Hogcamp Branch Stream Stabilization Project

Introduction

The Hogcamp Branch Stream Stabilization Project is an effort to restore the hydrogeologic condition of a section of the principal drainage that flows out of the Big Meadows Wetland. This stream is located northeast of the Byrd Visitor Center. Fee Demonstration funds have been used to achieve the stabilization. Work began on the project in 1998.

Management Needs

In the mid 1980s, maintenance staff at Shenandoah National Park undertook a stream trenching project within a 330' section of Hogcamp Branch (an intermittent stream at Big Meadows – see map). The channelization was intended to eliminate flooding onto a nearby nature trail, which it did. Unfortunately, the channelization removed many of the large rocks from the stream and thereby compromised the channel's natural armoring. Additionally, the trenching left the channel with steep slopes (7- 8 % grade). During subsequent high flow events (floods of 1995, 1996), stream velocities were intensified, because the water could not escape out of the "engineered" banks and dissipate energy naturally, as it did prior to channelization. The incised channel at Hogcamp Branch poses the threat of lowering the water- table of the Big Meadows Wetland. This was likely to occur within 25- 50 years through headward erosion. This wetland is a rare, high- elevation ecosystem upon which state- rare flora depend. The down stream riparian system was also being impacted due to the instability along this reach which in turn was causing sediments to release into downstream areas such as the Rose River (a sensitive brook trout fishery).

Lower Sloping Drop Structure with re-vegetated bank areas (2004)

Past & Current Procedures

With technical assistance from the USGS and the NPS Water Resources Division staff and through the Environmental Assessment process, the park staff chose streambed stabilization with two sloping rock drop structures and seven rock checkdams as appropriate restoration measures.
From 1998- 2001 detailed topographic, channel and overbank data were collected for the entire reach. Hydraulic analyses were conducted to predict the relative stability of different design scenarios. Cut- and- fill volumes were calculated for a stable design scenario. The design specifications called for a gradual and armored channel. This was accomplished with seven checkdams as these would serve as a series of natural bed steps. Additionally, two sloping drop structures would account for gradual channel grade at the two headcut locations. The Project Objectives are listed below:

1) Arrest the upstream spread of erosion on this 330' incised section of Hogcamp Branch. This will adequately protect the watertable of the Big Meadows Wetland.
a.) Construct two sloping rock drop structures at the two major headcuts.
b.) The areas below each sloping drop structure will be bolstered with native greenstone rocks and boulders.

2) Reduce soil and sediment loss along the 330' reach and sedimentation impacts to sensitive downstream areas such as the Rose River.
a.) Install seven loose- rock checkdams to build up and stabilize the 330' stream section.

With time, the checkdams will collect sediments, protect sensitive downstream areas such as the Rose River, and re-establish a stable stream grade. In general, sediment accumulation is desirable because it increases the stability of structures and enhances stabilization of the gully (Heede,1976).

Hogcamp Branch Stream Stabilization Project (continued...)

Accomplishments

All heavy restoration work was completed by 2003 including reshaping the stream channel, installation of native rock armor, and installation of checkdams and drop structures. From 2004 to 2008, the project moved to an upkeep and maintenance phase for the stream channel proper and revegetation efforts in adjacent areas.

Monitor and Repair Rock Structures (2004- 2008)- Staff made minor repairs of the single- fence checkdams in the upper and lower sections. This consisted of crews bolstering the shoulders of the checkdams as well as adding rocks to the aprons of the checkdams. Staff made minor repairs to two loose- rock checkdams. This involved bolstering the downstream apron with large rocks to prevent undercutting. It also involved shoring up the "key" areas behind the checkdams with large rock to prevent further scouring from large rain events. This reduced the erodibility of the bed and lower banks. Staff also made minor repairs to the sloping drop structures after summer storms caused some minor rock shifting and bank scour to the lower drop structure and one downstream area. The " tightly nestled" rip rap helped the drop structures and rock armor withstand these storms. Photographs were taken in 2004- 2007. Erosion control drainage dips were maintained along the old equipment route (horse trail).

Re- planting Native Vegetation (2003- 2007)- Native trees, shrubs, and grasses were planted along bank edges, and equipment routes. Five feet tall protective metal fencing was installed and maintained around all newly planted trees/shrubs to eliminate deer browsing. Over 95% of all trees and shrubs planted 2003- 2006 have survived. Staff maintained the tree nursery at Big Meadows (weeding, mulching, etc.). Native wildflowers and grasses were seeded in May and September 2004- 2005. Herbaceous species include little bluestem grass, big bluestem grass, switchgrass, and various milkweeds. Germination was improved with the use of straw mats.

Exotic Vegetation Removal (2004- 2008)- Staff began identifying and removing exotic vegetation in May 2004. This continued intermittently throughout the summers of 2004- 2008. Roughly two weeks of a two person crew was devoted to this per year. The predominant herbaceous exotic cover species is Japanese Stiltgrass. Bull thistle was also prevalent on site. All exotic vegetation is lopped or pulled by hand.

Observations- The structures and rock armoring withstood all the heavy storms that occurred from 2002- 2008. There was less loss of periglacial slopewash substrate (from the banks and stream bottom) in recent years as opposed to 2001 and prior years (based on observations of bed scour and accumulation of trapped sediments). The rock checkdams trapped most of the sediments and gravel that would have normally escaped prior to 2002.

Future Work

Staff members will continue to periodically bolster rock checkdams that need shoulder or apron repair work. They will also monitor and manage any emergent invasive exotic vegetation (e.g. Japanese stiltgrass, bull thistle, Oriental lady 's thumb), continue to re- plant native trees, shrubs, grasses, and wildflowers in areas of poor re- establishment, and repair metal tree protectors and eventually install plastic stem protectors to eliminate future tree damage from deer browsing and buck rub, respectively. Staff will continue to monitor sediment trapping along the reach and they will take photographs every other year to document restoration effectiveness. Vegetation and topographic re- surveys should be completed roughly every five years. This information will be evaluated and used for future planning and management of the area.

References

Heede, Burchard H. 1976 Gully Development and Control: The status of our knowledge. USDA Forest Service Research Paper. RM- 169, 42p. Rocky Mt. Forest and Range Experimental Station, Fort Collins, Colorado 80521.

Ludwig, J., Fleming, G., Pague, C. and Rawinski, T. , 1993. A Natural Heritage Inventory of Shenandoah National Park (Natural Heritage Technical Report #93- 5), February 1993. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia.

Stream Corridor Restoration - Principles, Processes and Practices. October 1998. The Federal Interagency Stream Restoration Working Group.

Hogcamp Branch Stream Stabilization Project (continued...)

Hogcamp Branch area map.