Susquehanna River Basin Commission

# Remote Water Quality Monitoring Network

Information Sheet January 2014

## Network Objectives

SRBC's Remote Water Quality Monitoring Network is guided by six primary objectives:

1. To establish a real-time monitoring network at areas of concern in the Susquehanna River Basin; network provides monitoring data to resource agencies, the regulated community and the public to allow timely response in the case of pollution incidents;
2. To establish baseline water quality conditions in targeted areas of the basin;
3. To verify whether or not the natural gas industry and/or other activities with the potential to cause pollution incidents are causing adverse impacts on local water quality;
4. To reduce the cost of data collection through the use of advanced technologies; to form collaborative partnerships to improve monitoring technology and provide educational opportunities;
5. To enhance water supply protection through source water monitoring; and
6. To be responsive to public concerns.

*The RWQMN is essentially an early warning mechanism to detect shifts in water quality conditions caused by pollution. The information helps improve decision making regarding management and use of the resource.*

## Monitoring Real-Time Water Quality Conditions

Are natural gas drilling activities impacting water quality in the Susquehanna River Basin? To help water management agencies make that determination, the Susquehanna River Basin Commission (SRBC) initiated the Remote Water Quality Monitoring Network (RWQMN) in January 2010.

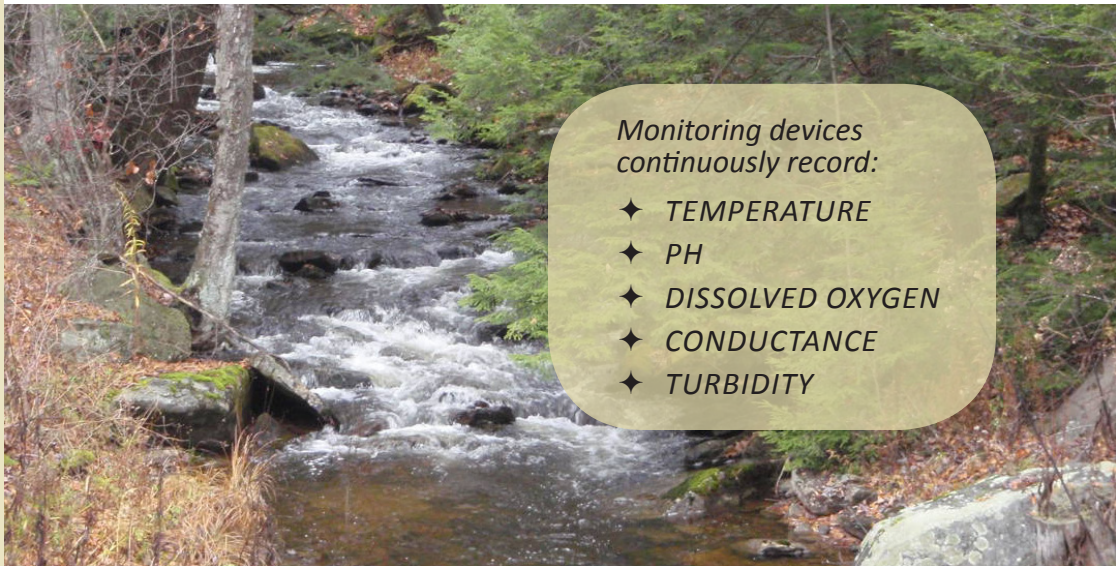
This monitoring network continuously measures and reports water quality conditions of smaller rivers and streams located in northern tier Pennsylvania and southern tier New York. The data help agency officials track existing water quality conditions and any changes in them on an ongoing, real-time basis.

RWQMN stations are located where drilling in the Marcellus shale for natural gas is most active, as well as other locations where no drilling activities are planned so SRBC can collect control-data (Figure 1).

Within the Susquehanna River Basin, natural gas drilling activities often take place near pristine streams in upland forests and farms, which has led to growing concern over the industry's impact on local water supplies, high quality streams and coldwater fisheries.

Public concerns over water quality relate to both on-site drilling and off-site natural gas development activities. On-site concerns can include contamination from poor casings surrounding well bores, flooded or leaking waste fluid pits, and gas migration. Off-site, there are concerns over the disposal of flowback, truck spills, and the impacts from land disturbances associated with pipeline development and roadway construction.

The RWQMN has been designed to help verify whether or not natural gas well activity is causing negative impacts on local water quality conditions. The network complements other SRBC efforts in water protection, namely its low flow protection requirements and environmental screening for water withdrawal approvals and aquatic resource surveys at proposed water withdrawal locations. In addition, SRBC has several long-standing water quality monitoring programs that track any changes in conditions over time throughout the basin.



## Designing the Network

SRBC selected parameters that serve to indicate the general health of rivers and streams (temperature, pH, conductance, dissolved oxygen, turbidity, and water depth).

Conductance is the primary indicator parameter of concern associated with natural gas drilling based on the significant concentrations of chlorides and dissolved solids present in gas drilling wastewater. In addition, turbidity increases can indicate issues associated with sediment from erosion problems, either natural or caused by construction activities and road damage. Other parameters such as pH have the potential for indicating the presence of contamination as well.

It is important to keep in mind that monitoring these parameters can indicate an impact or effect from other activities or phenomena — acid rain, turbidity from storm events, underlying geology, seasonal variations — so that the data must be carefully analyzed when determining if changes in water chemistry are the result of natural gas drilling.

In selecting station locations, SRBC considers the following criteria:

- Watershed size between 30-60 square miles (generally the size in which a spill from a 5,000 gallon tanker truck would be detected);
- Gas pad density and other infrastructure (on the ground or proposed);
- Non-impaired or minimally impaired waterbodies;
- Presence of wastewater discharges;
- Presence of drinking water intakes;
- Land use;
- Channel conditions that would allow the data sonde to be in moving water during all flow regimes;
- Availability of sunlight to power the battery; and
- Local interest. Local groups are often aware of specific water resource conditions and needs that SRBC can consider when locating stations.

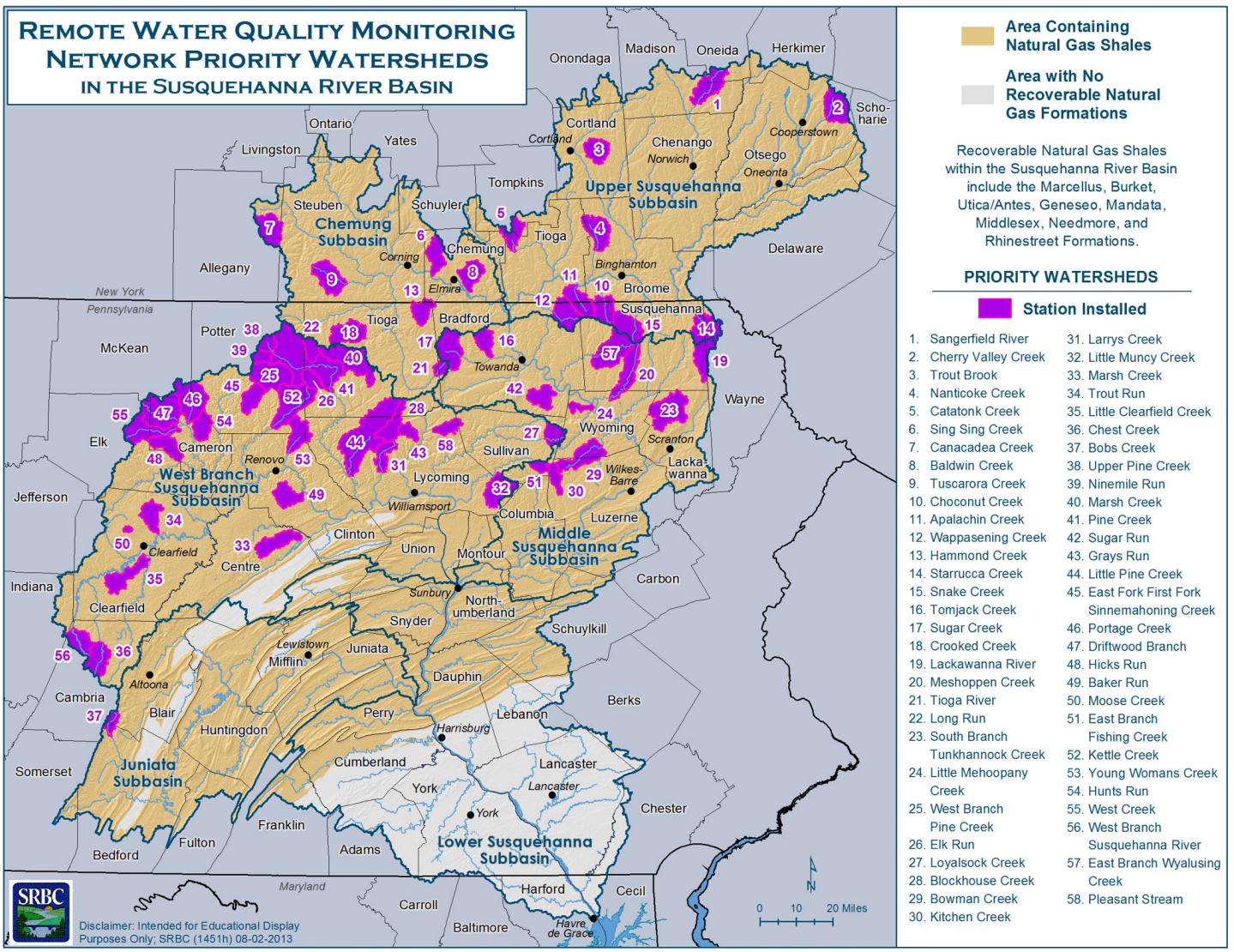



*Figure 1. The RWQMN is comprised of 58 remote stations on headwater streams in the Marcellus shale region of the basin; stations are located in a variety of areas including state forests, gamelands, private property, and municipal property.*

Stations were placed on both private and public lands having met all or the majority of the criteria. Some stations also monitor high-value watersheds such as municipal water supplies or popular recreation areas.

SRBC staff coordinate extensively to ensure monitoring efforts are not duplicative of other efforts.

## Station Components

Each station consists of a multi-parameter sonde placed in protective housing in free-flowing water at the site. The sonde is connected to a data platform that transmits data by cellular or satellite signals.

The sonde collects the water quality parameters every five minutes with data transmission varying based on the type of transmission (every two hours if cellular; every four hours if transmitted by satellite).

If key parameters surpass normal levels, the station triggers an alarm to prompt an investigation.

SRBC staff visits each station at approximately six- to eight-week intervals to service the equipment and bring the sonde back to the lab for calibration and cleaning before it is redeployed at another station.

*The data platform is powered by a rechargeable 12V battery connected to a solar panel.*

## Station Equipment

*SRBC staff member prepares to install a sonde in Apalachin Creek.*

*At each station, a water quality sonde (above) is secured either to the stream bottom or contained within a PVC casing secured to the streambank (below).*

*SRBC staff installs station along Hammond Creek.*

*Monitoring instruments must stay submerged even during low flow conditions and be placed deep enough to stay below the ice during winter. There should be enough flow to prevent leaves and sediment from building up around the sonde.*

## SRBC Monitors Other Parameters at Select Stations

*At each station, SRBC also collects:*

- *Streamflow measurements;*
- *Macroinvertebrate (bugs), fish and habitat data;*
- *Acidity/Alkalinity, Chloride, Barium, Aluminum, Total Dissolved Solids, Sulfate, Total Organic Carbon, Calcium, Magnesium, Sodium, Potassium, Nitrate, Phosphorus, Carbonate Alkalinity, Bicarbonate Alkalinity, Carbon Dioxide, Bromide, Strontium, Lithium, and Gross Alpha and Beta (about four times a year).*

## Easy Access to Data

Data are imported into SRBC's database and within a few minutes are posted without correction (labeled "provisional") for public access on the Commission's web site at *http://mdw.srbc.net/remotewaterquality/*.

More comprehensive data reports will be posted to the web site twice a year. These reports will include the corrected versions of the continuous data records as well as other data collected during routine maintenance visits.

The web site allows users to view, download, graph, and determine basic statistics from the raw data. General project information and maps are also found on the web site.

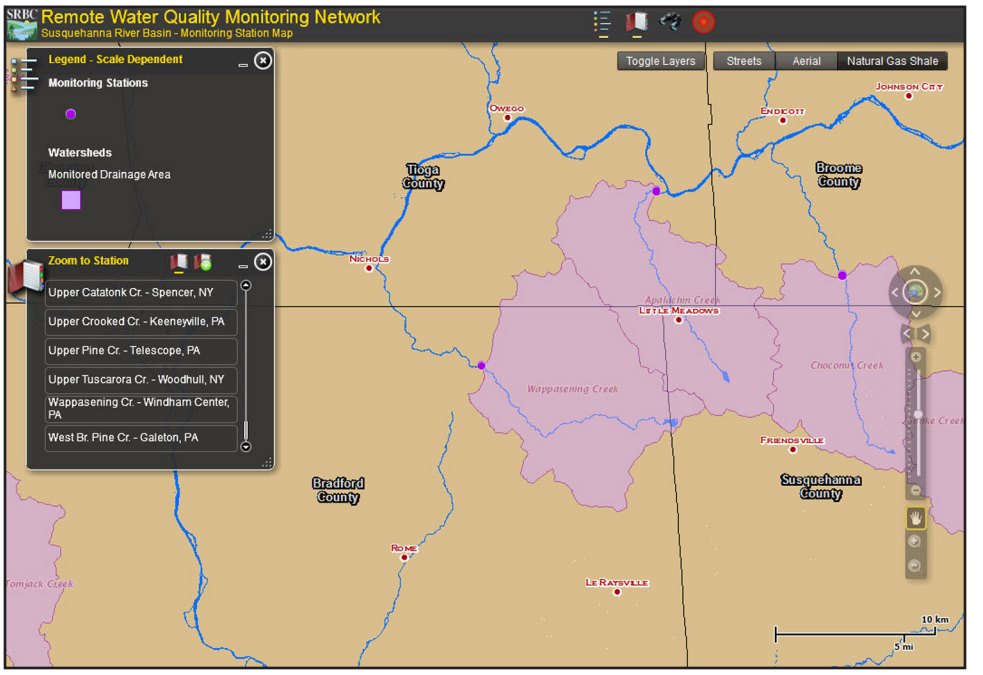
The data-rich web site has drawn interest from a wide variety of sectors — private citizens, members of civic or watershed groups, citizen groups organized around gas drilling concerns, universities, governmental agencies, public water suppliers and the natural gas industry.

## A Public/Private Initiative

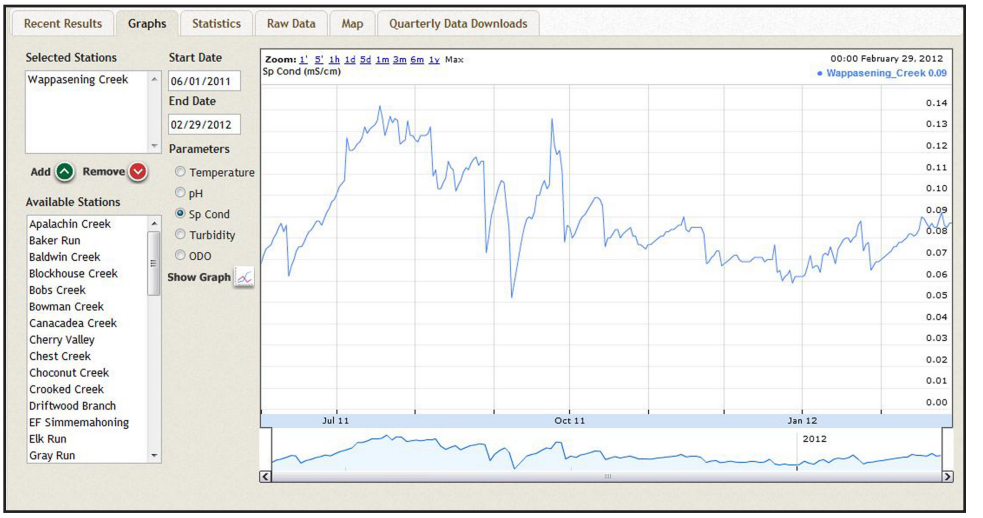
The start-up of the RWQMN was funded by private and public sector contributions. To date, the funding partners are:

- East Resources, Inc.
- New York State Energy Research and Development Authority
- Pennsylvania Department of Conservation and Natural Resources
- Headwaters RC&D Council Sinnemahoning Stakeholders Committee
- Chesapeake Energy

SRBC covers the network's ongoing operation and maintenance expenses. The annual maintenance costs include labor, equipment servicing, and data management.




*Map showing the Wappasening Creek monitoring station in Windham Center, Pa.*




*Graph showing Specific Conductivity at the Wappasening Creek station from June 2011 through February 2012. Elevated levels of conductance in water can be a leading indicator of impacts from natural gas activities.*

**Wappasening Creek**

| Parameter | Samples | Average | Maximum | Minimum | Standard Deviation |
|---|---|---|---|---|---|
| Temperature (C) | 78908 | 11.599 | 28.83 | -0.12 | 8.314 |
| Sp Cond (mS/cm) | 78908 | 0.086 | 0.142 | 0.03 | 0.02 |
| pH | 78908 | 6.817 | 9.12 | 3.73 | 0.467 |
| Turbidity (NTU+) | 78908 | 27.502 | 999.6 | 0 | 99.03 |
| ODO (mg/L) | 78908 | 9.999 | 14.67 | 0 | 2.223 |

*Graph showing statistics for Wappasening Creek station from June 2011 through February 2012.*