



**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF WATER STANDARDS & FACILITY REGULATION

## **Continuous Instream Monitoring Report (CIMR)**

### Station Description

**STREAM CODE:** 55306

**STREAM NAME:** South Branch Tionesta Creek

**SITE CODE:** 100471093-001

**SITE NAME:** Downstream of Chaffee Run

**Most recent revision:** 03/03/2015

**Revised by:** Lookenbill

**LATITUDE:** 41.592718 **LONGITUDE:** -78.927146

**COUNTY:** Elk

**HUC:** 05010003

**LOCATION DESCRIPTION:** Approximately 400 meters downstream of Chaffee Run.

**DRAINAGE AREA:** 19.002 sq. miles

**BACKGROUND AND HISTORY:** South Branch Tionesta Creek is a freestone tributary to Tionesta Creek located in the eastern portion of the Allegheny National Forest, draining portions of Highland Township, Elk County (Figure 1). The basin is characterized by relatively steep topography with land use consisting mostly of forested land (96%). The site is located approximately 400 meters downstream of Chaffee Run and downstream of two pipeline crossings. Records indicate there were approximately 353 active and 191 plugged conventional oil and gas wells and one unconventional gas well drilled prior to the sampling period. Throughout the period approximately 14 additional conventional wells were drilled and/or developed. There were no unconventional wells permitted within the basin before or during the sampling period. South Branch Tionesta Creek has a designated use of High Quality – Cold Water Fishes (HQ-CWF)

The primary objectives of the assessment were to:

1. Characterize diel temperature, specific conductance, pH, and stage using 24-hour monitoring.
2. Characterize baseline water chemistry.

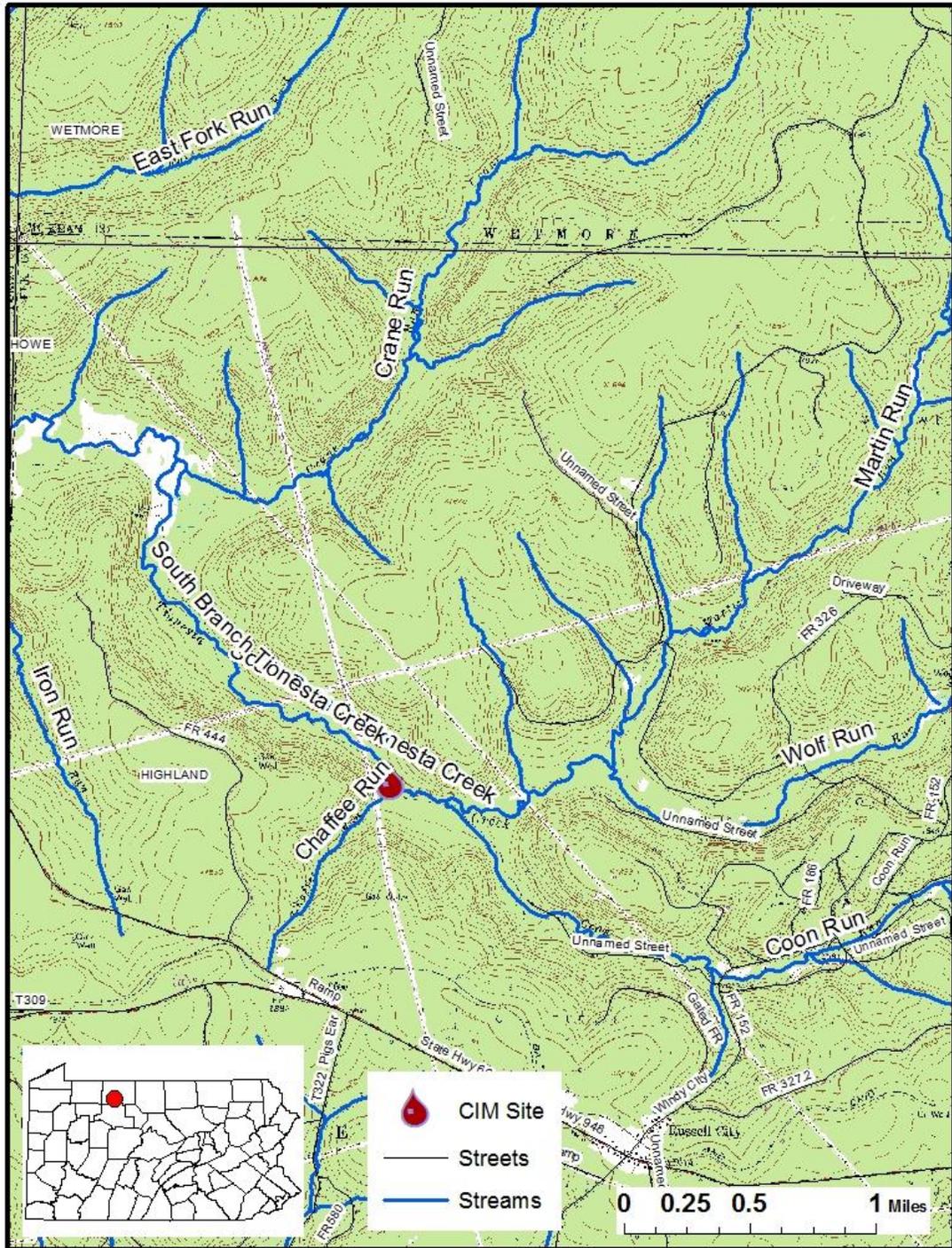


Figure 1. South Branch Tionesta Creek continuous instream monitoring site.

**WATER QUALITY PARAMETERS:**

Parameter	Units
Temperature	°C
Depth	Feet
pH	standard units
Specific Conductance	µS/cm <sup>c</sup>

**EQUIPMENT:**

A single Yellow Springs Instruments (YSI) 6920 water-quality sonde was used at this station. The sonde (Serial # 10B100980) was installed on May 16, 2010 and began recording at 14:00.

The sonde was housed in a 24-inch length of 4-inch diameter schedule 80 PVC pipe with holes drilled in it to allow for flow through. One end of the pipe was capped, and a notch was cut to accommodate the metal attachment bar on the top of the sonde. The attachment bar was clipped to an eye-bolt attached to rebar driven into the stream bed. The attachment bar was also clipped to a cable attached to a second piece of rebar located just upstream of the first. The sonde recorded water quality parameters every 60 minutes.

**PERIOD OF RECORD:** May 26, 2010 to September 16, 2010

The station was visited three times over the four months for the purpose of calibrating, cleaning, and servicing the sonde.

**DATA:**

Water chemistry grab samples were collected twice throughout the sampling period. Continuous data are graded based on a combination of fouling and calibration error. Specific conductance and pH data 5/26/2010 through 6/9/2010 were graded unverified due to the lack of appropriate fouling and calibration check data. Specific conductance data 8/21/2010 through 9/16/2010 were graded unusable and deleted from the final dataset due to elevated fouling error.

**Depth:**

Depth measurements from this YSI sonde are actually a measure of water column pressure plus atmospheric pressure. Depth is calibrated or zeroed with the sonde in air in order to subtract the atmospheric pressure during deployment. However, changes in atmospheric pressure while the sonde is deployed appear as changes in depth. The error is equal to 0.045 feet for every 1mm Hg change in atmospheric pressure. These data have not been corrected for confounding changes in atmospheric pressure. For this reason, depth data will be considered qualitative.

**Temperature: Average: 17.31°C; Maximum: 24.81°C; Minimum: 10.38°C**

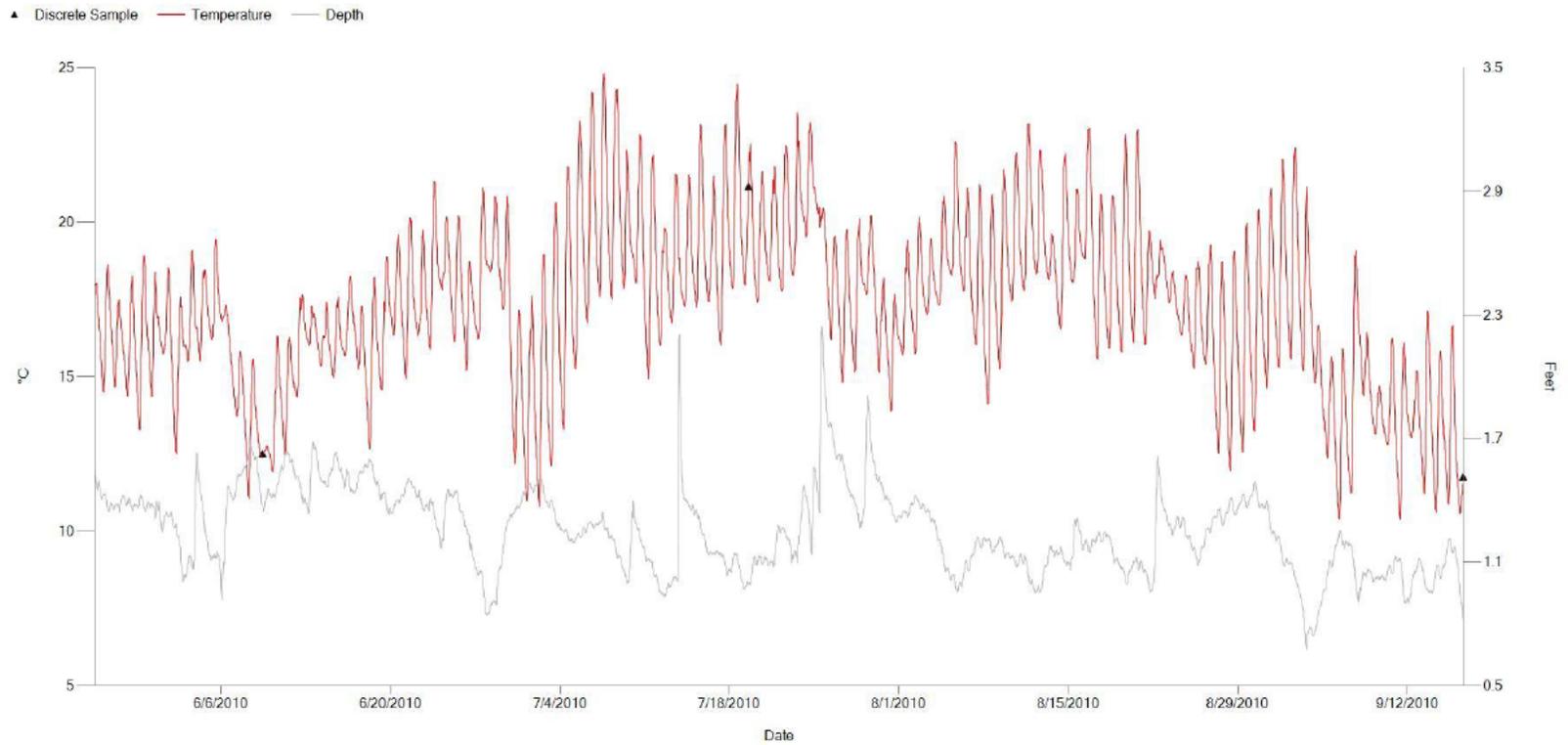


Figure 2. Continuous water temperature, continuous depth (not corrected), and discrete samples from May 26, 2010 to September 16, 2010.

**Specific Conductance:** Average: 115.5  $\mu\text{S}/\text{cm}$ ; Maximum: 175.7  $\mu\text{S}/\text{cm}$ ; Minimum: 65.0  $\mu\text{S}/\text{cm}$ .

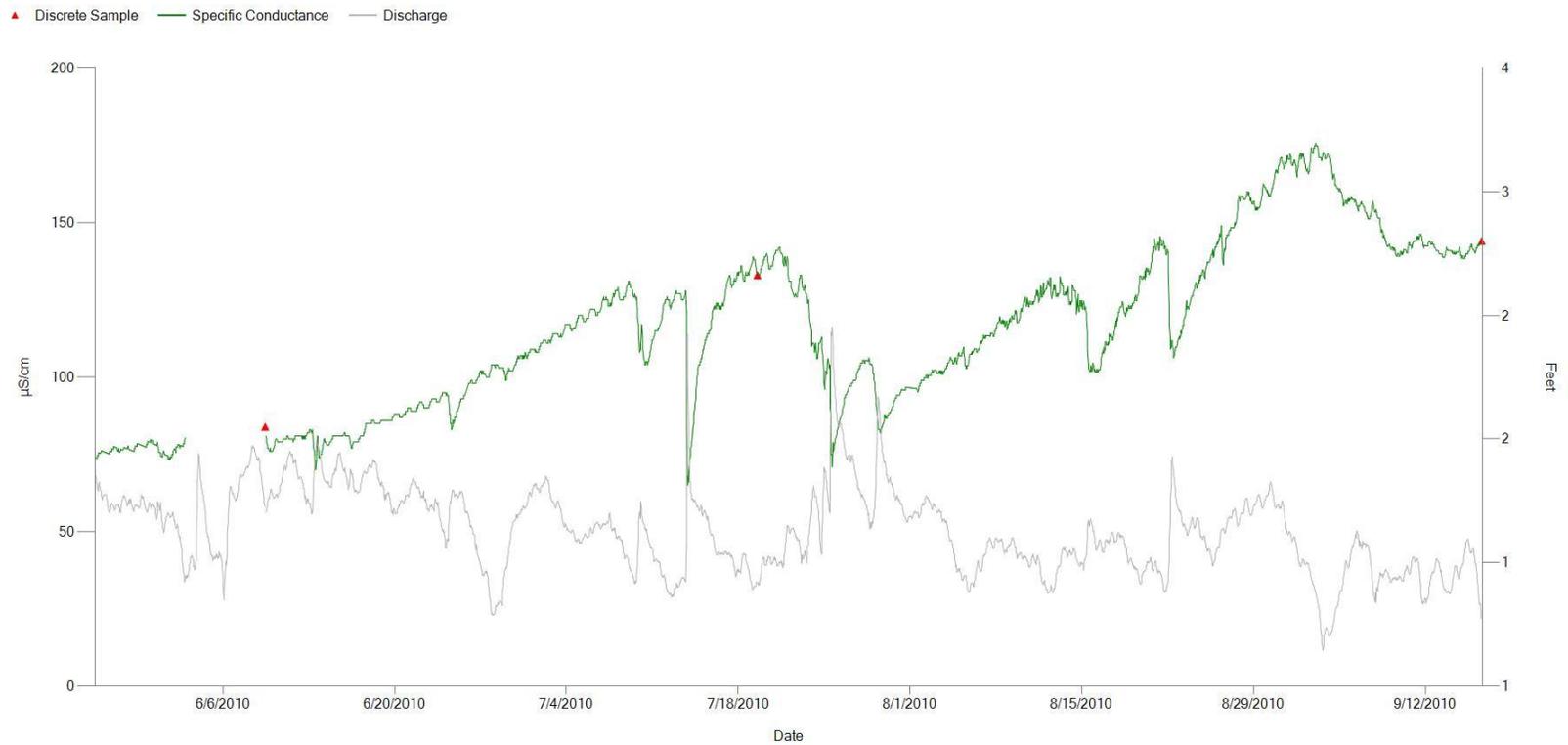


Figure 3. Continuous specific conductance, continuous depth (not corrected), and discrete samples from May 26, 2010 to September 16, 2010.

**pH:** Average: 7.41; Maximum: 7.99; Minimum: 6.42

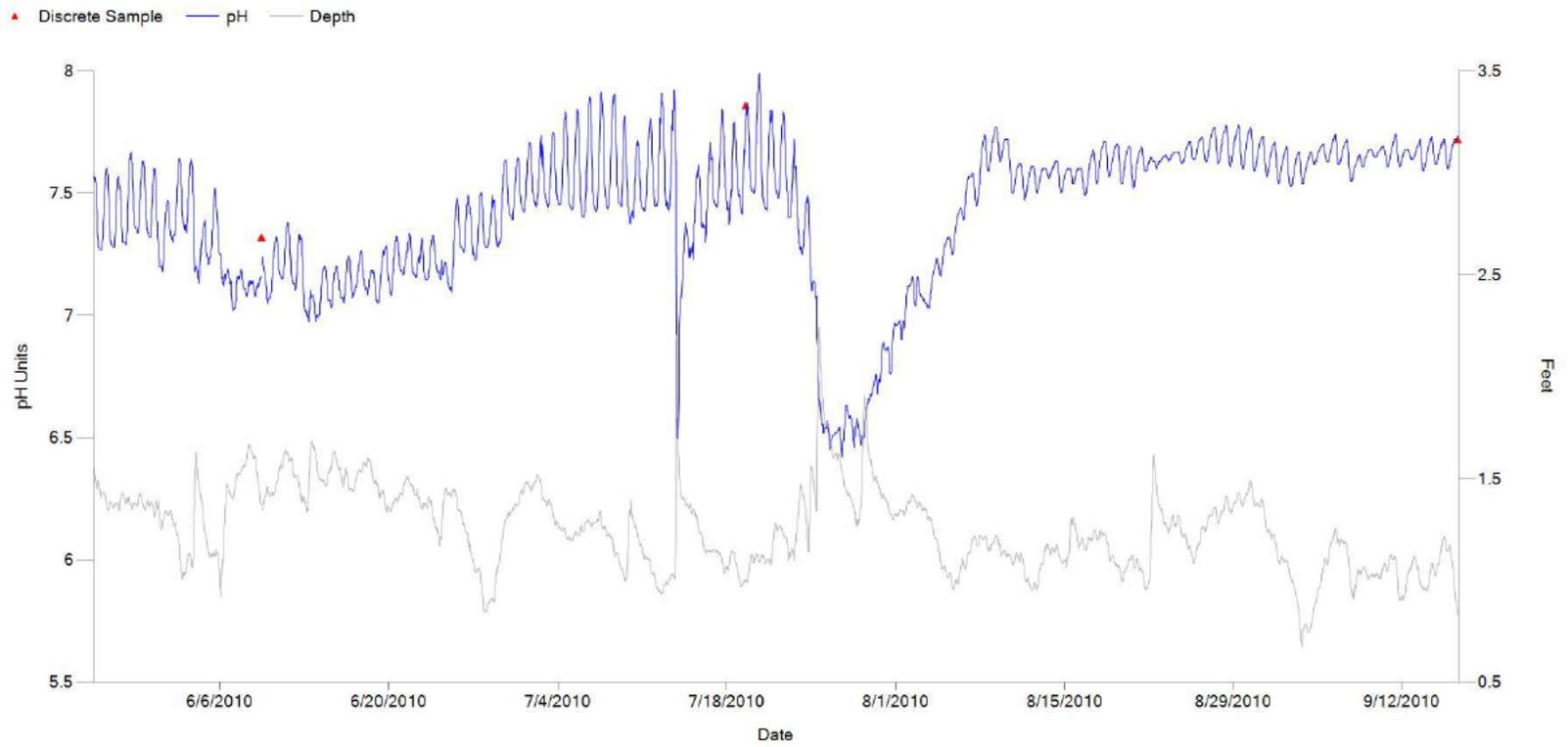


Figure 4. Continuous pH, continuous depth (not corrected), and discrete samples from May 26, 2010 to September 16, 2010.

**In-situ Water Chemistry:** Samples were collected twice using standard analysis code 046. Measurements with "<" indicate concentrations below the reporting limit.

Table 1. Chemical grab sample results.

PARAMETER	UNITS	6/9/2010	7/19/2010
		10:30	13:08
ALKALINITY	MG/L	16.2	36
ALUMINUM T	UG/L	<200	<200
AMMONIA T	MG/L	<0.02	<0.02
ARSENIC T	UG/L	<3	<3
BARIUM T	UG/L	69	122
BOD	MG/L	1	0.5
BORON T	UG/L	<200	<200
BROMIDE T	MG/L	<0.2	<0.2
CALCIUM T	MG/L	6.842	11.2
HARDNESS T	MG/L	25	40
IRON T	UG/L	597	672
MAGNESIUM T	MG/L	1.878	2.815
MANGANESE T	UG/L	42	47
OSMOTIC PRESSURE	MOSM	<1	<1
SELENIUM T	UG/L	<7	<7
SODIUM T	MG/L	5.265	8.861
STRONTIUM T	UG/L	37	69
CHLORIDE T	MG/L	8.65	14.3
TDS @ 180C	MG/L	66	84
NITRATE & NITRITE T	MG/L	0.23	0.18
PHOSPHORUS T	MG/L	0.018	0.012
SULFATE T	MG/L	7.28	5.65
TSS	MG/L	8	5
ZINC T	UG/L	<10	29

**SUMMARY:**

Data collected throughout the deployment period, May 26, 2010 to September 16, 2010, on South Branch Tionesta Creek characterized continuous water temperature, pH and specific conductance throughout most of the growing season. Typically this period is targeted to characterize critical effects of nutrient enrichment including elevated pH and depressed dissolved oxygen levels. Although continuous dissolved oxygen data were not collected, continuous pH data (Figure 4) and in-situ water chemistry sample results (Table 1) demonstrate that this site has low nutrient levels and suppressed instream production.

Significant decreases in pH during elevated flow events were observed. An elevated flow event on July 13, 2010 caused a decrease in pH of 1.42 standard units over a five-hour period with a low of 6.49. A second elevated flow event July 24 through July 26, 2010 caused a decrease in pH of 1.04 standard units over a 44-hour period with a low of 6.45. While pH values of 6.49 and 6.45 would not be limiting, the pH depressions over a short period of time during significant flow events indicates the potential for adverse effects caused by seasonal acid deposition.

Overall the South Branch Tionesta Creek continuous instream monitoring (CIM) effort for this period has limited utility in assessing baseline water quality conditions. Additional continuous instream monitoring, water chemistry and the collection of biological samples throughout at least a year-long period are recommend to characterize baseline water quality conditions.