

**WATER QUALITY ASSESSMENT REPORT  
2013  
SAGINAW CHIPPEWA INDIAN TRIBE**

**Clean Water Act Section 106  
October 1, 2012 – September 31, 2013  
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## ACRONYMS AND ABBREVIATIONS

%EPT	Percentage Ephemeroptera, Plecoptera, and Trichoptera
BOD	Biological Oxygen Demand
CFS	Cubic Feet per Second
CMDHD	Central Michigan District Health Department
CMU	Central Michigan University
CWA	Clean Water Act
CWA 106	Clean Water Act, Section 106 Program
CWA 319	Clean Water Act, Section 319 Program
D.O.	Dissolved Oxygen
<i>E. coli</i>	<i>Escherichia coli</i>
µg/L	micrograms per liter
mg/L	milligrams per liter
MPN	Most Probable Number
mS/cm	milli-Siemens per centimeter
NTU	Nephelometric Turbidity Unit
NH3	Ammonia
QAPP	Quality Assurance Project Plan
S.C.	Specific Conductivity
SCIT	Saginaw Chippewa Indian Tribe
SOM	State of Michigan
Temp	Temperature in Degrees Celsius
TDS	Total Dissolved Solids
TN	Total Nitrogen
TP	Total Phosphorus
Turb	Turbidity
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WQS	Water Quality Standards
WQX	Water Quality Exchange

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## SECTION 1 ATLAS OF TRIBAL WATER RESOURCES

### 1.1 OVERVIEW OF RESERVATION

The Saginaw Chippewa Indian Tribe (SCIT) is a federally recognized Indian Tribe. Current Tribal enrollment is 3,576 members. Of the approximate 3,500 members 1,650 live on tribally own lands on the Isabella Reservation. The Isabella Reservation covers approximately 138,240 acres of land including fee land. The Isabella District encompasses major portions of six townships in Isabella County. The Saganing District is located in a rural setting 70 miles east on the shores of Lake Huron in Arenac County. Allotted land is scattered throughout both Reservation areas. The majority of the land is fee land, meaning not tribally owned.

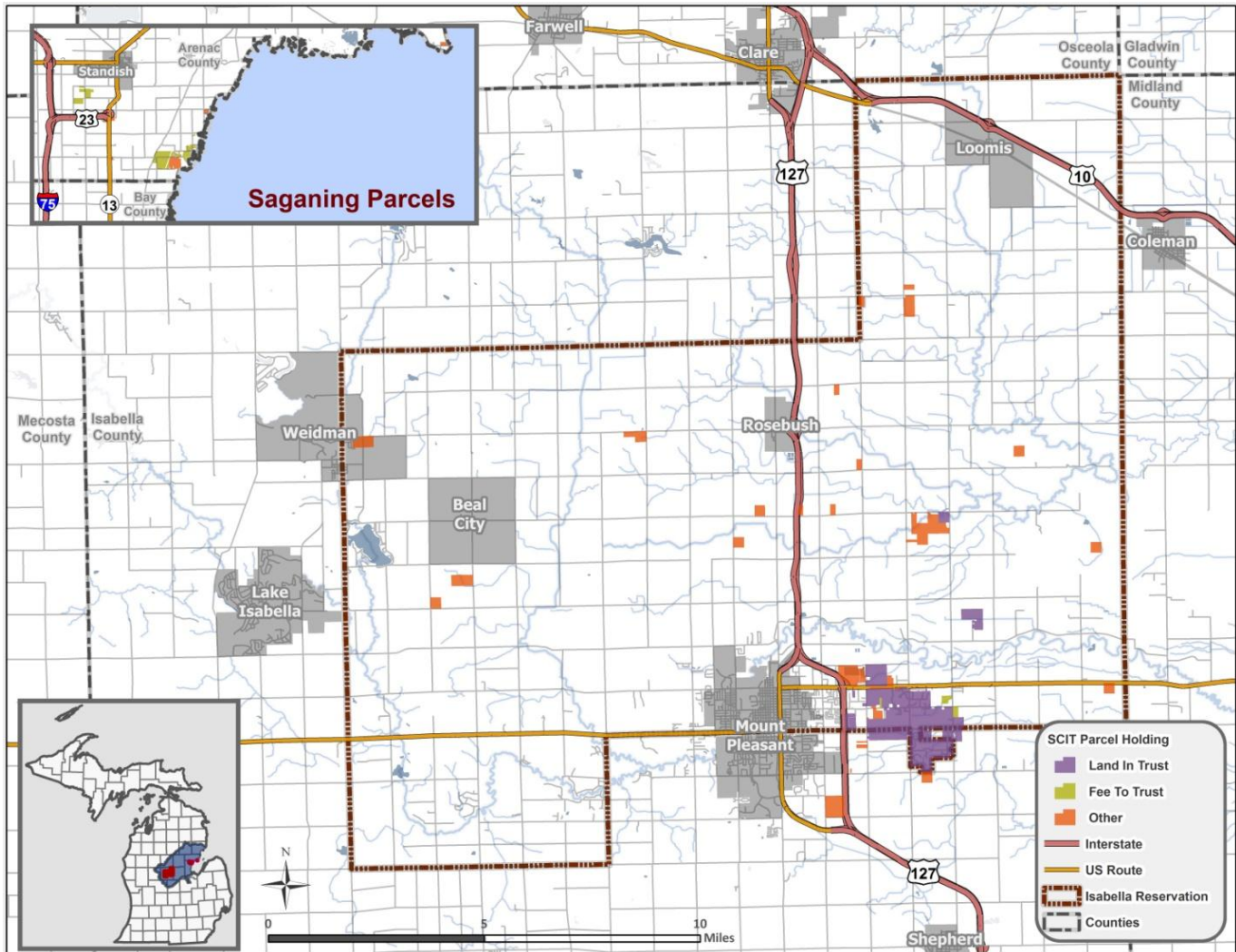


Figure 1. SCIT Locator Map

Table 1. Tribal Water Atlas

Category	Unit
Total miles of Rivers and Drains	571
Total number of lake acres (total does not include Lake Huron)	403
Total number of wetland acres	6,547

As a part of a rotational basin approach this assessment report focuses on the North and South Branches of the Salt River Watershed as well as Onion Creek. In addition, monitoring was conducted on fixed sites on the Chippewa River, North Branch Chippewa River, and Grewes Lake. It is the intention of the SCIT to focus water quality monitoring on the Saganing Creek in 2014.

The Chippewa River watershed drains 288,252 acres and 23.3 percent of that watershed lies within the SCIT Reservation boundaries. The Coldwater River, which is contained within the western portion of the Isabella Reservation, and drains into the Chippewa River. The Coldwater River contains 7,777 drainage acres within the Isabella Reservation. The North Branch Chippewa River watershed covers the central western portion of the Reservation, and drains into the Chippewa River just south of Reservation boundaries. The North Branch Chippewa River contains 27,008 drainage acres within Reservation boundaries.

The South Branch Salt River extends throughout the central and eastern portion of the Isabella Reservation, and contains 36,858 drainage acres within Reservation boundaries. The North Branch Salt River extends throughout the northern and eastern portion of the Isabella Reservation, and contains 25,566 drainage acres within Reservation boundaries. Together the South Branch Salt River and North Branch Salt River make up the Salt River, which begins after the confluence near the eastern border of the Isabella Reservation. The Salt River eventually leads to the Tittabawassee River, a major tributary of the Saginaw River. In total, the Salt River contains 64,584 drainage acres within Reservation boundaries.

Onion Creek is a small tributary that flows into and out of the southeastern portion of the Isabella Reservation. Onion Creek contains 1,582 drainage acres within Reservation boundaries.

**Table 2. Drainage Basins**

Name	Drainage Acres Inside of Reservation
Chippewa River	67,163
Coldwater River	7,777
North Branch Chippewa River	27,008
Saganing River	19,200
Salt River	64,584
South Branch Salt River	36,858
North Branch Salt River	25,566
Onion Creek	1,582

## 1.2 ENVIRONMENTAL ISSUES

The people of the SCIT have relied on the water resources of the Saginaw Bay Watershed for centuries. Traditions continue today that rely on healthy aquatic systems including hunting, fishing, and gathering. Significant resources that are water dependent include Black Ash, Wild Rice, Sweetgrass, many fish and wildlife species, etc. Water resources continue to be a focus for the Tribal Community. The community uses water resources for drinking, recreating, and ceremonial purposes.

The SCIT continues to experience growth and development, directly correlating with continued growth of the surrounding communities. The downside is the ever increasing pressure on the natural resources of

the Reservation. To continue planning and understanding the effects of development, the tribe is building long-term water quality database including physical, chemical, and biological parameters. These efforts help to determine the impact, current state, and maintain an awareness of any emergency situations, on the water resources of the SCIT.

The Chippewa River, tributaries, and the Salt Rivers run into the Tittabawasee River, which empties into the Saginaw River. The Saginaw River has been identified as an Area of Concern. According to the US EPA contaminated sediments, fish consumption advisories, degraded fisheries and loss of significant recreational values are reasons for the AOC designation. The EPA has identified the major contributing problems as soil erosion, excessive nutrients (e.g., phosphorus and nitrogen) entering the water, and contaminated sediments.

## **SECTION 2 WATER QUALITY MONITORING PROGRAM AND ASSESSMENT METHODS**

### **2.1 INTRODUCTION**

The purpose of the SCIT water quality monitoring and assessment program is to determine the current health and condition of the tribe’s waters. The monitoring program assesses whether the thresholds specified in Analytical Techniques and Reference Points (**Table 10**) are being met. A baseline study has been underway for SCIT waters since 2004, resulting in the collection of ten seasons of data on a limited amount of tribal waters. The program has evolved to cover more waters by developing a rotational basin approach. The river systems will be revisited according to the Monitoring Strategy to determine any changes and to continue to monitor the health of the systems.

Fixed stations will be monitored annually at specific points along the main branch of the Chippewa River and North Branch Chippewa River running through the Isabella Reservation. In October 2013, SCIT began implementing a CWA Section 319 Program to support the restoration activities necessary to make improvements to the systems. The fixed sites will also be used to evaluate the impact of those restoration activities.

**Table 3. Water Quality Program Objectives**

<b>Component</b>	<b>Objective</b>
Base Program	<ul style="list-style-type: none"> <li>- Evaluate expansion of monitoring to lakes and wetlands in the future</li> <li>- Establish, update, and maintain necessary documentation for grant status of CWA 106 Program</li> <li>- Implement Clean Water Act 319 Program</li> </ul>
Water Quality Monitoring	<ul style="list-style-type: none"> <li>- Determine current status of tribal waters using a minimum of 5 years measuring a combination of the following parameters               <ul style="list-style-type: none"> <li>o Biological – <i>E. coli</i>, macroinvertebrate, Habitat Assessment</li> <li>o Physical – Velocity, Temperature, pH, Dissolved Oxygen, Total Suspended Solids, Specific Conductance</li> <li>o Chemical – Total Phosphorous, Total Nitrogen, Sulfate</li> </ul> </li> <li>- Maintain a database of monitoring locations and information collected concerning the water quality of tribal waters</li> <li>- Identify waters in need of restoration</li> <li>- Identify potential threats to human health due to water quality issues</li> <li>- To maintain and improve the Water Program established by the SCIT with support from the Environmental Protection Agency</li> <li>- Compare changes in trends in chemical water quality, biology and habitat</li> <li>- Monitor emergency situations as necessary (suspicious situations, spills, fish kills)</li> </ul>
Outreach & Education	<ul style="list-style-type: none"> <li>- Represent the tribe at technical meetings</li> <li>- Attend school events Collaborate with internal Tribal departments and external agencies and organizations to develop programs for improvement to degraded water, health risks for community members, potential contamination, etc.</li> </ul>

Component	Objective
	<ul style="list-style-type: none"> <li>- Educate and build enthusiasm in community members concerning water quality, water issues, and water related activities</li> <li>- Make Tribal Community, including Tribal Council, aware of issues concerning water</li> </ul>

## 2.2 MONITORING PROGRAM OVERVIEW

All water quality monitoring is done by Water Quality Program staff in the SCIT Planning Department. A Quality Assurance Project Plan (QAPP) has been approved by US EPA for 2014 - 2017. SCIT staff follows the protocol outlined in the accepted QAPP to collect and analyze all data. Beginning in 2012 the SCIT Water Quality Program began on a rotation basin monitoring strategy to collect data from more water resources with limited time, staff, and resources. The 2013 sampling season concentrated on the North Branch and South Branch of the Salt River. Fixed sites have been established to stay aware of any changes or issues over time. As other areas of interest develop – the fixed sites will be used for reference.

The following table reflects the designated uses with the parameters used to establish if references levels are being met for each designated use.

**Table 4. Designated Use and Determining Parameters**

Designated Use or Tribal Goal	Parameters to be Measure to Determine Support of Goal
Aquatic Life	Dissolved oxygen, pH, turbidity, temperature, macroinvertebrate, Total Nitrogen, Total Phosphorous
Human Health	<i>E. coli</i> , total dissolved solids, turbidity, total nitrogen, total phosphorous
Recreation	<i>E. coli</i> , total dissolved solids, turbidity, total nitrogen, total phosphorous
Wild Rice Reintroduction	Velocity, dissolved oxygen, specific conductance, pH, total nitrogen, total phosphorous, sulfate

## 2.3 MONITORING LOCATIONS

**Table 5. Fixed Monitoring Locations**

River	Station ID	Monitoring Location Name	UTM Coordinates	Years Sampled	Parameters Sampled
Chippewa River	CHIP2	School Rd at Chip	43.646 -84.977	2004-2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	CHIP4	Meridian Rd at Chip	43.58 -84.847	2010-2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	CHIP8	Chipp-A-Waters at Chip	43.595 -84.793	2012-2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	CHIP7	Chippewa Rd at Chip	43.614 -84.708	2004-2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
North Branch Chippewa River	NB6	Meridian Rd at North Branch	43.593 -84.848	2011-2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
Grewes Lake	GL	Hideaway RV Park Beach	43.618 -84.738	2012-2013	<i>E. coli</i>

**Table 6. 2013 Monitoring Locations**

River	Station ID	Monitoring Location Name	UTM Coordinates	Years Sampled	Parameters Sampled
South Branch Salt River	SBS1	Leaton Rd at South Branch	41.765 -84.698	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	SBS2	Beal City Rd (west) at South Branch	41.749 -84.683	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	SBS3	Loomis Rd at South	43.676	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS,



River	Station ID	Monitoring Location Name	UTM Coordinates	Years Sampled	Parameters Sampled
		Branch	-84.668		NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	SBS4	Beal City Rd (east) at South Branch	43.670 -84.652	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
North Branch Salt River	NBS1	Battle Rd at North Branch	43.743 -84.665	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	NBS2	Denver Rd at North Branch	43.714 -84.673	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
	NBS3	Rosebush Rd at North Branch	43.699 -84.646	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>
Onion Creek	OC1	Shepherd Rd at Onion Creek	43.596 -84.688	2013	D.O., Temp, Turb, S.C., TDS, TP, TN, BOD, TSS, NH <sub>3</sub> , Discharge, Sulfate, and <i>E. coli</i>

## 2.4 MAP OF MONITORING LOCATIONS

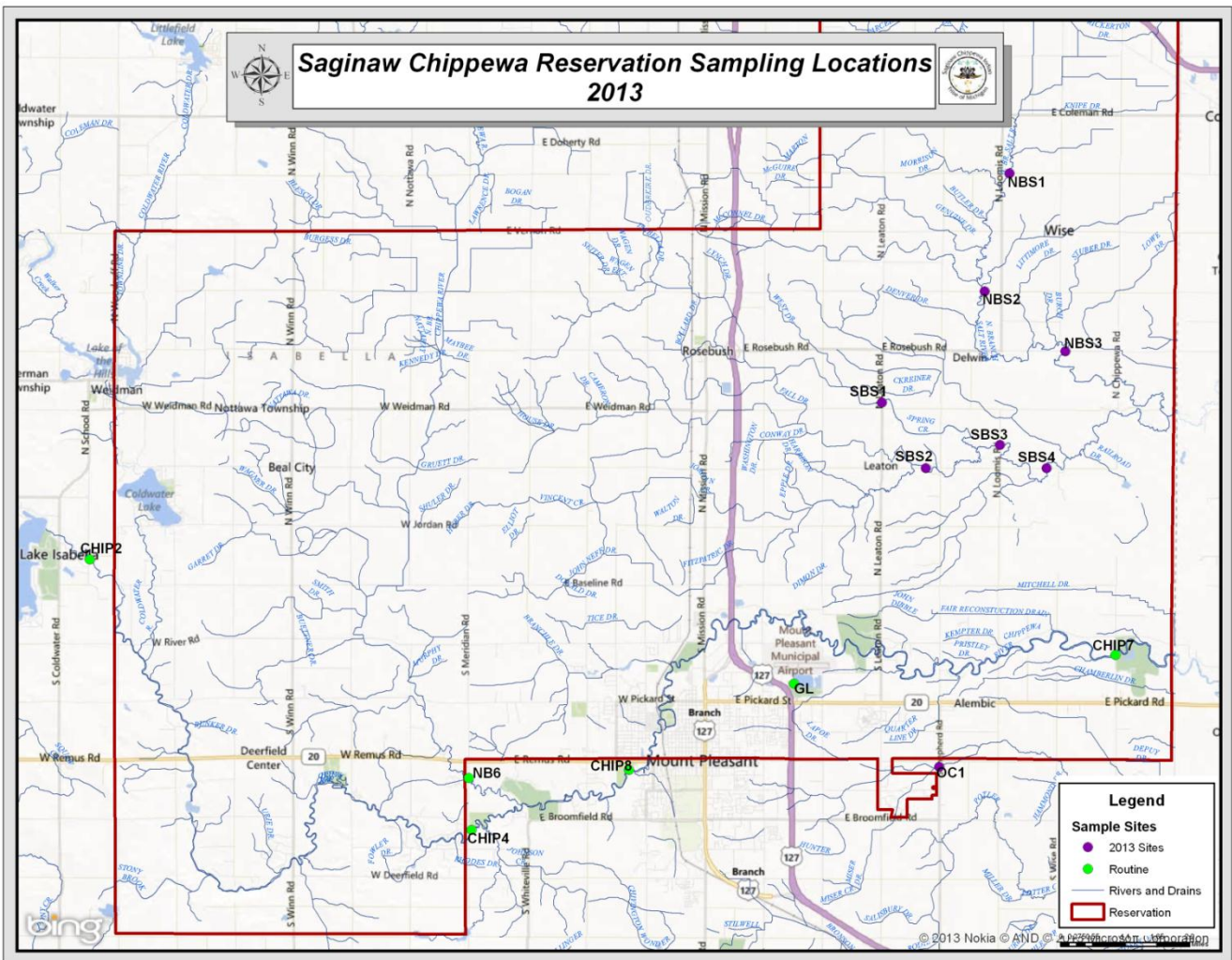


Figure 2. Map of 2013 Monitoring Sites

## 2.5 TOTAL EXTENT OF WATERS ASSESSED

In 2013, the SCIT monitored rivers within Reservation boundaries including both the North and South Branches of the River Salt River as well as fixed sites on the Chippewa River, North Branch Chippewa River. This represents approximately 56% of the total length of rivers and drains within the SCIT Reservation

boundaries. Grewes Lake was the only lake monitored in 2013, and monitoring was not conducted on any wetlands due to funding and programmatic constraints.

**Table 7. Extent of Tribal Waters Assessed**

Water Type	Area Monitored	Total within Reservation
Total miles of Rivers and Drains	318	571
Total number of lake acres (total does not include Lake Huron)	50	403
Total number of wetland acres	0	6547

## 2.6 WATER QUALITY STANDARDS AND REFERENCE CONDITIONS

The SCIT has not adopted tribal water quality standards for its water bodies, though the SCIT goal is for Tribal waters to fully support recreational, cultural, and domestic uses. The SCIT planning department has chosen to use the State of Michigan’s water quality standards (**Table 8**) to assess the state of tribal waters until tribal WQS are adopted. For parameters with no current Michigan water quality standards, USEPA Ecoregion reference conditions, and other applicable national criteria shown in **Table 9** were used to assess goal attainment status. **Table 10** lists the water quality standards numeric and narrative criteria values, as well as methods and response plans for all parameters sampled by the SCIT.

**Table 8. Michigan Water Quality Standards for Parameters Sampled by SCIT**

Parameter	WQS Rule No.	Value																								
pH	53	6.5 – 9.0																								
Dissolved Oxygen	64 & 65	Coldwater fisheries must be 7.0 mg/L or above Warm water fisheries must be 5.0 mg/L or above																								
Water Temperature	69–75	Warm water fisheries – for a line between Bay City, Midland, Alma, and North Muskegon monthly maximum temps.																								
		<table border="1"> <thead> <tr> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Apr</th> <th>May</th> <th>Jun</th> <th>Jul</th> <th>Aug</th> <th>Sep</th> <th>Oct</th> <th>Nov</th> <th>Dec</th> </tr> </thead> <tbody> <tr> <td>38</td> <td>38</td> <td>41</td> <td>56</td> <td>70</td> <td>80</td> <td>83</td> <td>81</td> <td>74</td> <td>64</td> <td>49</td> <td>39</td> </tr> </tbody> </table>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	38	38	41	56	70	80	83	81	74	64	49	39
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec													
		38	38	41	56	70	80	83	81	74	64	49	39													
Coldwater fisheries monthly maximum temps.																										
<table border="1"> <thead> <tr> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Apr</th> <th>May</th> <th>Jun</th> <th>Jul</th> <th>Aug</th> <th>Sep</th> <th>Oct</th> <th>Nov</th> <th>Dec</th> </tr> </thead> <tbody> <tr> <td>38</td> <td>38</td> <td>43</td> <td>54</td> <td>65</td> <td>68</td> <td>68</td> <td>68</td> <td>63</td> <td>56</td> <td>48</td> <td>40</td> </tr> </tbody> </table>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	38	38	43	54	65	68	68	68	63	56	48	40		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec															
38	38	43	54	65	68	68	68	63	56	48	40															
Turbidity	50	No numeric value – narrative																								
Specific Conductivity	51	Specific Conductivity- No numeric value – no narrative																								
<i>E. coli</i>	62	Total body contact requires 130 <i>E. coli</i> /100 mL as a 30 day mL geometric mean* and never over 300 <i>E. coli</i> /100 mL at any one time. Partial body contact is 1000 <i>E. coli</i> /100																								
Total phosphorus	60	At point source dischargers, 1.0 mg/L of total phosphorus as a monthly average																								
Total nitrogen	60	No numeric value																								

\*Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period.

**Table 9. Proposed Reference Conditions for Parameters with no Current Michigan Water Quality Standards**

Parameter	Reference	Value
Specific Conductivity	USEPA Freshwater (USEPA 2012b)	0.15 and 0.5 mS/cm
Total phosphorus	USEPA Nutrient Ecoregion Reference Conditions (Ecoregion 56 and 57)	20.76 – 70 µg/L
Total nitrogen	USEPA Nutrient Ecoregion Reference Conditions (Ecoregion 56 and 57)	0.47-1.55 mg/L

Parameter	Reference	Value
Turbidity	USEPA Nutrient Ecoregion Reference Conditions (Ecoregion VI, VII, and 56)	Level III Ecoregion VI: 9.89 NTU Level III Ecoregion VII: 1.7 NTU Level IV Ecoregion 56: 14.5 NTU Level IV Ecoregion 57: Not Available
Total dissolved solids	Lake Michigan Water Quality Use Standard ( <a href="http://www.ilga.gov/commission/jcar/adminco/de/035/035003020E05040R.html">http://www.ilga.gov/commission/jcar/adminco/de/035/035003020E05040R.html</a> )	1000 mg/L

## 2.7 ANALYTICAL TECHNIQUES AND REFERENCE STANDARDS

Table 10. Analytical Techniques and Points of Reference

Parameter	Analytical Method	Action Level & Reference	Accuracy	Detection Range	Assessment Threshold	Action Taken when Assessment Threshold Met or Exceeded
Dissolved Oxygen	Hydrolab	≤4.99 mg/L SOM WQS - 53	± 0.1 mg/L @ ≤ 8 mg/L ± 0.2 mg/L @ > 8 mg/L ± 10% reading > 20 mg/L	0-60 mg/L	10% of values contravene action level and/or when acute threats to aquatic life is noted	Notify MDEQ and Tribal Council (Immediate if acute threats are noted)
Specific Conductivity	Hydrolab	>0.5 mS/cm USEPA Water Monitoring & Assessing Chapter 5; 5.9 Conductivity <a href="http://water.epa.gov/type/rs/monitoring/vms59.cfm">http://water.epa.gov/type/rs/monitoring/vms59.cfm</a>	±0.05% of reading ±0.001 mS/cm	0-100 mS/cm	10% of values contravene action level	Inform tribal Council for further direction
Temperature	Hydrolab	Warm water fisheries – for a line between Bay City, Midland, Alma, north monthly maximum temps. *** see below SOM WQS	±0.10°C	-5-50°C	10% of values contravene action level and/or when acute threats to aquatic life is noted	Inform Tribal Council and MDEQ (Immediate if acute threats are noted)
pH	Hydrolab	<6.5 and >9.0 SOM WQS	±0.2 units	0-14 units	10% of values contravene action level and/or when acute threats to aquatic life is noted	Inform Tribal Council and MDEQ (Immediate if acute threats are noted)
Total P	Standard method 4500 P - E	>31.25 µg/L USEPA Nutrient Ecoregion Reference Conditions (Ecoregion 56)	0.3 µg/L	10-250 µg/L	10% of values contravene action level	Inform Tribal Council and MDEQ
Turbidity	Hydrolab	Level IV Ecoregion 56: 14.5 NTU USEPA Nutrient Ecoregion Reference Conditions (Ecoregion VI, VII, and 56)	Compared to <i>StabilCal</i> ± 1% up to 100 NTU ± 3% from 100 - 400 NTU ± 5% from 400 - 3,000 NTU	0-3000 NTU	10% of values contravene action level	Inform Tribal Council and MDEQ
Nitrate	Field Check – Test Strips	>1 mg/L Absence/presence	Gradation nitrate - N 0, 1, 2, 5, 10, 20, 50.	0-50 ppm	Any sample exceeds 1 mg/l, as determined by field test strip.	Send sample to lab for further analysis – used as presence absence indicator. In the event of an absence measure the data is recorded and submitted as 0.
Nitrite	Field Check – Test Strips	0.15 mg/L Absence Presence	Gradation nitrite - N 0, 0.15, 0.3, 1, 1.5, 3	0-3.0 ppm	Any sample exceeds 0.15 mg/l, as determined by field test strip.	Send sample to lab for further analysis – used as presence absence indicator. In the event of an absence measure the data is recorded and

Parameter	Analytical Method	Action Level & Reference	Accuracy	Detection Range	Assessment Threshold	Action Taken when Assessment Threshold Met or Exceeded
						submitted as 0.
TN	Persulfate Method Standard method 4500 -N C	>1.15. mg/L Based on the 25 <sup>th</sup> percentile for USEPA Ecoregion 56 EPA 822-B-00-018 "Ambient Water Quality Criteria Recommendations Information Supporting the Development of State and Tribal Nutrient Criteria for Rivers and Streams in Nutrient Ecoregion VII"	±15%	3 -2500 µg/L	10% of values contravene action level	Inform Tribal Council and MDEQ
Macro invertebrates	SOM P #51 – Manual Identification	<0*	N/A	-9 to 9	N/A	Inform Tribal Council and MDEQ
Velocity	OTT MF pro Wading Rod see methods in section 4.1	N/A	±2% of reading ±0.015 m/s (±0.05 ft/s) 0 to 3.04 m/s (0 to 10 ft/s); ± 4% of reading from 3.04 to 4.87 m/s (10 to 16 ft/s)	0 to 6.09 m/s (0 to 20 ft/s)	N/A	Inform Tribal Council and MDEQ in the event of significant flooding or lack of water flowing in stream.
E. coli	Colilert – 18	Total body contact requires no more than 130 <i>E. coli</i> /100 mL as a 30 day mL geometric mean and never over 300 <i>E. coli</i> /100 mL at any one time. Partial body contact is 1000 <i>E. coli</i> /100 mL SOM WQS	Suppresses up to 2 million heterotrophs per 100 mL and 5 million per 250 mL. Detects a single viable <i>E. coli</i> per sample	1-2496 CFU	Total body contact requires no more than 130 <i>E. coli</i> /100 mL as a 30 day mL geometric mean and never over 300 <i>E. coli</i> /100 mL at any one time. Partial body contact is 1000 <i>E. coli</i> /100 mL	Inform Tribal Council, Central Michigan District Health Department, and MDEQ
TSS	Standard Method 2540 D	Seeking to establish from our baseline	±2.8 mg/L	0 to 20,000 mg/L	N/A	Fluctuations from previous averages will be reviewed. Significant changes will be addressed with MDEQ and Tribal Council.
Ammonia	Standard Method NH <sub>3</sub> D	0.053 mg/ L Rule 57 Water Quality Values Surface Water Assessment Section Michigan DEQ for Aquatic Life	±0.038, ±0.017, ±0.007, and ±0.003	0.03 to 1400 mg	10% of values contravene action level	Fluctuations from previous averages will be reviewed. Significant changes will be addressed with MDEQ and Tribal Council
BOD	Standard Method 5210	N/A	There is no measurement for establishing bias of the BOD procedure.	2m g/L to difference between the max initial DO) and min DO residual of 1 mg/L multiplied by the dilution factor.	N/A	Fluctuations from previous averages will be reviewed. Significant changes will be addressed with MDEQ and Tribal Council
Habitat	Procedure 51	Poor*			N/A	Inform MDEQ of potential violation – inform Tribal Council of impairment.
TDS	Hydrolab	750 mg/L**  SOM never to be exceeded value, pg 8. <a href="http://www.michigan.gov/documents/deq/wb-swas-rules-part4_254149_7.pdf">http://www.michigan.gov/documents/deq/wb-swas-rules-part4_254149_7.pdf</a>	0.2 ppt	0-70 ppt	10% of values contravene action level	Fluctuations from previous averages will be reviewed. Significant changes will be addressed with MDEQ and Tribal Council
Sulfate	YSI Photometer	10 mg/L <a href="http://www.pca.state.mn.us/index.php_/view-">http://www.pca.state.mn.us/index.php_/view-</a>	±0.5% at 4% transmittance; ±0.005	0 to 200 mg/L SO <sub>4</sub>	10% of values contravene action level	Inform Tribal Council and

Parameter	Analytical Method	Action Level & Reference	Accuracy	Detection Range	Assessment Threshold	Action Taken when Assessment Threshold Met or Exceeded
	Method 520nm	<a href="document.html?gid=16356">document.html?gid=16356</a>	at 0.3 AU			MDEQ

\*Habitat Assessment and Macroinvertebrate data are used in combination to determine if a site is *Excellent, Good, Marginal,* or *Poor* based on the criteria included in SOM Procedure 51.

\*\*Amended from 2013-2017 QAPP value of 20 mg/L

\*\*\*Table 11. State of Michigan Water Quality Standards for Temperature

Water Temperature	Warm water fisheries – for a line between Bay City, Midland, Alma, north monthly maximum temps.											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	°C	3.33	3.33	5	13.33	21.11	26.67	28.33	27.22	23.33	17.78	9.44
°F	38	38	41	56	70	80	83	81	74	64	49	39

## 2.8 DATA ANALYSIS AND ASSESSMENT

Water quality monitoring data for the 2013 sampling season have been analyzed using Microsoft Excel. Data were reviewed at the time of collection for any indicators of significant impact or emergency situations. Data collected with SCIT resources are the only information used for data analysis unless otherwise noted. The 2013 monitoring data was uploaded to USEPA’s Water Quality Exchange (WQX) on November 22, 2013.

*E. coli* data were shared with the Central Michigan District Health Department (CMDHD) throughout the entire monitoring season. If samples were found to exceed State of Michigan Water Quality Standards, recreational locations along the Chippewa River were posted with advisories by CMDHD staff.

### 2.8.1 DATA USED TO MAKE ASSESSMENT DECISIONS

Data were collected for the 2013 monitoring season by SCIT water quality staff beginning June 4<sup>th</sup> and concluded on November 1<sup>st</sup>. SCIT water quality staff measured the following parameters at the monitoring sites, though not every parameter was analyzed in every sample taken.

Table 12. Measured Parameters at Site Locations

Water Resource Type/ Monitoring Objective	Dissolved Oxygen	Temperature	pH	Turbidity	Nutrients (TP/TN*)	Habitat	Macro Invertebrates	Pathogens	Total Dissolved Solids (TDS)	Ammonia	Biological Oxygen Demand (BOD)	Total Suspended Solids (TSS)	Velocity	Sulfate
River Water Quality (Fixed Station)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
River Water Quality (targeted)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lake Water Quality	X	X	X	X				X						

## 2.8.2 TRIBAL GOALS FOR THE WATERS OF THE RESERVATION

Table 13. Water Body Tribal Goals and Designations

Tribal Goal or Designated Use	Chippewa River	North Branch Chippewa River	South Branch Salt River	North Branch Salt River	Onion Creek
Aquatic Life	X	X	X	X	X
Human Health	X				
Recreation	X	X	X	X	X
Wild Rice (Potential)	X				

### SECTION 3 SUMMARY OF DATA

#### 3.1 SUMMARY OF DATA FROM CHIPPEWA RIVER

The following summarized statistical data are from the 2013 monitoring season.

**Note:** data were unavailable for the following parameters and dates due to lab delays: Nitrogen from July and October 2013; Total Phosphorus from October 2013.

**Note:** “N/A” indicates that data have been collected but are not available yet due to laboratory delays.

**Note:** “x” indicated that data have not been collected for this particular parameter.

### 3.1.1 CHIP2 - SCHOOL ROAD



Figure 3. CHIP2

Table 14. Field Data Statistics - Station ID: CHIP2

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	x	88.1	26.02	8.58	0.4002	4.9	256.1	159.20
Min Value	x	77.9	11.04	8.13	0.3348	0.0	214.3	63.76
Median	x	85.4	22.44	8.44	0.3614	0.0	231.3	98.03
Average	x	84.0	20.18	8.43	0.3687	1.1	236.0	103.29
# Samples (n)	0	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	None

Table 15. Lab Data Statistics - Station ID: CHIP2

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (µg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (SOM)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	15.56	4.30	0.085	20	0.0	N/A	2005.0	53.0
Min Value	N/A	15.56	1.00	0.018	0	0.0	N/A	1417.8	10.0
Median	N/A	15.56	1.50	0.019	0	0.0	N/A	2005.0	25.8
Average	N/A	15.56	2.08	0.043	4	0.0	N/A	1929.3	26.4
# Samples (n)	2	1	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.1.2 CHIP4 - MERIDIAN PARK



Figure 4. CHIP4

Table 16. Field Data Statistics - Station ID: CHIP4

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	8.90	90.4	24.33	8.44	0.4189	3.3	268.1	338.00
Min Value	6.82	74.1	10.28	7.69	0.3821	0.0	244.6	114.40
Median	8.01	85.2	20.19	8.31	0.4131	0.6	264.4	175.20
Average	7.79	84.6	18.53	8.20	0.4027	1.0	257.8	218.88
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 17. Lab Data Statistics - Station ID: CHIP4

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	17.50	2.25	0.075	20	0.0	N/A	2005.0	155.0
Min Value	N/A	17.50	1.00	0.020	0	0.0	N/A	1165.0	31.0
Median	N/A	17.50	1.20	0.026	0	0.0	N/A	2005.0	67.5
Average	N/A	17.50	1.37	0.043	8	0.0	N/A	1893.5	72.8
# Samples (n)	2	1	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN



### 3.1.3 CHIP8 - CHIPP-A-WATERS PARK



Figure 5. CHIP8

Table 18. Field Data Statistics - Station ID: CHIP8

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	9.16	91.7	23.59	8.45	0.4526	4.9	289.7	252.60
Min Value	6.76	80.2	14.43	8.29	0.4236	0.0	271.1	136.80
Median	7.96	84.7	21.09	8.43	0.4435	1.6	283.8	195.75
Average	7.96	85.3	20.05	8.39	0.4408	2.0	282.1	195.23
# Samples (n)	3	4	4	3	4	4	4	4
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 19. Lab Data Statistics - Station ID: CHIP8

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	x	1.20	0.048	20	0.0	N/A	2005.0	471.0
Min Value	N/A	x	1.00	0.015	0	0.0	N/A	1799.8	47.5
Median	N/A	x	1.10	0.020	20	0.0	N/A	2005.0	130.9
Average	N/A	x	1.10	0.026	12	0.0	N/A	1987.1	167.5
# Samples (n)	1	0	4	4	5	4	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.1.4 CHIP 7 - CHIPPEWA ROAD



Figure 6. CHIP7

Table 20. Field Data Statistics - Station ID: CHIP7

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	9.01	82.4	23.77	8.44	0.5101	8.2	326.5	274.40
Min Value	5.45	64.7	10.09	7.98	0.4687	0.0	300.0	147.20
Median	7.14	73.7	18.10	8.15	0.4871	0.5	311.8	207.45
Average	6.99	73.5	17.56	8.19	0.4866	2.5	311.5	209.13
# Samples (n)	5	5	5	5	5	5	5	4
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 21. Lab Data Statistics - Station ID: CHIP7

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	29.38	2.43	0.075	20	0.0	N/A	2005.0	950.5
Min Value	N/A	29.38	1.40	0.018	0	0.0	N/A	1431.5	49.3
Median	N/A	29.38	1.50	0.021	0	0.0	N/A	2005.0	118.0
Average	N/A	29.38	1.69	0.039	8	0.0	N/A	1962.8	184.6
# Samples (n)	2	1	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.2 SUMMARY OF DATA FROM NORTH BRANCH CHIPPEWA RIVER 3.2.1 NB6 - MERIDIAN ROAD



Figure 7. NB6

Table 22. Field Data Statistics - Station ID: NB6

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	8.65	86.8	20.63	8.33	0.6214	13.7	397.7	41.60
Min Value	6.59	74.8	12.23	8.12	0.5919	2.5	378.8	19.91
Median	7.58	79.8	18.24	8.21	0.5975	7.1	382.4	20.21
Average	7.60	80.3	17.33	8.22	0.6021	7.6	385.3	27.24
# Samples (n)	4	4	4	4	4	4	4	3
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 23. Lab Data Statistics - Station ID: NB6

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	x	1.50	0.061	0	21.0	N/A	20050.0	13295.0
Min Value	N/A	x	1.20	0.013	0	0.0	N/A	2005.0	212.3
Median	N/A	x	1.35	0.019	0	5.0	N/A	2005.0	420.0
Average	N/A	x	1.35	0.028	0	7.8	N/A	4411.0	1318.6
# Samples (n)	1	0	4	4	4	4	1	17	17
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.3 SUMMARY OF DATA FROM GREWES LAKE

#### 3.3.1 GL - GREWES LAKE

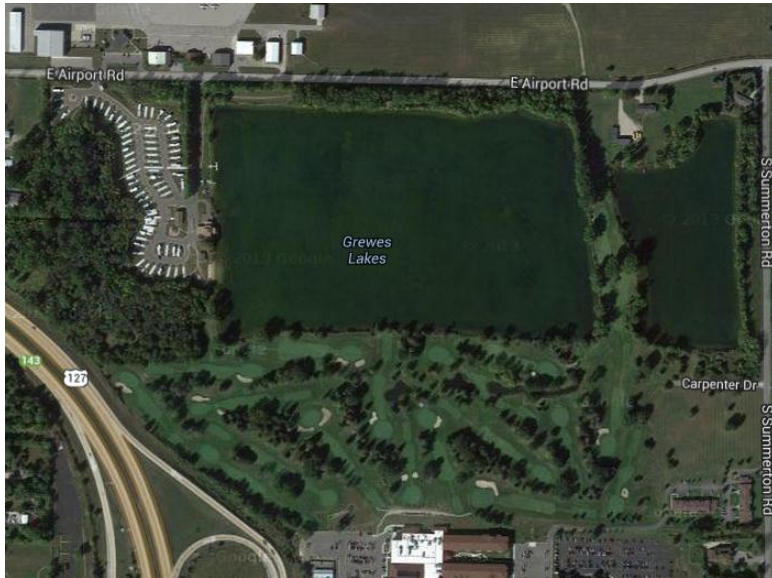


Figure 8. GL

Table 24. Lab Data Statistics - Station ID: GL

Statistic	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	2005.0	75.7
Min Value	1073.3	10.0
Median	2005.0	12.9
Average	1904.2	23.5
# Samples (n)	18	18
Threshold	None	>130 MPN, >300 MPN, >1000 MPN

### 3.4 SUMMARY OF DATA FROM SOUTH BRANCH SALT RIVER

#### 3.4.1 SBS1 - LEATON ROAD



Figure 9. SBS1

Table 25. Field Data Statistics - Station ID: SBS1

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	11.19	116.9	21.44	8.48	0.8838	16.0	565.6	3.04
Min Value	5.86	68.0	6.48	8.07	0.7192	0.9	460.3	1.16
Median	9.36	90.2	16.72	8.27	0.7655	4.3	489.9	1.59
Average	8.99	90.8	15.45	8.27	0.7841	7.3	501.8	1.79
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 26. Lab Data Statistics - Station ID: SBS1

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	99.66	3.02	0.089	20	79.0	N/A	20050.0	15830.0
Min Value	N/A	84.12	1.40	0.018	0	0.0	N/A	1818.3	153.3
Median	N/A	91.89	1.90	0.028	0	76.0	N/A	2005.0	384.4
Average	N/A	91.89	2.02	0.044	4	58.6	N/A	4511.8	1538.8
# Samples (n)	2	2	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.4.2 SBS2 - BEAL CITY ROAD WEST



Figure 10. SBS2

Table 27. Field Data Statistics - Station ID: SBS2

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	7.90	68.1	21.54	8.24	1.0160	53.3	650.3	3.96
Min Value	4.60	52.8	7.54	7.93	0.8085	1.6	517.4	0.94
Median	6.32	63.4	15.73	8.12	0.8773	8.3	561.4	3.36
Average	6.20	62.3	15.35	8.11	0.8943	24.3	572.3	2.78
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 28. Lab Data Statistics - Station ID: SBS2

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	389.92	4.28	0.069	0	140.0	N/A	20050.0	15446.7
Min Value	N/A	130.57	1.10	0.019	0	56.0	N/A	1818.3	355.3
Median	N/A	260.24	1.60	0.037	0	120.0	N/A	2005.0	801.3
Average	N/A	260.24	2.12	0.038	0	113.6	N/A	4646.8	2304.6
# Samples (n)	2	2	5	5	5	5	1	17	17
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.4.3 SBS3 - LOOMIS ROAD

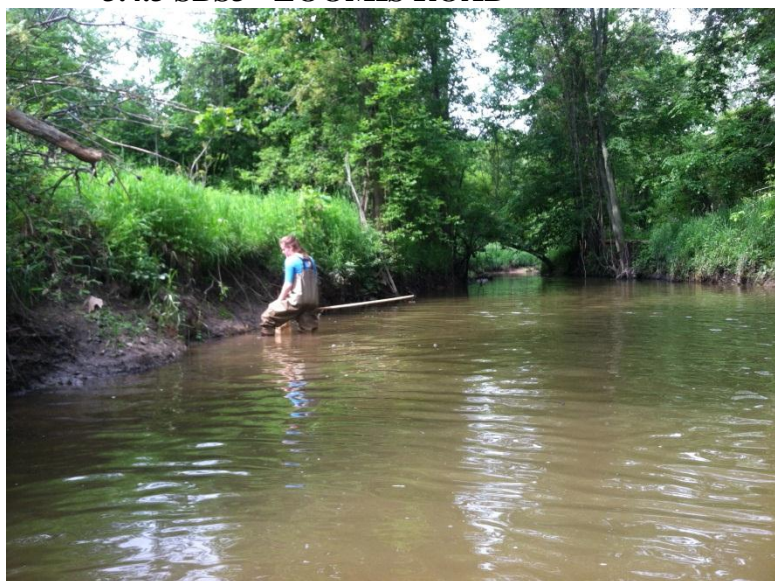


Figure 11. SBS3

Table 29. Field Data Statistics - Station ID: SBS3

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	8.27	73.9	21.13	8.32	1.0580	46.0	676.8	7.70
Min Value	5.30	60.5	7.74	8.02	0.4370	2.9	279.7	2.10
Median	7.30	71.7	15.18	8.18	0.9335	9.6	635.8	4.98
Average	6.94	69.5	15.09	8.18	0.8815	21.8	571.7	4.69
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 30. Lab Data Statistics - Station ID: SBS3

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	283.56	2.77	0.065	40	155.0	N/A	20050.0	11916.7
Min Value	N/A	115.78	1.30	0.019	0	66.0	N/A	2005.0	344.7
Median	N/A	199.67	1.50	0.045	0	144.0	N/A	2005.0	549.6
Average	N/A	199.67	1.79	0.039	8	126.2	N/A	4695.9	1795.7
# Samples (n)	2	2	5	5	5	5	1	17	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.4.4 SBS4 - BEAL CITY ROAD EAST



Figure 12. SBS4

Table 31. Field Data Statistics - Station ID: SBS4

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	7.38	69.0	21.42	8.20	1.2120	431.0	775.5	8.60
Min Value	5.29	58.9	7.93	7.91	0.9369	9.9	599.6	2.94
Median	6.44	64.2	16.02	8.09	1.1130	17.5	712.6	3.55
Average	6.36	64.1	15.20	8.07	1.0848	100.3	695.3	5.03
# Samples (n)	5	5	5	5	5	5	5	3
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 32. Lab Data Statistics - Station ID: SBS4

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	242.73	2.89	0.051	20	155.0	N/A	20050.0	14750.0
Min Value	N/A	111.67	1.10	0.010	0	24.0	N/A	2005.0	272.0
Median	N/A	177.20	1.50	0.024	0	134.0	N/A	2005.0	596.0
Average	N/A	177.20	1.86	0.031	8	118.0	N/A	3575.2	2280.4
# Samples (n)	2	2	5	5	5	5	1	17	17
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN



### 3.5 SUMMARY OF DATA FROM NORTH BRANCH SALT RIVER

#### 3.5.1 NBS1 - BATTLE ROAD



Figure 13. NBS1

Table 33. Field Data Statistics - Station ID: NBS1

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	9.00	79.0	20.72	8.34	0.7259	21.3	464.6	6.79
Min Value	6.27	71.7	6.05	8.13	0.4006	4.9	256.4	3.01
Median	7.79	74.6	15.33	8.17	0.7102	8.7	454.4	3.63
Average	7.62	75.5	14.55	8.22	0.6474	12.3	414.3	4.50
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 34. Lab Data Statistics - Station ID: NBS1

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	114.66	2.95	0.048	20	77.0	N/A	20050.0	3013.3
Min Value	N/A	27.11	1.30	0.012	0	7.0	N/A	2005.0	329.3
Median	N/A	70.89	1.40	0.015	0	71.0	N/A	2005.0	1165.5
Average	N/A	70.89	1.89	0.027	8	60.0	N/A	4055.3	1209.6
# Samples (n)	2	2	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.5.2 NBS2 - DENVER ROAD



Figure 14. NBS2

Table 35. Field Data Statistics - Station ID: NBS2

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	8.17	70.1	19.82	8.20	0.9477	21.9	606.5	15.47
Min Value	5.41	60.1	7.39	7.96	0.8839	3.0	565.7	6.56
Median	6.94	69.1	14.90	8.11	0.9277	7.5	593.7	8.37
Average	6.78	67.2	14.49	8.11	0.9180	10.9	587.5	9.26
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 36. Lab Data Statistics - Station ID: NBS2

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	67.84	2.41	0.058	0	128.0	N/A	20050.0	14450.0
Min Value	N/A	36.88	0.90	0.014	0	31.0	N/A	2005.0	266.0
Median	N/A	52.36	1.50	0.018	0	100.0	N/A	2005.0	678.5
Average	N/A	52.36	1.58	0.032	0	89.4	N/A	4881.8	1754.3
# Samples (n)	2	2	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.5.3 NBS3 - ROSEBUSH ROAD



Figure 15. NBS3

Table 37. Field Data Statistics - Station ID: NBS3

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	8.83	76.3	20.56	8.27	1.0110	13.8	647.3	20.82
Min Value	6.03	68.4	7.41	8.07	0.8950	2.3	572.8	7.54
Median	7.52	75.5	15.32	8.20	0.9669	2.5	618.8	9.21
Average	7.38	73.9	14.92	8.19	0.9647	5.2	617.5	11.14
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 38. Lab Data Statistics - Station ID: NBS3

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	84.06	2.40	0.053	20	145.0	N/A	20050.0	15136.7
Min Value	N/A	35.46	1.20	0.012	0	0.0	N/A	1769.3	133.3
Median	N/A	59.76	1.20	0.021	0	118.0	N/A	2005.0	368.2
Average	N/A	59.76	1.67	0.032	4	100.6	N/A	4028.0	1285.0
# Samples (n)	2	2	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	None	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.6 SUMMARY OF DATA FROM ONION CREEK

#### 3.6.1 OC1 - SHEPHERD ROAD



Figure 16. OC1

Table 39. Field Data Statistics - Station ID: OC1

Statistic	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Discharge (cfs)
Max Value	10.21	91.8	20.46	8.24	1.2930	28.1	827.8	9.68
Min Value	4.04	46.0	9.31	7.25	0.8196	0.0	524.5	0.73
Median	7.03	70.0	16.94	7.48	1.0330	1.2	660.9	1.53
Average	6.97	70.7	15.92	7.65	1.0401	7.1	665.7	3.00
# Samples (n)	5	5	5	5	5	5	5	5
Threshold	≤4.99 mg/L	N/A	See Table 11	<6.5 and >9.0	>0.5000 mS/cm	>14.5 NTU	>750 mg/L	N/A

Table 40. Lab Data Statistics - Station ID: OC1

Statistic	Nitrogen as NO <sub>3</sub> +NO <sub>2</sub> (mg/L)	Phos. Total (mg/L)	Biol. Oxygen Demand (mg/L)	NH <sub>3</sub> (mg/L)	Total Susp. Solids (mg/L)	Sulfate (mg/L)	Macro inverts (%EPT)	Total Coliform MPN/100ml	<i>E. coli</i> MPN/100ml
Max Value	N/A	50.07	10.90	0.057	0	155.0	N/A	20050.0	6376.7
Min Value	N/A	38.73	1.60	0.011	0	20.0	N/A	1828.5	147.0
Median	N/A	44.40	2.10	0.018	0	120.0	N/A	2005.0	612.4
Average	N/A	44.40	3.74	0.029	0	101.0	N/A	4875.9	1070.1
# Samples (n)	2	2	5	5	5	5	1	18	18
Threshold	>1.15 mg/L	>31.25 µg/L	N/A	>0.053 mg/L	N/A	>10 mg/L	<0	N/A	>130 MPN, >300 MPN, >1000 MPN

### 3.7 SUMMARY OF HABITAT ASSESSMENT DATA

Table 41. Summary of 2013 Habitat Assessment Data - Riffle/Run Streams

Habitat Assessment	CHIP2	CHIP4	CHIP8	CHIP7
Score	180	174	147	136
# Samples (n)	1	1	1	1
Threshold	<56	<56	<56	<56

Table 42. Summary of 2013 Habitat Assessment Data - Glide/Pool Stream

Habitat Assessment	NB6	SBS1	SBS2	SBS3	SBS4	NBS1	NBS2	NBS3	OC1
Score	99	83	115	130	83	106	99	130	122
# Samples (n)	1	1	1	1	1	1	1	1	1
Threshold	<56	<56	<56	<56	<56	<56	<56	<56	<56

### 3.8 SUMMARY OF MACROINVERTEBRATE DATA

Table 43. Summary of 2013 Macroinvertebrate Assessment Data - SOM Metric Scoring

Macroinvertebrate Assessment	CHIP 2	CHIP 4	CHIP 8	CHIP 7	NB6	SBS1	SBS2	SBS3	SBS4	NBS1	NBS2	NBS3	OC1
Metric Score	2	3	0	2	-1	-5	-7	-2	-5	-4	-3	-4	-2
# Samples (n)	1	1	1	1	1	1	1	1	1	1	1	1	1
Threshold	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0

Table 44. Summary of 2013 Macroinvertebrate Assessment Data - %EPT Scoring

Macroinvertebrate Assessment	CHIP 2	CHIP 4	CHIP 8	CHIP 7	NB6	SBS1	SBS2	SBS3	SBS4	NBS1	NBS2	NBS3	OC1
%EPT	27.13	57.38	30.70	27.27	20.00	3.60	2.02	9.00	5.83	5.66	6.25	10.38	2.88
# Samples (n)	1	1	1	1	1	1	1	1	1	1	1	1	1
Threshold	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## SECTION 4 COMPARISONS OF DATA TO BENCHMARKS/CRITERIA

### 4.1 SUMMARY OF BENCHMARK EXCEEDENCE BY PARAMETER

**Note:** The following graphs represent water quality data collected in the 2013 sampling season. Action levels correspond to information presented in **Table 10**.

#### 4.1.1 DISSOLVED OXYGEN

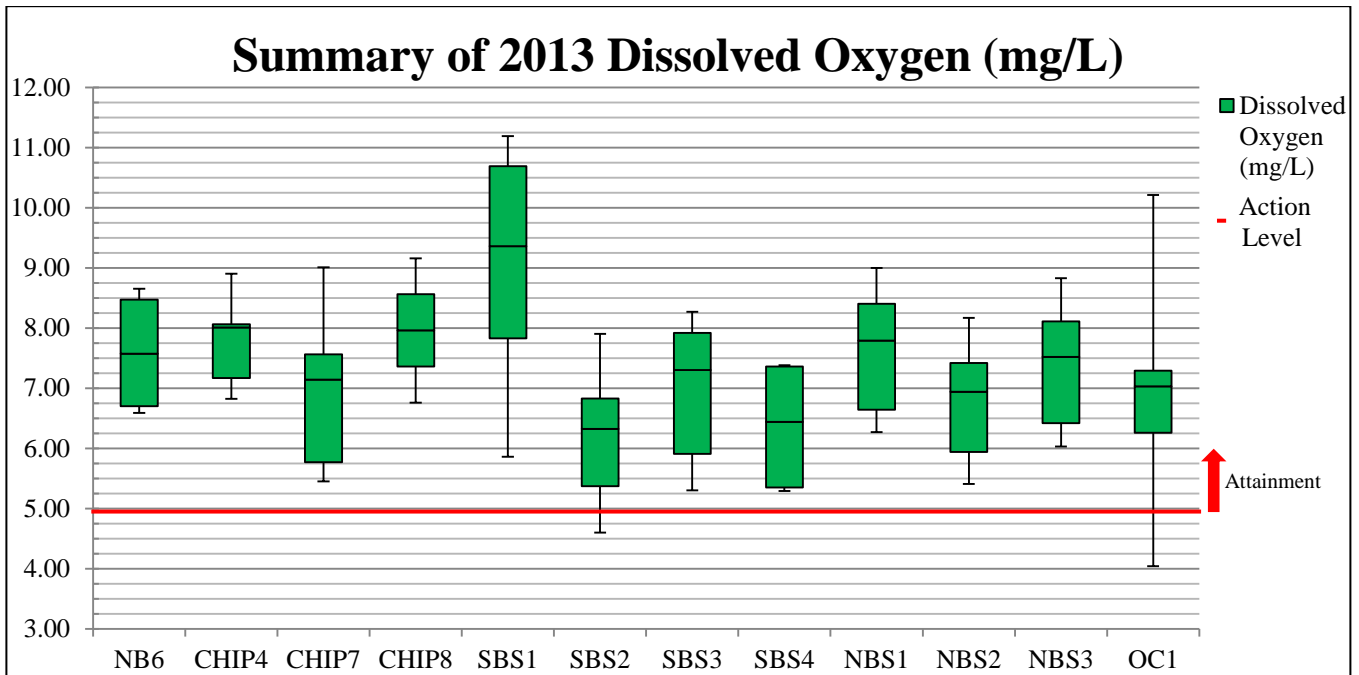


Figure 17. Summary of 2013 Dissolved Oxygen

All sample sites are largely meeting the reference standard of 5 mg/L or above, the threshold for dissolved oxygen in warm water streams as indicated in **Table 10**. Though there were two occasions where the threshold was crossed at SBS2 and OC1.

#### 4.1.2 TEMPERATURE

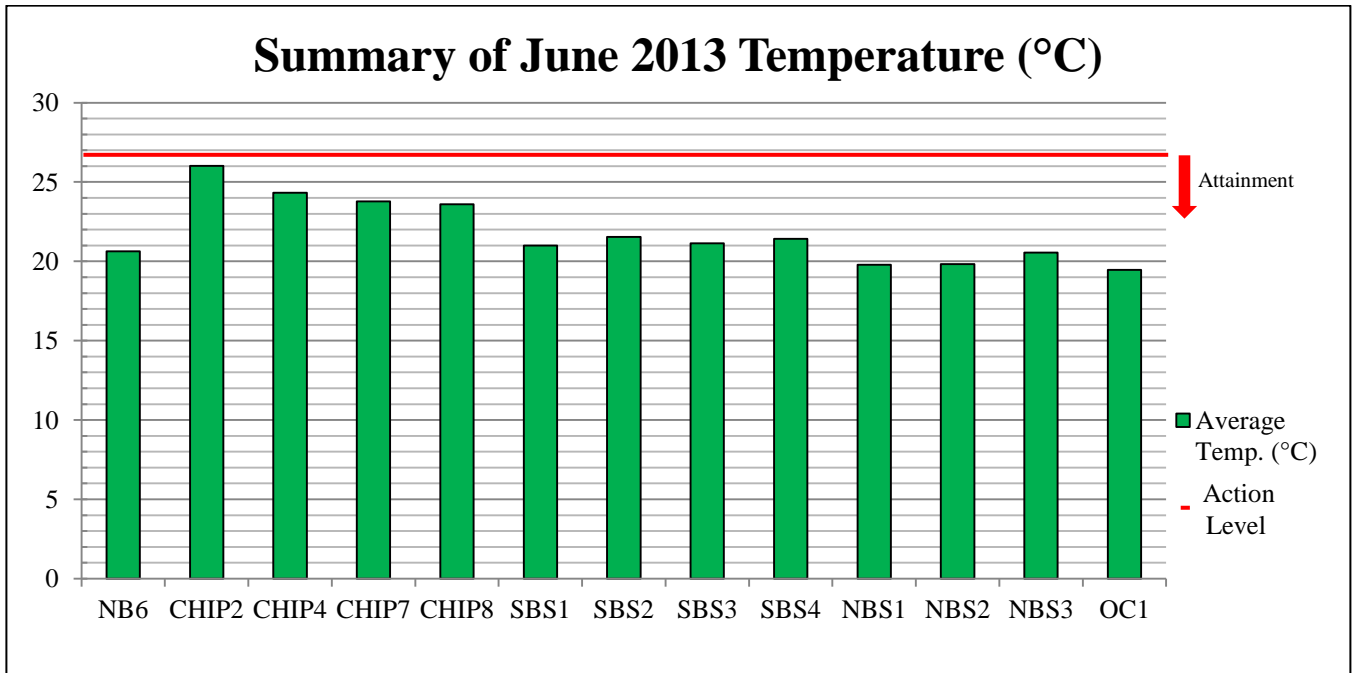


Figure 18. Summary of June 2013 Temperature

All sample sites are meeting SOM Water Quality Standard of 26.67 °C or below, the threshold for June temperature in warm water streams as indicated in **Table 11**.

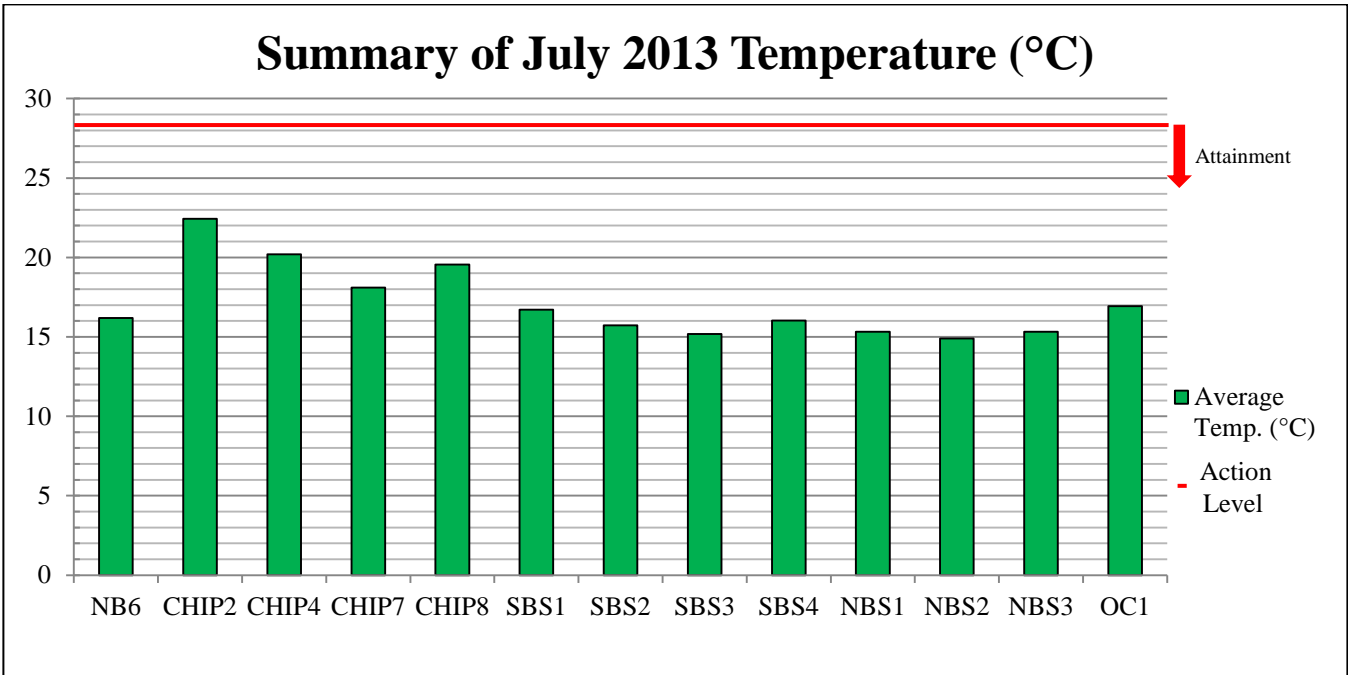


Figure 19. Summary of July 2013 Temperature

All sample sites are meeting SOM Water Quality Standard of 28.33 °C or below, the threshold for July temperature in warm water streams as indicated in **Table 11**.

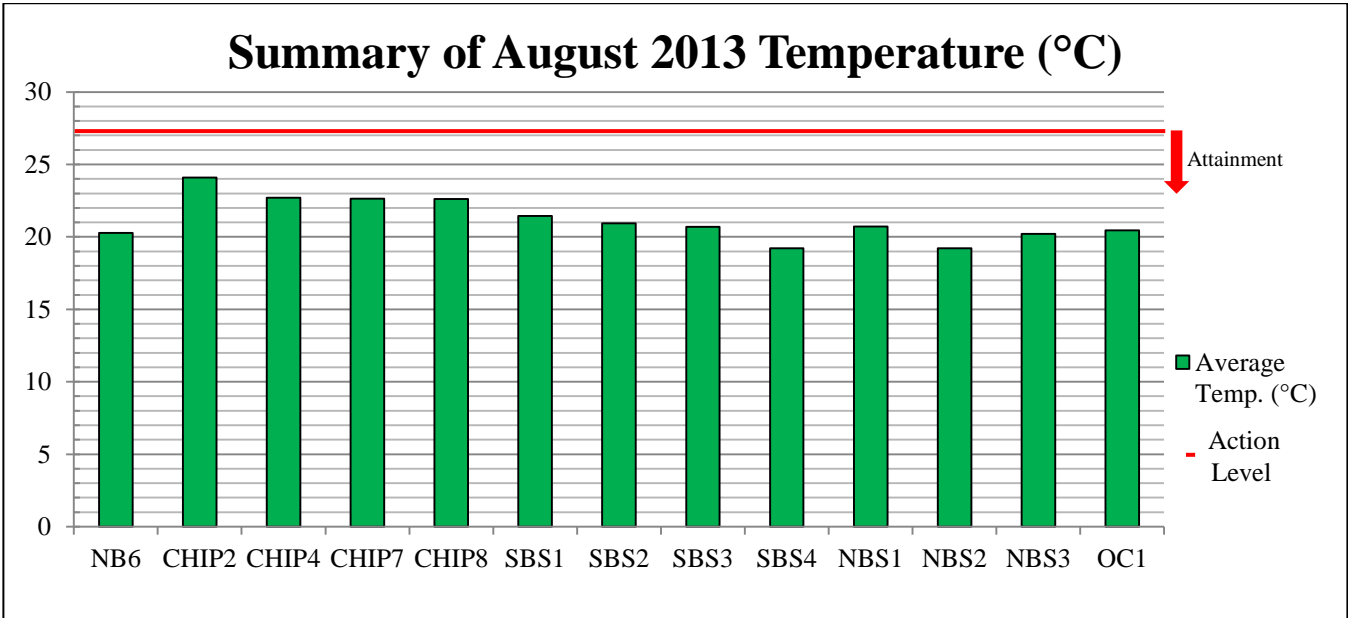


Figure 20. Summary of August 2013 Temperature

All sample sites are meeting SOM Water Quality Standard of 27.22 °C or below, the threshold for August temperature in warm water streams as indicated in **Table 11**.

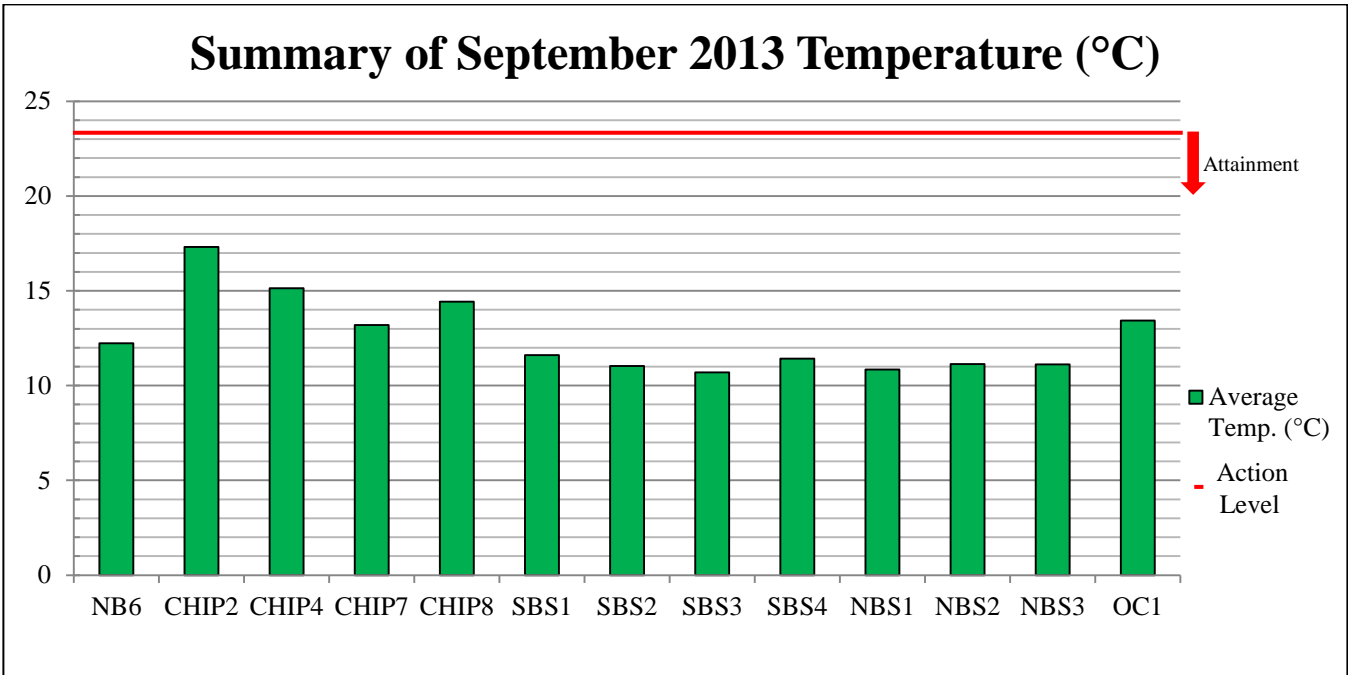


Figure 21. Summary of September 2013 Temperature

All sample sites are meeting SOM Water Quality Standard of 23.33 °C or below, the threshold for September temperature in warm water streams as indicated in **Table 11**.

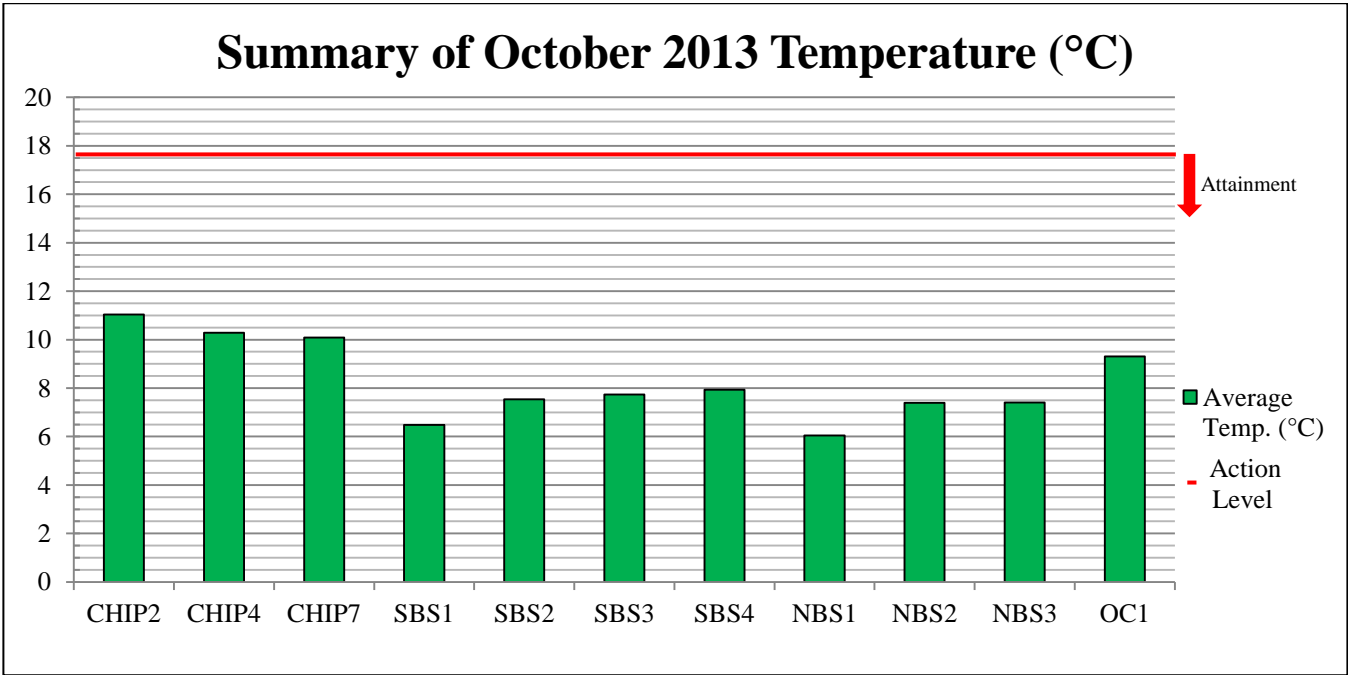


Figure 22. Summary of October 2013 Temperature

All sample sites are meeting SOM Water Quality Standard of 17.78 °C or below, the threshold for October temperature in warm water streams as indicated in **Table 11**.



### 4.1.3 PH

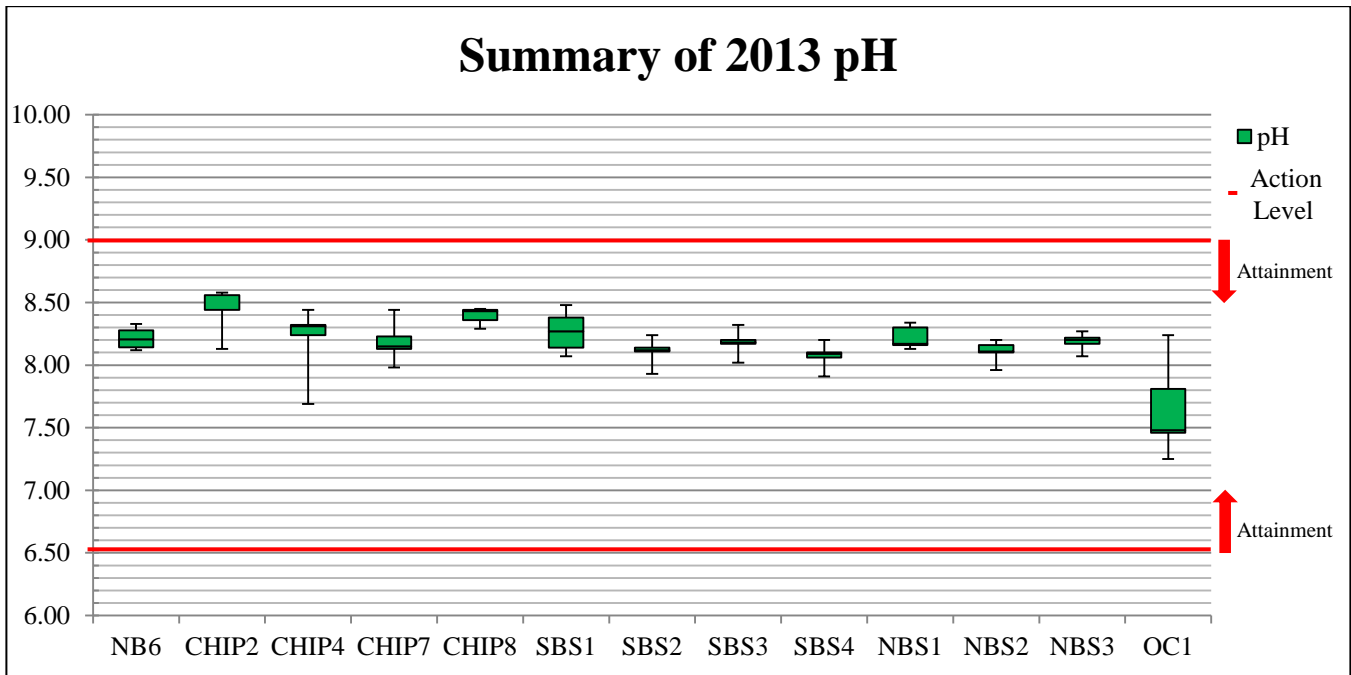


Figure 23. Summary of 2013 pH

All sample sites are meeting the reference standard of above 6.5 and below 9.0, the threshold for pH in warm water streams as indicated in **Table 10**.

### 4.1.4 SPECIFIC CONDUCTIVITY

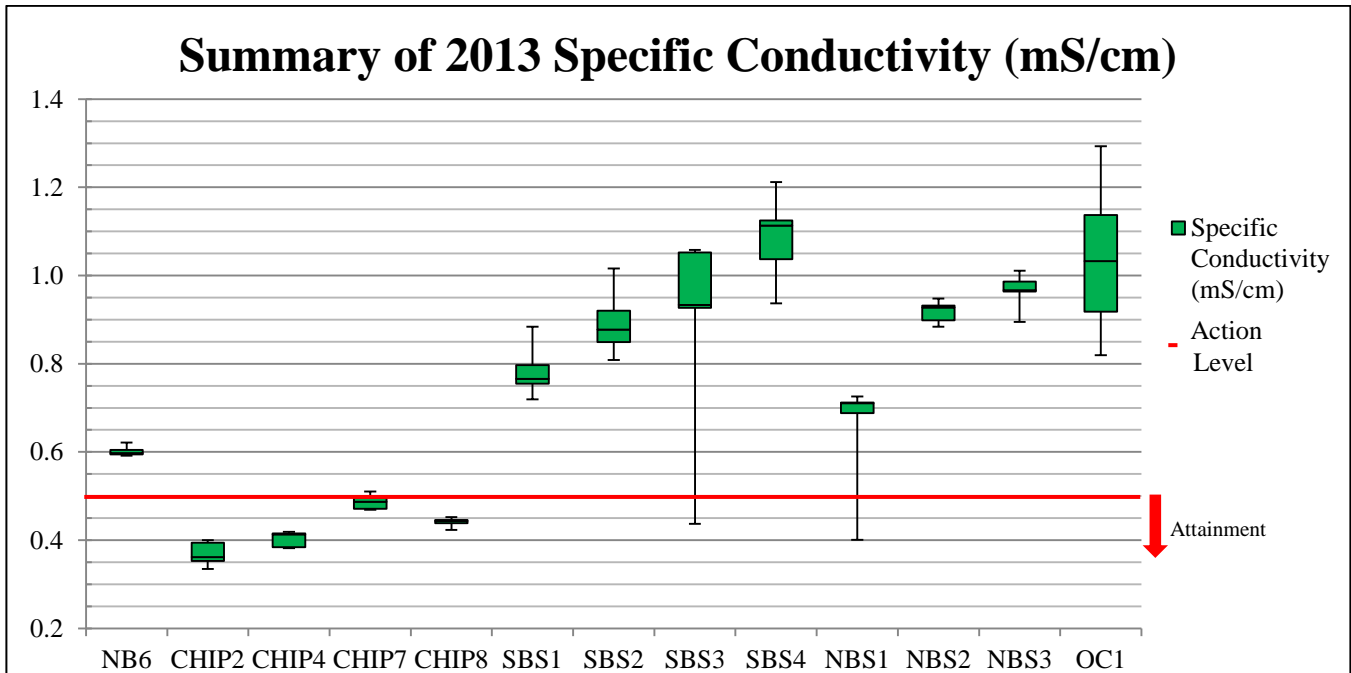
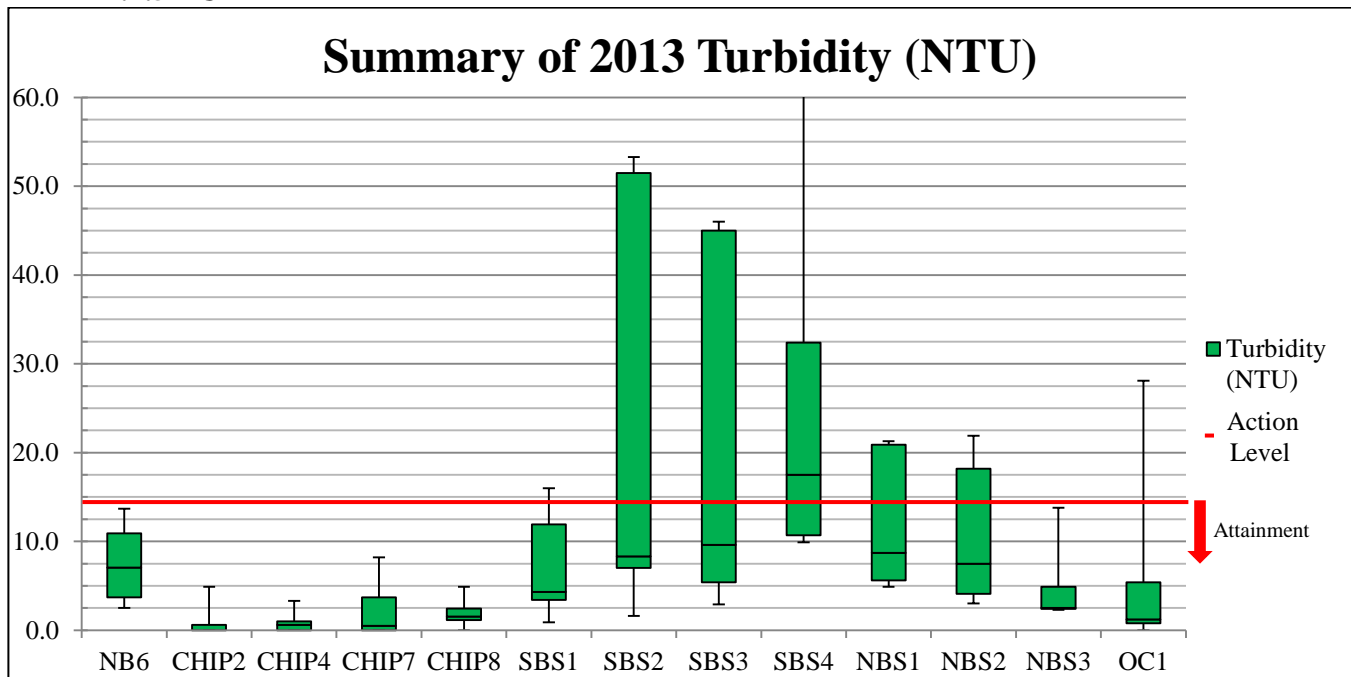


Figure 24. Summary of 2013 Specific Conductivity

Attainment varies for sample sites meeting the reference standard of below 0.5 mS/cm, the threshold for specific conductivity in warm water streams as indicated in **Table 10**. The Chippewa River monitoring sites meet the reference standard for specific conductivity. The North Branch Chippewa River, South

Branch Salt River, North Branch Salt River, and Onion Creek monitoring sites exceed the reference standard for specific conductivity.

#### 4.1.5 TURBIDITY



**Figure 25. Summary of 2013 Turbidity** \*SBS4 maximum values extend beyond graph boundaries

Attainment varies for sample sites meeting the reference standard of below 14.5 mS/cm, the threshold for turbidity in warm water streams as indicated in **Table 10**. The Chippewa River, North Branch Chippewa River, and Onion Creek monitoring sites largely meet the reference standard for turbidity. The South Branch Salt River and North Branch Salt River monitoring sites largely exceed the reference standard for turbidity.

#### 4.1.6 TOTAL DISSOLVED SOLIDS

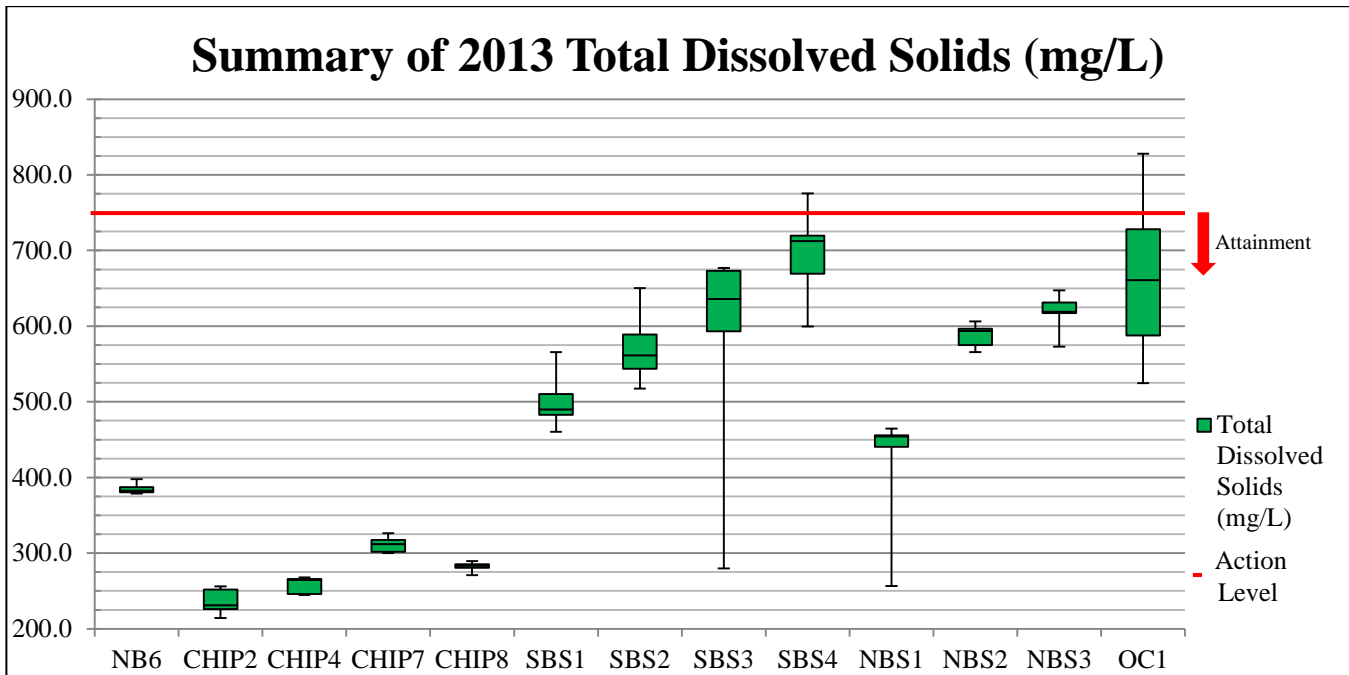


Figure 26. Summary of 2013 Total Dissolved Solids

Currently SCIT does not have reference standard values for Total Dissolved Solids.

#### 4.1.7 DISCHARGE

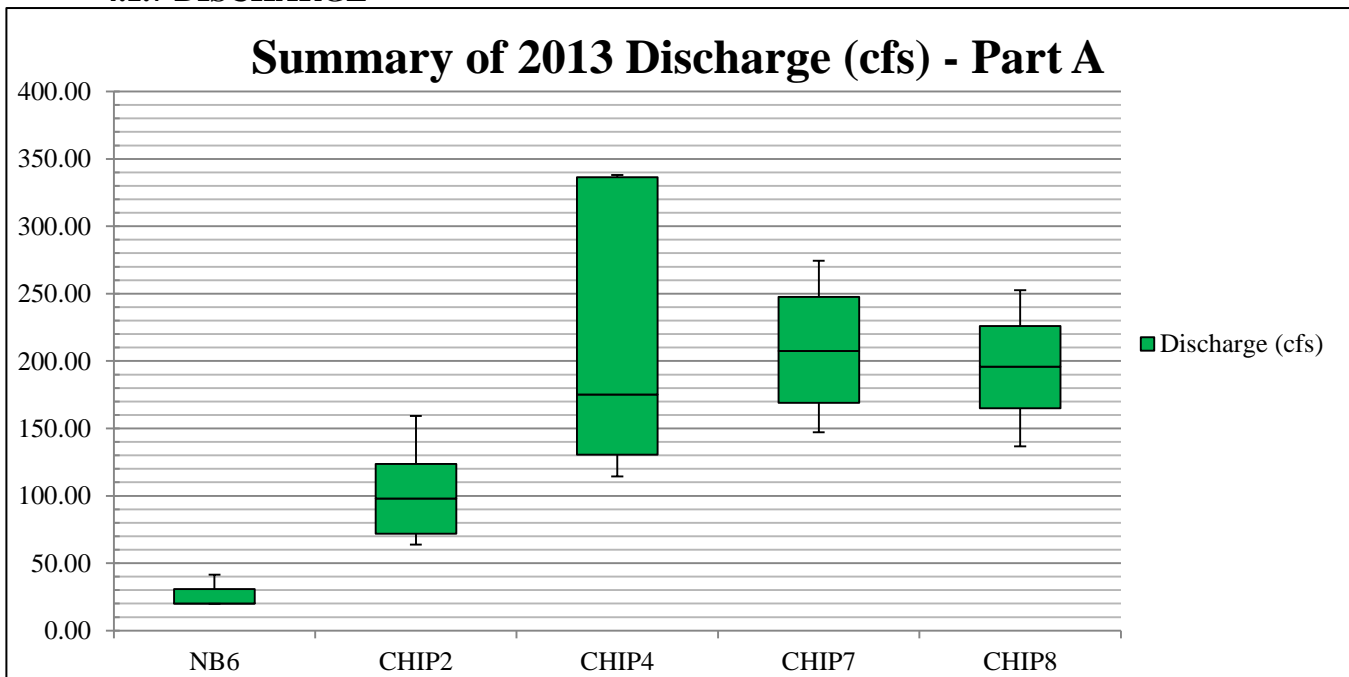
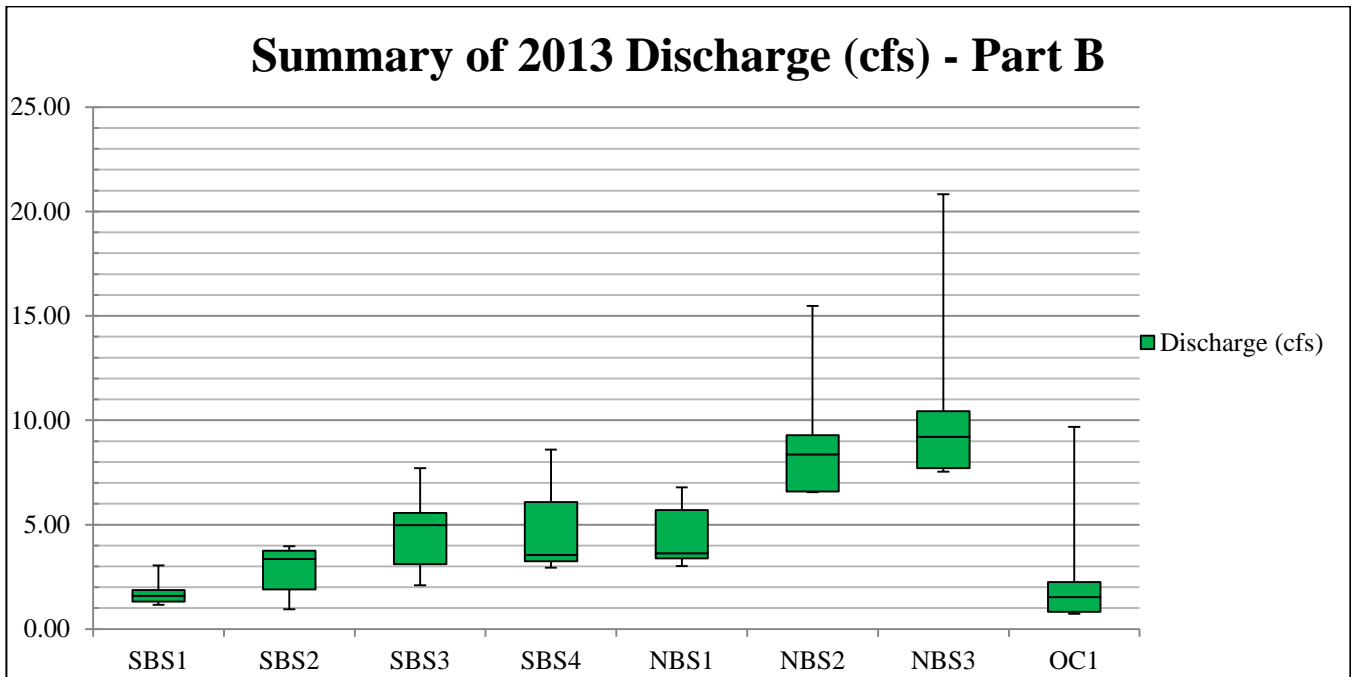


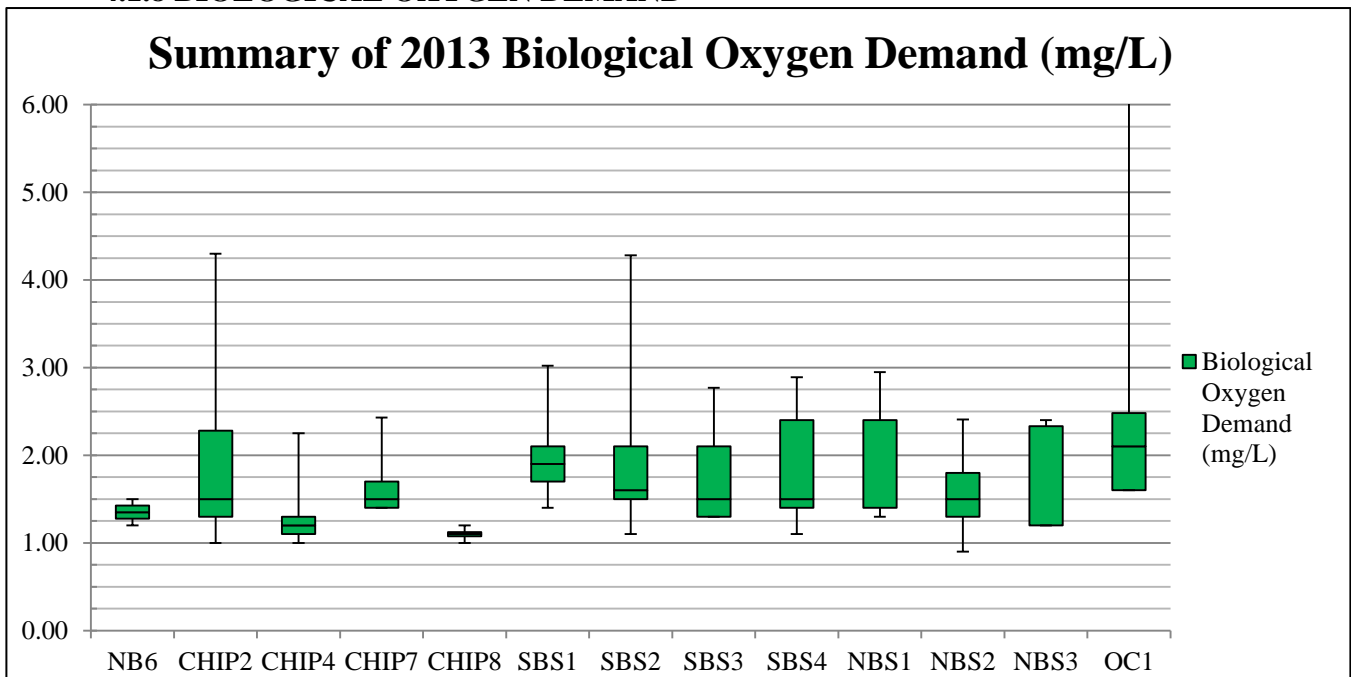
Figure 27. Summary of 2013 Discharge - Part A



**Figure 28. Summary of 2013 Discharge - Part B**

Discharge increases at each downstream sampling site for both the South Branch Salt River and the North Branch Salt River, demonstrating a typical drainage pattern.

#### 4.1.8 BIOLOGICAL OXYGEN DEMAND



**Figure 29. Summary of 2013 Biological Oxygen Demand \*OC1 maximum values extend beyond graph boundaries**

Currently SCIT does not have reference standard values for Biological Oxygen Demand.

#### 4.1.9 AMMONIA

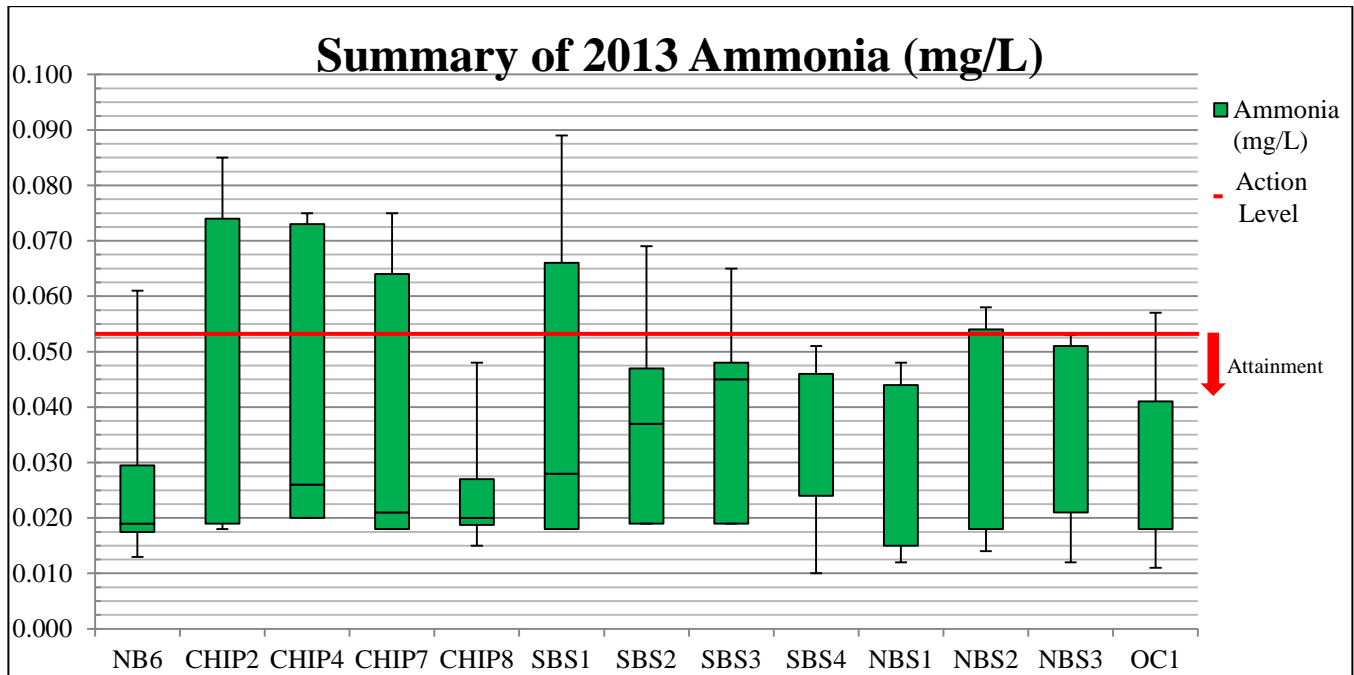


Figure 30. Summary of 2013 Ammonia

Attainment varies for sample sites meeting the reference standard of below 0.053 mg/L, the threshold for ammonia in warm water streams as indicated in **Table 10**. Each river system both meets and exceeds the reference standard for ammonia.

#### 4.1.10 TOTAL SUSPENDED SOLIDS

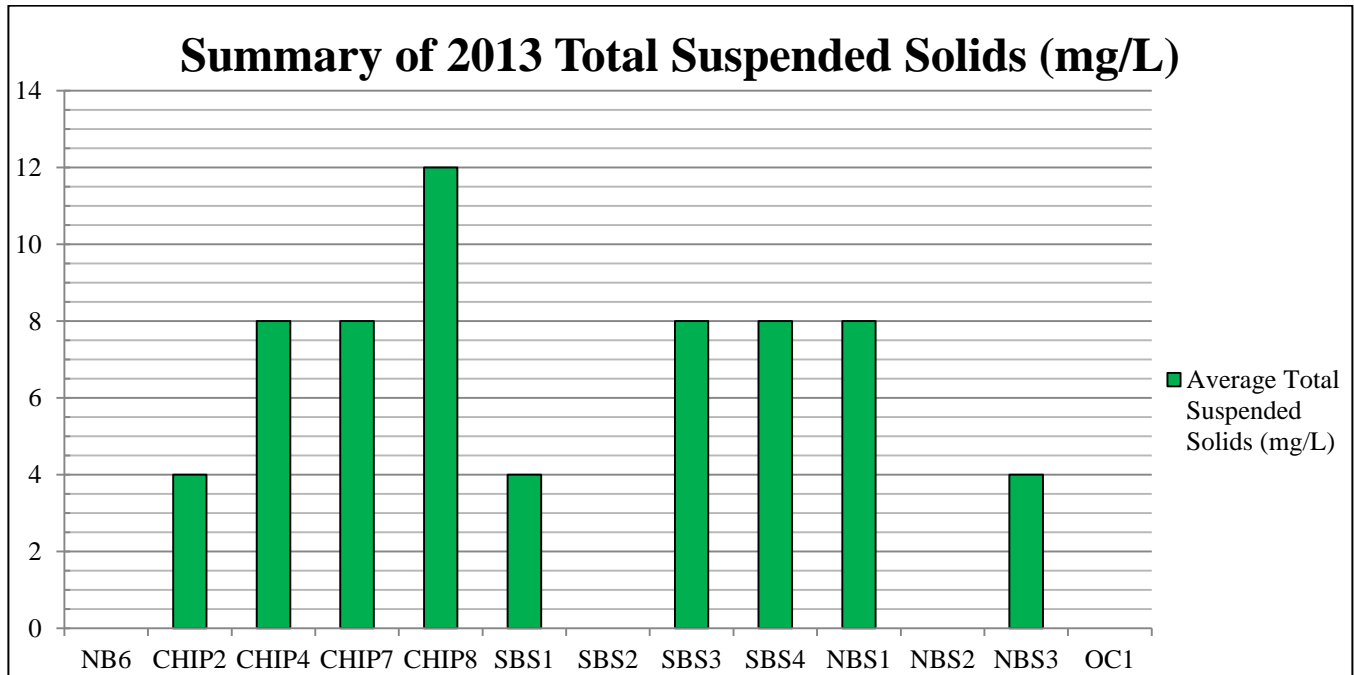
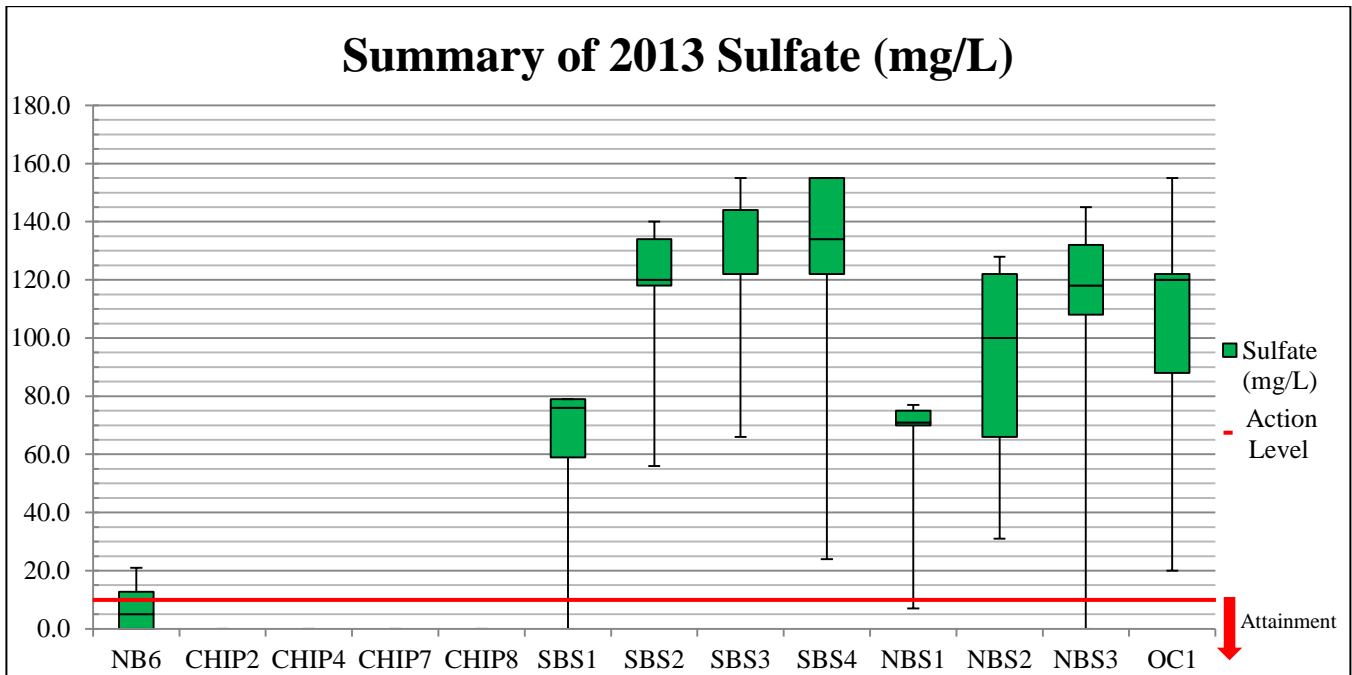


Figure 31. Summary of 2013 Total Suspended Solids

Currently SCIT does not have reference standard values for Total Suspended Solids.

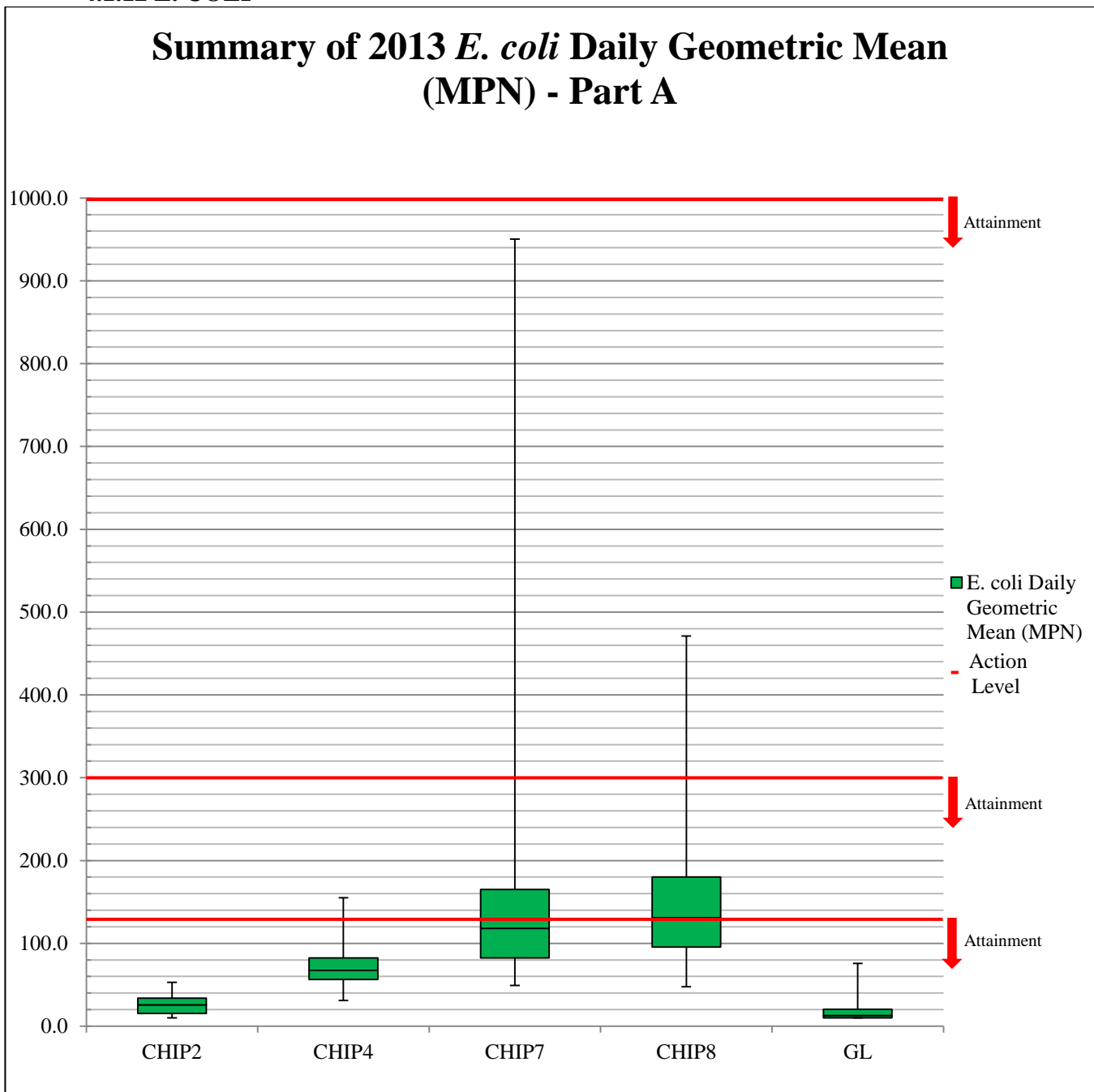
#### 4.1.11 SULFATE



**Figure 32. Summary of 2013 Sulfate**

Attainment varies for sample sites meeting the reference standard of below 14.5 mS/cm, the threshold for sulfate in warm water streams as indicated in **Table 10**. The Chippewa River meets the reference standard for sulfate. The North Branch Chippewa River both meets and exceeds the reference standard. The South Branch Salt River and North Branch Salt River monitoring sites largely exceed the reference standard for turbidity.

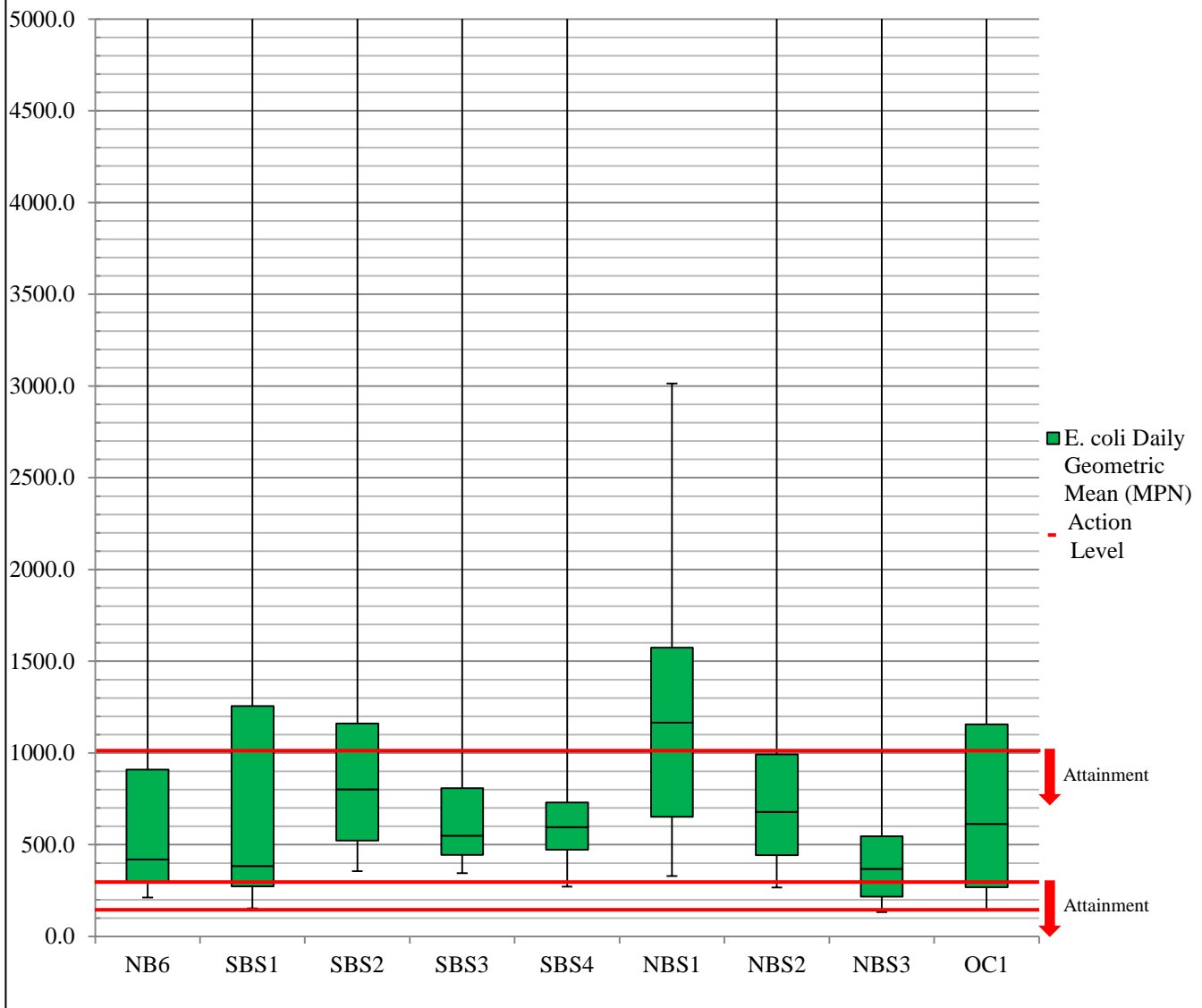
#### 4.1.12 E. COLI



**Figure 33. Summary of 2013 *E. coli* Daily Geometric Mean - Part A** \*Maximum values extend beyond graph boundaries

Attainment varies for sample sites meeting the reference standards of below 130 MPN/100ml, the threshold for *E. coli* Daily Geometric Mean (monthly average) and 300 MPN/100ml, the threshold for *E. coli* Daily Geometric Mean (daily max) for full body contact in warm water streams as indicated in **Table 10**. The Chippewa River upstream of the North Branch Chippewa River and Grewes Lake monitoring sites largely meet the reference standard for turbidity. The Chippewa River monitoring sites downstream of the North Branch Chippewa River do not meet the reference standard for *E. coli* Daily Geometric Mean (monthly average) for full body contact and also have exceeded the threshold for *E. coli* Daily Geometric Mean (daily max) for full body contact.

## Summary of 2013 *E. coli* Daily Geometric Mean (MPN) - Part B



**Figure 34. Summary of 2013 *E. coli* Daily Geometric Mean - Part B** \*Maximum values extend beyond graph boundaries

Attainment never occurred for reference standards of below 130 MPN/100ml, the threshold for *E. coli* Daily Geometric Mean (monthly average) and 300 MPN/100ml, the threshold for *E. coli* Daily Geometric Mean (daily max) for full body contact and 1,000 MPN/100ml, the threshold for *E. coli* Daily Geometric Mean (daily max) for partial body contact in warm water streams as indicated in **Table 10**. The North Branch Chippewa River, South Branch Salt River, North Branch Salt River, and Onion Creek regularly exceeded all three *E. coli* reference standards.

### 4.1.13 TOTAL NITROGEN

**Note:** Lab analyses by CMU Water Research Center of **2013 Total Nitrogen** samples has not been completed. This report will be updated when results become available.



#### 4.1.14 TOTAL PHOSPHORUS

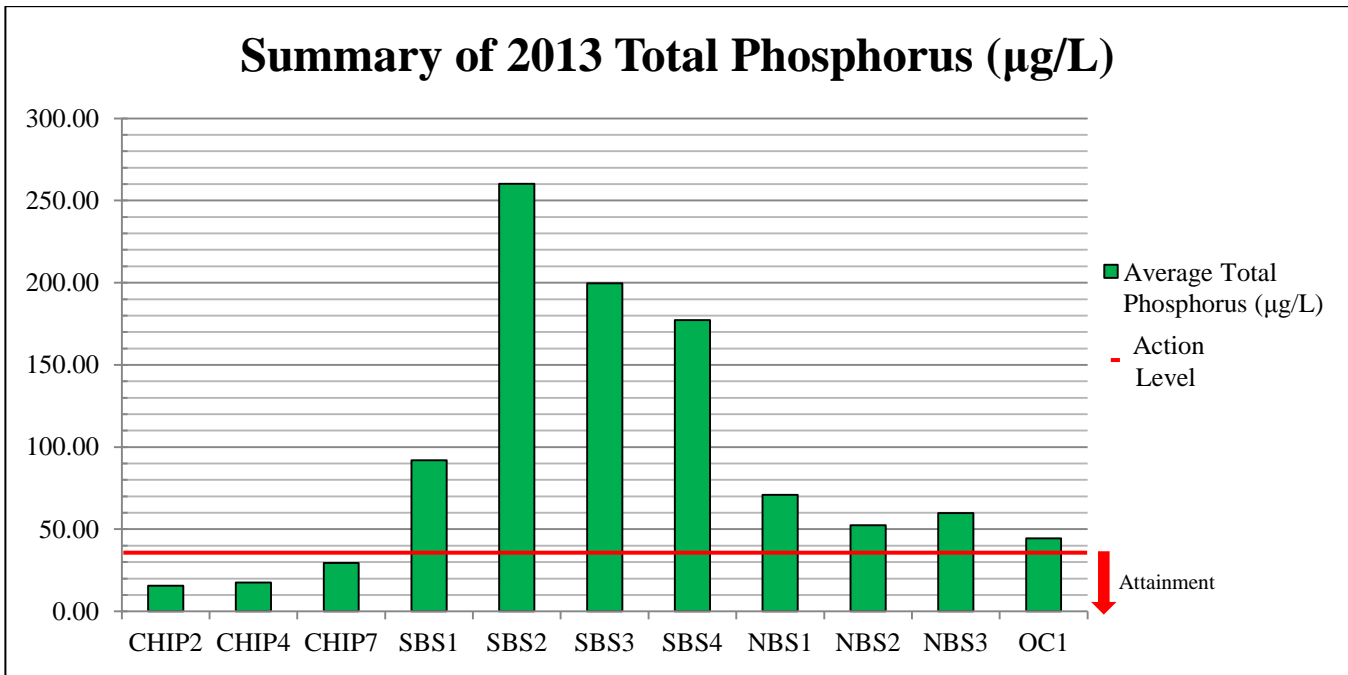


Figure 35. Summary of 2013 Total Phosphorus

The reference standard 31.25 µg/L or below, the threshold for Total Phosphorus in warm water streams as indicated in **Table 10**, was exceeded in the South Branch Salt River, North Branch Salt River, and Onion Creek. These data are based off of the July 2013 and October 2013 Total Phosphorus sampling.

#### 4.1.15 HABITAT ASSESSMENT

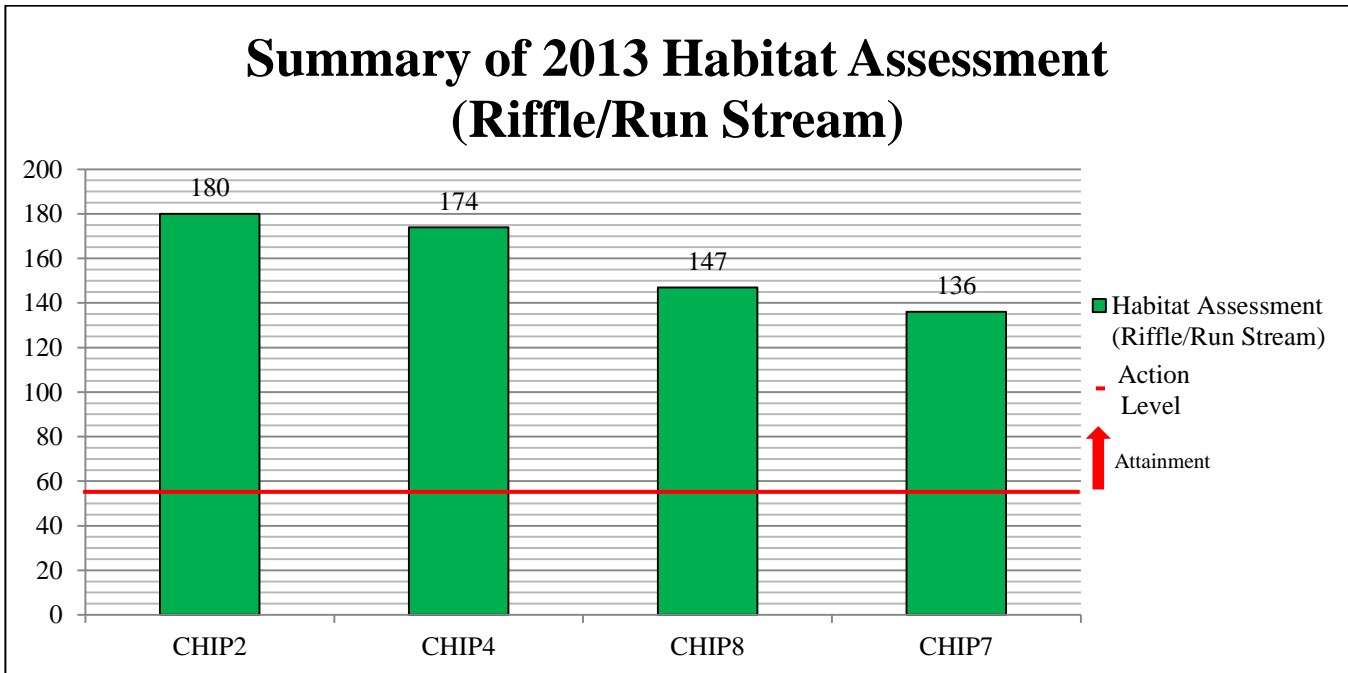


Figure 36. Summary of 2013 Habitat Assessment (Riffle/Run Stream)

## Summary of 2013 Habitat Assessment (Glide/Pool Stream)

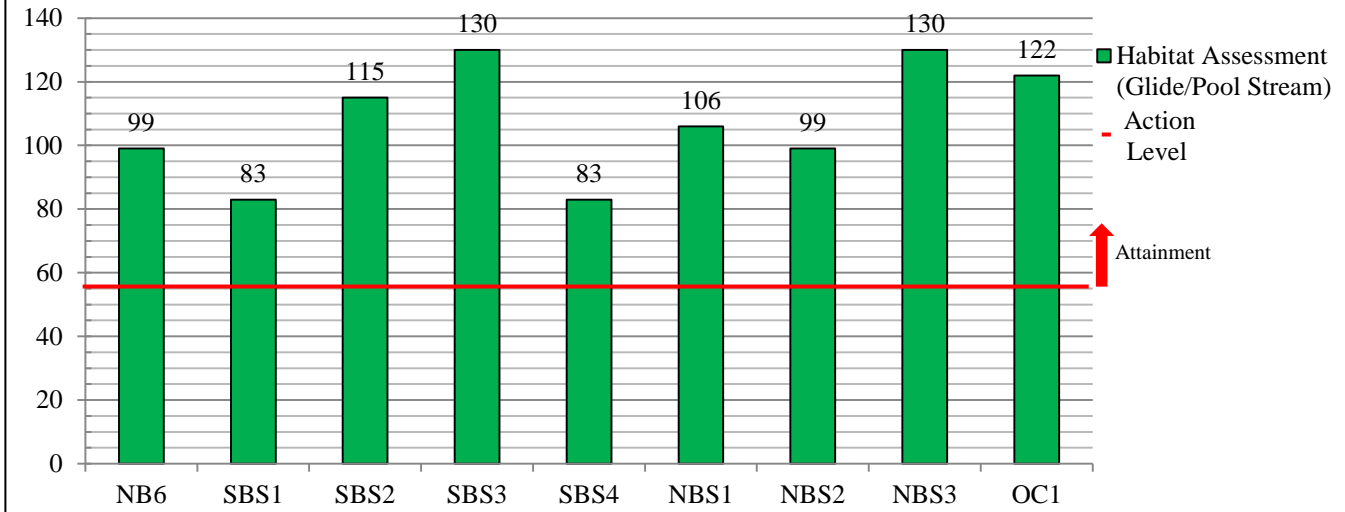


Figure 37. Summary of 2013 Habitat Assessment (Glide/Pool Stream)

All sample sites are meeting the reference standard of above 56, the threshold for Habitat Assessment scoring in warm water streams as indicated in **Table 10**.

### 4.1.16 MACROINVERTEBRATES

## Summary of 2013 Macroinvertebrate Assessment (SOM Metric Score)

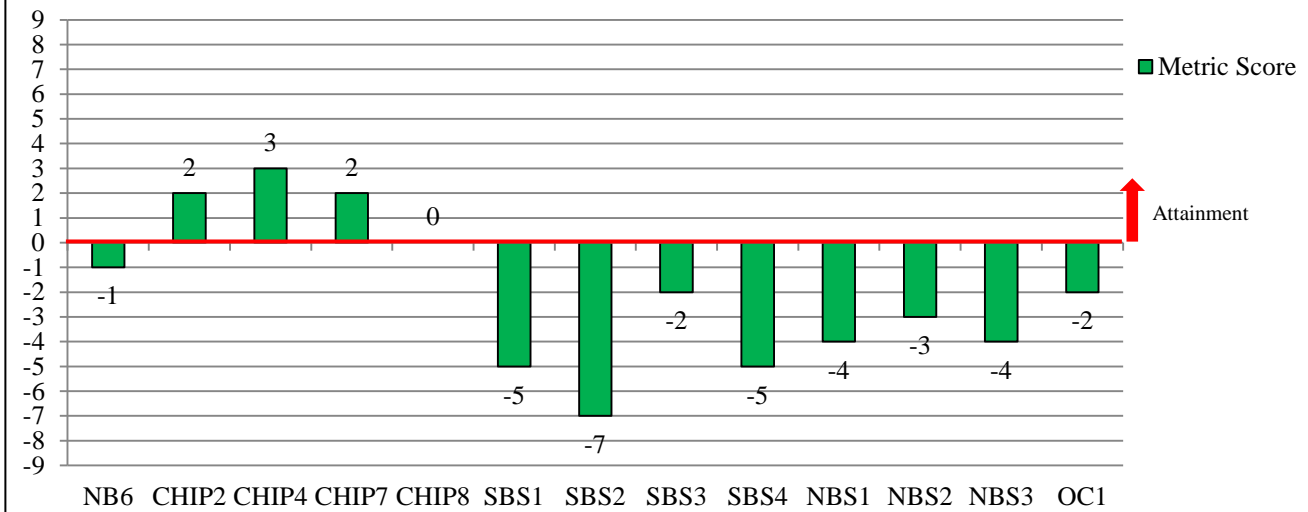


Figure 38. Summary of 2013 Macroinvertebrate Assessment (SOM Metric Score)

## Summary of 2013 Macroinvertebrate Assessment (%EPT)

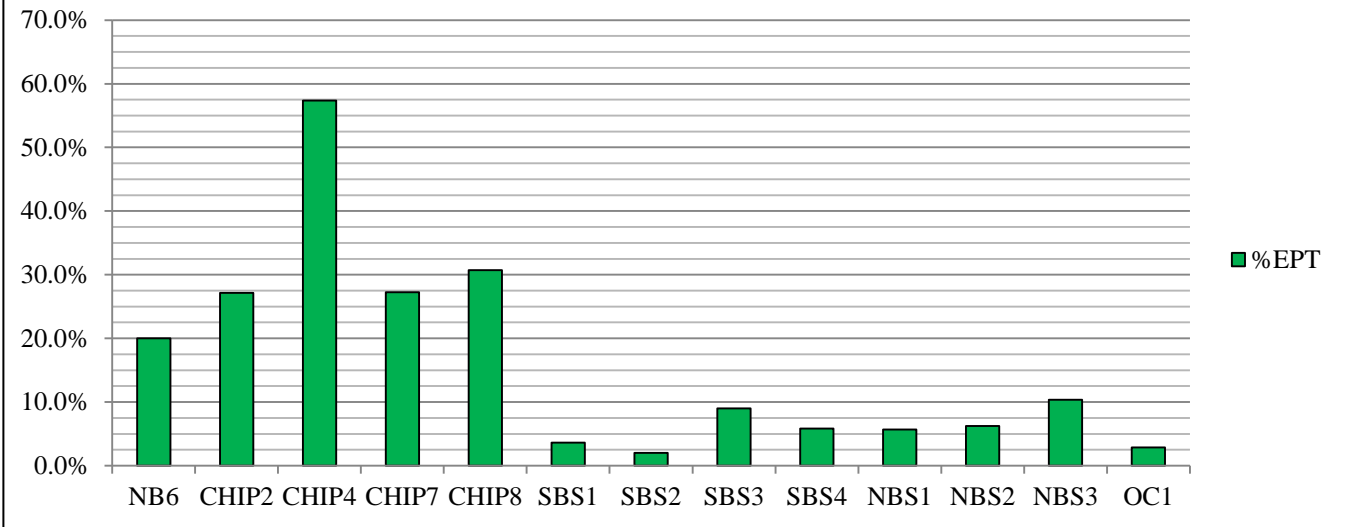


Figure 39. Summary of 2013 Macroinvertebrate Assessment (%EPT)

## **SECTION 5 SUMMARY OF THE EXTENT TO WATERS MEETING DESIGNATED USES**

### 5.1 SUMMARY

**Note:** See **Table 4** for information on the parameter determinants for each designated use.

**Table 45. Summary of the Extent to Waters Meeting Designated Uses**

Tribal Goal or Designated Use	Chippewa River	North Branch Chippewa River	South Branch Salt River	North Branch Salt River	Onion Creek
Aquatic Life	Full Support	Full Support	Not Full Support	Not Full Support	Not Full Support
Human Health	Not Full Support				
Recreation	Not Full Support	Not Full Support	Not Full Support	Not Full Support	Not Full Support
Wild Rice (Potential)	Not Full Support				

### 5.2 CHIPPEWA RIVER

Aquatic Life - Full support of the aquatic life designated use is achieved for all determining parameters.

Human Health - Full support of the human health designated use is not achieved for all determining parameters. Exceedance of the reference standard for *E. coli* prevents the achievement of full support for the human health designated use.

Recreation - Full support of the recreation designated use is not achieved for all determining parameters. Exceedance of the reference standard for *E. coli* prevents the achievement of full support for the recreation designated use.

Wild Rice - Full support of the wild rice designated use is not achieved for all determining parameters. Exceedance of the reference standard for specific conductivity prevents the achievement of full support for the wild rice designated use.

### **5.3 NORTH BRANCH CHIPPEWA RIVER**

Aquatic Life - Full support of the aquatic life designated use is achieved for all determining parameters.

Recreation - Full support of the recreation designated use is not achieved for all determining parameters. Exceedance of the reference standard for *E. coli* prevents the achievement of full support for the recreation designated use.

### **5.4 SOUTH BRANCH SALT RIVER**

Aquatic Life - Full support of the aquatic life designated use is not achieved for all determining parameters. Exceedance of the reference standards for dissolved oxygen, turbidity, and total phosphorus prevents the achievement of full support for the aquatic life designated use.

Recreation - Full support of the recreation designated use is not achieved for all determining parameters. Exceedance of the reference standards for *E. coli*, total dissolved solids, turbidity, and total phosphorus prevents the achievement of full support for the recreation designated use.

### **5.5 NORTH BRANCH SALT RIVER**

Aquatic Life - Full support of the aquatic life designated use is not achieved for all determining parameters. Exceedance of the reference standard for turbidity and total phosphorus prevents the achievement of full support for the aquatic life designated use.

Recreation - Full support of the recreation designated use is not achieved for all determining parameters. Exceedance of the reference standards for *E. coli*, turbidity, and total phosphorus prevents the achievement of full support for the recreation designated use.

### **5.6 ONION CREEK**

Aquatic Life - Full support of the aquatic life designated use is not achieved for all determining parameters. Exceedance of the reference standards for dissolved oxygen, turbidity, and total phosphorus prevents the achievement of full support for the aquatic life designated use.

Recreation - Full support of the recreation designated use is not achieved for all determining parameters. Exceedance of the reference standards for *E. coli*, total dissolved solids, turbidity, and total phosphorus prevents the achievement of full support for the recreation designated use.

## SECTION 6 DESCRIPTION OF WHY WATERS ARE NOT MEETING USES OR GOALS

### 6.1 SUMMARY

**Table 46. Parameters Exceeding Water Quality Standards and Reference Conditions**

Parameter	Reference Standard (See Table 10)	Percent of Samples Not Meeting Reference Standards					
		Chippewa River (upstream of North Branch)	Chippewa River (downstream of North Branch)	North Branch Chippewa River	South Branch Salt River	North Branch Salt River	Onion Creek
Dissolved Oxygen	≤4.99 mg/L	0% (0/5)	0% (0/8)	0% (0/4)	5% (1/20)	0% (0/15)	20% (1/5)
Temperature	See Table 11	0% (0/10)	0% (0/9)	0% (0/4)	0% (0/20)	0% (0/15)	0% (0/5)
pH	<6.5 and >9.0	0% (0/10)	0% (0/8)	0% (0/4)	0% (0/20)	0% (0/15)	0% (0/5)
Specific Conductivity	>0.5000 mS/cm	0% (0/10)	11% (1/9)	100% (4/4)	95% (19/20)	93% (14/15)	100% (5/5)
Turbidity	>14.5 NTU	0% (0/10)	0% (0/9)	0% (0/4)	40% (8/20)	27% (4/15)	20% (1/5)
Total Dissolved Solids	>750 mg/L	0% (0/10)	0% (0/9)	0% (0/4)	5% (1/20)	0% (0/15)	20% (1/5)
Total Nitrogen	>1.15 mg/L	N/A	N/A	N/A	N/A	N/A	N/A
Total Phosphorus	>31.25 µg/L	0% (0/2)	0% (0/1)	N/A	100% (8/8)	83% (5/6)	100% (2/2)
Ammonia	>0.053 mg/L	40% (4/10)	22% (2/9)	25% (1/4)	20% (4/20)	13% (2/15)	20% (1/5)
Sulfate	>10 mg/L	0% (0/10)	0% (0/9)	50% (2/4)	95% (19/20)	87% (13/15)	100% (5/5)
Macroinvertebrates	<0	0% (0/2)	0% (0/2)	100% (1/1)	100% (4/4)	100% (3/3)	100% (1/1)
Habitat Assessment	<56	0% (0/1)	0% (0/1)	0% (0/1)	0% (0/1)	0% (0/1)	0% (0/1)
<i>E. coli</i> Daily (full body contact - monthly)	>130 MPN/100ml	3% (1/36)	47% (17/36)	100% (17/17)	100% (70/70)	100% (54/54)	100% (18/18)
<i>E. coli</i> (full body contact - daily)	>300 MPN/100ml	0% (0/36)	14% (5/36)	65% (11/17)	84% (59/70)	78% (42/54)	61% (11/18)
<i>E. coli</i> (partial body contact)	>1000 MPN/100ml	0% (0/36)	0% (0/36)	18% (3/17)	26% (18/70)	30% (16/54)	33% (6/18)

\*All percentages were rounded to the nearest whole number

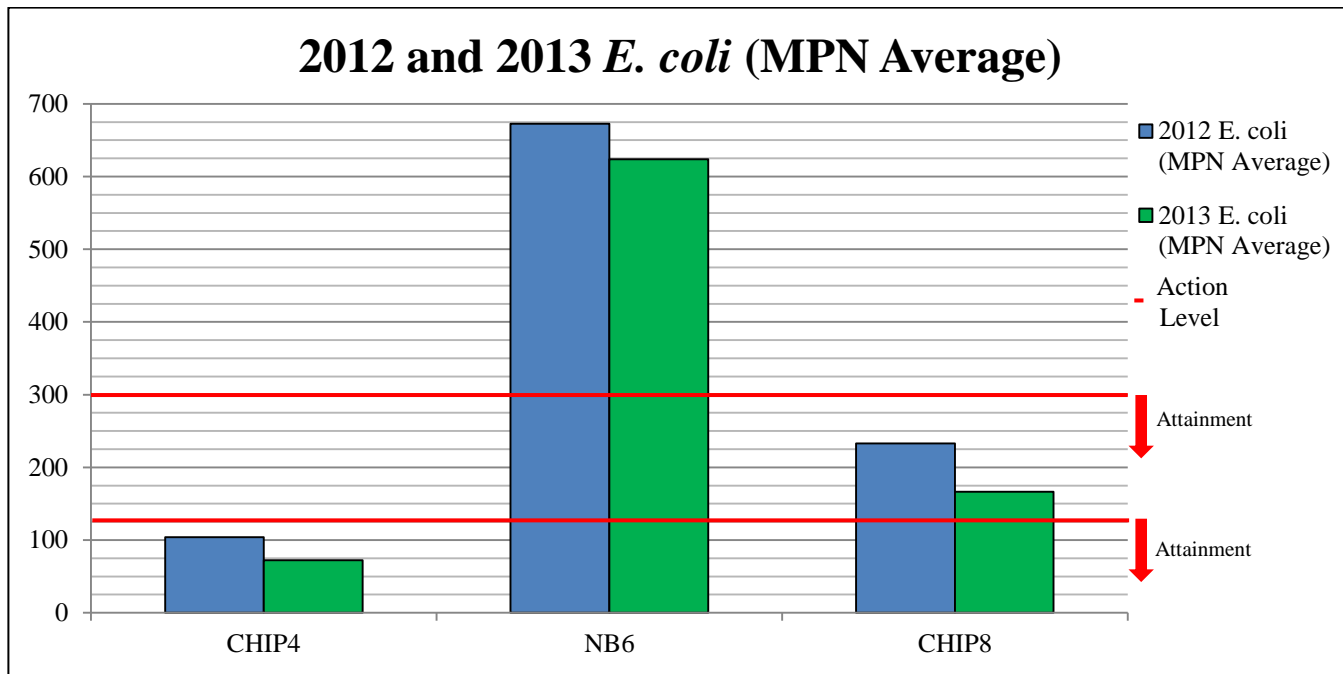
\*\***YELLOW** indicates values between 0-50%

\*\*\***RED** indicates values range from 50-100%

### 6.2 CHIPPEWA RIVER

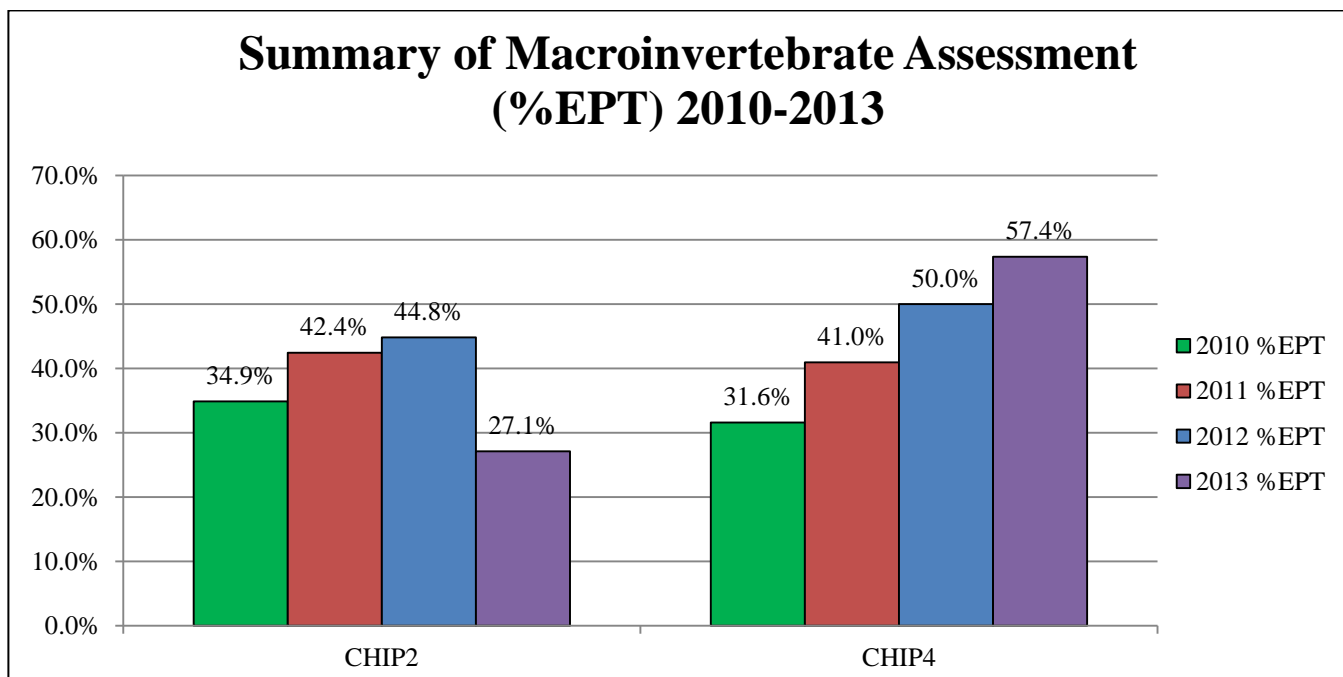
The Chippewa River is relatively clean upstream of the confluence of the North Branch Chippewa River. Upstream sites are healthy, and rarely exceed reference standards. This is in contrast to results at Chippewa River monitoring locations downstream of the North Branch Chippewa River confluence. A significant increase in agriculture related water quality issues occurs at these locations. *E. coli* reference standards are regularly exceeded and continue to pose a human health risk due to the Chippewa River's recreational opportunities. This report gives further evidence of the North Branch Chippewa River's negative impact on the Chippewa River, and provides rationale for promoting agriculture and drainage

best management practices within SCIT Reservation boundaries. High specific conductivity can also be contributed to North Branch Chippewa River influence, though the high ammonia levels appeared consistent at all Chippewa River monitoring locations.



**Figure 40. 2012 and 2013 *E. coli* (MPN Average)** \*Samples from July, August, and September only (4 per month)

In the above figure, the impact to Chippewa River *E. coli* levels from the North Branch of the Chippewa River is apparent. Data has been recorded for two consecutive years at these monitoring locations.



**Figure 41. Summary of Macroinvertebrate Assessment (%EPT) 2010-2013**

In the above figure, the past four years of macroinvertebrate assessment data (%EPT) is presented for upstream Chippewa River sites, CHIP2 and CHIP4. In this data set, we see a gradual increase in %EPT,

which is a direct measure of water quality and ecosystem health, as it is composed of the collective percentage of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) of the overall sample. In 2010-2012 a trend increase in %EPT at both CHIP2 and CHIP4 occurred. In 2013 this increase continued for CHIP4, but a reduction in %EPT occurred at CHIP2. The suspected cause for the degradations in water quality may be attributed to the drawdown of Lake Isabella, an impoundment located roughly a mile upstream of CHIP2. The drawdown occurred in October of 2012, delivering sediment to downstream locations on the Chippewa River. It remains a concern for the SCIT.

### **6.3 NORTH BRANCH CHIPPEWA RIVER**

The suspected negative impact to the North Branch Chippewa River is the agricultural production and drain management occurring within the watershed. Poor management practices are suspected due to the *E. coli* data for the second year in a row. Promoting the usage of best management practices is essential for water quality improvement. A major health concern exists due to the confluence of the North Branch of the Chippewa River into the Chippewa River, and the issues associated with increased *E. coli* levels and their impact to human health. Issues with spring time temperature and high levels of nutrients have been recorded in the past, but due to monitoring constraints these issues were not detected in 2013. Specific conductivity regularly exceeded reference standards in the North Branch Chippewa River. Though ammonia levels exceeded the reference standard once, they were below levels detected in upstream portions of the Chippewa River. High sulfate levels demonstrate a lack of acceptable habitat for wild rice restoration.

### **6.4 SOUTH BRANCH SALT RIVER**

The South Branch Salt River has many of the same characteristic as the North Branch Chippewa River , though in many cases its water quality is more degraded. Agricultural impact is readily apparent with the high sediment, nutrient, and *E. coli* levels. High specific conductivity levels are suspected to be caused by agriculture and drain management issues. It is likely that the South Branch Salt River would benefit from implementation of agricultural best management practices for upstream crop fields and drains. Many of the water quality parameters trend more towards degradation at downstream monitoring locations, providing evidence for the cumulative negative impact of South Branch Salt River tributaries. Sulfate levels are too high for any wild rice restoration.

### **6.5 NORTH BRANCH SALT RIVER**

The North Branch Salt River also shows impacts suspected to be associated with agricultural production and poor drain management. Agricultural impact is suspected to be the cause of high sediment, nutrient, and *E. coli* levels. High specific conductivity levels may be caused by irrigation or other agricultural practices. It is apparent that the North Branch Salt River would benefit from implementation of agricultural best management practices for upstream areas and drains. Many of the water quality parameters trend more towards degradation at upstream monitoring locations, providing evidence that the more natural downstream areas cause improvements to water quality. Sulfate levels are too high for wild rice restoration.

### **6.6 ONION CREEK**

Onion Creek also faces many of the same challenges as the other degraded streams within the Tribal Boundary. Impacts of agriculture are suspected to be associated with the high sediment, nutrient, and *E. coli* levels. High specific conductivity levels may be caused by irrigation or other agricultural practices. It is apparent Onion Creek would benefit from implementation of best management practices for upstream agricultural areas and drains. Because there was only one monitoring location on Onion Creek in 2013, trends downstream and upstream are not possible to determine. Sulfate levels are too high for any wild rice restoration.

## **SECTION 7 DISCUSSION OF ISSUES OF TRIBAL CONCERN**

SCIT has concerns regarding the Chippewa River, North Branch Chippewa River, South Branch Salt River, North Branch Salt River, Onion Creek and the tributaries associated with these rivers. The concerns in the watershed may be associated to agricultural production, sedimentation during construction, road management, and deforestation over the last century. The results of these issues include the data relating to high sediment loads, lack of habitat, *E. coli* issues, high nutrient input, and many parameters not meeting water quality standards for the State of Michigan or reference standards for SCIT.

The SCIT rivers and streams are tributaries that eventually empty into the Area of Concern, the Saginaw River and eventually the Saginaw Bay of Lake Huron. The Area of Concern has been listed due to many of the same characteristic found within Tribal waters. It is the intention of the SCIT to continue monitoring SCIT waters utilizing the CWA 106 Program. In October 2013 the SCIT Water Quality Program received approval of the CWA 319 Program as well. Through partnerships SCIT hopes to rebuild our ability to properly manage the Tribal waters while promoting water quality.

The SCIT Water Quality Program will continue to monitor fixed stations along the Main Branch of the Chippewa River and North Branch Chippewa River, while still implementing a rotational basin approach throughout the Reservation allowing for more complete coverage of all waters of the Tribe. SCIT Water Quality staff become more familiar with the issues of all waters within the Reservation through the rotational basin approach. The SCIT is focused on restoring all Tribal waters. Respect, restoration, and stewardship of Mother Earth are the backbone of the SCIT heritage.

During the 2013 sampling season there were challenges. Limitations to data collection included not being able to begin monitoring until June 2013 related to the QAPP approval process. Therefore important nutrient and temperature data is missing.

## **SECTION 8 REFERENCES**

G:\Planning\Water Section 106\Water Quality Assessments\2013\Assessment Results 2013.xls