



Monitoring Problematic Plants in George Washington Carver National Monument - 2013

The National Park Service's management policies distinguish between native and exotic (i.e., non-native) plant species (NPS 2006). Exotic plant species are typically characterized by their introduction due to human actions, whether intentional or not. Invasive plants, following the definition used in Executive Order 13112, are those plants that are exotic and cause ecological or economic harm. Finally, pest plants are defined less by their biology and more by their context in the same way that the term "weed" is defined (NPS 2006). Pest plants, which include native species, interfere with a specific management objective, including protecting human health. We refer to the collection of exotic, invasive, and pest plants as "potentially problematic".

Park managers, however, are only required to control any problematic plant that leads to "resource impairment". For plant populations causing effects that fall short of the impairment threshold, park managers wield a high level of discretion in judging whether the population should be controlled or not. The standard for making this decision rests on five criteria: the origin of the species, prudence, feasibility, the harm (i.e., impact) that the plant causes to park resources, and the harm that removal causes (NPS 2006). As with impairment determinations, these decisions are based on professional judgment, environmental assessment, consultation with regulating agencies, evidence-based scholarship, subject matter expertise, and civic engagement with the public (NPS 2006).

Methods:

For details on the survey, see Young et al. (2007).

- In 2006 and 2013, we sought plant species on two watch lists: early detection and park-established.
- Observers used handheld GPS units to make three approximately equidistant passes through each search unit (Figure 1).
- During each pass, observers estimated plant cover in a belt at least 3 m-wide, but used a larger belt width if conditions allowed. In 2006, the widest belt possible was observed. In 2013, this maximum distance was capped at 12 m.
- Cover values (0=0, 1=0.1-0.9 m², 2=1-9.9 m², 3=10-49.9 m², 4= 50-99.9 m², 5=100-499.9 m², 6= 500-999.9 m², 7= 1,000-4,999 m²) were attributed to each species per search unit.
- To calculate the minimum end of the estimated cover range for each species, the lower endpoints associated with the assigned cover class values for that species were summed and then divided by the reference frame fraction observed assuming the widest possible survey belt (i.e., maximum fraction observed).

- Maximum cover for each species was calculated similarly, using the upper endpoints of the cover values in each occupied search unit and assuming that a 3 m-belt was surveyed (i.e., minimum fraction of area observed).
- To provide additional information on the ecological impact and feasibility of control, the ecological impact and general management difficulty sub-ranks that constitute the invasiveness rank (I-rank), as determined by NatureServe (Morse et al. 2004), were listed when available.

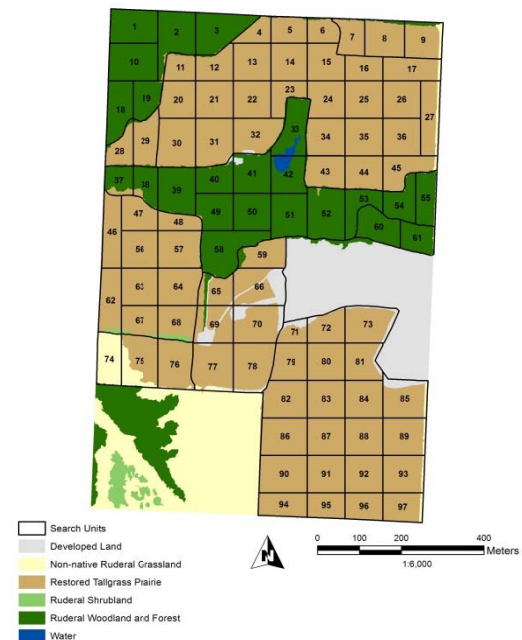


Figure 1. Invasive exotic plant search units on vegetation map (Diamond et al. 2013) of George Washington Carver National Monument.

Summary of Findings:

Two tables summarize the results of this study. Table 1 summarizes frequency and abundance estimates during 2006 and 2013. Observations are summarized with respect to data quality. In Table 2, we group our observations according to current or recommended management actions. These management recommendations are judgments based on our experience controlling problematic plants and are not binding on park staff.

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Supporting Literature:

- Cribbs, J. T., C. C. Young, J. L. Haack, and H. J. Etheridge. 2007. Invasive exotic plant monitoring at George Washington Carver National Monument: Year 1 (2006). Natural Resource Technical Report NPS/HTLN/NRTR—2007/017. National Park Service, Fort Collins, Colorado.
- Diamond, D. D., L. F. Elliott, M. D. DeBacker, K. M. James, D. L. Pursell, and A. Struckhoff. 2013. Vegetation mapping and classification of George Washington Carver National Monument. Natural Resource Report NPS/GWCA/NRR—2013/648. National Park Service, Fort Collins, Colorado.
- Morse, L. E., J. M. Randall, N. Benton, R. D. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. Document. Online. <<http://www.natureserve.org/getData/plantData.jsp#InvasivesProtocol>>. Accessed 22 January 2014.
- National Park Service. 2006. Management Policies. Unpublished document. Online. <<http://www.nps.gov/policy/mp2006.pdf>>. Accessed 22 January 2014.
- Young, C. C., J. L. Haack, L. W. Morrison, and M. D. DeBacker. 2007. Invasive exotic plant monitoring protocol for the Heartland Inventory and Monitoring Program. Natural Resource Report NPS/HTLN/NRR-2007/018. National Park Service, Fort Collins, Colorado.

Table 1. Overview of potentially problematic plants in George Washington Carver National Monument. The first 23 species in the list constitute the species with no obvious data quality deficiencies. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as high (H), medium (M), low (L), insignificant (I), unknown (U), a range of ranks (indicated by /), not available (--), or native.

Scientific Name	Common Name	Watch list	2006 Park-wide cover (acres)	2013 Park-wide cover (acres)	2006 Frequency (%)	2013 Frequency (%) (Difference 2006-2013)	Ecological Impact	Management Difficulty
<i>Lonicera japonica</i>	Japanese honeysuckle	Established	4.4 - 69.7	0.2 – 3.4	27.8	38.1(10.3)	M	HM
<i>Maclura pomifera</i>	osage orange	Established	1.6 - 24.5	0.1 – 2.3	19.6	20.6(1)	ML	L
<i>Rhus glabra</i>	smooth sumac	[Native]	0.7 - 7.6	0.01 – 0.4	19.6	21.6 (2)	Native	Native
<i>Bromus inermis</i>	smooth brome	Established	0.7- 7.5	0.04 – 0.5	21.6	13.4(-8.2)	M	ML
<i>Rosa multiflora</i>	multiflora rose	Established	0.7 - 11.7	0.06 – 1.5	37.1	32.0(-5.1)	L	L
<i>Sorghum halepense</i>	Johnsongrass	Established	0.5 - 8.0	0.01 – 0.6	28.9	29.9(1)	ML	HM
<i>Lespedeza cuneata</i>	sericea lespedeza	Established	0.3 - 5.6	0.01 – 0.5	35.1	38.1(3)	ML	ML
<i>Securigera varia</i>	crownvetch	Established	0.3 - 2.5	0.03 – 0.3	1	3.1(2.1)	H	L
<i>Euonymus fortunei</i>	winter creeper	Established	0.03 - 0.7	0.4 – 4.5	13.4	14.4(1)	M	LI
<i>Melilotus officinalis</i>	sweetclover	Established	0.01 - 0.3	0.009 – 0.3	5.2	10.3(5.1)	M	M
<i>Morus alba</i>	white mulberry	Established	0.009 - 0.3	0	9.3	0(-9.3)	ML	ML
<i>Glechoma hederacea</i>	ground ivy	Established	0.001 - 0.05	0.006 – 0.1	2.1	1.0(-1.1)	MI	U
<i>Verbascum thapsus</i>	common mullein	Established	0.0009 - 0.04	0.0005 – 0.02	6.2	8.2(2)	ML	L
<i>Lonicera maackii</i>	Amur honeysuckle	Established	0.0006 - 0.02	0.0006 – 0.02	1	1.0(0)	HM	M
<i>Potentilla recta</i>	sulphur cinquefoil	Established	0.0003 - 0.01	0	5.2	0(-5.2)	HL	ML
<i>Celastrus orbiculatus</i>	Oriental bittersweet	Established	0.0001 - 0.004	0	2.1	0(-2.1)	ML	M
<i>Arctium minus</i>	lesser burdock	Established	0.0001 - 0.002	0.0002 – 0.009	1	4.1(3.1)	LI	MI
<i>Euonymus alatus</i>	burningbush	Established	0.0001 - 0.002	0	1	0(-1)	LI	L
<i>Cornus foemina</i>	stiff dogwood	Early detection	0	0.0006 – 0.02	0	1.0(1)	--	--
<i>Hedera helix</i>	English ivy	Established	0	0.0001 – 0.002	0	1.0(1)	M	ML
<i>Hemerocallis fulva</i>	orange daylily	Established	0	0.0006 – 0.02	0	1.0(1)	MI	L
<i>Phalaris arundinacea</i>	reed canarygrass	Early detection	0	0.0001 – 0.002	0	1.0(1)	H	HM
<i>Ulmus pumila</i>	Siberian elm	Established	0	0.0007 – 0.03	0	2.1(2.1)	ML	ML
<u>Species likely affected by detection or identification issues</u>								
<i>Bromus racemosus</i>	bald brome	Established	3.6 - 55.1	0.4 – 6.7	33	71.1(38.1)	--	--
<i>Bromus sterilis</i>	poverty brome	Established	0.09 - 1.1	1.1 – 17.4	9.3	36.1(26.8)	ML	U
<i>Bromus tectorum</i>	cheatgrass	Established	0	0.6 – 7.5	0	54.6(54.6)	H	HM

Table 1 (cont.). Overview of potentially problematic plants in George Washington Carver National Monument. The first 23 species in the list constitute the species with no obvious data quality deficiencies. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as high (H), medium (M), low (L), insignificant (I), unknown (U), a range of ranks (indicated by /), not available (--), or native.

Scientific Name	Common Name	Watch list	2006 Park-wide cover (acres)	2013 Park-wide cover (acres)	2006 Frequency (%)	2013 Frequency (%) (Difference 2006-2013)	Ecological Impact	Management Difficulty
<u>Species likely affected by detection or identification issues</u>								
<i>Carduus nutans</i>	nodding plumeless thistle	Established	0	0.003 – 0.1	0	37.1(37.1)	MI	HM
<i>Schedonorus phoenix</i>	tall fescue	Established	0	0.4 – 7.0	0	76.3(76.3)	M	HM
<u>Species likely affected by taxonomic issues</u>								
<i>Lolium</i> sp.	ryegrass	Established	2.4 - 30.1	0	20.6	0(-20.6)	--	--
<i>Poa</i> spp.	bluegrass	Established	0.8 - 15.3	0	7.2	0(-7.2)	--	--
<i>Poa pratensis</i>	Kentucky bluegrass	Established	0	0.2 – 3.4	0	61.9(61.9)	M	ML
<i>Torilis arvensis</i>	spreading hedgeparsley	Established	0	0.03 – 1.1	0	50.5(50.5)	--	--
<i>Torilis japonica</i>	erect hedgeparsley	Established	0.3 - 2.5	0	1	0(-1)	--	--
<i>Ligustrum vulgare</i>	European privet	Established	0.05 - 0.8	0	14.4	0(-14.4)	HL	HM
<i>Ligustrum sinense</i>	Chinese privet	Early detection	0	0.03 – 0.6	0	10.3(10.3)	M	L
<i>Poa compressa</i>	Canada bluegrass	Established	0	0.0008 – 0.03	0	4.1(4.1)	ML	HL
<u>Aquatic species likely affected by search effort</u>								
<i>Nasturtium officinale</i>	watercress	Early detection	0	0.001 – 0.05	0	3.1(3.1)	ML	MI
<i>Potamogeton crispus</i>	curly pondweed	Established	0	0.0007 – 0.03	0	2.1(2.1)	M	ML
<u>Species searched for in 2013 only</u>								
<i>Rhus copallinum</i>	winged sumac	[Native]	0	0.09 – 1.9	0	45.4(45.4)	Native	Native
<i>Rumex crispus</i>	curly dock	Established	0	0.03 – 1.0	0	59.8(59.8)	LI	L
<i>Juniperus virginiana</i>	Eastern redcedar	[Native]	0	0.02 – 0.7	0	27.8(27.8)	Native	Native
<i>Lolium perenne</i>	perennial ryegrass	Park-based	0	0.01 – 0.3	0	9.3(9.3)	M	MI
<i>Hypericum perforatum</i>	common St. Johnswort	Established	0	0.009 – 0.2	0	15.5(15.5)	ML	M
<i>Rumex acetosella</i>	common sheep sorrel	Established	0	0.006 – 0.2	0	12.4(12.4)	LI	H
<i>Sonchus arvensis</i>	field sowthistle	Early detection	0	0.0001 – 0.002	0	1.0(1)	LI	HL

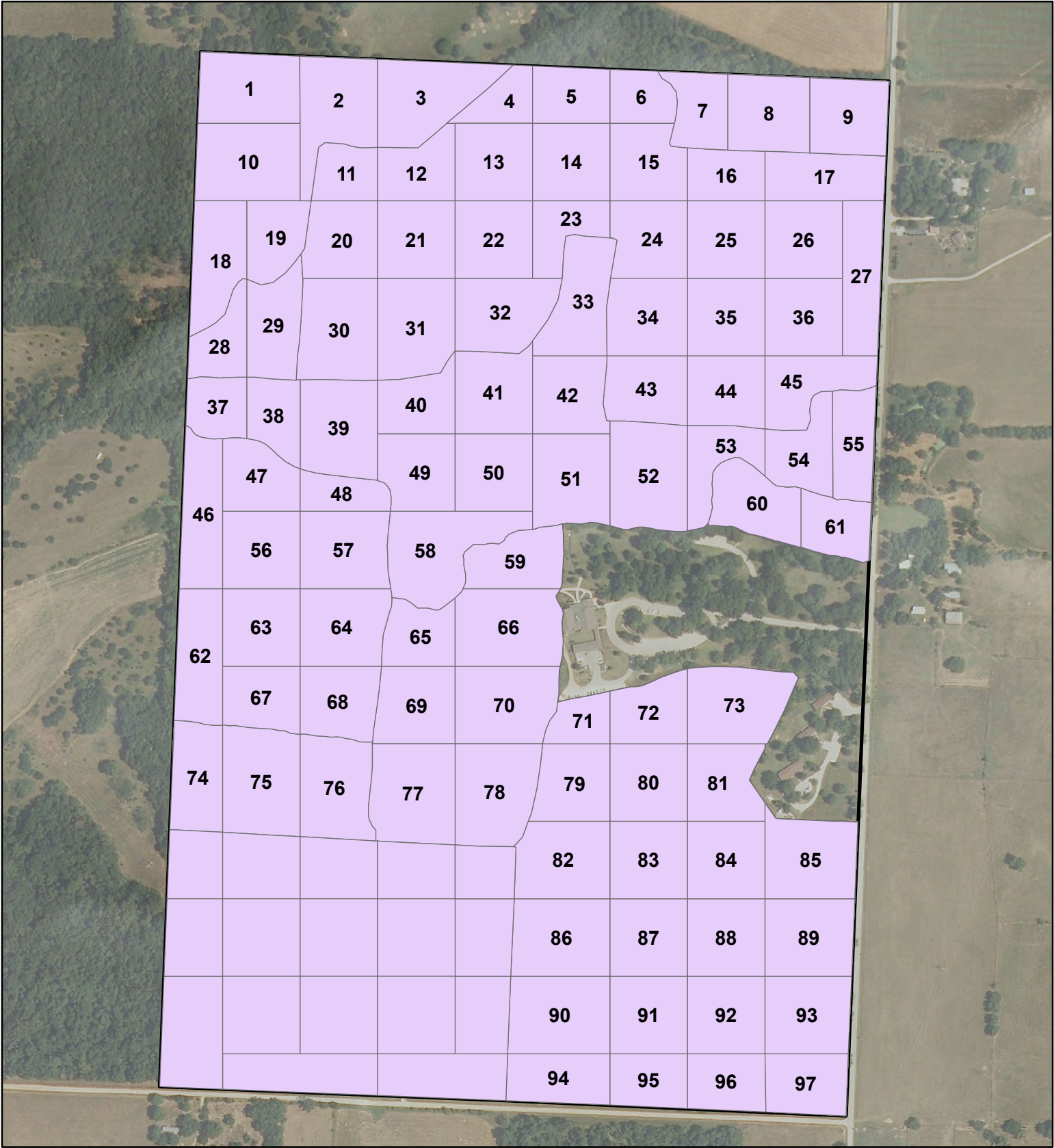
Table 2. Categorization of potentially problematic plants found in George Washington Carver National Monument as to the action that is currently occurring or needed to manage these species. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as high (H), medium (M), low (L), insignificant (I), unknown (U), a range of ranks (indicated by /), not available (--), or native.

Scientific Name	Common Name	Watch list	2006 Park-wide cover (acres)	2013 Park-wide cover (acres)	2006 Frequency (%)	2013 Frequency (%) (Difference 2006-2013)	Ecological Impact	Management Difficulty
<u>Prairie plants under management</u>								
<i>Rhus glabra</i>	smooth sumac	[Native]	0.7 - 7.6	0.01 – 0.4	19.6	21.6 (2)	Native	Native
<i>Sorghum halepense</i>	Johnsongrass	Established	0.5 - 8.0	0.01 – 0.6	28.9	29.9(1)	ML	HM
<i>Lespedeza cuneata</i>	sericea lespedeza	Established	0.3 - 5.6	0.01 – 0.5	35.1	38.1(3)	ML	ML
<i>Securigera varia</i>	crownvetch	Established	0.3 - 2.5	0.03 – 0.3	1	3.1(2.1)	H	L
<i>Melilotus officinalis</i>	sweetclover	Established	0.01 - 0.3	0.009 – 0.3	5.2	10.3(5.1)	M	M
<i>Verbascum thapsus</i>	common mullein	Established	0.0009 - 0.04	0.0005 – 0.02	6.2	8.2(2)	ML	L
<i>Rhus copallinum</i> ^p	winged sumac	[Native]	0	0.09 – 1.9	0	45.4(45.4)	Native	Native
<i>Carduus nutans</i>	nodding plumeless thistle	Established	0	0.003 – 0.1	0	37.1(37.1)	MI	HM
<u>Prairie plants to consider for future management</u>								
<i>Torilis japonica</i>	erect hedgeparsley	Established	0.3 - 2.5	0	1	0(-1)	--	--
<i>Potentilla recta</i>	sulphur cinquefoil	Established	0.0003 - 0.01	0	5.2	0(-5.2)	HL	ML
<i>Torilis arvensis</i>	spreading hedgeparsley	Established	0	0.03 – 1.1	0	50.5(50.5)	--	--
<i>Rumex crispus</i>	curly dock	Established	0	0.03 – 1.0	0	59.8(59.8)	LI	L
<u>Ruderal woodland plants under management</u>								
<i>Lonicera japonica</i>	Japanese honeysuckle	Established	4.4 – 69.7	0.2 – 3.4	27.8	38.1(10.3)	M	HM
<i>Ligustrum vulgare</i>	European privet	Established	0.05 - 0.8	0	14.4	0(-14.4)	HL	HM
<i>Ligustrum sinense</i>	Chinese privet	Early detection	0	0.03 – 0.6	0	10.3(10.3)	M	L
<u>Ruderal woodland plants to consider for future management</u>								
<i>Maclura pomifera</i>	Osage orange	Established	1.6 - 24.5	0.1 – 2.3	19.6	20.6(1)	ML	L
<i>Rosa multiflora</i>	multiflora rose	Established	0.7 - 11.7	0.06 – 1.5	37.1	32.0(-5.1)	L	L
<i>Euonymus fortunei</i>	winter creeper	Established	0.03 - 0.7	0.4 – 4.5	13.4	14.4(1)	M	LI
<i>Morus alba</i>	white mulberry	Established	0.009 - 0.3	0	9.3	0(-9.3)	ML	ML
<i>Lonicera maackii</i>	Amur honeysuckle	Established	0.0006 - 0.02	0.0006 – 0.02	1	1.0(0)	HM	M
<i>Juniperus virginiana</i>	eastern redcedar	[Native]	0	0.02 – 0.7	0	27.8(27.8)	Native	Native
<u>Early detection species requiring immediate management</u>								
<i>Phalaris arundinacea</i>	reed canarygrass	Early detection	0	0.0001 – 0.002	0	1.0(1)	H	HM

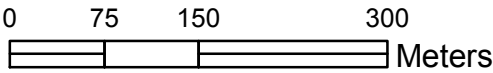
Table 2 (cont.). Categorization of potentially problematic plants found in George Washington Carver National Monument as to the action that is currently occurring or needed to manage these species. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as high (H), medium (M), low (L), insignificant (I), unknown (U), a range of ranks (indicated by /), not available (--), or native (continued).

Scientific Name	Common Name	Watch list	2006 Park-wide cover (acres)	2013 Park-wide cover (acres)	2006 Frequency (%)	2013 Frequency (%) (Difference 2006-2013)	Ecological Impact	Management Difficulty
<u>Cool-season grasses which require further evaluation of control options</u>								
<i>Bromus racemosus</i>	bald brome	Established	3.6 - 55.1	0.4 – 6.7	33	71.1(38.1)	--	--
<i>Lolium sp.</i>	ryegrass	Established	2.4 - 30.1	0	20.6	0(-20.6)	--	--
<i>Poa spp.</i>	bluegrass	Established	0.8 - 15.3	0	7.2	0(-7.2)	--	--
<i>Bromus inermis</i>	smooth brome	Established	0.7- 7.5	0.04 – 0.5	21.6	13.4(-8.2)	M	ML
<i>Bromus sterilis</i>	poverty brome	Established	0.09 - 1.1	1.1 – 17.4	9.3	36.1(26.8)	ML	U
<i>Bromus tectorum</i>	cheatgrass	Established	0	0.6 – 7.5	0	54.6(54.6)	H	HM
<i>Schedonorus phoenix</i>	tall fescue	Established	0	0.4 – 7.0	0	76.3(76.3)	M	HM
<i>Poa pratensis</i>	Kentucky bluegrass	Established	0	0.2 – 3.4	0	61.9(61.9)	M	ML
<i>Poa compressa</i>	Canada bluegrass	Established	0	0.0008 – 0.03	0	4.1(4.1)	ML	HL
<i>Lolium perenne</i>	perennial ryegrass	Park-based	0	0.01 – 0.3	0	9.3(9.3)	M	MI
<u>Terrestrial plant species without immediate management requirements</u>								
<i>Celastrus orbiculatus</i>	Oriental bittersweet	Established	0.0001 - 0.004	0	2.1	0(-2.1)	ML	M
<i>Arctium minus</i>	lesser burdock	Established	0.0001 - 0.002	0.0002 – 0.009	1	4.1(3)	LI	MI
<i>Euonymus alatus</i>	burningbush	Established	0.0001 - 0.002	0	1	0(-1)	LI	L
<i>Glechoma hederacea</i>	ground ivy	Established	0.001 - 0.05	0.006 – 0.1	2.1	1.0(-1.1)	MI	U
<i>Cornus foemina</i>	stiff dogwood	Early detection	0	0.0006 – 0.02	0	1.0(1)	--	--
<i>Hedera helix</i>	English ivy	Established	0	0.0001 – 0.002	0	1.0(1)	M	ML
<i>Hemerocallis fulva</i>	orange daylily	Established	0	0.0006 – 0.02	0	1.0(1)	MI	L
<i>Ulmus pumila</i>	Siberian elm	Established	0	0.0007 – 0.03	0	2.1(2.1)	ML	ML
<i>Hypericum perforatum</i>	common St. Johnswort	Established	0	0.009 – 0.2	0	15.5(15.5)	ML	M
<i>Rumex acetosella</i>	common sheep sorrel	Established	0	0.006 – 0.2	0	12.4(12.4)	LI	H
<i>Sonchus arvensis</i>	field sowthistle	Early detection	0	0.0001 – 0.002	0	1.0(1)	LI	HL
<u>Aquatic plant species without immediate management requirements</u>								
<i>Nasturtium officinale</i>	watercress	Early detection	0	0.001 – 0.05	0	3.1(3.1)	ML	MI
<i>Potamogeton crispus</i>	curly pondweed	Established	0	0.0007 – 0.03	0	2.1(2.1)	M	ML

George Washington Carver NM Problematic Plant Monitoring



Cover Class



1:6,000