Monitoring Problematic Plants in Homestead National Monument of America - 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. (2007a).

- In 2006, 2009, 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 2009 and 2013, this maximum distance was capped at 12 m.
- Cover values (0=0, 1=0.1-0.9 m^2, 2=1-9.9 m^2, 3=10-49.9 m^2, 4= 50-99.9 m^2, 5=100-499.9 m^2, 6= 500-999.9 m^2, 7= 1,000-4,999 m^2) 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.

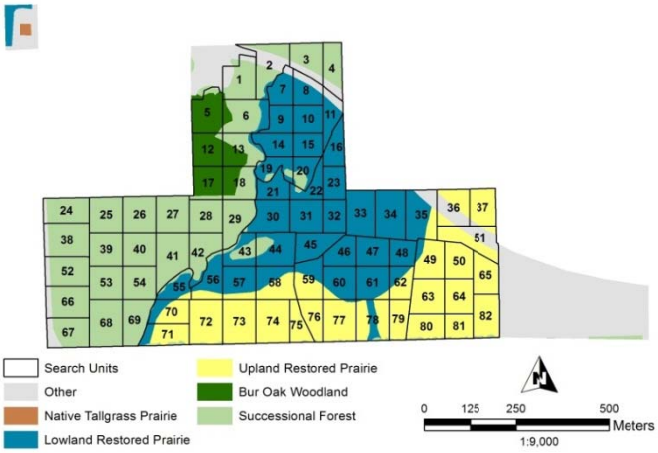

Figure 1. Vegetation cover (Kindscher et al. 2011) and search units for invasive plant monitoring at Homestead National Monument of America.

Summary of Findings:

Two tables summarize the results of this study. Table 1 summarizes frequency and abundance estimates during 2006, 2009, 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:

Kindscher, K., H. Kilroy, J. Delisle, Q. Long, H. Loring, K. Dobbs and J. Drake. 2011. Vegetation mapping and classification of Homestead National Monument of America. Natural Resource Report NPS/HTLN/NRR—2011/345. National Park Service, Fort Collins, Colorado.

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Young, C. C., J. L. Haack, L. W. Morrison, and M. D. DeBacker. 2007a. 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.

Young C. C., J. T. Cribbs, J. L. Haack, and H. J. Etheridge. 2007b. Invasive exotic plant monitoring at Homestead National Monument of America: Year 1 (2006). Natural Resource Technical Report NPS/HTLN/NRTR—2007/020. National Park Service, Fort Collins, Colorado.

Young, C. C., M. F. Short, L. W. Morrison, C. S. Gross, and J. L. Haack. 2010. Invasive exotic plant monitoring at Homestead National Monument of America: Year 2 (2009). Natural Resource Technical Report NPS/HTLN/NRTR—2010/304. National Park Service, Fort Collins, Colorado.

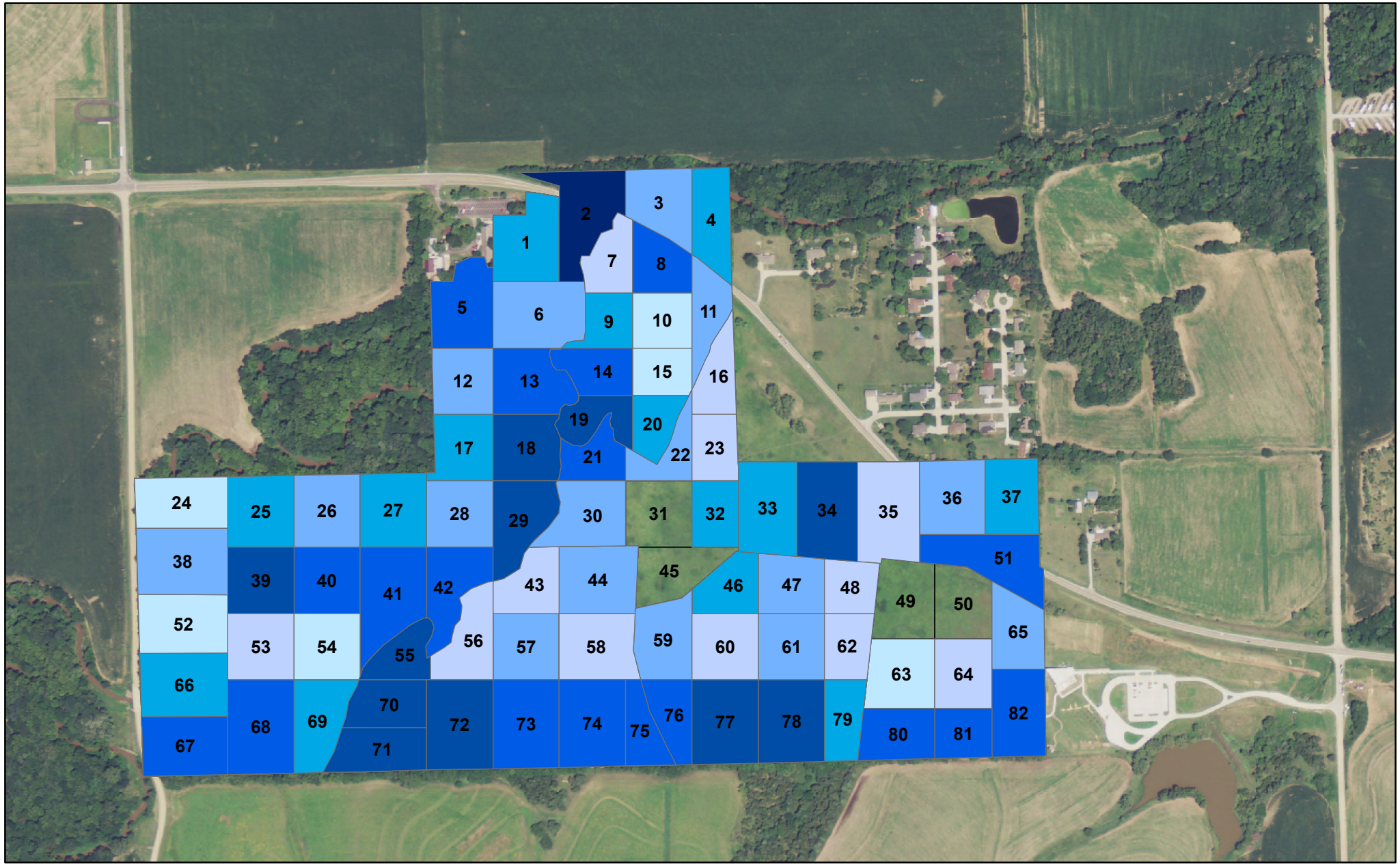
Table 1. Overview of potentially problematic plants found in Homestead National Monument of America. The first 13 species include no obvious data quality deficiencies. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as high (H), medium (M), low (L), insignificant (I), unknown (U), a range of ranks (indicated by /), or not available (--).

Scientific Name	Common Name	Watch List	2006 Park-wide acres (freq.)	2009 Park-wide acres (freq.)	2013 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
Bromus inermis	smooth brome	Park established	4.6 – 54.7 (65.9)	4.1 – 62.1 (53.7)	3.4 – 46.6 (74.4)	M	ML
Maclura pomifera	osage orange	Park established	2.5 – 26.9 (25.6)	1.0 – 14.8 (20.7)	3.2 – 29.2 (23.2)	ML	L
Phalaris arundinacea	reed canarygrass	Park established	1.9 – 23.6 (25.6)	0.6 – 10.6 (29.3)	0.4 – 6.0 (34.1)	H	HM
Morus alba	white mulberry	Park established	1.6 – 19.8 (37.8)	0.6 – 10.6 (34.1)	0.9 – 14.3 (39.0)	ML	ML
Bromus racemosus	bald brome	Park established	0.5 – 5.5 (12.2)	0.0008 – 0.03 (4.9)	0.4 – 4.1 (15.9)	--	--
Melilotus officinalis	sweetclover	Park established	0.2 – 2.9 (6.1)	0.01 – 0.3 (12.2)	0.03 – 0.5 (8.5)	M	M
Sorghum halepense	Johnsongrass	Park established	0.001 – 0.05 (4.9)	0 (0.0)	0 (0.0)	ML	HM
Verbascum thapsus	common mullein	Park established	0.0002 – 0.007 (3.7)	0.0001 – 0.002 (1.2)	0 (0.0)	ML	L
Berberis thunbergii	Japanese barberry	Park established	0.0001 – 0.002 (1.2)	0 (0.0)	0 (0.0)	HM	I
Cirsium vulgare	bull thistle	Park established`	0.0001 – 0.002 (1.2)	0 (0.0)	0 (0.0)	ML	ML
Alliaria petiolata	garlic mustard	Park established	0 (0.0)	0 (0.0)	0.0007 – 0.03 (2.4)	ML	M
Carduus nutans	nodding plumeless thistle	Park established	0 (0.0)	0.0001 – 0.002 (1.2)	0.0001 – 0.002 (1.2)	MI	HM
Ulmus pumila	Siberian elm	Park established	0 (0.0)	0.0001 – 0.002 (1.2)	0.006 – 0.1 (2.4)	ML	ML
Species affected by taxonomic and detection issues							
Poa spp.	bluegrass	Park established	0.0007 – 0.03 (2.4)	0.1 – 2.0 (17.1)	0.09 – 1.6 (54.9)	--	--
Poa pratensis	Kentucky bluegrass	Park established	0 (0.0)	0.06 – 1.3 (2.4)	0 (0.0)	M	ML
Species searched for in 2013 only							
Sonchus arvensis	field sowthistle	Early detection	0 (0.0)	0 (0.0)	0.0001 – 0.004 (2.4)	LI	HL
Rumex crispus	curly dock	Park established	0 (0.0)	0 (0.0)	0.0002 – 0.009 (4.9)	--	--

Table 2. Categorization of potentially problematic plants found in Homestead National Monument of America and categorized 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 /), or not available (--).

Scientific Name	Common Name	Watch List	2006 Park-wide acres (freq.)	2009 Park-wide acres (freq.)	2013 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
Species under management							
Maclura pomifera	osage orange	Park Established	2.5 – 26.9 (25.6)	1.0 – 14.8 (20.7)	3.2 – 29.2 (23.2)	ML	L
Morus alba	white mulberry	Park Established	1.6 – 19.8 (37.8)	0.6 – 10.6 (34.1)	0.9 – 14.3 (39.0)	ML	ML
Melilotus officinalis	sweetclover	Park Established	0.2 – 2.9 (6.1)	0.01 – 0.3 (12.2)	0.03 – 0.5 (8.5)	M	M
Sorghum halepense	Johnsongrass	Park Established	0.001 – 0.05 (4.9)	0 (0.0)	0 (0.0)	ML	HM
Verbascum thapsus	common mullein	Park Established	0.0002 – 0.007 (3.7)	0.0001 – 0.002 (1.2)	0 (0.0)	ML	L
Cirsium vulgare	bull thistle	Park Established	0.0001 – 0.002 (1.2)	0 (0.0)	0 (0.0)	ML	ML
Carduus nutans	nodding plumeless thistle	Park Established	0 (0.0)	0.0001 – 0.002 (1.2)	0.0001 – 0.002 (1.2)	MI	HM
Ulmus pumila	Siberian elm	Park Established	0 (0.0)	0.0001 – 0.002 (1.2)	0.006 – 0.1 (2.4)	ML	ML
Early detection species requiring immediate control							
Berberis thunbergii	Japanese barberry	Park Established	0.0001 – 0.002 (1.2)	0 (0.0)	0 (0.0)	HM	I
Alliaria petiolata	garlic mustard	Park Established	0	0	0.0007 – 0.03	ML	M
Cool-season grasses requiring further evaluation of control options							
Bromus inermis	Smooth brome	Park Established	4.6 – 54.7 (65.9)	4.1 – 62.1 (53.7)	3.4 – 46.6 (74.4)	M	ML
Phalaris arundinacea	reed canarygrass	Park Established	1.9 – 23.6 (25.6)	0.6 – 10.6 (29.3)	0.4 – 6.0 (34.1)	H	HM
Bromus racemosus	bald brome	Park Established	0.5 – 5.5 (12.2)	0.0008 – 0.03 (4.9)	0.4 – 4.1 (15.9)	--	--
Poa spp.	bluegrass	Park Established	0.0007 – 0.03 (2.4)	0.1 – 2.0 (17.1)	0.09 – 1.6 (54.9)	--	--
Poa pratensis	Kentucky bluegrass	Park Established	0 (0.0)	0.06 – 1.3 (2.4)	0 (0.0)	M	ML
Species not requiring management attention							
Sonchus arvensis	field sowthistle	Park Established	0	0	0.0001 – 0.004	LI	HL
Rumex crispus	curly dock	Park Established	0 (0.0)	0 (0.0)	0.0002 – 0.009 (4.9)	--	--

Homestead NM of America Problematic Plant Monitoring



CoverClass

1 2 3 4 5 6 7

Search Units Park Boundary

N

0 150 300 600 Meters

1:7,000