

Exotic plant control successes tempered by long-term challenges

At Allegheny Portage Railroad National Historic Site and Johnstown Flood National Memorial in western Pennsylvania, successes in dealing with the exotic plants Japanese barberry (*Berberis thunbergii*) and giant and Japanese knotweed (*Polygonum sachalinense* and *P. cuspidatum*, respectively) are tempered by an ongoing, long-term challenge in removing garlic mustard (*Alliaria petiolata*). Results of projects to remove exotic bush honeysuckle (*Lonicera* spp.) have been mixed. Outcomes of these exotic plant removal projects tend to vary by plant and by site location.

At Allegheny Portage Railroad National Historic Site, volunteers removed barberry from a wooded area and a field in 2002 (fig. 1). In 2003, park staff treated the re-sprouting populations at the wooded area and thousands of seedlings at the field area with herbicide. Also in 2003, park staff and a Student Conservation Association (SCA) crew seeded the field area with native grasses by top-layering it with a mixture of topsoil and seed, and hand-tamping the plots. At the wooded area, no further treatment was required and in 2006 the area remains free of re-invading plants. At the field area, some follow-up treatment to remove new seedlings was again required in 2004. But by 2005 and continuing this year, monitoring of the site found no new plants, and the native grasses planted in 2003 had become well established.

Both parks have also experienced success with controlling giant and Japanese knotweed (fig. 2). A contractor at Johnstown Flood National Memorial first treated knotweed populations in 2001, with follow-up treatments annually by park staff in 2002 through 2004. In 2005, monitoring of the site showed knotweed levels had fallen below the threshold level and no treatments were required. The monocultures of knotweed have now been replaced by a more diverse native plant community through natural revegetation at this site. At Allegheny Portage Railroad National Historic Site's Staple Bend Tunnel Unit, knotweed control has taken a little longer, but native revegetation has also replaced vast monocultures of this plant pest. Except for some seeding at a field area, the revegetation has also been accomplished naturally, thanks to a good, native seedbank at the site.

At Johnstown Flood National Memorial, exotic bush honeysuckle has been treated in the historical former lakebed and in wooded areas near the park's picnic area. Park staff, interns, and an SCA crew removed plants from the lakebed from 2001 through 2004. Volunteers from the



Figure 1. Volunteers from Girl Scouts of the USA and Environmental Alliance for Senior Involvement removed barberry plants from a field at Allegheny Portage Railroad National Historic Site in 2002. The site has now been restored with native grasses. CHERYL NOLAN/ENVIRONMENTAL ALLIANCE FOR SENIOR INVOLVEMENT



Figure 2. Areas formerly covered by giant and Japanese knotweed have naturally revegetated with native grasses and forbs such as these Joe-pye weeds at Johnstown Flood National Memorial. A single stalk of knotweed can be seen (lower right), but knotweed occurrence was below the threshold level for treatment in 2005. NPS/KATHY PENROD

local community college removed plants from a wooded area in 2004. Outcomes have been mixed, with good success at the wooded area where native revegetation is occurring, but some problem areas persist in the lakebed area where new honeysuckle plants continue to invade the meadows.



These successes in dealing with large and imposing exotic plants have been tempered by another challenge posed by a small but ubiquitous plant, garlic mustard (fig. 3). At the Summit area of Allegheny Portage Railroad National Historic Site, park staff, volunteers, and interns have treated garlic mustard for up to six years by hand-pulling all flowering plants each year.



Figure 3. Garlic mustard is a small plant that is proving to be a larger control challenge than barberry or knotweed at Allegheny Portage Railroad National Historic Site.

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Despite declines in population size approaching 90%, the park’s data show that a few populations continue to increase even after six years of treatment. Originally, park staff expected to be treating the garlic mustard populations for five years, based on the available scientific literature for long-term seed viability. However, most garlic mustard populations are still re-emerging. Apparently, eradication will be a longer-term effort than originally anticipated.

With increasing years of treatment, chances of success of garlic mustard control are improving. The success in eradicating populations appears to increase with increasing number of years of plant removal, although the data are highly variable (table 1). The average decline in plant numbers tends to increase with increasing number of years of treatment; however, populations may continue to increase even after six years of treatment (table 1).

Because all flowering garlic mustard plants in treated populations were removed, the recurring plants are likely to be coming from seeds present in a dormant soil seed bank. Though dispersal from off-site is another possibility, it is probably not a major factor in the persistence of the treated populations. With each passing year, park staff assumes that the dormant soil seed bank is being depleted, but apparently it takes longer than six years for the depletion to be complete.

It is difficult to predict which plants or sites will achieve favorable results. The parks’ success in dealing with barberry and knotweed are encouraging in the battle against exotic plants. However, garlic mustard and sites where a good, native seed bank is lacking are presenting longer-term challenges.

Table 1. Garlic mustard population trends at Allegheny Portage Railroad National Historic Site, Pennsylvania, 2001–2005

Years treated (running)	Populations in sample	Populations eradicated	Populations decreasing ¹	Average population decrease	Populations increasing	Average population increase
2	5	0%	4	60%	1	26%
3	2 ²	50% ²	2	91% ²	0	No data
4	8	0%	6	60%	2	46%
5	9	11%	6	86%	3	167%
6	8	38%	7	88%	1	168%

Note: The control treatment was hand-pulling of flowering plants.

¹Includes populations eradicated.

²May not be representative because of small sample size.

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