



Continuous Instream Monitoring Report (CIMR)

Most recent revision: 2/12/2014
Revised by: Shull

Station Description

STREAM CODE: 21892
STREAM NAME: Canada Run
SITE CODE: 66535511-001
SITE NAME: Canada Run

COUNTY: Tioga

LATITUDE: N41°47'22.111" **LONGITUDE:** W77°22'36.921"

LOCATION DESCRIPTION: Along Canada Run Road, approximately 0.5 miles upstream of stream ford.

HUC: 02050205

DRAINAGE AREA: 3.88 sq. miles

BACKGROUND AND HISTORY: Canada Run is a freestone tributary to Marsh Creek within Shippen Township, Tioga County (Figure 1). The basin is characterized by relatively steep topography with land use consisting of forested land (100%). The site is located within the Tioga State Forest. The purpose of this survey was to collect baseline data on a High Quality stream where deep well activity, is possible. The primary objectives of the assessment were to:

1. Characterize seasonal and diel water temperature, specific conductance, pH, and turbidity using 24-hour monitoring.
2. Characterize seasonal water chemistry.
3. Characterize biological communities.

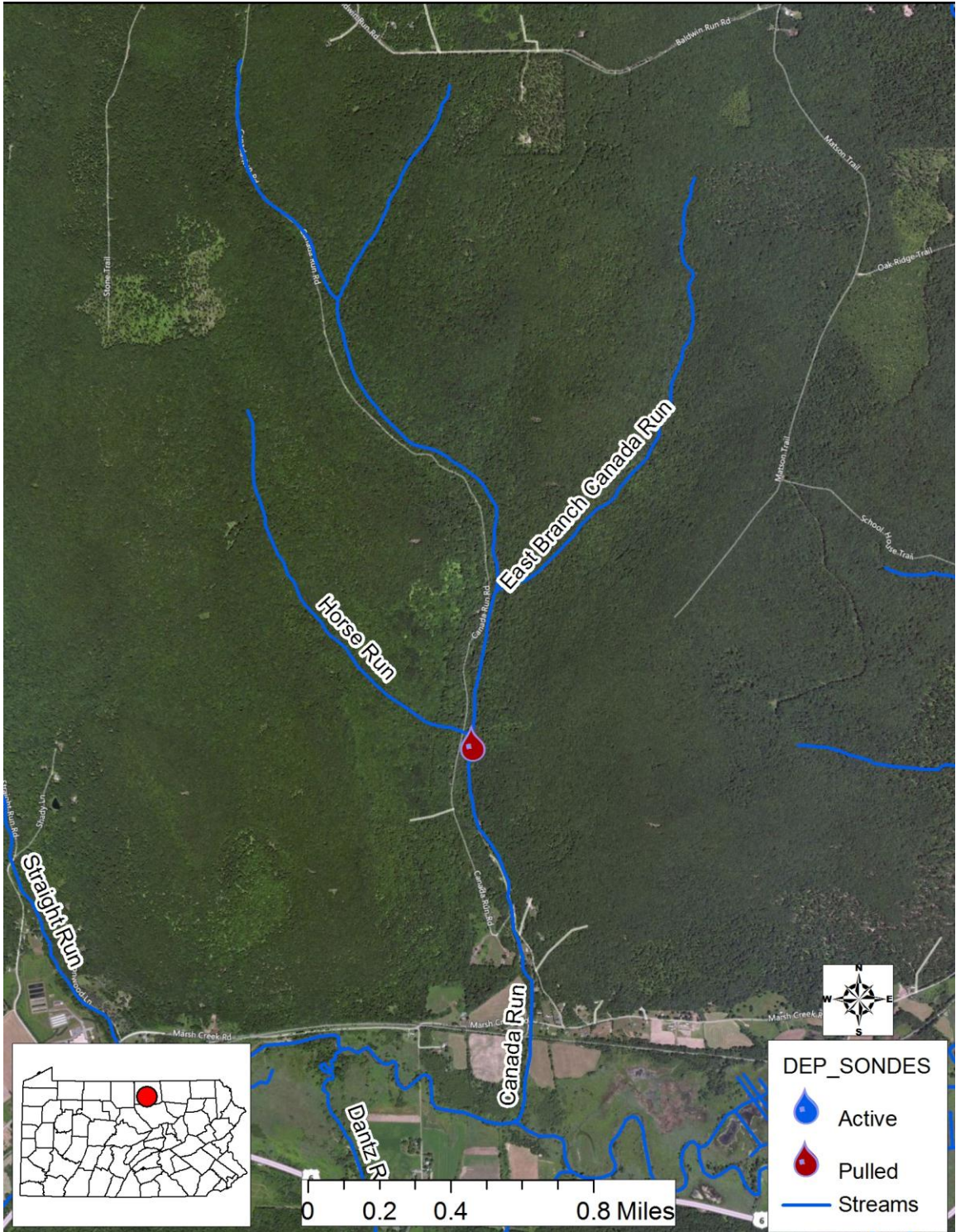


Figure 1. Location of the Canada Run continuous instream monitoring site.



Figure 2. Location of sonde in stream (straight out from hemlock on left).

WATER QUALITY PARAMETERS:

Parameter	Units
Depth	Feet
Water Temperature	°C
Specific Conductance (@25°C)	µS/cm ^c
pH	standard units
Turbidity	Formazin Nephelometric Units (FNU)

EQUIPMENT:

A single YSI 6920V2 water quality sonde was used at this station. The sonde (Serial # 00018B73) was installed on March 13, 2012. A Yellow Springs Instruments (YSI) 6920V2 Sonde was used as a field meter during revisits.

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 30 minutes.

PERIOD OF RECORD: March 13, 2012 to March 13, 2013

The station was visited ten times over twelve months for the purpose of downloading data, checking calibration, and cleaning.

DATA:

Water chemistry grabs were collected seven times during the sampling period. Benthic macroinvertebrates were collected on April 3, 2012 using the Department's Instream Comprehensive Evaluation (ICE) methods (PA DEP 2013a). Continuous data are graded based on a combination of fouling and calibration error (PA DEP, 2013b).

Depth:

Depth measured by this non-vented YSI 6920 is actually the measure of water column pressure plus atmospheric pressure. Depth was calibrated with the sonde in air during deployment. Changes in atmospheric pressure while the sonde was deployed appear as changes in depth. Data in this report were corrected for barometric pressure using a Solinst Barologger Edge located at the USGS Northern Appalachian Research Laboratory. These data are used only as qualitative interpretation for changes in other parameters due to a lack of verification.

Temperature: Average: 7.3 °C; Maximum: 18.39 °C; Minimum: -0.05 °C.

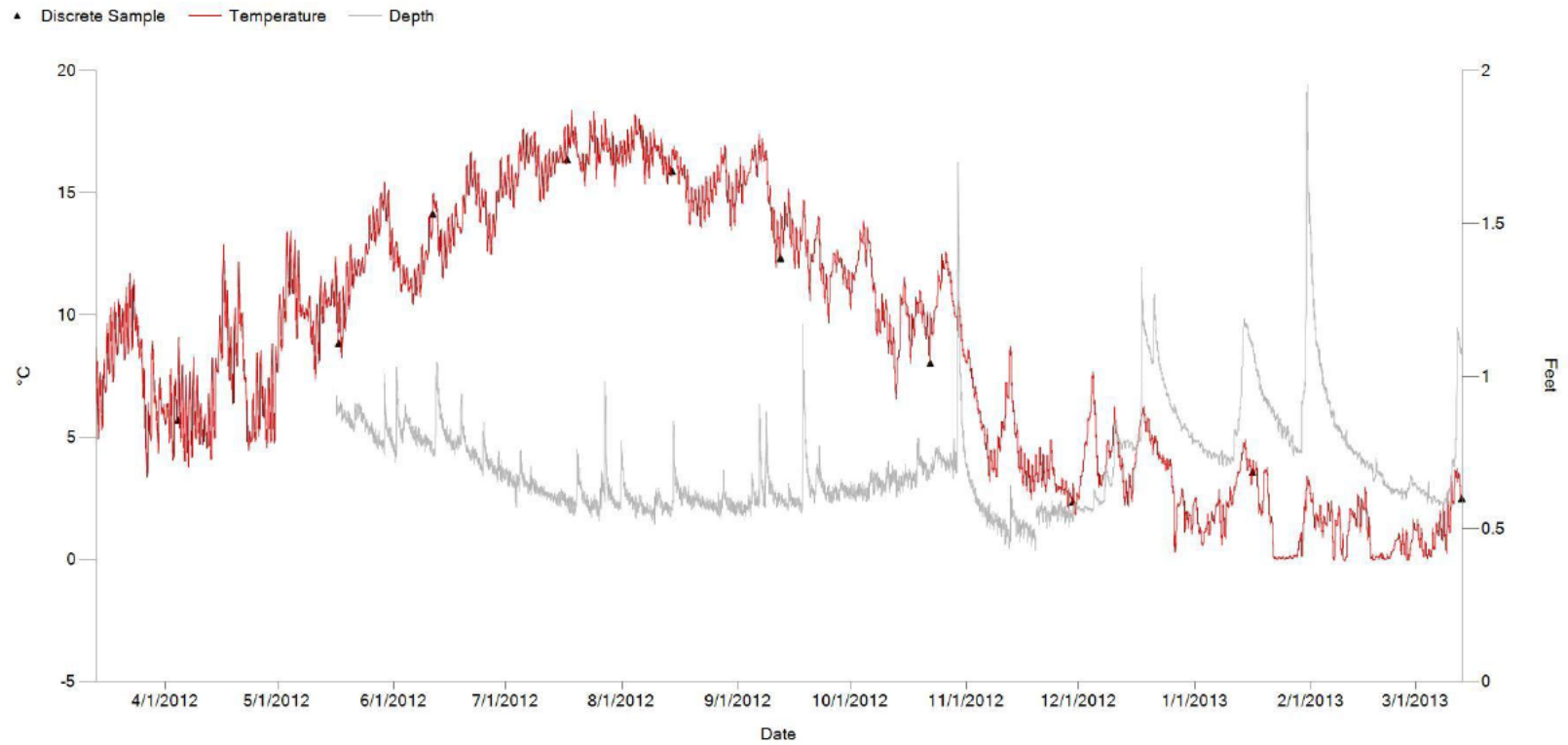


Figure 2. Continuous water temperature, continuous depth and discrete samples from March 13, 2012 to March 13, 2013.

Specific Conductance: Average: 52.9 $\mu\text{S}/\text{cm}$; Maximum: 100.0 $\mu\text{S}/\text{cm}$; Minimum: 23.8 $\mu\text{S}/\text{cm}$.

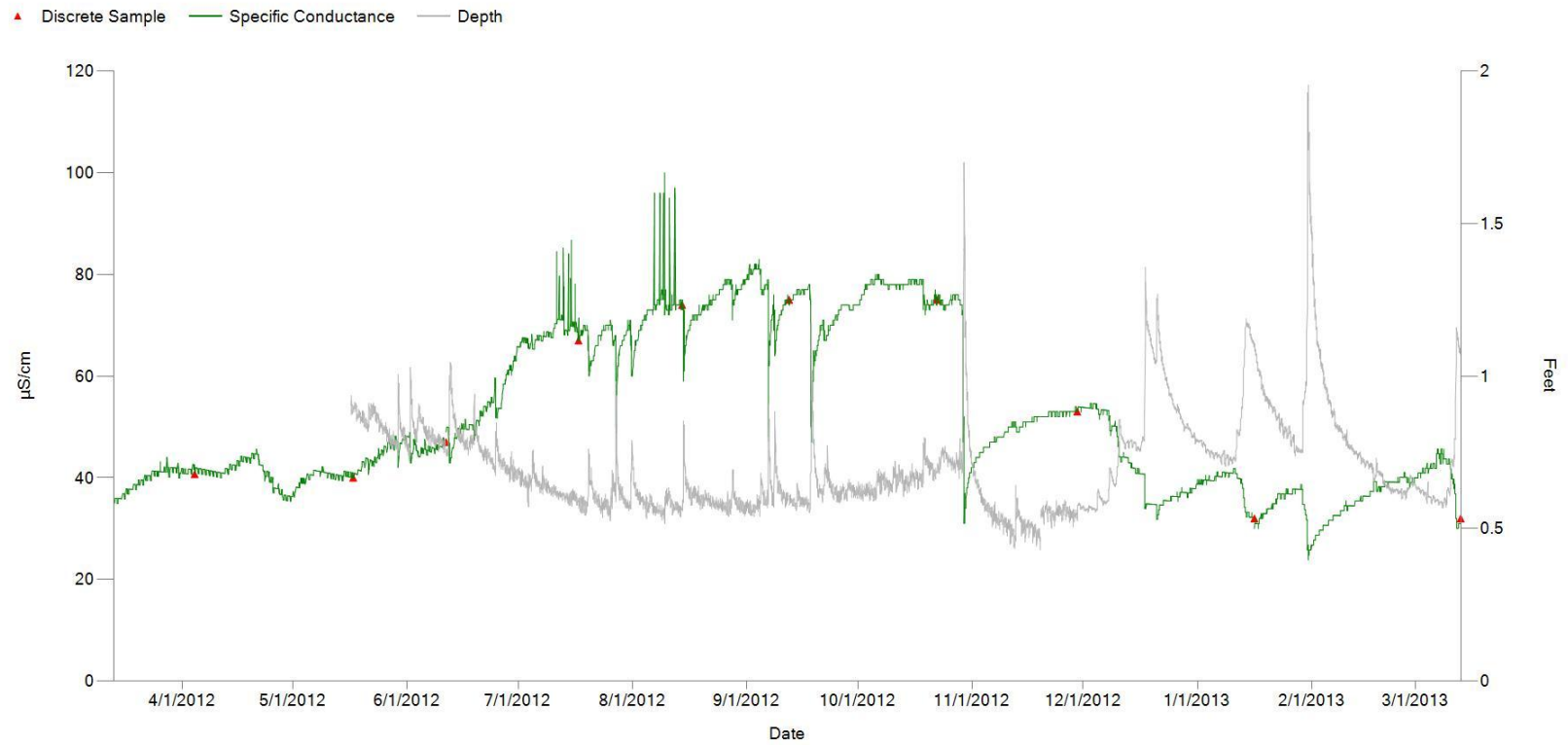


Figure 3. Continuous specific conductance, continuous depth and discrete samples from March 13, 2012 to March 13, 2013.

pH: Average: 7.16; Maximum: 7.44; Minimum: 6.45

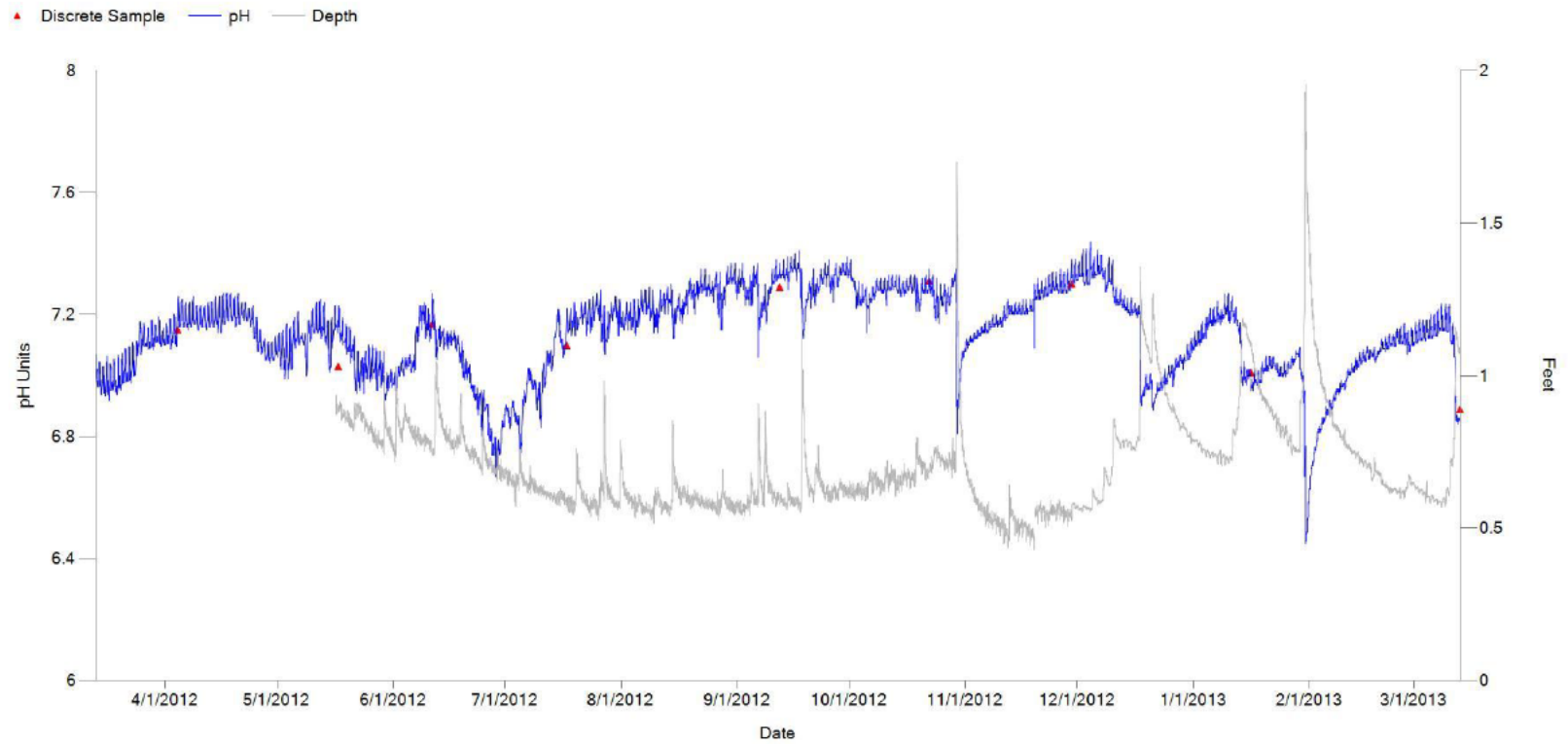


Figure 4. Continuous pH, continuous depth and discrete samples from March 13, 2012 to March 13, 2013.

Turbidity: Average: 2.5 FNU; Maximum: 424.5 FNU; Minimum: 0.0 FNU.

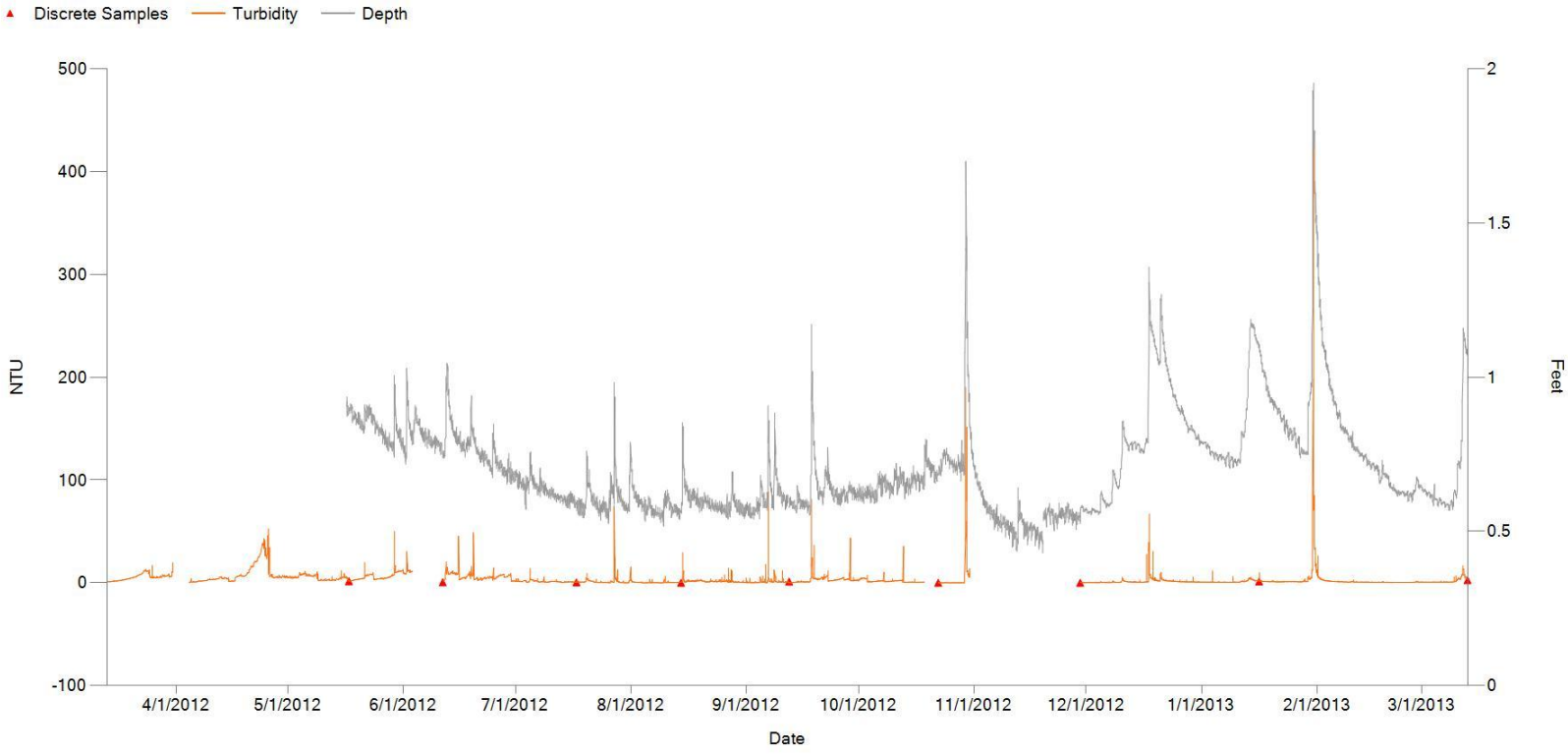


Figure 5. Continuous dissolved oxygen, continuous depth and discrete samples from March 13, 2012 to March 13, 2013.

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

Table 1. Chemical grab sample results.

PARAMETER	UNITS	3/13/2012 12:45 PM	4/3/2012 3:00 PM	5/17/2012 8:20 AM	6/12/2012 8:35 AM	8/15/2012 8:15 AM	9/13/2012 6:35 AM	1/17/2013 7:15 AM
ALKALINITY T	MG/L	6.4	9.2	9.8	14	23.2	28	6
ALUMINUM T	UG/L	< 200	< 200	< 200	< 200	< 200	< 200	< 200
AMMONIA T	MG/L	< 0.02	0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
ARSENIC T	UG/L	< 3	< 3	< 3	< 3	< 3	< 3	< 3
BARIUM T	UG/L	11	12	12	17	20	24	10
BOD	MG/L	0.2	1.8	1.2	0.5	0.7	1	0.9
Boron T	UG/L	< 200	< 200	< 200	< 200	< 200	< 200	< 200
BROMIDE	UG/L	< 50	< 50	< 50	< 50	< 25	< 25	< 25
CALCIUM T	MG/L	3.254	4.114	4.298	5.387	7.415	8.42	3.533
HARDNESS T	MG/L	12	14	15	19	26	29	12
IRON T	UG/L	36	27	32	54	42	81	46
LITHIUM T	UG/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25
MAGNESIUM T	MG/L	0.863	1.02	1.084	1.305	1.72	1.997	0.862
MANGANESE T	UG/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OSMOTIC PRESSURE	MOSM	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SELENIUM T	UG/L	< 7	< 7	< 7	< 7	< 7	< 7	< 7
SODIUM T	MG/L	0.655	0.828	0.815	1.09	1.764	2.413	0.65
SPECIFIC CONDUCTIVITY @ 25.0 C	µS/cm	30.7	39.4	38	43.6	61.1	71.6	33.7
STRONTIUM T	UG/L	14	19	19	25	33	41	15
CHLORIDE T	MG/L	0.81	1.03	0.86	1.09	1.26	1.64	0.98
TDS @ 180C	MG/L	32	46	38	44	46	48	34
NITRATE & NITRITE T	MG/L	< 0.05	< 0.05	< 0.05	0.1	0.18	0.13	< 0.05
PHOSPHORUS T	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	0.011	0.012	< 0.01
SULFATE T	MG/L	6.41	6.7	6.55	6.34	6.04	6.43	6.62
TSS	MG/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5
ZINC T	UG/L	< 10	< 10	< 10	< 10	< 10	73	< 10

Biology: The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of water quality. Benthic macroinvertebrates (Table 2) were collected on 4/3/2012 using the Department's ICE protocol.

Table 2. Taxa list for benthic macroinvertebrate survey.

Order	Family	Genus	20120403-1500-dushull
Ephemeroptera	Baetidae	Baetis	10
Ephemeroptera	Baetidae	Dipheter	4
Ephemeroptera	Heptageniidae	Epeorus	55
Ephemeroptera	Heptageniidae	Leucrocuta	1
Ephemeroptera	Heptageniidae	Maccaffertium	1
Ephemeroptera	Heptageniidae	Cinygmula	29
Ephemeroptera	Ephemerellidae	Drunella	9
Ephemeroptera	Ephemerellidae	Ephemerella	13
Ephemeroptera	Leptophlebiidae	Paraleptophlebia	9
Plecoptera	Pteronarcidae	Pteronarcys	7
Plecoptera	Peltoperlidae	Tallaperla	1
Plecoptera	Nemouridae	Amphinemura	10
Plecoptera	Leuctridae	Leuctra	10
Plecoptera	Perlidae	Agnetina	1
Plecoptera	Perlidae	Acroneuria	2
Plecoptera	Perlodidae	Isoperla	2
Plecoptera	Chloroperlidae	Sweltsa	1
Trichoptera	Hydropsychidae	Parapsyche	1
Trichoptera	Hydropsychidae	Diplectrona	5
Trichoptera	Hydropsychidae	Ceratopsyche	3
Trichoptera	Rhyacophilidae	Rhyacophila	4
Coleoptera	Elmidae	Oulimnius	10
Diptera	Tipulidae	Hexatoma	1
Diptera	Simuliidae	Prosimulium	12

ASSESSMENT:

Continuous: Overall, parameters collected by the instream monitor indicate excellent water quality conditions. Specific conductance measurements show a relatively consistent pattern throughout the sampling period with no unexpected variation. Continuous measurements in pH were remarkably consistent with little seasonal or diel variance. Constancy of pH through this period suggests minimal anthropogenic influence and moderate buffering capacity. Turbidity data were measured in a quantitative manner. A relatively low maximum during high flow events suggests minimal surface disturbance.

Biological: The benthic macroinvertebrate community also indicated excellent water quality during the period sampled (Table 3). The most dominant taxa were Epeorus and Cinygmula, two mayflies that are intolerant to pollution.

Table 3 Macroinvertebrate metric calculations.

Date	IBI	Richness	Mod EPT	HBI	% Dom	% Mod May	Beck3	Shannon Div
April 3, 2012	95.0	26	19	1.55	26.4	56.2	40	2.63

SUMMARY:

Continuous monitoring, in-situ lab chemistries, and biological data all suggest that Canada Run has excellent water quality conditions. The Division of Water Quality Standards will continue to refine turbidity and depth data in order to establish rating curves for parameters such as discharge, total suspended solids, and others.

LITERATURE CITED

PA DEP. 2013a. Instream Comprehensive Evaluations (ICE).

http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/2013_assessment_methodology/1407203

PA DEP. 2013b. Continuous Instream Monitoring Protocol.

http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/2013_assessment_methodology/1407203