260.00	550.00	450.00	75.00	150.00	72.60	45.27	299.00
<b>AVG</b>	33.70	52.12	45.16	14.25	18.72	11.98	10.53	22.86
<b>MEDIAN</b>	11.00	10.50	14.00	10.25	9.10	8.65	8.40	11.85
	<b>4S</b>							
	<b><u>2007</u></b>	<b><u>2008</u></b>	<b><u>2009</u></b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>
<b>MIN</b>	1.70	3.56	2.70	3.40	2.70	1.90	1.53	1.77
<b>MAX</b>	300.00	500.00	270.00	140.00	110.00	100.40	52.80	441.00
<b>AVG</b>	32.25	48.54	35.53	15.76	18.84	13.54	11.31	27.21
<b>MEDIAN</b>	10.50	8.10	13.00	8.60	9.60	9.15	8.79	10.52

Eight Year Statistical Analysis of Turbidity Data for Saugahatchee Creek Tributaries

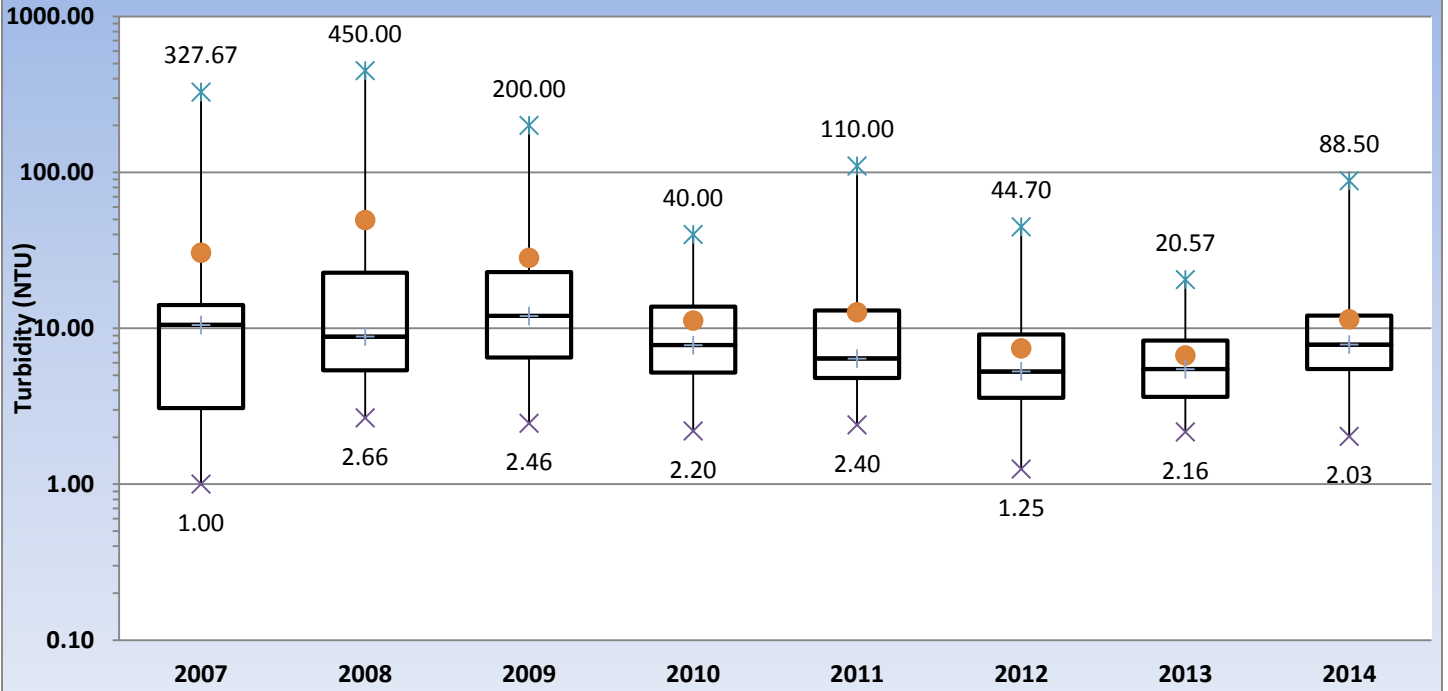
		5S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		<b>8.83</b>	3.23	5.20	3.10	4.80	7.47	2.56	2.79
<b>MAX</b>		<b>683.67</b>	400.00	160.00	45.00	70.00	293.00	40.47	54.30
<b>AVG</b>		<b>90.47</b>	41.68	22.99	13.26	15.58	25.54	9.78	13.94
<b>MEDIAN</b>		<b>22.33</b>	13.50	12.00	10.60	11.00	12.00	7.34	11.00
		6S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		4.27	2.03	4.20	3.40	3.40	3.20	2.17	1.09
<b>MAX</b>		28.67	50.00	38.00	26.00	32.00	17.60	65.00	58.40
<b>AVG</b>		14.01	11.07	11.07	9.44	10.58	8.71	7.41	6.50
<b>MEDIAN</b>		13.00	8.54	9.20	8.10	9.70	8.01	5.37	4.46
		7S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		<b>3.07</b>	2.23	2.20	1.60	2.80	1.67	1.61	1.67
<b>MAX</b>		<b>62.00</b>	75.00	110.00	27.00	37.00	19.60	19.60	22.20
<b>AVG</b>		<b>15.38</b>	13.76	13.80	6.45	8.43	5.99	5.57	6.76
<b>MEDIAN</b>		<b>10.00</b>	7.05	8.40	5.40	6.00	5.50	4.48	5.76
		8S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		1.33	1.83	1.70	1.40	2.30	0.80	0.89	1.00
<b>MAX</b>		650.00	220.00	150.00	28.00	85.00	38.20	24.57	178.00
<b>AVG</b>		36.90	26.99	15.50	5.49	10.64	10.76	5.47	11.46
<b>MEDIAN</b>		9.49	8.43	7.90	4.55	5.20	7.29	3.42	4.43
		12S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		<b>1.40</b>	2.26	3.70	2.40	3.60	2.60	3.19	1.51
<b>MAX</b>		<b>190.00</b>	500.00	400.00	40.00	60.00	50.60	37.70	258.00
<b>AVG</b>		<b>24.02</b>	31.94	31.58	8.21	11.55	10.34	8.77	15.99
<b>MEDIAN</b>		<b>14.00</b>	7.93	13.00	6.85	7.30	7.75	6.90	7.09
		14S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		3.83	4.20	3.50	3.00	5.50	3.63	1.95	0.56
<b>MAX</b>		996.67	950.00	55.00	85.00	65.00	50.00	32.40	55.60
<b>AVG</b>		82.53	64.97	14.97	15.69	19.29	16.68	7.98	13.73
<b>MEDIAN</b>		30.50	14.50	11.00	13.00	16.00	12.90	5.86	9.76
		15S							
		<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>		<b>1.57</b>	2.20	3.20	2.40	2.80	1.73	2.16	0.88
<b>MAX</b>		<b>280.00</b>	65.00	65.00	55.00	40.00	17.70	17.43	23.60
<b>AVG</b>		<b>21.42</b>	13.46	14.64	7.42	8.94	6.07	5.62	7.11
<b>MEDIAN</b>		<b>13.00</b>	8.57	10.00	5.50	6.30	5.35	4.32	5.69

		16S							
		2007	2008	2009	2010	2011	2012	2013	2014
MIN		3.20	2.60	3.70	2.20	3.80	3.94	1.44	1.38
MAX		220.00	270.00	310.00	55.00	55.00	49.30	29.13	49.50
AVG		27.07	25.86	29.79	7.99	12.09	10.61	8.20	9.73
MEDIAN		13.00	7.48	10.60	5.75	7.80	7.00	5.38	7.23
		17S							
		2007	2008	2009	2010	2011	2012	2013	2014
MIN		12.67	8.90	11.00	8.70	15.00	17.00	4.56	6.40
MAX		550.00	400.00	135.00	55.00	90.00	147.00	60.47	116.00
AVG		80.01	56.91	25.37	23.84	36.58	34.99	23.43	30.12
MEDIAN		47.50	25.00	21.00	21.00	29.00	29.50	20.37	23.14
		18S							
		2007	2008	2009	2010	2011	2012	2013	2014
MIN		2.30	2.26	2.30	1.80	2.20	2.66	2.98	2.00
MAX		1100.00	360.00	200.00	29.00	33.00	30.50	57.43	42.60
AVG		56.92	30.39	16.00	5.49	6.66	6.54	8.18	7.77
MEDIAN		13.00	7.51	7.30	4.35	4.45	5.35	6.13	5.75

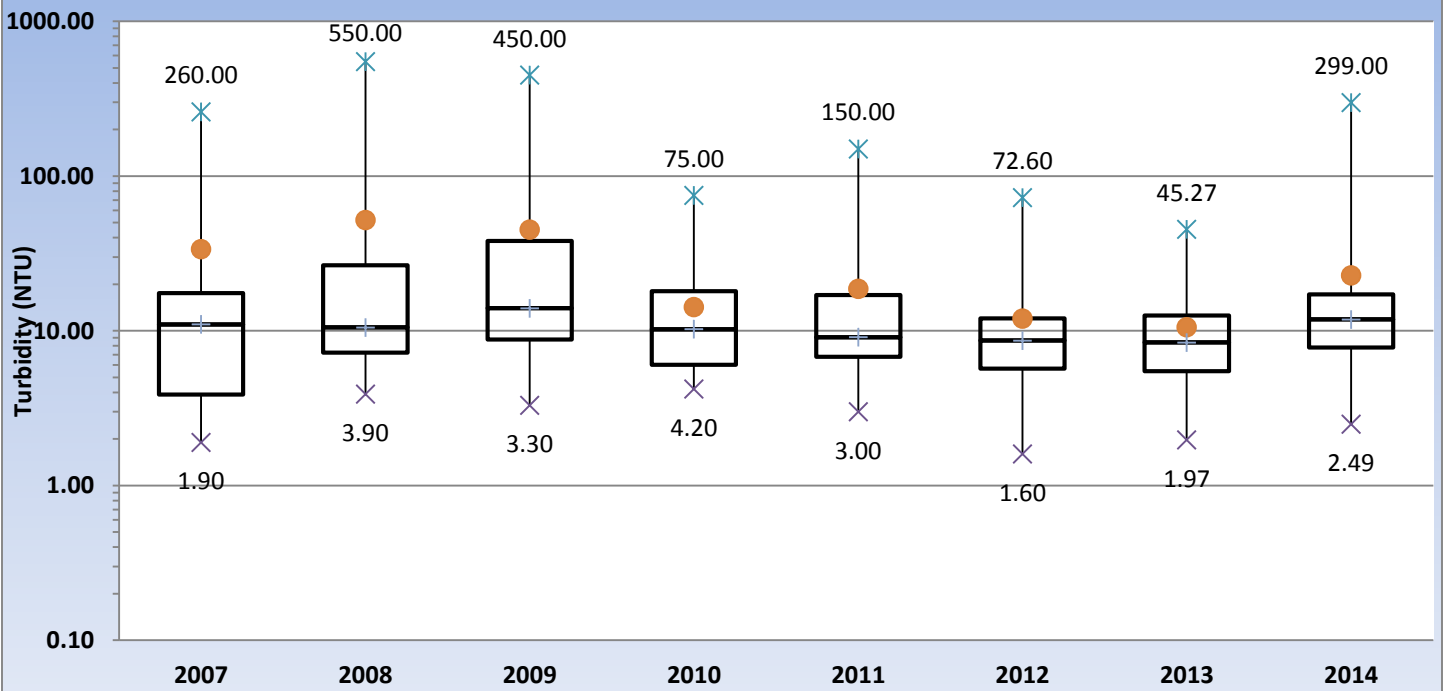




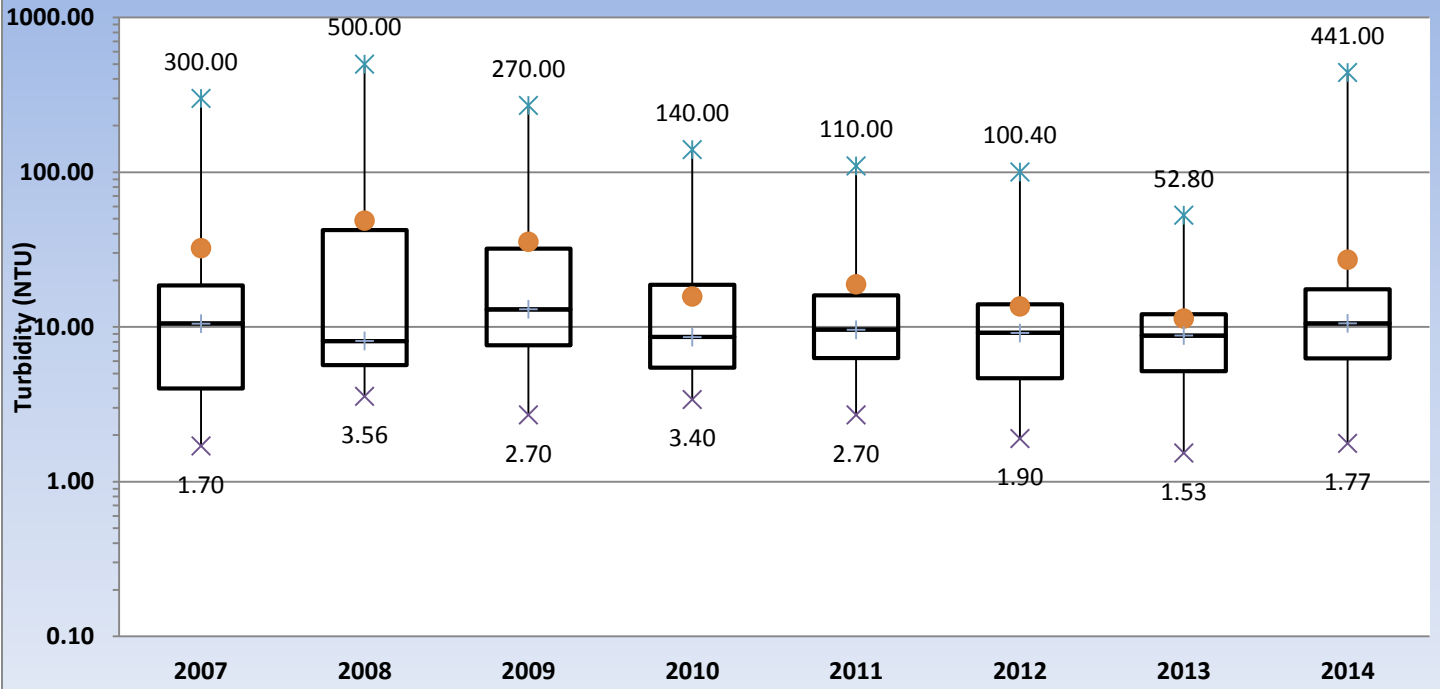
### 1S 2007 - 2014



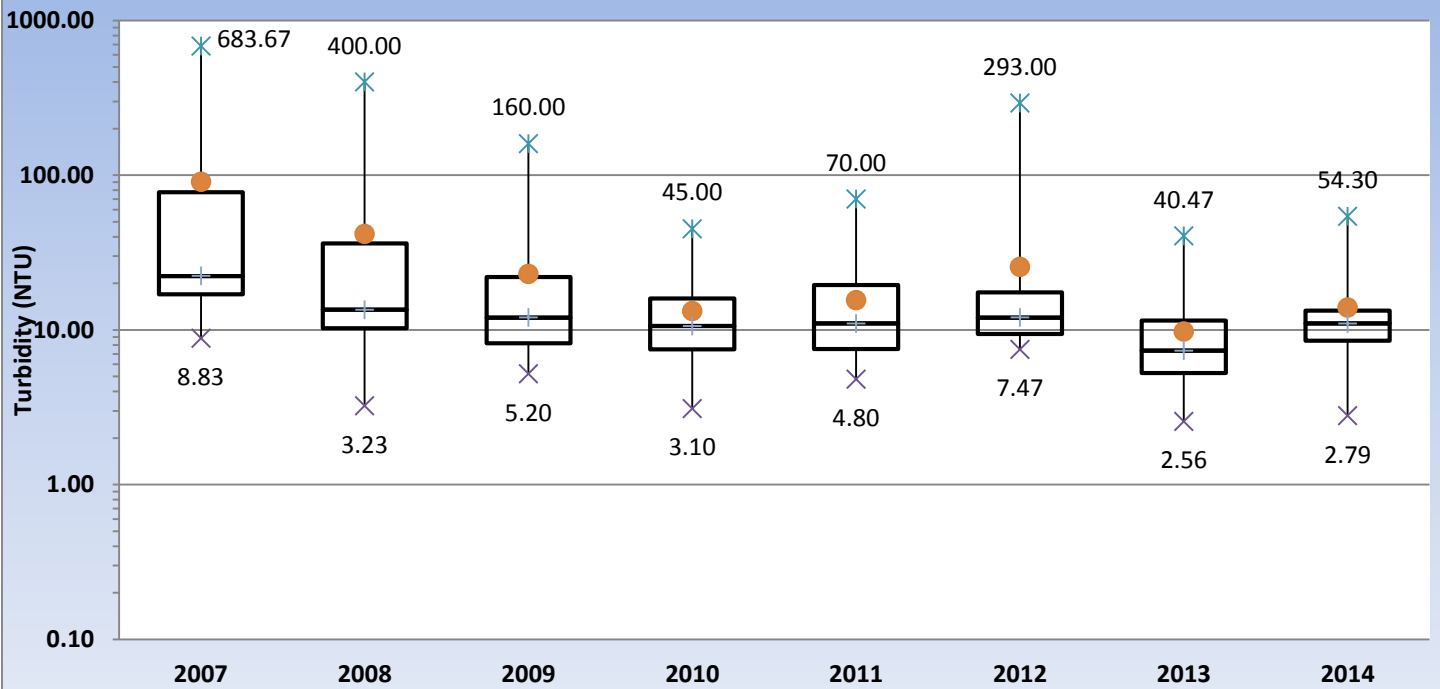
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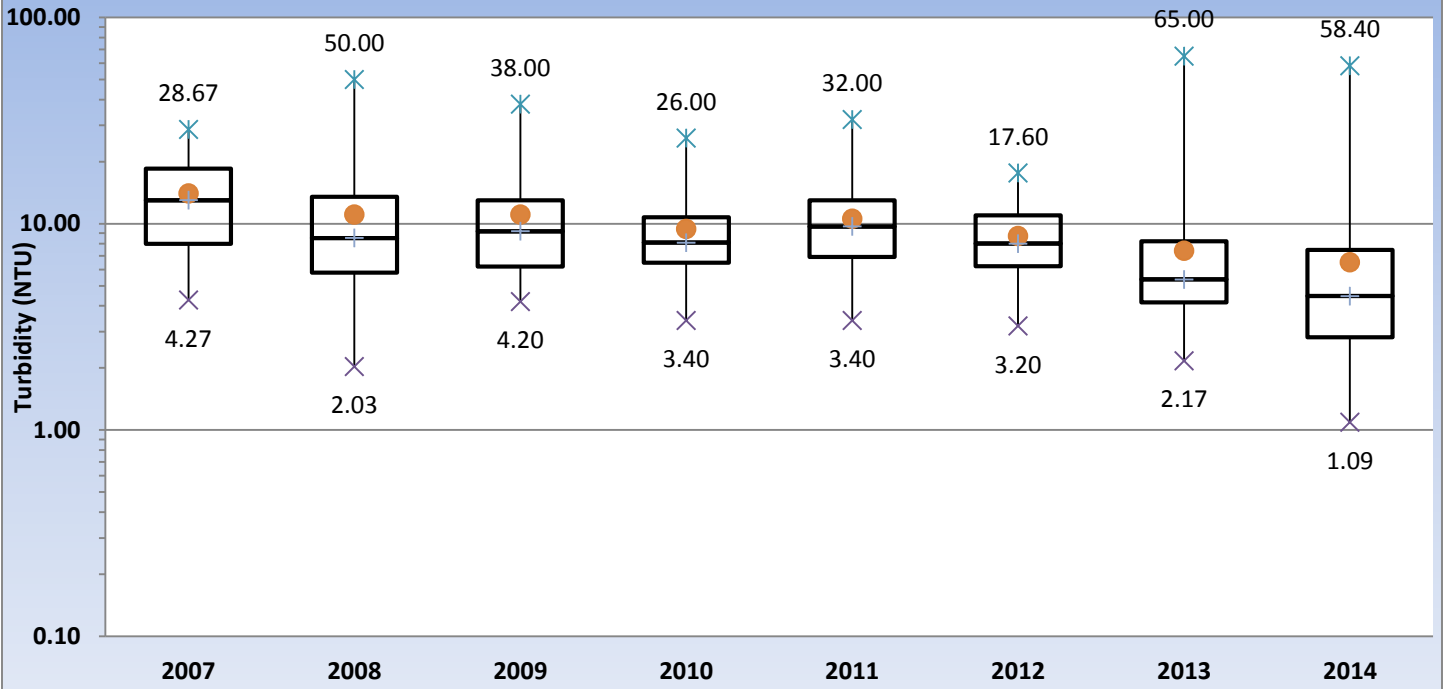
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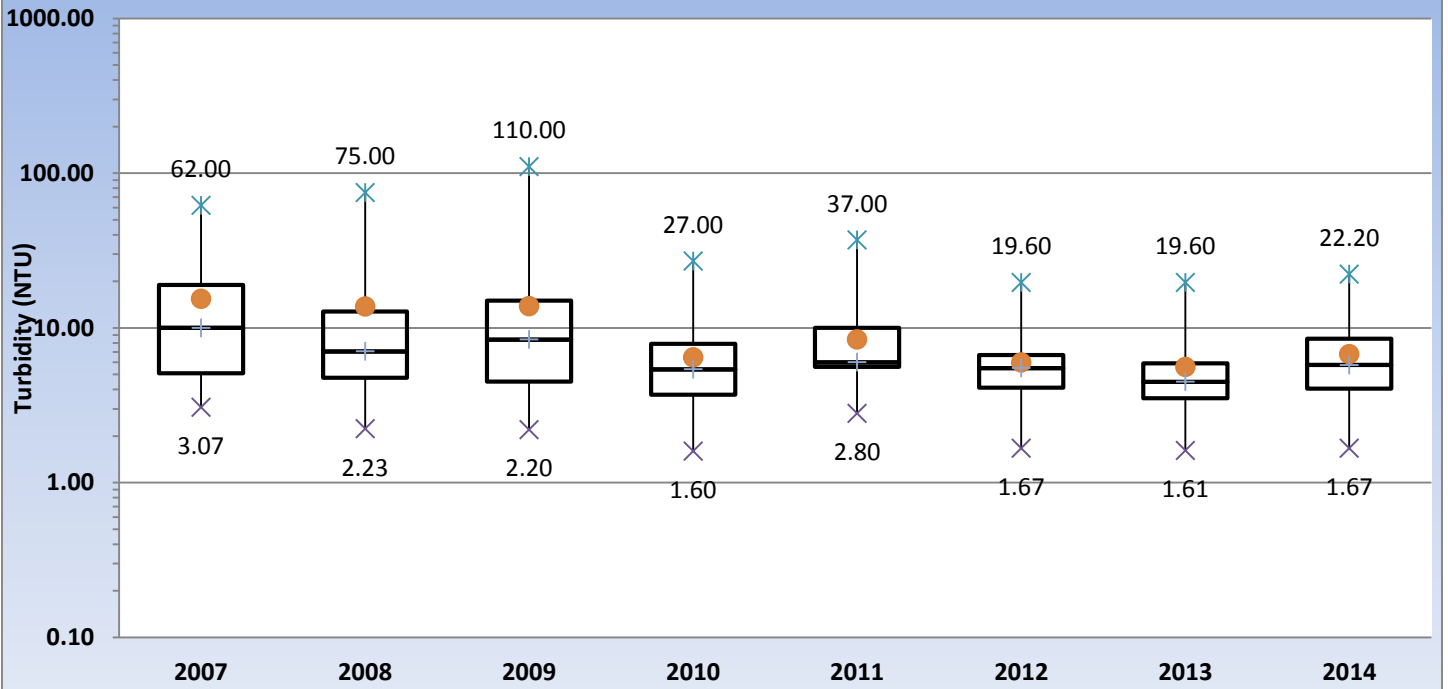
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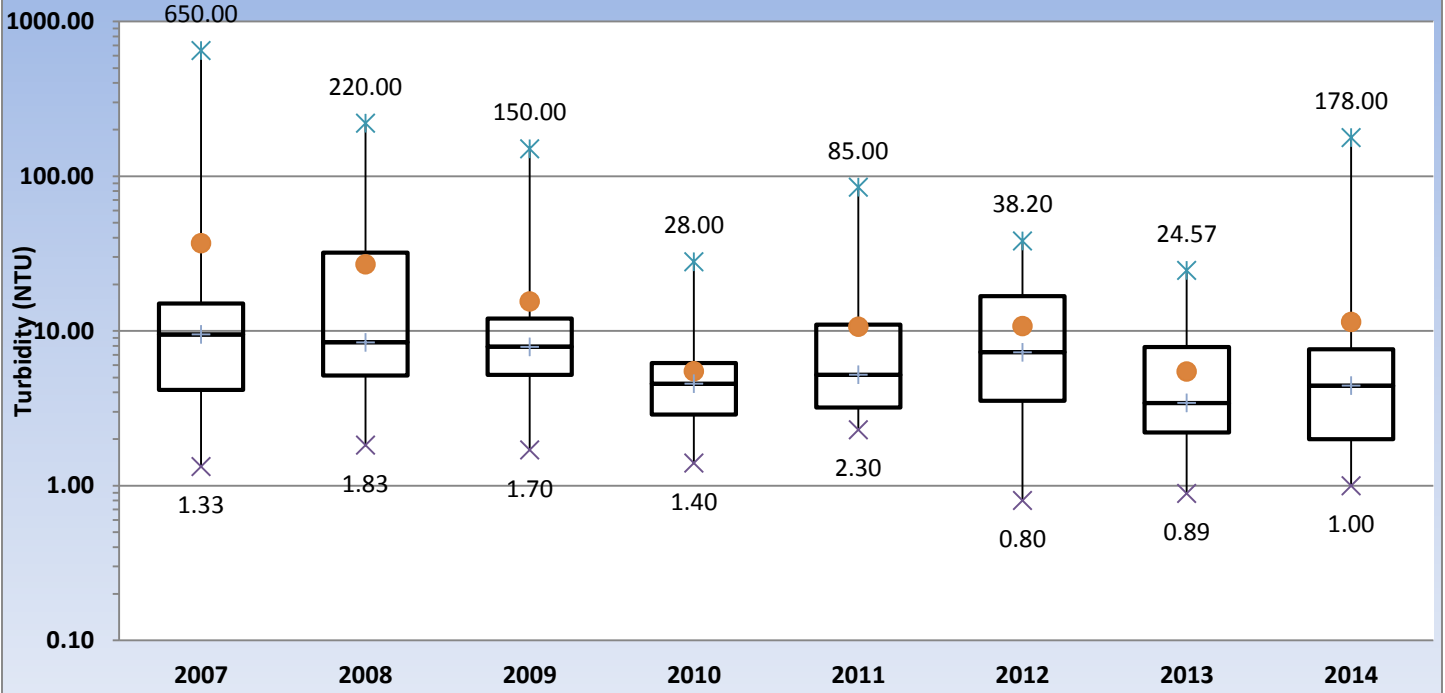
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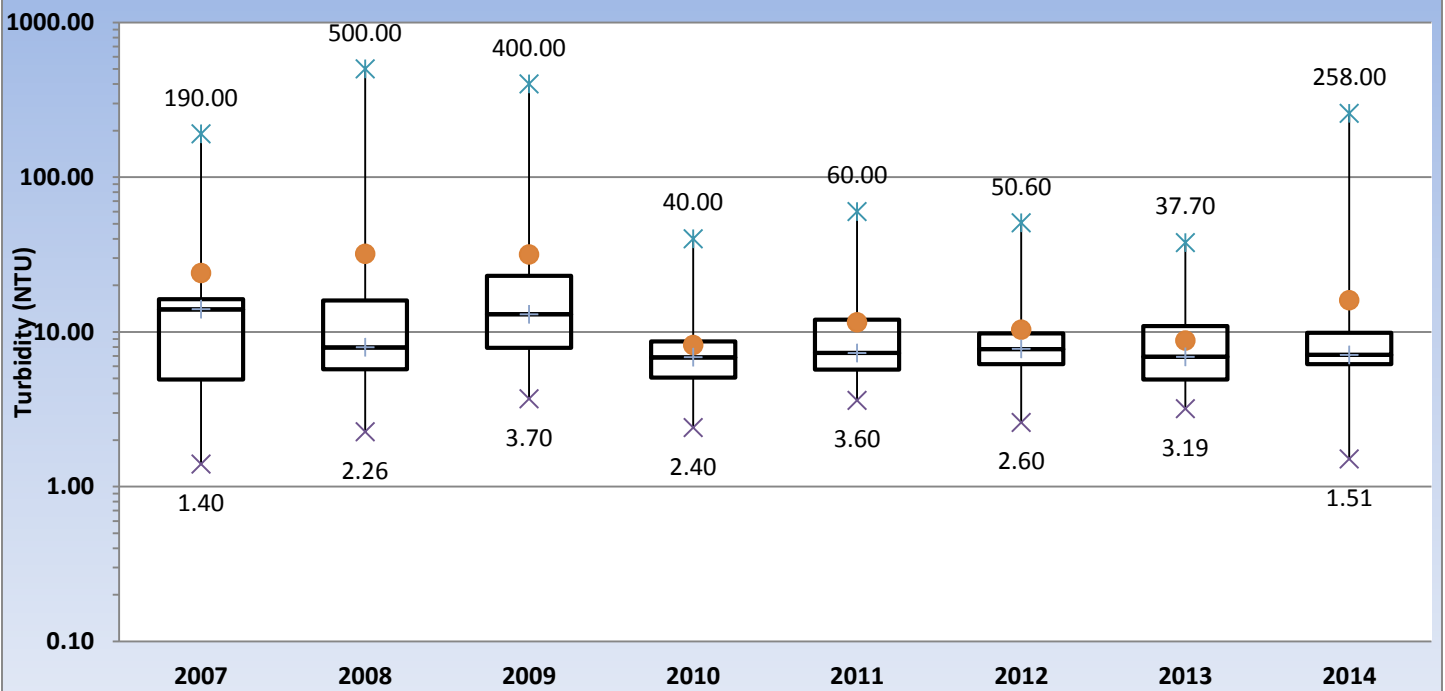
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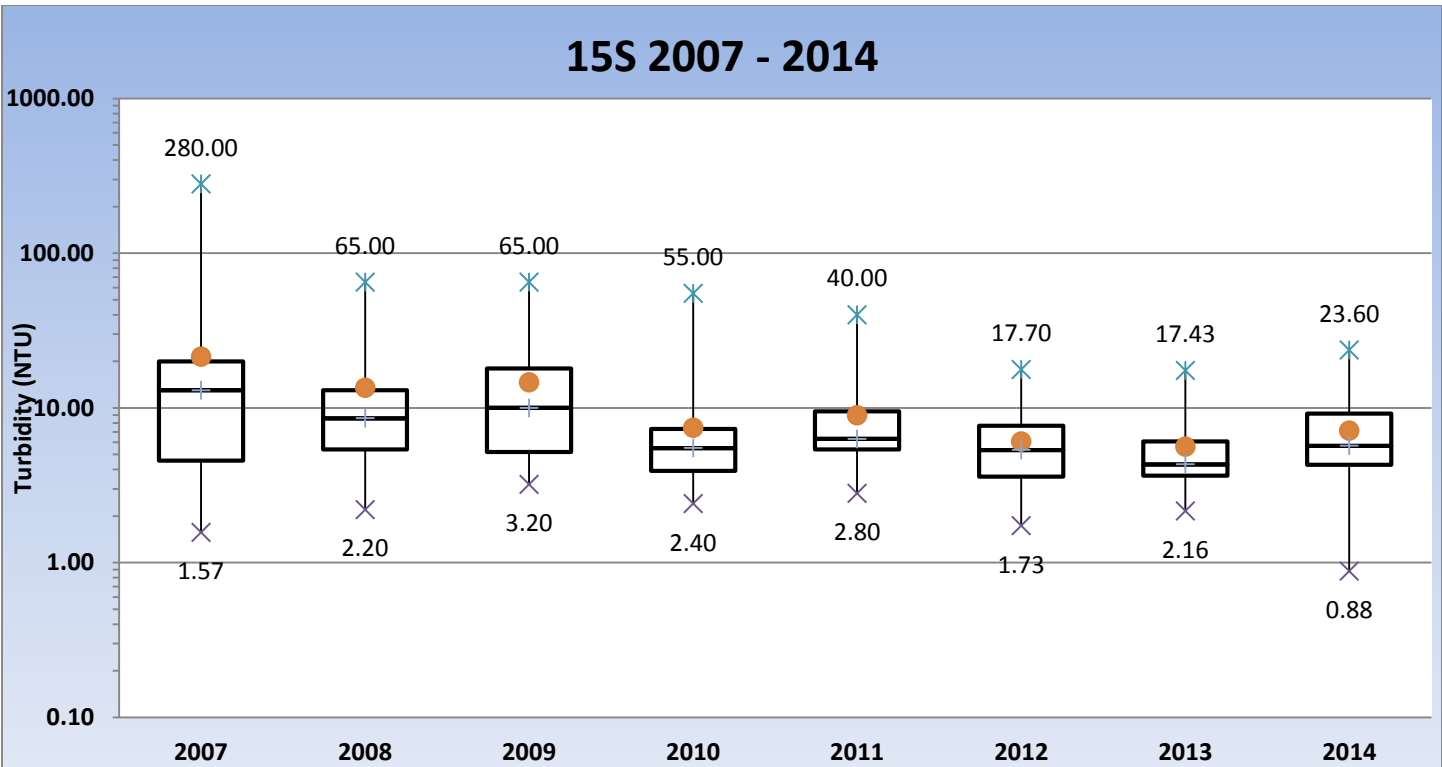
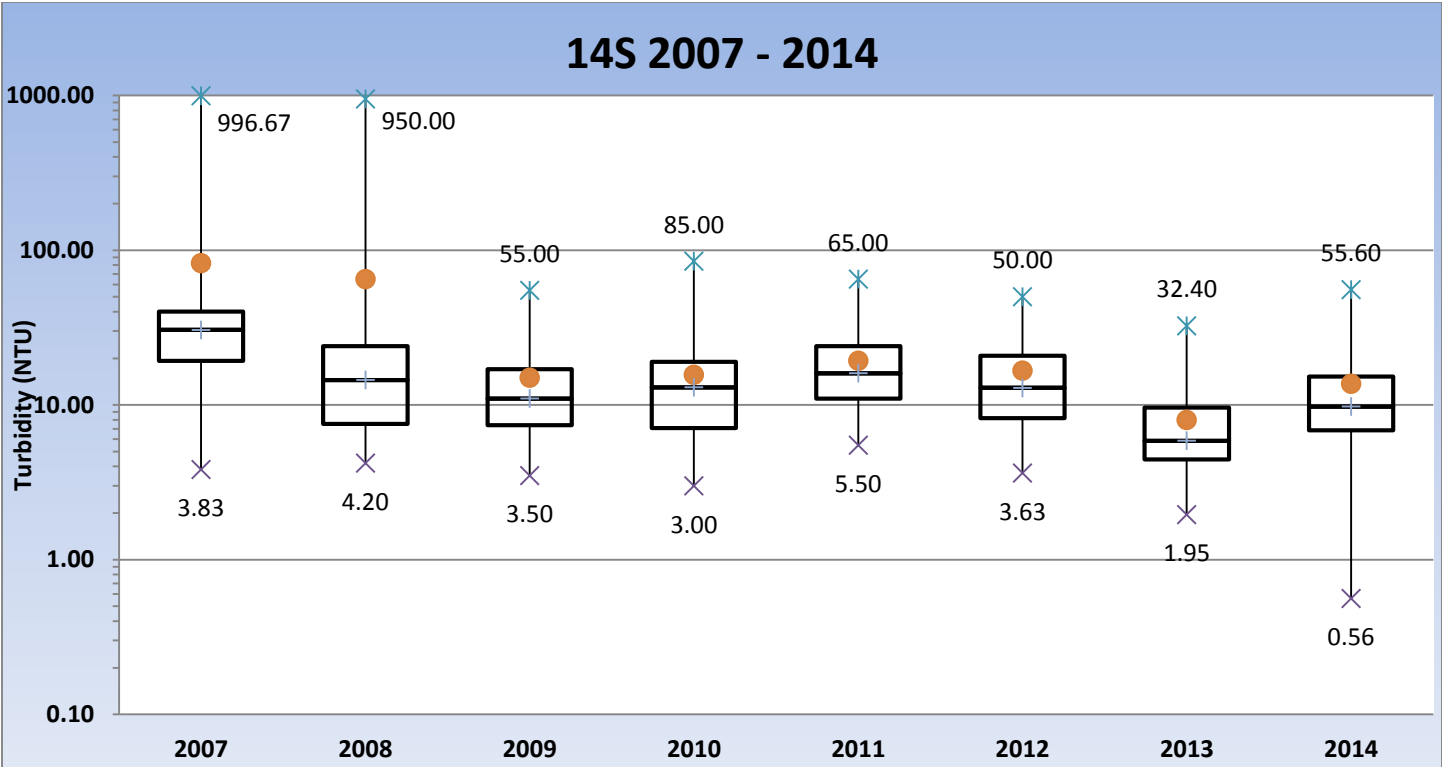


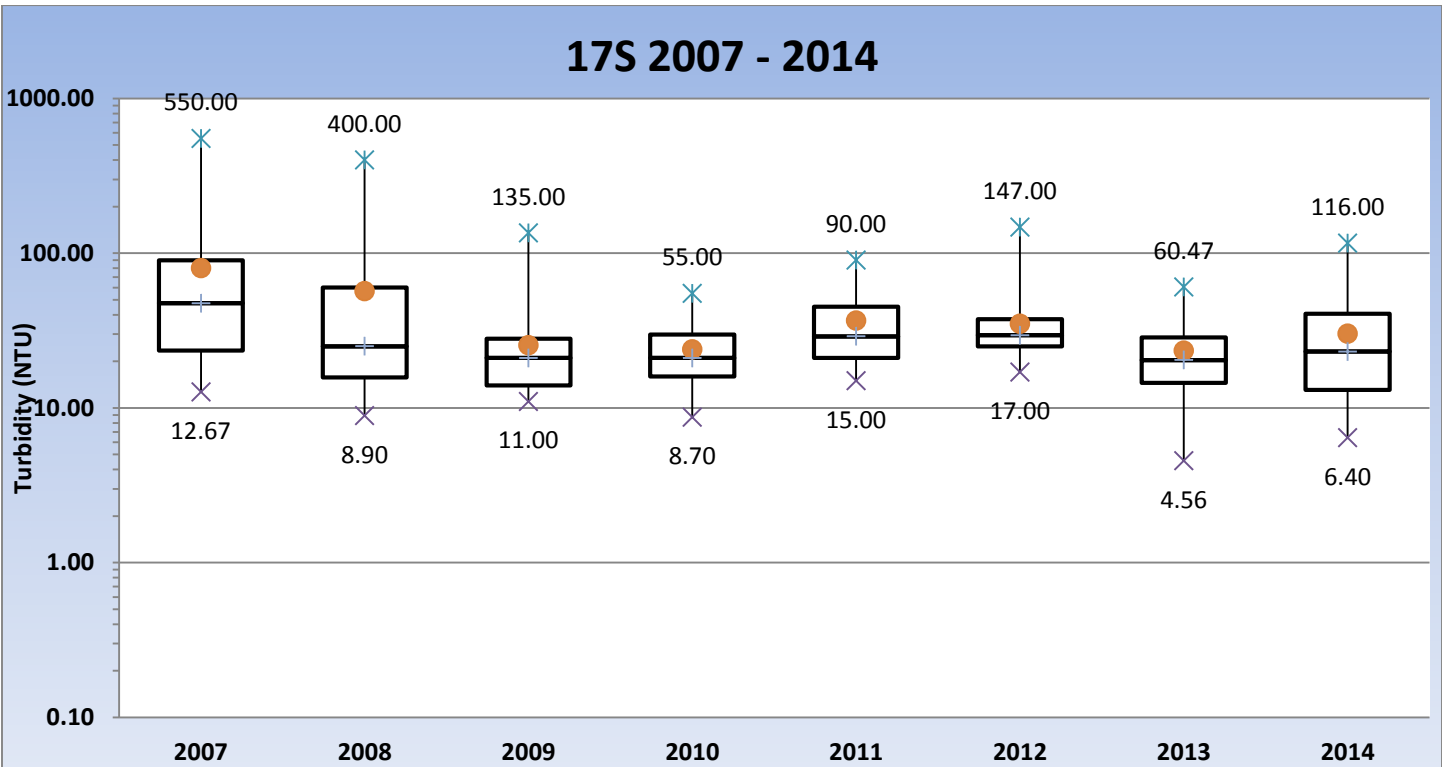
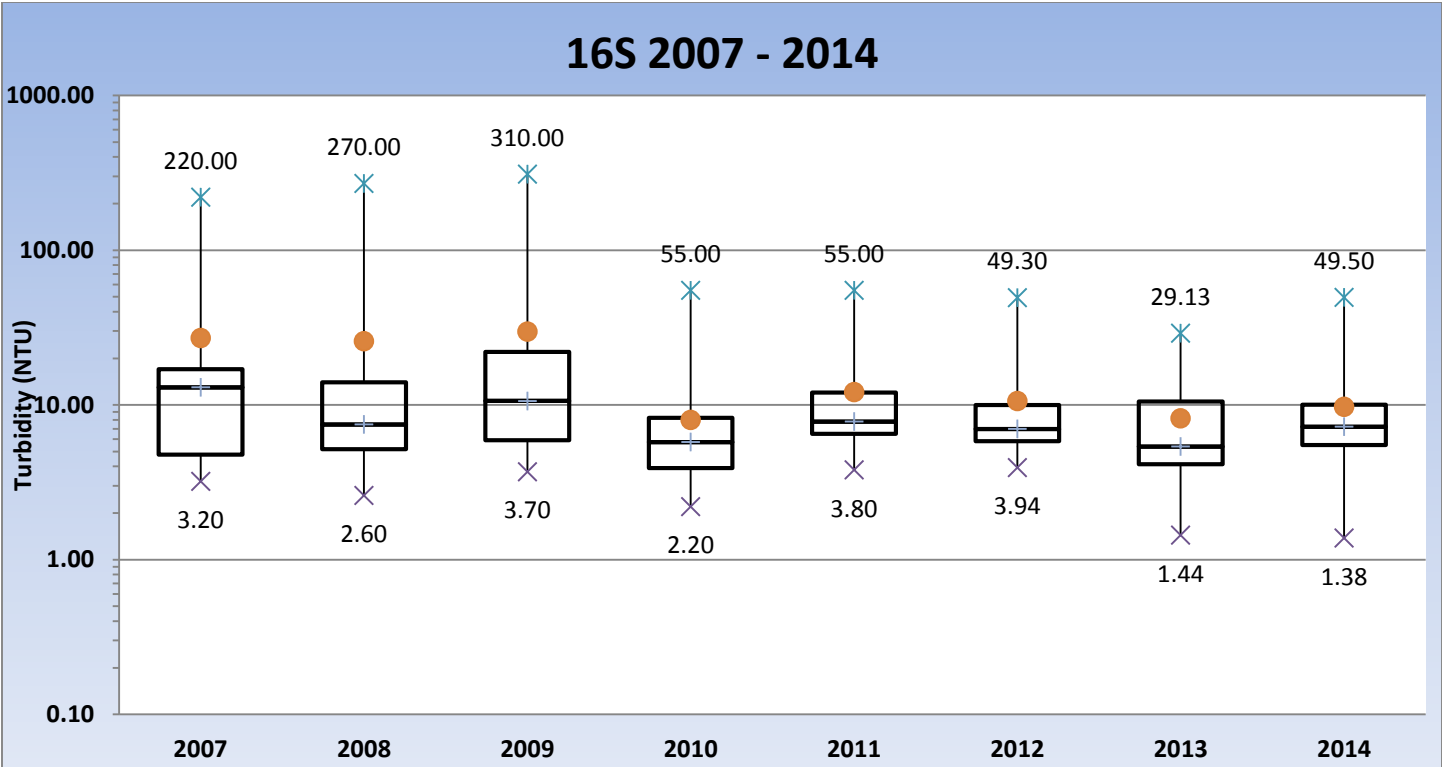
### 8S 2007 - 2014



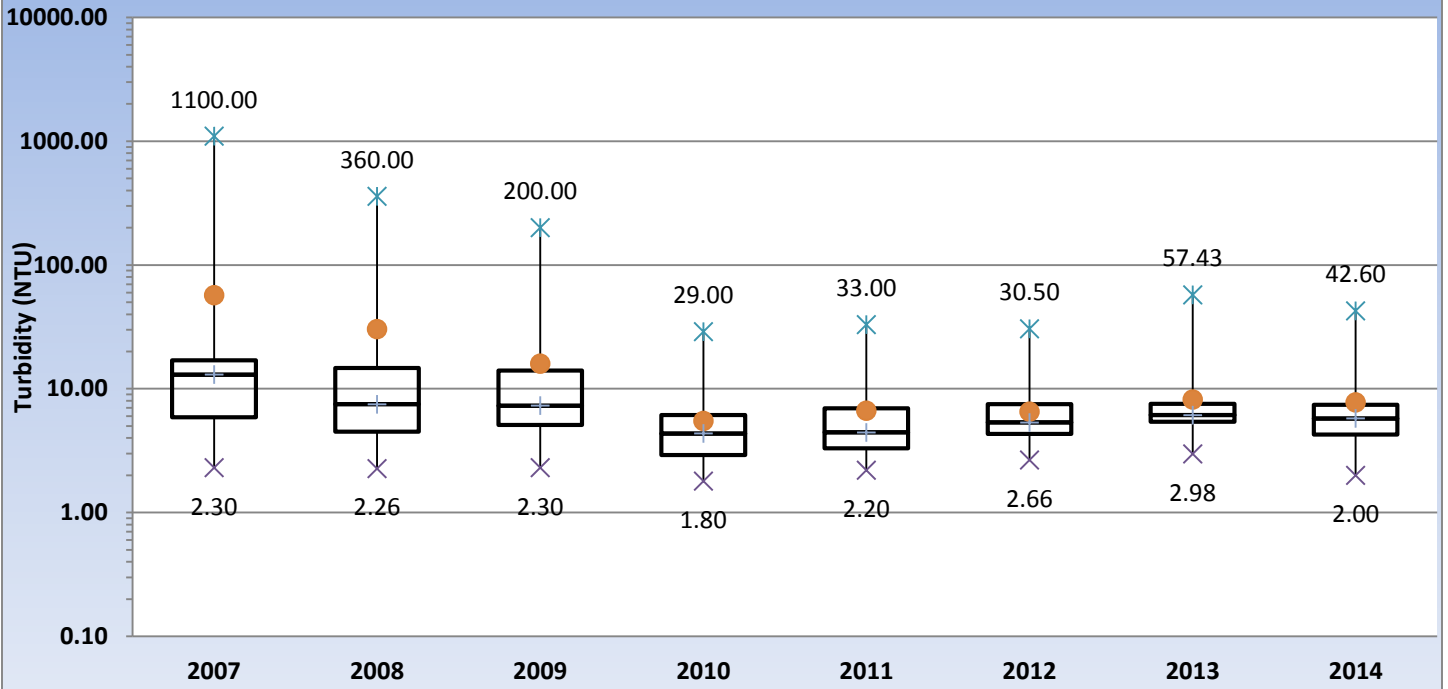
### 12S 2007 - 2014



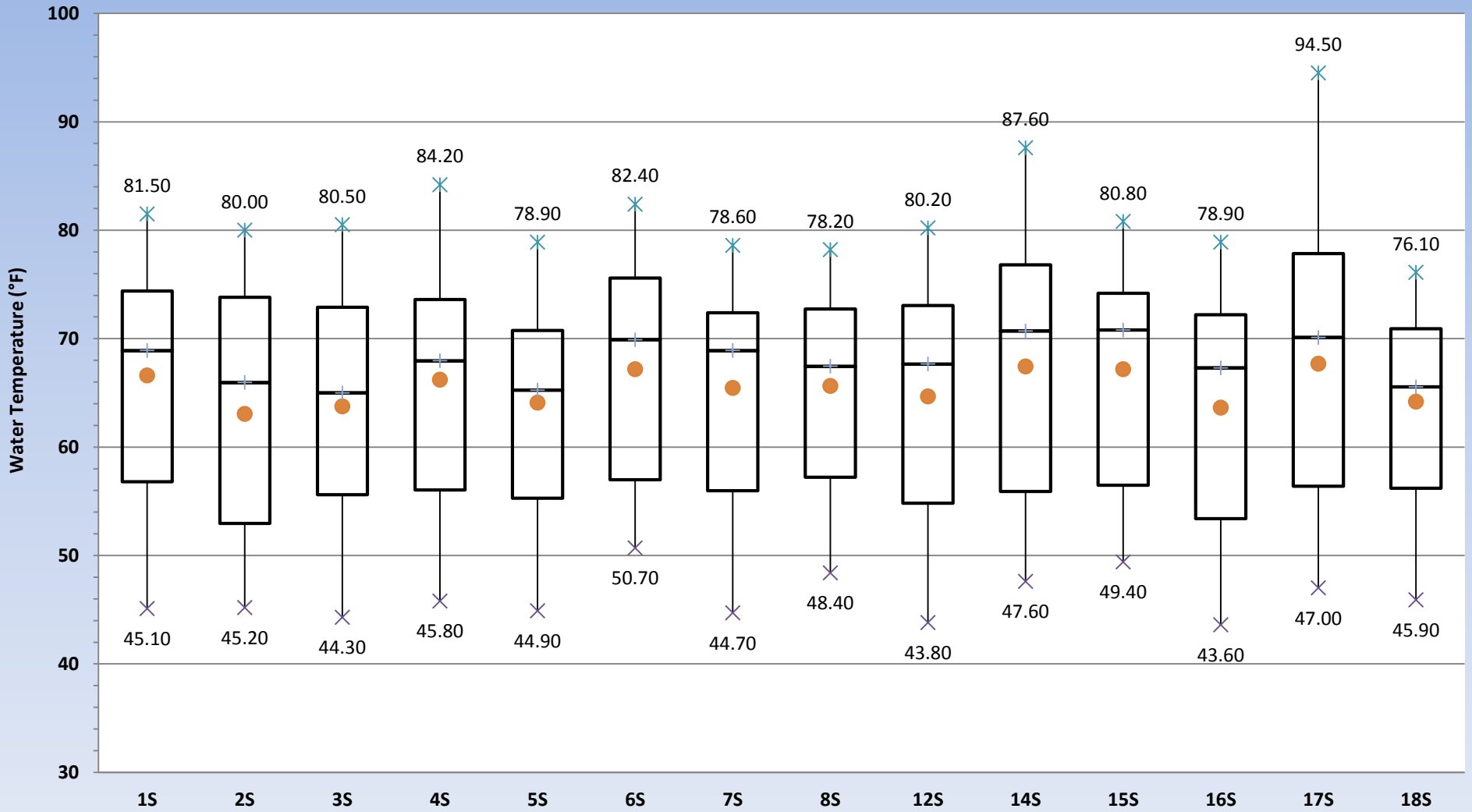




# 18S 2007 - 2014

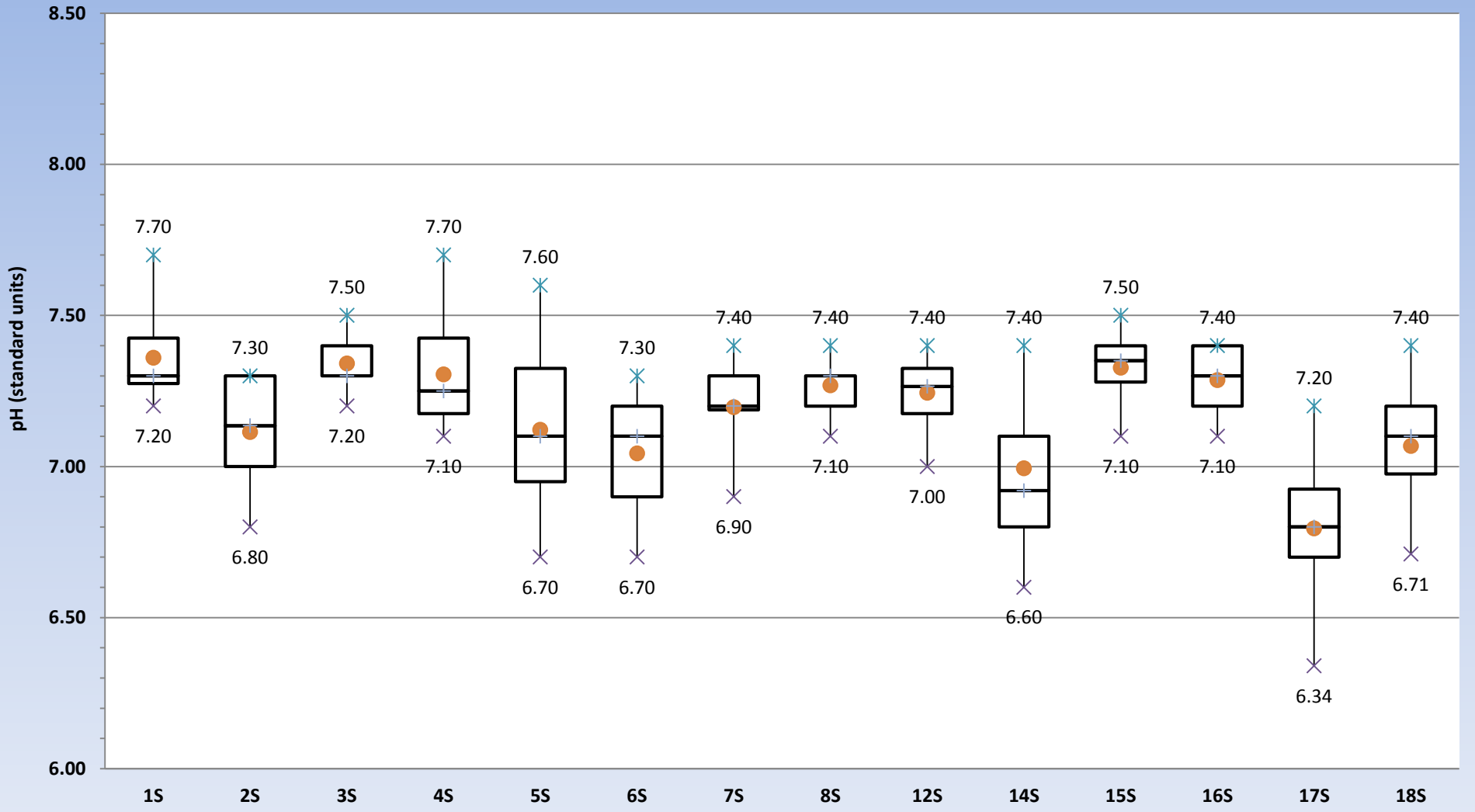


## Saugahatchee Creek Sites 2014 Water Temperature

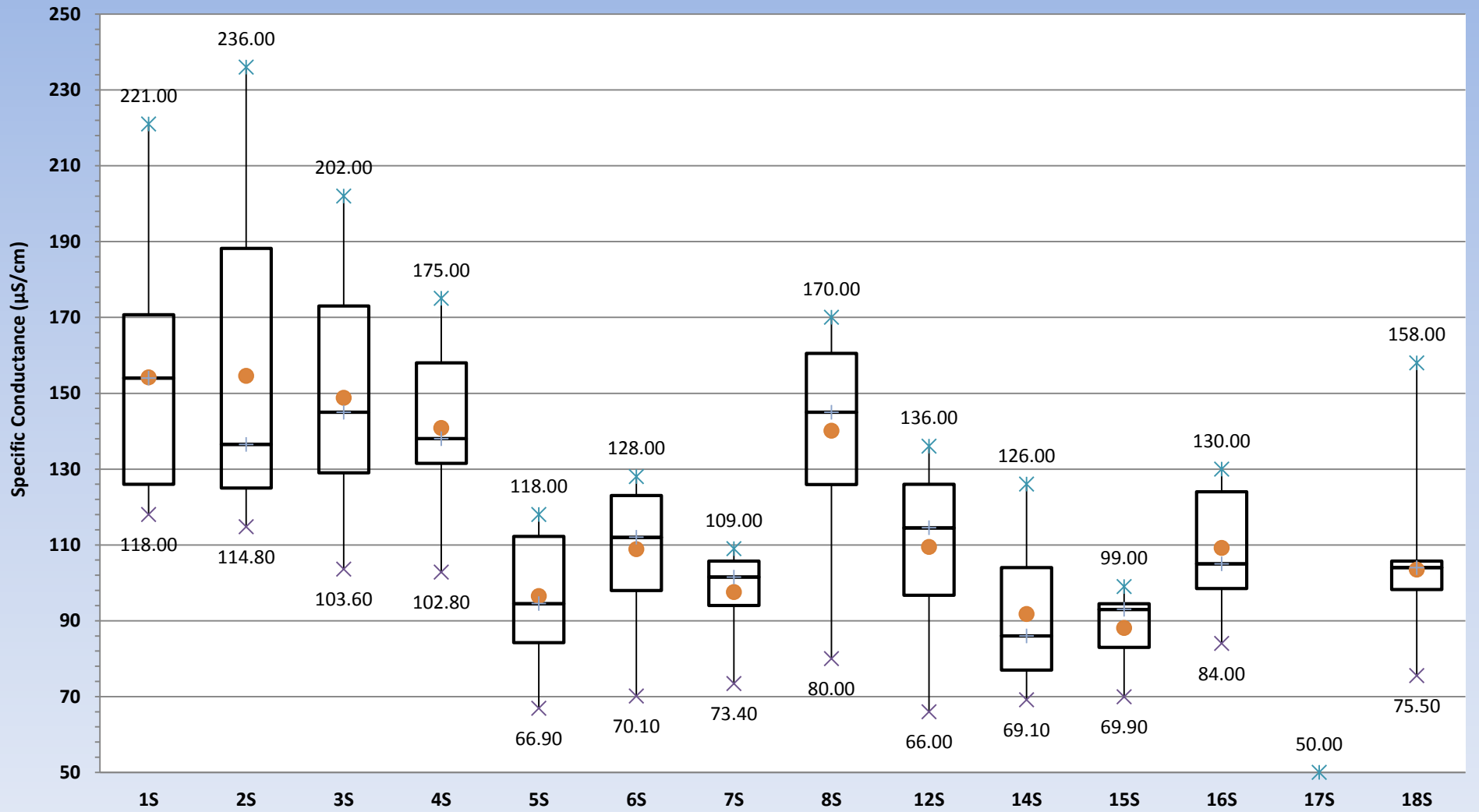




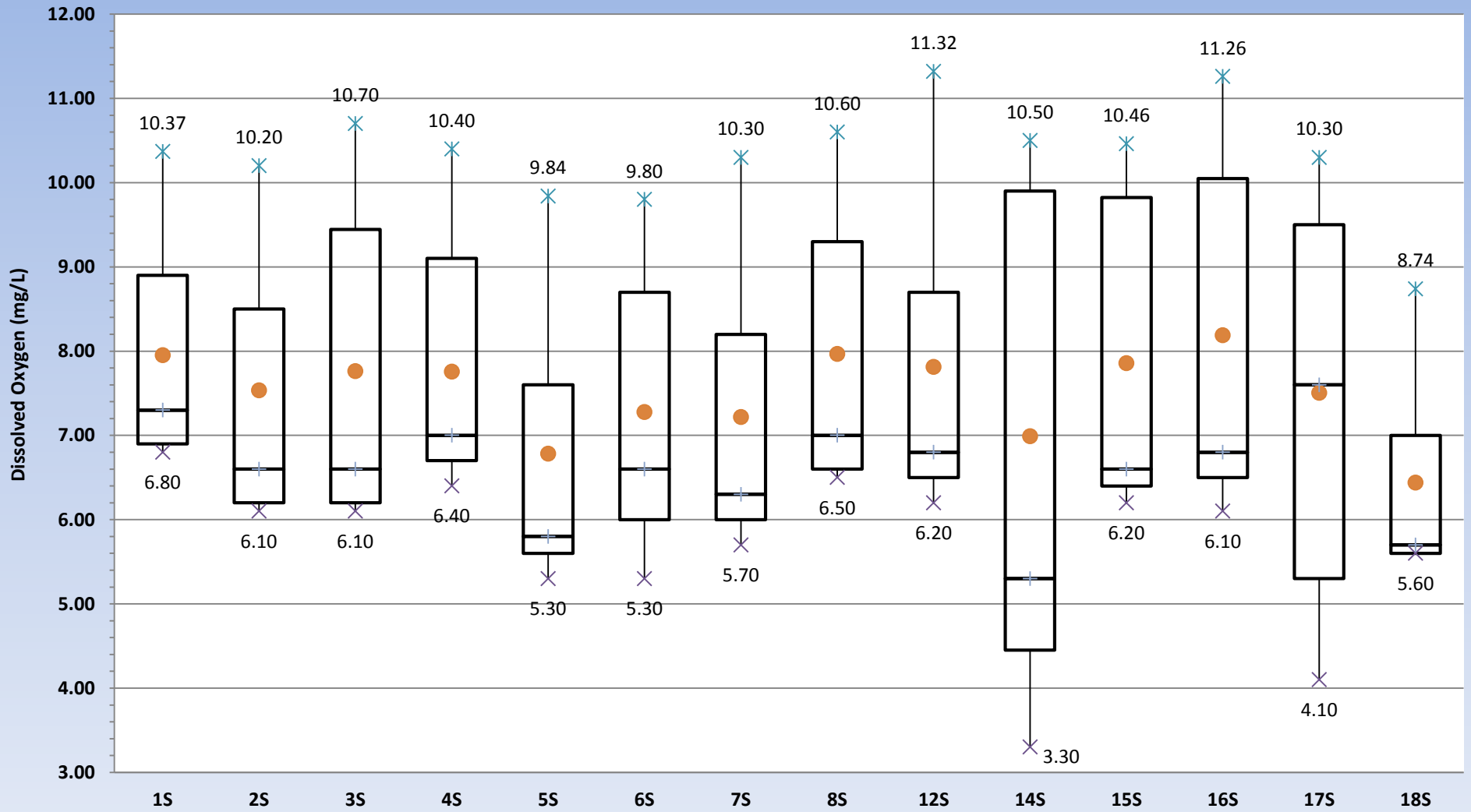
# Saugahatchee Creek Sites 2014 pH



## Saugahatchee Creek Sites 2014 Specific Conductance



## Saugahatchee Creek Sites 2014 Dissolved Oxygen



## Town Creek Watershed

A total of 350 independent water quality measurements were collected in the Moore's Mill Creek watershed in 2014. Weekly sampling of turbidity (175 samples) began in January and continued throughout the calendar year. Weekly sampling of water temperature (46 samples), pH (46 samples), specific conductance (45 samples), and dissolved oxygen (38 samples) began in September 2014.

### Monitoring Station Locations and Notes:

**1T** – Latitude 32, 35, 55.414 N; Longitude 85, 28, 18.325 W. Station 1T is located on Town Creek just upstream of the Samford Avenue crossing.

**2T** – Latitude 32, 35, 3.724 N; Longitude 85, 28, 27.539 W. Station 2T is located on Town Creek at the crossing of Gay Street.

**3T** – Latitude 32, 34, 46.858 N; Longitude 85, 28, 42.094 W. Station 3T is located on Town Creek at the crossing of East University Drive.

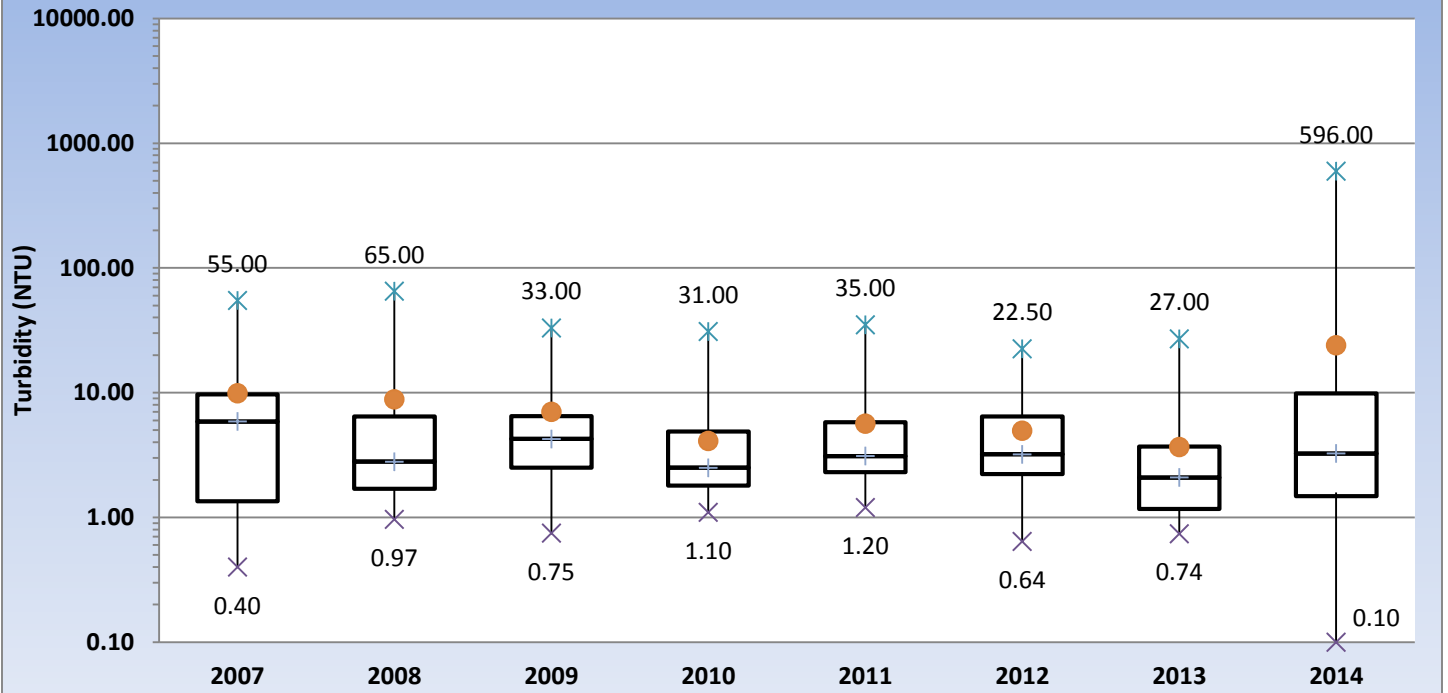
**4T** - Latitude 32, 39, 53.844 N; Longitude 85, 28, 51.164 W. Station 4T is located on Town Creek at the crossing of Shell-Toomer Parkway.

*\*See Insert for Maps of All Water Quality Monitoring Locations*

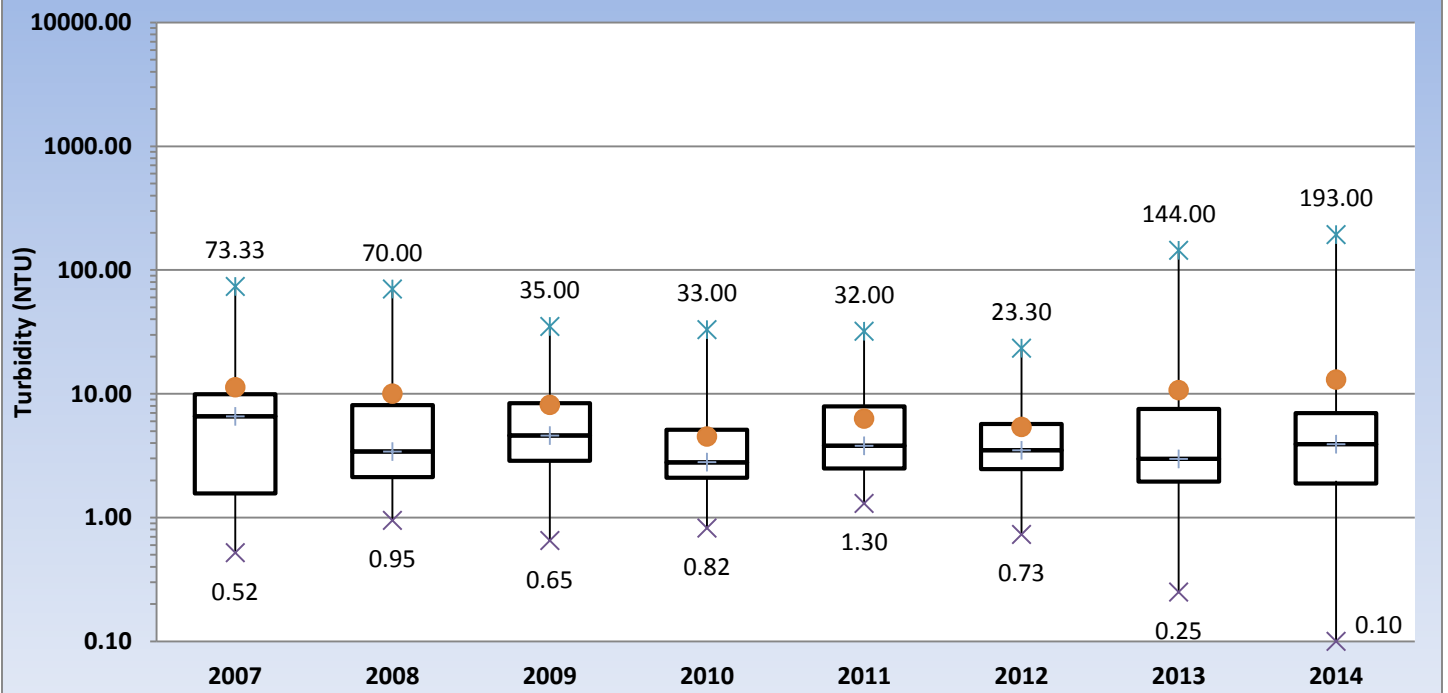
### Eight Year Statistical Analysis of Turbidity Data for Town Creek Watershed

	1T							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.40	0.97	0.75	1.10	1.20	0.64	0.74	0.10
<b>MAX</b>	55.00	65.00	33.00	31.00	35.00	22.50	27.00	596.00
<b>AVG</b>	9.89	8.83	7.04	4.10	5.66	4.94	3.66	23.94
<b>MEDIAN</b>	5.87	2.80	4.25	2.50	3.10	3.21	2.09	3.25
	2T							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.52	0.95	0.65	0.82	1.30	0.73	0.25	0.10
<b>MAX</b>	73.33	70.00	35.00	33.00	32.00	23.30	144.00	193.00
<b>AVG</b>	11.27	10.00	8.13	4.52	6.30	5.41	10.68	13.05
<b>MEDIAN</b>	6.57	3.42	4.60	2.80	3.80	3.50	2.98	3.92
	3T							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.48	0.88	1.00	0.93	1.30	1.21	0.75	1.65
<b>MAX</b>	66.67	65.00	58.00	48.00	41.00	21.90	18.60	153.00
<b>AVG</b>	11.70	10.48	10.38	5.51	8.36	5.29	5.59	10.41
<b>MEDIAN</b>	7.15	4.02	5.80	3.00	5.10	3.95	4.02	4.65
	4T							
	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>MIN</b>	0.15	0.72	2.00	0.75	1.30	0.57	0.92	0.10
<b>MAX</b>	70.00	80.00	55.00	45.00	39.00	32.30	27.20	77.30
<b>AVG</b>	11.91	11.72	10.46	5.10	7.92	6.21	5.38	7.56
<b>MEDIAN</b>	6.69	4.27	6.05	2.60	4.80	4.45	3.25	2.68

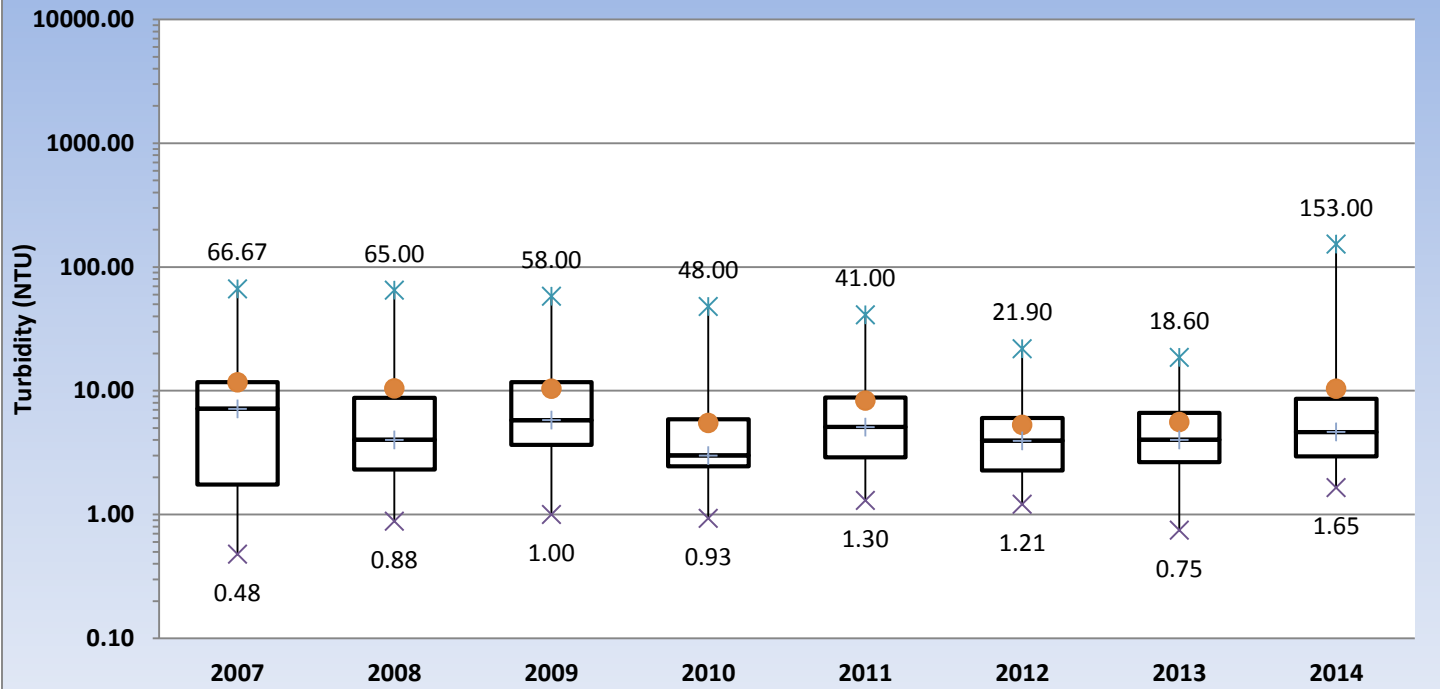
### 1T 2007 - 2014



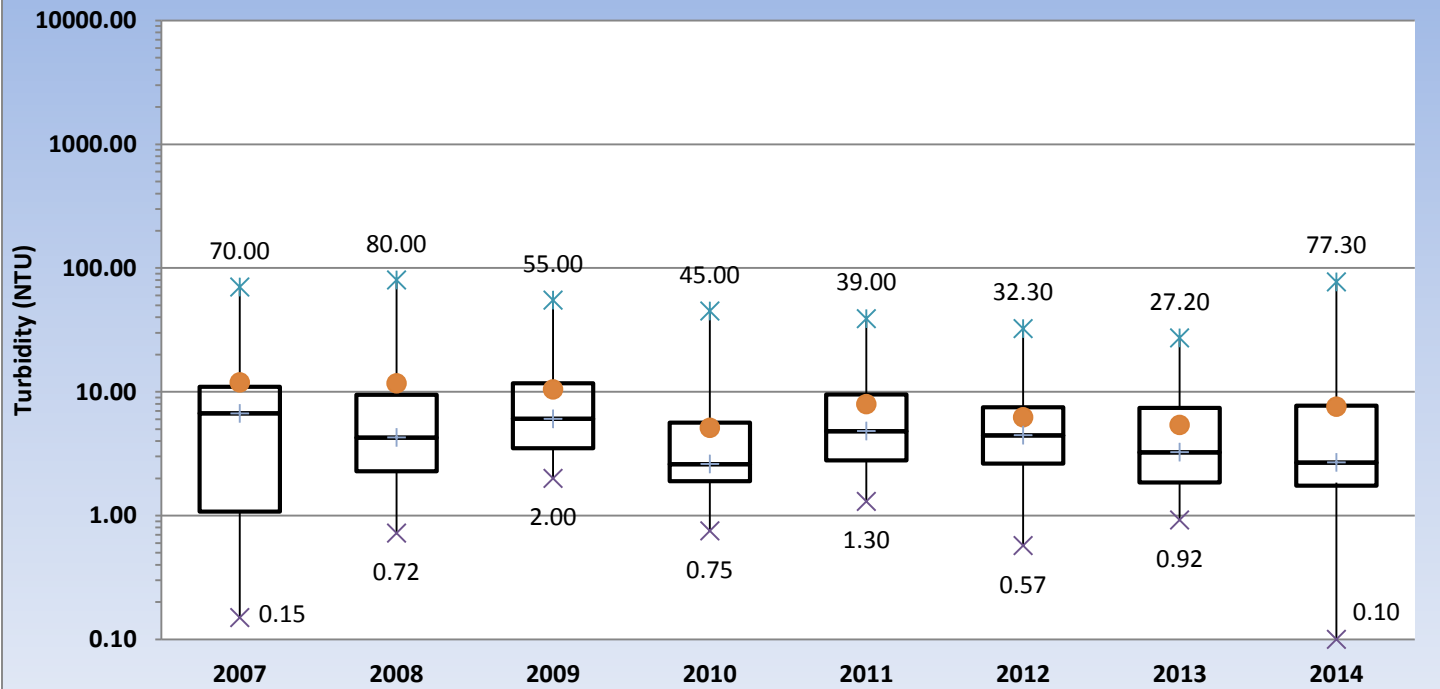
### 2T 2007 - 2014



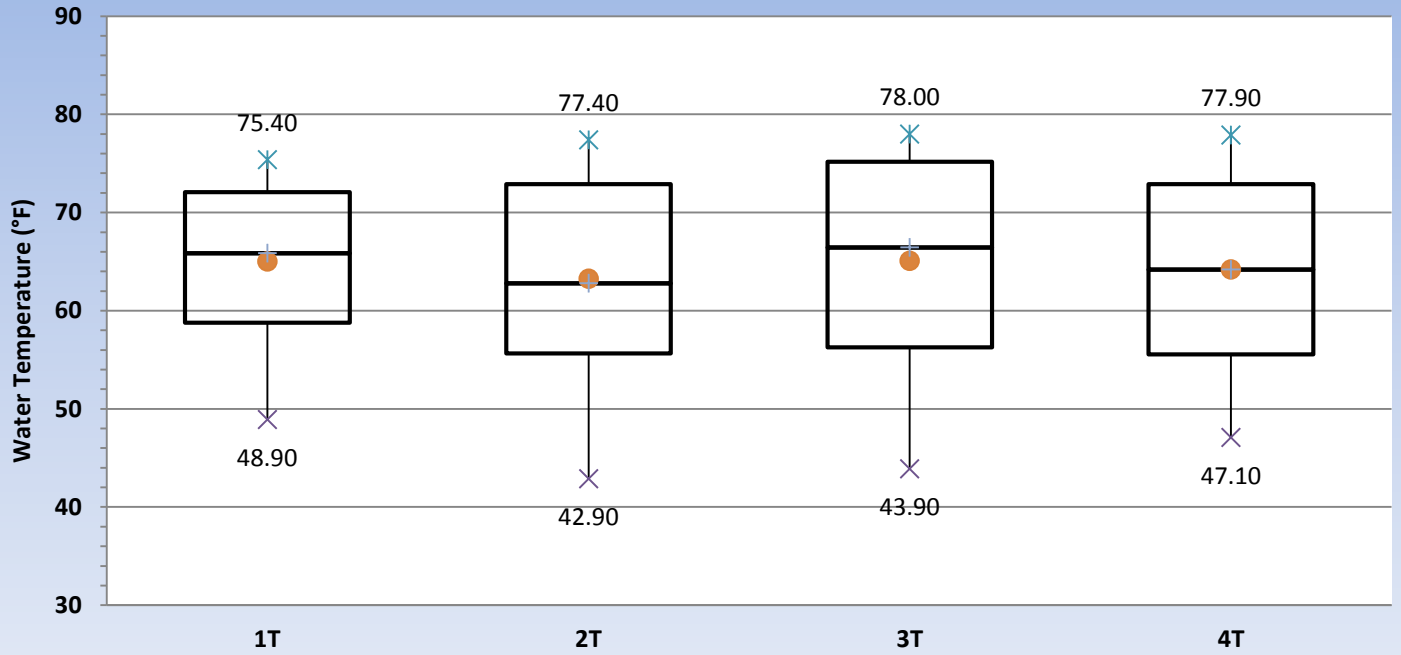
### 3T 2007 - 2014



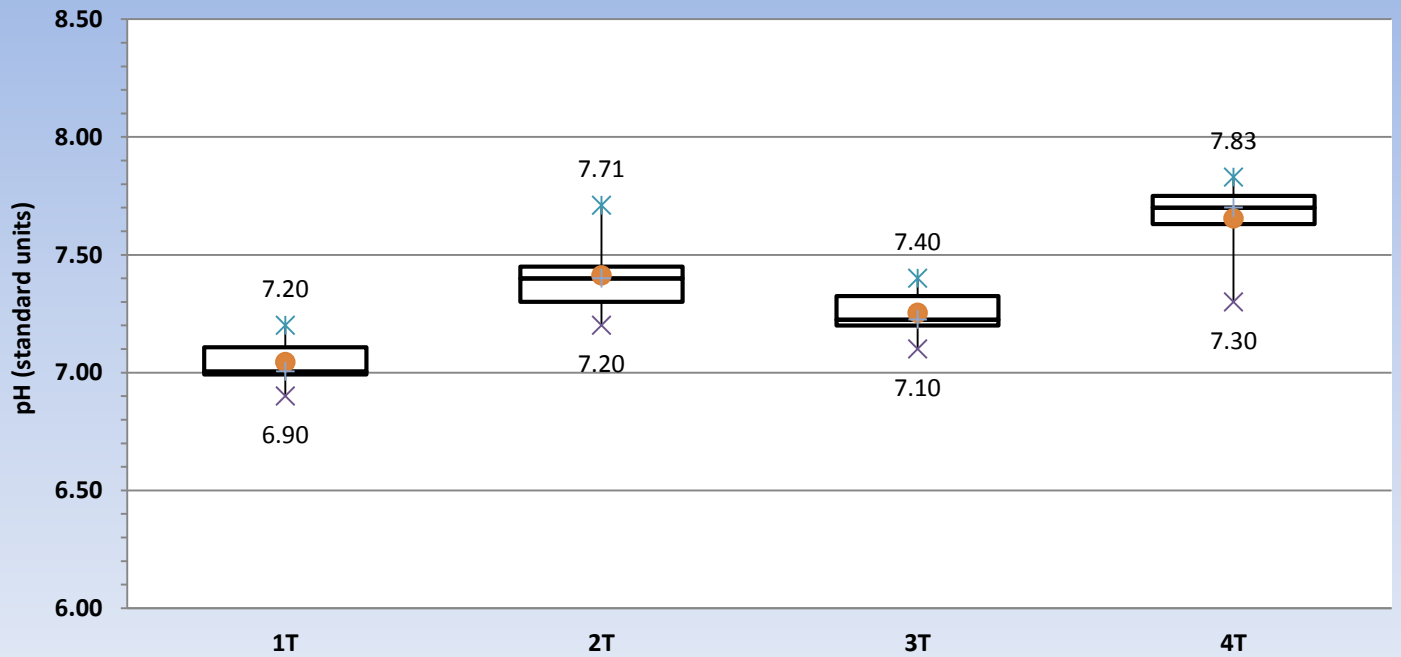
### 4T 2007 - 2014



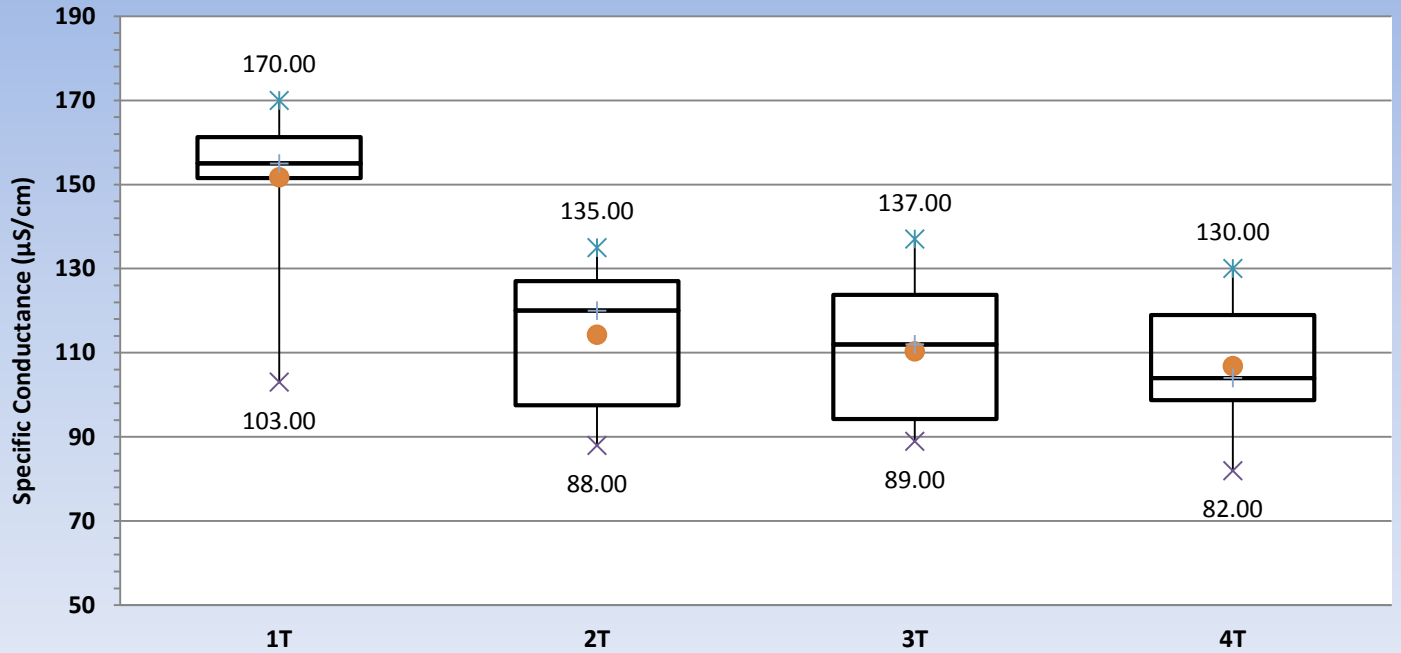
## Town Creek Sites 2014 Water Temperature



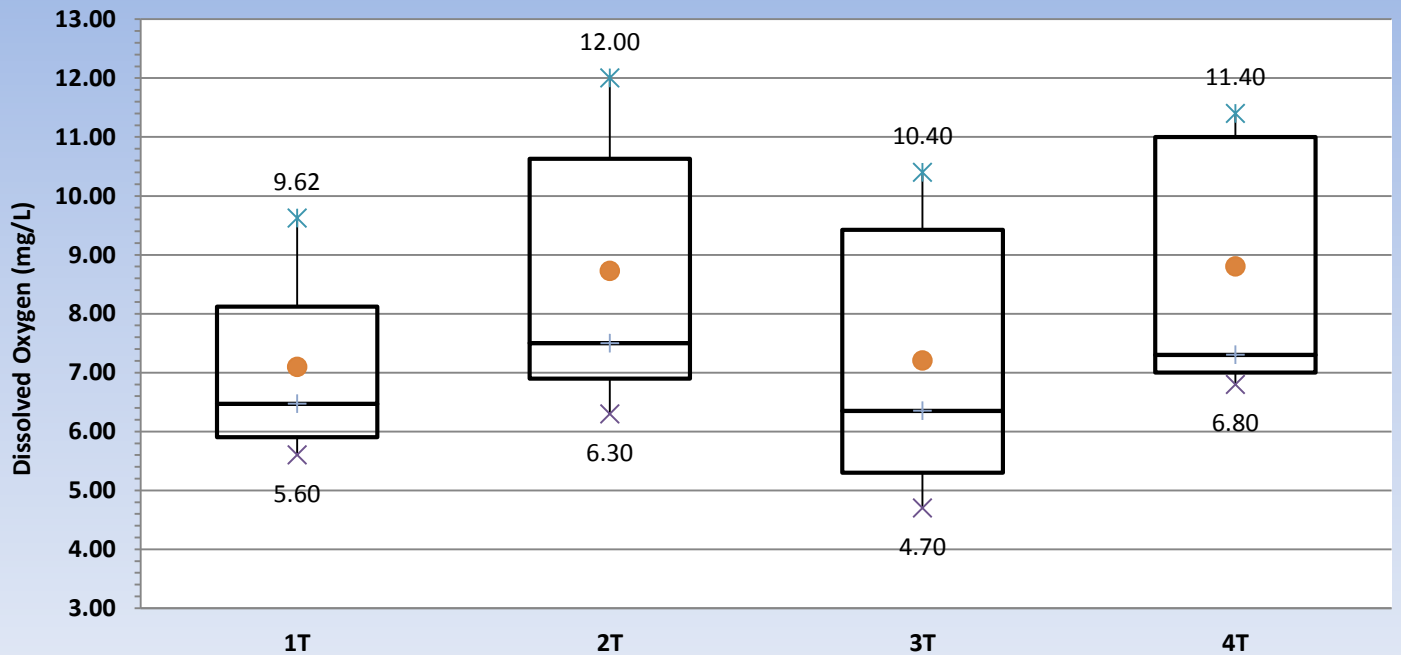
## Town Creek Sites 2014 pH



## Town Creek Sites 2014 Specific Conductance



## Town Creek Sites 2014 Dissolved Oxygen





## 3.0 Multi-parameter Monitoring

### 3.1 Purpose

There is no single water quality parameter available to determine the health of a waterbody. Rather, the overall health of aquatic ecosystems is determined by a wide range of biological, chemical, physiochemical, and physical characteristics. Furthermore, these characteristics often vary from region-to-region, stream-to-stream, season-to-season, and day-to-day (diurnal patterns). Therefore, the City has committed itself to trying to better understand each of its major receiving waters by monitoring year-round. Monitoring throughout the year is performed to determine if the various waterbodies are attaining State Water Quality across multiple parameters and to determine if, when, and where causes for concern may exist. The water quality sondes utilized in this multiparameter monitoring may also be operated as secondary devices for detection and tracing of illicit discharges.

### 3.2 Definition and Methods

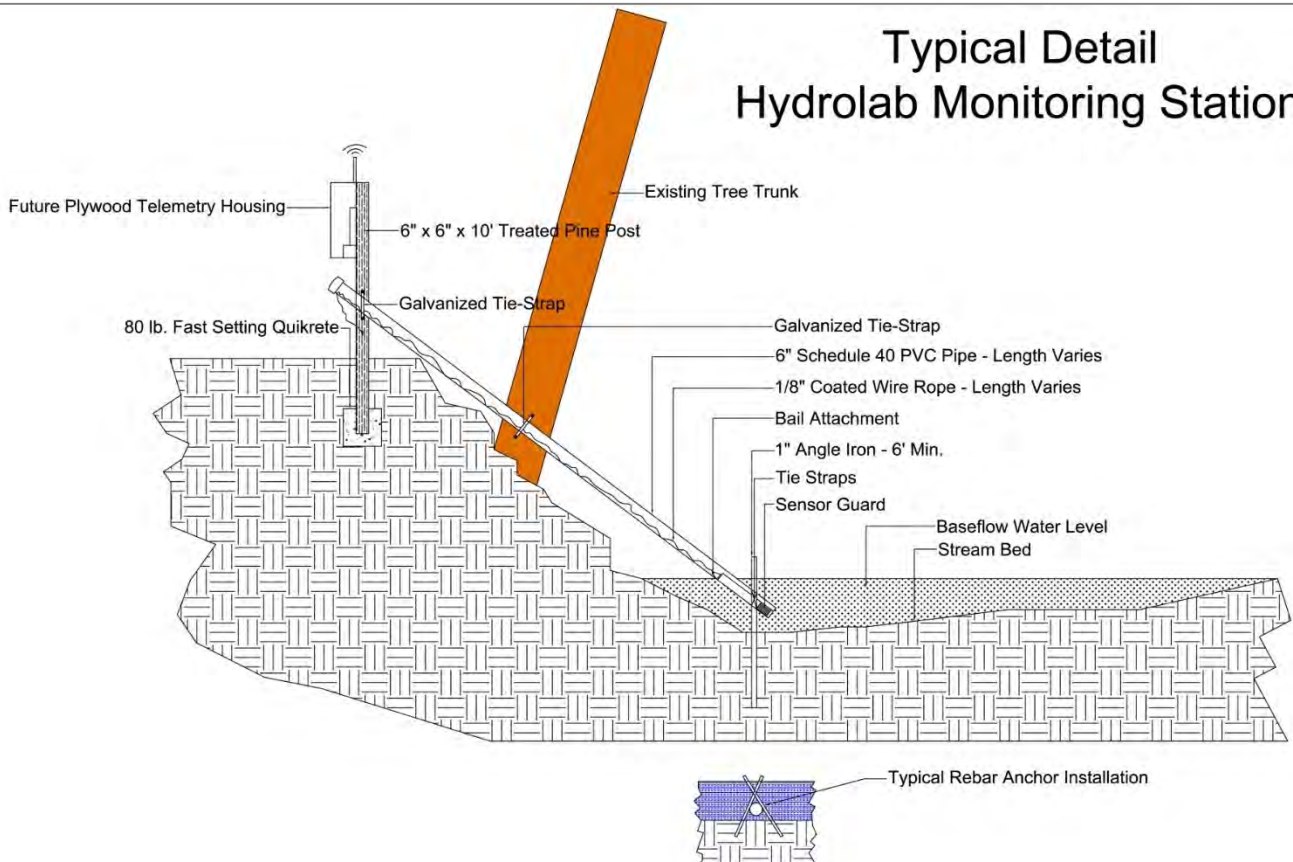
The Water Resource Management Department is equipped with two Hach Hydrolab DS5 Multiparameter Water Quality Sondes (Hydrolab). These Hydrolab units allow for the monitoring of multiple water quality parameters and are capable of being launched unattended for extended periods of time to conduct linear, in-situ sampling. In years past, both sondes were launched simultaneously at an upstream and downstream location within the City's Phase II jurisdictional territory for a period of 72 hours and with a logging interval of one reading per 20 minutes (equal to 72 readings per 24 hours). However, in 2012 the Water Resource Management Department constructed 10 permanent stations for which to perform long-term deployment of the hydrolabs, starting with Parkerson's Mill Creek. Each deployment will last one calendar year, for which the monitoring of Parkerson's Mill was performed between July 27, 2012 and July 18, 2012 and the monitoring of Saugahatchee Creek began on August 1, 2013. The Hydrolabs were moved to Moore's Mill Creek beginning August 13, 2014. Each sonde is cleaned and data downloaded once per week and is shipped to the manufacturer once per quarter for performance testing, evaluation, and calibration. Parameters that the Hydrolab measures and records are temperature, pH, turbidity, dissolved oxygen, conductivity, salinity, oxidation-reduction potential, total dissolved solids, and resistance. The sondes will analyze these water quality parameters at an interval of 20 minutes/logging for one full year (interval of 15 minutes if USGS Flow Gage data available). Each individual probe uses EPA approved methods for analysis of each parameter. Analyzing each parameter individually and collectively over extended periods of time allows for a holistic analysis of water quality. These parameters are defined as:

- Temperature – A measure of how hot or cool a substance is. For most designated uses, State Water Quality Criteria requires that temperature not exceed 90° Fahrenheit.
- pH – A measure of how basic or how acidic a substance is. For most designated uses, State Water Quality Criteria requires pH to be between 6.0 and 8.5.
- Turbidity – A measure of the degree of transparency of a fluid as it affects the ability of light to pass through.
- Dissolved Oxygen – A measure of the concentration of oxygen in its dissolved form within a substance. For most designated uses, State Water Quality Criteria requires dissolved oxygen to be a minimum of 5 mg/L except under “extreme conditions”.
- Conductivity – A measure of a substance's ability to pass an electrical current. There are currently no State Water Quality Criteria for conductivity. Conductivity is directly correlated to the amount of dissolved ions within a substance and is a useful indicator of potential illicit discharges.
- Oxidation-Reduction Potential (ORP) – Represents the tendency of a substance to either gain or lose electrons. For example, a higher reduction potential expresses a tendency to gain electrons. As it is influenced by the amount of molecular oxygen, a low ORP value can indicate a high biological oxygen demand (BOD) and/or heterotrophic bacteria number. There are currently no State Water Quality Criteria for oxidation-reduction potential.

\*Information regarding individual sensor range, accuracy, and resolution and analytical method can be found at [http://www.hydrolab.com/web/ott\\_hach.nsf/id/pa\\_datasonde\\_5.html](http://www.hydrolab.com/web/ott_hach.nsf/id/pa_datasonde_5.html).



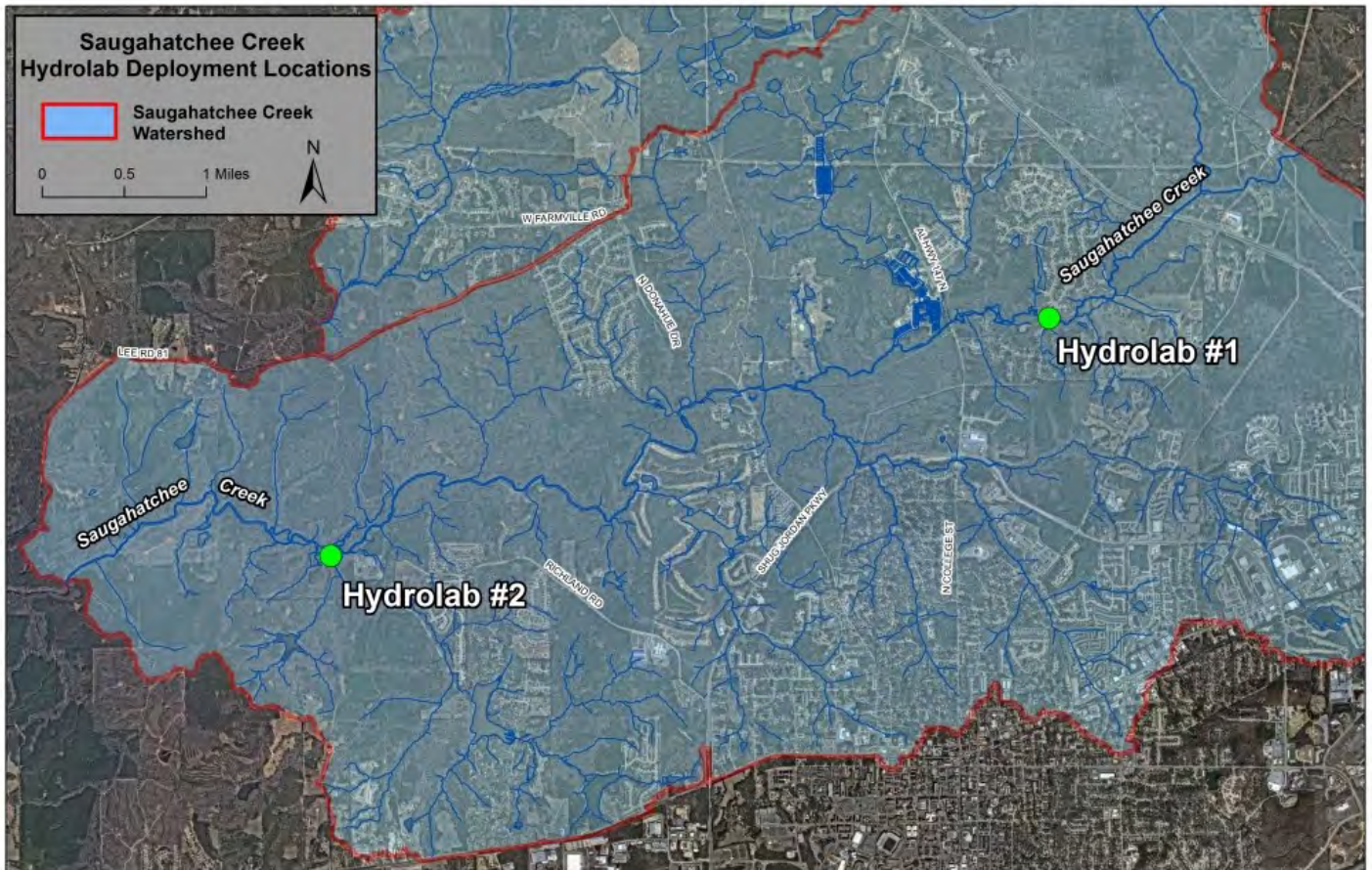
## Typical Detail Hydrolab Monitoring Station



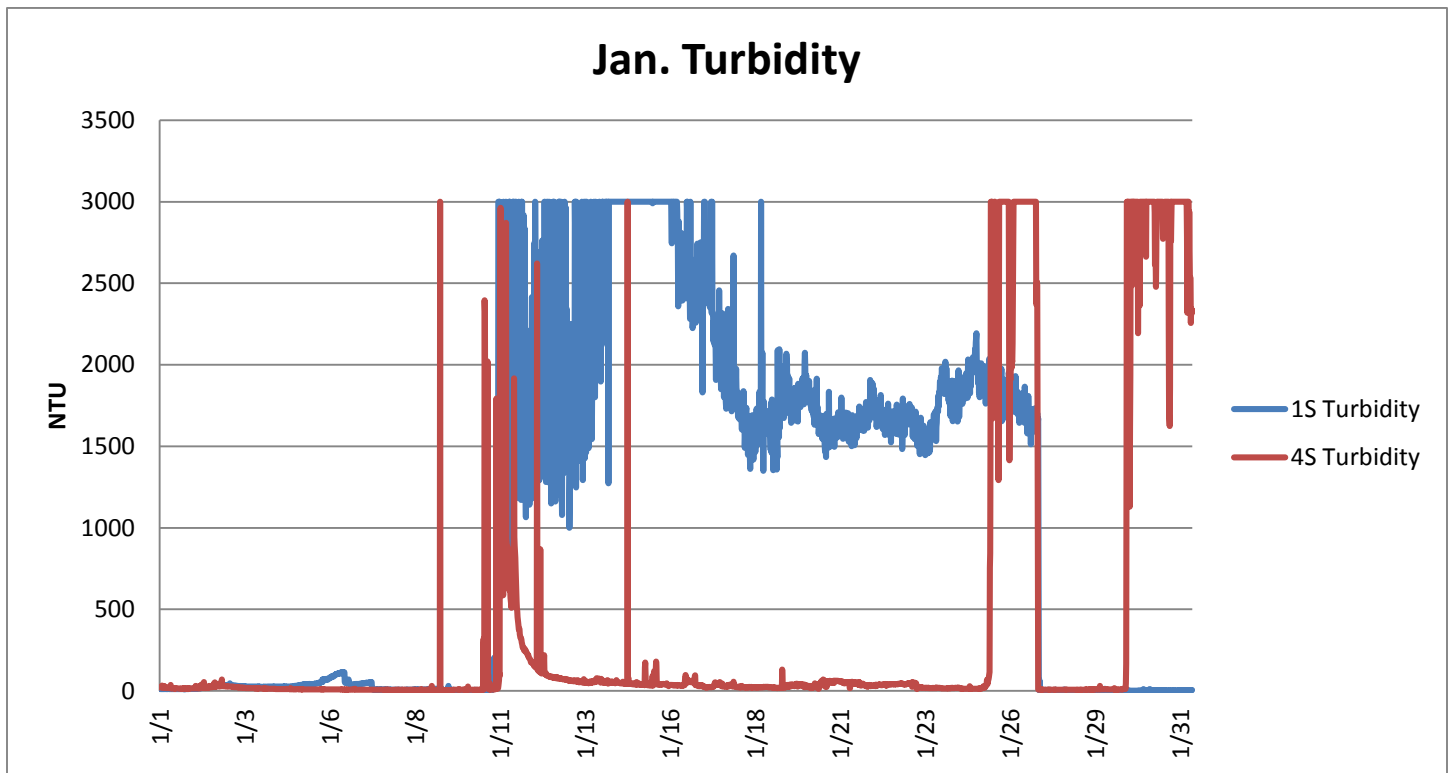
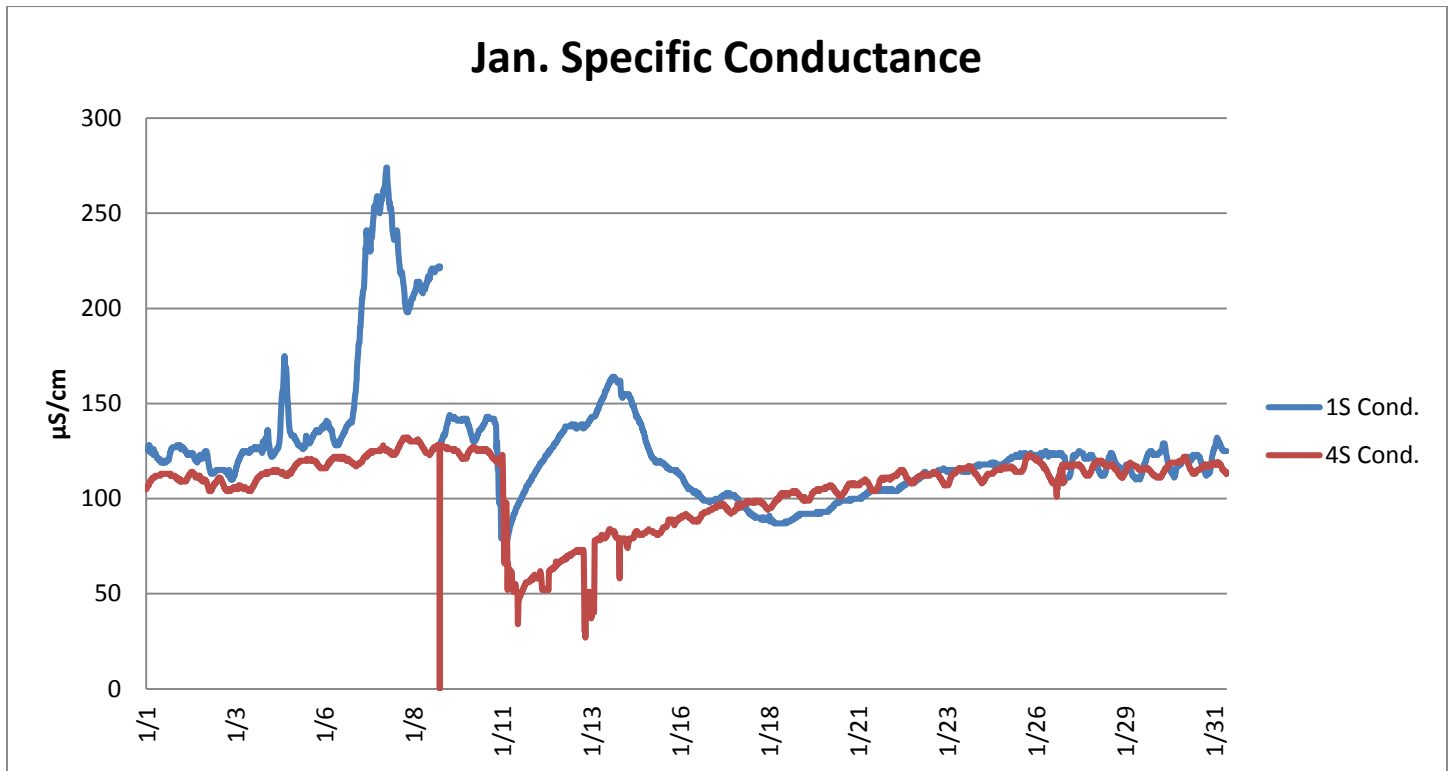
### 3.3 Multi-parameter Monitoring Data

#### Saugahatchee Creek

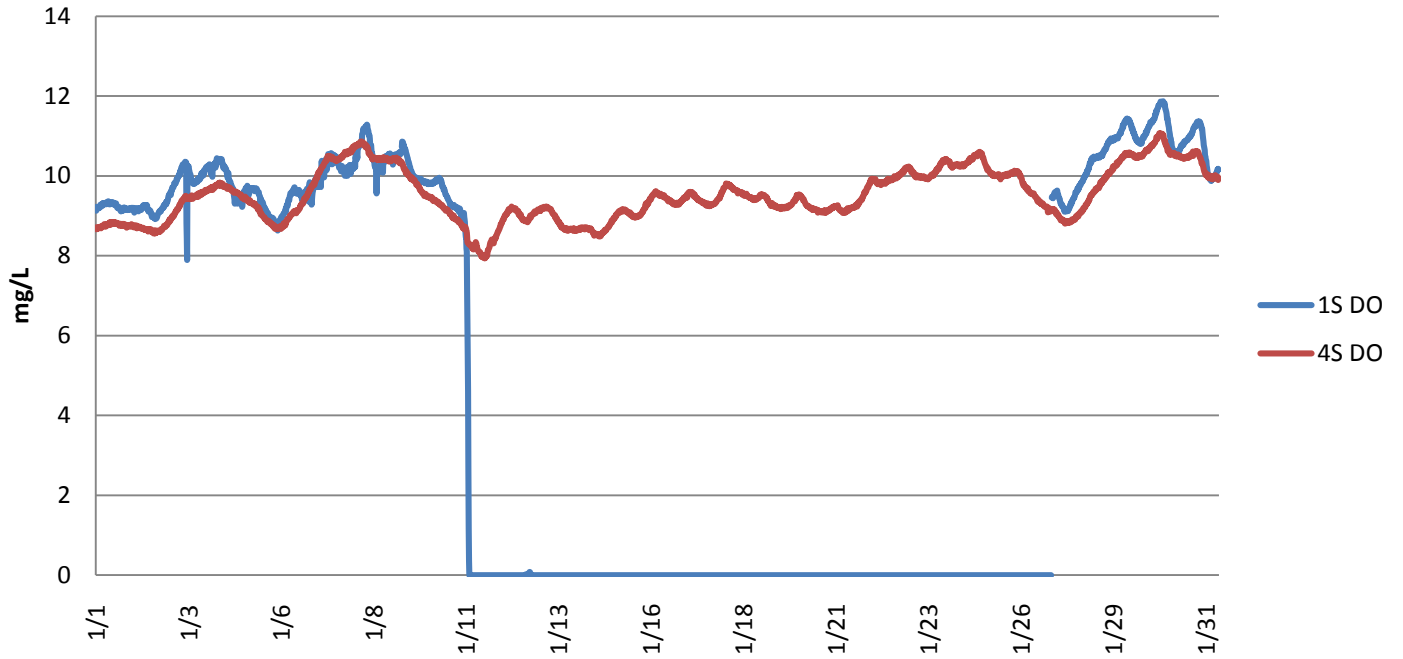
Multi-parameter monitoring began on Saugahatchee Creek on August 1, 2013, and ended on June 2, 2014. Below is a map of the Hydrolab locations on Saugahatchee Creek. Monthly data collected during this extended deployment are shown below. Site number 1S refers to Hydrolab #1, and site number 4S refers to Hydrolab #2.



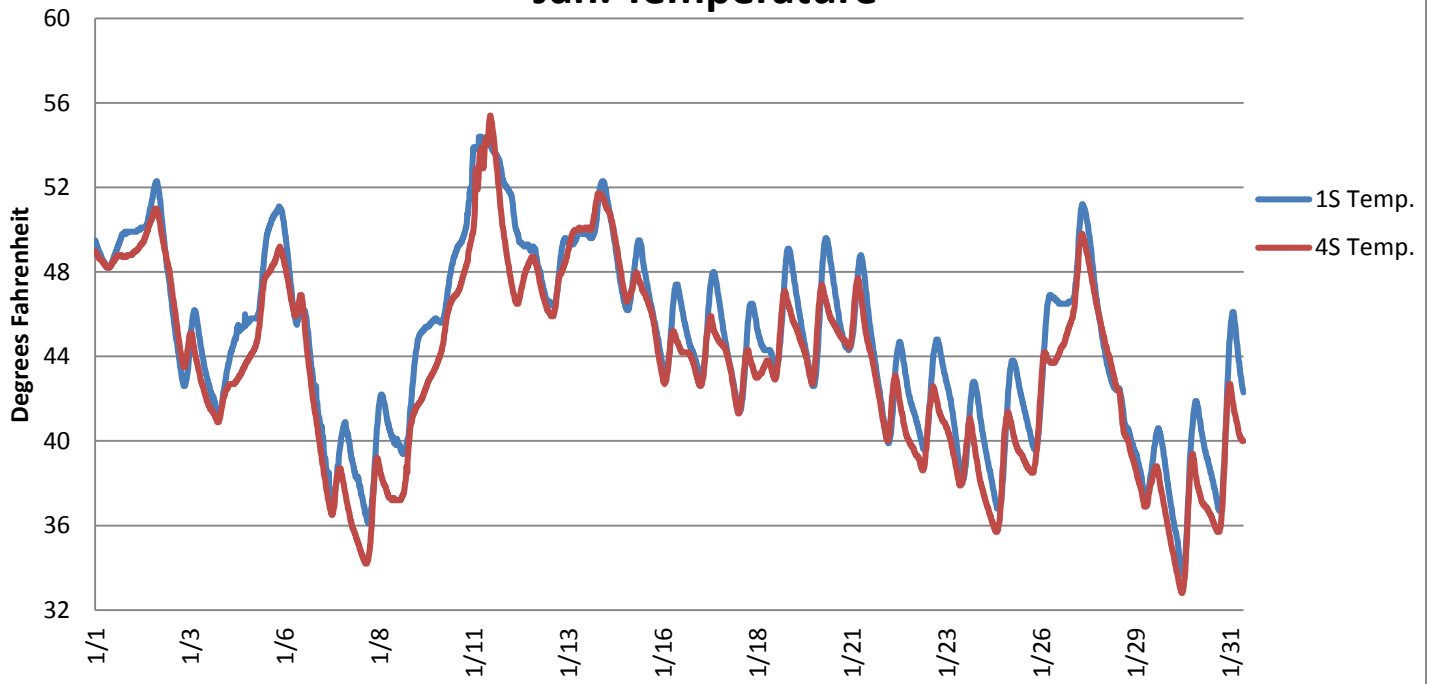
Saugahatchee Creek Hydrolab Deployment Locations



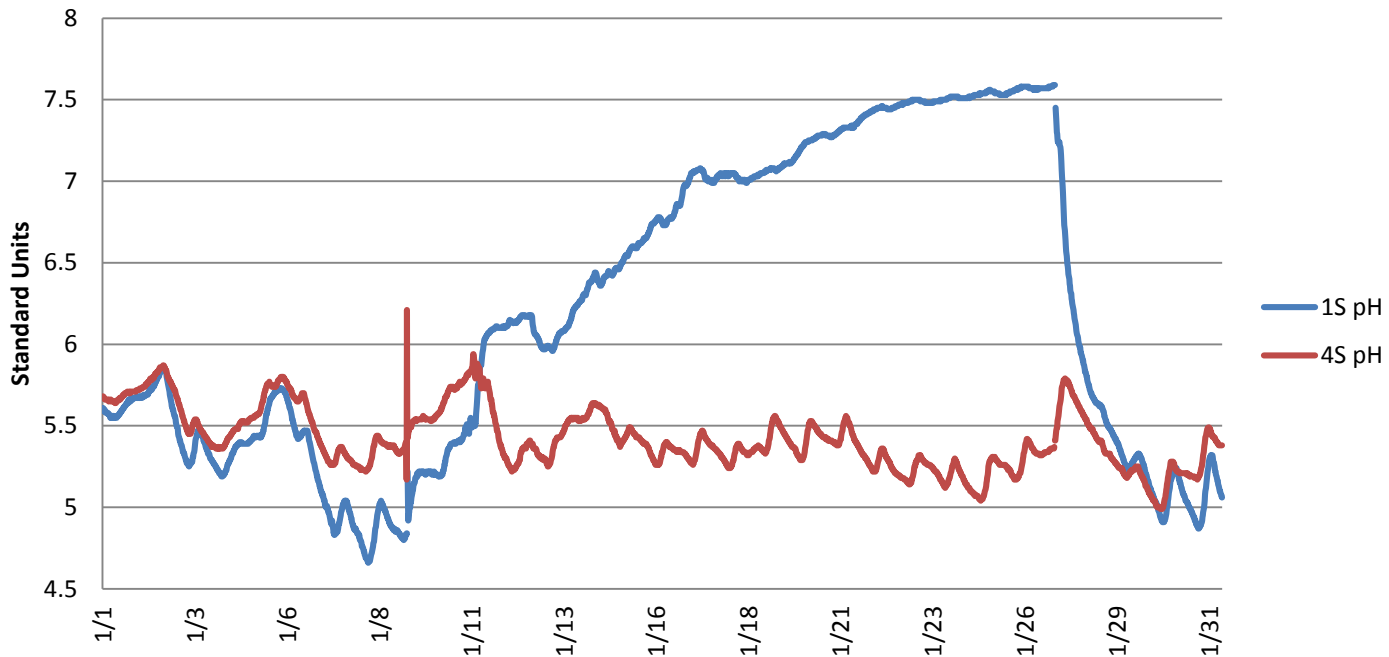
### Jan. Dissolved Oxygen



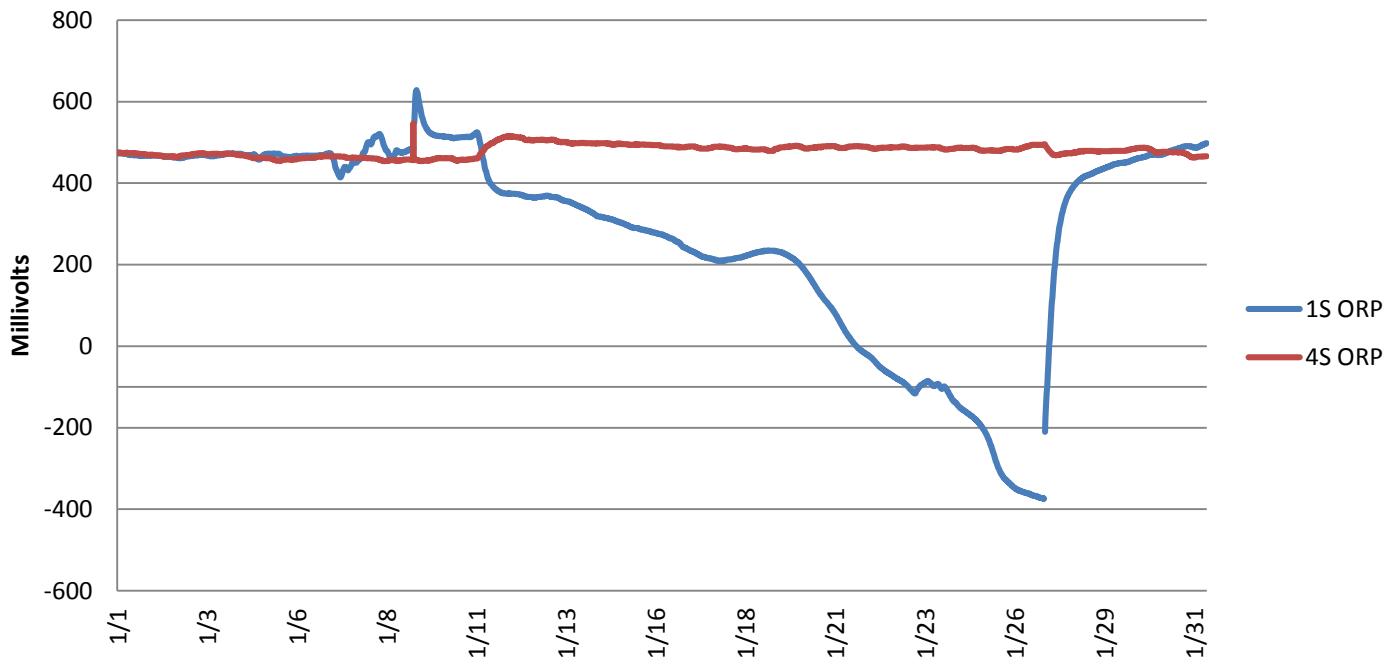
### Jan. Temperature



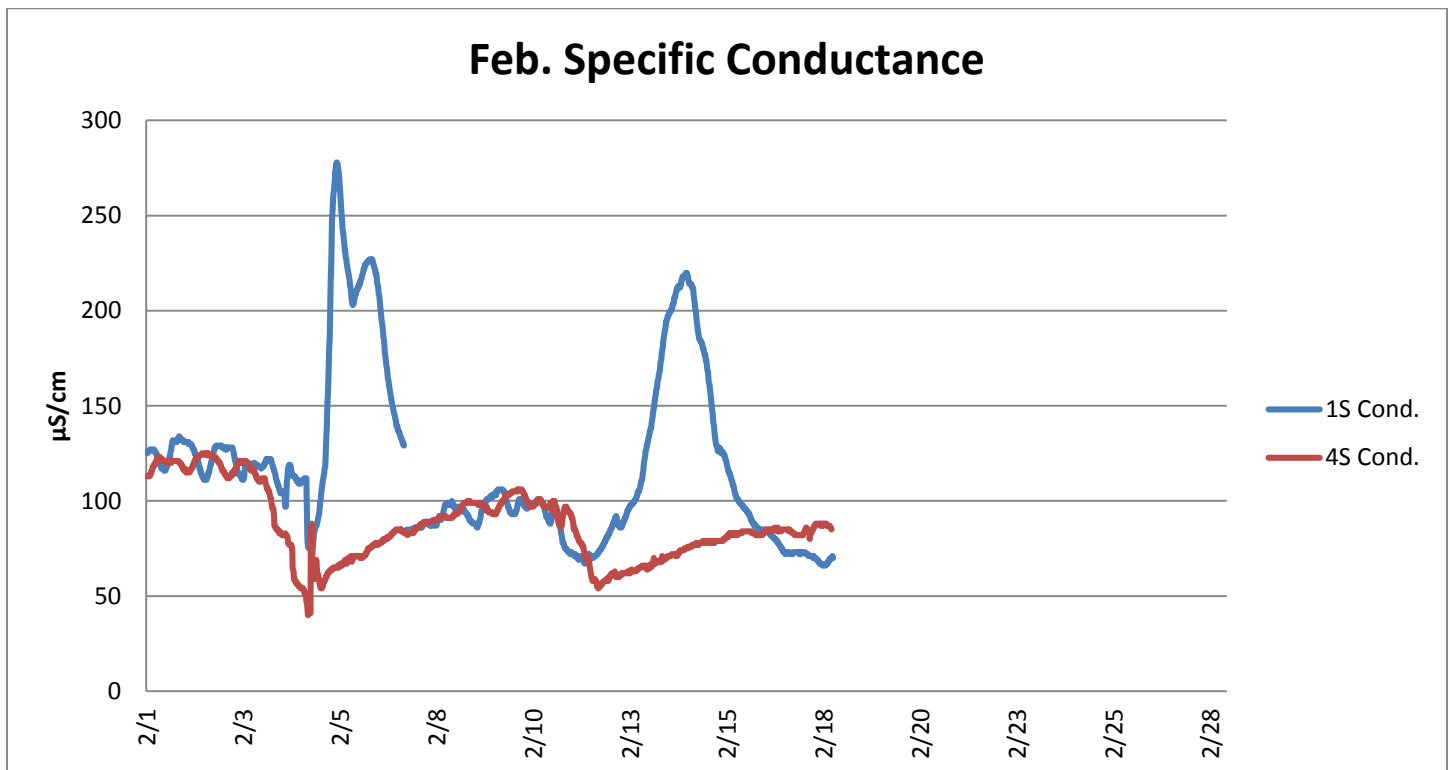
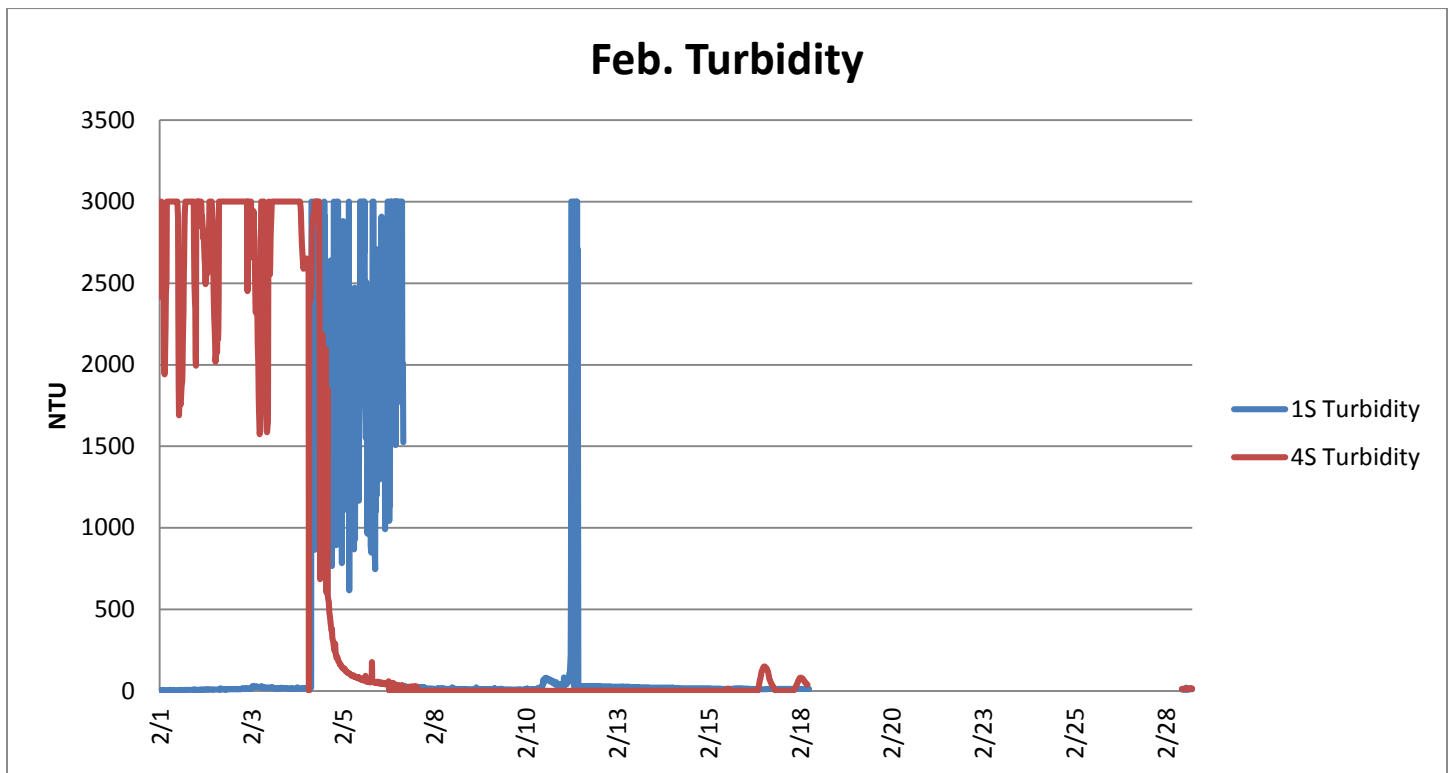
### Jan. pH



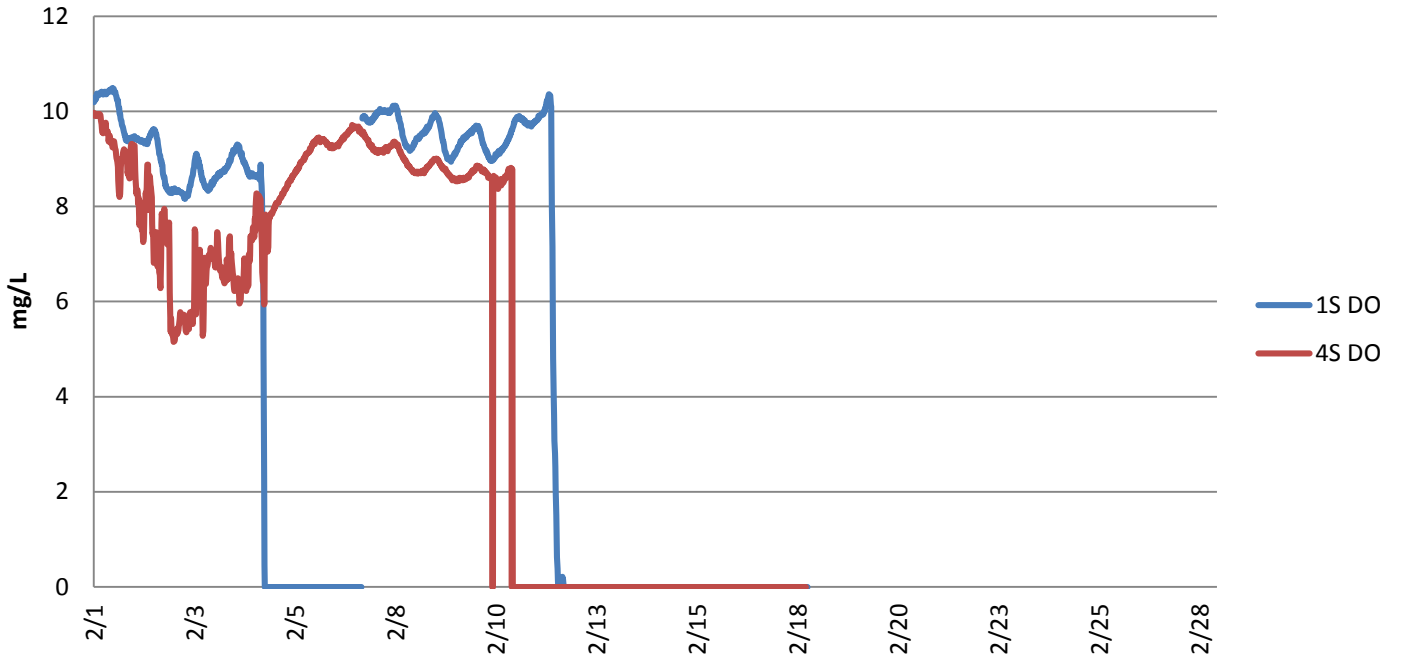
### Jan. ORP



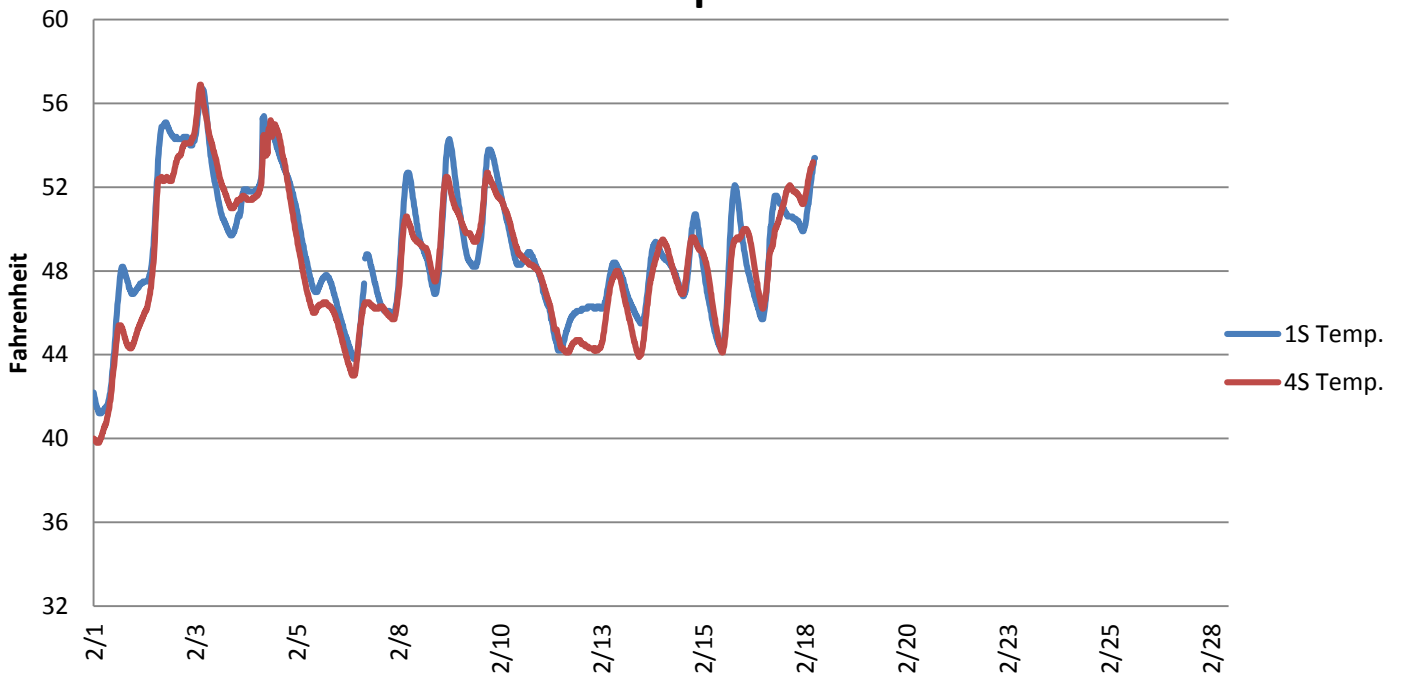
February 2014



### Feb. Dissolved Oxygen

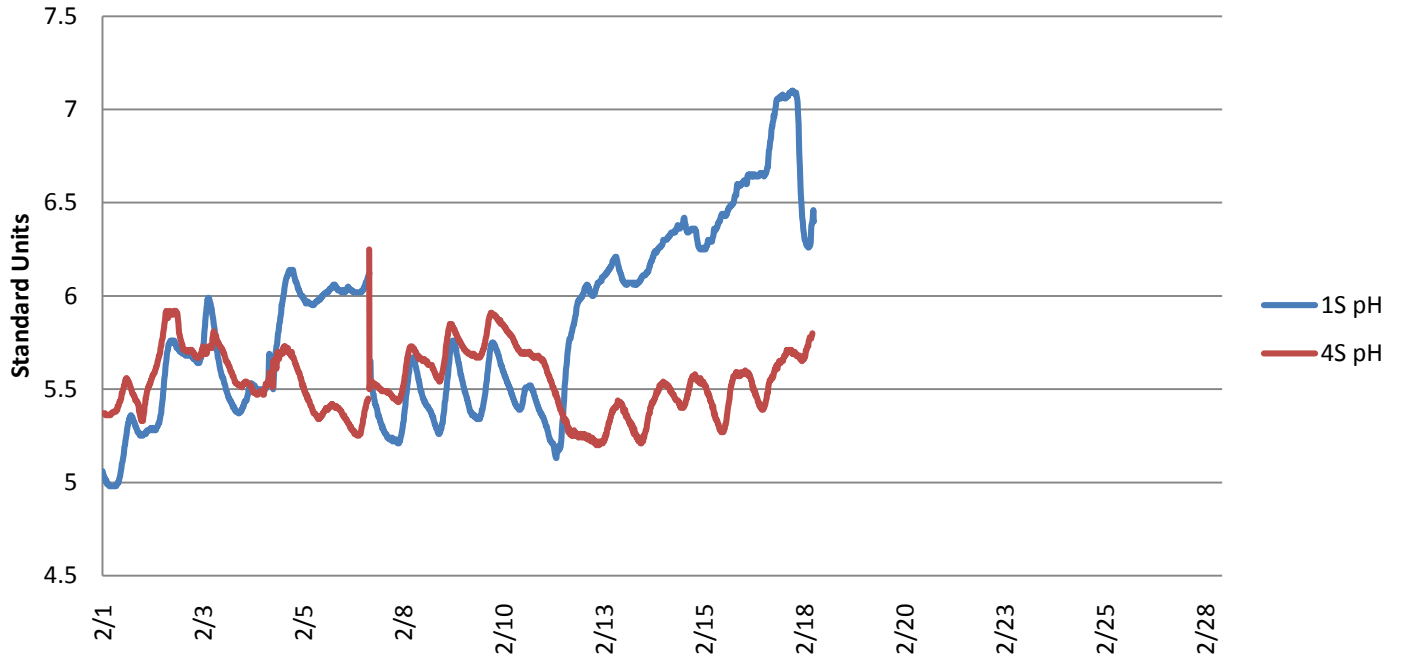


### Feb. Temperature

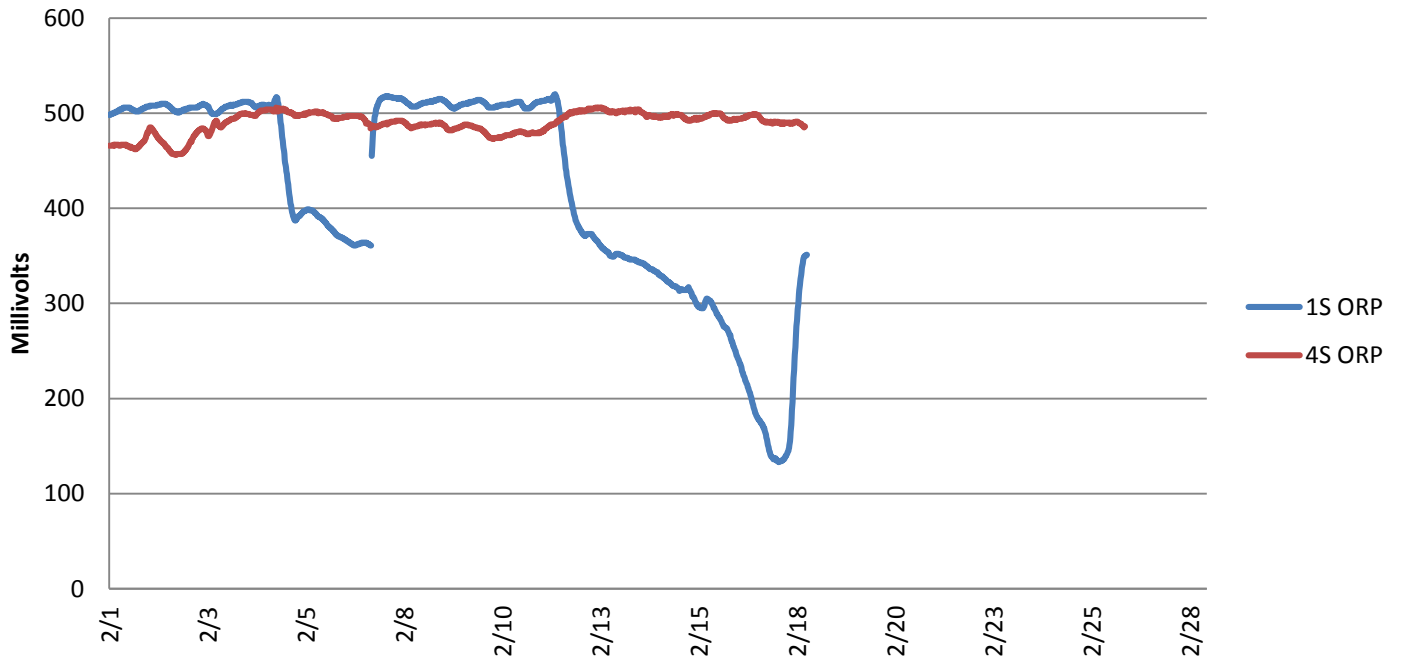




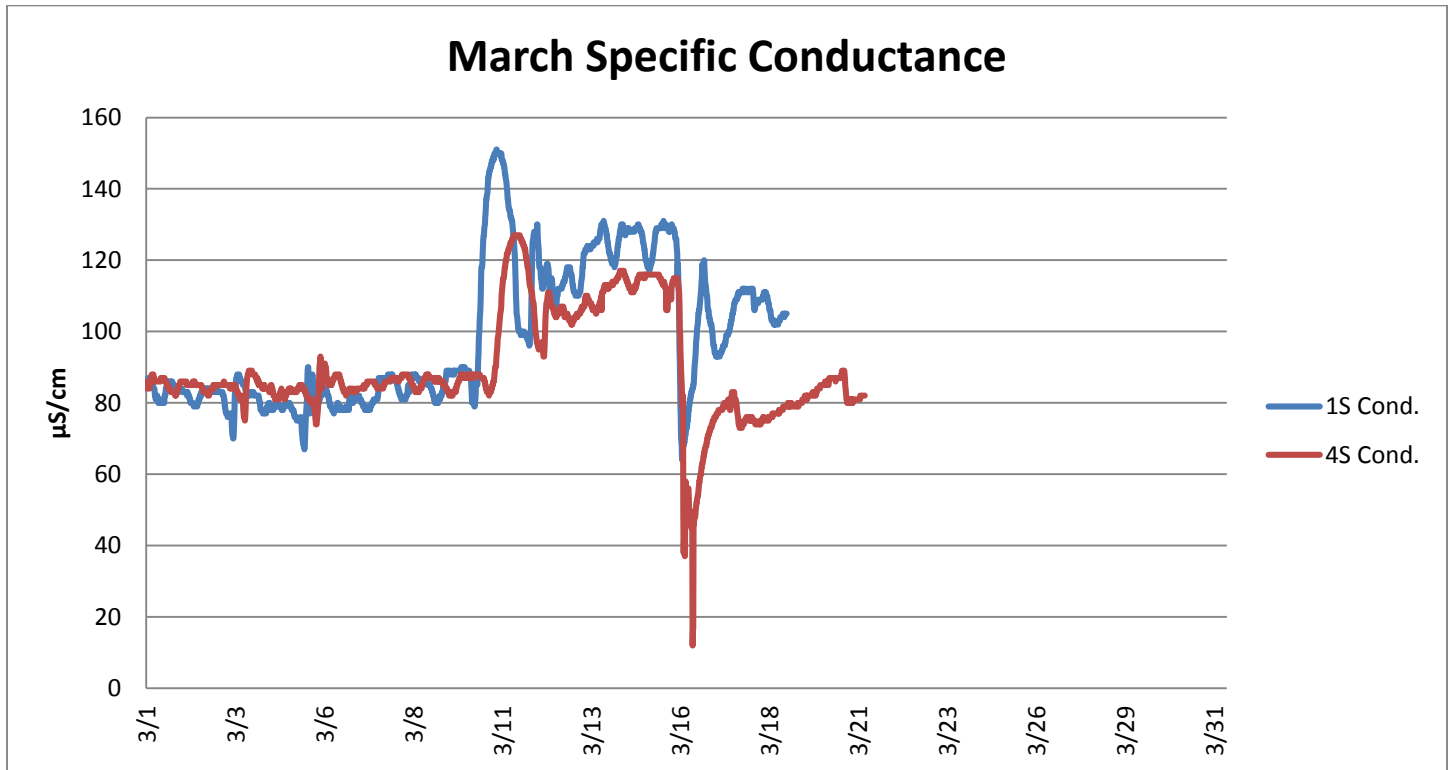
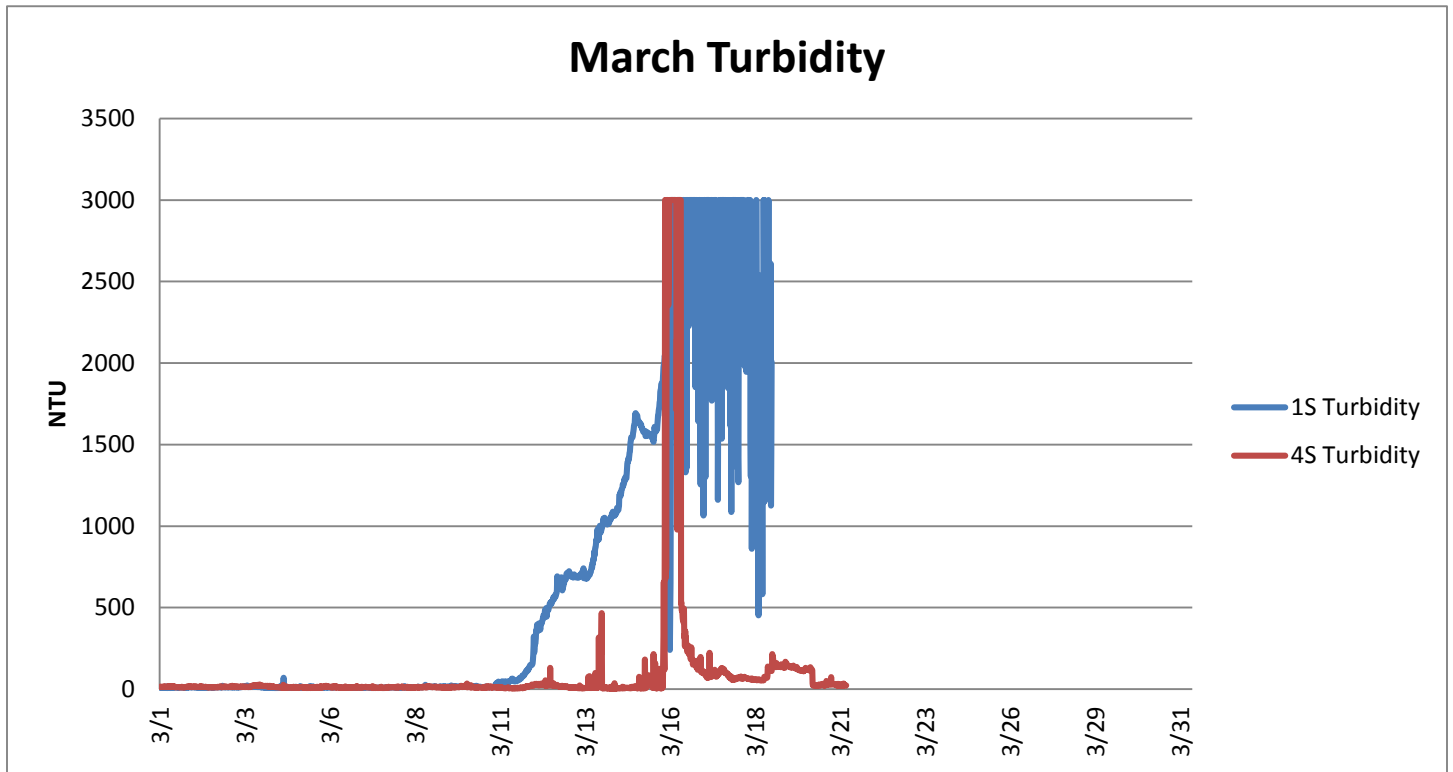
### Feb. pH



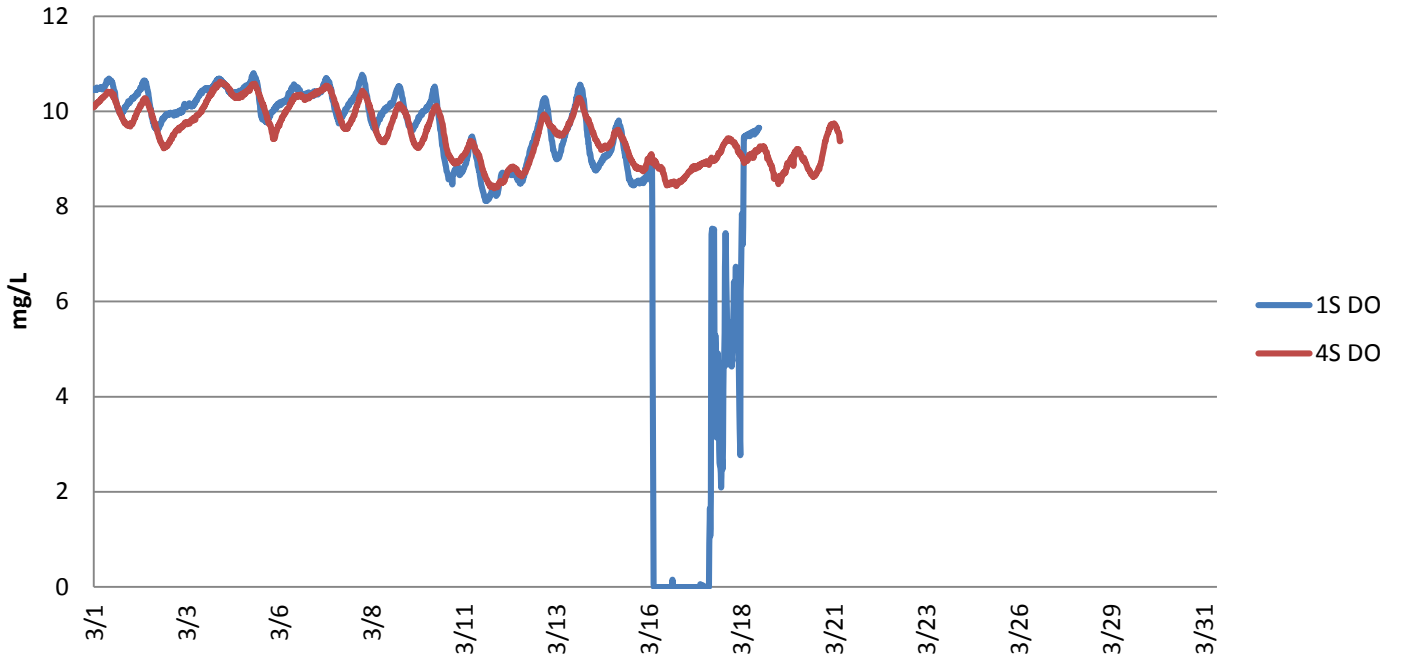
### Feb. ORP



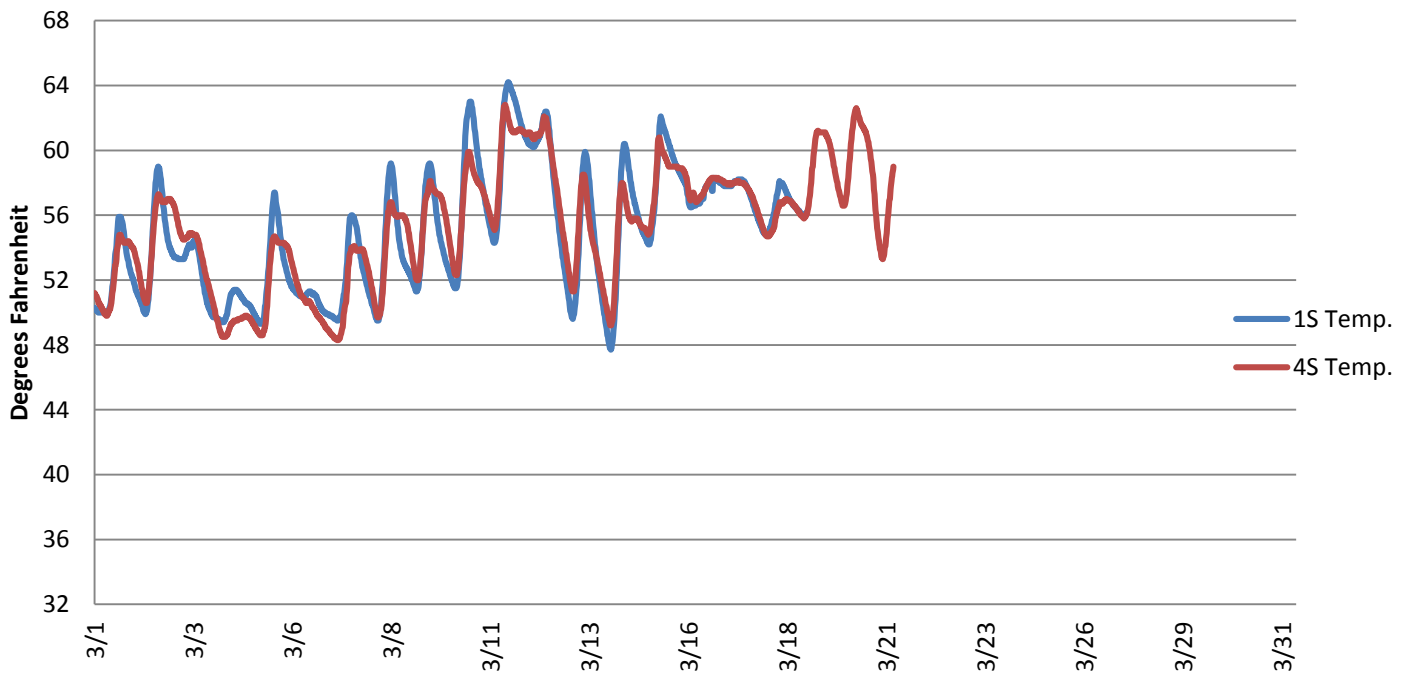
March 2014



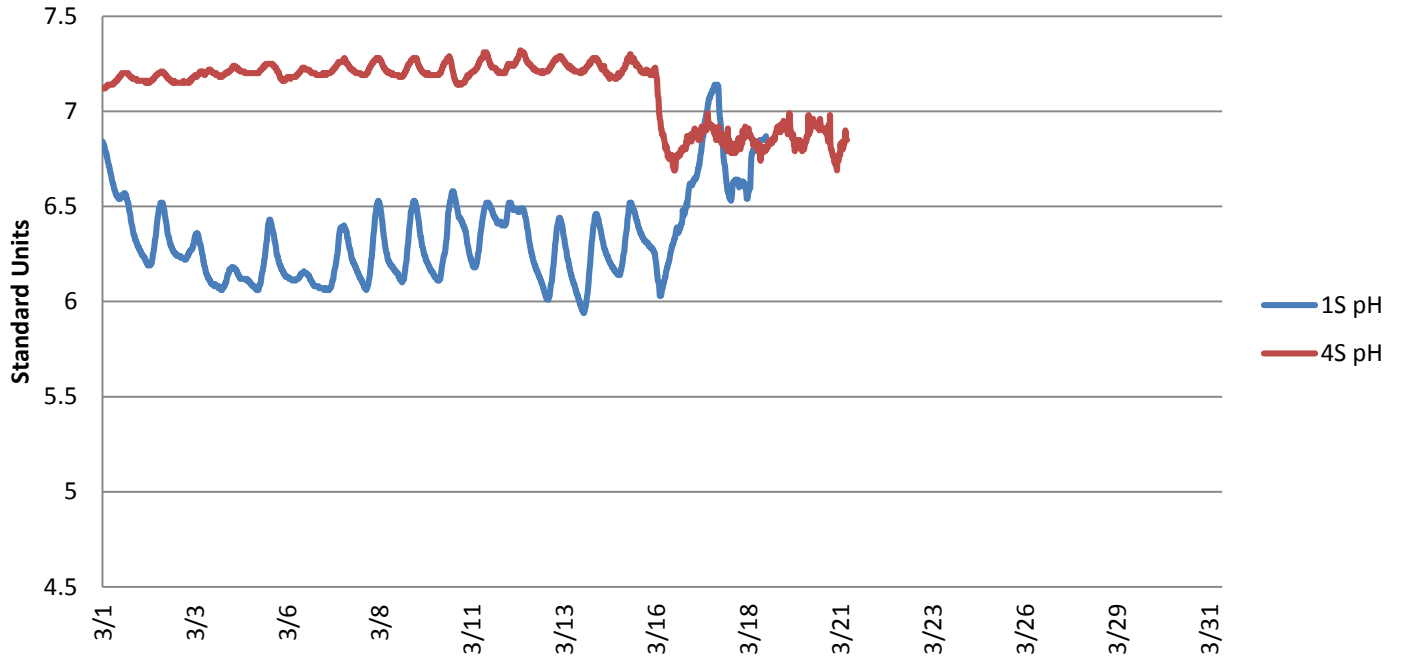
### March Dissolved Oxygen



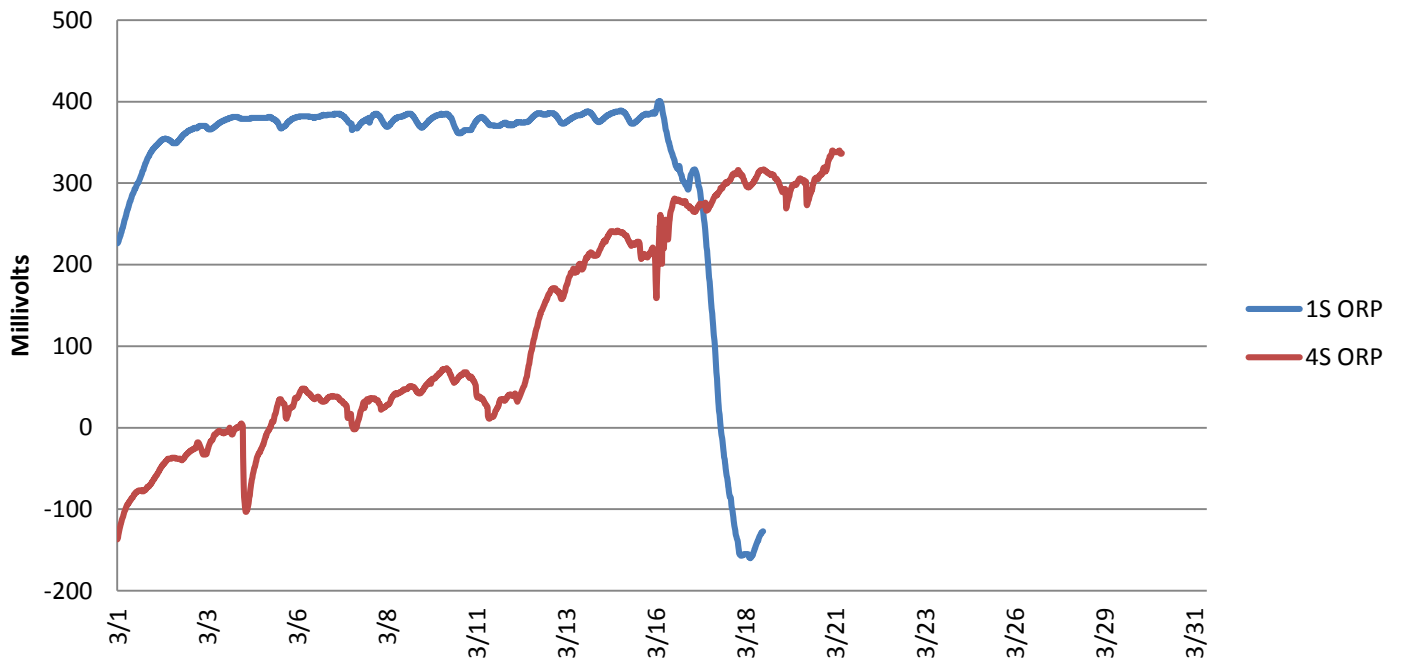
### March Temperature



### March pH



### March ORP

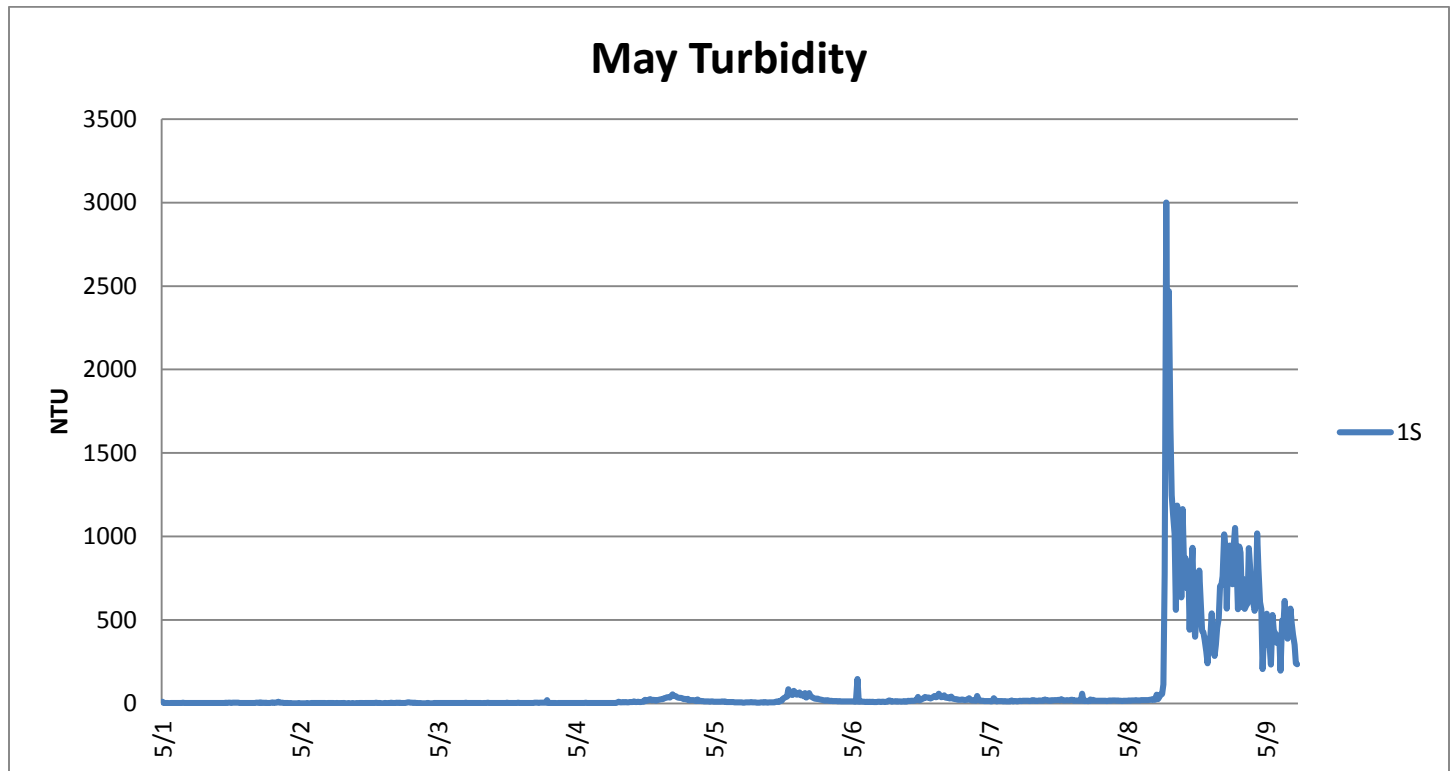


## April 2014

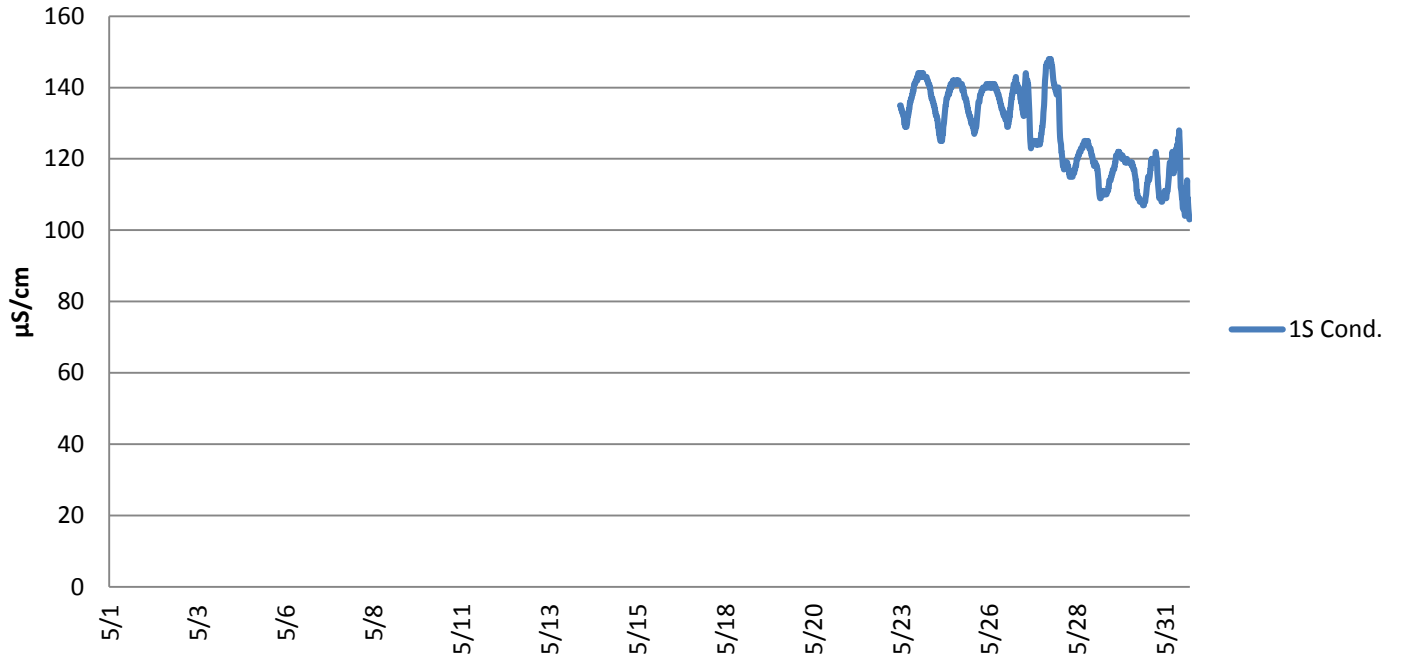
Hydrolab units were not deployed in April due to maintenance.

## May 2014

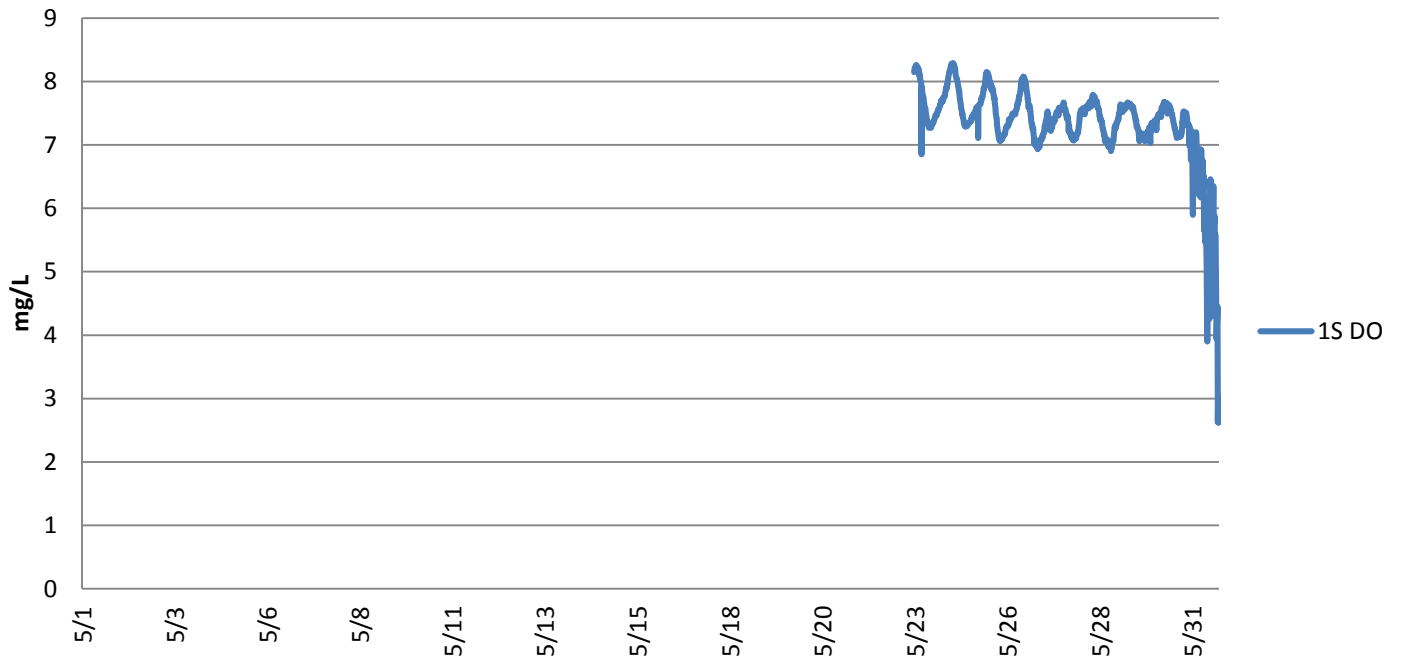
The Hydrolab unit at site 4S was not deployed in May due to maintenance.



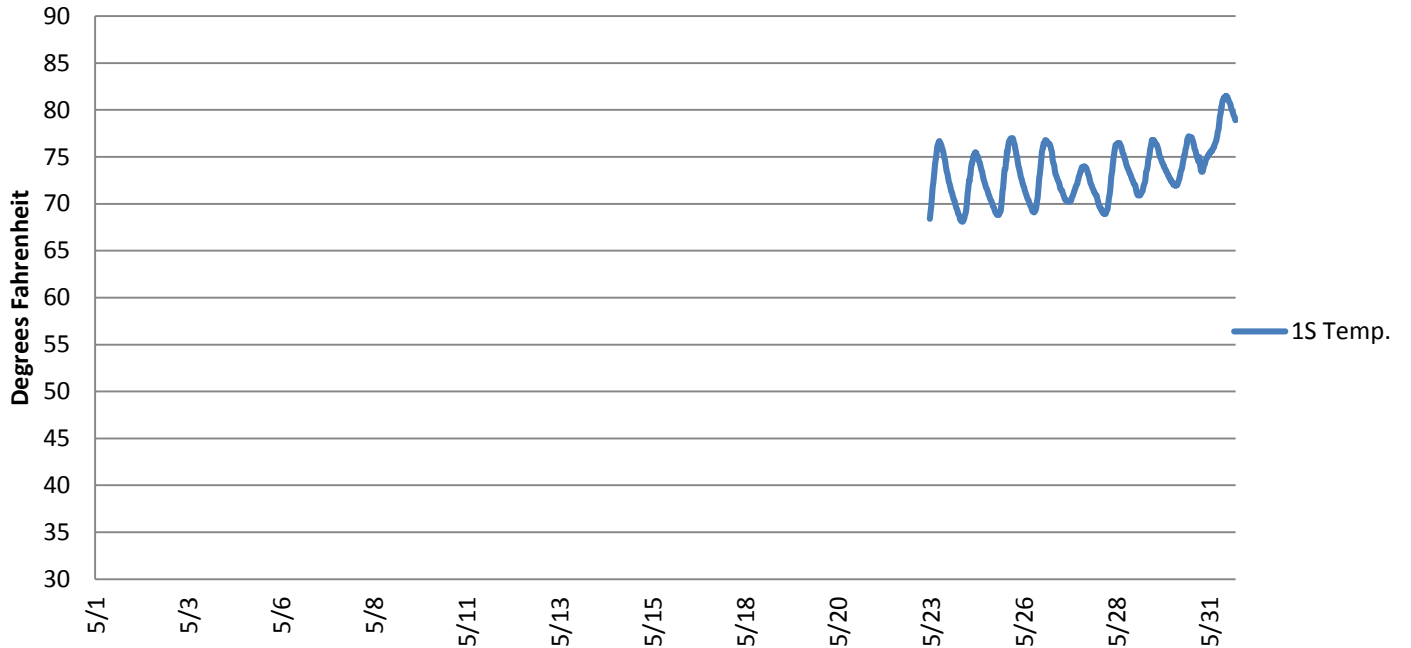
### May Specific Conductance



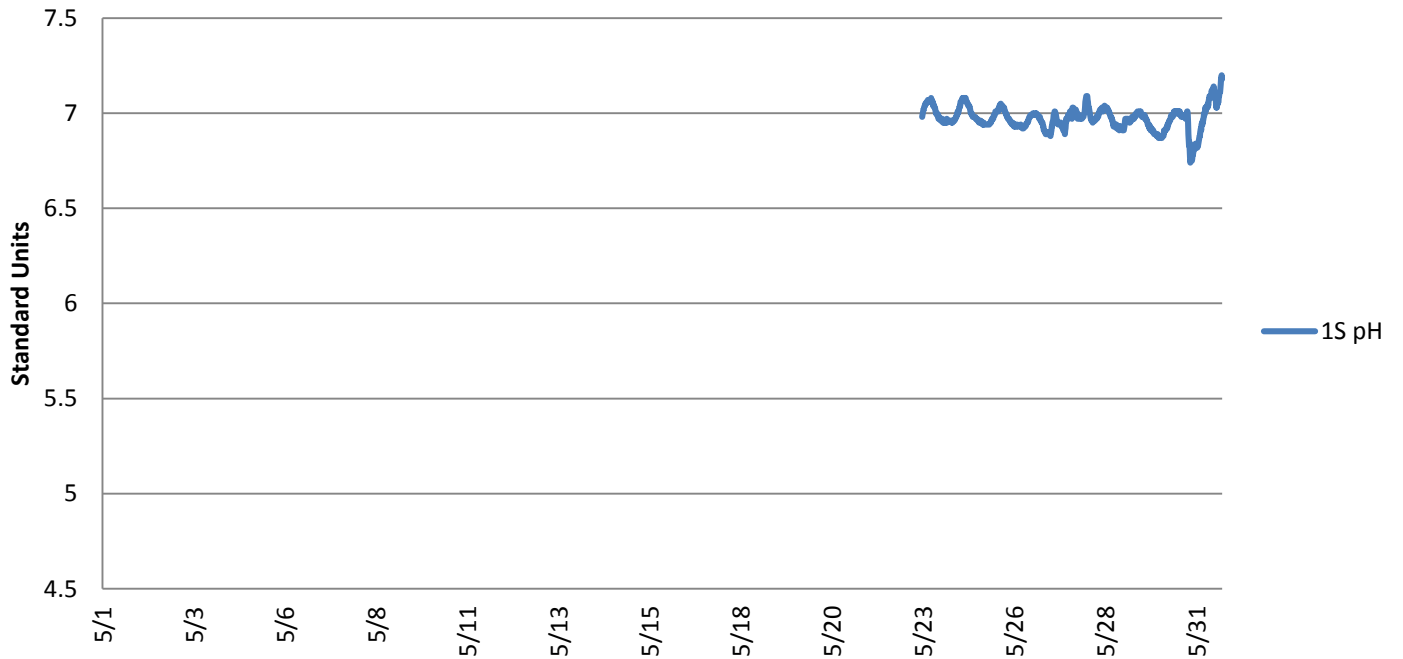
### May Dissolved Oxygen



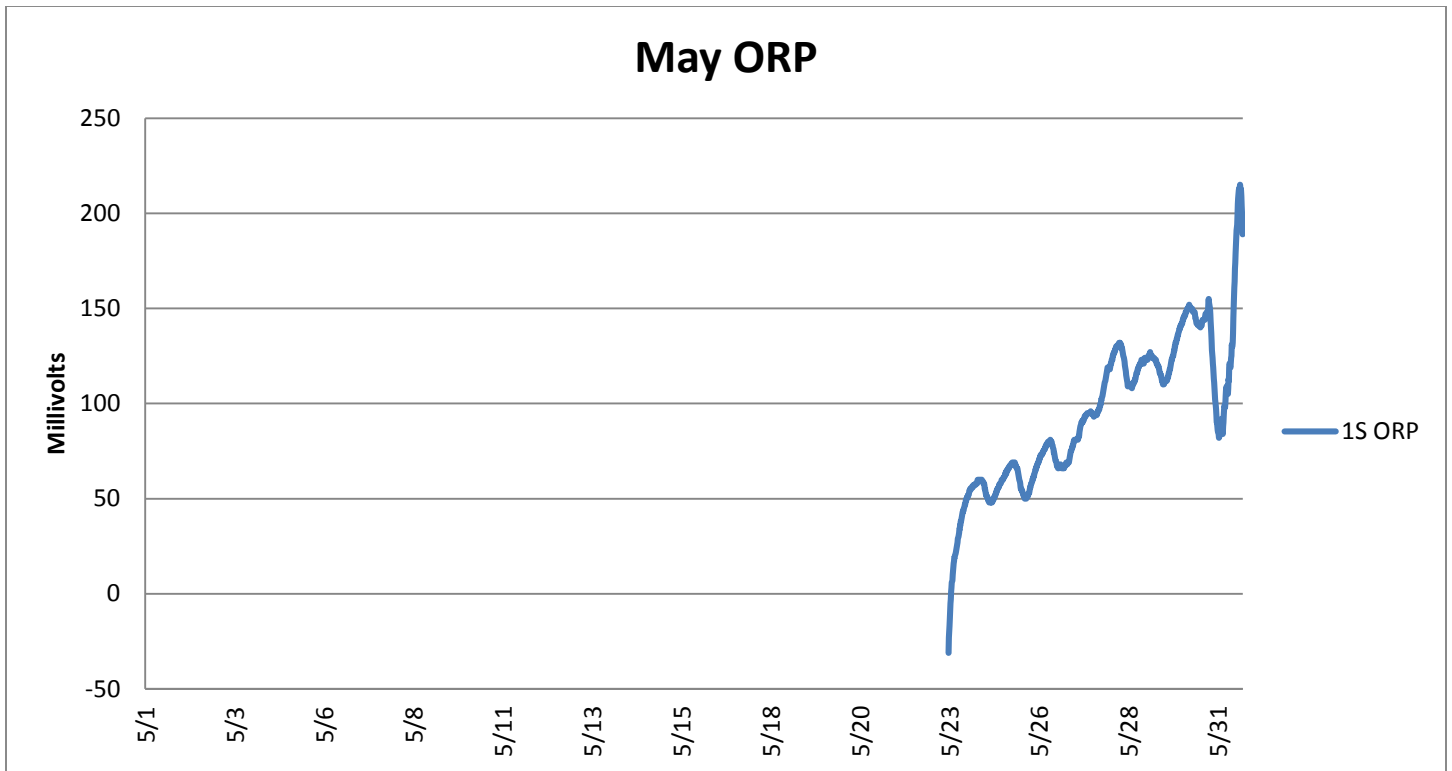
## May Temperature



## May pH



## May ORP



### June 2014

Hydrolab units were not deployed in June due to maintenance.

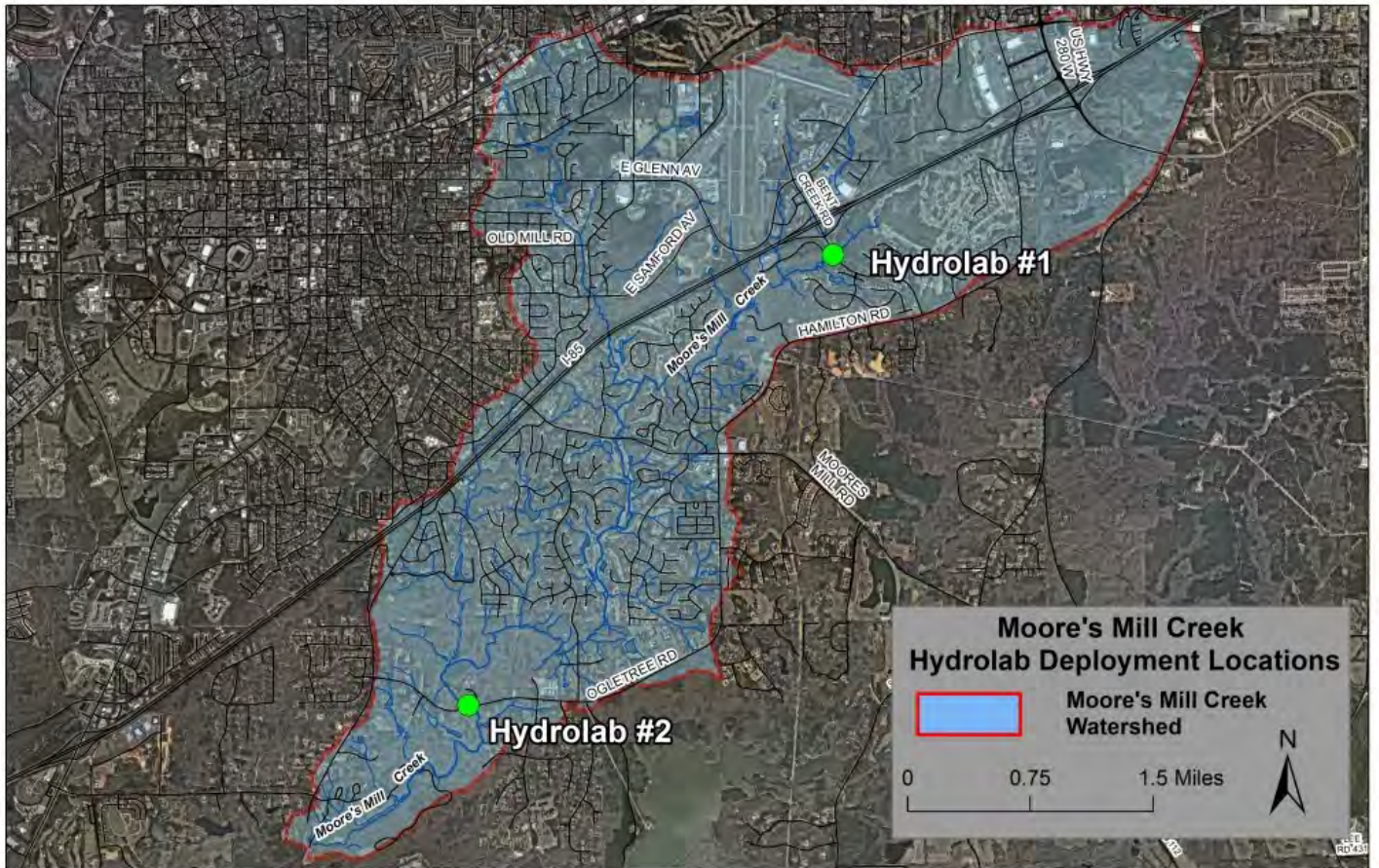
### July 2014

Hydrolab units were not deployed in June due to maintenance.

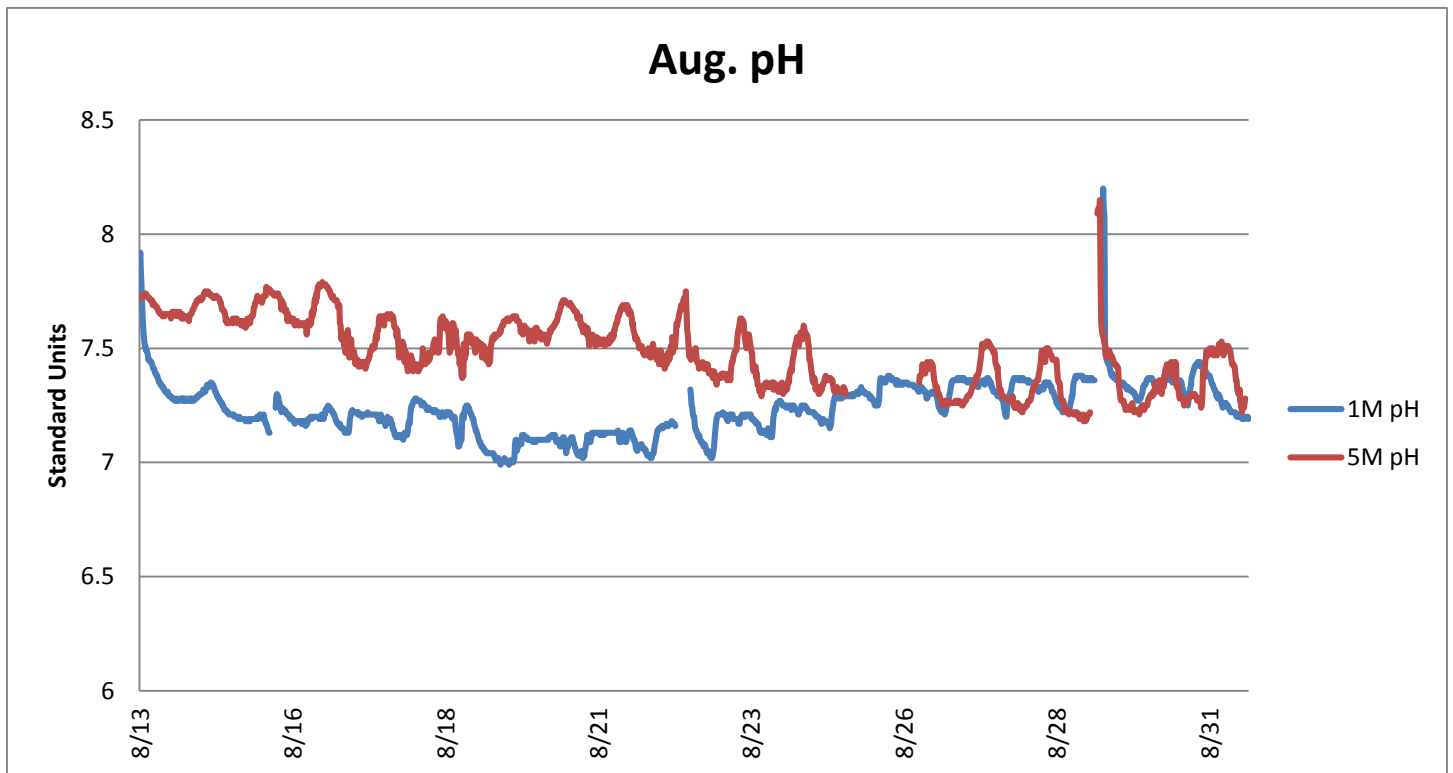
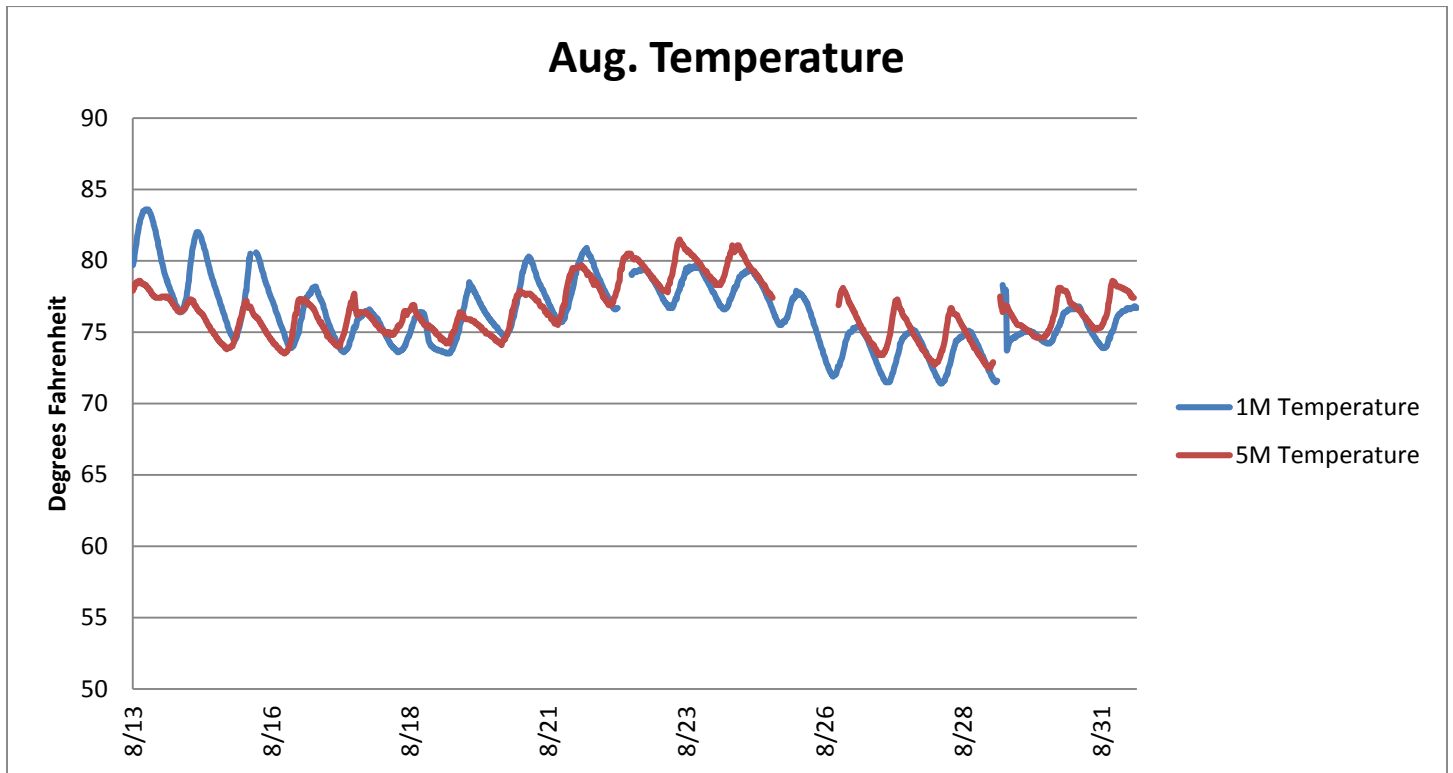


## Moore's Mill Creek

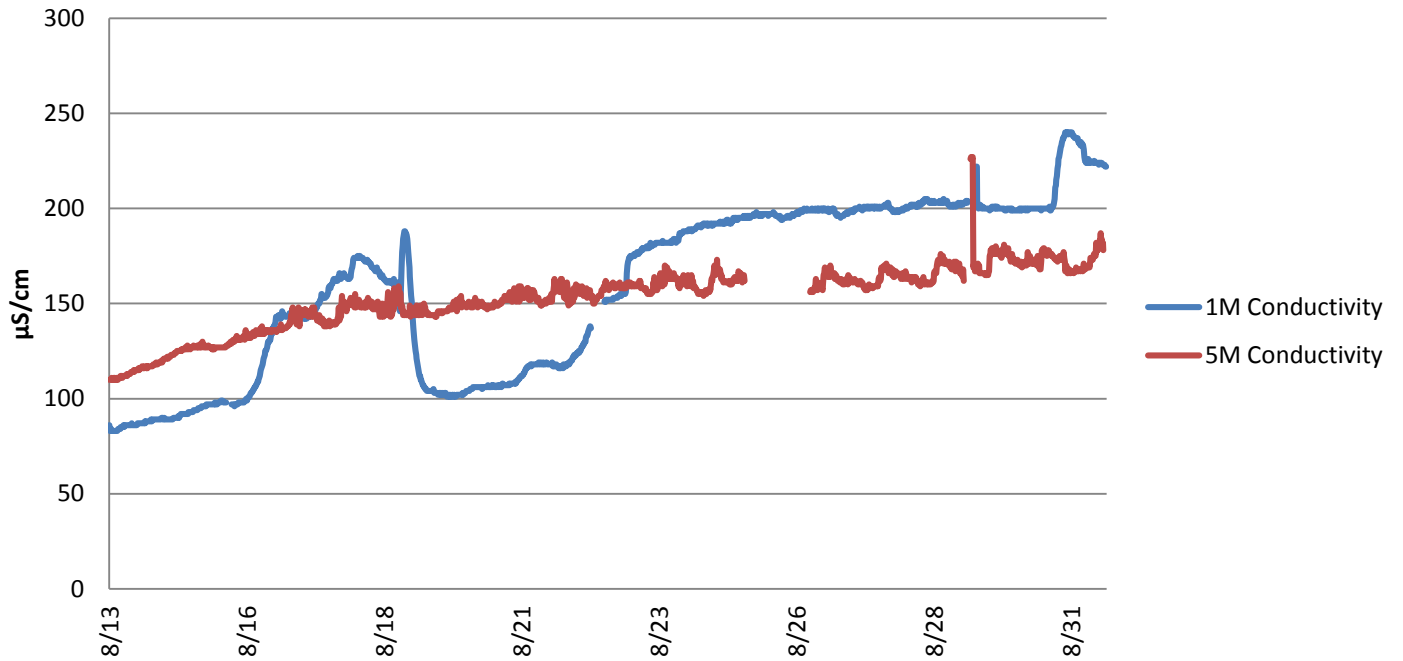
Multi-parameter monitoring began on Moore's Mill Creek on August 13, 2014, and continued through the end of 2014. Below is a map of the Hydrolab locations on Moore's Mill Creek. Monthly data collected during this extended deployment are graphed below. Site number 1M refers to Hydrolab #1, and site number 5M refers to Hydrolab #2.



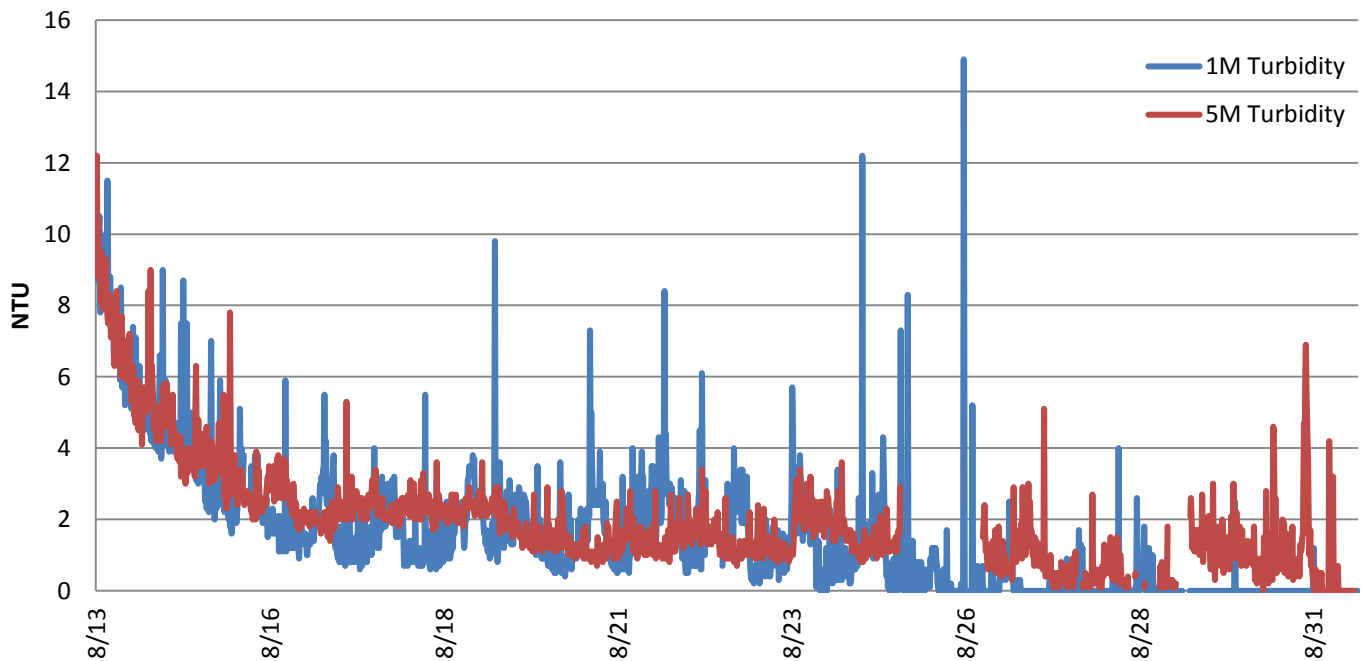
August 2014



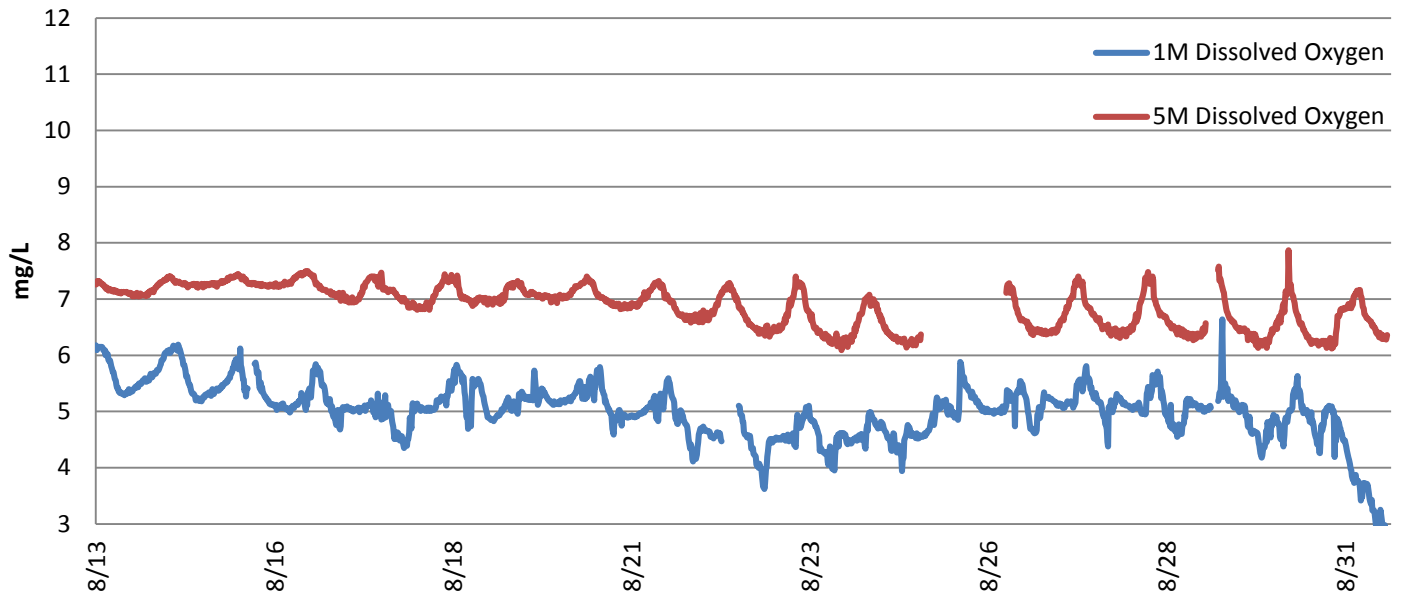
## Aug. Specific Conductance



## Aug. Turbidity

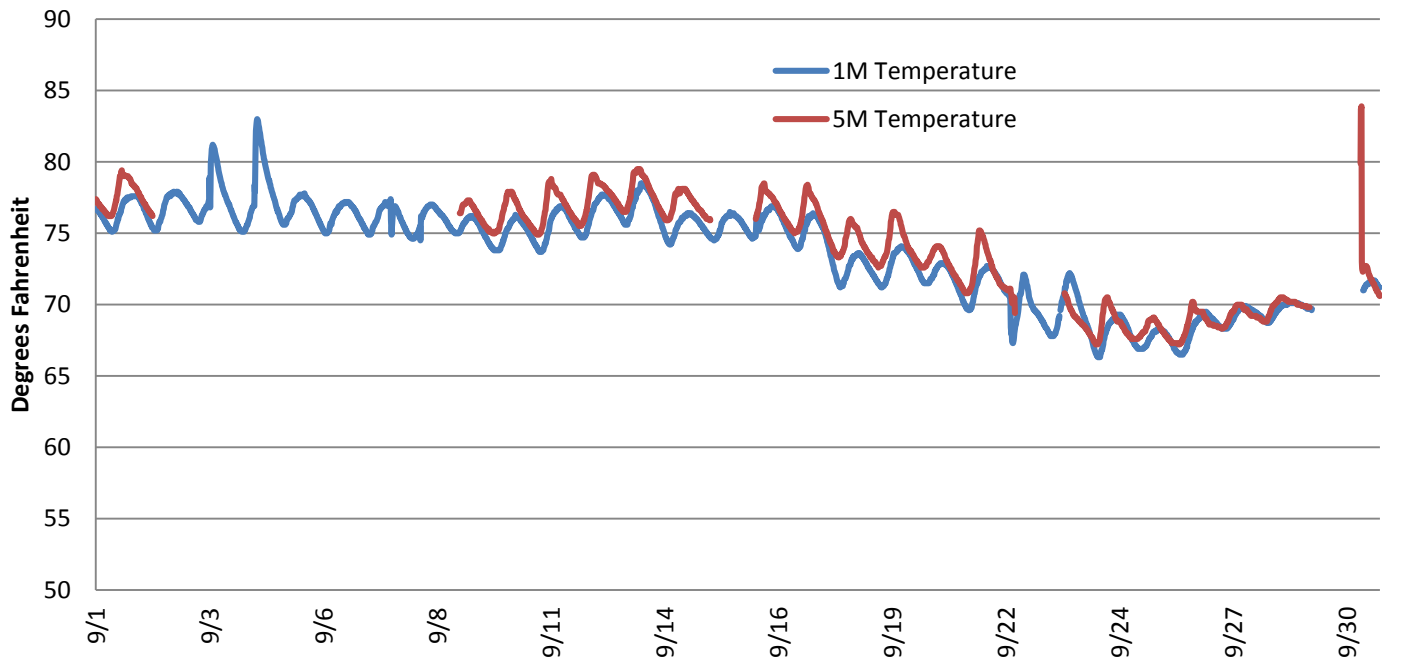


## Aug. Dissolved Oxygen

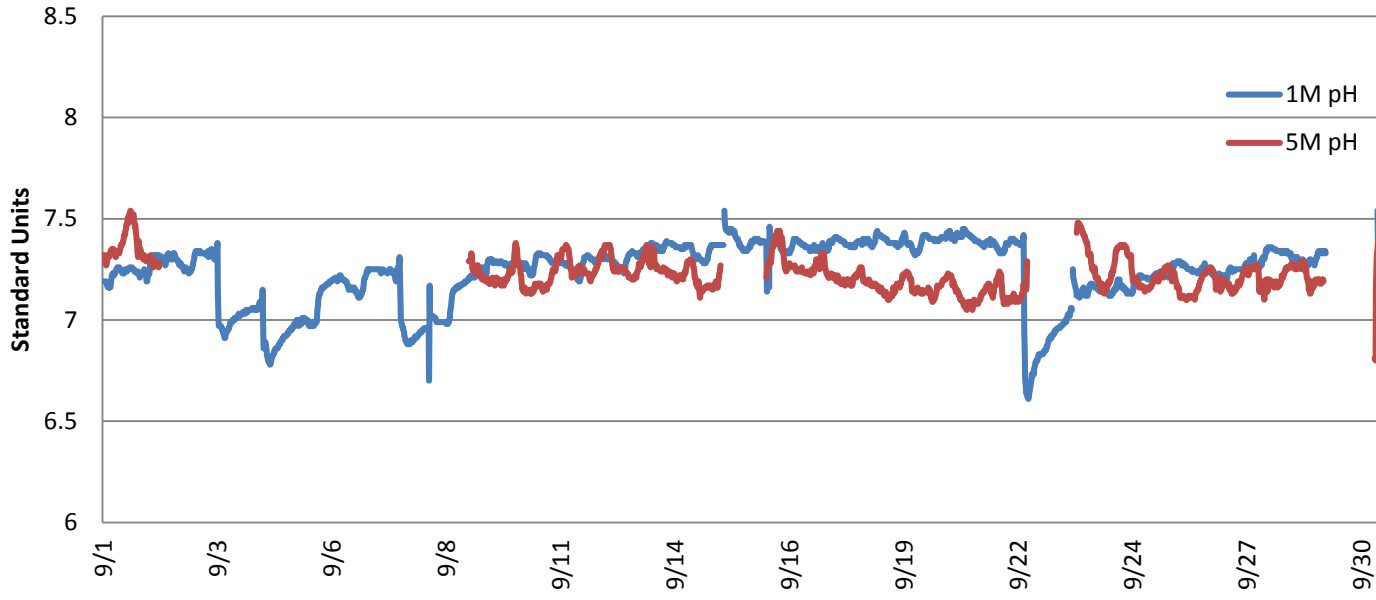


## September 2014

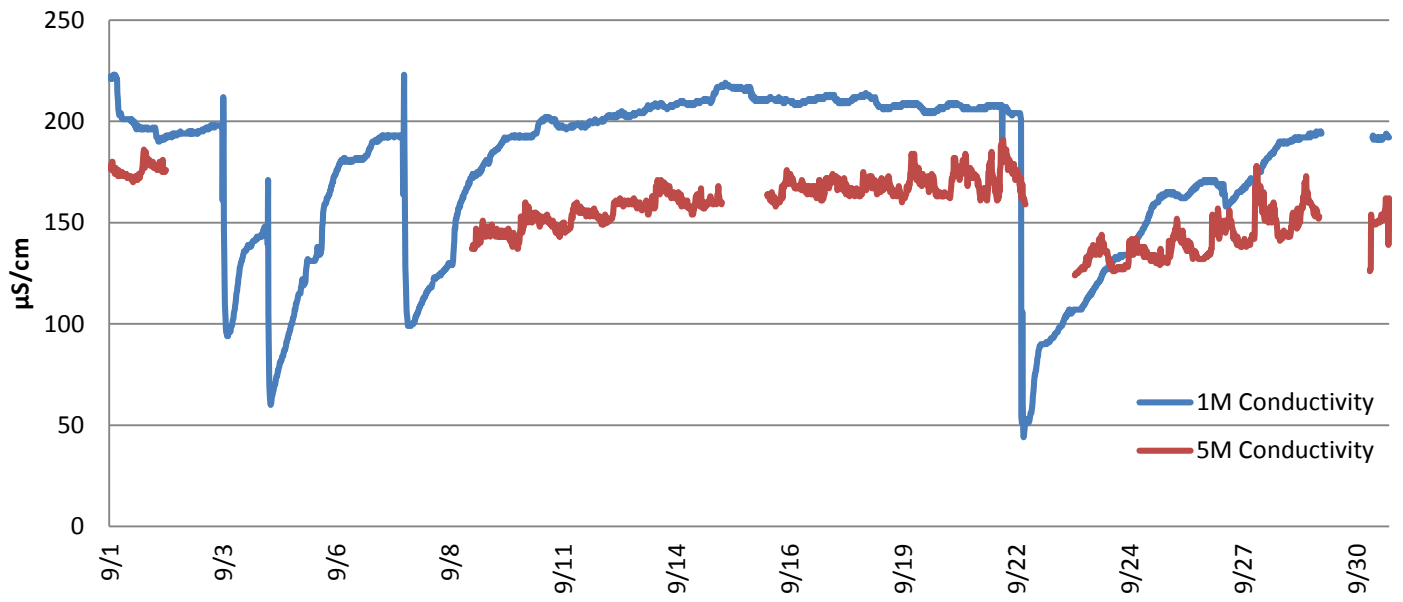
### Sep. Temperature



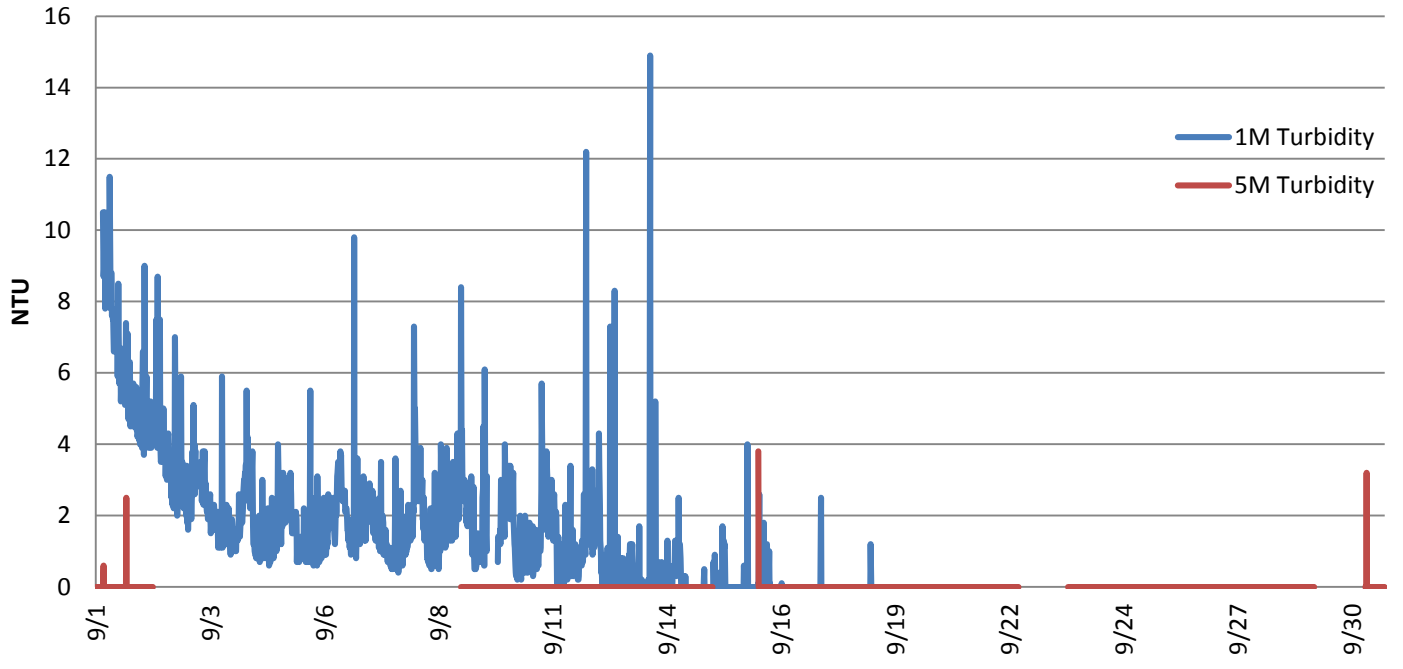
### Sep. pH



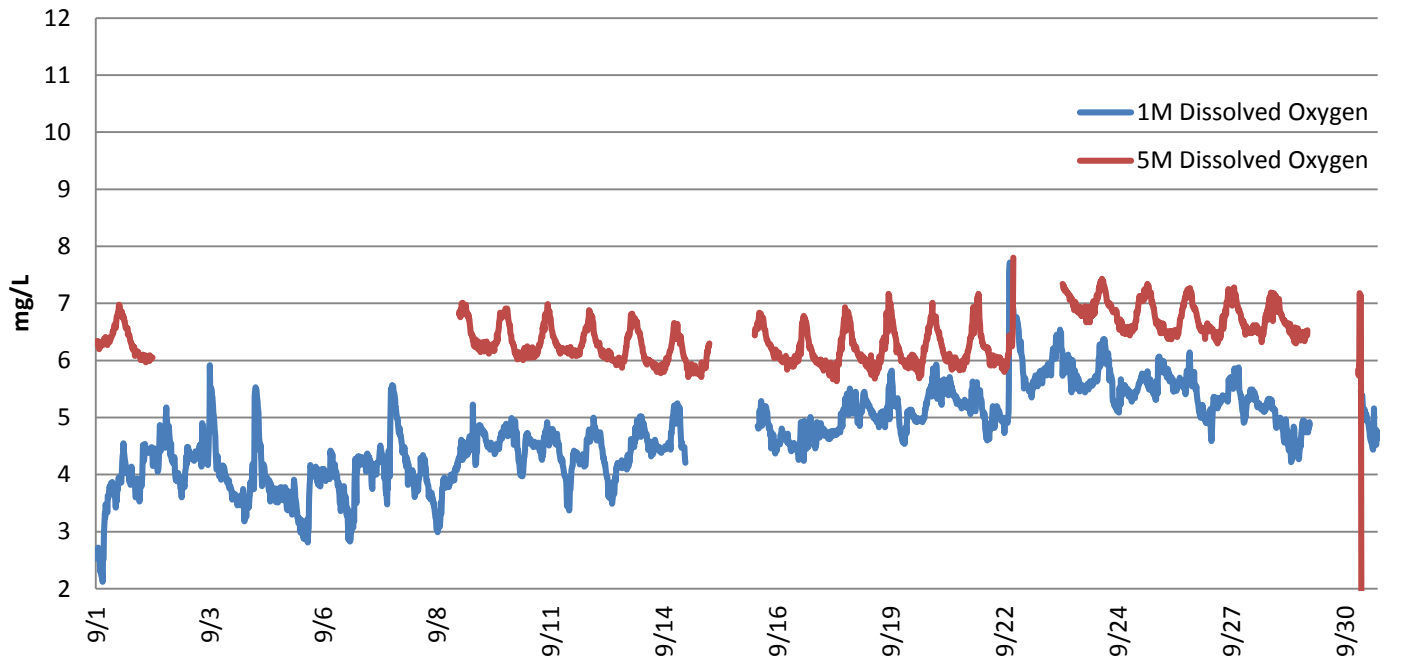
### Sep. Specific Conductance



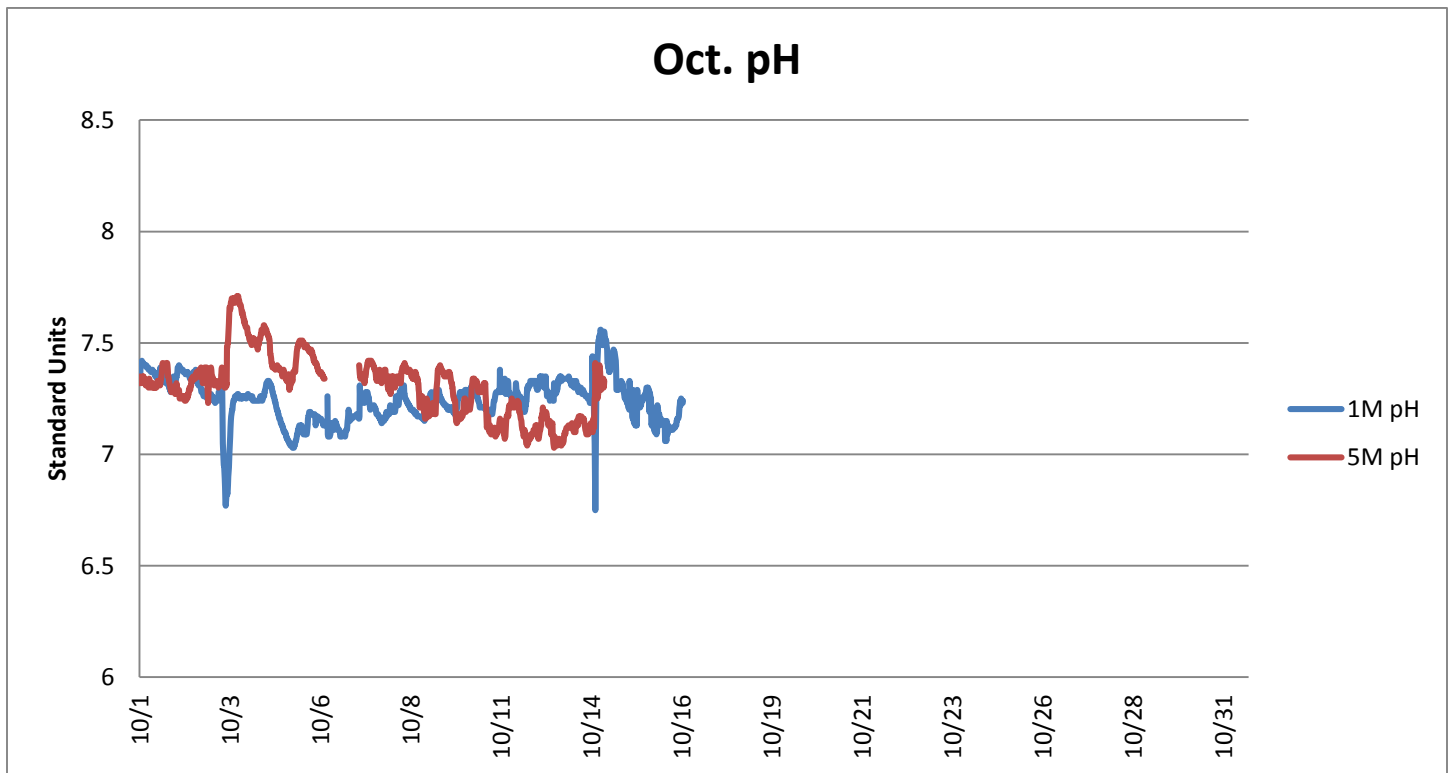
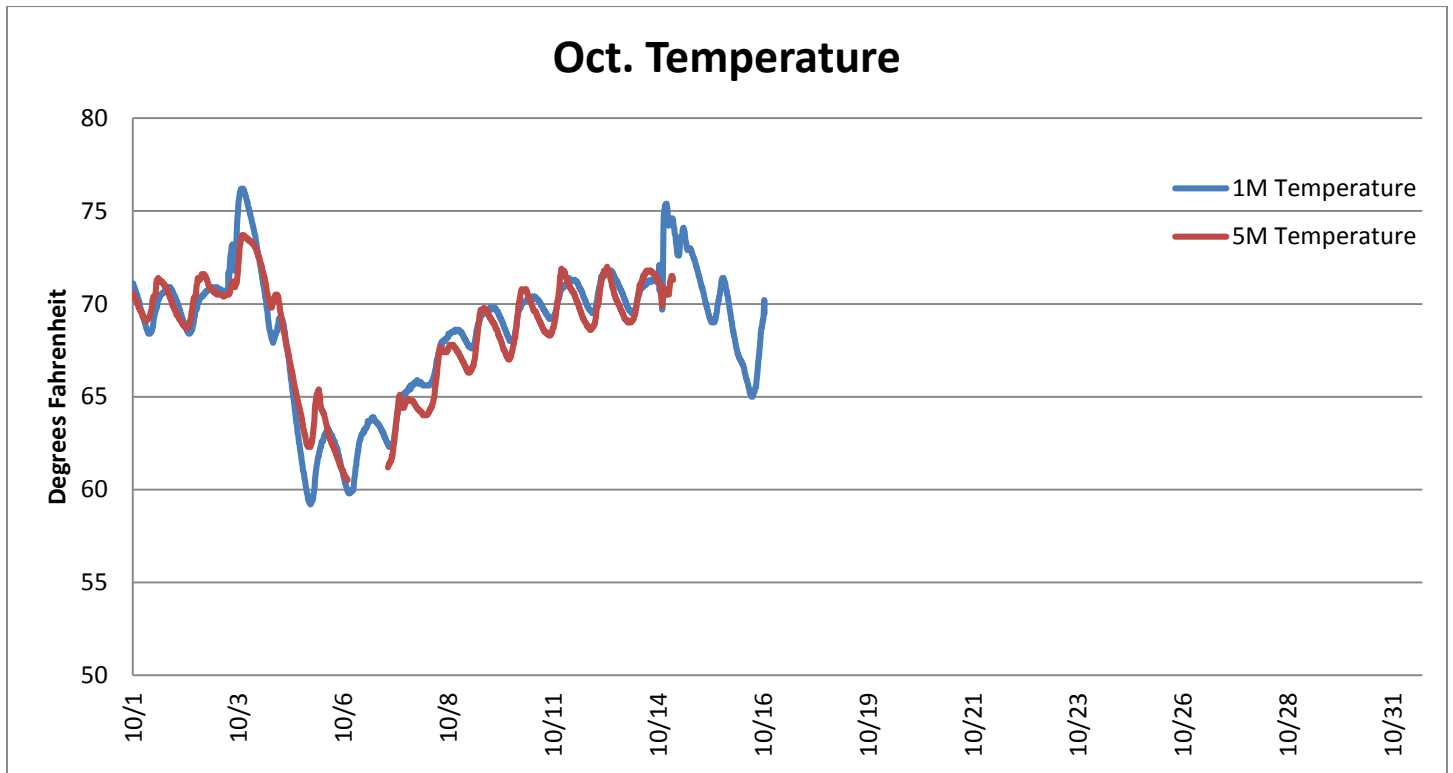
### Sep. Turbidity



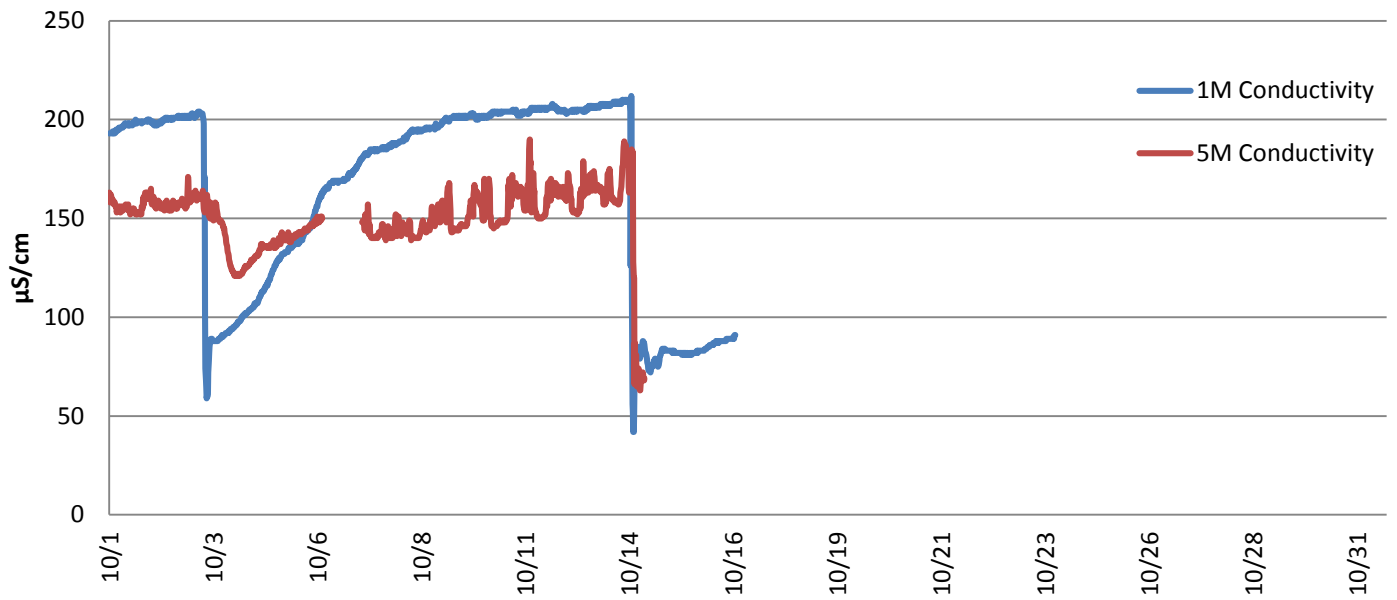
### Sep. Dissolved Oxygen



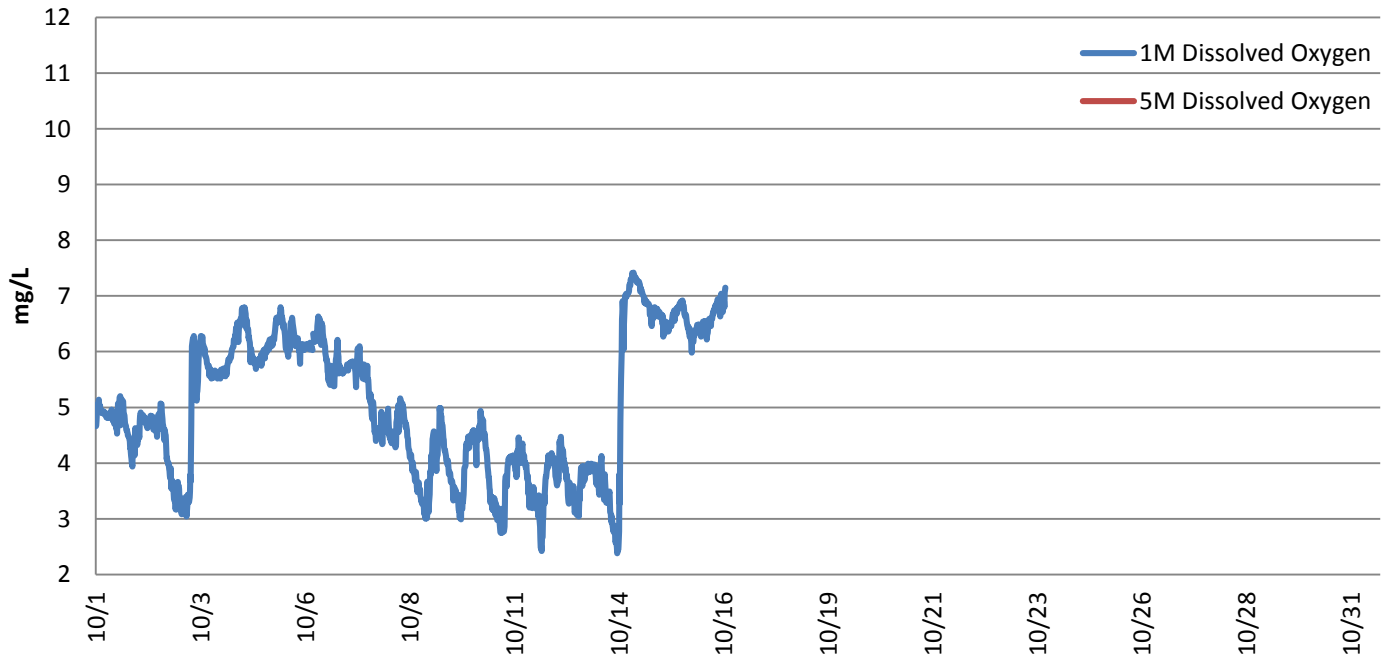
October 2014



### Oct. Specific Conductance

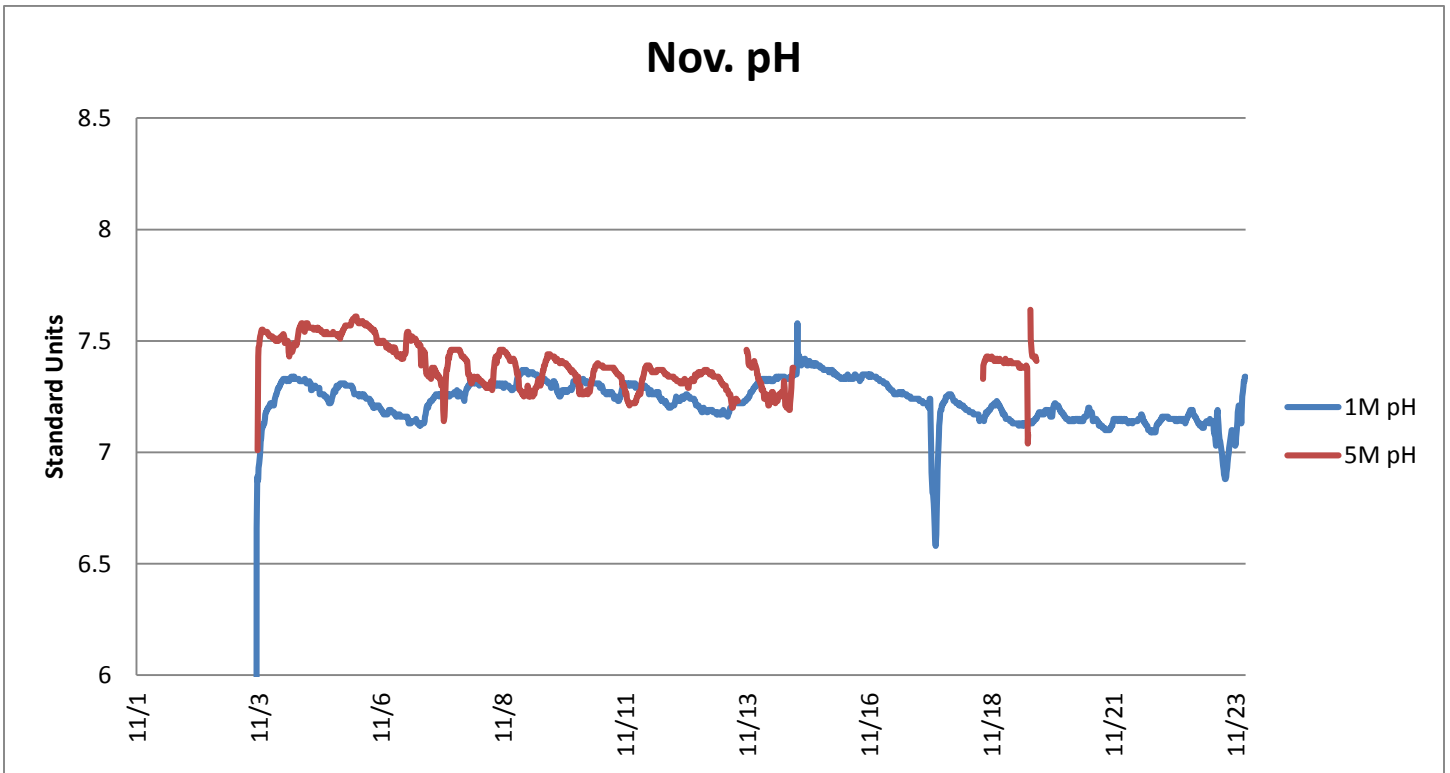
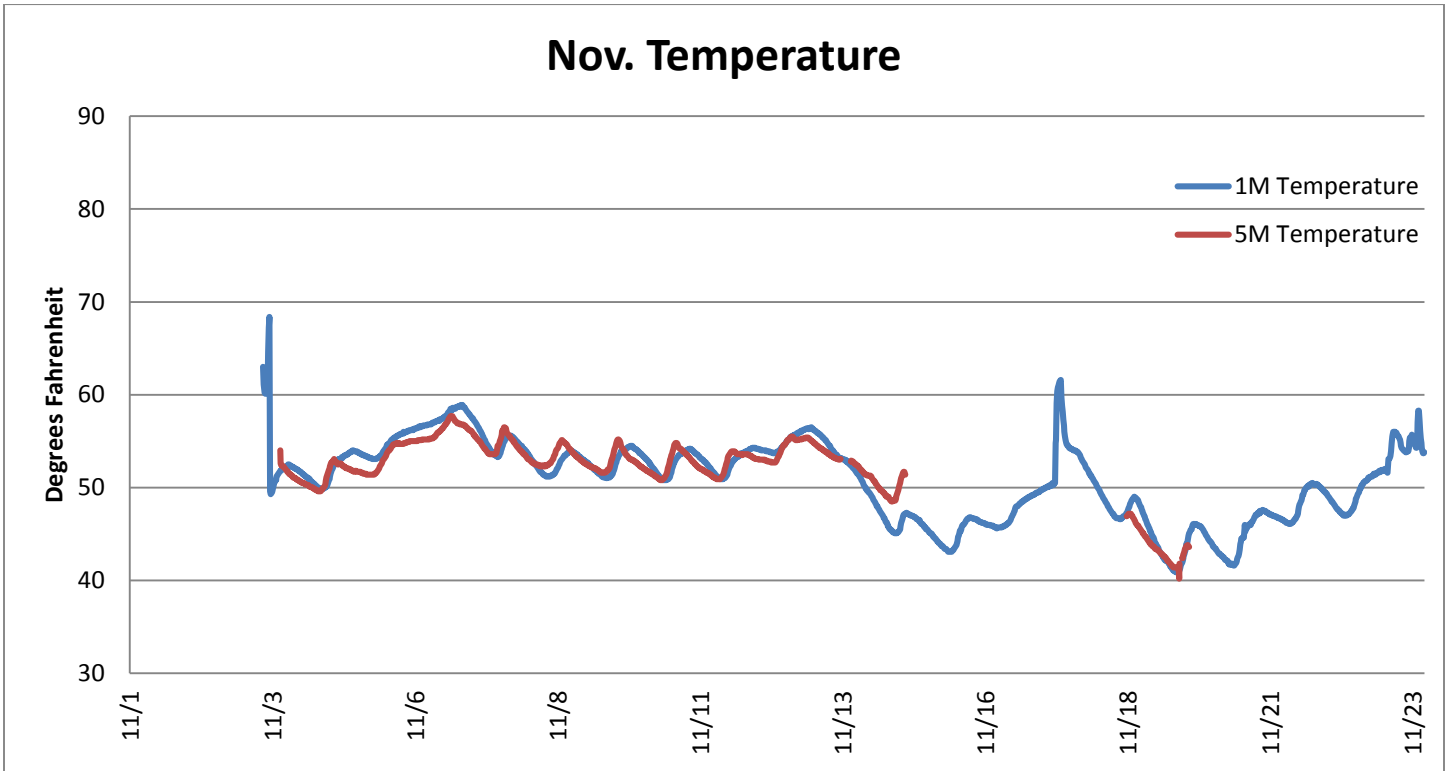


### Oct. Dissolved Oxygen

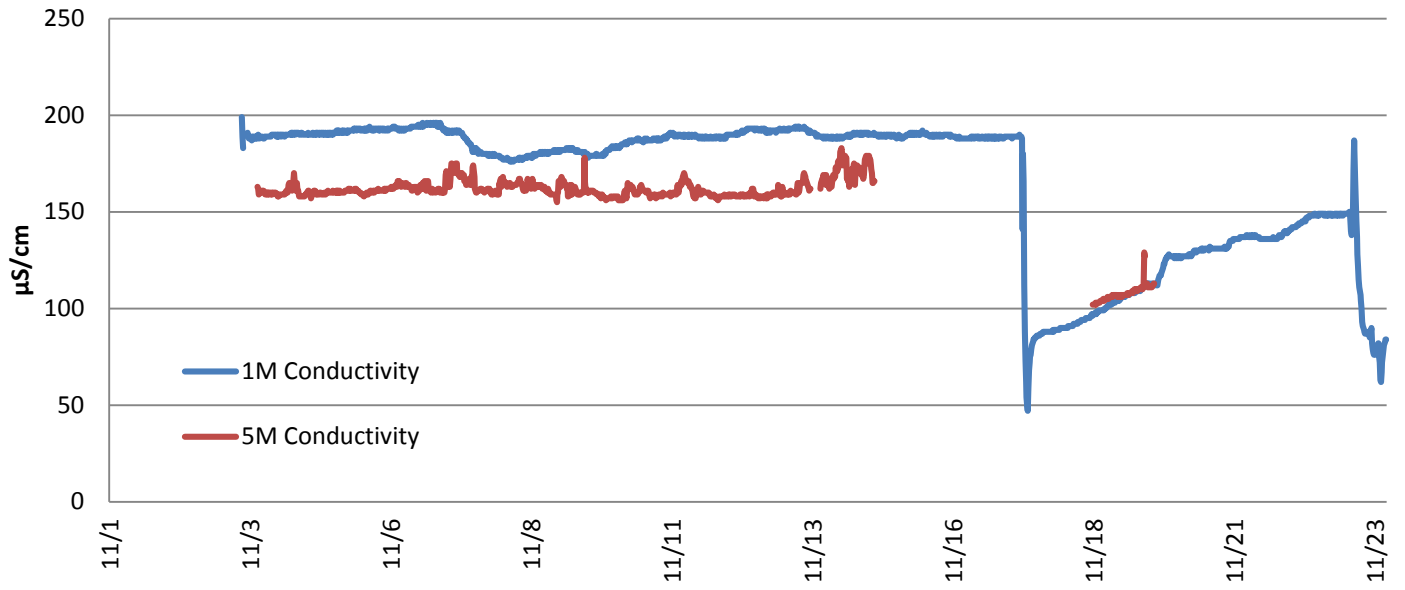




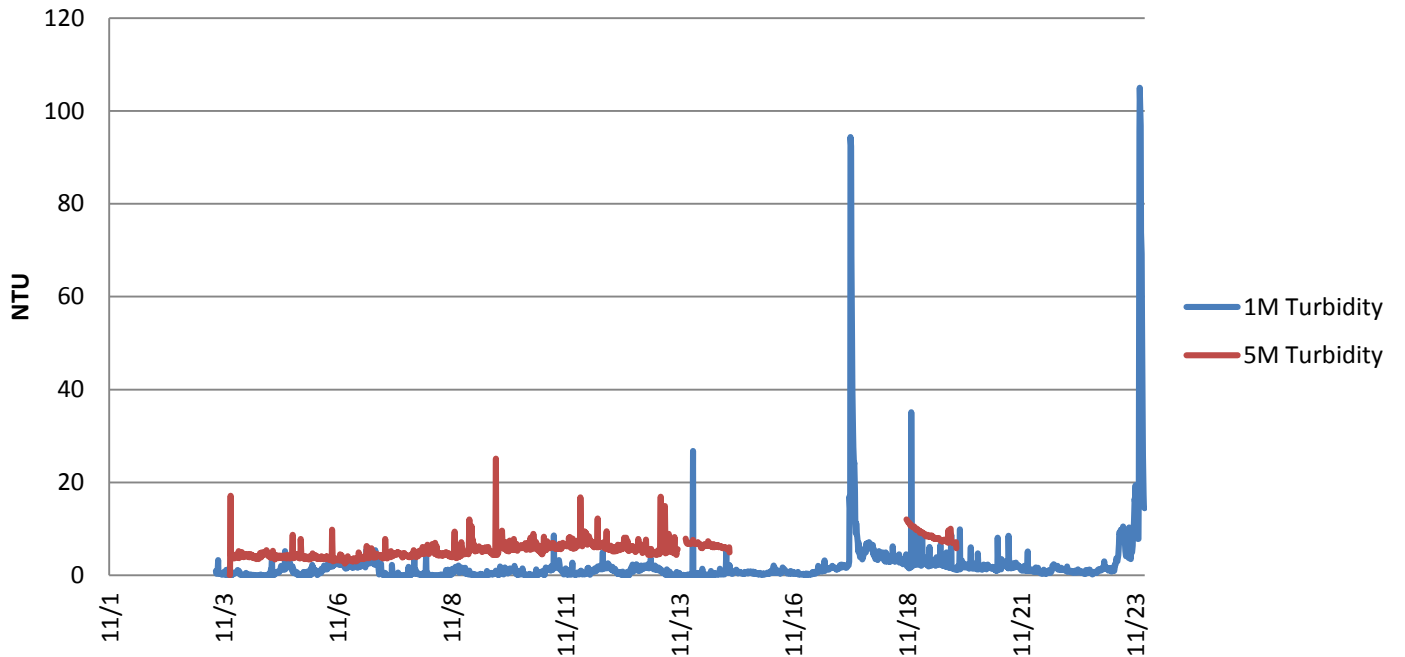
November 2014



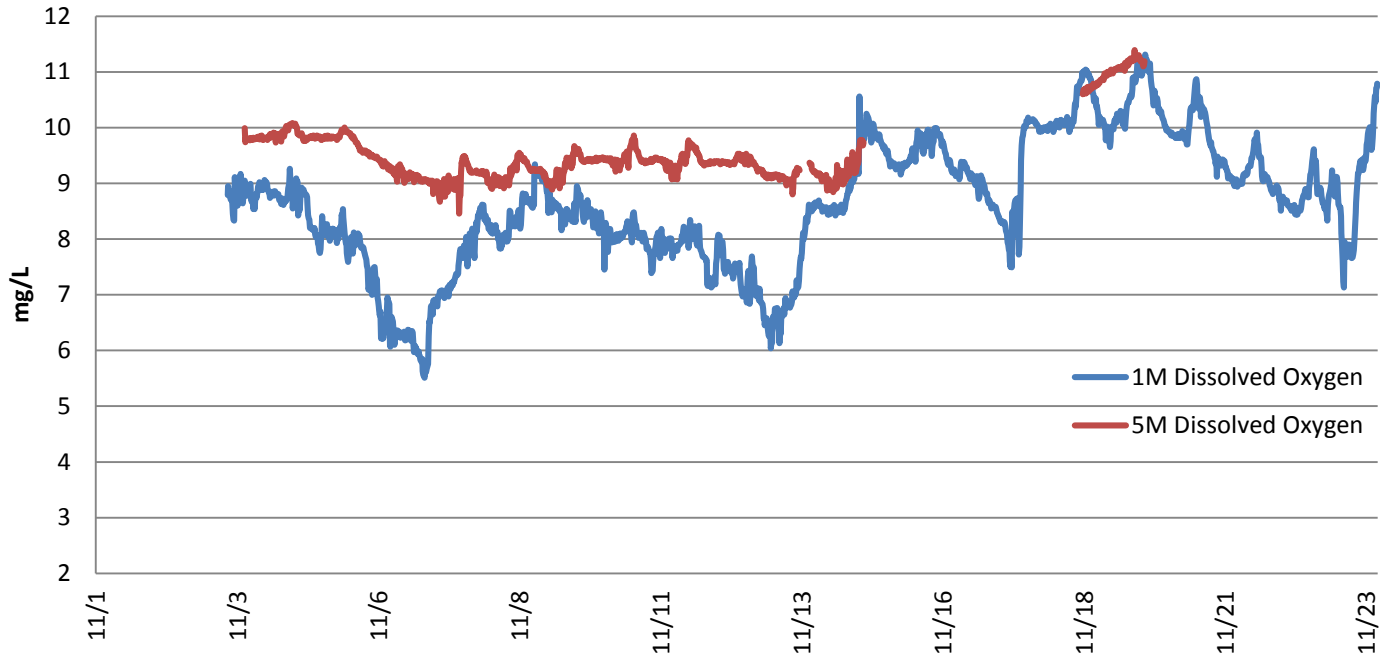
### Nov. Specific Conductance



### Nov. Turbidity

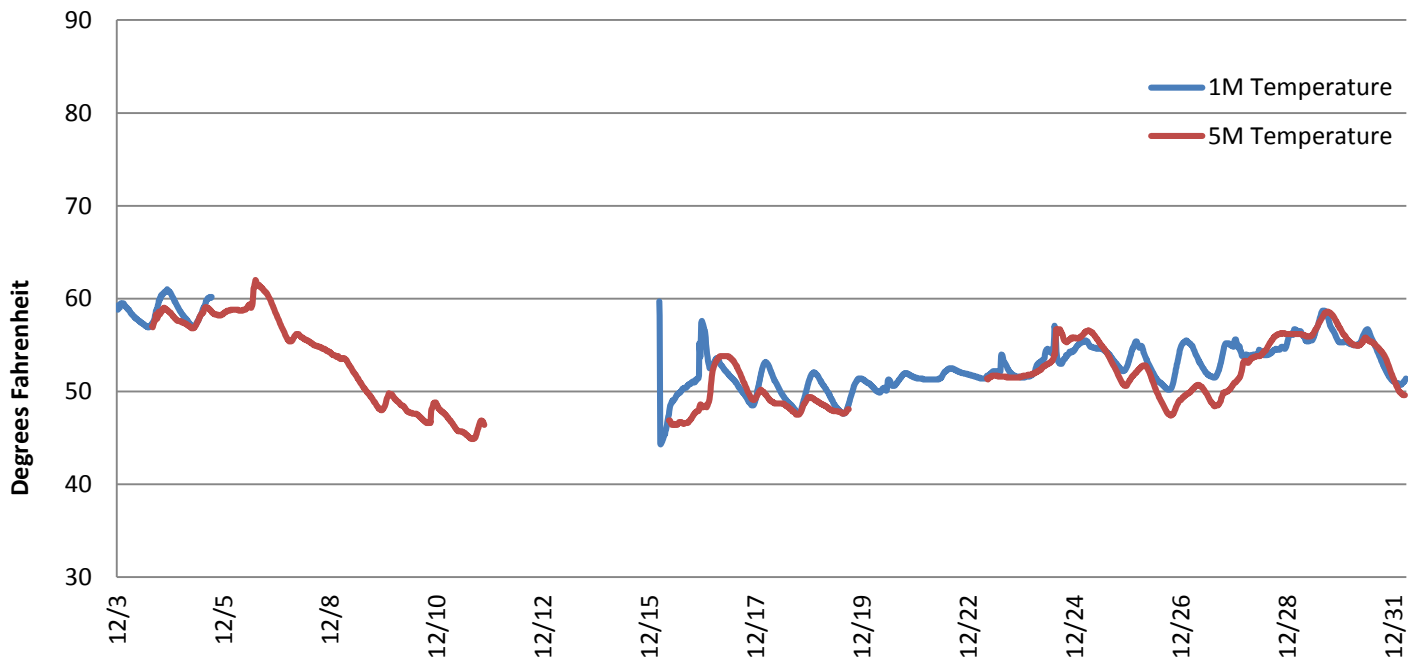


### Nov. Dissolved Oxygen

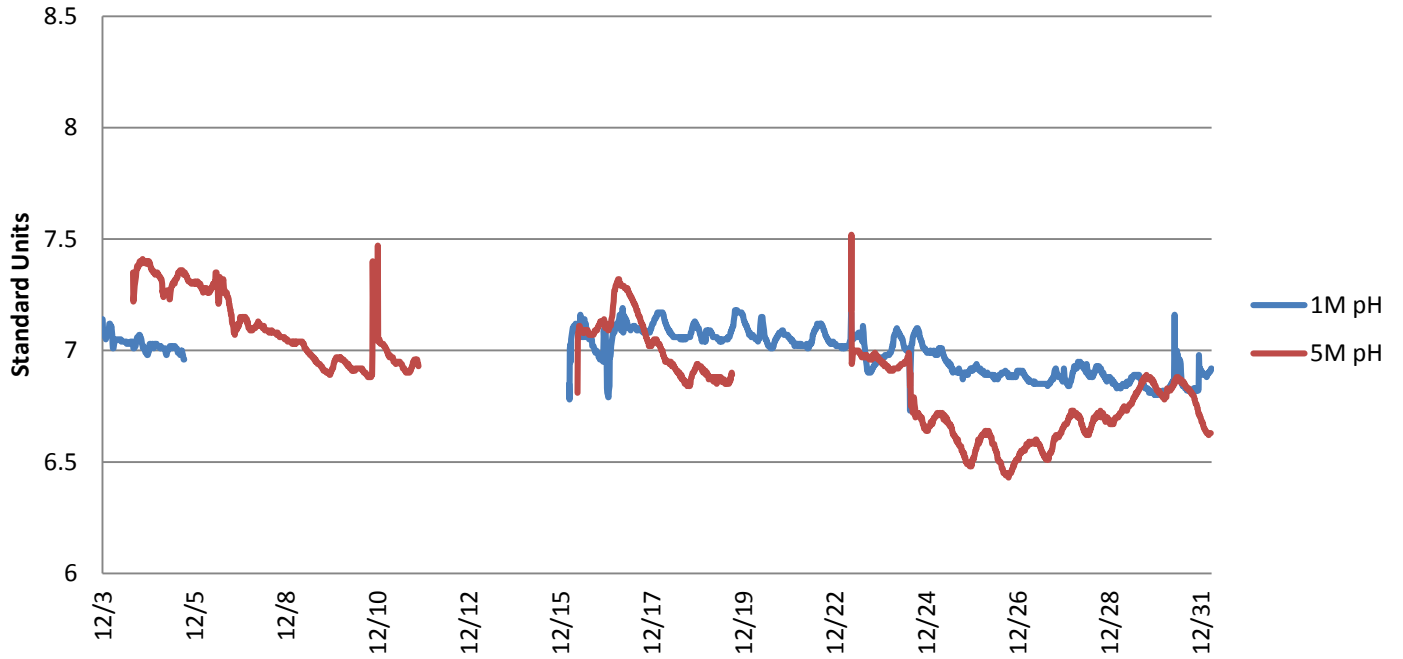


### December 2014

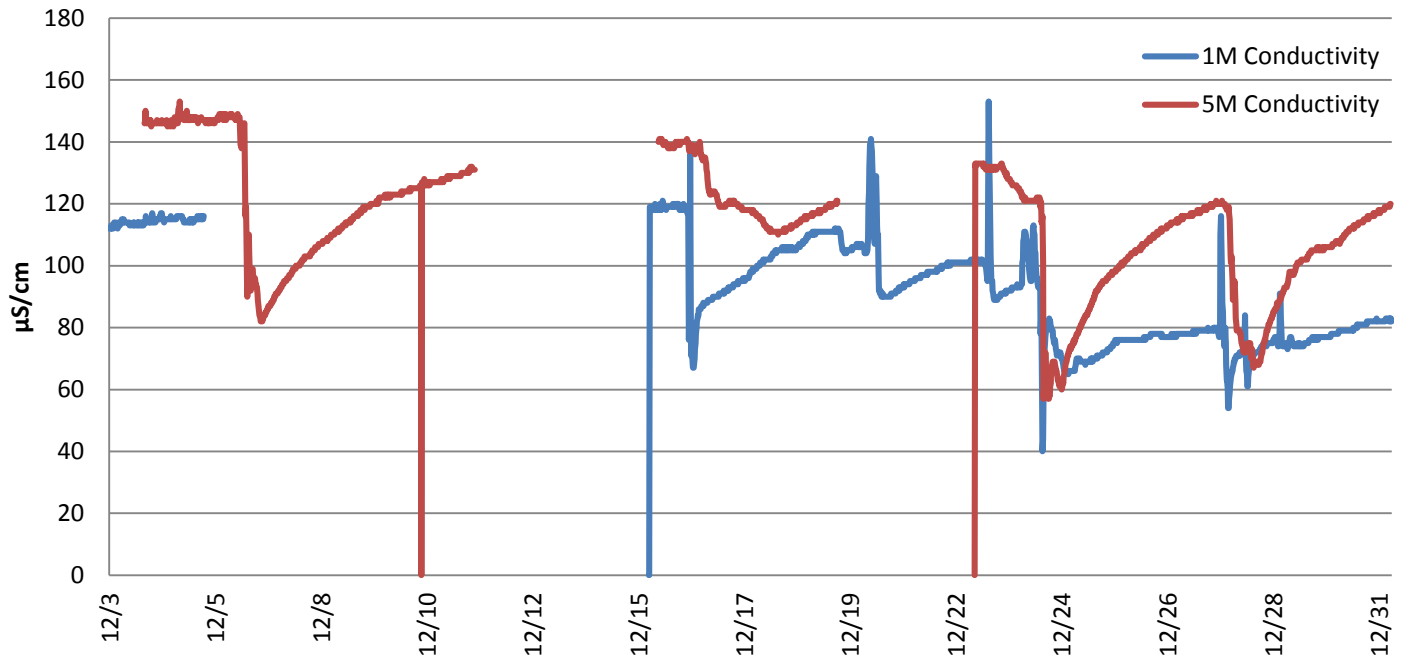
### Dec. Temperature



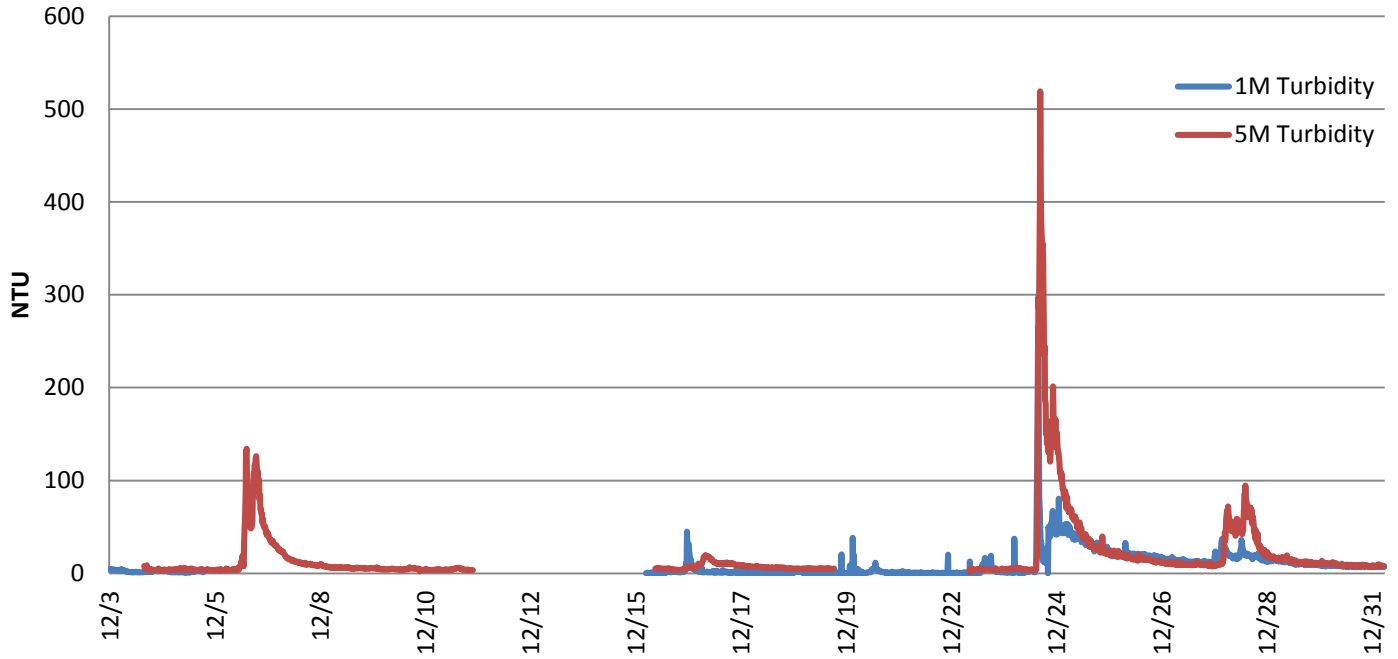
### Dec. pH



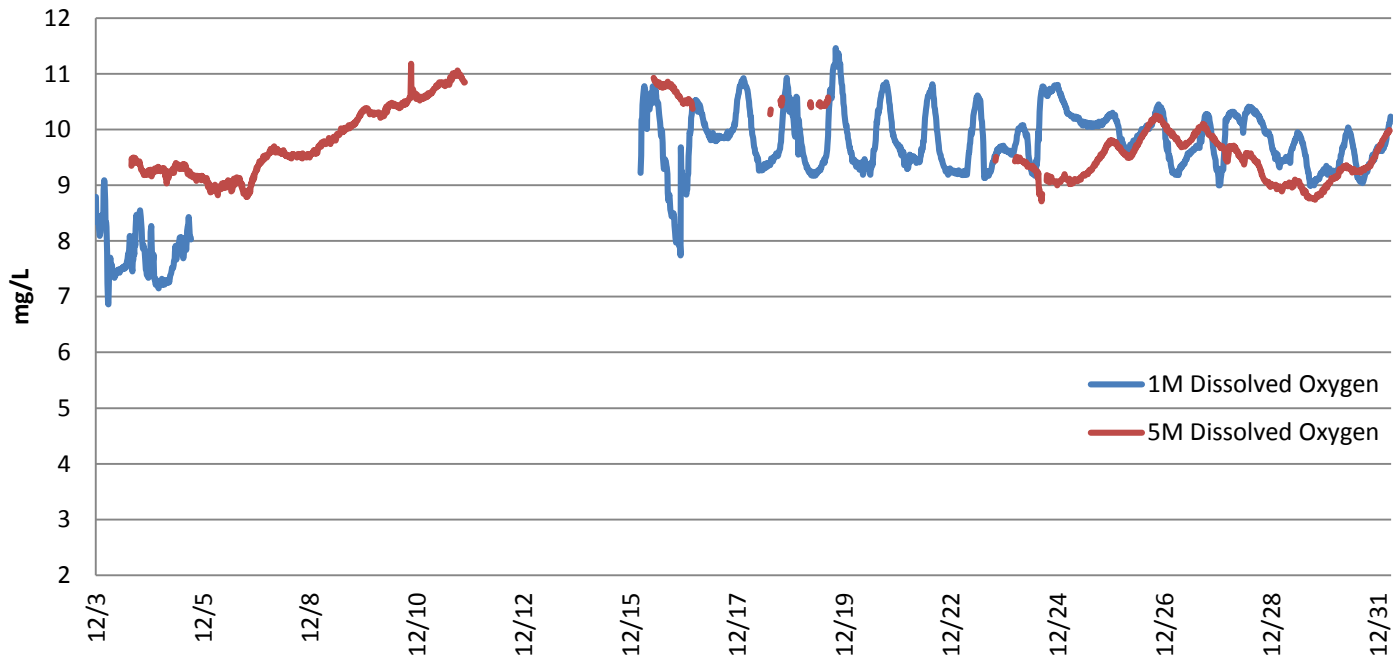
### Dec. Specific Conductance



### Dec. Turbidity



### Dec. Dissolved Oxygen



## 4.0 WPCF Dissolved Oxygen Monitoring

### 4.1 Purpose

As an expansion of the Water Resource Management Department's water quality monitoring program, staff began collecting in-stream dissolved oxygen data upstream and downstream of both WPCF's effluent discharge points beginning in August of 2006. This monitoring provides valuable data assuring that the effluent discharged from Auburn's WPCFs is not causing decreases in the dissolved oxygen content of Parkerson's Mill or Saugahatchee Creek during the critical summer months. Monitoring at the Northside WPCF was discontinued in 2013 due to closure of the plant. Monitoring is performed on a frequent basis (almost daily) using a YSI (Clark Cell) and/or Hach (LDO) dissolved oxygen probe at points both upstream and downstream of each effluent discharge location.

### 4.2 Definition and Methods

As noted above, dissolved oxygen measurements are taken with a YSI (Clark Cell) and/or HACH (Luminescent Dissolved Oxygen) probe.

- Dissolved Oxygen – This is the amount of oxygen that has been dissolved in the water column, which comes from both the atmosphere and photosynthesis by aquatic plants.

### 4.3 Monitoring Stations

**H.C. Morgan WPCF Upstream** Latitude 32, 32, 9.89 N; Longitude 85, 30, 20.443 W

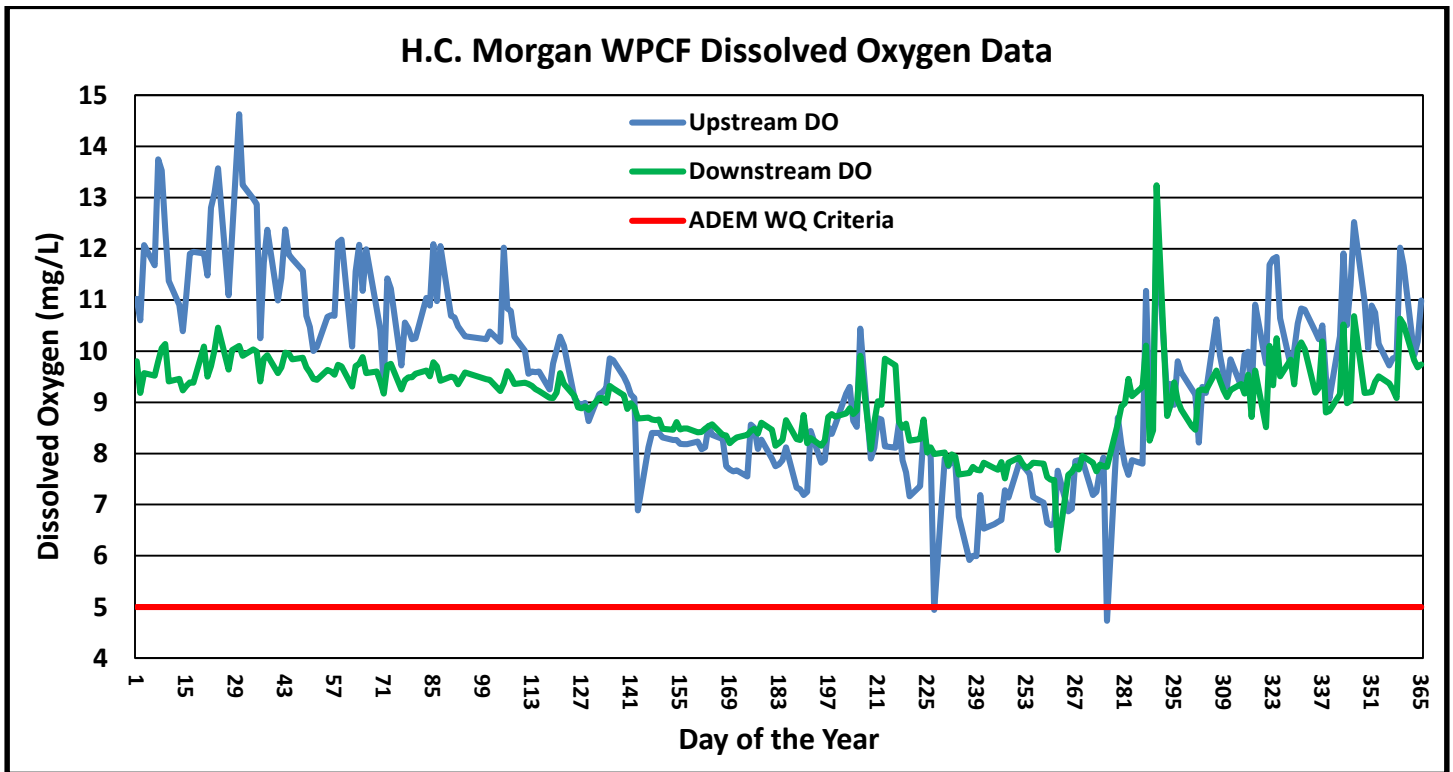
**H.C. Morgan WPCF Downstream** Latitude 32, 33, 9.077 N; Longitude 85, 30, 19.699 W

### 4.4 Data

As with previous years, monitoring of dissolved oxygen at the H.C. Morgan WPCF during the 2014 calendar year indicated a positive influence on in-stream dissolved oxygen levels during the critical summer months. The data continue to support a trend of increasing average dissolved oxygen in both Parkerson's Mill Creek and Saugahatchee Creek for the last eight years.



H.C. Morgan WPCF Dissolved Oxygen Monitoring Stations



H.C. Morgan WPCF Dissolved Oxygen Monitoring Data

H.C. Morgan WPCF Dissolved Oxygen Data January – March 2014

January, 2014					February, 2014					March, 2014				
Date	Upstream		Downstream		Date	Upstream		Downstream		Date	Upstream		Downstream	
	DO	Temp	DO	Temp		DO	Temp	DO	Temp		DO	Temp	DO	Temp
1	11.02	8.7	9.80	14.0	1					1				
2	10.60	10.0	9.18	16.7	2					2				
3	12.07	5.4	9.57	15.6	3	12.98	6.3	10.03	14.1	3	10.09	14.0	9.31	17.0
4					4	12.87	6.6	9.99	14.2	4	11.56	9.0	9.71	15.9
5					5	10.25	13.1	9.41	16.2	5	12.08	9.2	9.75	16.1
6	11.68	6.5	9.52	15.5	6	11.73	7.9	9.85	15.1	6	11.18	10.1	9.88	15.1
7	13.75	0.6	9.80	14.7	7	12.37	5.9	9.92	15.0	7	11.99	9.9	9.57	16.4
8	13.53	0.9	10.06	13.6	8					8				
9	12.38	4.1	10.14	13.5	9					9				
10	11.37	7.1	9.41	15.9	10	10.99	10.2	9.57	15.7	10	10.82	12.4	9.60	16.5
11					11	11.43	9.1	9.68	15.6	11	10.42	12.8	9.41	16.8
12					12	12.38	6.6	9.97	14.7	12	9.33	16.4	9.17	17.5
13	10.90	9.3	9.46	15.7	13	11.89	7.0	9.95	14.2	13	11.42	9.7	9.72	16.2
14	10.39	11.5	9.23	16.4	14	11.80	7.1	9.84	14.6	14	11.22	9.9	9.75	16.4
15	11.10	8.7	9.32	16.0	15					15				
16	11.90	5.7	9.39	12.9	16					16				
17	11.94	5.9	9.38	15.8	17	11.57	8.8	9.87	15.0	17	9.72	15.1	9.25	16.6
18					18	10.69	12.4	9.68	16.1	18	10.56	12.3	9.43	16.3
19					19	10.47	13.4	9.58	16.3	19	10.44	13.2	9.49	16.7
20	11.91	5.6	10.09	13.4	20	10.00	15.0	9.46	16.6	20	10.23	14.3	9.49	17.0
21	11.48	7.3	9.50	15.7	21	10.08	15.1	9.44	16.9	21	10.25	14.7	9.56	17.2
22	12.80	3.6	9.71	15.1	22					22				
23	13.09	3.6	10.02	15.0	23					23				
24	13.57	2.3	10.46	13.8	24	10.67	13.0	9.63	16.4	24	11.04	11.8	9.62	16.8
25					25	10.70	12.5	9.60	16.5	25	10.89	12.0	9.51	17.2
26					26	10.69	11.8	9.54	16.5	26	12.09	8.3	9.78	16.5
27	11.09	8.2	9.64	15.5	27	12.12	7.1	9.73	15.7	27	10.98	9.8	9.70	17.0
28	12.27	5.3	10.02	14.4	28	12.18	7.1	9.70	15.7	28	12.05	14.0	9.42	17.6
29					29					29				
30	14.63	1.1	10.10	14.2	30					30				
31	13.25	3.2	9.91	13.0	31					31	10.69	12.5	9.50	16.7
<b>Avg.</b>	12.12	5.66	9.71	14.84	<b>Avg.</b>	11.39	9.80	9.72	15.56	<b>Avg.</b>	10.91	11.97	9.55	16.64
<b>Min</b>	10.39	0.60	9.18	12.90	<b>Min</b>	10.00	5.90	9.41	14.10	<b>Min</b>	9.33	8.30	9.17	15.10
<b>Max</b>	14.63	11.50	10.46	16.70	<b>Max</b>	12.98	15.10	10.03	16.90	<b>Max</b>	12.09	16.40	9.88	17.60



H.C. Morgan WPCF Dissolved Oxygen Data April – June 2014

April, 2014					May, 2014					June, 2014				
Date	Upstream		Downstream		Date	Upstream		Downstream		Date	Upstream		Downstream	
	DO	Temp	DO	Temp		DO	Temp	DO	Temp		DO	Temp	DO	Temp
1	10.66	13.4	9.48	17.0	1	10.28	17.9	9.57	18.6	1				
2	10.48	13.7	9.35	18.2	2	10.10	18.0	9.36	19.0	2	8.26	22.2	8.46	22.4
3					3					3	8.26	22.2	8.61	22.6
4	10.29	14.1	9.58	18.0	4					4	8.19	22.3	8.47	22.0
5					5	9.08	18.7	9.12	18.8	5	8.18	22.9	8.49	23.1
6					6	8.98	19.0	8.90	18.8	6	8.18	22.9	8.49	23.1
7					7	8.95	19.1	8.88	19.5	7				
8					8	8.99	19.6	8.92	20.6	8				
9					9	8.63	21.3	8.85	21.3	9	8.23	24.2	8.41	24.1
10	10.23	14.1	9.45	17.1	10					10	8.08	24.4	8.42	24.0
11	10.38	14.3	9.44	17.9	11					11	8.12	24.0	8.48	23.5
12					12	9.16	21.1	9.08	21.2	12	8.54	22.3	8.53	23.2
13					13	9.20	20.9	9.08	21.4	13	8.36	22.1	8.57	23.2
14	10.18	15.2	9.22	18.0	14	9.28	21.0	8.99	21.8	14				
15	12.02	14.6	9.37	16.9	15	9.86	17.6	9.32	19.6	15				19.6
16	10.83	11.8	9.61	16.6	16	9.82	17.6	9.27	20.4	16	8.28	23.6	8.36	24.0
17	10.78	12.0	9.50	17.3	17					17	7.75	24.5	8.35	24.1
18	10.28	13.7	9.36	17.8	18					18	7.69	24.6	8.20	24.3
19					19	9.50	20.8	9.14	21.1	19	7.65	24.6	8.26	24.5
20					20	9.36	20.9	8.87	21.5	20	7.67	24.8	8.31	24.7
21	10.01	15.0	9.38	18.2	21	9.15	20.7	8.98	21.2	21				
22	9.56	16.6	9.36	18.3	22	9.08	20.6	8.90	21.5	22				
23	9.60	16.9	9.32	17.5	23	6.89	21.2	8.68	21.5	23	7.55	24.3	8.36	24.6
24	9.59	16.6	9.26	18.3	24					24	8.56	24.0	8.44	24.5
25	9.60	16.5	9.22	18.0	25					25	8.50	23.3	8.48	23.9
26					26	8.12	22.5	8.70	22.1	26	8.09	24.2	8.39	24.6
27					27	8.40	22.9	8.66	22.5	27	8.27	24.2	8.60	24.3
28	9.25	18.8	9.09	19.8	28	8.40	22.9	8.65	21.8	28				
29	9.76	17.9	9.08	19.9	29	8.40	22.9	8.66	22.5	29				
30	10.02	17.5	9.19	19.8	30	8.31	22.5	8.48	22.5	30	7.90	25.4	8.46	25.4
31					31					31				
<b>Avg.</b>	10.20	15.15	9.35	18.03	<b>Avg.</b>	9.00	20.44	8.96	20.87	<b>Avg.</b>	8.11	23.67	8.44	23.62
<b>Min</b>	9.25	11.80	9.08	16.60	<b>Min</b>	6.89	17.60	8.48	18.60	<b>Min</b>	7.55	22.10	8.20	19.60
<b>Max</b>	12.02	18.80	9.61	19.90	<b>Max</b>	10.28	22.90	9.57	22.50	<b>Max</b>	8.56	25.40	8.61	25.40

H.C. Morgan WPCF Dissolved Oxygen Data July – September 2014

July, 2014					August, 2014					September, 2014				
Date	Upstream		Downstream		Date	Upstream		Downstream		Date	Upstream		Downstream	
	DO	Temp	DO	Temp		DO	Temp	DO	Temp		DO	Temp	DO	Temp
1	7.75	25.4	8.15	25.7	1	8.14	23.7	9.85	25.4	1	6.62	25.4	7.71	25.9
2	7.79	25.4	8.20	25.6	2					2	6.66	25.5	7.68	25.8
3	7.87	25.2	8.26	25.0	3					3	6.70	26.0	7.83	27.0
4	8.12	23.3	8.65	24.6	4	8.11	23.8	9.72	25.3	4	7.28	24.8	7.51	26.5
5					5	8.60	24.3	8.62	25.4	5	7.14	24.4	7.82	26.6
6					6	7.87	24.2	8.50	25.6	6				
7	7.33	24.3	8.28	24.6	7	7.63	24.8	8.58	25.7	7				
8	7.30	24.4	8.26	25.0	8	7.16	25.6	8.25	26.1	8	7.80	24.0	7.92	26.5
9	7.19	25.0	8.75	25.4	9					9	7.76	24.2	7.80	26.6
10	7.25	25.0	8.20	25.2	10					10	7.69	25.0	7.72	26.2
11	8.44	24.3	8.30	25.1	11	7.36	24.9	8.28	25.6	11	7.60	25.9	7.75	26.0
12					12	8.40	25.0	8.66	25.5	12	7.15	25.1	7.82	27.2
13					13	8.10	25.1	8.02	25.7	13				
14	7.82	25.4	8.15	25.4	14	7.95	24.0	8.12	24.9	14				
15	7.87	25.3	8.25	25.4	15	4.94	22.7	7.99	25.8	15	7.04	25.1	7.80	25.8
16	8.51	24.2	8.71	25.4	16					16	6.64	24.8	7.54	26.4
17	8.38	22.7	8.77	25.1	17					17	6.60	24.8	7.49	25.8
18	8.56	22.3	8.72	25.1	18	7.90	22.8	8.02	24.0	18	6.62	24.6	7.48	25.5
19					19	7.75	23.2	7.77	24.6	19	7.66	26.3	6.11	27.7
20					20	7.86	24.2	7.98	24.7	20				
21	9.17	23.9	8.78	24.9	21	7.80	24.8	7.94	25.1	21				
22	9.30	24.0	8.88	24.4	22	6.76	25.5	7.59	26.5	22	6.87	21.8	7.58	24.7
23	8.64	23.6	8.77	24.6	23					23	6.92	19.6	7.64	24.2
24	8.52	24.1	8.84	25.3	24					24	7.85	19.7	7.75	24.3
25	10.44	24.8	9.91	25.5	25	5.92	25.7	7.62	26.5	25	7.87	19.9	7.69	24.4
26					26	6.00	25.9	7.74	26.2	26	7.87	20.1	7.95	24.8
27					27	5.99	23.2	7.68	24.9	27				
28	7.90	26.3	8.08	25.9	28	7.19	26.1	7.67	26.1	28				
29	8.11	24.1	8.61	25.4	29	6.53	23.6	7.82	26.4	29	7.19	22.1	7.82	25.5
30	8.69	21.7	9.02	25.1	30					30	7.25	21.4	7.65	25.2
31	8.66	21.9	8.95	24.4	31					31				
<b>Avg.</b>	8.24	24.20	8.59	25.13	<b>Avg.</b>	7.33	24.43	8.21	25.52	<b>Avg.</b>	7.22	23.66	7.64	25.85
<b>Min</b>	7.19	21.70	8.08	24.40	<b>Min</b>	4.94	22.70	7.59	24.00	<b>Min</b>	6.60	19.60	6.11	24.20
<b>Max</b>	10.44	26.30	9.91	25.90	<b>Max</b>	8.60	26.10	9.85	26.50	<b>Max</b>	7.87	26.30	7.95	27.70

H.C. Morgan WPCF Dissolved Oxygen Data October – December 2014

October, 2014					November, 2014					December, 2014				
Date	Upstream		Downstream		Date	Upstream		Downstream		Date	Upstream		Downstream	
	DO	Temp	DO	Temp		DO	Temp	DO	Temp		DO	Temp	DO	Temp
1	7.67	21.9	7.78	25.3	1					1	10.38	10.8	9.19	17.9
2	7.92	21.6	7.75	26.0	2					2	10.23	11.3	9.28	18.7
3	4.73	22.6	7.74	26.1	3	10.62	10.7	9.62	20.8	3	10.50	13.9	10.19	19.4
4					4	9.92	12.8	9.42	21.0	4	9.50	14.8	8.80	19.8
5					5	9.56	14.4	9.24	21.5	5	9.07	14.8	8.83	20.1
6	8.70	15.9	8.59	23.0	6	9.30	16.4	9.10	22.0	6				
7	8.16	17.6	8.92	23.4	7	9.84	13.8	9.24	21.7	7				
8	7.79	19.5	8.98	23.7	8					8	10.29	11.4	9.16	18.5
9	7.58	20.7	9.46	24.7	9					9	11.91	9.0	10.52	18.2
10	7.87	21.3	9.12	24.1	10	9.32	13.5	9.36	20.9	10	10.51	9.7	8.98	18.7
11					11	9.93	13.8	9.17	20.9	11	11.28	8.0	9.03	18.7
12					12	9.99	13.2	9.54	20.7	12	12.52	7.4	10.68	17.7
13	7.80	21.7	9.30	24.6	13	9.11	13.4	8.71	21.3	13				
14	11.18	21.6	10.11	24.5	14	10.91	11.2	9.62	19.9	14				
15	8.92	18.1	8.25	23.7	15					15	10.97	8.1	9.18	
16	9.13	16.5	8.45	23.0	16					16	10.05	11.7	9.19	17.5
17	12.27	15.9	13.24	22.8	17	9.76	13.8	8.51	20.8	17	10.89	8.7	9.20	17.6
18					18	11.69	9.0	10.10	18.8	18	10.75	9.2	9.40	17.7
19					19	11.80	5.0	9.33	18.7	19	10.14	10.1	9.51	17.9
20	9.13	15.9	8.73	22.9	20	11.84	7.1	10.25	18.1	20				
21	9.36	15.6	8.95	22.8	21	10.64	11.3	9.51	19.8	21				
22	8.95	16.6	9.39	22.7	22					22	9.72	12.6	9.37	16.9
23	9.80	14.6	9.03	22.9	23					23	9.86	13.0	9.25	16.8
24	9.58	14.5	8.86	22.9	24	9.72	17.1	9.83	19.1	24	9.89	14.2	9.08	17.3
25					25	10.02	14.0	9.35	18.2	25	12.02	11.5	10.63	15.2
26					26	10.54	13.6	10.04	19.1	26	11.67	16.3	10.52	16.7
27	9.26	15.8	8.53	22.6	27	10.83	11.2	10.17	18.6	27				
28	9.15	16.0	8.46	22.8	28	10.81	10.4	10.04	17.7	28				
29	8.21	17.7	9.23	22.9	29					29	9.92	14.9	9.82	15.9
30	9.30	15.9	9.25	22.7	30					30	10.19	13.7	9.68	16.3
31	9.18	13.9	9.23	21.5	31					31	10.99	10.0	9.74	16.7
<b>Avg.</b>	8.77	17.89	9.02	23.55	<b>Avg.</b>	10.31	12.29	9.51	19.98	<b>Avg.</b>	10.58	11.53	9.53	17.74
<b>Min</b>	4.73	13.90	7.74	21.50	<b>Min</b>	9.11	5.00	8.51	17.70	<b>Min</b>	9.07	7.40	8.80	15.20
<b>Max</b>	12.27	22.60	13.24	26.10	<b>Max</b>	11.84	17.10	10.25	22.00	<b>Max</b>	12.52	16.30	10.68	20.10

## 5.0 Sanitary Sewer Overflow Tracking

### 5.1 Purpose

Sanitary Sewer Overflows (SSO's) can occur for any number of reasons, the majority of which are from blockages due to fats, oils, grease (FOG) and/or debris, root intrusion blockages, and/or inflow and infiltration (I & I) that result in flows exceeding design capacities. Although many overflows may subside naturally, the underlying cause must be addressed to reduce the likelihood of reoccurring problems. With over 250 miles of sanitary sewer line, 5,500 manholes, and more than 50 square miles of area to cover it can be difficult to keep up with when and where overflows have occurred, which ones have been resolved, which ones are reoccurring problems, and which ones need additional attention. For this reason, the Water Resource Management Department developed a GIS tracking database to monitor SSO's and to identify areas that may need additional attention. SSO's are tracked by location, discharge, cause of blockage, receiving water body, WPCF, and reporting status (see table on next page). This database allows for efficient and timely identification and prioritization of where I & I analysis may be necessary as well as where rehabilitation and/or additional capacity may be needed.

### 5.2 Definition and Methods

SSO's occur when untreated sanitary sewage is unintentionally discharged from sanitary sewer infrastructure. These SSO's may occur when there is a blockage in a sanitary sewer line and/or when the capacity of the sanitary sewer line is exceeded through internal or external factors. The Alabama Department of Environmental Management (ADEM) requires that owners of sanitary sewer utility infrastructure monitor for and report SSO's and the correction action(s) taken to address them. The City uses a geographic information system (GIS) database to track the occurrence of these SSO's, thus allowing for the analysis of trends and for the tracking of improvements once improvements have been made.

### 5.3 Data

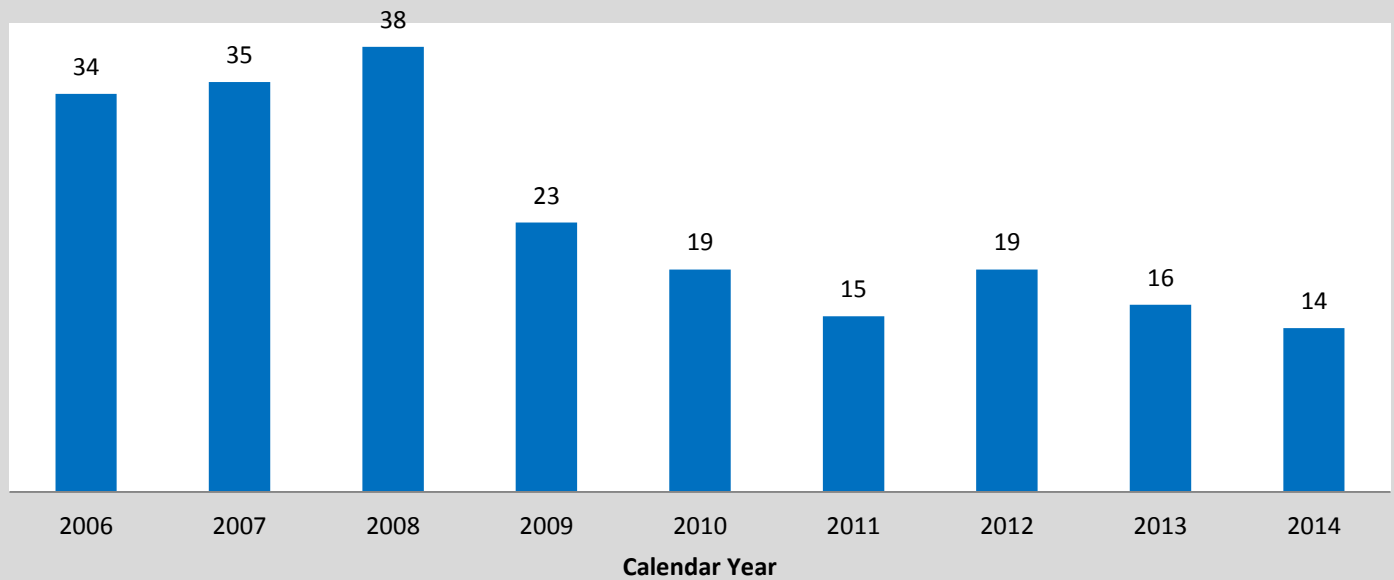
The City of Auburn has aggressively sought to make improvements to its sanitary sewer conveyance and treatment infrastructure. These improvements include upgrades to the City's WPCF's, upsizing sanitary sewer lines to increase capacity, rehabilitation of sanitary sewer lines to address inflow and infiltration (I & I), and targeted root and grease treatment. By tracking and mapping the occurrence of SSO's, the City has been able to directly document the reductions attributed to these efforts. The occurrence of SSO's has declined by 64% since 2008. The continued reduction of SSO's in 2014 is evidence that the City's proactive prevention measures are having a positive impact.

## Sanitary Sewer Overflows in 2014

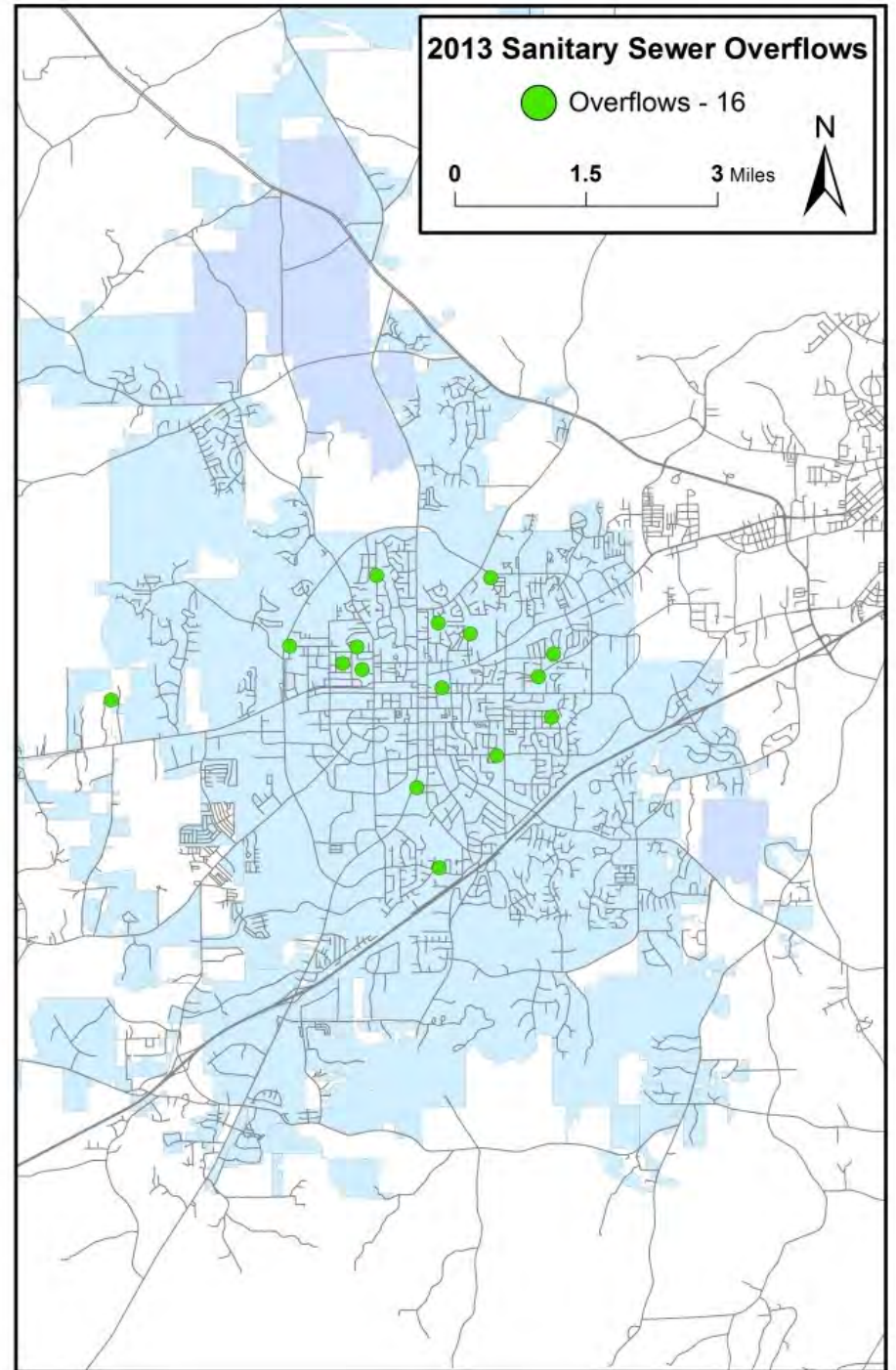
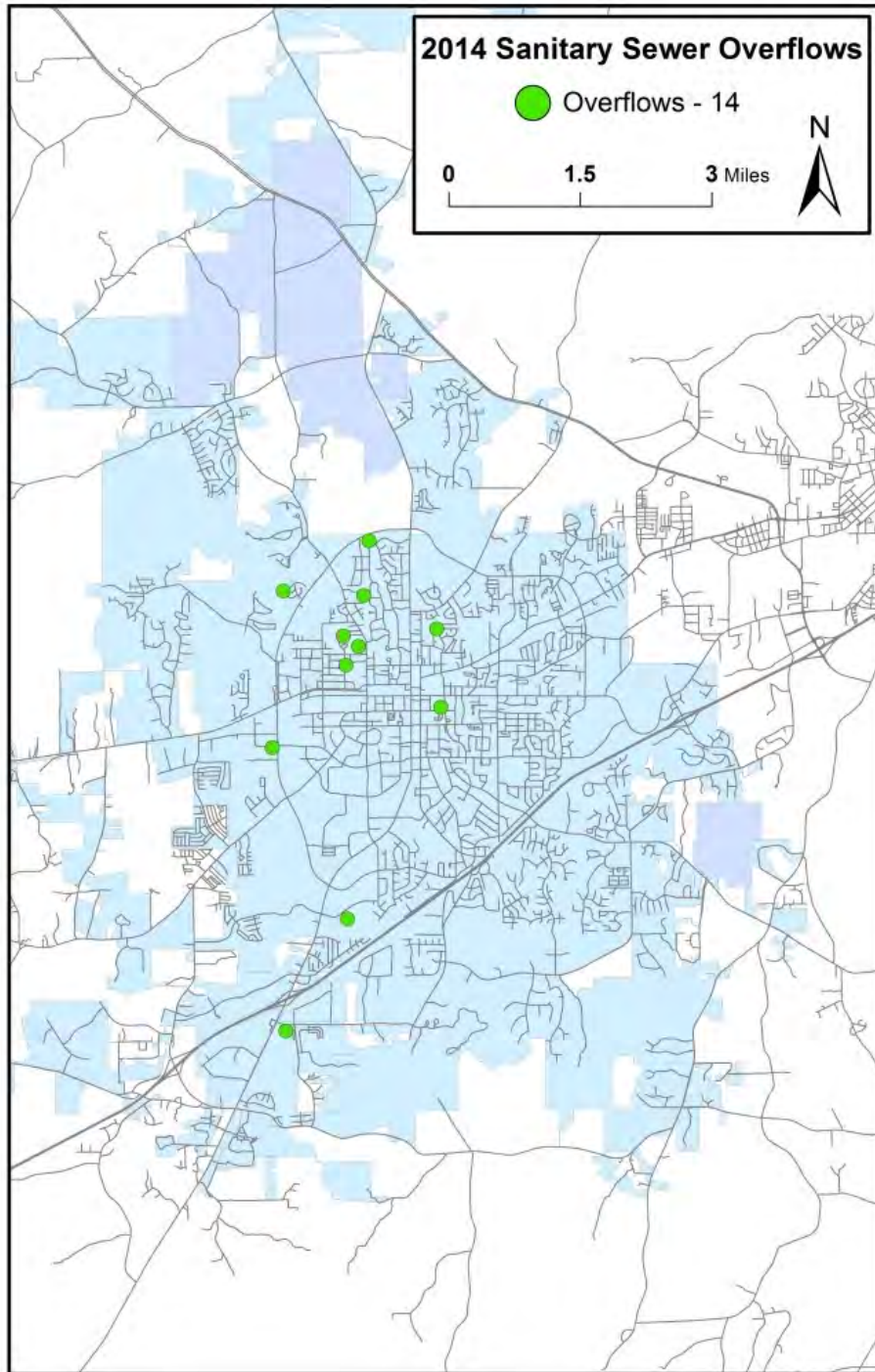
Location	Waterbody	Incidents	WWTP	Reporting	Cause	Date
308 Jack Hampton Drive	Saugahatchee Creek	2	Southside	Yes, Yes	Roots	11/08/2007, 07/14/2014
359 East Magnolia Ave	Town Creek	2	Southside	Yes, Yes	Plug	8/26/2014
535 Boykin Street	Saugahatchee Creek	1	Northside	Yes	Debris	8/12/2014
1400 Shug Jordan Pkwy	Saugahatchee Creek	2	Northside	Yes, Yes	Pipe Collapse	04/11/2014, 04/12/2014
623 Edgewood Drive	Saugahatchee Creek	1	Northside	Yes	Grease	3/14/2014
657 Westview Drive	Saugahatchee Creek	1	Northside	Yes	Debris	3/21/2014
1204 Northlake Drive	Saugahatchee Creek	1	Northside	Yes	Debris	3/28/2014
1501 West Samford Ave	Parkerson's Mill Creek	1	Southside	Yes	Debris	3/24/2014
1717 South College St	Town Creek	1	Southside	Yes	Debris	3/31/2014
826 Shell Toomer Pkwy	Parkerson's Mill Creek	1	Southside	Yes		7/25/2014
505 Greentree Terrace	Saugahatchee Creek	1	Northside	Yes		3/3/2014

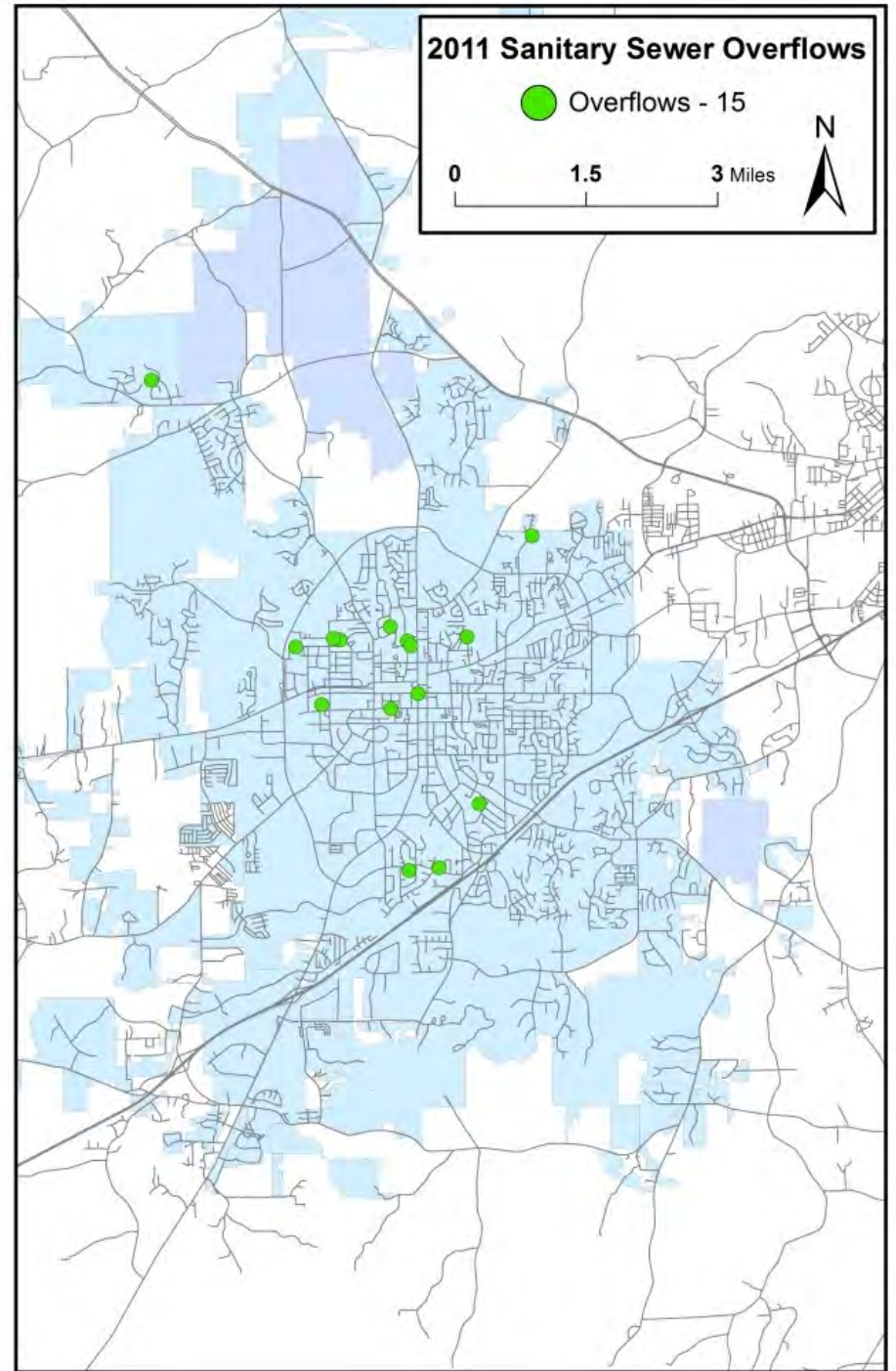
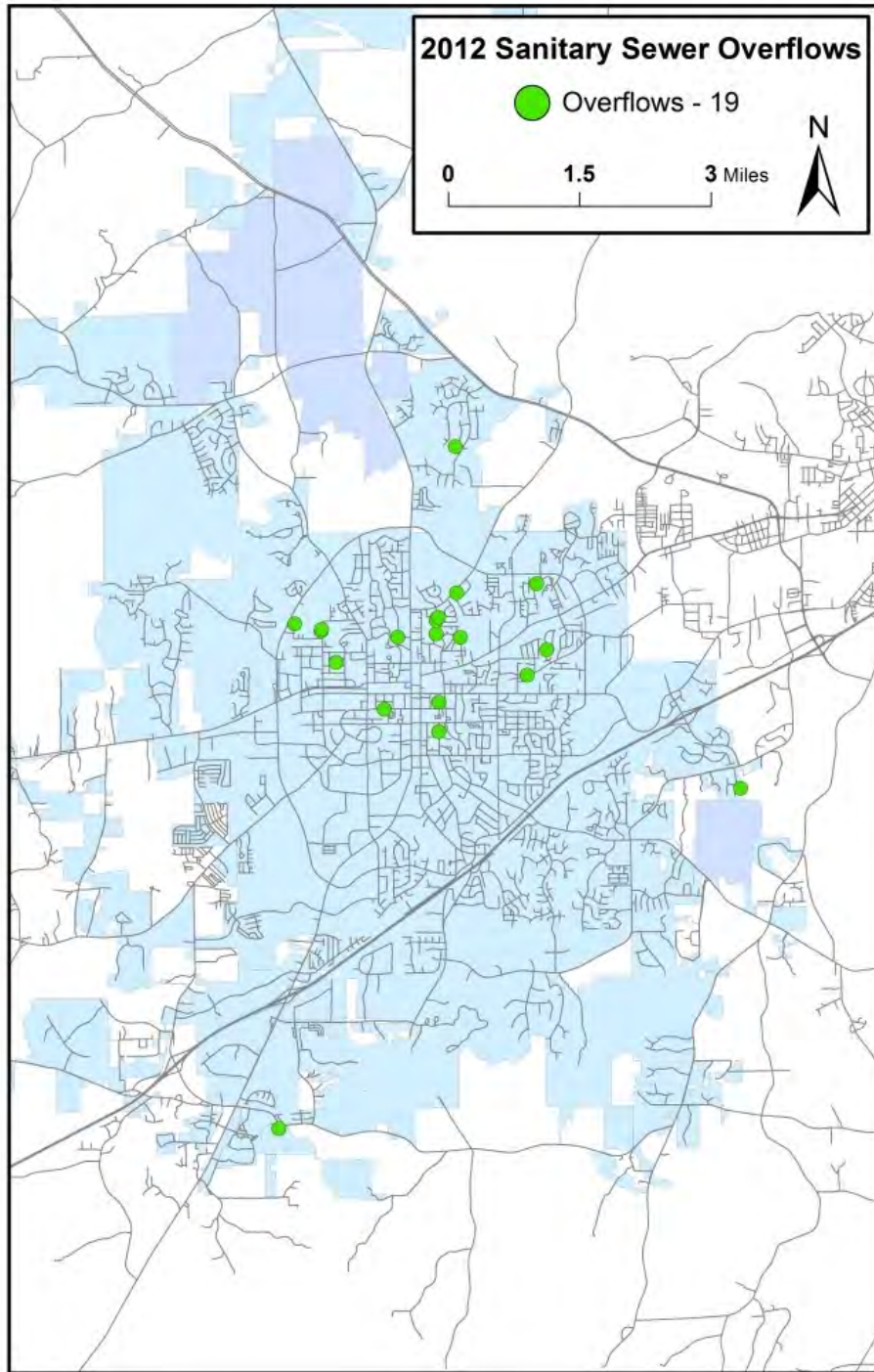
### Sanitary Sewer Overflows - 2006-2014

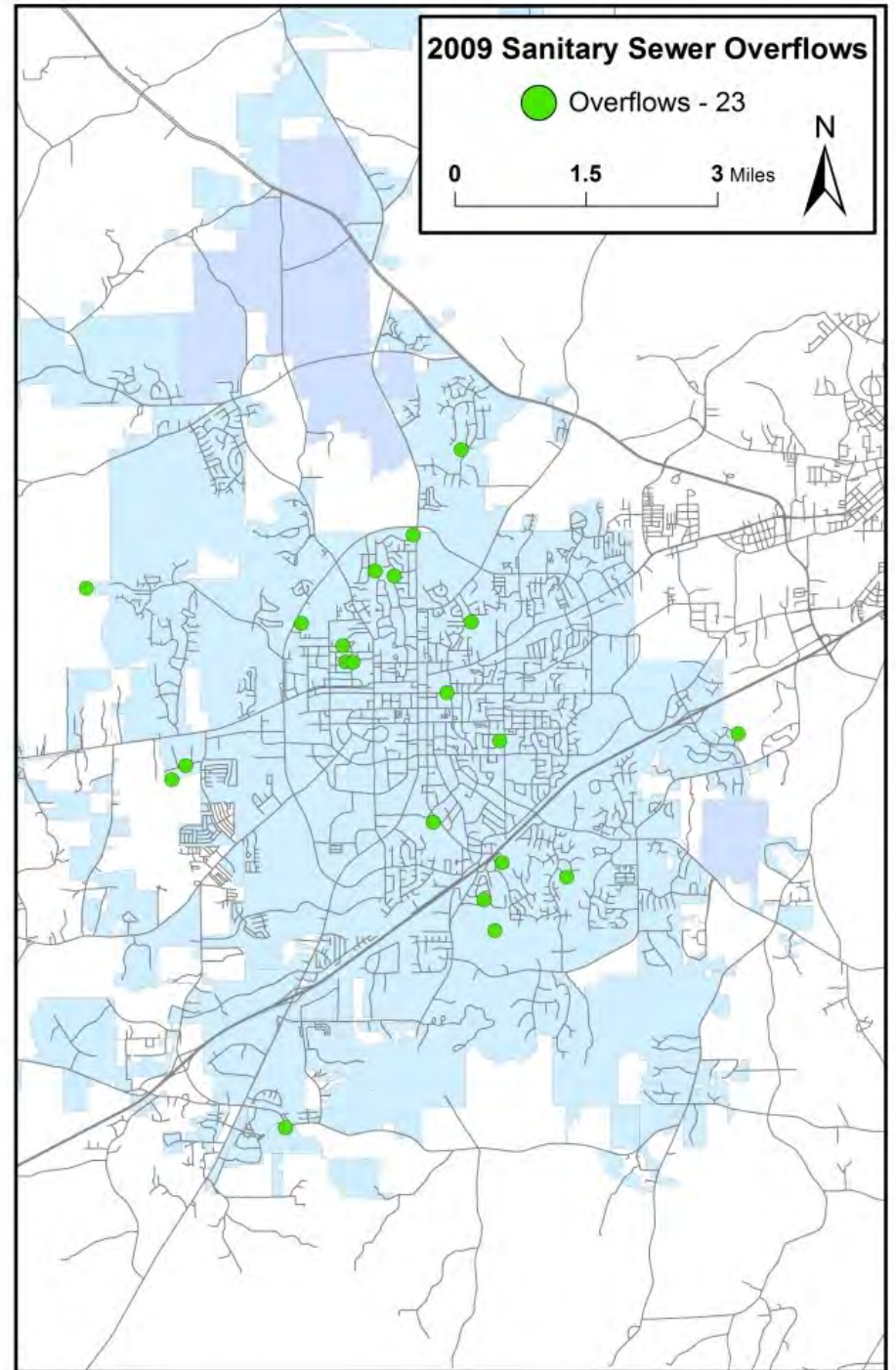
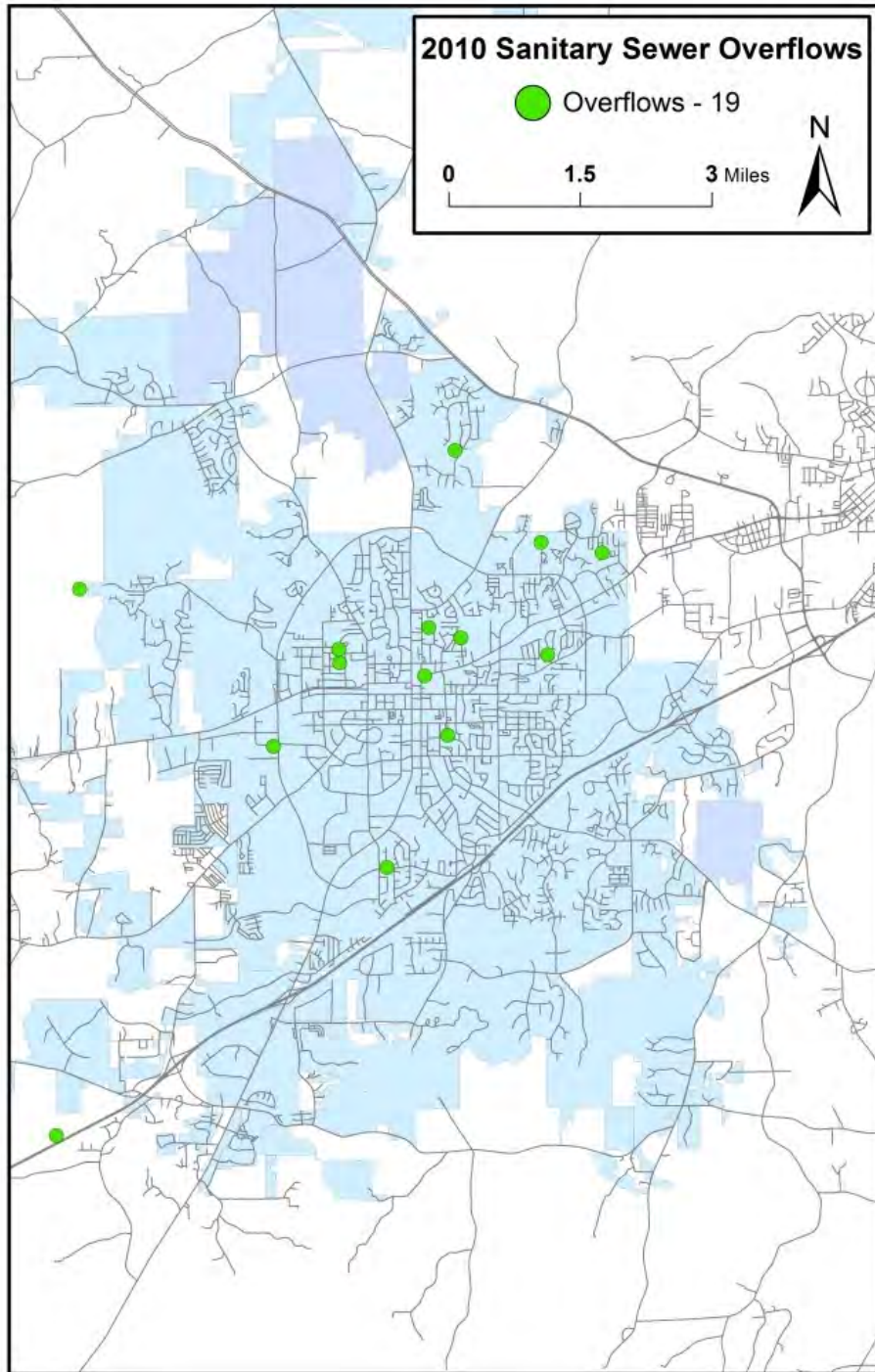
■ Sanitary Sewer Overflows



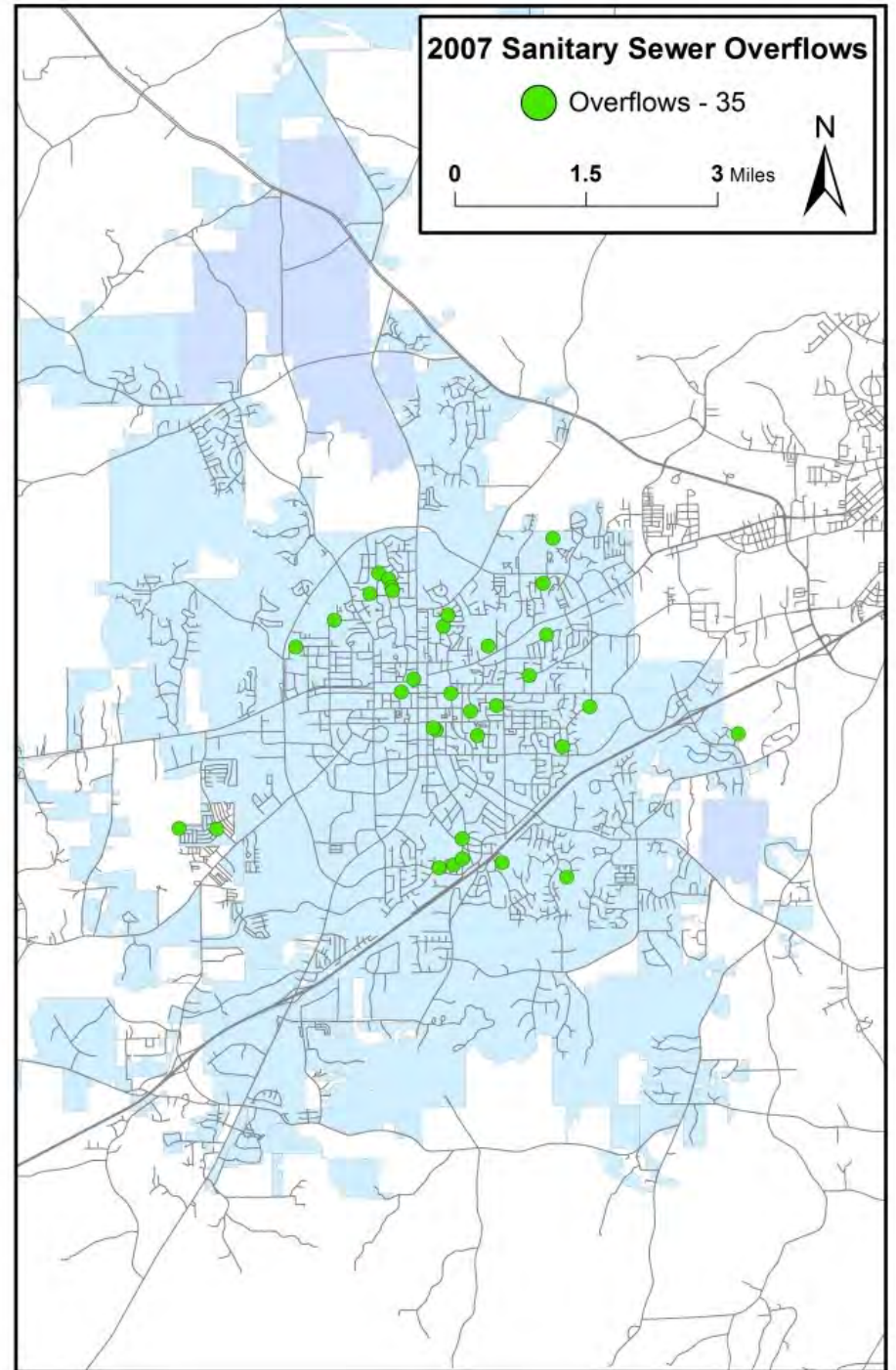
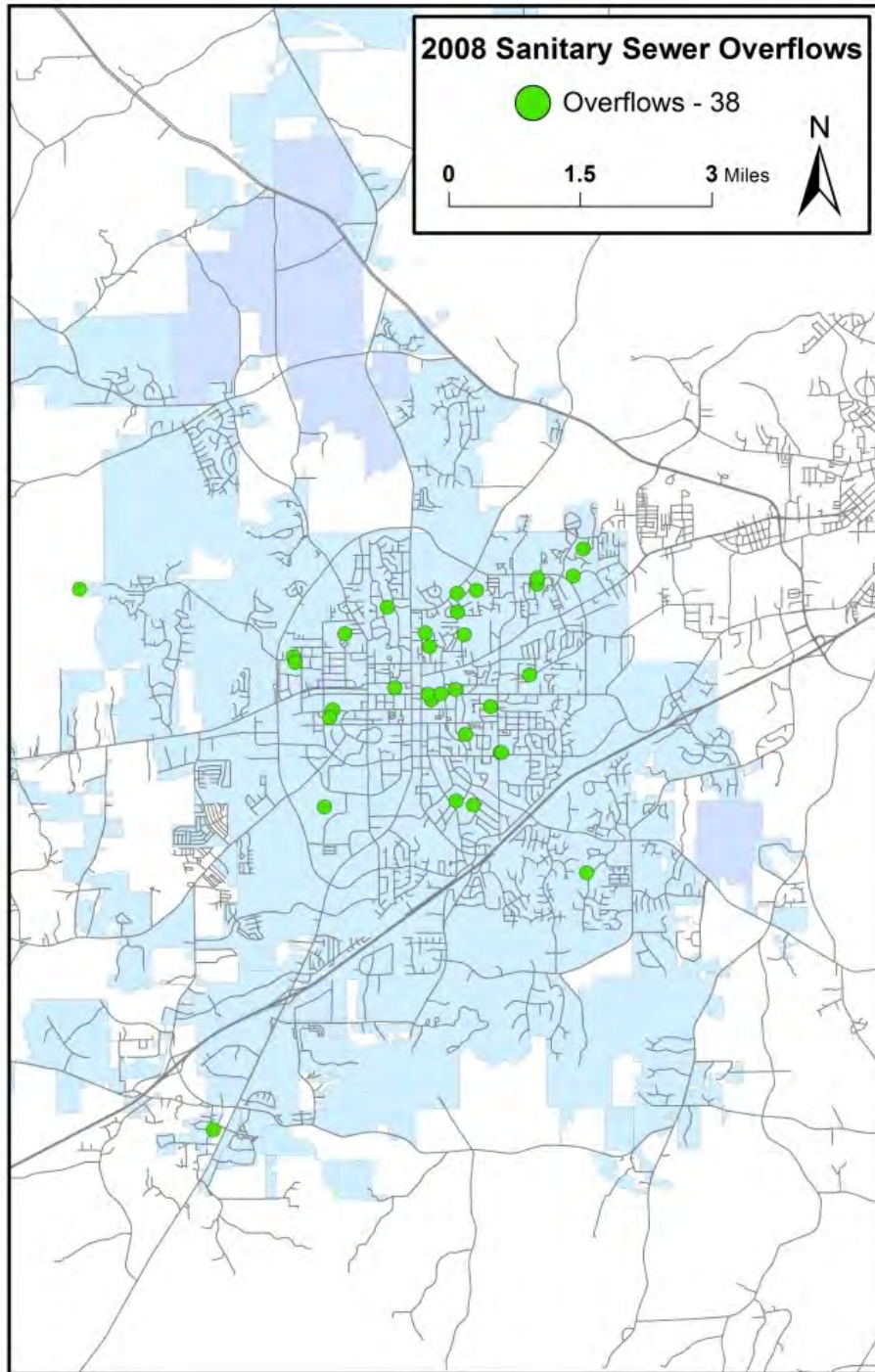
Sanitary Sewer Overflows 2006 - 2014

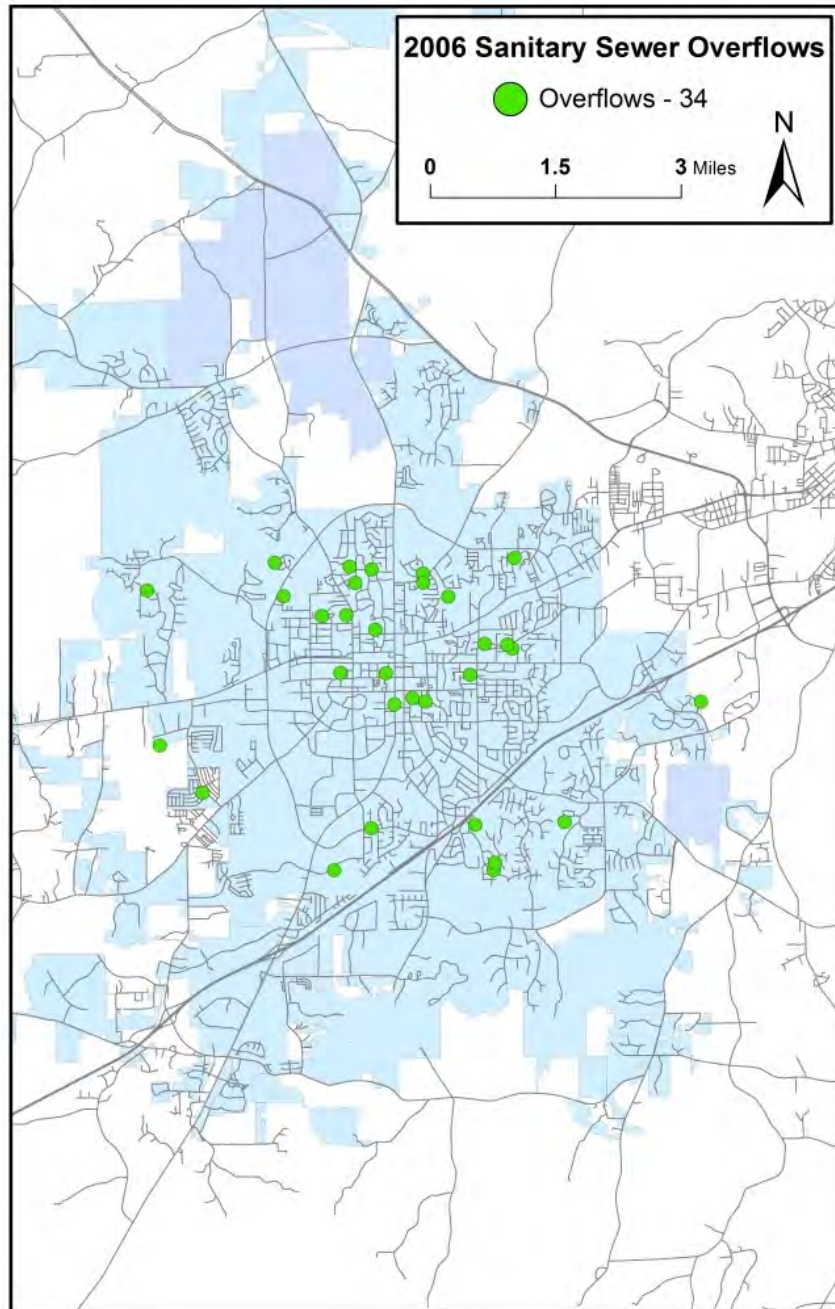












## 6.0 Ammonia (Nitrogen) Monitoring Program

### 6.1 Purpose

Parkerson's Mill Creek was listed by the Alabama Department of Environmental Management (ADEM) as an impaired waterbody in 2008, with the cause of impairment identified as pathogens. Subsequently, the ADEM developed a Total Maximum Daily Load for Parkerson's Mill Creek in September of 2011. The ADEM currently recognizes E-Coli as the indicator organism for purposes of evaluating bacteriological impairments of State waters. Furthermore, ADEM classifies the designated use of Parkerson's Mill Creek to be Fish & Wildlife, for which bacteriological water quality criteria are:

- (i) *In non-coastal waters, bacteria of the E. coli group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.*
- (ii) *For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean E. coli organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 487 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 158 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain*

Prior to the development of the TMDL, the City performed a side-by-side intensive monitoring study with the ADEM from April-November of 2010. The data obtained during this study supported the ADEM's listing of Parkerson's Mill Creek as impaired. Furthermore, these data suggested that the majority of the pollutant loading was concentrated in the upper 1/3 of the Parkerson's Mill Creek watershed. Thus, the City determined it would focus its efforts of source tracking and elimination in the headwaters and repeat the intensive study at a later date. As part of this source tracking effort, the City chose to use ammonia monitoring as a substitute for more costly and time-consuming E-Coli analysis. The results have been useful and informative, helping to identify a number of private sanitary sewer concerns. The results of samples taken in 2014 are shown below.

## 6.2 Definition and Methods

Currently, the Water Resource Management Department performs ammonia (nitrogen) monitoring as needed and on a case-by-case basis. Monitoring is performed using HACH Ammonia (Nitrogen) Test Strips (<http://www.hach.com/ammonia-nitrogen-test-strips-0-6-0-mg-l/product?id=7640211610>), which have a range of 0-6 mg/L and present data in incremental steps of 0, 0.25, 0.5, 1.0, 3.0, and 6.0 mg/L. Staff follow the sampling procedures provided by the manufacturer. Typically, staff follow up on any sampling efforts which result in an ammonia (nitrogen) concentration above 0.5 mg/L. Follow up may consist of one or more of the following; visual inspection of surround storm sewer and sanitary sewer, closed circuit television of the surround storm sewer and sanitary sewer, smoke testing of sanitary sewer, and dye testing of sanitary sewer (for confirmation of appropriate connection). Any finding of sanitary sewer discharge to the City's MS4 is immediately addressed using the most appropriate corrective action.

## 6.3 Monitoring Sites

Monitoring site locations depend on access to storm sewer infrastructure or receiving streams. See map below for 2014 sampling locations.

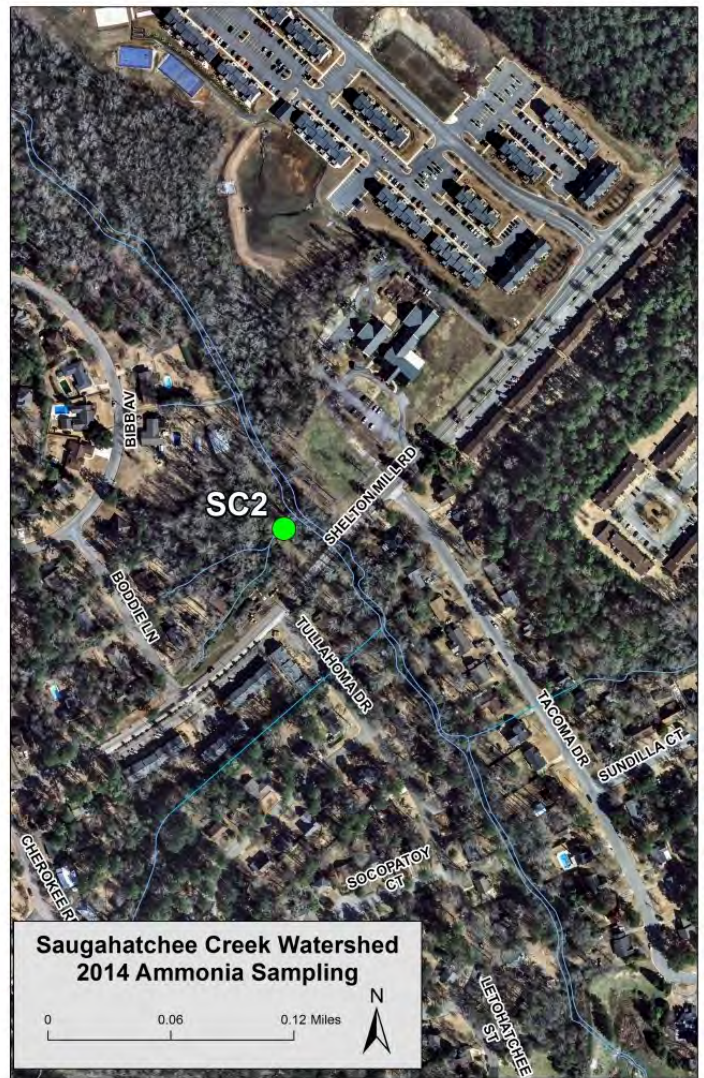
## 6.4 Data

Nine samples collected during 2014 indicated an ammonia (nitrogen) concentration above 0.5 mg/L. Follow-up monitoring and field investigation of these sites helped to identify one (1) private sanitary sewer concern and one

(1) public sanitary sewer concern. Appropriate corrective action was taken immediately in each of these circumstances.

Ammonia Monitoring Sites and Measured Concentrations

<b>Date</b>	<b>Site</b>	<b>Basin</b>	<b>Ammonia (mg/L)</b>
7/30/2014	16	Parkerson's Mill Creek	0.25
7/30/2014	17	Parkerson's Mill Creek	1
7/30/2014	21	Parkerson's Mill Creek	0.25
7/30/2014	22	Parkerson's Mill Creek	0.5
7/9/2014	22	Parkerson's Mill Creek	3
7/7/2014	21	Parkerson's Mill Creek	3
7/7/2014	23	Parkerson's Mill Creek	3
6/5/2014	21	Parkerson's Mill Creek	4.5
6/5/2014	22	Parkerson's Mill Creek	4.5
6/5/2014	23	Parkerson's Mill Creek	6
7/14/2014	SC2	Saugahatchee Creek	1



2014 Ammonia Sampling Sites

## 7.0 Source Water Monitoring Program (Lake Ogletree)

### 7.1 Purpose

The Lake Ogletree reservoir, located in southeast Auburn, Alabama, is the City of Auburn’s primary drinking water source. At full pool its surface area is approximately 300 acres with a volumetric capacity of approximately 1.5 billion gallons of water. Chewacla Creek is the primary feeder stream of Lake Ogletree, which has a 33 square mile watershed (as delineated from the Lake Ogletree dam and spillway). Although mostly forested and agricultural lands, the Lake Ogletree watershed includes industrial, commercial/retail, and residential landuses, which should increase as the population of Lee County increases. Although a recently updated Source Water Assessment Program (SWAP) determined Lake Ogletree to be at low to moderate risk from stormwater-driven pollutants, it is imperative that water quality monitoring be performed to identify potential threats to water quality and to protect the health and vitality of Chewacla Creek and the encompassing watershed. Therefore, the Water Works Board of the City of Auburn is committed to performing monitoring and analysis of a wide range of physical, chemical, and mineral water quality parameters both in Lake Ogletree and its contributing watershed. The Water Works Board of the City of Auburn (AWWB) is currently entering its 24<sup>th</sup> year of its Source Water Monitoring Program, which includes 40 biannual phases of water quality monitoring.

## 7.2 Definition and Methods

Currently in its 25<sup>th</sup> year of biannual source water monitoring, the AWWB contracts with Suncrest Laboratories for biannual water quality sampling and analysis at various locations in the Lake Ogletree Watershed. Each biannual assessment includes three rounds of sampling at locations along main stem Chewacla Creek (“C-Sites”), its smaller tributaries (“T-Sites”), and Lake Ogletree (“L-Sites”). Parameters monitored at these locations include fecal coliforms, total coliforms, dissolved oxygen, chlorophyll a, pH, temperature, turbidity, conductivity, nutrients, and an array of minerals (including lead, copper, and zinc). Bound reports are submitted biannually as well and include a detailed “results and discussion” section. Reports are then reviewed for immediate areas of concern and data is then imported by the AWWB into a comprehensive report for trend analysis.

The past annual monitoring locations for the Source Water Monitoring Program have been refined based on assessed need to evaluate impacts from perceived areas of concern. Several sites have been included much more often than others and therefore present a much more detailed dataset to evaluate trends within Chewacla Creek, its tributaries, and/or Lake Ogletree. In general, most of the monitoring stations during 2014 exhibited values similar to previous results and/or followed similar trends with regards to water quality parameters. The following are the parameters which are included in this program and the method of analysis.

- Temperature – YSI Model 57 Oxygen Meter
- Dissolved Oxygen – YSI Model 57 Oxygen Meter
- pH – SM 4500-H./EPA 150.1
- Chlorophyll a - Standard Method 10200 H
- Turbidity – Standard Method 2130
- Ammonia (as N) – EPA 350.1
- Nitrate+Nitrite – EPA 353.2
- Total Kjeldahl Nitrogen – EPA 351.2
- Total Phosphorus – EPA 365.4
- ICP Metals – Standard Method 3120 B
- Total Coliforms – Standard Method 9222 B
- Fecal Coliforms – Standard Method 9222 D

The City’s Watershed Division will begin in-house water quality sampling and management of the source water monitoring program beginning January 2015. The sampling suite will include all of the above mentioned constituents, as well as the taste and odor causing compounds 2-methylisoborneol (2-MIB) and geosmin.

## 7.3 Monitoring Stations and Data

**T11** – Station T11 is located on lower Robinson Creek at Moore’s Mill Road (CR 146). Latitude 32, 33, 48.221 N; Longitude 85, 23, 23.423 W

**T12N** – Station T12N is located upper Robinson Creek, just upstream of Highway 51 and downstream from an Opelika sanitary sewer lift station. Latitude 32, 37, 1.72 N; Longitude 85, 22, 9.316 W

**T19** – Station T19 is located on an unnamed tributary upstream of Emerald Lake. Latitude 32, 35, 36.364 N; Longitude 85, 20, 37.00 W

**T22** – Station T22 is located on upper Robinson Creek, just downstream of Highway 51 and downstream from three Opelika sanitary sewer lift stations. Latitude 32, 36, 2.361 N; Longitude 85, 22, 45.426 W

**T32** – Station T32 is located near the mouth of Nash Creek just before the confluence with Chewacla Creek. Latitude 32, 33, 18.484 N; Longitude 85, 25, 30.655 W

**T34** – Station T34 is located on Chewacla Creek, upstream of Station C8. Latitude 32, 34, 32.672 N; Longitude 85, 21, 49.692 W

**HQ1** – Station HQ1 is the effluent discharge from the SRM Aggregate Quarry. Latitude 32, 35, 1.536 N; Longitude 85, 20, 24.772 W

**C1** – Station C1 is located at the forebay of Lake Ogletree, immediately downstream of the Society Hill Road bridge crossing. Latitude 32, 33, 20.161 N; Longitude 85, 25, 36.026 W

**C2** – Station C2 is located at the bridge crossing of CR 027 with Chewacla Creek. Latitude 32, 33, 21.387 N; Longitude 85, 24, 46.384 W

**C5** – Station C5 is located at the bridge crossing of Lee Road. 112 with Chewacla Creek. Latitude 32, 33, 6.291 N; Longitude 85, 23, 41.151 W

**C7** – Station C7 is located at the bridge crossing of Highway 51 (Marvyn Parkway) with Chewacla Creek. Latitude 32, 33, 41.868 N; Longitude 85, 22, 20.559 W

**C8** – Station C8 is located upstream of the bridge crossing of CR 146 (Moores Mill Road) with Chewacla Creek. Latitude 32, 34, 5.715 N; Longitude 85, 21, 42.033 W

**L1** – Station L1 is located in Lake Ogletree, immediately northeast of the Lake Ogletree spillway. Latitude 32, 32, 50.846 N; Longitude 85, 26, 52.83 W

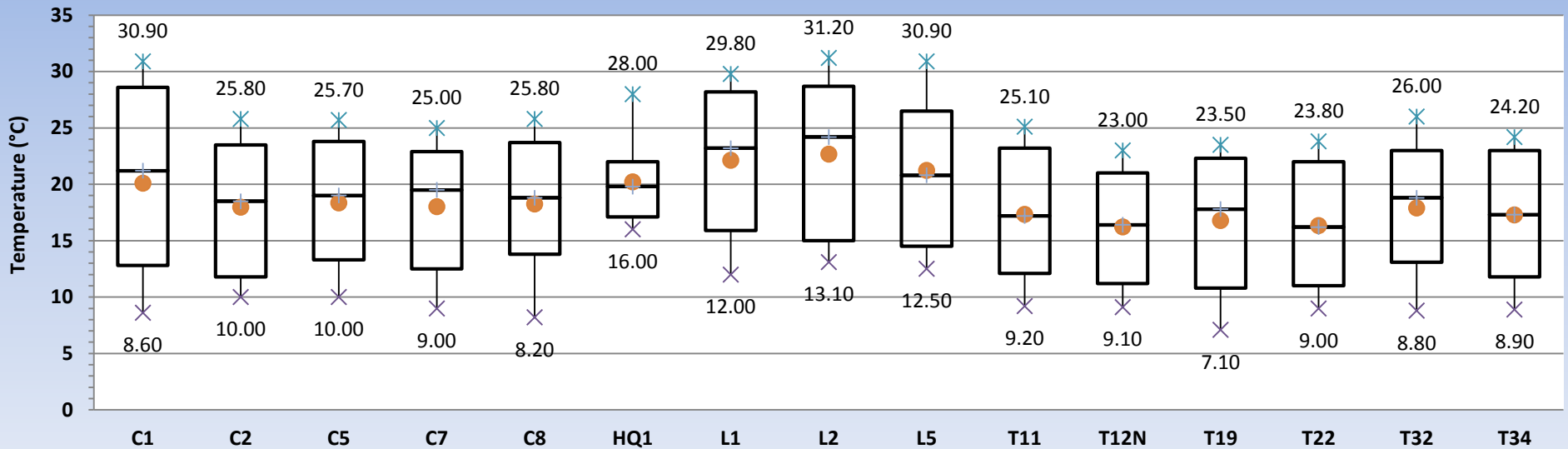
**L2** – Station L2 is located in Lake Ogletree near the water intake pump house. Latitude 32, 33, 5.626 N; Longitude 85, 26, 45.038 W

**L5** – Station L5 is located along the northwest finger of Lake Ogletree, near the confluence with the East Lake/Green Chapel tributary. Latitude 32, 33, 37.961 N; Longitude 85, 25, 38.369 W

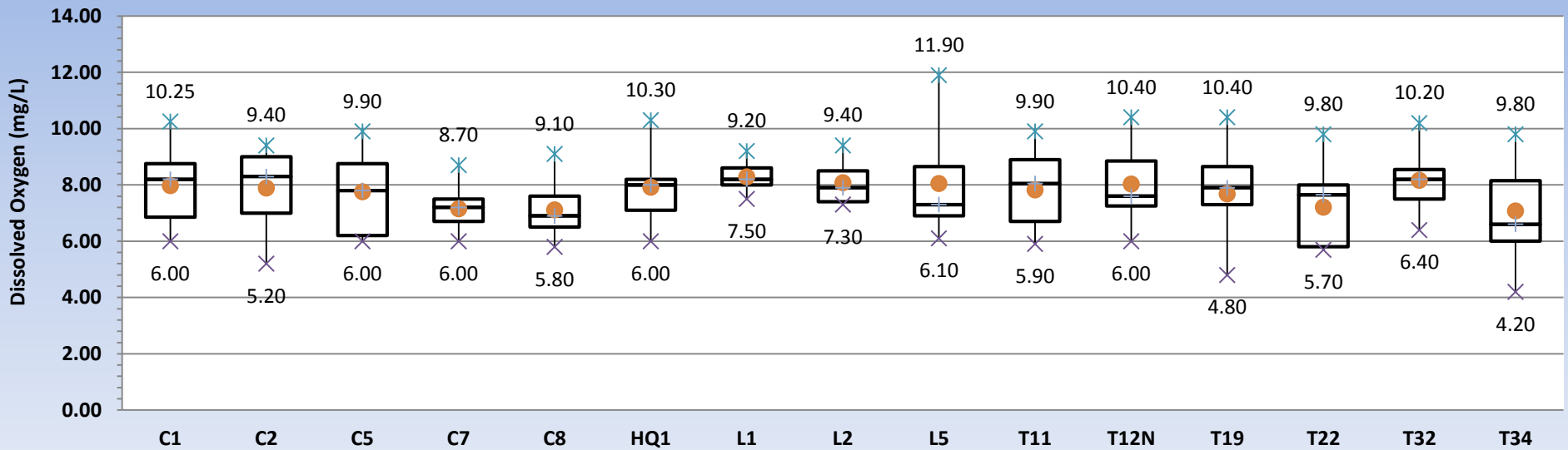
*\*See Insert for Maps of All Water Quality Monitoring Locations*

*\*\*Note: At the time of this report, the City had not received all of the 2014 monitoring results for its Source Water Monitoring Program. Data below is through June of 2014.*

## Temperature 2013-2014

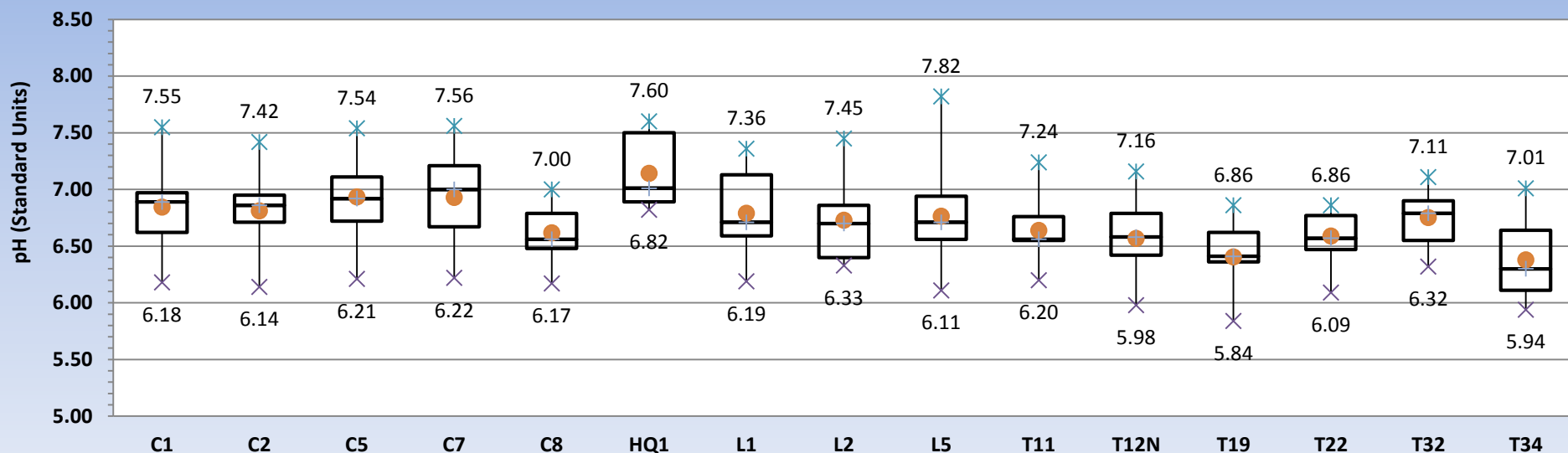


## Dissolved Oxygen 2013-2014

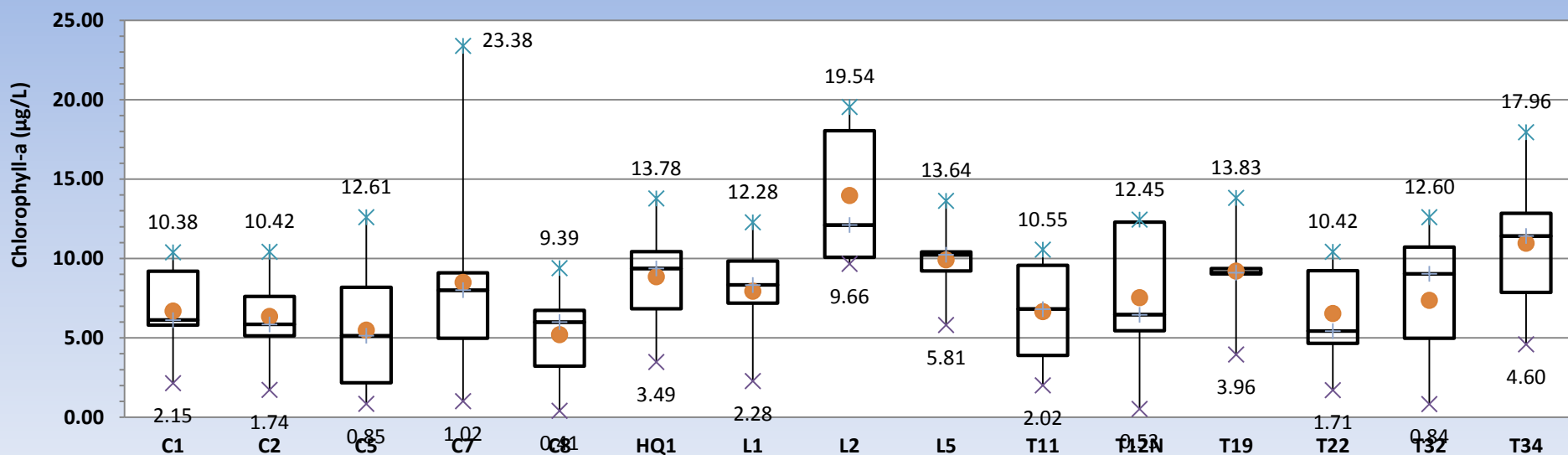




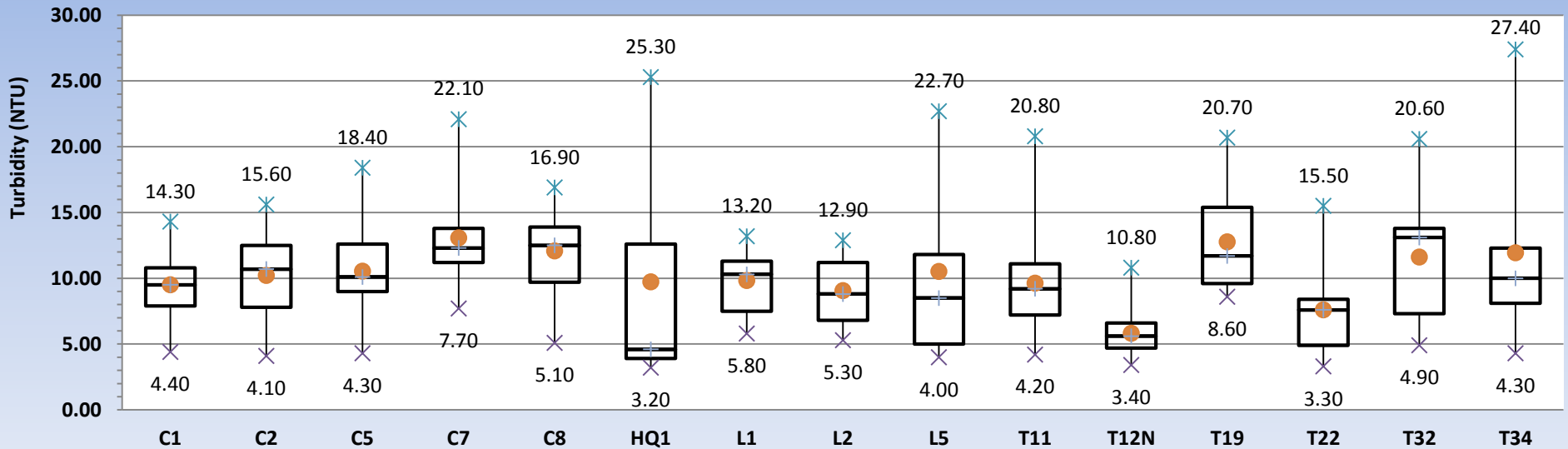
## pH 2013-2014



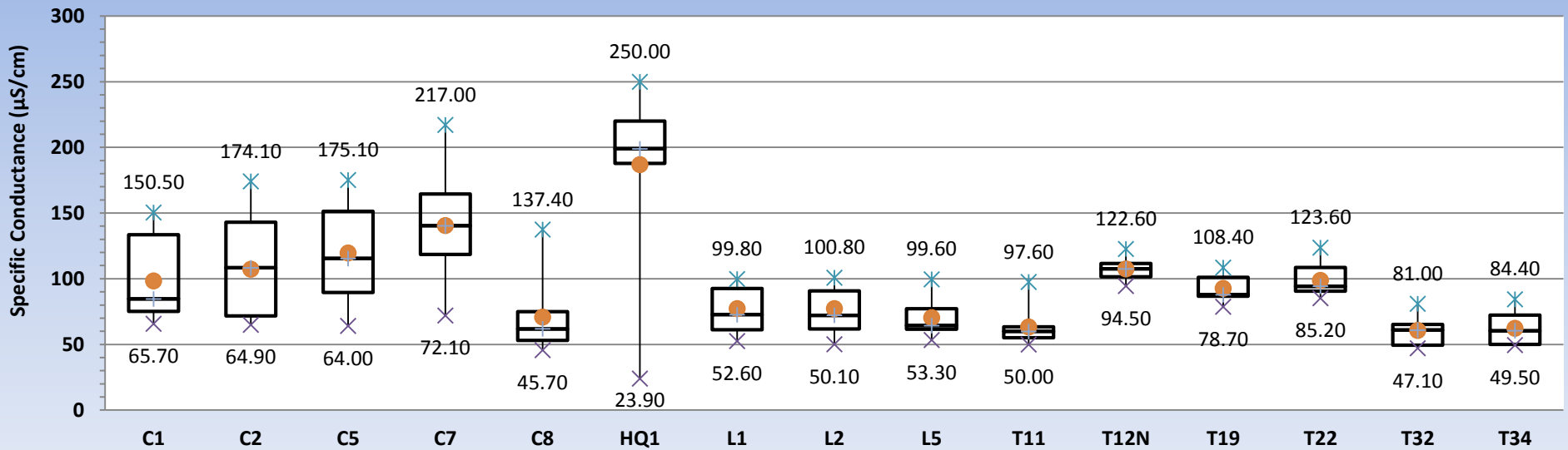
## Chlorophyll-a 2013-2014



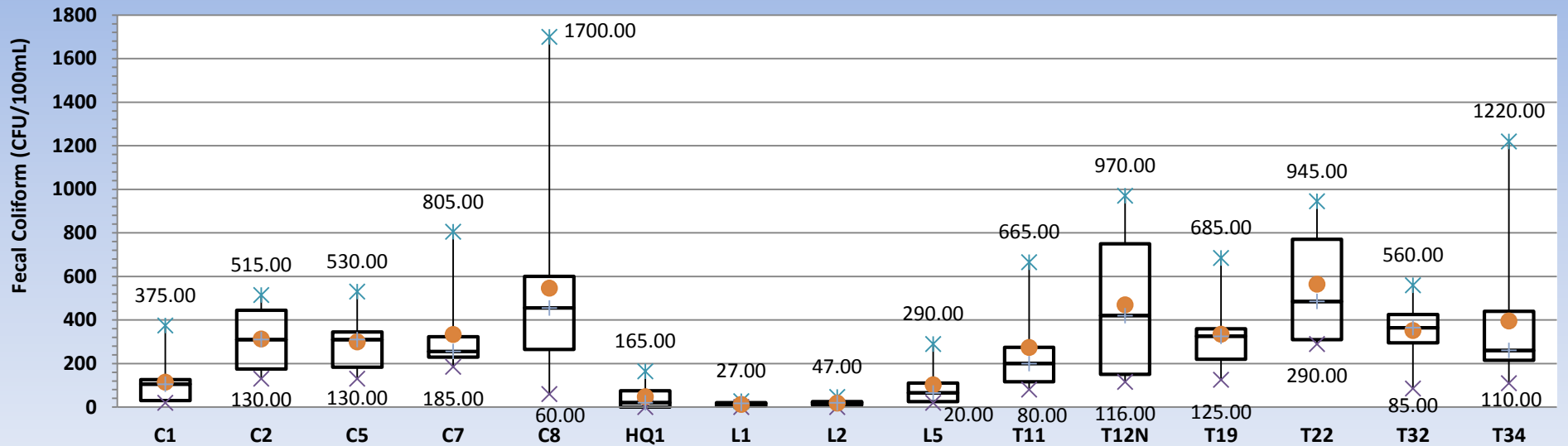
## Turbidity 2013-2014



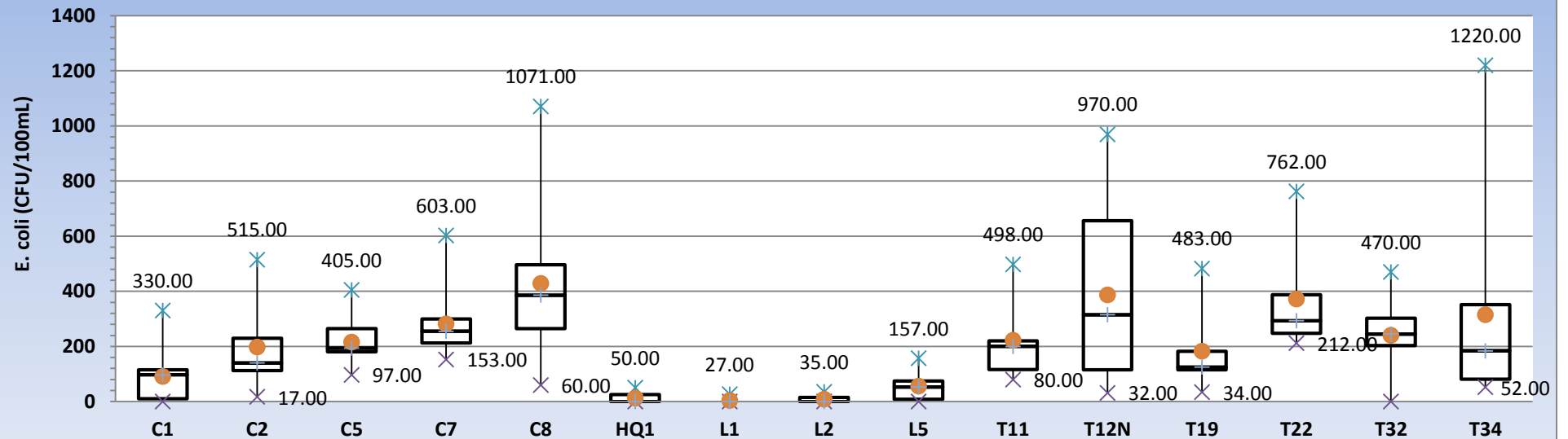
## Specific Conductance 2013-2014



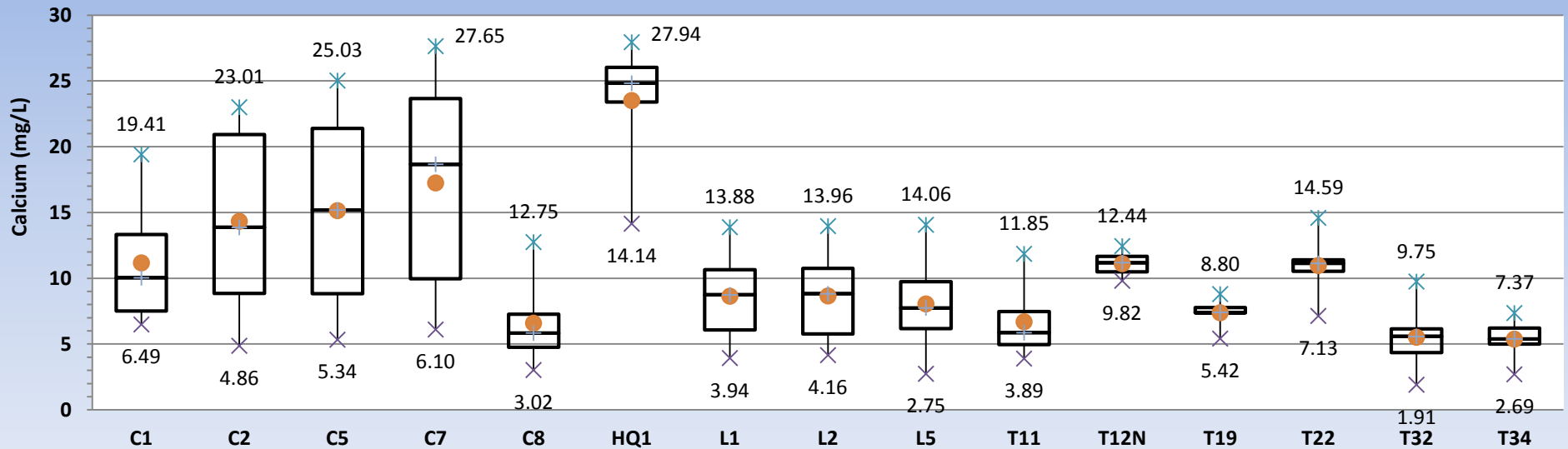
## Fecal Coliform 2013-2014



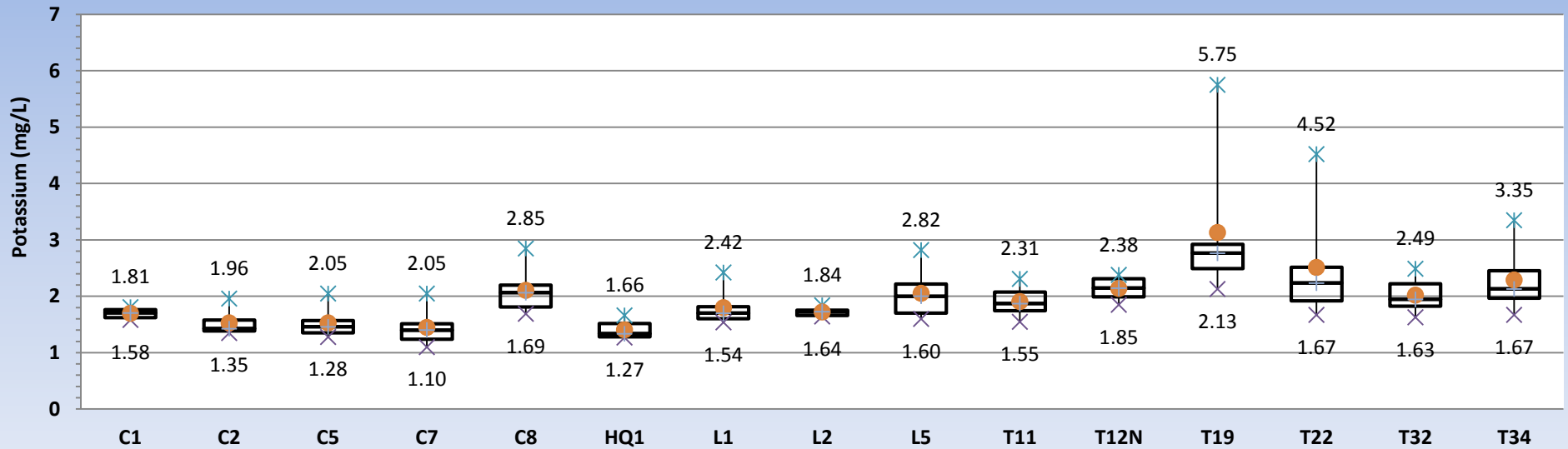
## E. coli 2013-2014



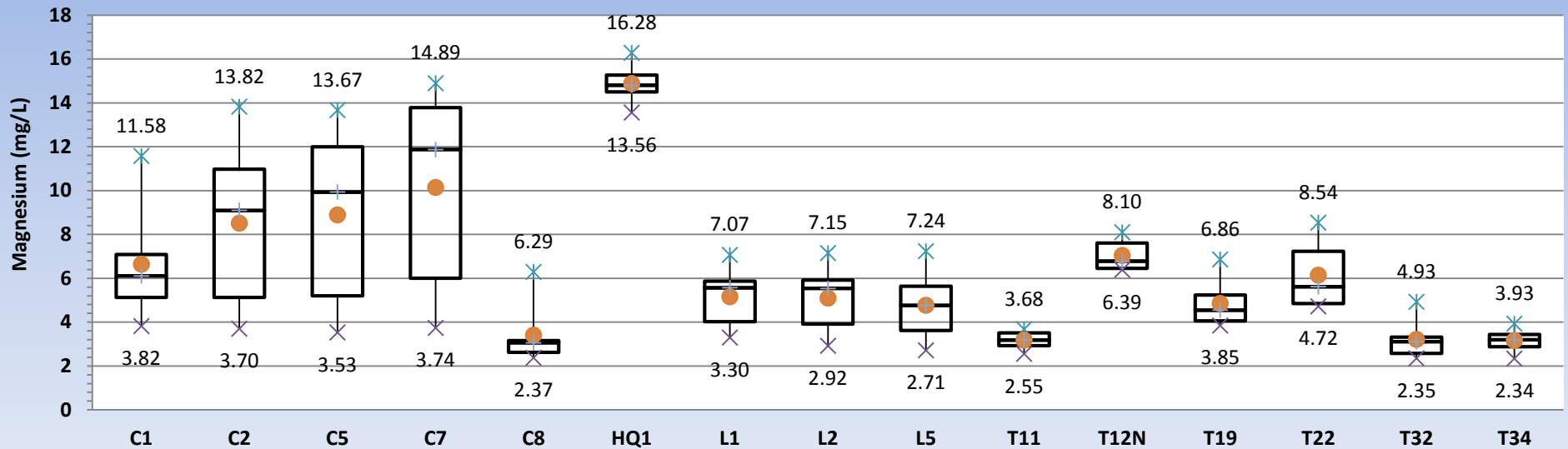
## Calcium 2013-2014



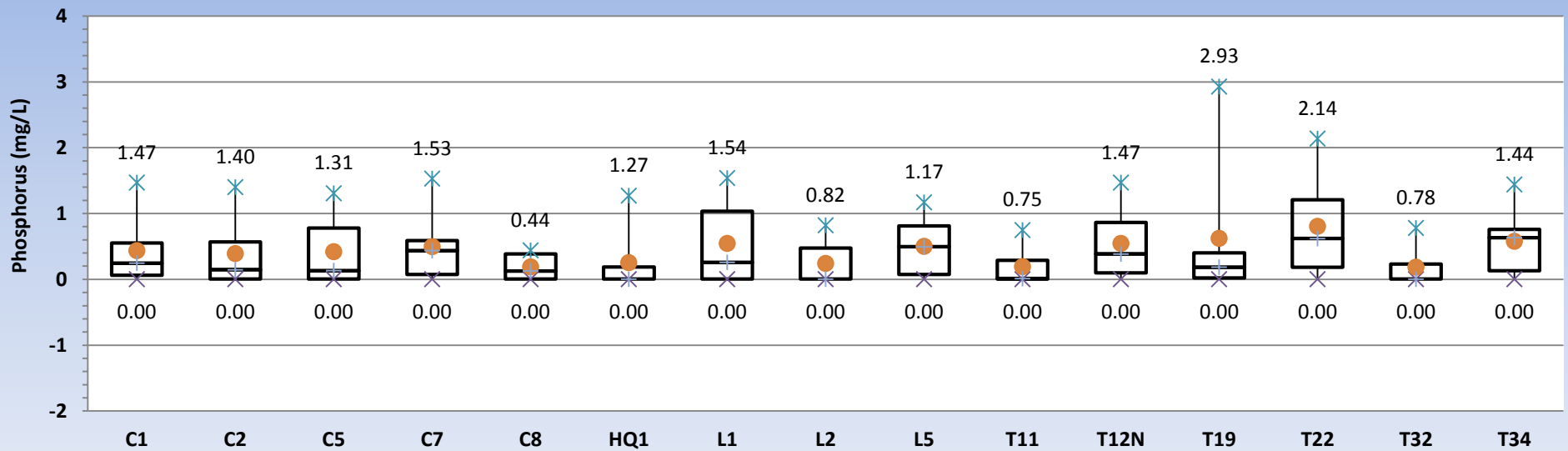
## Potassium 2013-2014



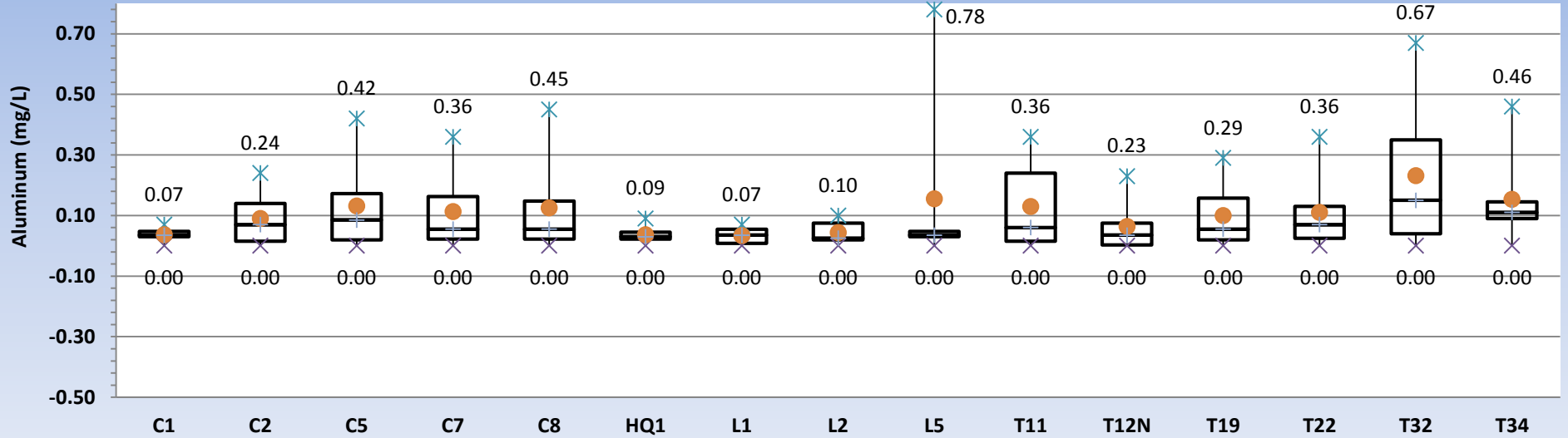
## Magnesium 2013-2014



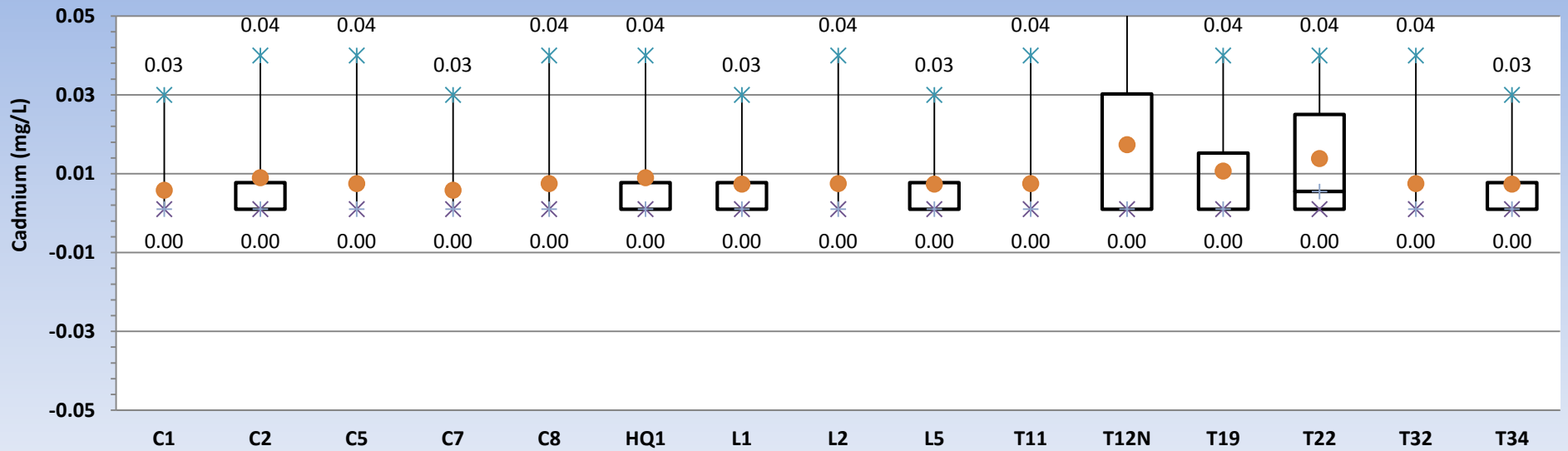
## Phosphorus 2013-2014



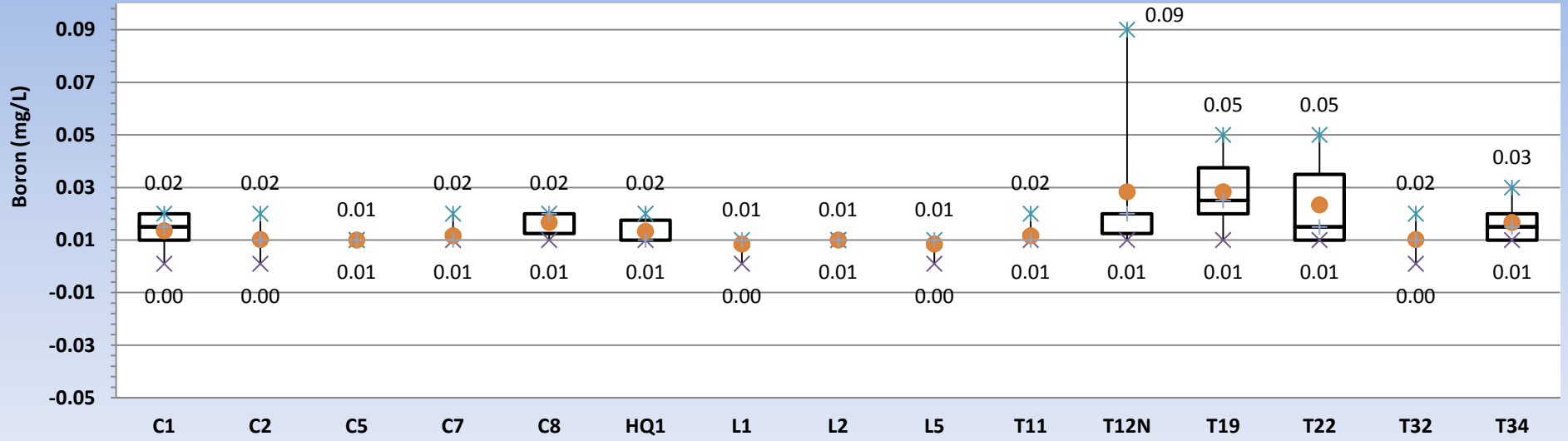
## Aluminum 2013-2014



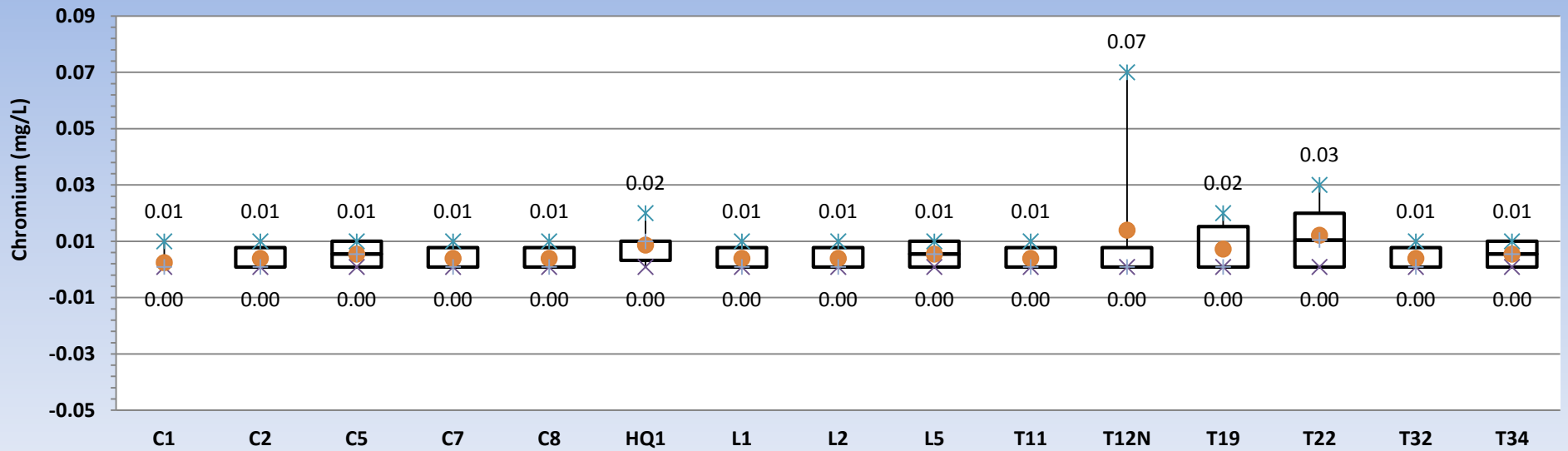
## Cadmium 2013-2014



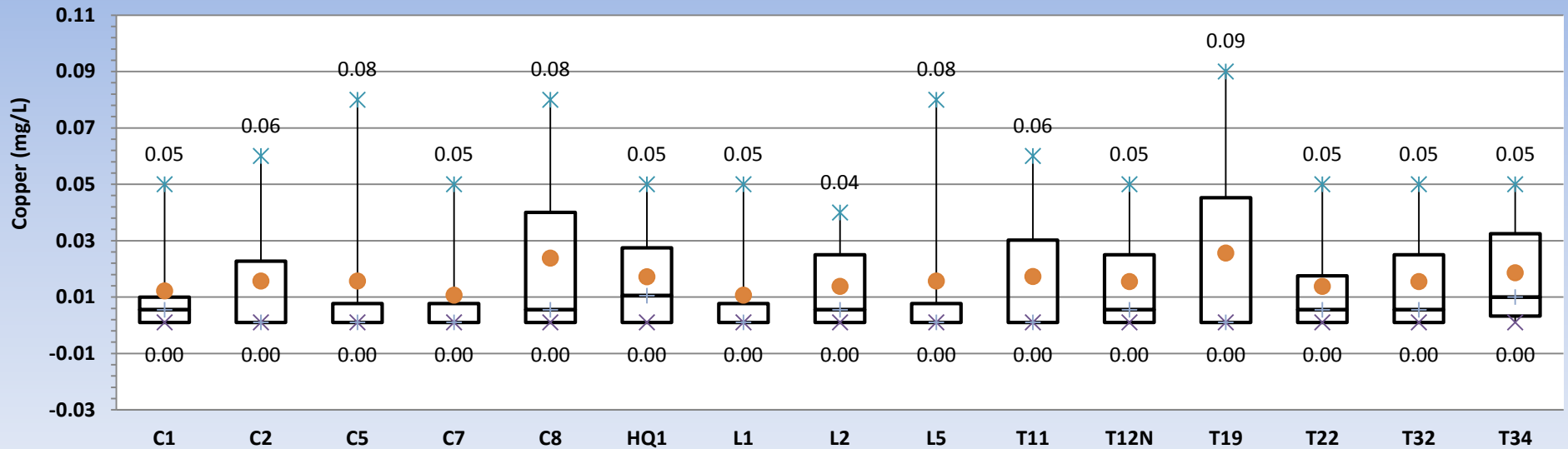
## Boron 2013-2014



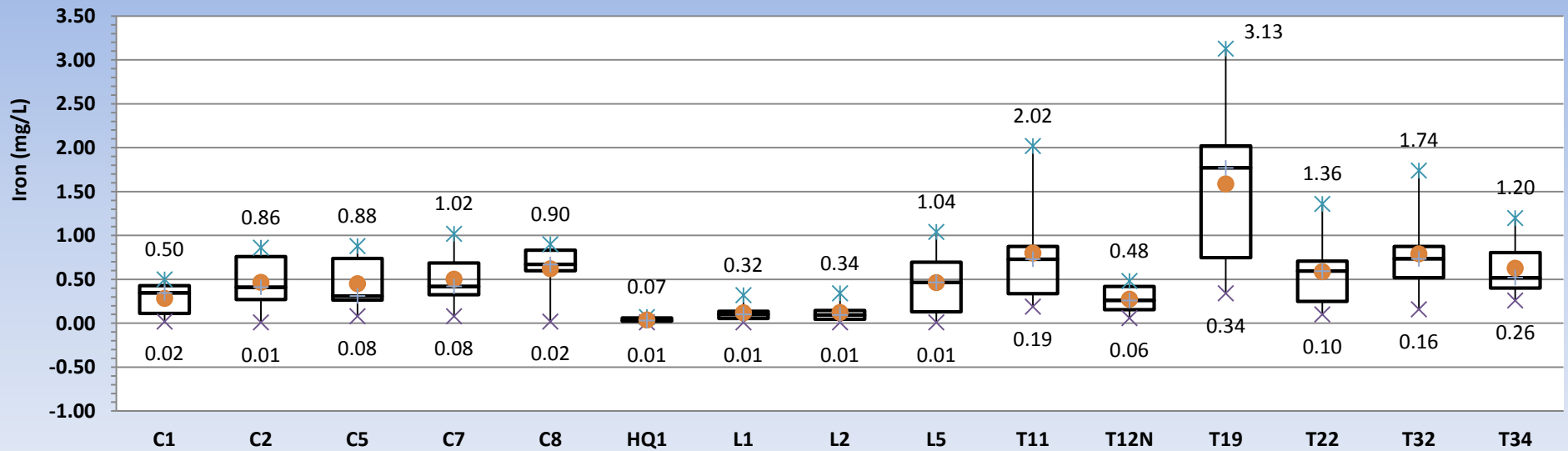
## Chromium 2013-2014



### Copper 2013-2014

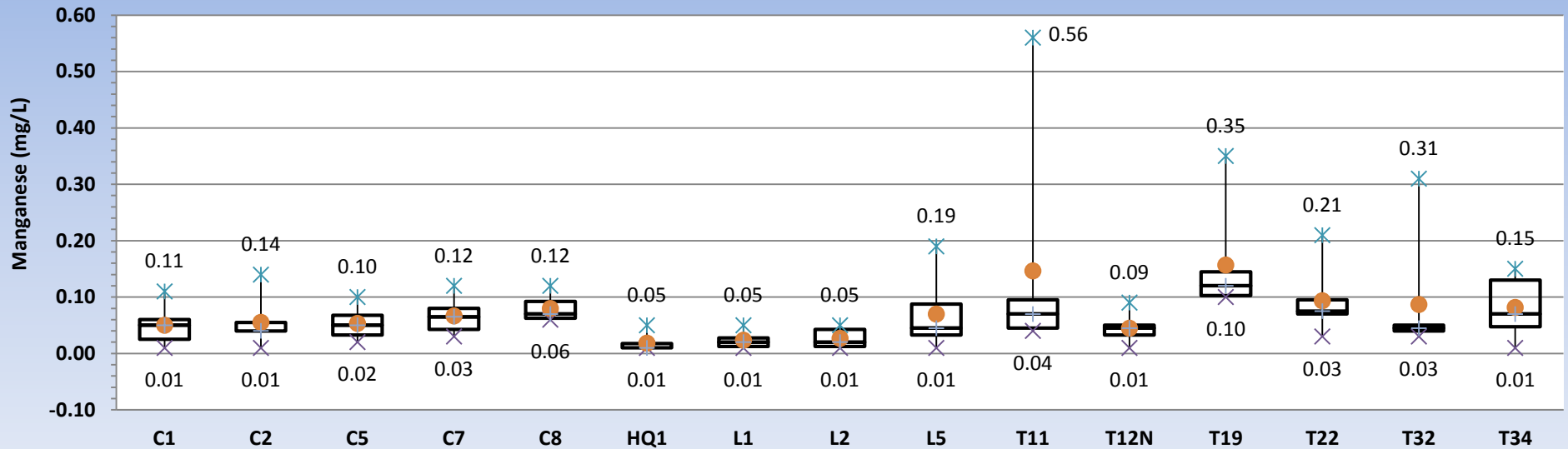


### Iron 2013-2014

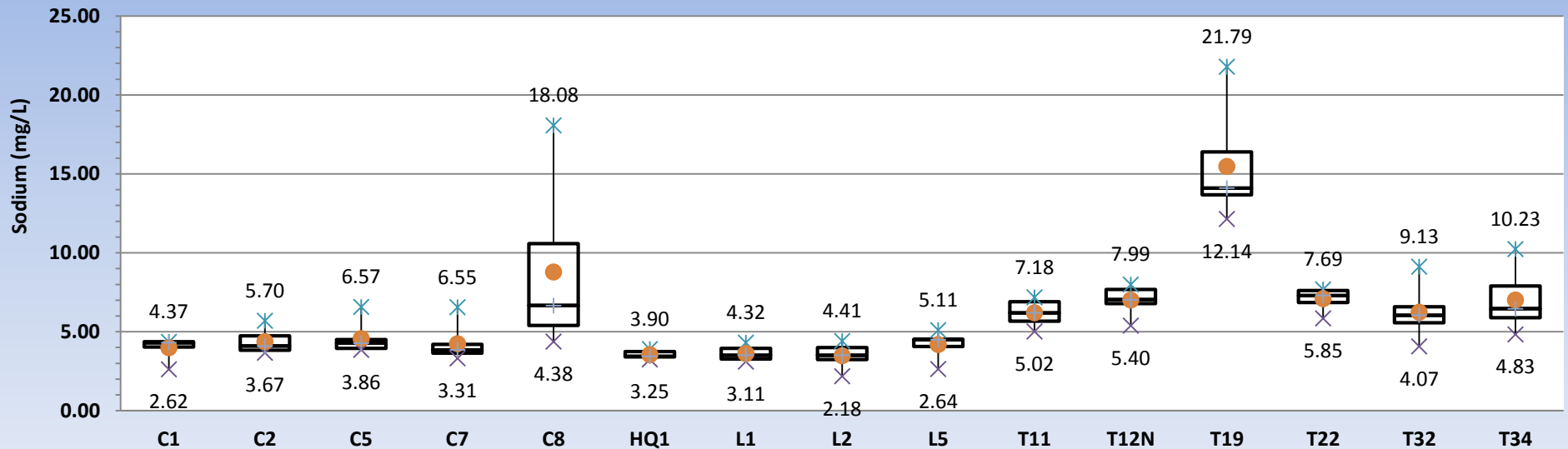




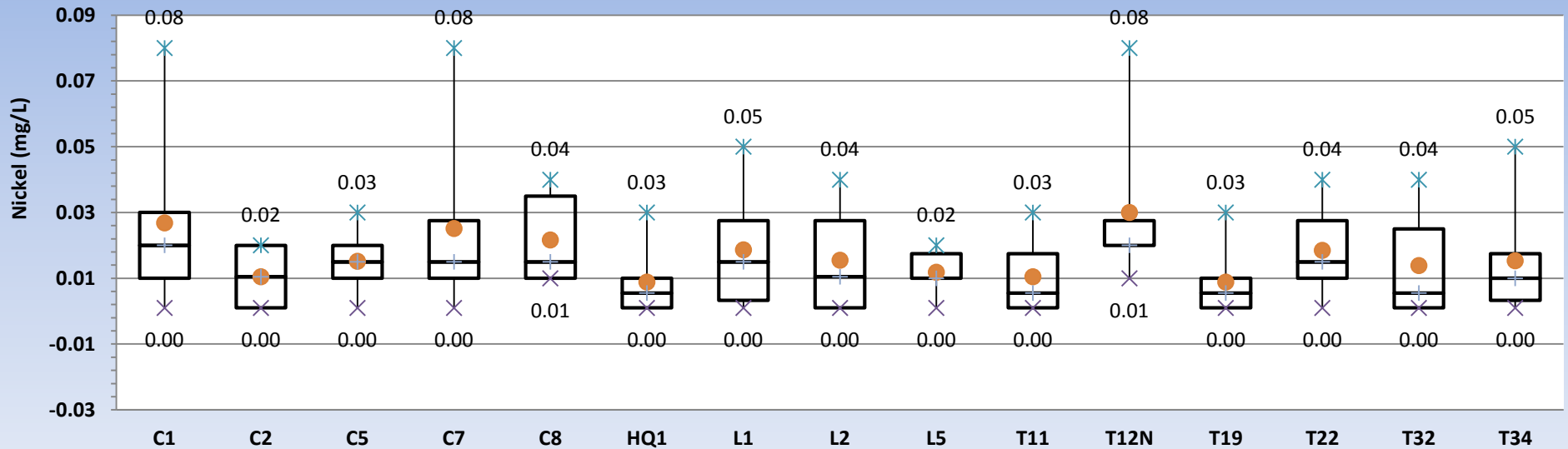
## Manganese 2013-2014



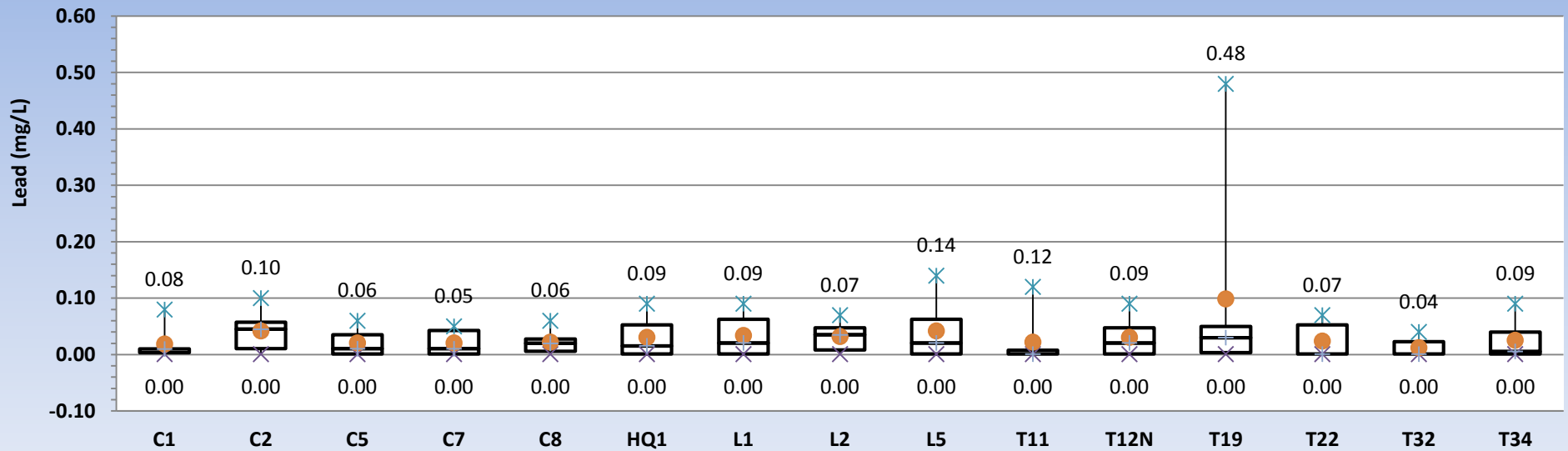
## Sodium 2013-2014



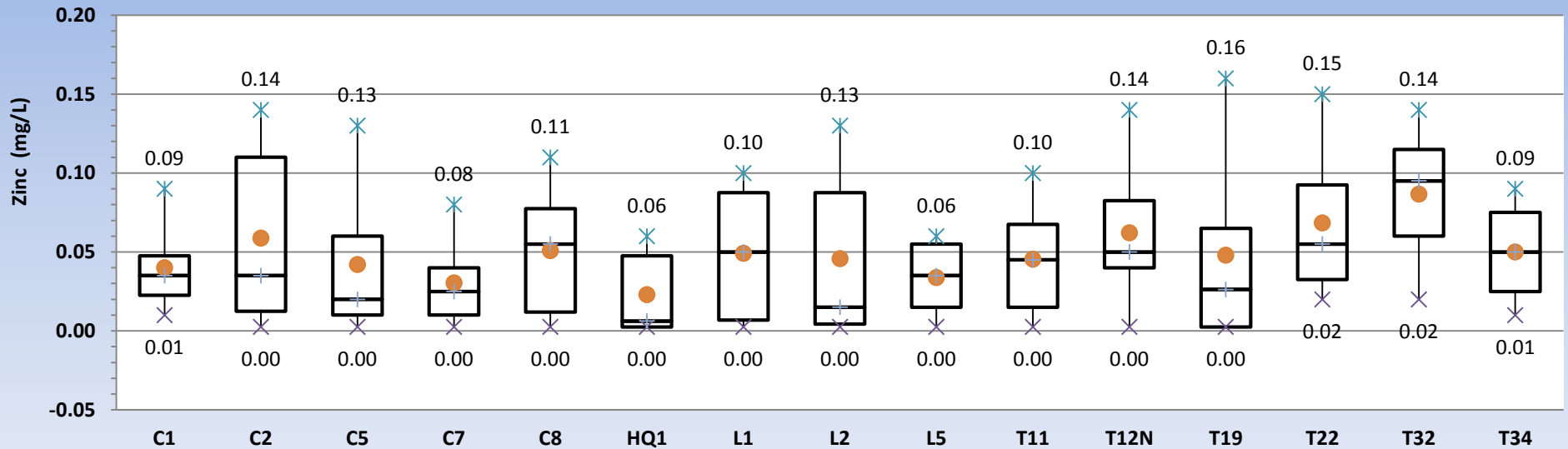
## Nickel 2013-2014



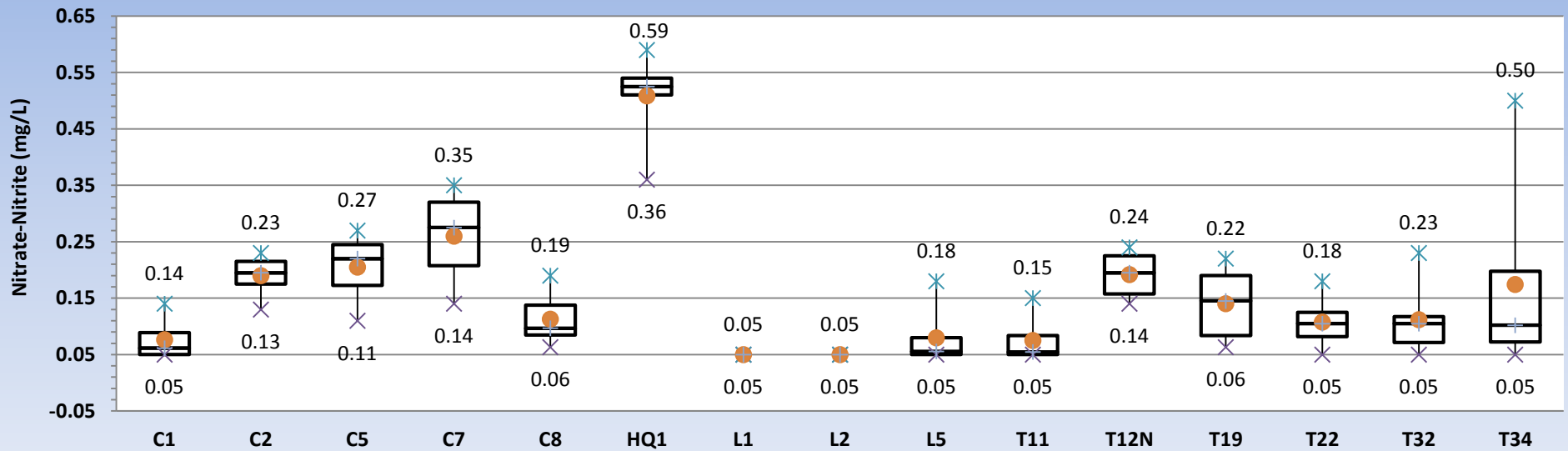
## Lead 2013-2014



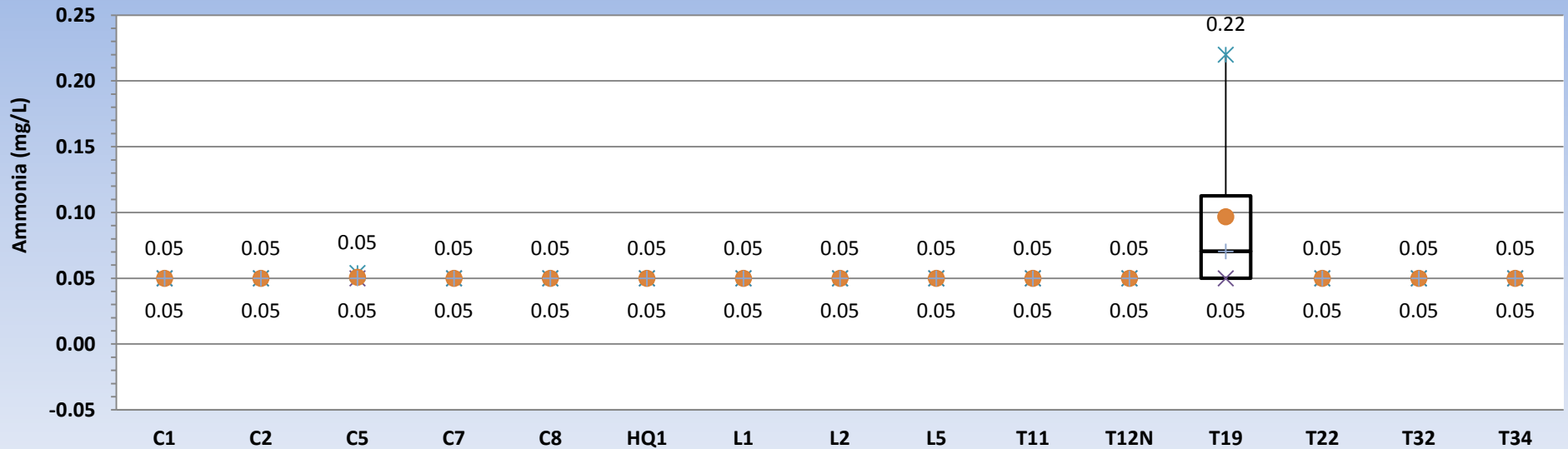
## Zinc 2013-2014



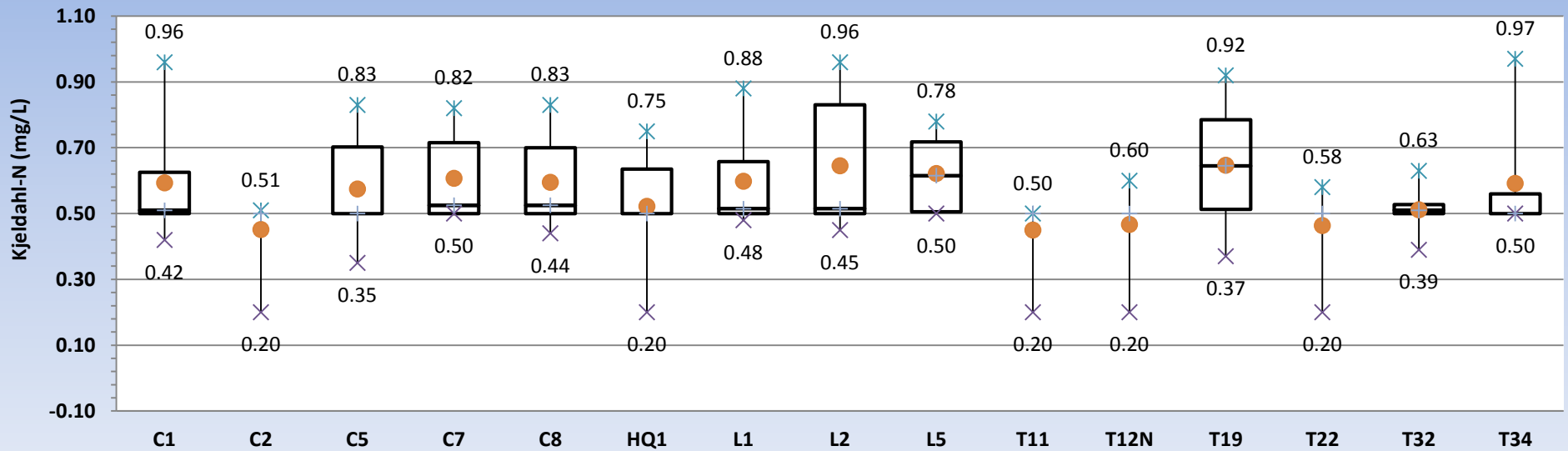
## Nitrate-Nitrite 2013-2014



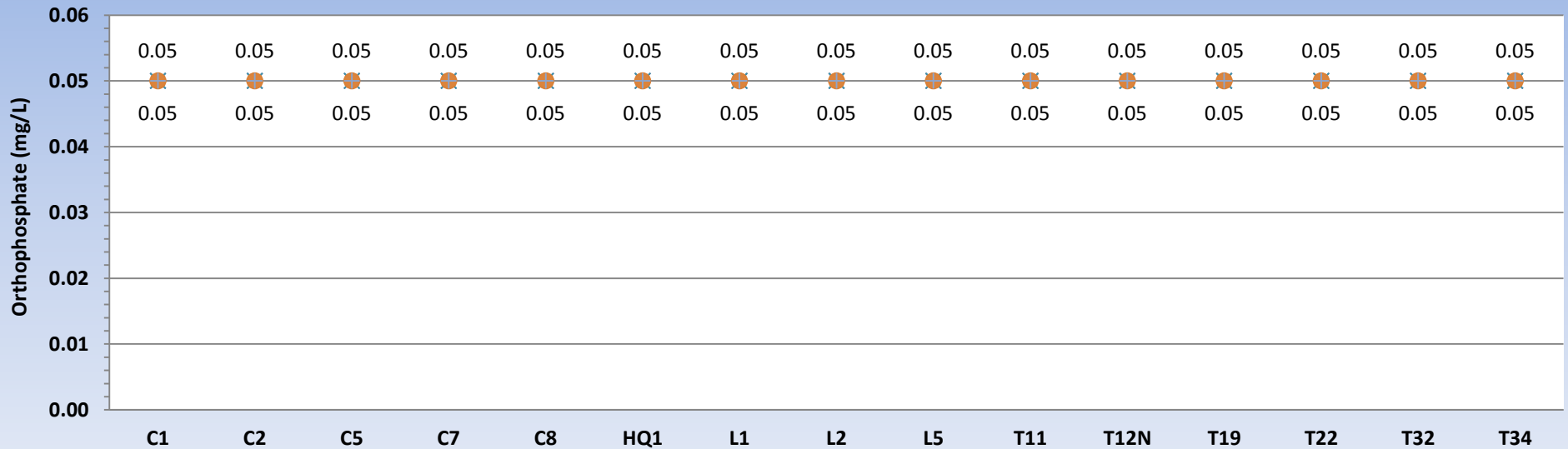
## Ammonia 2013-2014



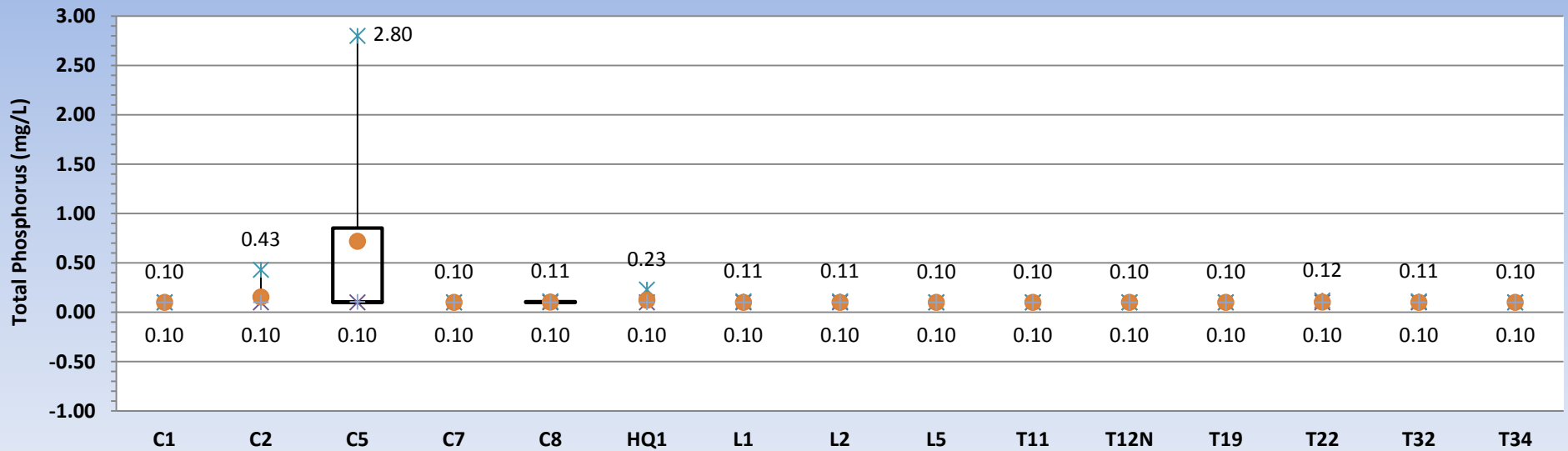
## Kjeldahl-N 2013-2014



## Orthophosphate 2013-2014



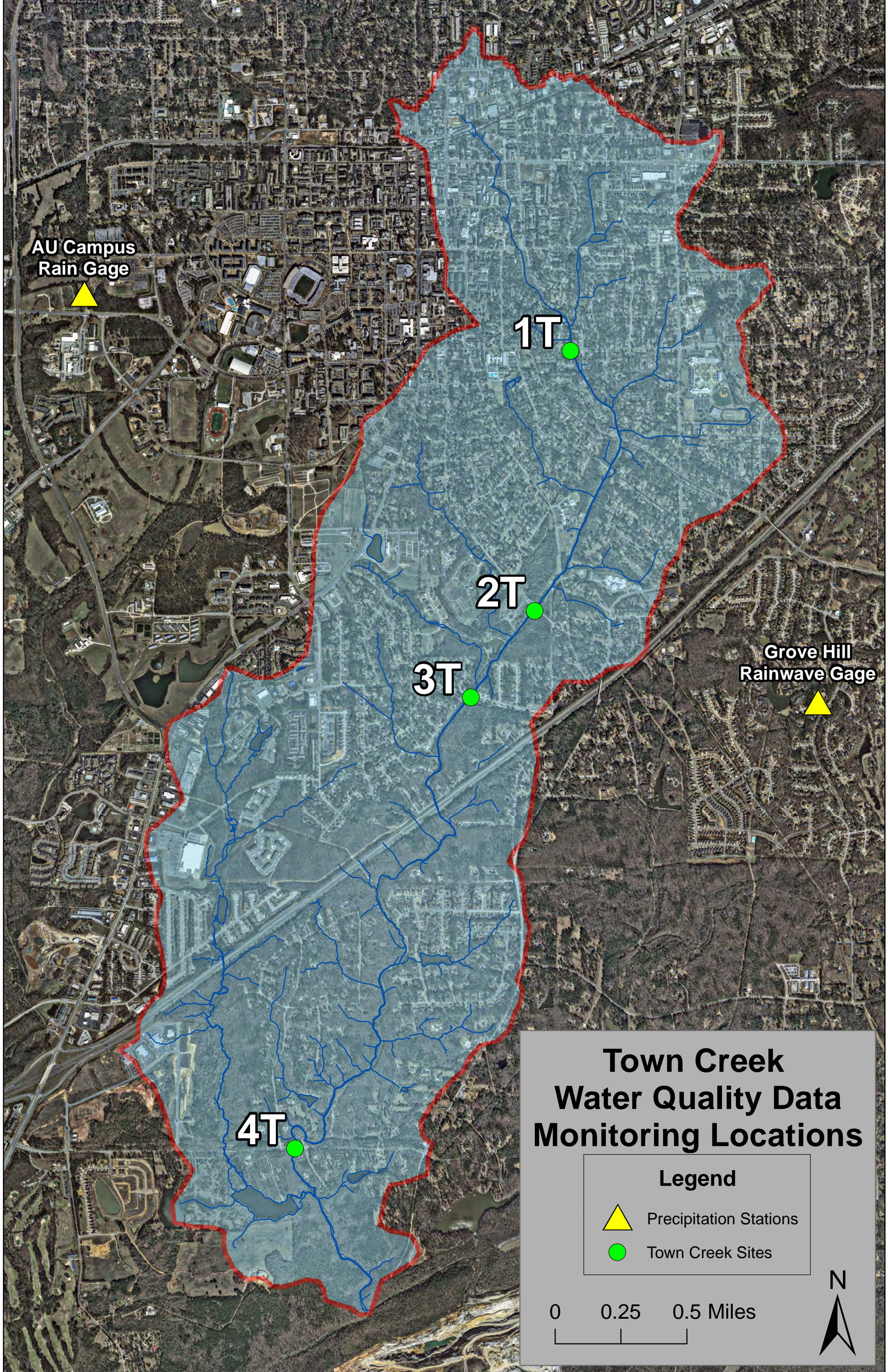
## Total Phosphorus 2013-2014



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## **APPENDIX F**

# **WATER QUALITY MONITORING LOCATION MAPS**



AU Campus  
Rain Gage



1T



2T



3T



Grove Hill  
Rainwave Gage



4T



## Town Creek Water Quality Data Monitoring Locations

### Legend



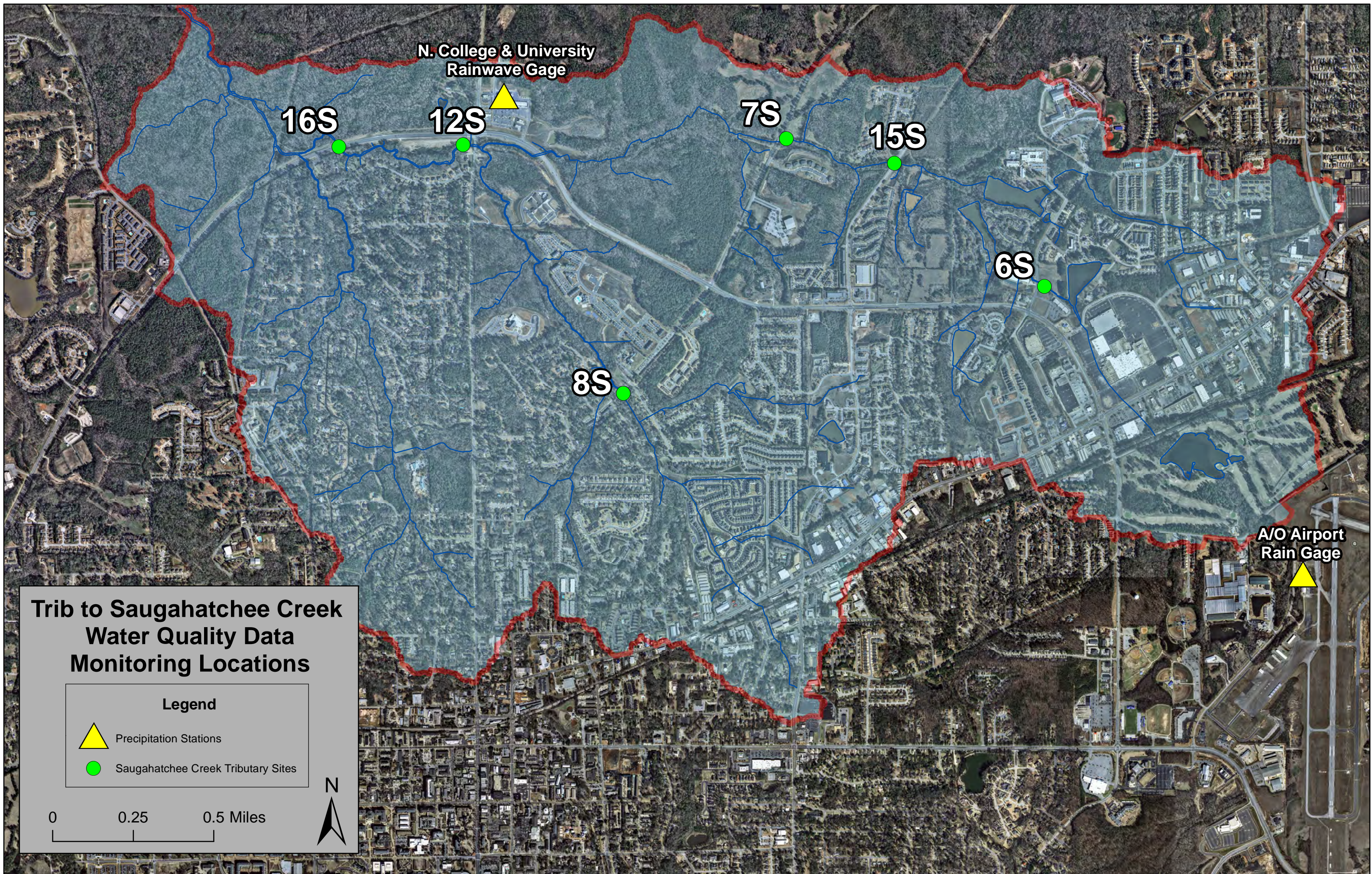
Precipitation Stations



Town Creek Sites

0 0.25 0.5 Miles





N. College & University  
Rainwave Gage

16S

12S

7S

15S



6S

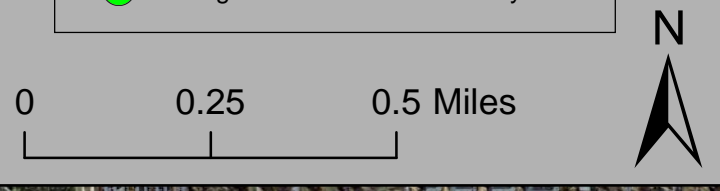
8S

A/O Airport  
Rain Gage

### Trib to Saugahatchee Creek Water Quality Data Monitoring Locations

#### Legend



-  Precipitation Stations
-  Saugahatchee Creek Tributary Sites



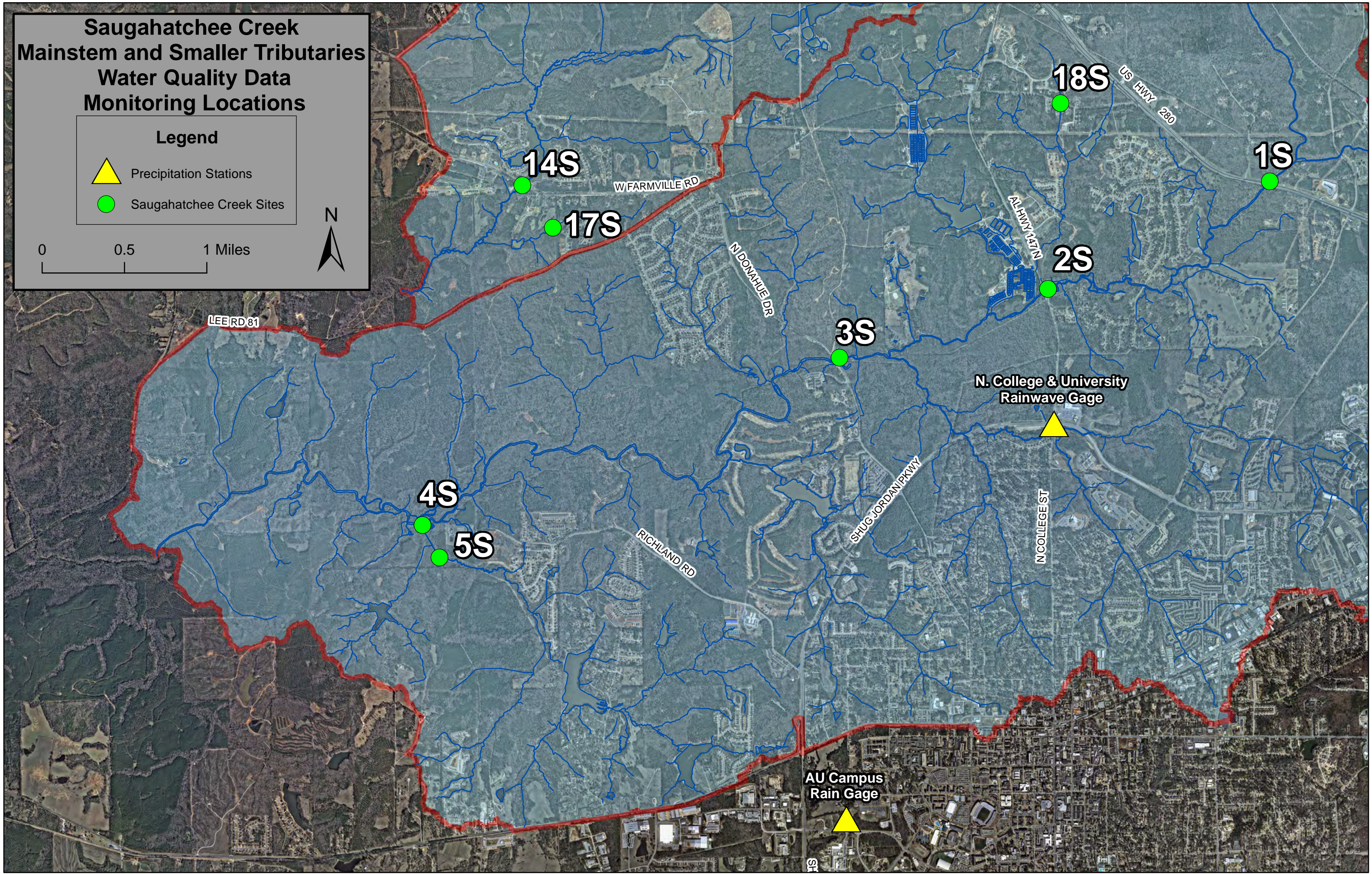


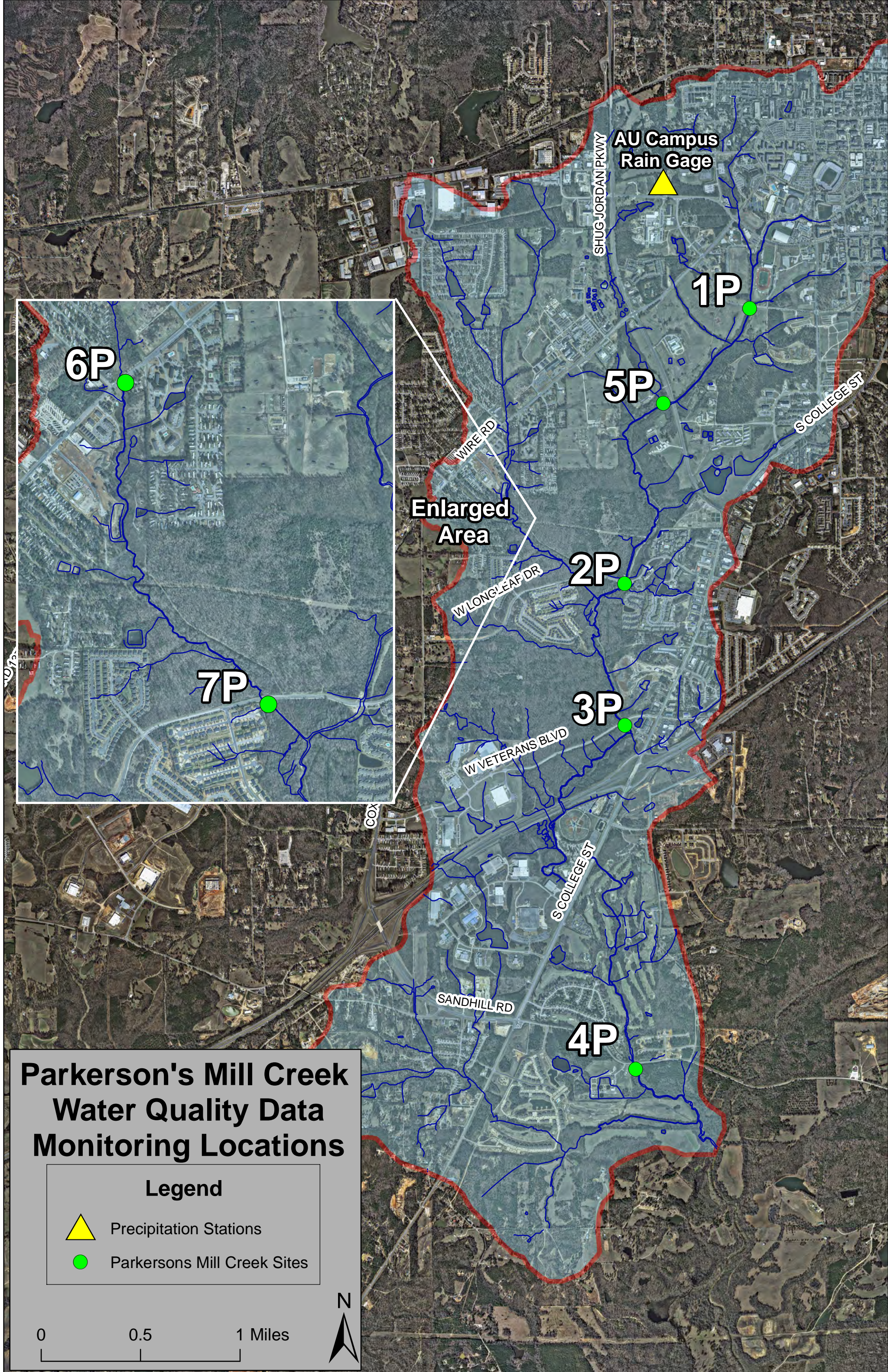
# Saugahatchee Creek Mainstem and Smaller Tributaries Water Quality Data Monitoring Locations

## Legend

-  Precipitation Stations
-  Saugahatchee Creek Sites

0 0.5 1 Miles





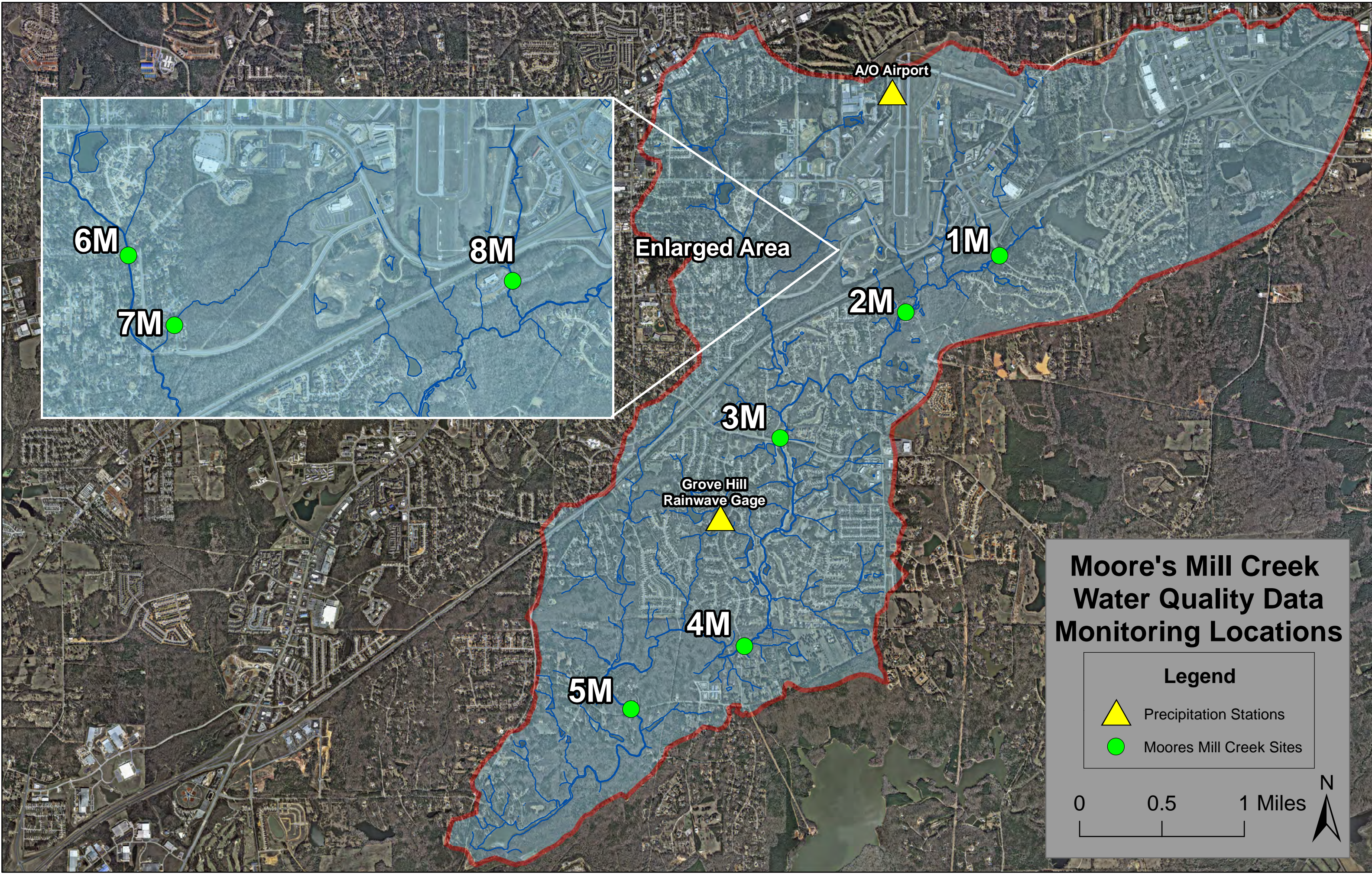
# Parkerson's Mill Creek Water Quality Data Monitoring Locations

## Legend

-  Precipitation Stations
-  Parkersons Mill Creek Sites

0 0.5 1 Miles





A/O Airport

Enlarged Area

6M

8M

1M

7M

2M

3M



Grove Hill  
Rainwave Gage

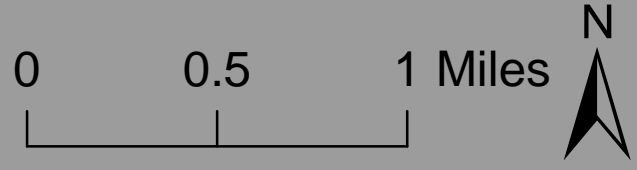
4M

5M

### Moore's Mill Creek Water Quality Data Monitoring Locations



#### Legend

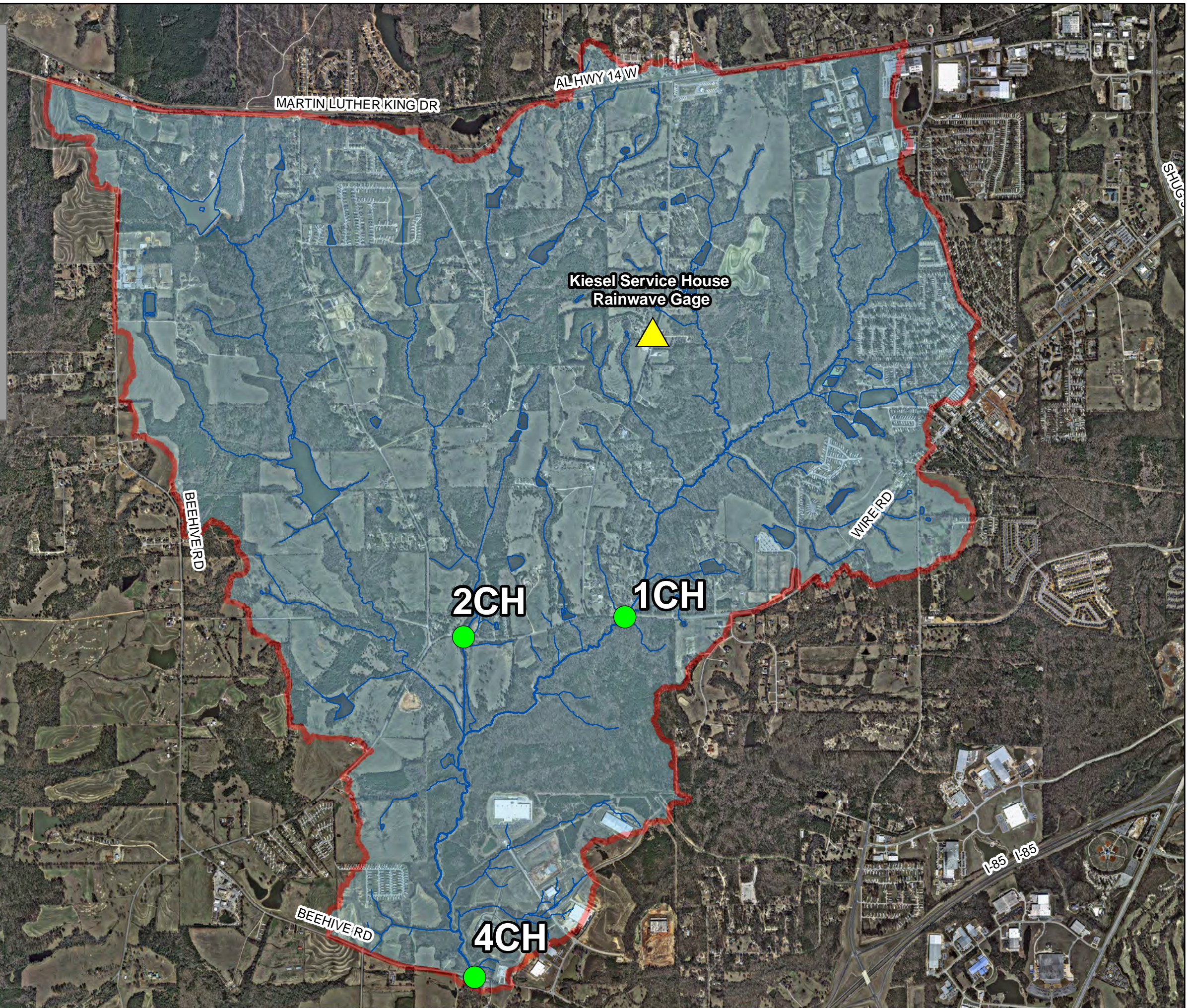
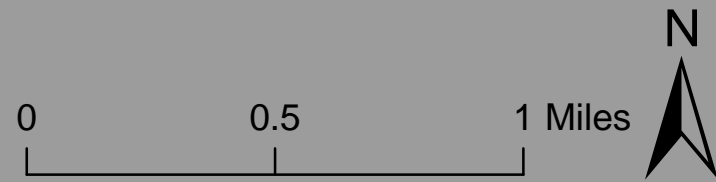
-  Precipitation Stations
-  Moores Mill Creek Sites



# Choctafaula Creek Water Quality Data Monitoring Locations



## Legend

-  Precipitation Stations
-  Choctafaula Creek Sites

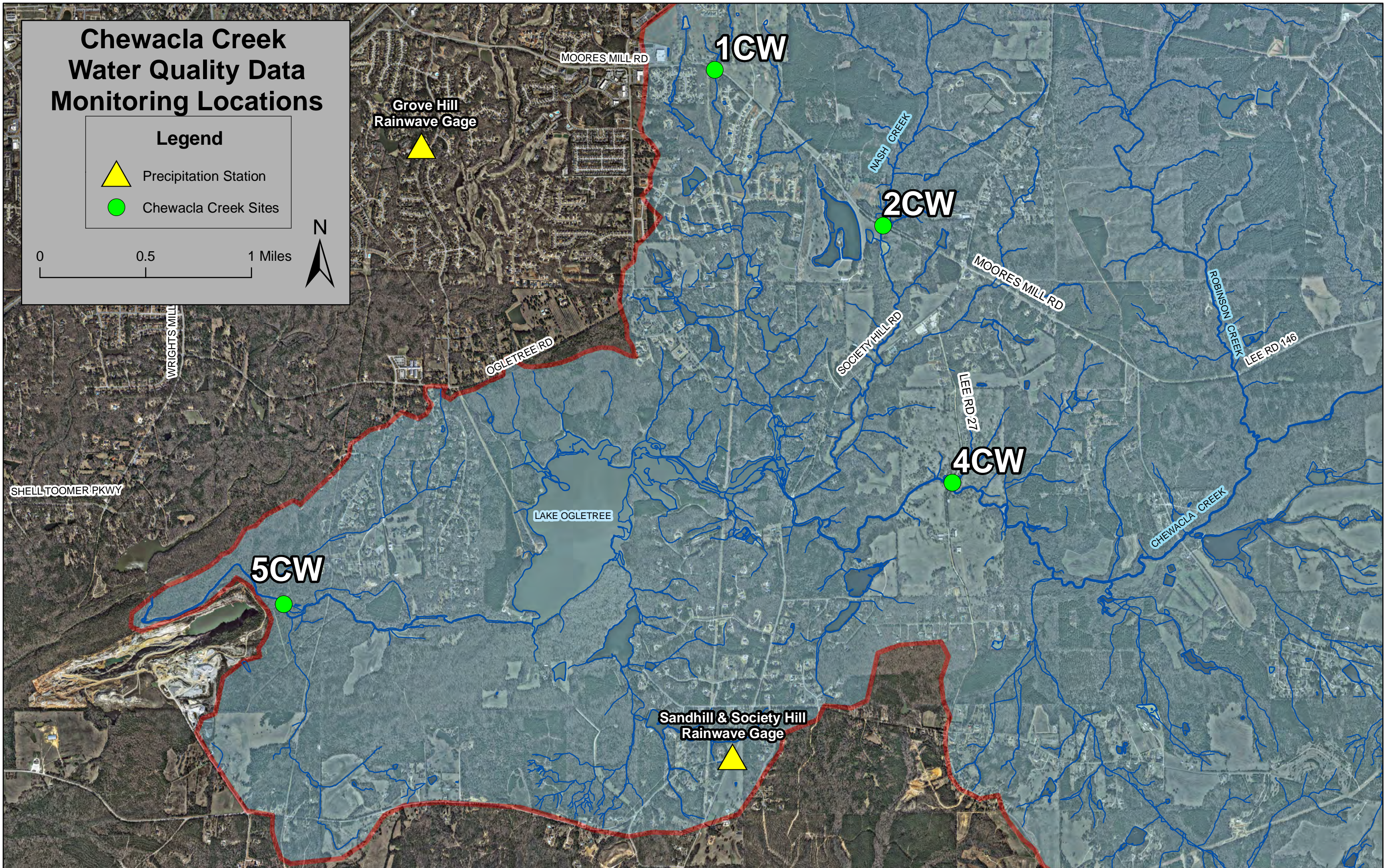


# Chewacla Creek Water Quality Data Monitoring Locations

## Legend

-  Precipitation Station
-  Chewacla Creek Sites

0 0.5 1 Miles



# Source Water Monitoring Program Monitoring Locations

## Legend

- Source Water Sampling Locations
- ▭ Lake Ogletree Watershed & Sub-Watersheds

0 1 2 Miles

