

# Collaboration Builds a Database of Stream Parameters in Indiana County

Katherine Farnsworth (IUP), Cindy Rogers (Evergreen Conservancy), many volunteers and students

## Abstract

A collaboration between Indiana University of Pennsylvania and Evergreen Conservancy for the monitoring of streams throughout Indiana County has been ongoing for the past 5 years. This relationship has allowed for opportunities for undergraduate students of the Geoscience Department to work with Evergreen Conservancy on monitoring streams to characterize the natural variability as well as monitor for anthropogenic impacts. Dataloggers have been installed and maintained by Evergreen Conservancy volunteers with IUP Geoscience students collecting physical and biological data in these same locations taking advantage of the time-series data collected via the dataloggers of temperature, conductivity and water level. It has provided data that has been used in the classroom as well as for individual student research projects. IUP also provides the service of data processing, storage and presentation of data via the web to the Conservancy and other interested parties.

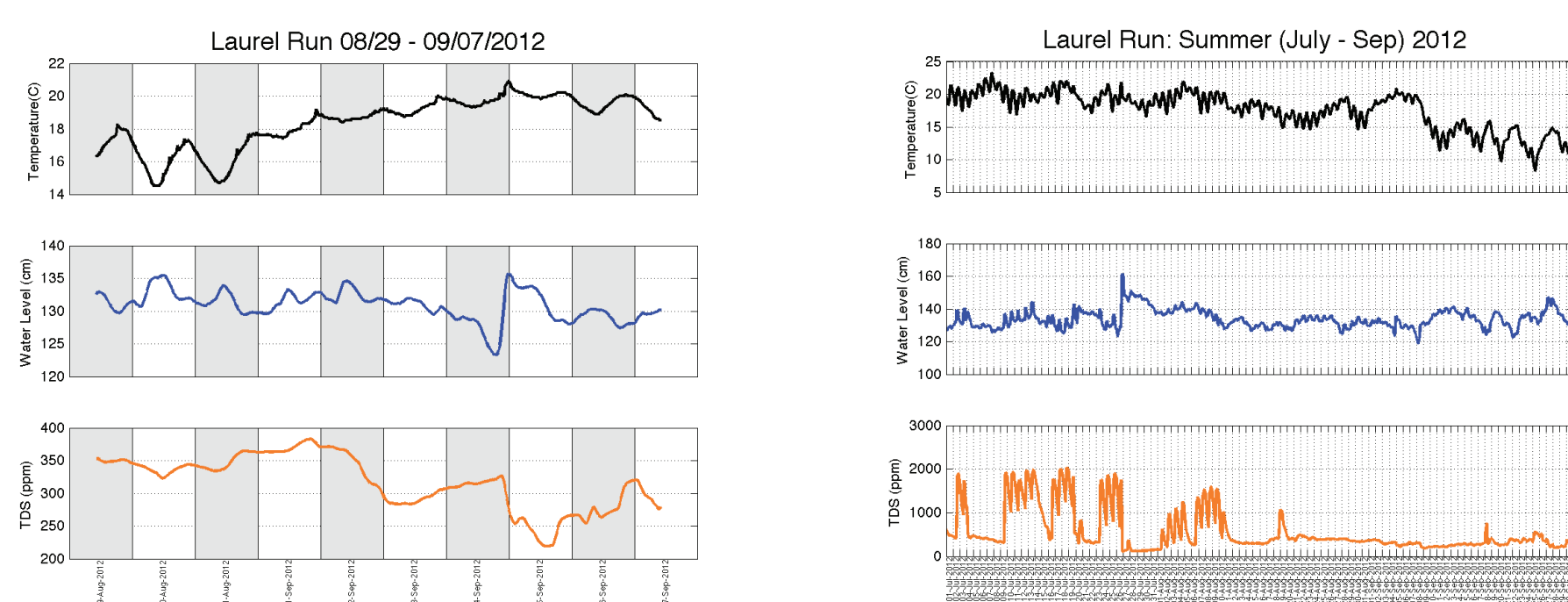
## Data Workflow

Evergreen Conservancy has installed and maintains over 32 dataloggers on streams throughout Indiana County. They acquired the funding for initial set up and maintenance from a variety of sources.



Left: Solinst Levelogger and barologger, Middle: PVC pipe installation setup, Right: Lauren Run data logger location

Volunteers of Evergreen Conservancy download data from the dataloggers approximately every 2 weeks. The data is processed by students at IUP including barometric corrections on water level and posted to the web for others to use.



Example plots from our website for Laurel Run: (left) 2 week data dump and (right) seasonal plots.



Students are also in the process of creating Stage-Discharge rating curves to allow for the calculation of estimated discharge on many of these streams.

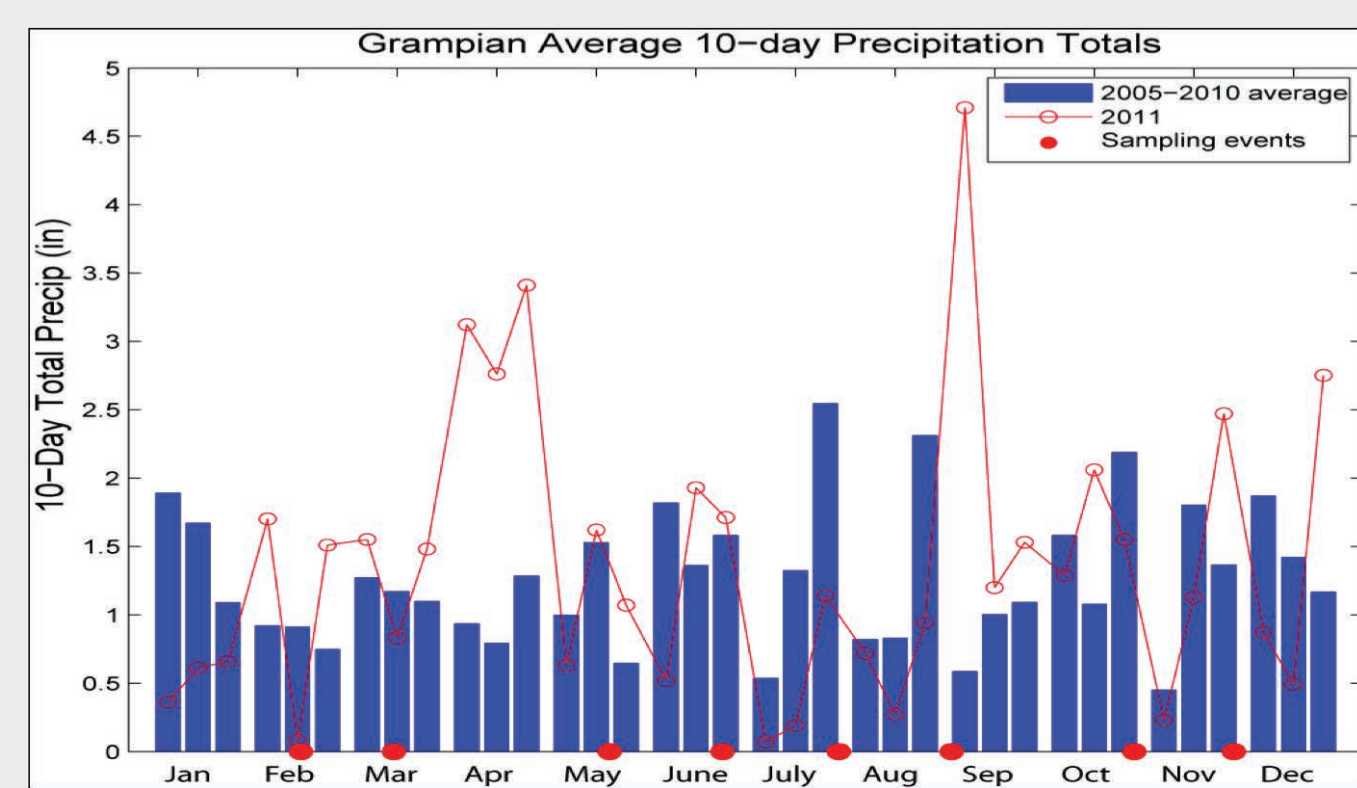
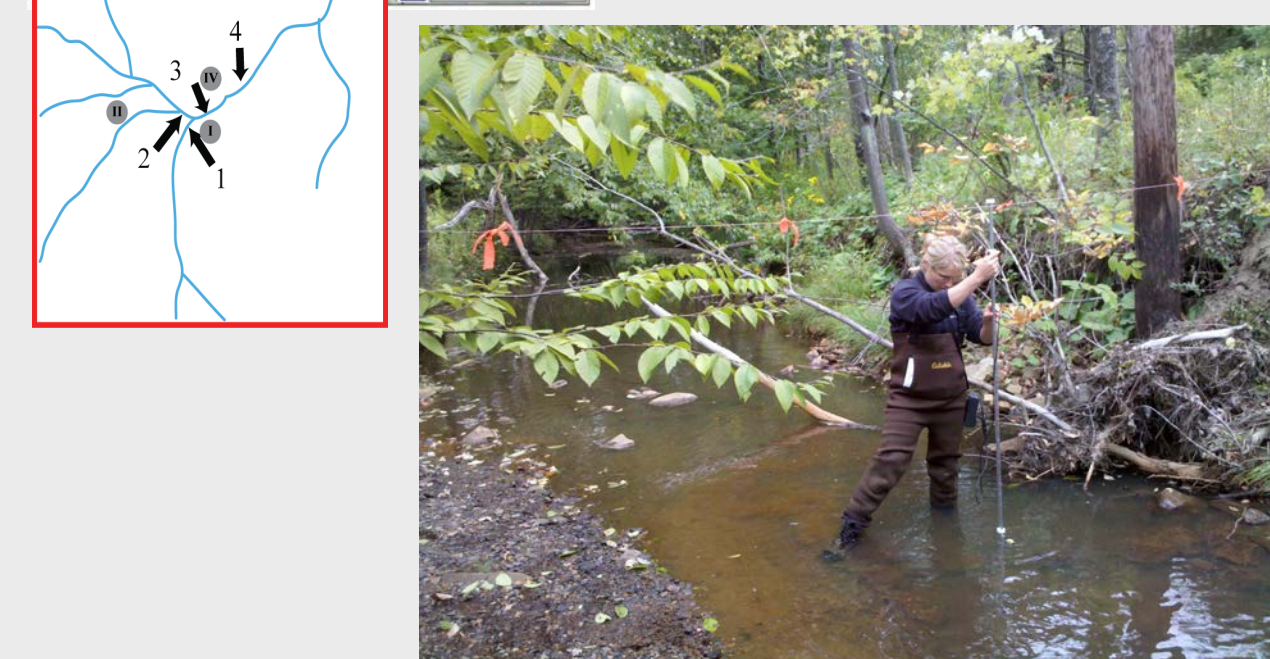
## Student Research Projects

Students in the Geoscience Department at Indiana University of Pennsylvania have taken part in monitoring the streams of Indiana County over the past 5 years in a variety of ways. The data has been used in class exercises, field labs have been conducted at monitoring sites, work study students have been hired to process data and many senior independent research projects have been facilitated by this collaboration. This hands-on learning allows the students real-world experience while collaborating on a bigger project characterizing the water quality and quantity in a region they are familiar with.



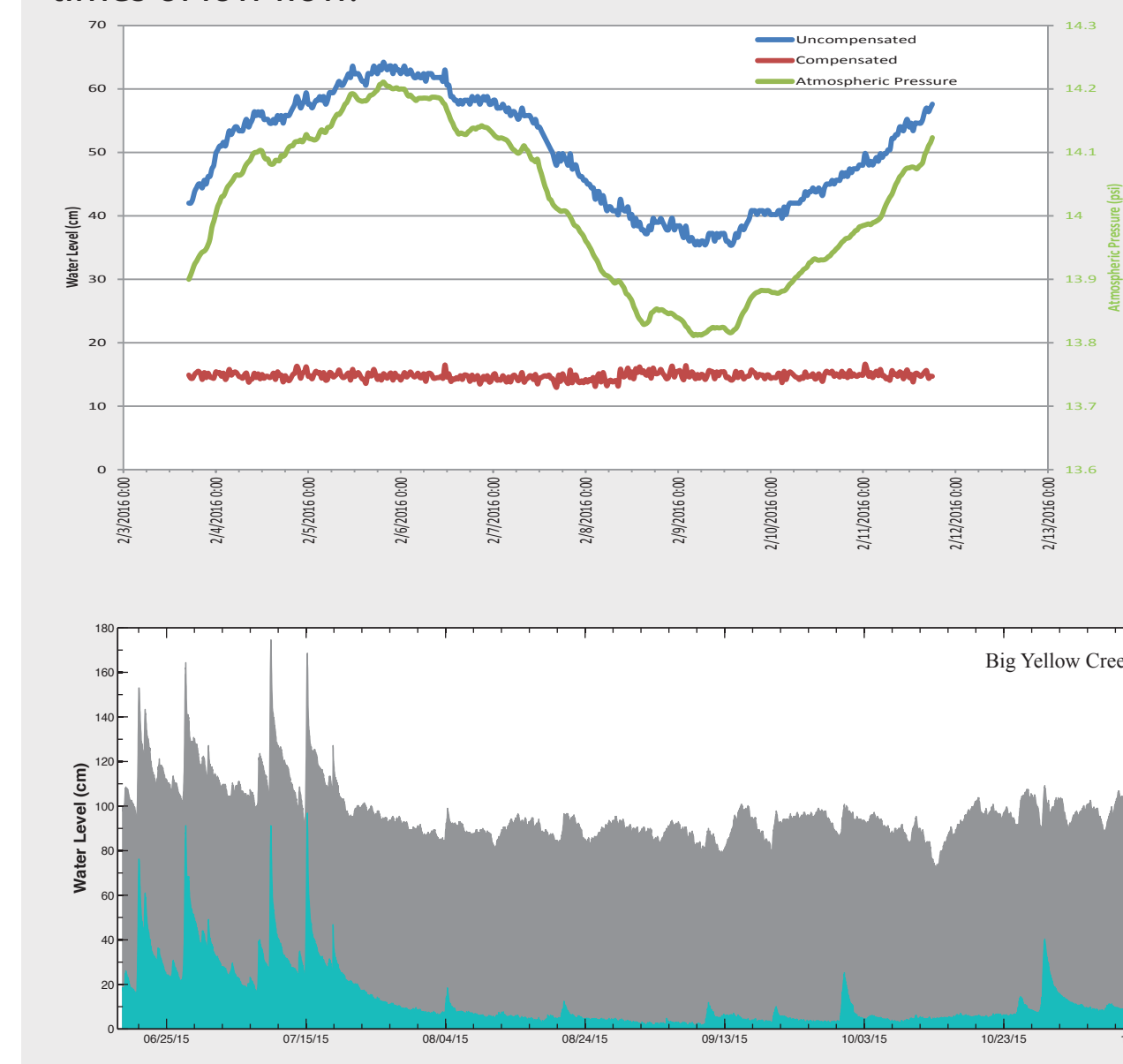
### AMD Projects

Students have conducted a variety of projects on streams impacted by Abandoned Mine Drainage. The project depicted here examined water quality and flux of dissolved material in Bear Run in the Northeast corner of Indiana County, PA. Student: Heather McGinnis Empfield



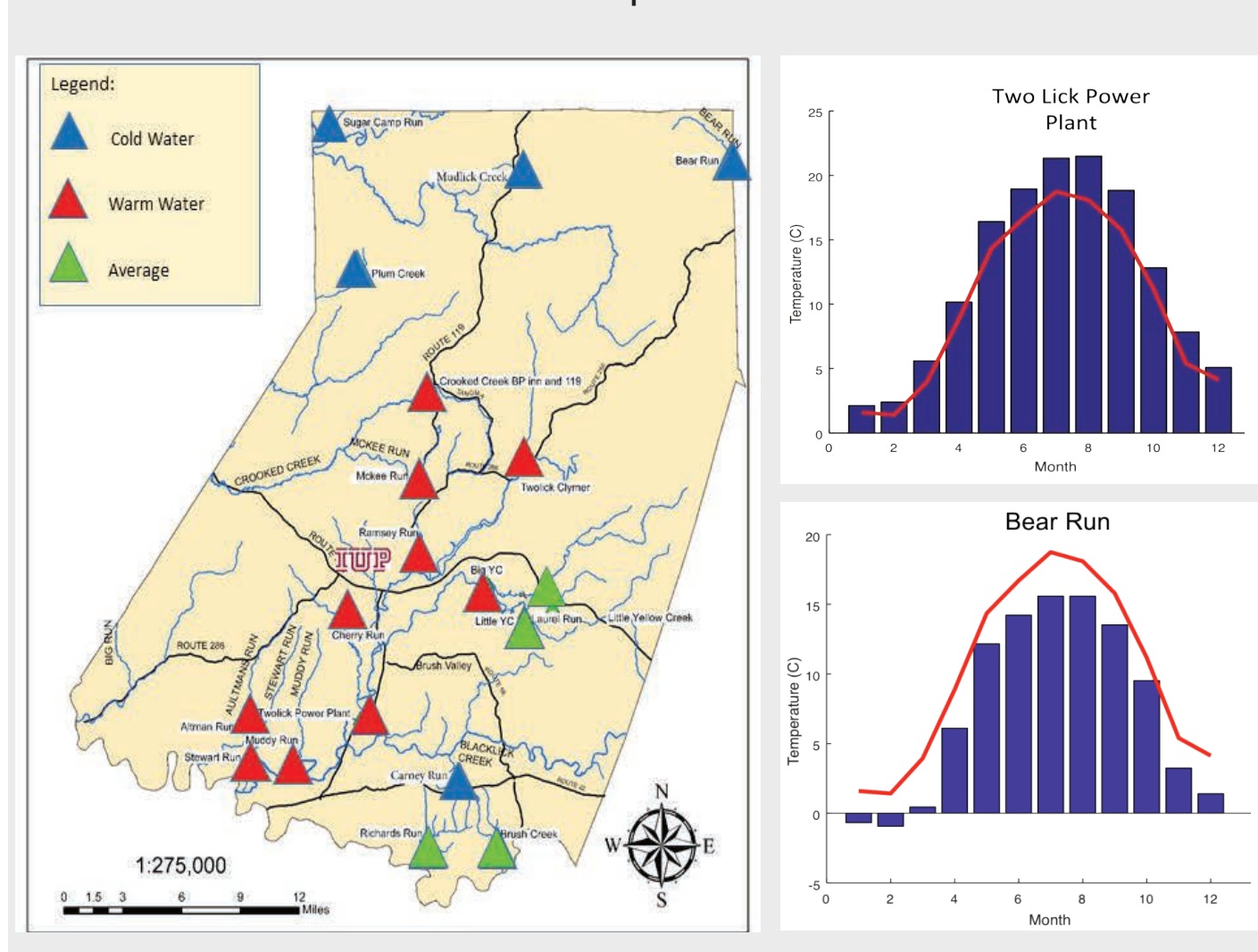
### Evaluation of Atmospheric Pressure on Data

Recently a student, Josh Master '16, evaluated the magnitude of the impact changes in atmospheric pressure has on measurement of water depth in these small shallow streams. By conducting controlled experiments (middle figure) using a known depth of water, the significance of atmospheric pressure changes were shown. When applying these corrections to stream data (bottom) it was found that between 40-90% reduction in recorded water level was seen, especially during times of low flow.



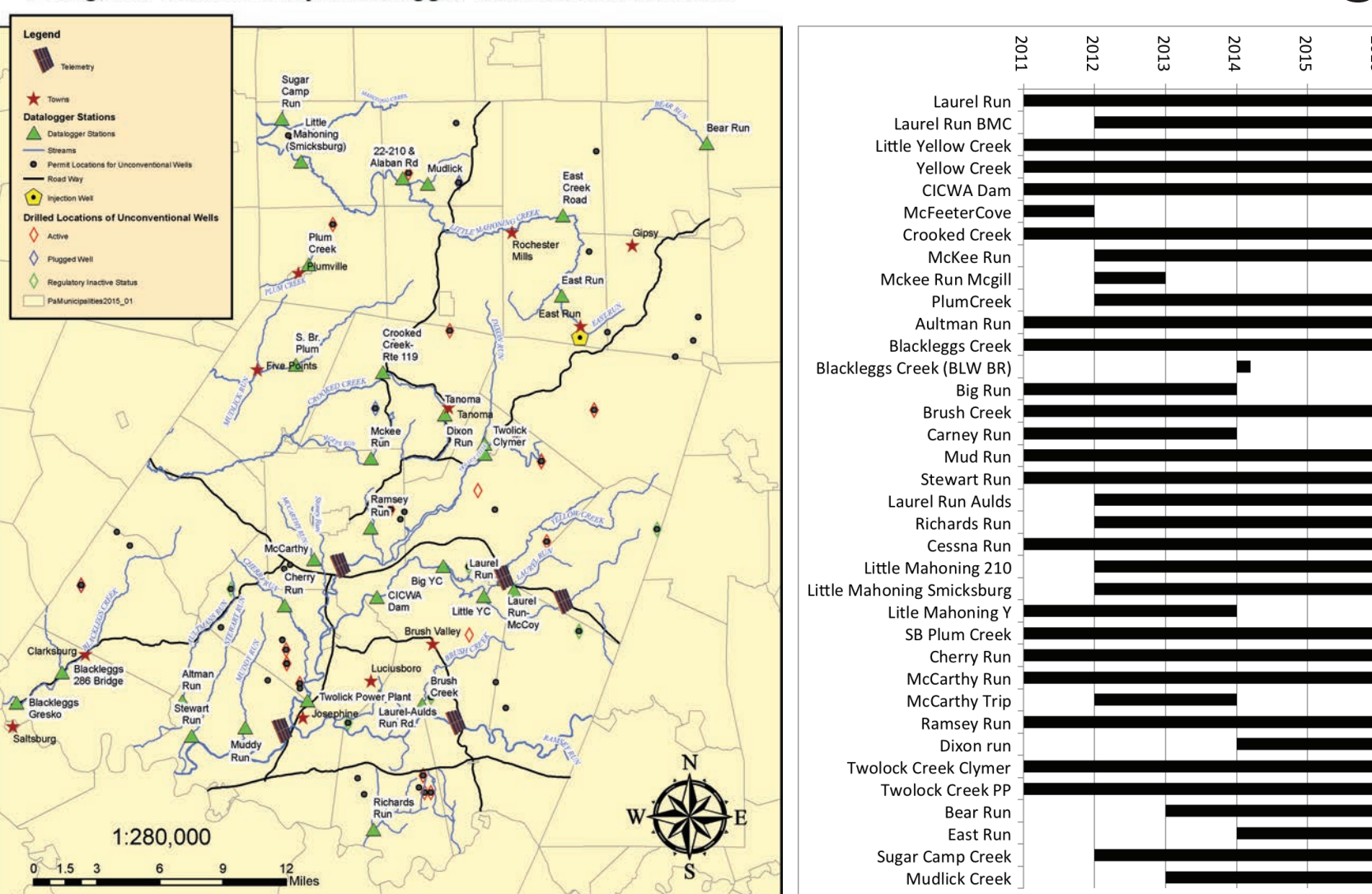
### Assessment of Stream Temperatures

Another senior research project in 2016 was conducted by Jacob Brown '16. He evaluated the temperature data of the streams to examine where there may be a threat to cold water fisheries due to elevated water temperatures. The good news is that he found that even in the warmer streams (e.g. Twolick @ Powerplant road below) <15% of the measurements showed temperatures that would be considered stressful to the fish. He also found distinct regions of the county where water was warmer or cooler than 'average'. This will lead to further studies investigating the specific causes of these differences.



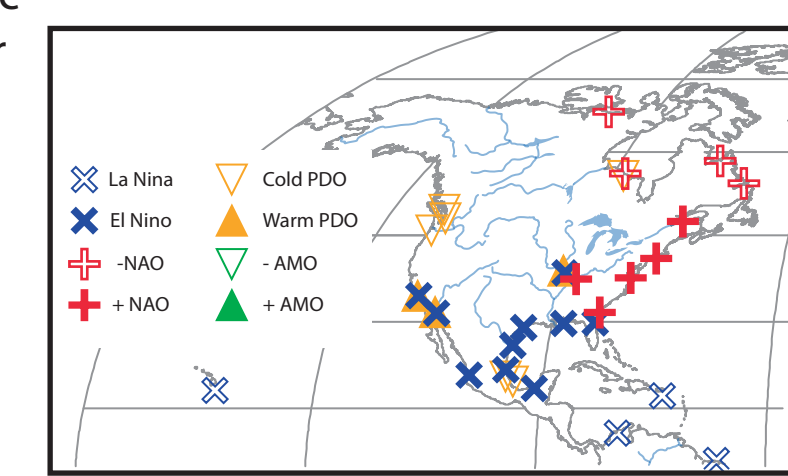
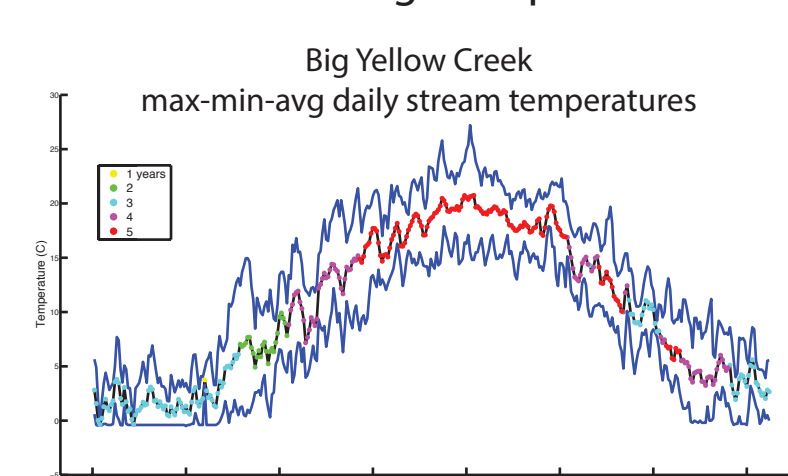
## Ongoing Research Projects from the Collaboration

### Evergreen Conservancy: Datalogger and Stream Locations



The database of measurements has been growing since 2011. Some locations get moved to meet the needs of monitoring particular operations, however IUP will work with Evergreen Conservancy to ensure that some long term monitoring stations are maintained and the network continues to grow.

The growing length of the time-series in many of these watersheds is allowing us to get a better understanding of seasonal and inter-annual differences within these systems. Putting these into context with regional patterns as well as larger global climate controls is beginning to take place. Top: Daily temperature maximum, minimum and averages for Big Yellow Creek. Bottom: North American climatic drivers influencing river runoff to the ocean.



Starting in the summer of 2016, 6 new dataloggers are beginning to be installed in Marsh Run and Stoney Run, located in Indiana PA. This project has two main goals. The first is to help the managers of IUP, Indiana Borough and White Township assess stormwater runoff issues that are leading to flooding and the second is to establish a very local watershed monitoring program to use with classes of all levels in the Geoscience and Biology Departments.

