

Flood Assessment in Shenandoah

“It was as if someone were pouring water out of a glass.” That is how one resource specialist described the relentless rainstorm that caused extensive flooding in central Virginia and Shenandoah National Park late last June. After 5 days of soaking rain, the storm delivered 12 inches more that fell on already-saturated ground in a period of a few hours. Outside the park, the storm killed eight people, displaced 800 residents, and damaged 2,000 area homes. Within the park, numerous landslides rerouted and reshaped entire drainages (see photo). The barrage of water carried massive boulders down streams and even cut channels 15 to 20 feet down to bedrock in some areas. Tree-covered, bubbling mountain stream

channels once 15-30 feet wide were “blown out” and are now 150-200 feet wide, treeless, and filled with rocks and large debris dams of debarked trees. The concentrated erosion and landslides altered some administrative roads beyond repair, but only affected 37 miles of the over 500 miles of park trails.

Although devastating to people and property, the flood was a natural, albeit rare, event. Floods of this magnitude occur at an estimated interval of approximately 100-1,000 years. The opportunity to understand geologic processes and ecological recovery from catastrophic disturbance is rare and Shenandoah intends to make the most of it.

Park managers asked that resources and facilities be assessed for safety hazards, management options, and short- and long-term resource monitoring. The park set up an inci-

perts from Shenandoah National Park, Assateague Island National Seashore, University of Virginia, U.S. Geological Survey, NPS Water Resources Division, NPS Geologic Resources Division, Virginia Tech, and Virginia Department of Game and Inland Fisheries. The team examined existing and potential geohazards, slope stability, hydrology, fisheries, aquatic ecology, and vegetation affected by the flooding. Shenandoah and Assateague staff recorded the information collected by members of the team on the park Geographic Information System using GPS (global positioning system) units.

The team observed impacts that were caused by both large volumes of water (flood) and the mass movement of rocks, sediments, and woody debris in a slurry with water (debris flow, debris torrent). They recom-



Days of relentless rainfall caused landslides in Shenandoah National Park, Virginia, including these 2-5 acre (0.8-2.0 hectare) slides in the Moormans River drainage. While flood impacts were considerable throughout the park and region, the rare natural event provides scientists the opportunity to study geologic processes and ecological recovery.

dent command team to deal with assessment planning and coordination. The scientific assessment team consisted of ex-

mended that the park restrict or discourage use of former trails or roads with undercut banks and “toe” areas at the base of

the most unstable debris flows. The team strongly recommended against stabilization of debris slopes. Trail or road rebuilding, if done at all, should wait until after next winter to allow some settling, continued slumping, and rockfall to occur. Some trail rerouting to more stable slopes was also recommended.

As part of the NPS prototype Inventory and Monitoring Program, Shenandoah had detailed information from many park watersheds on water chemistry, geology, fisheries, amphibians, and aquatic insects before the storm. In fact, the watershed with the greatest flood impacts was also, fortuitously, the one with the most preflood data. Gathered over a period of several years, the information will greatly help the park assess ecosystem changes with respect to the severe storm. When compared with postflood surveys of the same areas, the data already show a marked change in watershed fish. Just one week before the storm over 800 fish of 15 species along 100 meters of stream were counted. A week after the flood, the same area had only 6 fish of 4 species. Biological recovery of these streams to support trout populations will require perhaps as little as 3 years to 30 years or more and will vary from one watershed to the next.

More biological resource assessment information will follow in the report to be written by the scientific assessment team. Also expected in this report are assessments of the park infrastructure and a strategy for interpreting the flood and its effects to park visitors.