

USGS streamgaging and related research activity at Mount Mansfield, Vermont, for Water Year 2007 (October 2006 through September 2007)

Jamie Shanley and Jon Denner, USGS
 Beverley Wemple, University of Vermont

January 18, 2008

Water Year 2007 marks the seventh year of streamgaging by the USGS at West Branch Brook and (an) Brook drainage basin in the east face of Mount Mansfield, Vermont. Included with this report is a file with the final daily flow compilation for Water Year 2006 and the provisional daily flows, interrelated, will have major adjustments for Water Year 2007.

The Water Year 2006 data can also be found on the internet. The USGS no longer publishes hard copy of its annual report, but the appropriate electronic pages for Water Year 2006 for the two basins can be retrieved using the following links:

West Branch

http://11.dr.us.gov/1_y200-1pdfs102288223/200-*.pdf

(an) Brook

http://11.dr.us.gov/1_y200-1pdfs102288240/200-*.pdf

This report focuses on Water Year 2006, but here we give a brief summary of the first six years of gaging. As we have noted from the outset of this study, the runoff per unit area at West Branch Brook is considerably greater than at (an) Brook. The finalized Water Year 2006 flows verify this pattern yet Water Year 2006 had the most runoff of any year to date.

Water Year	West Branch runoff (mm)	Ranch Brook runoff (mm)	West Branch excess (%)
2001	1190	872	36.5
2002	1416	1173	20.7
2003	1132	958	18.2
2004	1812	1428	26.9
2005	1062	909	16.8
2006	1919	1614	18.9

Table 1. Runoff at West Branch and (an) Brook near Stowe, Vermont, Water Years 2001-2006.

, with percentage & y, which the runoff at West Branch is greater* (runoff is flow, per unit area, which, with appropriate conversions is expressed in millimeters (mm)* (runoff in mm can then be directly compared to precipitation depth in mm (not shown) / the difference is attributed primarily to evapotranspiration (ET), which is precipitation that does not run off because it is transpired by vegetation or evaporated from land surfaces to the atmosphere* (annual ET at)) ansfield is estimated to average 400-500 mm*

Annual runoff during the 5 years ranged over nearly a factor of 2, which

Bethany used major ion chemistry and stable isotopes to differentiate hydrological flow paths in the Adirondacks. We are all on revisions for a journal article on Bethany's study. Matt Bruhn, a former student of Bethany's, is comparing concentrations and loadings at the 2 sites, and Beverley has a former student, Tiffany, who is investigating the possible precipitation discharge. Tiffany is also funded by a \$23,000 UV grant received in summer 2008, which has freed her from grad school so she can do research full time. Beverley recently received a new \$23,000 UV grant to perform hydrological modeling of the Adirondacks. The model will be driven largely by the USGS flow data and the UV snow surveys.

Aside from the ongoing streamflow in W 2008, USGS also assisted Tiffany; arsenic efforts to assess potential differences in snow accumulation and ablation in the Adirondacks. Jamie Shanley serves on Tiffany's committee and has assisted in the design and implementation of snow surveys in 2008 and 2008. Fine tool, we are using is ground penetrating radar mounted on a motorized snow machine to measure snow depth on the ski trails. This technique holds promise for assessing how much snow is stored on the mountain on both trails, with machine made snow and trails, with natural snow cover. (supported this effort in W 2008 & assisted us as a ski patrol escort for a day).

For research team has developed a collaboration, with professors Chris Salza and Jeff Croll of UV. As a school of engineering, Jeff and Chris developed a sensor for continuous measurement and logging of snow, water equivalent (SWE) the equivalent water depth of melted snow, and have deployed it near the (an old Brookfield site at one of Tiffany's snow measurement sites). Tiffany's periodic snow surveys will serve as ground truth for the sensor data and the logged SWE data, will help Tiffany understand the day-to-day variation and, even her measured points.

For one final note, Beverley and Jamie revised and updated an article on mountain hydrology, which, as published in the Vermont Journal, (evie, in 2002, for inclusion as a chapter in a 2008 book, Mountains and the Journal, edited by Vermont Journal, Shanley and Wemple, in press). This is a rather general treatise but uses our results from the Mount Mansfield sites in a case study section.

The Mansfield sites continue to yield valuable data that can be used to assess the effect of high elevation development on water quantity and quality. They have attracted a number of collaborations and have been used as a selling point in several successful proposals. The sites also serve as an outdoor laboratory for field hydrology and snow hydrology courses offered by

