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## **Appendix A -- Demonstration Projects**

### **I. BRODHEAD FOREST AD STREAM ASSOCIATION**

### **II. BUCK HILL FALLS**

### **III. MCMICHAEL STREAMBANK – STROUDSBURG**

### **IV. SMITHFIELD TOWNSHIP PARK**

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## **I. Brodhead Forest and Stream Association**

WORKSHOP - MAY 9, 2009  
INVASIVE REMOVAL 2009 AND 2010

The Brodhead Forest and Stream Association (BF&SA), a Pocono Mountain fishing club, R.R. 7, East Stroudsburg, PA 18301, requested information from the Brodhead Watershed Association about controlling invasive plants on their property. The association owns over 1200 acres along the confluence of the Brodhead and Paradise creeks. Dr. Shixiong Hu, Professor of Geology at East Stroudsburg University, worked with the Brodhead Watershed Association (BWA) to prepare maps of the Club's property showing the location and extent of invasives in the riparian corridor, with data drawn from BWA surveys.

On Saturday, May 9, 2009, BF&SA hosted an educational workshop on riparian invasive plants. Members of other fishing clubs in the watershed were invited and several attended. The workshop was organized by the BWA. Presenters were Dr. Jerilyn Jewett-Smith, Director of Environmental Studies at East Stroudsburg University and BWA Board member; Brian McDonnell of the National Park Service, Northeast Region; and Jason Smith, Wetlands Specialist of Hanover Engineering Associates.

Presentations focused on the occurrence of invasive plants along streams of the Brodhead Watershed and their impact on trout waters. Participants visited the Paradise Creek to view invasive plants on the stream bank. Information packets and survey maps were provided to those attending.

The BF&SA was advised that the continuing uncontrolled growth of invasive plants along the streams would have a deleterious effect on the capacity of the streams to provide habitat for trout. Therefore, the BF&SA committed to an annual, two-phase invasive plant treatment program to suppress the growth of invasive plants along the fishing streams.

The BF&SA property has an extensive incursion of riparian knotweed, along with substantial barberry and multiflora rose. There are lesser but significant amounts of autumn or Russian olive and garlic mustard. The property also has numerous native plants along the streams: Canadian mayflower, meadow rue, dog-toothed violet, Dutchman's breeches, bluets, cardinal flower, horsetail, may apple, spicebush, and undoubtedly others.

The BF&SA followed the methods developed by the NPS Exotic Plant Treatment Program. In Spring 2009, work crews cut and properly cleared knotweed at two riparian sites along Brodhead Creek (about 1 acre total) in preparation for a revisit to these sites in the late summer to apply herbicide to the stunted regrowth of the knotweed.



Because the project was near surface water, Brian McDonnell of the NPS recommended applying the herbicide glyphosate with a non-ionic surfactant to minimize non-target toxicity to aquatic plants and wildlife.

**Figure 28**, on left, shows BWA and BF&SA member Doug Swift, painting

this herbicide on targeted plants.

*Note: the BWA does not recommend the use of herbicide. A generalized (non-target) application of a broad-spectrum herbicide would jeopardize the property's wide variety of native plants and aquatic life. As shown on the image to the left, The BF&SA elected to carefully target specific plants to avoid chemical danger to the stream.*

At the end of August members sprayed the sites that had been cut earlier, along with a midstream cobble bar in the Brodhead, and another site along the Paradise Stream, both of which had been too difficult to cut. They also sprayed some barberry and multiflora rose.

An April 2010 inspection showed the knotweed to have been very effectively treated—less than 10% of plants regrowing. The barberry and multiflora that were treated appeared to be dead. The remnant thorny stems, however, proved to be an obstacle to fishermen unless removed. BWA invasive plant specialist, Lori Colgan, attended the April 2010 inspection of the previous removal attempt and emphasized the importance of following the instructions from the herbicide manufacturer and NPS to minimize contamination of the creeks.



**Figure 29**, above right, shows the condition of the cleared section on June 12, 2011. Very few knotweed have returned. In the distance, knotweed can be seen all along the uncleared section downstream from the cleared site.



Erosion control plantings were discussed along with suitable replacement plants including the possibility of re-vegetation by the native plants already existing on site. The association members attending the inspections thought it might be better to just remove barberry and multiflora rose manually in the future and avoid spraying. The cost of the 2009 removal effort, including Stihl cutting equipment, 2 spray packs, and herbicide was approximately \$1500.

The Association repeated the cut/spray program in 2010, and a cutting was done on June 12. Members cut extensive areas of knotweed from the bank of the Paradise Creek and removed barberry and autumn olive from riparian areas of the Brodhead Creek. The autumn olive stumps were painted with an herbicide formulation.

The Association members also participated in a native plant restoration. Red osier dogwood (*cornus sericea*), black chokeberry (*aronia melanocarpia*), cardinal flower (*lobelia cardinalis*), foam flower (*tiarella cordifolia*), boneset (*eupatorium perfoliatum*), and winterberry holly (*ilex verticillata*) were planted.

On August 21, 2010, BF&SA volunteers and Lori Colgan were joined by BWA board member



Kietryn Zychal to manually remove barberry and autumn olive and spray of knotweed. **Figure 30**, on left, shows the native plants that had been planted in June were being watered by the fishing club's caretakers and were doing well despite the heat and dry weather that had been experienced.

The BF&SA has continued its annual invasive plant treatment program dedicating two work days, one in the Spring,<sup>1</sup> and a second planned for late

Summer.

**Figure 31**, on right, taken on June 13, 2011, shows Doug Swift, a member of BWA and BF&SA, replacing stones around newly planted black willows.

The results that the BF&SA achieved in just two years have been very gratifying.

**Lessons Learned:** This successful project had all the elements necessary for a successful outcome: proper planning, prompt actions and committed landowner follow-up.



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<sup>1</sup> As this report is being completed, on June 10 remove regrowth.

The BWA will monitor future invasives management and control activities at BF&SA and report on results through our newsletter and website.

## II. Buck Hill Falls Community



Buck Hill Falls (shown on **Figure 32** to the left) is the environmental and aesthetic core for a residential community in the headwaters of the Brodhead watershed. The community surrounds two headwaters streams: Buck Hill Creek and Griscom Run. The Buck Hill Falls Conservation Foundation is a land trust dedicated to protecting the land and water of the upper watershed.

In 2006, the Brodhead Watershed Association (BWA) and the Buck Hill Falls Conservation Foundation (the Foundation) formed a partnership to survey and manage invasive plants along Buck Hill Creek and Griscom Run. Frank Mays, President of the Foundation, and Dawn Kendall served as liaison between the Foundation and the BWA.

On April 13, 2006, the BWA hosted a training session on invasive plant identification and inventory methods for Buck Hill residents led by Dr. Jerilyn Jewett-Smith, Director of Environmental Studies at East Stroudsburg University (ESU) and BWA Board member, trained volunteers from Buck Hill Falls along with Monroe County Cooperative Extension Master Gardeners and volunteers from the Cherry Valley area of Monroe County on invasive plant identification and inventory methods.

In the summer of 2006 Dawn Kendall, accompanied by ESU interns Jake Brunkard and Vicki Shaller, conducted surveys of the Buck Hill and Griscom creeks for presence and density of riparian invasive plants. The Buck Hill Creek was surveyed from Route 447 upstream, past Buck Hill Falls, through the Buck Hill Golf Course, and on to Route 191. The Griscom Creek was surveyed from its confluence with Buck Hill Creek for approximately 1 mile upstream. Data were collected using the protocols developed for the Brodhead Invasive Species Management Project by Dr. Jewett-Smith. The data collected were included in the mapping of invasive plants in the Upper Brodhead watershed in the Brodhead Invasive Species Management Project-Phase 1.

Although there were a few “hot spots” of Japanese Knotweed, invasive incursions were generally found to be less dense than those found further downstream, where human disturbance is greater. It was also observed that a previously logged property on Griscom Run showed much greater density of invasive barberry. Dawn would like to continue the survey of Buck Hill Creek from Route 191 to its source, Big Spring.

When Dawn and the ESU interns would encounter Buck Hill residents while surveying, the residents showed great interest in the project and often asked questions. In the fall of 2007 the Foundation held a Family Work Day for residents and approximately 20 adults and a dozen



youths attended. The volunteers worked on Japanese Knotweed removal at the base of Buck Hill Falls.

In the spring of 2010, Buck Hill Falls once again partnered with the BWA to work on invasive plant control and to raise awareness in the Buck Hill community of the detriment invasive plants pose to the native ecosystems. Chris Mitchell, president of the BHF Foundation, coordinated the projects between Buck Hill and BWA. On May 29<sup>th</sup> approximately 20 Buck Hill residents, along with BWA invasive plant specialist Lori Colgan, spent about 4 hours removing Japanese Knotweed from the base of Buck Hill Falls.

In addition, a selection of native shrubs was planted to replace the knotweed. Then on June 13<sup>th</sup> five BHF residents attended a presentation and interpretive hike on invasive plants given by Lori. Garlic mustard, stiltgrass and especially Japanese barberry were noted, along with a wide variety of native plants.



Figure 33. Young volunteers at Buck Hills Falls Invasive removal clean up, May 2010.

BWA and the Foundation would like to continue invasive management along the Buck Hill and Griscom creeks, and continue education programs for the residents of Buck Hill Falls.

### III. McMichael Streambank Project



The McMichael streambank at 8<sup>th</sup> and Ann streets, in Stroudsburg (shown on **Figure 34**, a Google satellite map to the left) is a poster child for dense invasion by Japanese knotweed. The problem became intense when a Hampton Inn was built at this location where the McMichael creek runs between downtown Stroudsburg and Interstate 80. In an effort to gain visibility from the heavily traveled interstate, Hampton Inn managers had the underbrush cleared from the

woods between the hotel and the highway.

This provided an excellent opportunity for Japanese knotweed to take over the site – a property owned by East Stroudsburg Savings Association (ESSA).

The McMichael Creek at this location is also a popular fishing spot. The Brodhead Chapter of Trout Unlimited decided to undertake a knotweed removal project along the bank; BWA volunteers, accompanied by ESU students, joined in the effort. (See **Figure 35** below (ESU student volunteer) and earlier **Figure 10**, p. 22).



On April 26, 2009 a group of 22 volunteers, dug, pulled and carried 6 large pickup loads of this highly invasive, rapidly growing weed off the bank of the McMichael Creek.

Unfortunately, no plans were made for disposal of the knotweed stalks when the project began. Nor were follow-up plans made for care of the site.

BWA undertook to do that follow-up, with the help of a student intern hired for the summer.



**Figure 36**, to the left, shows the BWA's student intern from ESU on May 30, 2009, attempting to fight back the knotweed that was re-invading the cleared patch.

At first an attempt was made to compost the stalks on site. However, as shown on **Figure 37** (below left) that effort failed and the compost pile became a jungle of regenerated knotweed.



**Figure 38**. With the help of BWA volunteers, the knotweed stalks were taken to a nearby landfill.

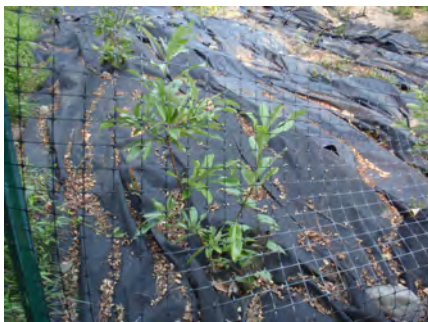


A small area was selected for a demonstration planting and native shrubs planted, weed barrier cloth installed and the area fenced in. See **Figure 39** (below right).

The intern maintained the planted area over the summer while the surrounding area grew into a forest of knotweed. Over the following winter the fence was knocked down by deer and many of the shrubs eaten. However, in the Spring of 2010 a watershed resident required to undertake a community service project restored the fence and the weed cloth and the shrubs began to bud out. (See **Figure 40** to the right and **Figure 41**, below right).



BWA contacted ESSA to see if they would agree to maintain the demonstration planting; they were not interested in having that responsibility.



Neither BWA nor Trout Unlimited had a volunteer willing or able to “adopt” the site, nor did either group have funds to pay another intern. Since young knotweed plants were already beginning to grow through the weed cloth barrier, we decided to give up the project. The remaining fence and weed cloth were removed and the site given over to re-growth of knotweed.

At the present time, plans are underway to build a trail from the ESSA parking lot along the edge of the woods to the creek. The ESSA Foundation has provided funding to the Stroud Region Recreation and Open Space Commission for the trail, currently scheduled to be built during summer 2011. Unfortunately, the knotweed filled area along the creek seems likely to remain.

**Lessons Learned:** Although this project will certainly be categorized as a failed effort, two major lessons were learned. No invasive removal project should be begun without plans and funding for follow-up maintenance of the site. Also, a large expanse of knotweed is not a good candidate for a demonstration site unless, as with The Brodhead Forest and Steam Club, there is a committed landowner or steward who takes responsibility for long-term maintenance.

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#### **IV. Smithfield Township Parks**

On Thursday, July 22, 2010, the Brodhead Watershed Association received a request from Mary Ellen Higgins, a member of the Smithfield Township Environmental Advisory Council, requesting the help of our invasive plant specialist, Lori Colgan, in devising a plan for removal of Japanese knotweed in one of their municipal parks.

Mary Ellen had spoken to the Smithfield Township Parks Commission about removing knotweed from the park. She was thinking of approaching some Boy Scout and Girl Scout troops as volunteers for removal. One of the members of the parks commission requested she write up a job description before talking with the Boy Scouts/Girl Scouts. She believes there is about an acre of knotweed at this park. The township has a \$500,000 grant to build a trail from Minisink Park to another park in Delaware Water Gap and Mary Ellen thought some of that grant money could be



used on knotweed removal. Smithfield Township had sent park/road workers to a municipal training workshop on invasive plants BWA held in Spring of 2008.

On July 30<sup>th</sup> Mary Ellen and Lori met at the park and surveyed the knotweed. It is very extensive. They discussed the difficulty of trying to control such large incursions of knotweed and the importance of applying good stewardship by not allowing pieces of knotweed to remain on the ground, possibly to be washed downstream and established elsewhere and the possibility of building a containment unit for any cut knotweed.

Mary Ellen plans to discuss the knotweed removal with the Smithfield Parks Commission.