



NON-NATIVE INVASIVE PLANT SURVEY

Ramsey's Draft Wilderness Area

A study conducted by Wild Virginia
April 2011



BACKGROUND

Non-native invasive plants (NNIP) are a severe threat to natural areas that often result in a loss of biodiversity by displacing native plants, increasing exposure of native species to disease, degrading or eliminating some types of wildlife habitat, and threatening rare plant species (USDA Forest Service 2010). Many national organizations and agencies, the US Department of Agriculture among them, have recognized the growing threat of NNIP in the US (Wilcove et al. 1998). In western Virginia, many groups are taking steps to combat NNIP, including the Virginia Native Plant Society, Virginia Division of Natural Heritage, The Nature Conservancy, and the National Park Service.

The George Washington National Forest (GWNF) has not been spared from NNIP. Many users of the forest as well as staff of the GWNF are aware of the growing problem of exotic species throughout the national forest. In December 2010, an Environmental Assessment was issued by the US Forest Service to guide action on the George Washington and Jefferson National Forests to control NNIP. Approval of the Environmental Assessment will facilitate more control actions in the future.

Early detection and control of NNIP is extremely important to the maintenance of healthy ecosystems. Despite this reality, and the awareness of NNIP as a management issue in the GWNF, there has been no systematic inventory of Wilderness Areas in the GWNF to document the invasion and spread of NNIP. Wilderness Areas of the GWNF are among the last vestiges of large, intact wild areas in Virginia and the region. This project served as a first step toward filling the important need of identifying and acting on threats to the integrity of our publicly-owned Wilderness Areas.

The primary route of entry of many NNIP into wilderness and other natural areas is often along trails and riparian areas (Miller et al. 2010). This project was designed to sample for NNIP along all trails and riparian areas in the Ramsey's Draft Wilderness Area during the 2010 growing season.

The project was not envisioned as a comprehensive survey of the presence of NNIP throughout all of Ramsey's Draft Wilderness Area. Rather, it was designed to show the degree to which NNIP are present in human travel routes and access areas.

METHODS

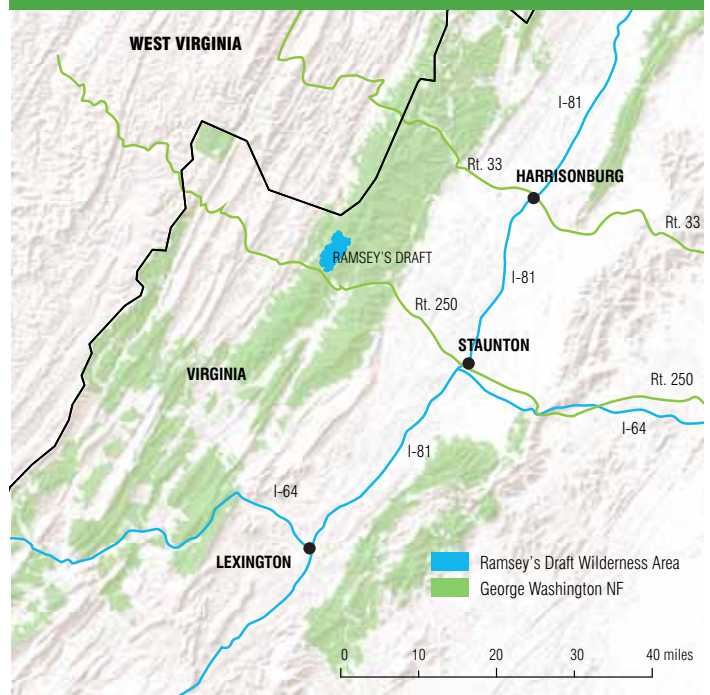
Figure 1 is a general locator map of Ramsey's Draft Wilderness Area. All survey and field work was conducted in July of 2010. All trails along the border and the interior of Ramsey's Draft Wilderness Area were sampled for NNIP. The following trails, either in part or whole, were sampled: Shenandoah Mountain, Hardscrabble, Hiner Spring, Wild Oak, Bald Ridge, Jerry's Run, and Ramsey's Draft. In addition, portions of two streams were sampled: Ramsey's Draft (where the trail was distant from the stream) and Left Prong (the 1500 meter section upstream of the confluence with Ramsey's Draft). Figure 2 illustrates the areas sampled and locations of observed NNIP. In total, approximately 46.8 kilometers (29 miles) of trails and streams were sampled.

The Forest Service provided two lists of NNIP to identify and survey (Appendix A). The primary list of nine species are those believed to be most common in the Ramsey's Draft area. Three species of bush honeysuckle (*Lonicera maackii*, *L. morrowii*, *L. tatarica*) were lumped together and treated as a single species. The secondary list, or "watch list," included eight other species that are problematic in other parts of the GWNF.

Working in tandem, two field workers hiked the trails and streams in 100 meter segments. A GPS reading was taken at the start and end point of each segment. For each sampling unit of 100 meters, the workers surveyed a corridor 10 meters wide on each side of the trail or stream, noting each NNIP observed. A total width of 20 meters was sampled for each unit.

FIGURE 1

The George Washington National Forest and Ramsey's Draft Wilderness Area



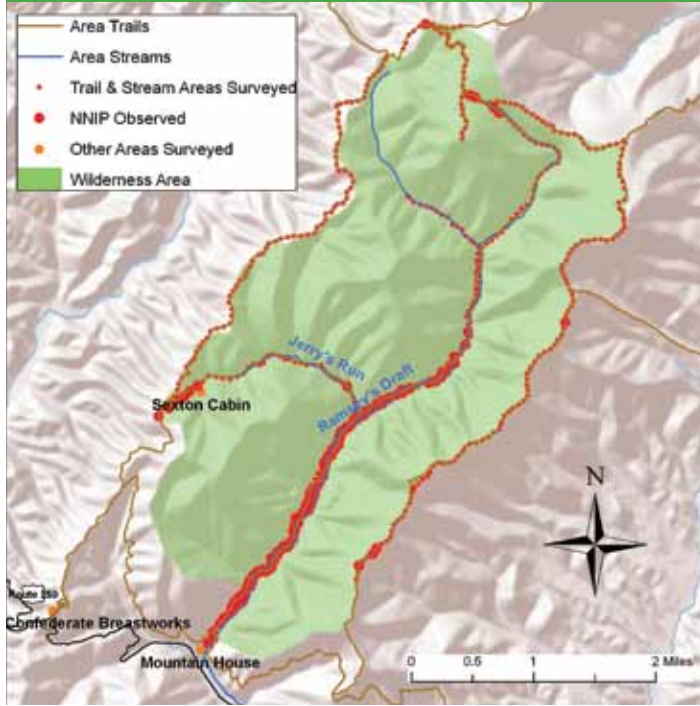
The field workers also noted if NNIP were present at the start and end points of the segments, the relative cover of the NNIP in the sample unit (categories of 0-25%, 26-50%, 51-75%, and 76-100% of total area), evidence of disturbance, and any other significant observations.

Upon completion of the field work, information recorded on data sheets was entered into electronic files. The GPS readings were transferred to computer, and a geographic information system (GIS) was used to organize the data and create map products.

In addition to the trail and stream sampling, three other areas were sampled in a less structured manner: Mountain House (parking and picnic area on Highway 250 serving as trailhead for the Ramsey's Draft Trail), Confederate Breastworks (a Civil War site, and access area to the Shenandoah Mountain Trail from Highway 250), and the Sexton cabin area (a popular camping location on Jerry's Run Trail).



FIGURE 2
The area sampled and NNIP observations in Ramsey's Draft Wilderness



RESULTS

Five species of NNIP from the two species lists were observed on the 468 trail and stream sampling units. Japanese stiltgrass (*Microstegium vimineum*) was the most commonly observed NNIP, followed by Coltsfoot (*Tussilago farfara*). Table 1 provides the frequency with which each NNIP was observed.

TABLE 1
The number and percentage of all 468 sampling segments where each NNIP was observed.

NNIP Species	Number of 100m trail segments where species observed	Percentage of all trail segments sampled
Japanese stiltgrass (<i>Microstegium vimineum</i>)	95	20.3%
Coltsfoot (<i>Tussilago farfara</i>)	58	12.4%
Bush Honeysuckle (<i>Lonicera</i> spp.)	17	3.6%
Multiflora rose (<i>Rosa multiflora</i>)	13	2.8%
Autumn olive (<i>Elaeagnus umbellata</i>)	8	1.7%

At least one NNIP was observed in 115 of the 468 sampling segments, or 24.6% of all segments. Table 2 indicates the frequency with which NNIP were observed.

TABLE 2
The number and percentage of the 468 sampling segments where NNIP were observed.

NNIP Species	Number of 100m trail segments	Percentage of all trail segments sampled
No NNIP species observed	353	75.4%
One or more NNIP species observed	115	24.6%
One NNIP species observed	66	14.1%
Two NNIP species observed	30	6.4%
Three NNIP species observed	11	2.4%
Four NNIP species observed	8	1.7%

RESULTS CONTINUED

As Figure 3 illustrates, NNIP were far more abundant in the lower (southern) section of Ramsey's Draft Wilderness Area than other parts of the wilderness area. The lower section, south of the intersection of Jerry's Run and Ramsey's Draft Trails, includes 78 sampling units along both Ramsey's Draft and Ramsey's Draft Trail. All five NNIP observed during the project were found here. Japanese stiltgrass was observed on 72 (92.3%) of the sampling segments in this area. Table 3 and Table 4 show the statistics for NNIP along the 78 trail segments in the lower section of Ramsey's Draft. At least one NNIP was found on all but two of the 78 sampling segments.



FIGURE 3

NNIP observed in the lower section of Ramsey's Draft Wilderness.

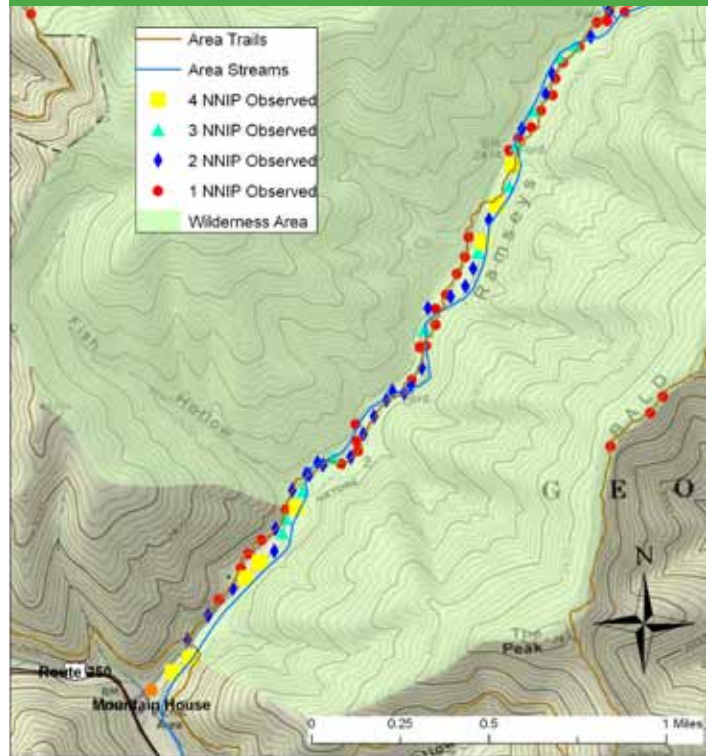


TABLE 3

The number and percentage of the 78 sampling segments in the lower section of Ramsey's Draft Wilderness Area where each NNIP was observed.

NNIP Species	Number of 100m trail segments where species observed	Percentage of all trail segments sampled
Japanese stiltgrass (<i>Microstegium vimineum</i>)	72	92.3%
Coltsfoot (<i>Tussilago farfara</i>)	46	59.0%
Bush Honeysuckle (<i>Lonicera</i> spp.)	17	21.8%
Multiflora rose (<i>Rosa multiflora</i>)	9	11.5%
Autumn olive (<i>Elaeagnus umbellata</i>)	6	7.7%

TABLE 4

The number and percentage of the 78 sampling segments in the lower section of Ramsey's Draft Wilderness Area where NNIP were observed.

NNIP Species	Number of 100m trail segments	Percentage of all trail segments sampled
No NNIP species observed	2	2.6%
One or more NNIP species observed	76	97.4%
One NNIP species observed	29	37.2%
Two NNIP species observed	28	35.9%
Three NNIP species observed	11	14.1%
Four NNIP species observed	8	10.3%

Figures 4 – 7 document where NNIP occurrences were observed during the project. It is noteworthy that while NNIP were abundant in many areas, total ground cover of NNIP in the sampling units (100 m long by 10 m wide) was always less than 25%.

FIGURE 4

Japanese stiltgrass observed in Ramsey's Draft Wilderness.

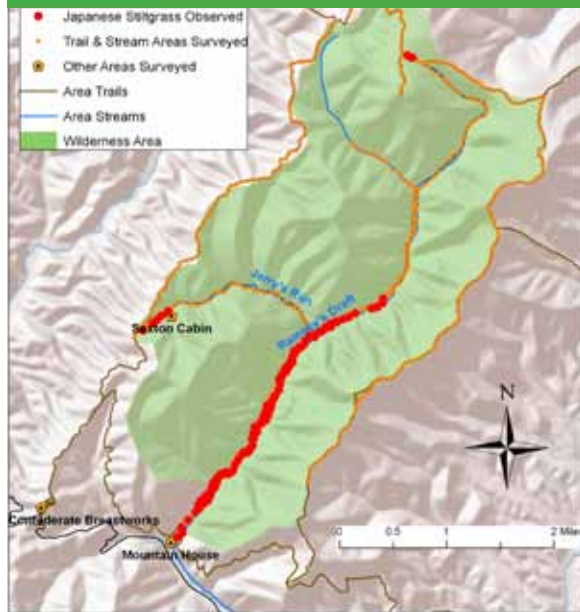


FIGURE 5

Coltsfoot observed in Ramsey's Draft Wilderness.

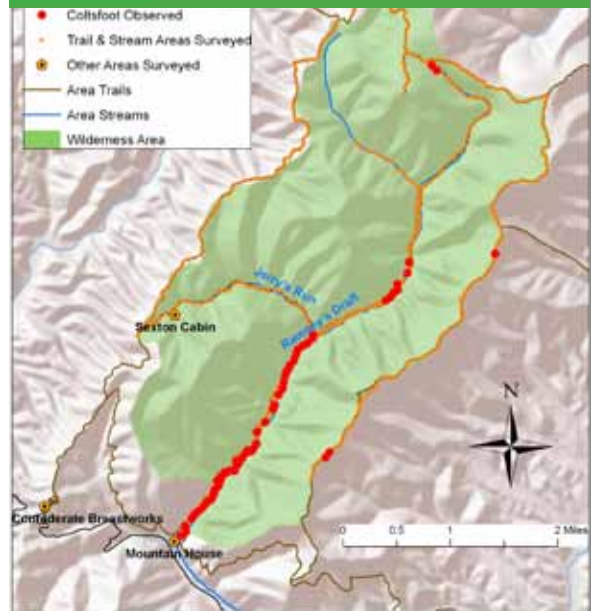


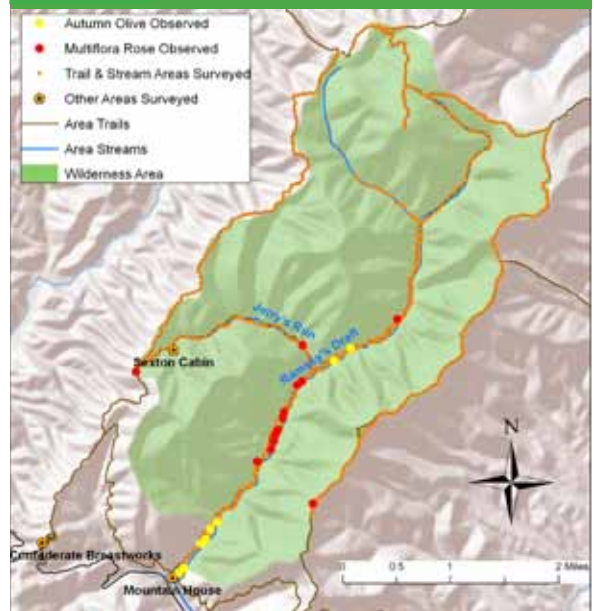
FIGURE 6

Bush honeysuckle observed in Ramsey's Draft Wilderness.



FIGURE 7

Multiflora rose and autumn olive observed in Ramsey's Draft Wilderness.



Listed below are the NNIP observed in the three additional areas sampled.

SEXTON CABIN

Microstegium vimineum–Japanese stiltgrass
Rosa multiflora–Multiflora rose

CONFEDERATE BREASTWORKS

Microstegium vimineum–Japanese stiltgrass
Alliaria petiolata–Garlic mustard
Tussilago farfara–Coltsfoot
Coronilla varia–Crown vetch**

MOUNTAIN HOUSE AREA

Elaeagnus umbellata–Autumn olive
Lonicera species–Bush honeysuckle
Lonicera japonica–Japanese honeysuckle
Rosa multiflora–Multiflora rose
Microstegium vimineum–Japanese stiltgrass
Alliaria petiolata–Garlic mustard

Centaurea biebersteinii–Spotted knapweed
Rubus phoenicolasius–Wineberry**
Coronilla varia–Crown vetch**
Leonurus cardiaca–Motherwort**
Polygonum persicaria–Ladysthumb**

** Not on the US Forest Service lists of NNIP species, found in Appendix A.

DISCUSSION

This project was conducted to determine the general presence and impact of NNIP on Ramsey's Draft Wilderness Area during the growing season of 2010. Though NNIP could be encountered almost anywhere within the project area, much of the Wilderness Area was largely unaffected.

Japanese stiltgrass is the most prevalent NNIP species in the Wilderness Area. It has crowded out native plants in many of the areas it was observed, becoming the only ground cover. Given its ability to spread and colonize new areas (Miller et al. 2010), it could remain an ecological threat for many years to come.

As Figure 3 illustrates, the lower section of Ramsey's Draft Wilderness Area has been negatively impacted by NNIP. NNIP were far more abundant here than in other areas sampled. NNIP were observed on 97.4% of the sample segments in lower Ramsey's Draft (76 of 78 segments, see Table 4), compared to 24.6% of the sample segments study-wide (Table 3). Only 10% (39 of 390) of the sample segments outside the lower section contained NNIP.



Of the 49 sample segments study-wide in which more than a single NNIP was observed, 47 (95.9%) occurred in the lower section of Ramsey's Draft (Tables 2 and 4). The stream, trail, and trailhead area (Mountain House) were all dramatically impacted. Any control efforts must include this area if they are to be effective.

A positive finding from the survey was that garlic mustard, while present, does not yet occur in thick patches throughout the

Wilderness Area. It is present in the Mountain House area, and a small patch was observed along Ramsey's Draft Trail between Mountain House and the southern boundary of the Wilderness Area. It is also present at the Confederate Breastworks parking area. Like Japanese stiltgrass, garlic mustard has the ability to spread rapidly, establish new populations, and crowd out native plants (Miller et al. 2010). Efforts should be made to contain garlic mustard and prevent its spread into the Wilderness Area. Roadside surveys of NNIP, conducted by the Virginia Native Plant Society for the past several years, indicate that garlic mustard is common in the North River Ranger District of the GWNF (Chris Bowlen, personal communication).

As reported above, the Mountain House area was infested with a number of troubling NNIP. Located in a valley along a stream, highway, and popular hiking trail, it is not surprising that NNIP have concentrated here. It will likely continue to be a source of potential NNIP spreading into the Wilderness Area, and should be monitored as such.

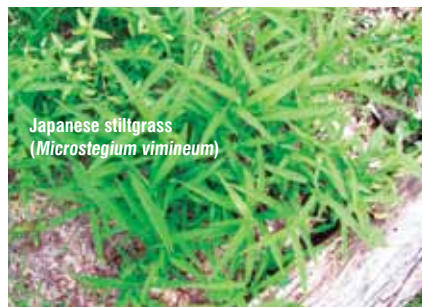
Controlling NNIP here would involve serious long term effort. At a minimum, efforts should be made to reduce the spread of NNIP into the Wilderness Area. Educating forest users

about NNIP and how they spread would be very constructive. With sufficient resources, targeting specific NNIP species for control over a multi-year period could reduce their ecological impact. In order to be effective, control efforts should focus on individual species rather than a broader approach that targets multiple species. Reports of new NNIP in the area should also be taken very seriously. Early detection of NNIP is often critical in controlling them. Once they are well established in an area, NNIP are generally much more difficult to remove.



Follow-up site visits after the July 2010 field work indicated that survey results likely underestimate the presence of NNIP. Seasonality can affect the visibility and ability to detect individual plant species. Additional surveying is recommended to understand the full extent and spread of NNIP throughout Ramsey's Draft Wilderness Area.

One of the ideas underlying this project was the hope that Wilderness Areas, given their recent history of reduced human disturbance, would be less impacted by NNIP than other areas of the GWNF. It is often assumed that areas with more frequent disturbance and activity (e.g., timber harvest sites, construction areas, recreation sites, etc.) are more likely to be infested with NNIP. This project did not attempt to answer that question, and the assumption may have some validity. However, project results clearly show that Wilderness Areas can have a significant NNIP presence.



The intention of this project was to collaborate and partner with the Forest Service in control efforts for targeted species in targeted areas in a multi-year effort. Final approval of the Environmental Assessment for controlling NNIP in the Jefferson

and George Washington National Forests will allow such work to begin. As of this writing, budgetary constraints limit the resources that the Forest Service can devote to NNIP control at Ramsey's Draft.

Wild Virginia will assist with the control of NNIP by sponsoring a few work days in 2011. The work days will entail volunteers manually removing specific plants in targeted areas with high concentration of NNIP. There will be collaboration with the Forest Service in determining what areas and species to target. The intention is to monitor these selected sites in subsequent years and continue control efforts as needed. Further eradication and removal can occur as more resources are made available to the Forest Service, hopefully within the near future.

ACKNOWLEDGEMENTS

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ABOUT WILD VIRGINIA

Wild Virginia is a grassroots non-profit organization dedicated to preserving wild forest ecosystems in Virginia's national forests. Since 1995 we have worked to protect one of the last large wild forests remaining in eastern North America, the Shenandoah Mountain area of the GWNF. Through education and outreach, Wild Virginia informs and mobilizes citizens about issues, threats, and opportunities for the GWNF. Wild Virginia is also a "watchdog" in the forest, monitoring all proposed projects (e.g., timber sales, road construction). Financial support for our work comes from our members, individual donors and grants from private foundations.

APPENDIX A

Primary list of non-native invasive plant species to survey.

SYMBOL	SCIENTIFIC NAME	COMMON NAME
AIAL	<i>Ailanthus altissima</i>	Tree of Heaven
ALPE4	<i>Alliaria petiolata</i>	Garlic mustard
BETH	<i>Berberis thunbergii</i>	Japanese barberry
CEOR7	<i>Celastrus orbiculatus</i>	Oriental bittersweet
ELUMP	<i>Elaeagnus umbellata</i>	Autumn olive
MIVI	<i>Microstegium vimineum</i>	Japanese stiltgrass
ROMUW	<i>Rosa multiflora</i>	Multiflora rose
LOJA	<i>Lonicera japonica</i>	Japanese honeysuckle
LONB	<i>Lonicera maackii</i>	Amur honeysuckle
LONB	<i>Lonicera morrowii</i>	Morrow's honeysuckle
LONB	<i>Lonicera tatarica</i>	Tartarian honeysuckle

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Miller, J, E. Chambliss, and N. Loewenstein. 2010. A field guide for the identification of invasive plants in southern forests. General Technical Report SRS-119, Southern Research Station, USDA Forest Service. 126 pp.

USDA Forest Service. 2010. Environmental assessment of forest-wide non-native invasive plant control. George Washington and Jefferson National Forests. December 2010. 110 pp.

Wilcove, D., D. Rothstein, J. Dublow, A. Philips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *Bioscience* 48:607-615.

Secondary list of other non-native invasive plant species to note.

SYMBOL	SCIENTIFIC NAME	COMMON NAME
LESZ	<i>Lespedeza</i> species	Lespedeza
LISI	<i>Ligustrum sinense</i>	Privet
PEFR4	<i>Perilla frutescens</i>	Beefsteak plant
POCU6	<i>Polygonum cuspidatum</i>	Japanese knotweed
POCU10	<i>Polygonum perfoliatum</i>	Mile-a-minute weed
PUMOL	<i>Pueraria montana</i> var. <i>lobata</i>	Kudzu
TUFA	<i>Tussilago farfara</i>	Coltsfoot
CESTM	<i>Centaurea biebersteinii</i>	Spotted knapweed



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Garlic mustard – Chris Evans, Bugwood.org
Autumn olive – James R. Allison, Georgia DNR, Bugwood.org
Bush honeysuckle – Stacey Leicht, Univ. Connecticut, Bugwood.org
Ramsey's Draft (back cover, upper right) - Clint Farlinger



FOR MORE INFORMATION CONTACT

WILD VIRGINIA

P.O. Box 1065
Charlottesville, VA 22902
(434) 971-1553
info@wildvirginia.org

www.wildvirginia.org

