Centre County Senior Environmental Corps Newsletter April 2019

CCPaSEC's Stream water monitoring

Our water monitoring methods and the selection of chemistries to be studied is based upon the Environmental Alliance for Senior Involvement (EASI) program of (1997).

Nature Abounds™ established a new program when the EASI program ended and provides us with new equipment including a portable colorimeter not only improved the accuracy of our measurements, it also lessened the time to conduct our surveys.

Why do we study nitrates and phosphates?

Pennsylvania comprises 35 percent of the entire Chesapeake Bay Watershed. The mandatory pollutant reductions necessary to meet EPA's total maximum daily load goals for nitrate and phosphorus must be achieved by the year 2025.

Pennsylvania is responsible for 69 percent of remaining basin wide nitrogen load and needs to reduce the nitrogen total of 34 million lbs. by 2025. Phosphorus Loads to 3.6 million lbs. Agriculture will likely be responsible for much more than 80 percent of these nitrogen reductions.

(Federal clean water Act and Pennsylvania's Article 1 Section 27)

Pennsylvania's plan for compliance set clean water goals for each county based on historical monitoring data. county-based goals *DO NOT* establish any new requirement or regulatory obligation. Failure to achieve could mean more regulations on livestock. wastewater standards and withholding of EPA funding.

Centre County BMP

The purpose of this program is to assist farmers with the cost of installing agricultural **Best Management Practices** (BMPs) to help with nutrient management, soil erosion, and water control within the farm's operation.

https://www.dep.pa.gov/Business/Water/Pennsylvania's Chesapeake Bay Program Office/

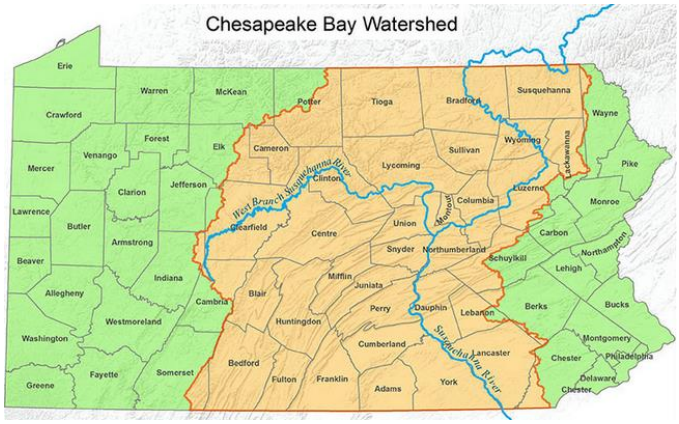

Figure 1. Pennsylvania Planning Targets

Year	Nitrogen (M lbs/year)		Phosphorus (M lbs/year)	
	Delivered to the Bay	Delivered to Local PA Waterways	Delivered to the Bay	Delivered to Local PA Waterways
1985(Actual)	122.02	183.88	6.046	14.857
2017 (Actual)	107.31	161.94	3.801	9.640
2025 (Final TMDL Planning Target)	73.18	110.88	3.044	7.619
Remaining Reductions to be Achieved Through Local Planning Goals *	34.31	51.06	0.757	2.021

*This table does not account for future (beyond 2025) pollution loads and potential impacts such as climate change, development and growth, and potential infrastructure or (cost of doing business) which may alter the amount of sediment reaching the Bay (currently held in place by the Conowingo Dam).

Nitrates: Nitrogen is a major pollutant of the Chesapeake Bay. Excess nitrogen fuels the growth of algae, creating dense algae blooms that block sunlight and reduce dissolved oxygen available to fish, blue crabs, and other organisms. Sources of nitrogen include fertilizers, household septic systems, and municipal and industrial wastewater. High levels of nitrates in water can cause excessive aquatic plant growth. As the algae and aquatic plants die, their decomposition by oxygen using bacteria uses up oxygen faster than oxygen can be put into water, so fish and other organisms die. This natural process of excessive plant growth is called eutrophication, and high levels of nitrates added to the water by human activity greatly speeds up this process. All aquatic organisms need some nitrate. Nitrate is measured in mg/L. Unpolluted waters have nitrate levels below 4.4 mg/L.

Our maximum observed total nitrate level was 37.4 mg/L at Lick Run and the average there is 19.9 mg/L. Elk Creek Site 2 had the second highest nitrate level of 25.6 mg/L. The average level at our other 23 sites was less than 3.0 mg/L.

Phosphates: Phosphorus is also a major pollutant of the Chesapeake Bay. While phosphorus is needed for plant growth, human activities contribute more phosphorus than the Bay's waters can handle. Sources of phosphorus include fertilizer, municipal and industrial wastewater, and stormwater runoff stimulate the growth of plankton and aquatic plants. Too much can "choke" the waterway and when the plants die, their decomposition uses up much of the oxygen. Many fish and organisms then die. All aquatic organisms need phosphate to grow. Phosphate is measured in parts per Million (ppm). Most unpolluted streams have levels below 0.03 mg/L. Total phosphate levels should be 0.1 ppm or lower.

Our maximum observed phosphate level was 5.5 mg/L at Sinking Creek Barton and Sinking Creek Ramsey. The average phosphate level for all of our 23 sites is less than 0.40 mg/L.

Sulfates in the form of sulfuric acid enter streams and rivers, they can decrease the pH of the body of water making it intolerable for certain species of aquatic life. Acid mine drainage alone can potentially cause the pH of the water to fall into a range of 1 to 5, which is very acidic.

Our maximum measured level for sulfate is 68 mg/L at Buffalo Run Kolln and 61 mg/L at Buffalo Run Benner Park, however there were several indications of over measurable range.

Despite having the highest sulfate level, the minimum recorded pH at Buffalo Run Kolln is 7.3. – just a fraction over neutral, solutions with a pH greater than 7 are basic, not acidic. The average pH at Buffalo Run Kolln is 8.09. The Buffalo Run Benner Park average pH is 8.42.

Why don't we study Fracking chemicals?

According to the *International Journal of Human and Ecological Risk Assessment*: Wastewater from fracking contains potentially toxic chemicals used in fracking fluid, as well as natural contaminants from deep underground, including total dissolved solids (e.g., salts, barium, strontium), organic pollutants (e.g., benzene, toluene) and normally occurring radioactive such as Radium 226.

High levels of barium and strontium in addition to high levels of conductivity (greater than 500 µS/cm) and total dissolved solids may point to Fracking activity. Unfortunately, there are no accurate field kits for measuring concentrations of barium or strontium.

Our two Marcellus teams collect water samples at sites in the Beech Creek watershed for analysis by Lock Haven University's Geology & Physics laboratory which do test and report levels of barium, among other chemistries.

Beginning in 2009, CCPaSEC volunteer monitors sampled nine (9) stream sites that are in close proximity to natural gas drilling pads in the Marcellus shale region. Lock Haven University and the Centre County Conservation District collaborated with CCPaSEC and the Beech Creek Watershed Association to establish this program.

Our two CCPaSEC teams expanded the surveillance to 25 streams help determine a basis for the condition of in the Marcellus area Beech Creek watershed prior to extensive deep well exploration.

Our teams perform monthly field measurements for flow rate, pH, dissolved oxygen, conductivity, total dissolved solids, salinity and collect water samples for detailed analysis by Dr. K's Lock Haven University's Geology & Physics Laboratory. The monitoring requires round trips to visit 4 or 5 remote sites each month (excluding December when LUH is on winter break or when weather conditions are prohibitive).

The teams have also collected water samples for Pennsylvania State University (PSU) that did methane analysis and they performed joint field monitoring with some Teen Shale Local high school students**.**

Healthy Water Grant

http://centrecountypa.gov/DocumentCenter/View/808

In 2012 the Centre County Conservation District, Trout Unlimited and the Centre County Pennsylvania Senior Environment Corps (CCPaSEC) took part in the Healthy Waters Grant funded by the Federal Healthy Waters Program.

The findings in the Healthy Waters Initiative project indicate that, with the exception of Beech Creek, all streams in the study area are healthy.

Abandoned mine drainage (AMD) impairs the main stem of Beech Creek, but many tributaries, including those in this study, are untouched by the legacy left by unsafe coal mining. The fact that there are healthy waters in an AMD impaired watershed underscores the need to protect and preserve these valuable resources.

CCPaSEC volunteer observers previously reported a roadway erosion and sediment problem in the Council Run Watershed that was mitigated by the District and Anadarko.

Dickinson College *ALLARM*

Alliance for the Resource Monitoring

(https://www.dickinson.edu/Allarm)

Dickinson College Alliance for Aquatic Resource Monitoring (ALLARM) participate in decision making about water resources in their local community. They are involved with the Pennsylvania's DEP in the phase 3 Watershed implementation plan.

ALLARM reported: "that although the composition of flowback water varies greatly they use conductivity, total dissolved solids and **barium and strontium as indicator chemicals** for monitoring fracking activity".

Table: "New York Department of Conservation Supplemental Environment Impact Statement on the Oil, Gas and Solution Mining Regulator Program based on flowback water samples for Pa and WV noticed high concentrations of barium in the flowback water in comparison to water quality criteria in PA.

Parameter	Median concentrations in flowback samples (mg/L)	PA water quality criteria (mg/L)	PA drinking water criteria (mg/L)	Potential health & environmental effects
Total Dissolved Solids	93,200	500	500	Variable; includes many chemicals
Barium	661	10	2	Increase in blood pressure
Strontium	821	0.050	none	Musculoskeletal toxicant

The Marcellus water analyses at lock Haven's laboratory include barium (mg/L) using spectrophotometer and include the CCPaSEC field data for conductivity and total dissolved solids. The data is summarized in the three charts on pages 6,7 & 8.

CCPaSEC monitoring the Marcellus

The following charts (pages 6 - 8) are provided by Dr. Khalequzzaman's (Dr. K) Professor of Geology, Department of Geology & Physics, Lock Haven University.

Note the correlation of barium concentration, conductivity and total dissolved solids during the 2013 – 2014 time period of deep well drilling and road construction and the extensive pipe laying that took place in 2017.

Note: It is this writer's opinion that most of the barium and conductivity increase was more likely from road, drill pad construction and the pipeline installation than from deep well drill leakage because there was no deep well exploration or activity to account for the 2017 - 2018 peak.

Our contribution

The costs of our watershed cleanup are high. The Pa DEP Chesapeake Bay program phase 3 plan is considering local help from organizations like the CCPaSEC.

How will the Centre County determine progress in achieving its goal?

Our volunteers are trained and experienced collectors of water samples, chemical data, flow and recorders of the conditions under which they were obtained.

While our data is not lab certifiable it is reliable and conducted under a formal quality assurance plan with published quality control statistics.

Macroinvertebrate population data would also be helpful in ascertaining improvement over the long term.

The value of those hours to the community in 2017 dollars for the last 5 years (2014-2018) is $309,967.83. *https://www.independentsector.org/volunteer_time*.

"We appreciate the significance of the ongoing water quality data that your group collects and will use it as appropriate with our State agencies and partners. We look forward to continuing our relationship".

Robert Sweitzer, Manager, Centre County Conservation District.

Attention: Upcoming happenings

Apr 20, 8:00 AM – 12:00 PM Watershed Cleanup Day. Multiple Locations, Centre County, PA, USA. Join us for our Annual Watershed Cleanup Day! We need your help in making this year's event a success.

Please contact our coordinator: Genie Robine.

Celebrate Spring with us: Plant Trees for Water and Wildlife! Thanks to the Chesapeake Bay Foundation's "Keystone 10 Million Trees Partnership" and Growing Native and ClearWater's wonderful volunteer-led native plant nursery, we have 1000 trees and shrubs to plant along streams to protect water quality and provide wildlife habitat!

Wednesday April 25, 9 am until completed
To do: Plant Trees & Shrubs in Oak Hall, PA on a Stream Buffer along Spring Creek and wetlands with Trout Unlimited and ClearWater Conservancy.

Friday April 27, 9 am-3 pm
To do: Help 5 th graders Plant Trees & Shrubs on a Stream Buffer along the headwaters of Spring Creek just east of Boalsburg, PA.

Fun Tasks: Be a group leader to help students plant native trees and shrubs.

Monday April 30, 10 am-2pm
To do: Plant Trees & Shrubs along Slab Cabin Run in "Kissinger Meadow" in State College with Trout Unlimited, Fish & Wildlife Service and ClearWater Conservancy.

If you can help with one or more of these work sessions, please call or email with questions:
Colleen DeLong, ClearWater Conservancy
814-237-0400 colleen@clearwaterconservancy.org

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May 7 & 8, Centre Gives Contributions to CCPaSEC may be made through the ClearWater Conservancy. Please see our website for instructions.

May 16 & 17 Shale Network Workshop Monitoring Communities and Their Environment at the Nittany Lion Inn.

http://www.shalenetwork.org

Schedule: Nittany Lion Inn, State College, Pennsylvania, May 16–17, 2019 Workshop Organized and/or Sponsored By: Penn State (Earth and Environmental Systems Institute; Marcellus Center for Outreach and Research), University of Pittsburgh, Evergreen Conservancy, PA Department of Environmental Protection, Shell Oil Co., Oak Ridge Associated Universities.

The Shale Network is working together to organize water quality and quantity data in regions where shale gas is being exploited. The Steering Committee of the Shale Network derive from Dickinson College, the University of Pittsburgh, Penn State, and the Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI).

From the Editor: Concern for our future

Pennsylvania is blessed with abundant water. Some say we are second only to Alaska. While mining has seriously sullied many of our streams, Pennsylvania is tasked to help monitor and improve our watersheds that drain into the Chesapeake Bay.

CCPaSEC's volunteers work with our County, PSU and LHU to help, by providing real month by month data on the health of many steams in the Spring Creek and Beech Creek watersheds.

The ClearWater Conservancy provisions our extensive website to make the information available to our county leaders, the public and is used by student researchers.

CCPaSEC Membership

Help support our teams of seniors to gather water quality data and macroinvertebrate populations that are published on our public website.

You can help

Please consider a **Centre Gives** contribution to CCPaSEC on **May 7 & 8, 2019** by directing your donation through the ClearWater Conservancy.

Directions for contributions are on our website:

http://www.ccpasec.org/index.php/donations

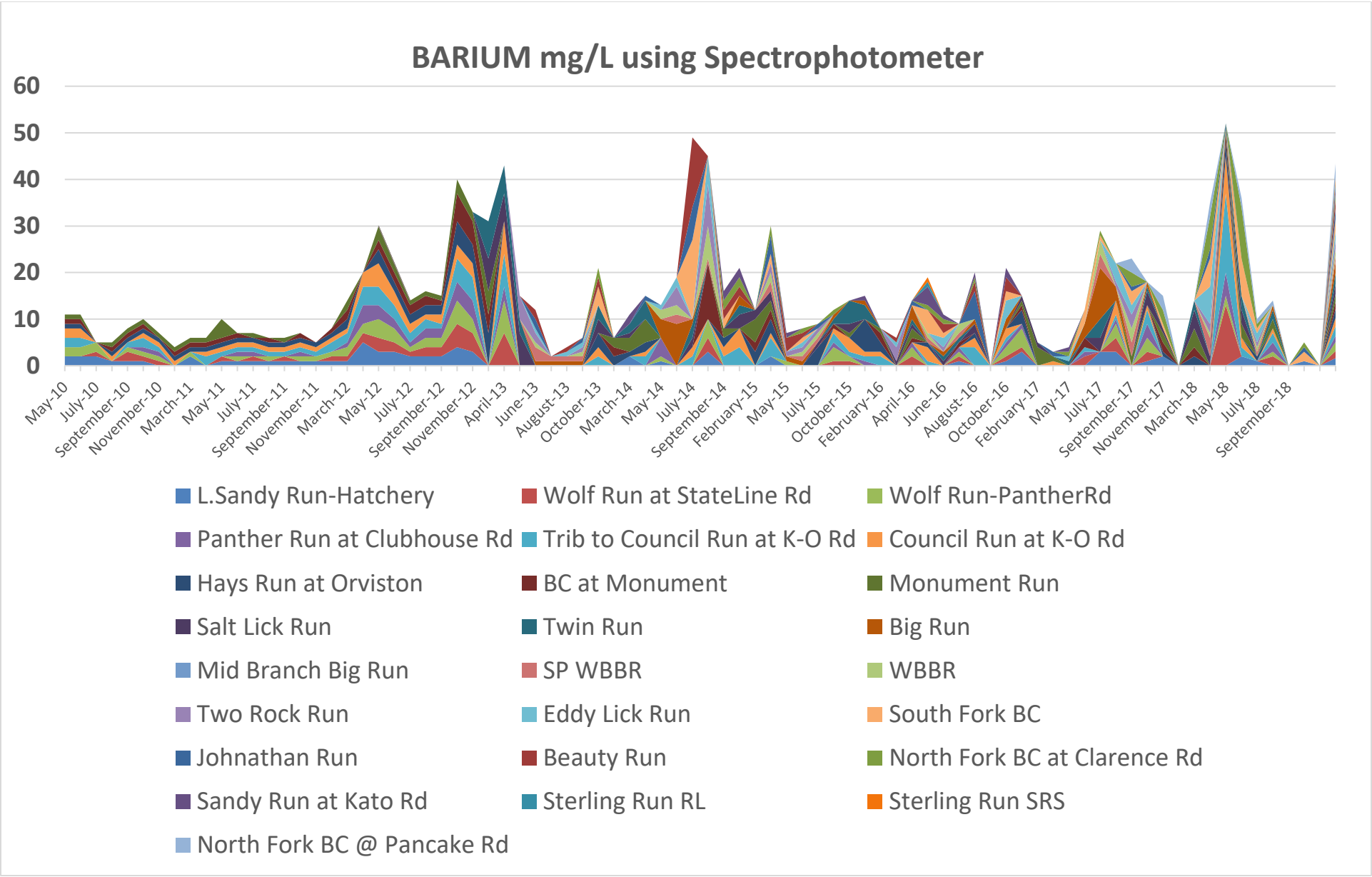
We are in need of financial support for team equipment and supplies. Thank you.

To join the CCPaSEC please call the Centre County RSVP (Retired and Senior Volunteer Program) Monday thru Friday 8:30 am to 5: pm 814 355 6816

The CCPaSEC newsletter is published quarterly except for special events. To submit comments or to contribute articles or corrections please contact Ken Johnson via our website

"***Drill for oil? You mean drill into the ground to try and find oil? You're crazy***," **– response to Edwin L. Drake in 1859**

Nature Abounds™ is the primary sponsor and provider of equipment and supplies for CCPaSEC the. The ClearWater Conservancy and Centre County RSVP are major supporters. following have provided additional support funding for special equipment for one field kit: Financial support for this grant is provided by the Dominion Energy Charitable Foundation which is dedicated to the economic, physical, and social health of the communities served by Dominion Energy companies. Western Pennsylvania Conservancy: This grant program was administered by the Western Pennsylvania Conservancy in commitment to its core mission of conserving Pennsylvania's diverse ecosystems through science-based strategy, leadership, and collaboration.


BARIUM mg/L using Spectrophotometer
60
50
40
30
20
10
0
May-10
July-10
September-10
November-10
March-11
May-11
July-11
September-11
November-11
March-12
May-12
July-12
September-12
November-12
April-13
June-13
August-13
October-13
March-14
May-14
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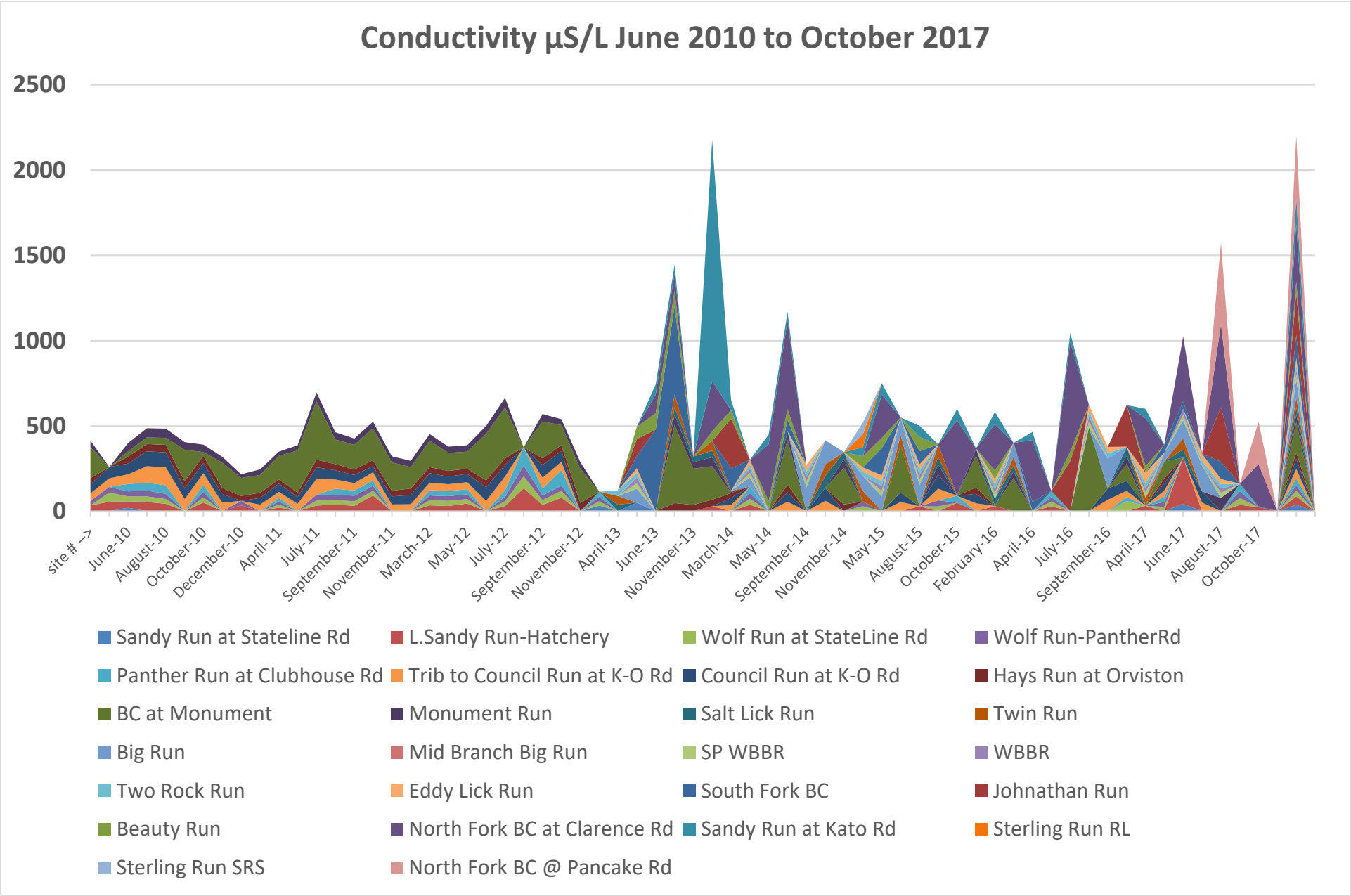
February-15
May-15
July-15
October-15
February-16
April-16
June-16
August-16
October-16
February-17
May-17
July-17
September-17
November-17
March-18
May-18
July-18
September-18
L.Sandy Run-Hatchery
Wolf Run at StateLine Rd
Wolf Run-PantherRd
Panther Run at Clubhouse Rd
Trib to Council Run at K-O Rd
Council Run at K-O Rd
Hays Run at Orviston
BC at Monument
Monument Run
Salt Lick Run
Twin Run
Big Run
Mid Branch Big Run
SP WBBR
WBBR
Two Rock Run
Eddy Lick Run
South Fork BC
Johnathan Run
Beauty Run
North Fork BC at Clarence Rd
Sandy Run at Kato Rd
Sterling Run RL
Sterling Run SRS
North Fork BC @ Pancake Rd


Conductivity µS/L June 2010 to October 2017
2500
2000
1500
1000
500
0
site # -->
June-10
August-10
October-10
December-10
April-11
July-11
September-11
November-11
March-12
May-12
July-12
September-12
November-12
April-13
June-13
November-13
March-14
May-14
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February-16
April-16
July-16
September-16
April-17
June-17
August-17
October-17
Sandy Run at Stateline Rd
L.Sandy Run-Hatchery
Wolf Run at StateLine Rd
Wolf Run-PantherRd
Panther Run at Clubhouse Rd
Trib to Council Run at K-O Rd
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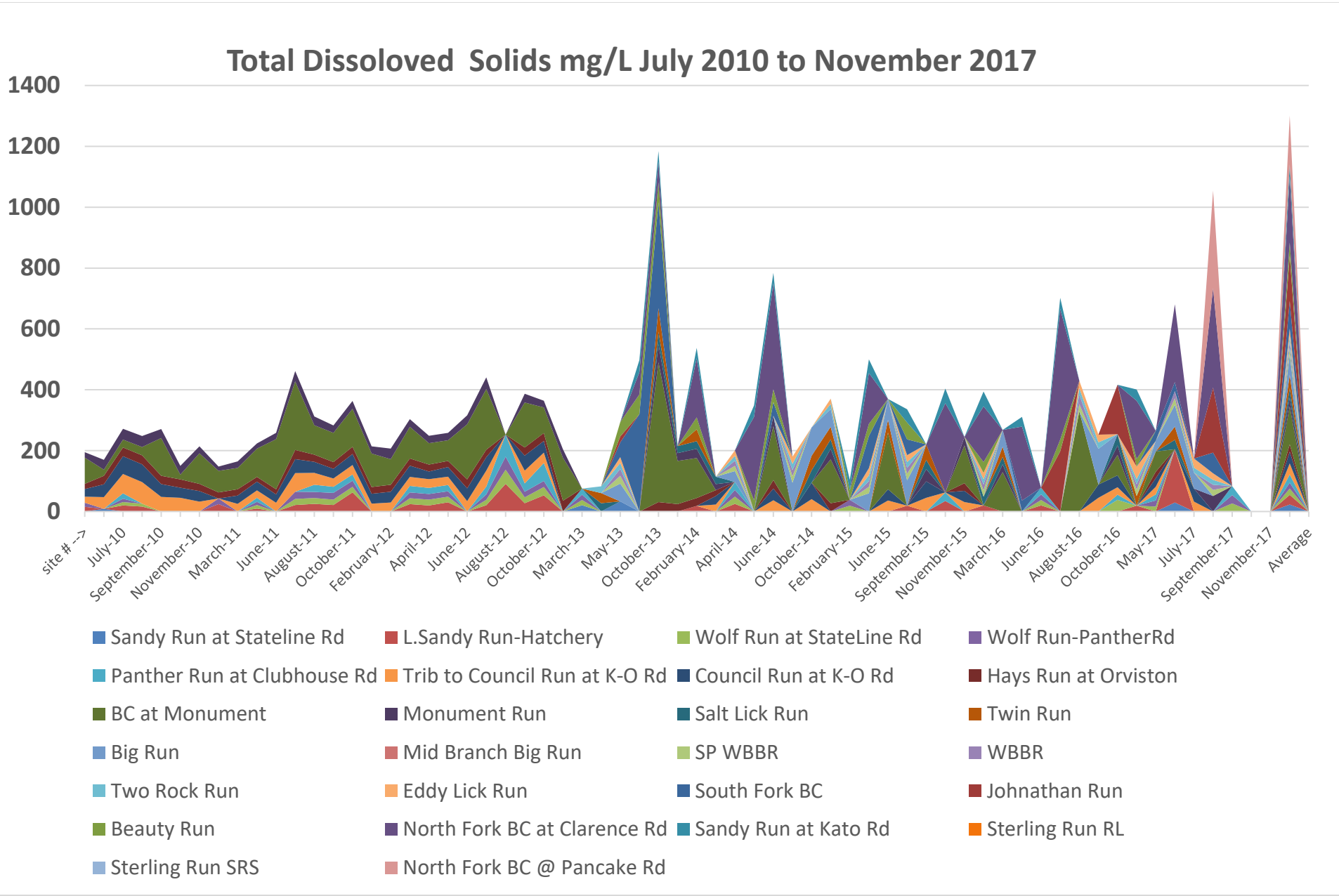
Hays Run at Orviston
BC at Monument
Monument Run
Salt Lick Run
Twin Run
Big Run
Mid Branch Big Run
SP WBBR
WBBR
Two Rock Run
Eddy Lick Run
South Fork BC
Johnathan Run
Beauty Run
North Fork BC at Clarence Rd
Sandy Run at Kato Rd
Sterling Run RL
Sterling Run SRS
North Fork BC @ Pancake Rd


Total Dissoloved Solids mg/L July 2010 to November 2017
1400
1200
1000
800
600
400
200
0
site # -->
July-10
September-10
November-10
March-11
June-11
August-11
October-11
February-12
April-12
June-12
August-12
October-12
March-13
May-13
October-13
February-14
April-14
June-14
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February-15
June-15
September-15
November-15
March-16
June-16
August-16
October-16
May-17
July-17
September-17
November-17
Average
Sandy Run at Stateline Rd
L.Sandy Run-Hatchery
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Wolf Run-PantherRd
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