

Stream Restoration and Trout Habitat Improvements at the Greenbrier Resort, White Sulphur Springs, West Virginia

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Abstract: The Greenbrier Sporting Club initiated a voluntary stream enhancement and restoration effort to restore trout habitat in nearly 4.02 km of Howard Creek, a perennial stream located near White Sulphur Springs, West Virginia. Howard Creek, which has a 170.94 km² watershed, receives runoff from the town of White Sulphur Springs, flows through the Greenbrier Resort, and ultimately drains into the Greenbrier River. The effects of urbanization and historic stream modifications have degraded stream habitat and function within Howard Creek. More specifically, channel armoring, sedimentation, unstable stream banks, and higher instream temperatures have severely impaired trout habitat conditions. In May 2001, Williamsburg Environmental Group, Inc. (WEG) and the Greenbrier Sporting Club began a cooperative effort to restore trout populations. Restoration measures included instream and riparian habitat restoration and construction of stable geomorphologic dimension, pattern, and profile to Howard Creek. Design elements also included wetland mitigation and floodplain modifications. WEG completed baseline stream habitat, watershed, and hydrologic/hydraulic assessments to document environmental conditions. The results of the studies were collectively utilized to implement the appropriate stream and trout habitat restoration measures. Detailed stream restoration planning utilized HEC-RAS, regional curve, geomorphic, and entrainment data in order to adequately design and implement the proposed restoration measures. In June 2003, instream structures including cross vanes, j-hooks, rock vanes, modified lunger structures, and boulder clusters were installed. Severely undercut banks were re-graded and seeded with a native riparian seed mix and planted with containerized tree and shrub species. Based on post-construction monitoring conducted in 2005, trout populations and hold-over times following restoration activities significantly increased. Local, state, and federal permits from the U.S. Army Corps of Engineers and from West Virginia Department of Natural Resources, were also required as part of the project.

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