Stream Gages in the Schoharie Basin

The United States Geological Survey (USGS) maintains two continuously recording stream gages on the Schoharie Creek near Lexington (established 1999, drainage area 96.8 mi^2, USGS ID# 01349705) and Prattsville (established 1902, drainage area 237 mi^2, USGS ID# 01350000). Prior to 1996, a crest stage gage was maintained at Lexington starting in 1929. All gage information is available online at the USGS website: http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01349705 (Lexington) and http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01350000 (Prattsville). You can also navigate to other gages in the Schoharie basin including on the West Kill, East Kill, Batavia Kill, Manor Kill and Bear Kill at: http://waterdata.usgs.gov/ny/nwis/current/?type=flow (Figure 1).

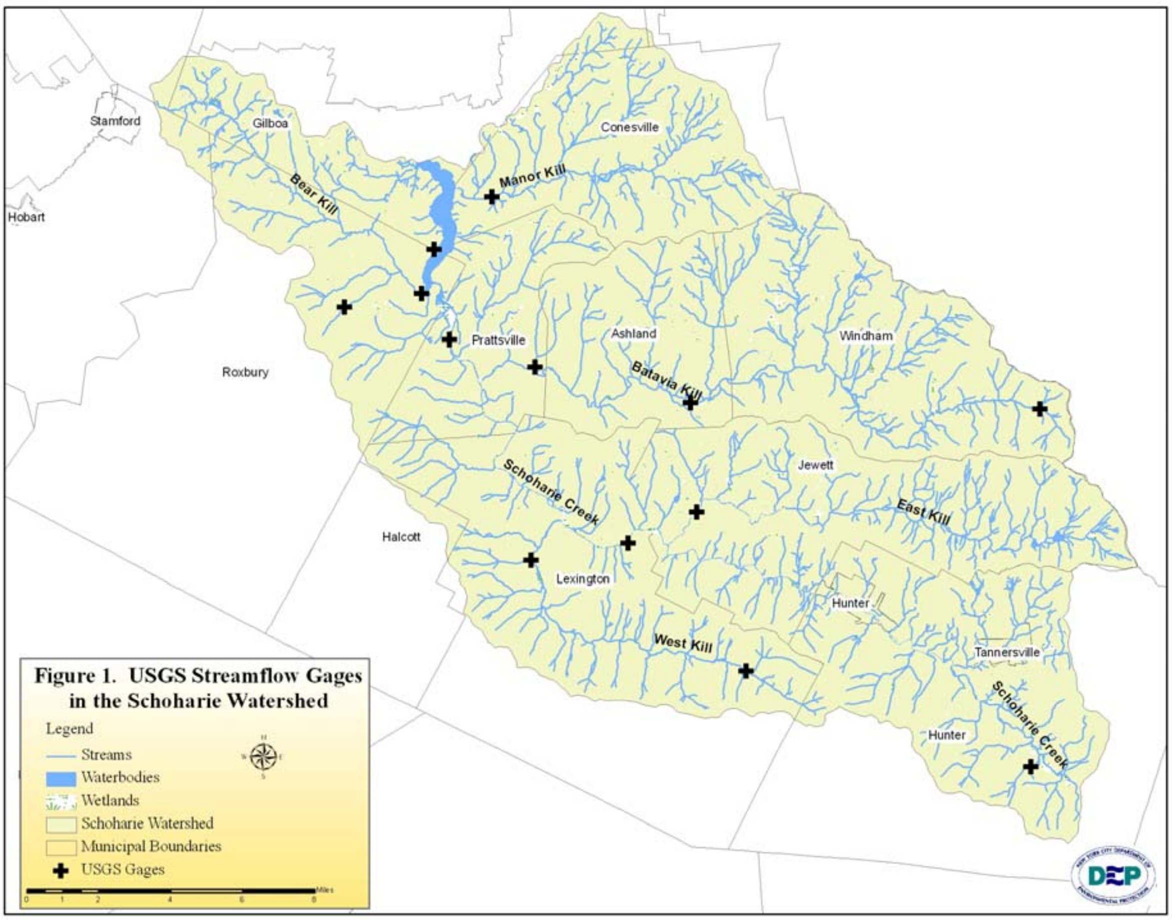

Figure 1. USGS Streamflow Gages in the Schoharie Watershed

These gages measure the *stage*, or height, of the water surface at a specific location, typically updating the measurement every 15 minutes. By knowing the stage we can calculate the magnitude of the *discharge* (flow), or volume of water flowing by that point, using a relationship developed by USGS called a *rating curve*. Using this rating curve, the magnitude of flow in the Schoharie at the gage location can be determined at any time just by knowing current stage. Flow can also be calculated for any other stage of interest. Additionally, we can use the historic record of constantly changing stage values to construct a picture of stream response to rain storms, snow melt or extended periods of drought, to analyze seasonal patterns or flood characteristics.

The Schoharie gages have a long enough period of record to prepare a hydrograph covering several years for the stream (Figure 2). Each spike on the Prattsville gage graph represents a peak in stream flow (and stage) in response to rain storms. Stream level rises (called the “rising limb” of the hydrograph) and falls as the flood recedes (called the “falling (or receding) limb” of the hydrograph). We can analyze long time periods to see seasonal trends or long-term averages for the entire length (period) of gage record. We can see the hydrograph for the gage shows higher flows in fall (hurricane season) compared to winter (water held in ice and snow), and higher flows in spring (snow and ice melt, with rain-on-snow events) compared to summer (drought conditions with vegetation using a lot of water). The highest flows of the year are generally associated with the hurricane season in the fall, followed by winter and spring snowmelt or rain-on-snow events. Overland flow accounts for most of water that causes the sharp peaks in the hydrograph.

Streamflow always rises and peaks following the height of a precipitation event because it takes time for water to hit the ground and run off to the stream (this is known as lag time). Knowing storm timing, we could also calculate *lag time* for Schoharie Creek at the gage location for particular storms or types of storms, and determine how the stream responds to storms both in timing and flood magnitude and recession. Through analysis of the long-term flow and flood records provided by the USGS, the town, its residents and resource managers can begin to better understand the cause/effect of various precipitation amounts on flooding.

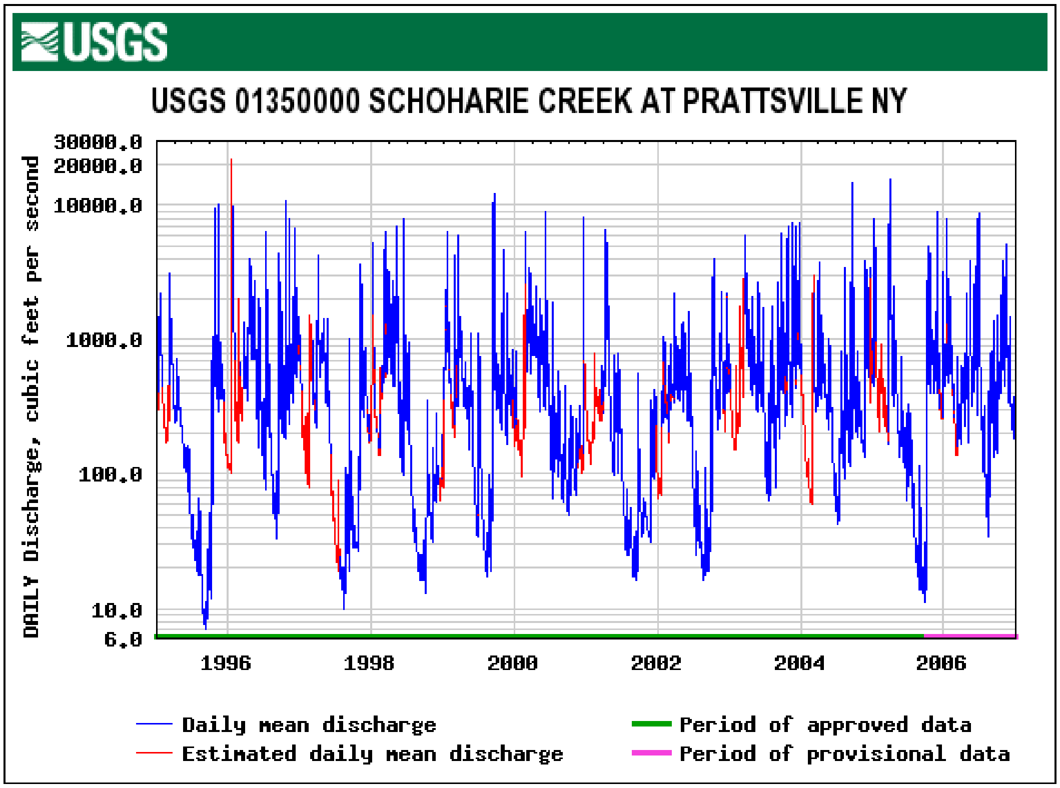

Figure 2. This hydrograph represents the daily average flow from 12/95 through 12/06.

The hydrograph of April, 2005 illustrates the effects of a spring storm on top of snow (Figure 3). The Schoharie rose quickly from the precipitation from a daily average of 411 CFS to 2,290 CFS in 24-hours. The recession took longer than a large summer storm due to the vegetation still being dormant, or just emerging, and the snow pack.

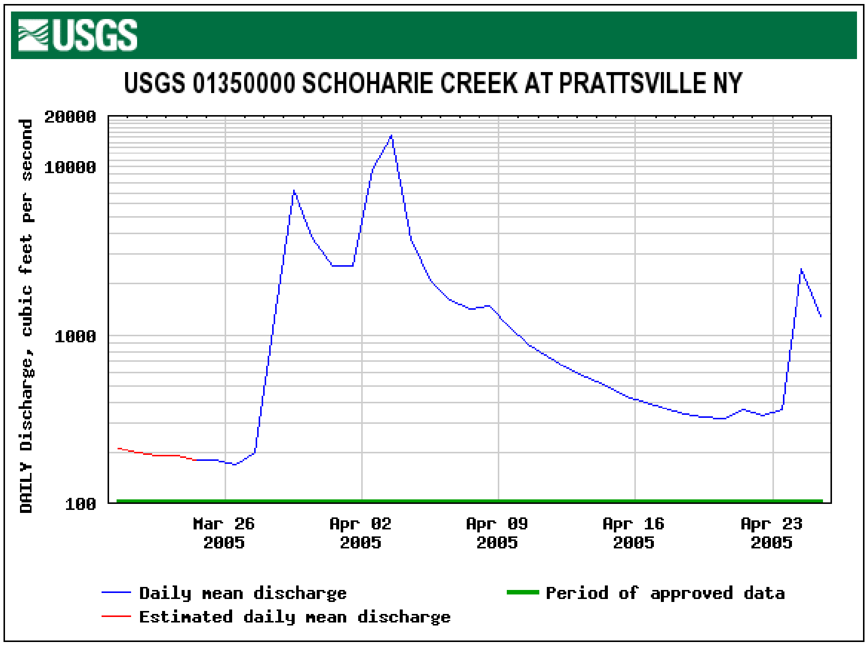

Figure 3. This hydrograph represents the daily average flow for April, 2005, including a large rain on snow precipitation event.

The unique hydrology of the Schoharie Creek has consequences for how the stream corridor should be managed. Flood history and dynamics play a large role in determining the shape, or morphology, of stream channels and the hazards associated with land uses on the banks and in the floodplain. For example, applications for stream disturbance permits (from NYS DEC) typically increase following floods as landowners and municipalities attempt to repair damage caused by flooding. If we want to minimize their impact on property, infrastructure and other damages or inconvenience, it is critical that we understand and plan for flooding behavior. These stream gages offer a glimpse into the historical flows and provide us with an idea of what we may see in coming years.