



## Renewing the Core and the Creek

### Buck Creek Educational Corridor

Buck Creek has been an integral part of Springfield's history. From supplying fresh water to a growing community to providing early power to more than 65 mills along its banks through Springfield, Buck Creek was the lifeblood of early Springfield. While a significant portion of its corridor is now dedicated to parks and recreation, recreational enhancements of Buck Creek envisioned by John and Kevin Loftis, Springfield Conservancy District, and National Trail Parks and Recreation District, will once again connect the community to the creek. Modification of four lowhead dams to enable water recreation and downstream navigation is the centerpiece of this vision.

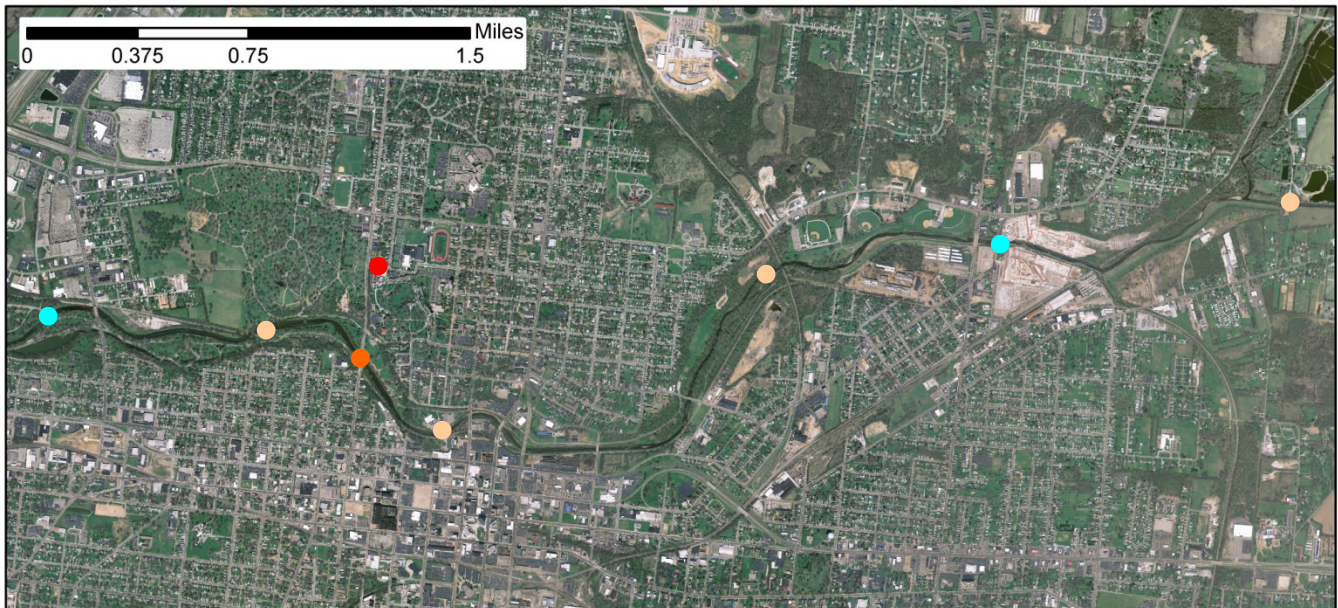
Modifications of the lowhead dams for recreational purposes offers an excellent opportunity to study their impact on water quality and quality of stream habitat. The Buck Creek Educational Corridor, part of Wittenberg's Center for Civic and Urban Engagement and its "Renewing the Core and the Creek" initiative, is an instrumented five-mile section of Buck Creek and its tributary Beaver Creek. Current instrumentation includes a weather station,

a stream gaging station, and two water quality stations. In addition to their own research and that of their students, Wittenberg faculty will provide support to local teachers interested in incorporating the stream setting and logged data in their science and math courses.

#### Objectives of the Buck Creek Educational Corridor

- assess the environmental impact of in-stream and watershed changes on water quality over time;
- provide problem-based learning opportunities related to stream environments for area K-16 students; and
- provide current weather and water information to recreationists taking advantage of recreational amenities along the creek corridor.

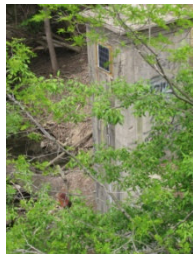
Stream and weather data are available at <http://v4.wqdata.com/webdblink/buckcreek.php>.



Four lowhead dams (●) will be modified for recreational purposes. The impact of their modification on water quality and quality of stream habitat will be monitored using a weather station (●), a stream gaging station (●), and two water quality stations (●).

## Instrumentation

The instrumentation will allow the relation between rainfall, streamflow, and water quality to be explored and assessed. The *Weather Station* is located on top of Wittenberg's Science Building. It provides wind speed, wind direction, barometric pressure, relative humidity, liquid precipitation, and air temperature. Barometric pressure is absolute, not currently adjusted to sea level.



The *Stream Gaging Station* is located in existing USGS/USACE gaging station housing west of the Plum Street bridge. It measures changes in water level, which eventually will be converted to stream discharge as well as depth at each of the recreational sites. The latter information will be of interest to kayakers and canoeists as it will control the hydraulics of flow through constrictions at the recreational sites.

Two *Water Quality Stations* are located upstream and downstream of the first two lowhead dams that will be modified in order to assess the quality of water as it changes through the reach as a function of the dam modifications. The water quality monitors provide temperature, pH, conductivity, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity data.



## Water Quality Parameters

Water quality is dependent on the physical, chemical and biological characteristics of water. It is assessed relative to standards established for drinking water, safety of human contact, and ecosystem health.

- Temperature - rates of biological and chemical processes depend on temperature. Temperature affects oxygen content of the water; photosynthesis by aquatic plants; metabolic rates of aquatic organisms; and sensitivity of organisms to toxic wastes, parasites, and diseases. Optimal temperatures for fish depend on the species.
- pH – a measure of the acidity or basicity of water. Different stream organisms flourish within different ranges of pH, but the largest variety of aquatic species prefer a pH range of 6.5-8.0.

- Conductivity - a measure of the ability of water to conduct an electrical current. It is affected by the presence of inorganic dissolved solids and is a useful measure of stream water quality. Significant changes in conductivity could then be an indicator that a discharge or some other source of pollution has entered a stream.
- ORP - oxidation-reduction potential is a measure of the electrical potential of water in millivolts and depends on whether the stream water is oxidizing or reducing. Tap water is generally between +200 to +600mv and is oxidizing; streams with higher ORP values have higher water quality.
- Dissolved Oxygen - a relative measure of the amount of oxygen dissolved in stream water. Running water, because of turbulence, dissolves more oxygen than still water. Respiration by aquatic animals, decomposition, and various chemical reactions consume oxygen. If more oxygen is consumed than is produced, dissolved oxygen levels decline and sensitive species may move away, weaken, or die. Dissolved oxygen varies with temperature.
- Turbidity - a measure of water clarity dependent on the passage of light through the water. Suspended sediment from erosion, waste discharge, and urban runoff, increase turbidity. Turbidity is associated with higher stream temperature and lower dissolved oxygen and is harmful to aquatic species.

## Accessing the Information

**Buck Creek Educational Corridor**  
Stream Education

Project Description  
The Buck Creek Educational Corridor, when fully operational, will be an integrated four-mile reach of Buck Creek and Buck Creek flowing through Springfield, Ohio, designed to (1) provide problem-based learning opportunities related to stream environments for area K-18 students, (2) assess environmental impact of in-stream and riparian changes on water quality over time, and (3) provide current weather and water information to researchers taking advantage of recreational amenities along the creek corridor.

The Springfield community is exploring recreational enhancements along the reach of Buck Creek and Buck Creek, including modification of four low head dams to allow for recreation and downstream navigation. The proposed changes offer significant opportunities for sharing the impact of low head dam modifications on water quality and quality of the stream environment for both professionals and students. As part of Wittenberg's Center for Civic and Urban Engagement and its "Learning the Core and the Creek" initiative, the reach corridor is currently instrumented with weather and water level monitoring equipment and water quality monitoring equipment will be added in the spring and the next year. In addition to their own research and that of their students, Wittenberg faculty will provide support to local teachers interested in incorporating the stream setting and logged data in their science and math courses.

**Buck Creek Educational Corridor**  
at 05/05/09 3:35 PM

WindDir	230 Deg
WindSp	1.0 mph
AirTemp	53.90
RH	81 %
BP	28.9 Hg
DailyRain	0.00 in
Bat	13.0 v

All DATA Provided by InSitu Technology

**Limitation & Data Disclaimer**  
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POWERED BY NARRING TECHNOLOGY

Weather, stream level, and water quality data are measured every 15 minutes and uploaded to the web once an hour. The web page provides the user different means of viewing the data. Users can change the data being displayed, the duration of time displayed, and down-

load data using the GRAPH option. Interested users can access the site at <http://v4.wqdata.com/webdblink/buckcreek.php>.

### For additional information

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