A POST HURRICANE IRENE RAPID BIOASSESSMENT OF THE WATER QUALITY OF THE SCHOHARIE CREEK AT BURTONSVILLE, NY

Mary Rachel Keville, Jacob Tanzman, Corrine Skala, Nick Marotta, Nick Lynch and John McKeeby
Schoharie River Center, Burtonsville, NY

Background

Schoharie River Center Environmental Study Team has been conducting rapid bio-assessments of the Schoharie Creek since 2002, collecting water chemistry, macro-invertebrate and bacterial data to assess water quality of the creek, and several of its tributaries between the Gilboa Dam and Burtonsville NY. On August 28 – 30, 2011 the creek was severely altered due to the devastating effects of Hurricane Irene and the subsequent record flooding of the entire Schoharie Watershed. To assess the damage and recovery of the Schoharie Creek following Hurricane Irene and Topical Storm Lee between August 28 and September 5, 2011, high school student members of the EST have been conducting bi-monthly testing of the creek, measuring water quality at Burtonsville, with some surprising results.

The Schoharie Creek is a major tributary of the Mohawk River that is home to many towns and communities. Its headwaters begin at the base of Indian Head Mountain, located in the Catskills, Greene County, NY. It flows north through Delaware, Schenectady, Montgomery, and Schoharie counties and joins the Mohawk River at Fort Hunter. Land use, draining more than 2,300 square kilometers, is approximately 77 % forested, 20 % agricultural, 2 % urban, and 1 % other.

The Schoharie Creek was damned in 1927 at Gilboa, NY, to create the Schoharie Reservoir, providing drinking water for New York City. The impoundment essentially severed the creek in half and changed its flow pattern and habitat, from below the dam to the confluence with the Mohawk River, the main stem of the creek was altered from a cold-water fishery (trout) to a warm water fishery (small mouth bass). No regular release of water occurs from the Schoharie reservoir, and during summer months the creek bed from the reservoir dam is essentially dry to Middleburgh, where minor tributaries begin to add enough water to recreate the creek.

August 28th, 2011 brought the major storm that incited record-breaking flooding of the creek, upwards of 15 feet of water, 2.5 times the National Weather Service flood stage. Normally the Schoharie at Burtonsville averages a height from 1-4 feet of water during the summer months. (USGS 01351500 Schoharie Creek at Burtonsville) With the unprecedented flooding caused by Hurricane Irene the towns along the creek were forced to evacuate, and major damage was sustained throughout the watershed. Roads, bridges, and houses were washed away. The quality of the drinking water supply and the safety of the residents were compromised. Cleanup efforts began immediately, temporarily hindered by a second onslaught of flooding from Tropical Storm Lee in early September, raising the creek to a level of 9 feet. (USGS 01351500 Schoharie Creek at Burtonsville) The Schoharie River Center's Environmental Study Team initiated post flood water chemistry and macroinvertebrate assessment on 9/25/2011, about one month after the initial flooding event began. Water quality assessment by the EST began as soon as the water level had receded to a safe level, in order to better understand the impact the event may have on water quality of the Schoharie Creek.

The Schoharie creek at the testing site has been classified by the NYS DEC as class C waters, indicating that the creek is suitable for fish propagation and survival, as well as primary and secondary contact recreation. The Schoharie Creek is actively and heavily used for recreation, including but not limited to: swimming, kayaking, and fishing. Within the reaches of the study site, the area is primarily forested, but is host to agricultural and residential activities; potential pollutant sources from this area include septic systems, road runoff, agricultural practices, and other human impacts. This past year, the potential pollution sources have been greatly augmented due to the severe flooding resulting from Hurricane Irene, expanding the list of potential pollutants to include housing materials, fuel oil, soil and sediment and other such pollutants resulting from damage to home and property.

Results
Physical site assessment, chemical analysis, and collection and analysis of macroinvertbrate samples were performed eight times (Post Flood) at the test site from September 25, 2011 – February 16, 2012. These results were compared to pre flood testing results that were collected six times between July 19th, 2004 and July 22, 2011. Bacteriological testing (coliform) was conducted in March 2012 for comparison with pre-flood sampling.

Location: All samples were drawn at the same location on the Schoharie Creek, about ¼ mile below the Burtonsville Bridge. GPS location: N42°48.812, W 074° 15.523.

The site is about 24 kilometers from the confluence of the Mohawk River, downstream from the village of Burtonsville, Montgomery County. The width of the stream bed at this location is about 50 meters wide, flow is generally characterized as fast moving and the substrate is rocky with a range of stone sizes from large cobble stones to boulders. The riparian zone prior to the flooding was generally good with natural vegetation and mature forest trees (hardwoods) growing to the water's edge. No invasive plant species such as Knotweed, or Didimo have been observed at the site prior to the flooding event. Because of the risk imposed by high water levels, post flood sampling first occurred on September 25, 2011, about 20 days after Hurricane Irene and 15 days after Tropical Storm Lee had produced record flooding of the creek.

Water Chemistry Data for the Schoharie Creek at Burtonsville

Date	7/19/2004	10/22/2006	9/29/2007	6/29/2010	7/13/2010	7/22/2011	9/25/2011	10/9/2011	10/23/2011	11/2/2011	11/20/2011	12/21/2011	1/16/2012	2/16/2012
Temp °C	24	9		18	28	30.3	22.1	17	13	9.5	8.6	5	2.5	6.5
pH	8.8	8.4	9.2	8.6	9.1		8.6	7.5	8.4	8.5	8	7.5	6.8	7.2
Alkalinity (mg/L)		100	62			73	85	118	84	92	61	88	30	52
Dissolved Oxygen (mg/L)	7	8	8.2	8.4		8.6	7.8	10	8.2	11.2	13	12.2	13	10.8
Percent Saturation	80.7	68.45		71.2		109.4	85.53	101.53	76.7	96.94	110.19	94.76	94.67	90
Nitrate (mg/L)	0.8	0.3	1.2	0.1	0.6	0.3	0	0.2	0	0.1	0.2	1.3	0.5	0.6
Orthophosphate (mg/L)	0.01	0.09	0	0	0.01	0	0.01	0	0.05	0.05	0.11	0.21	0.1	0.15
Conductivity (µS/cm)	284	273	147	325	304	225	215			220	205	220	180	178
Turbidity (FAU)	7	72	3	9	12	8	93	108	94	74	32	39	36	4

Schoharie Creek Water Chemistry Parameters
Red diamond indicates point in time after flooding caused by Hurricane Irene.