

BIG RAIN AT BAT FORK BOG

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In late November and early December of 2011 a major rain storm occurred primarily in Henderson and Transylvania counties of Western North Carolina. The storm, presaged by announcements from the National Weather Service office in Greer North Carolina (NWS, 2010) warning of showers, thunderstorms, and flooding, began around 2200 on Monday, November 29, 2010, and passed over and exited the area early on the morning of Wednesday December 1, 2010. The rain gauge at Bat Fork Bog Plant Conservation Preserve was made inoperable by the rising flood waters, consequently we do not have a specific measure of the rain that fell on the site. However, the National Weather Service plot of rainfall over the area surrounding the Preserve indicates that the Preserve received from 15-20 cm during the period of the storm.

The hydrology of Bat Fork Bog Plant Conservation Preserve (Figure 1) was recently described in *Natural Areas Journal* (Baugh and Evans 2011). At that time we mentioned anecdotal information of deep flooding within the Preserve. This recent storm was, however, the first opportunity for observation and some study. In this case we were able to gather rainfall information from the National Weather Service, Greer, North Carolina but were unable to obtain stream-flow data because the United States Geological Service does not gather data from adjacent Bat Fork.

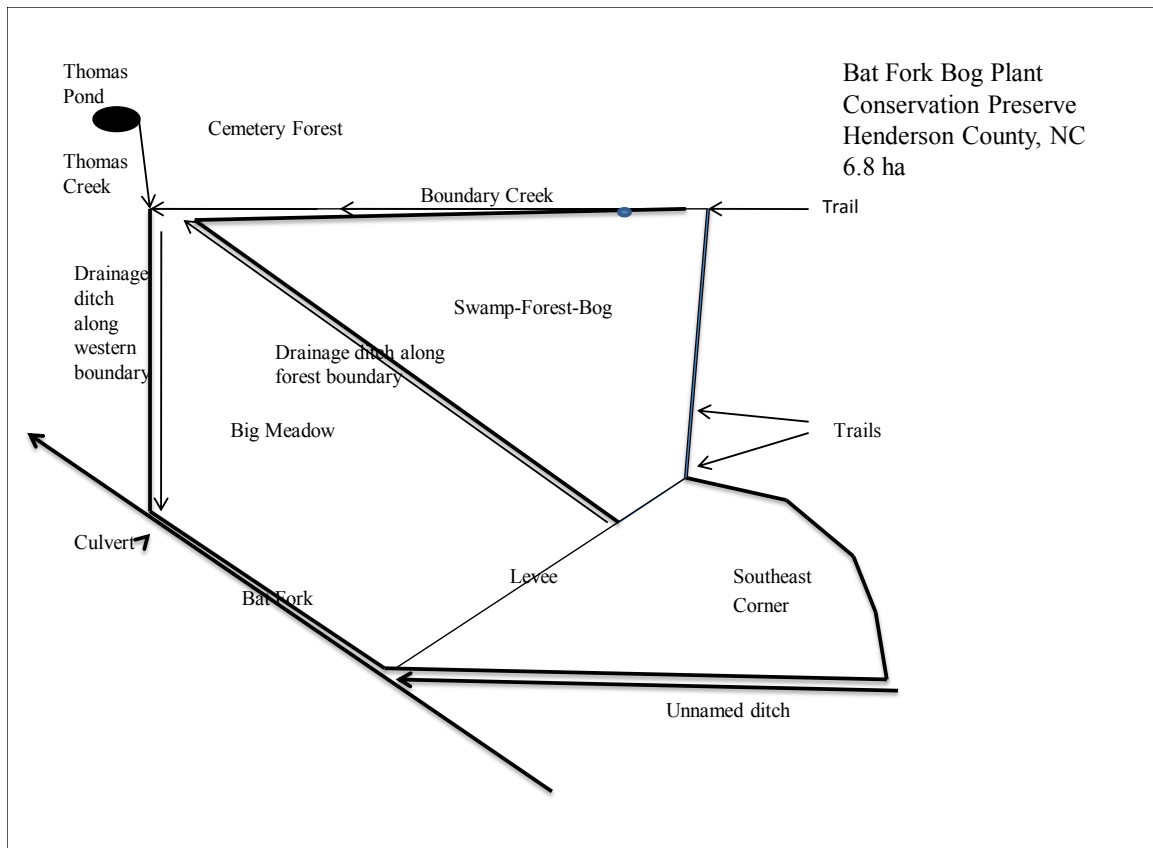


Figure 1. Schematic of Bat Fork Bog Plant Conservation Preserve, Hendersonville County, North Carolina showing access trails.

The highest place in the Preserve is its northeast corner. The Preserve is, essentially, a basin with uplands on the north and east and dikes on the south and west. During a major storm event, water enters the Preserve from overland flow from the surrounding uplands, through a culvert connecting the Preserve to adjacent Bat Fork, and possibly over the levee that separates Bat Fork from the Preserve. During the event reported here, water filled the Preserve to such an extent that it was only possible to walk into the Preserve from the northeast corner for about 20 meters before it exceeded the 45 cm height of a pair of 'mud boots' (Figure 2).



Figure 2. Boundary Creek Trail with water backed-up almost to the northeast corner of the Preserve. (Photo by Tom Baugh)

At about 1430 on Wednesday December 1, water remained so high in the Preserve that it was still impossible to penetrate any more than a few meters into the site in mud boots. However, by 1430 on Thursday December 2, so much water had drained from the Preserve that it was possible to enter the site along all three of the maintenance access trails along the eastern boundary of the Preserve. By 1430 on Friday December 3, it was possible to reach the northwest corner of the Preserve. However, as late as 1430 on December 09, 2010, over a week later, most of the southeast bulge or salient of the Preserve remained under water.

Although conditions preclude an exact measurement of the amount of rainfall at the Preserve we were able to measure the depth of water covering the Preserve at its peak by measuring the height of the mud deposited by the flood water on the vegetation (Figure 3) at several places throughout the Preserve. These measurements give a depth of water of 122 cm over the top of the levee road in the southeast section of the Preserve and 114 cm over the top of the maintenance trail that follows the northern boundary of the Preserve.

We conservatively estimate the peak volume of water in the Preserve during the flood event at one meter deep. That would give us a standing volume of about 792,516 cubic meters. We know however, from the depth measurements given above that standing water exceeded one meter in depth. Consequently, we can assume that the Preserve held about one million cubic meters of water at its peak.

The impact of storm events, such as the one above, raises a number of questions about how often flooding impacts the Preserve and what some of those impacts might be. Rains of this intensity are



Figure 3. Water line on the shrubbery in the middle distance near the north-west corner of the Preserve. (Photo by Tom Baugh)

ranked as a "seven to eight year event" that usually occur "...during the summer to early fall with remnant tropical systems" (Dixon, personal communication) We know, however, from reports of residents living adjacent to the Preserve that the site floods seasonally, if not several times a year. Although many of these floods may not be of the intensity of the event described here, they will have some impact on the Preserve. Based on the cursory observations of this one event it doesn't appear as if the movement of this large volume of water poses a serious threat to the Preserve from erosion or siltation. We are curious, however, as to how storm events such as this contribute to the nutrient budget of the Preserve.

Wetlands of any type are relatively rare in the Southern Appalachian Mountains and this is particularly so in terms of those classified as bogs (Baugh et. al., In press). Rainfall and temperature in the Southern Appalachian Mountains, and heavy storm events, are expected to increase in response to global climate change (IPCC, 2001). As Schultheis et al. (2010) point out, how rising temperatures and rainfall balance out remains to be seen.

In summary, the seasonally atypical storm of late November and early December brought substantial flooding to Bat Fork Bog Plant Conservation Preserve in Henderson County, North Carolina. Although this Preserve is reportedly subject to seasonal flooding, this was the first time that such an event came under professional observation and study.

References

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*Tom Baugh is the Steward at Bat Fork Bog Plant Conservation Preserve in Henderson County, NC. He is the first Steward to serve in the Plant Conservation Program and, in addition to Bat Fork Bog, has provided assistance to Plant Conservation staff on restoration and acquisition projects in Henderson and Transylvania counties. Tom is a biologist with a focus on ecology and 35 years experience in various aspects of conservation biology with one university and two federal natural resource and conservation agencies. He is the lead author of two articles on Bat Fork Bog Plant Conservation Preserve, one which appeared in the January 2011 issue of **Natural Areas Journal** and one which is scheduled to appear in March in the journal **Ecological Restoration**.*