



Monitoring Problematic Plants in Pipestone 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, 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.
- Coarse 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.

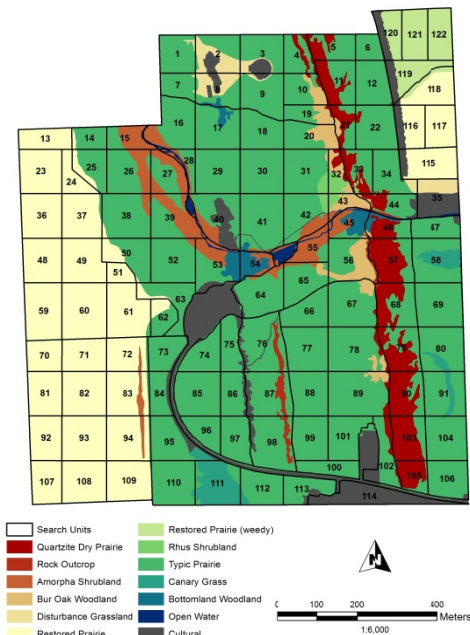


Figure 1. Vegetation cover (Diamond et al. 2014) and search units for invasive plant monitoring at Pipestone National Monument.

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:

- Diamond, D. D., L. F. Elliott, M. D. DeBacker, K. M. James, D. L. Pursell, and A. Struckhoff. 2014. Vegetation mapping and classification of Pipestone National Monument, Minnesota: Project report. Natural Resource Report NPS/PIPE/NRR—2014/802. 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, J.T. Cribbs, K.E. Mlekush, and H.J. Etheridge. 2007. Invasive exotic plant monitoring at Pipestone National Monument: Year 1 (2006). Natural Resource Technical Report NPS/HTLN/NRTR—2007/002. National Park Service, Fort Collins, Colorado.
- 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.
- Young, C. C., M .F. Short, L. W. Morrison, C. S. Gross, and J. L. Haack. 2010. Invasive exotic plant monitoring at Pipestone National Monument: Year 2 (2009). Natural Resource Technical Report NPS/HTLN/NRTR—2010/294. National Park Service, Fort Collins, Colorado.

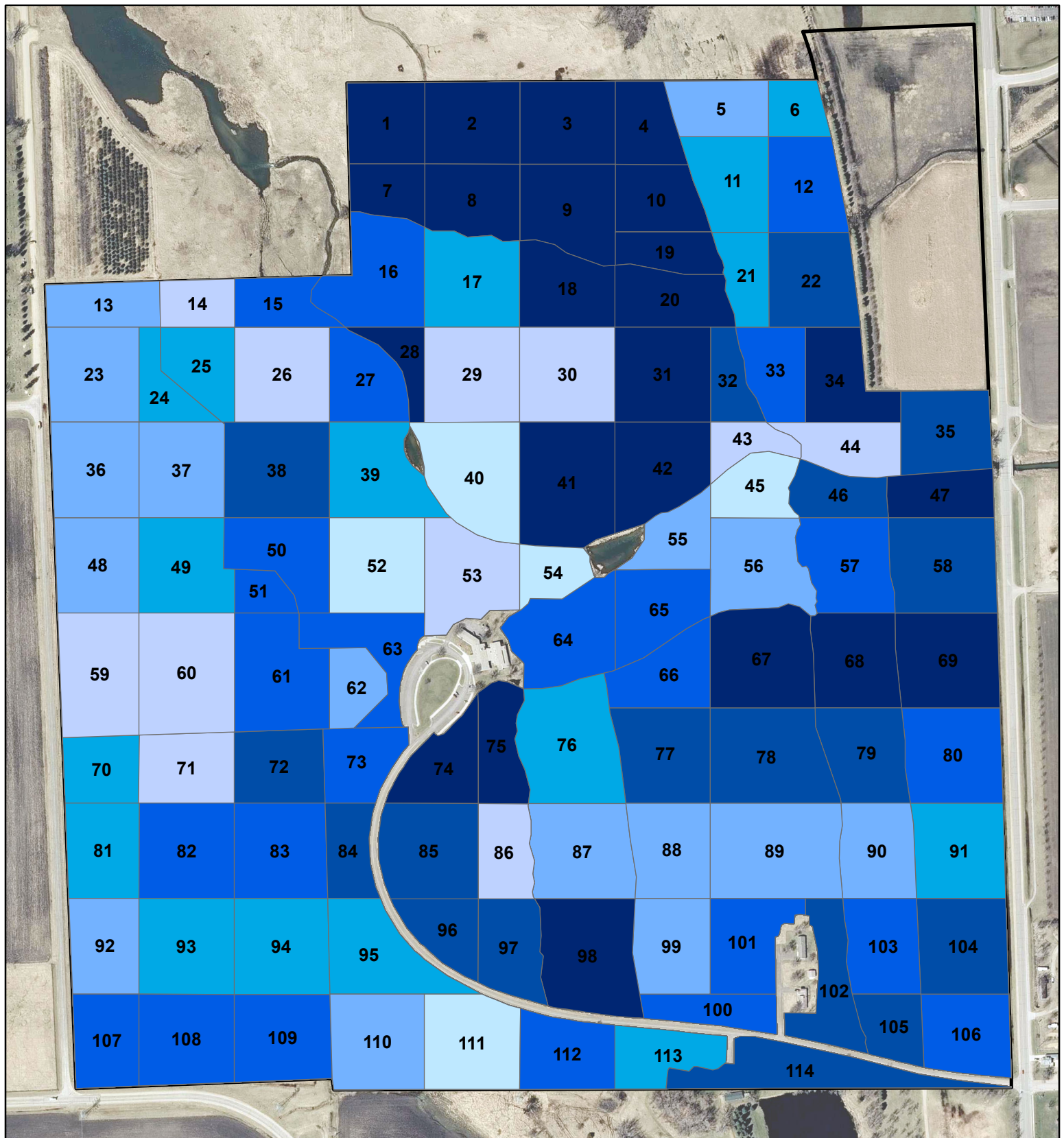
Table 1. Abundance of potentially problematic plants found in Pipestone National Monument. The first 20 species in the list include no obvious data quality deficiencies. Ecological impact and general management difficulty based on NatureServe I-Rank subranks (Morse et al. 2004). Subranks are given as 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
<i>Poa compressa/pratensis</i>	Bluegrass (Canada and Kentucky)	Park Established	28.7 – 541.8 (99.1)	21.7 – 368.4 (97.4)	1.9 – 28.9 (97.4)	--	--
<i>Bromus inermis</i>	smooth brome	Park Established	24.1 – 410.3 (95.6)	31.4 – 512.1 (99.1)	20.6 – 282.0 (100)	M	ML
<i>Phalaris arundinacea</i>	reed canarygrass	Park Established	4.2 – 59.3 (50.9)	6.5 – 109.6 (47.4)	4.6 – 81.9 (49.1)	H	HM
<i>Rhamnus cathartica</i>	common buckthorn	Park Established	3.5 – 43.4 (59.6)	0.4 – 8.1 (27.2)	0.1 – 1.9 (29.8)	M	M
<i>Melilotus officinalis</i>	sweetclover	Park Established	1.7 – 28.4 (70.2)	3.3 – 44.9 (43.9)	0.06 – 1.5 (51.8)	M	M
<i>Securigera varia</i>	crownvetch	Park Established	0.8 – 11.1 (18.4)	1.3 – 17.8 (19.3)	0.2 – 3.0 (19.3)	H	L
<i>Cirsium arvense</i>	Canada thistle	Park Established	0.3 – 6.2 (63.2)	0.5 – 8.5 (62.3)	0.07 – 1.9 (49.1)	ML	HM
<i>Typha</i> spp.	cattail	Park Established	0.05 – 0.5 (2.6)	0 (0)	0.07 – 1.5 (1.8)	--	--
<i>Verbascum thapsus</i>	common mullein	Park Established	0.02 – 0.4 (19.3)	0.003 – 0.1 (13.2)	0.002 – 0.06 (5.3)	ML	L
<i>Cirsium vulgare</i>	bull thistle	Park Established	0.02 – 0.4 (21.9)	0.004 – 0.2 (18.4)	0.006 – 0.2 (13.2)	ML	ML
<i>Carduus nutans</i>	nodding plumeless thistle	Park Established	0.01 – 0.4 (30.7)	0.009 – 0.4 (32.5)	0.006 – 0.2 (20.2)	MI	HM
<i>Ulmus pumila</i>	Siberian elm	Park Established	0.007 – 0.1 (4.4)	0.03 – 0.3 (0.9)	0.008 – 0.2 (8.8)	ML	ML
<i>Elymus repens</i>	quackgrass	Park Established	0.006 – 0.2 (28.9)	0.007 – 0.1 (0.9)	0.1 – 2.2 (54.4)	ML	HM
<i>Hesperis matronalis</i>	dames rocket	Park Established	0.0007 – 0.03 (9.6)	0.002 – 0.06 (14.0)	0.0001 – 0.003 (0.9)	MI	HL
<i>Linaria vulgaris</i>	butter and eggs	Park Established	0.0003 – 0.009 (3.5)	0.0009 – 0.03 (3.5)	0.009 – 0.2 (9.6)	ML	HM
<i>Cirsium</i> spp.	thistle	Park Established	0.0001 – 0.003 (0.9)	0 (0)	0 (0)	--	--
<i>Sonchus arvensis</i>	field sowthistle	Park Established	0.0001 – 0.003 (0.9)	0.008 – 0.2 (4.4)	0.0001 – 0.003 (0.9)	LI	HL
<i>Arctium minus</i>	lesser burdock	Park Established	0 (0)	0 (0)	0.002 – 0.09 (5.3)	LI	MI
<i>Daucus carota</i>	Queen Anne's lace	Park Established	0 (0)	0 (0)	0.0001 – 0.003 (0.9)	I	I
<i>Euphorbia esula</i>	leafy spurge	Park Established	0 (0)	0.008 – 0.2 (3.5)	0.0007 – 0.03 (1.8)	M	H
<u>Species searched for in 2013 only</u>							
<i>Leonurus cardiaca</i>	common motherwort	Park Established	0 (0)	0 (0)	0.008 – 0.2 (6.1)	--	--
<i>Rhus glabra</i>	smooth sumac	Native	0 (0)	0 (0)	0.4 – 7.6 (8.8)	--	--
<i>Rumex crispus</i>	curly dock	Park Established	0 (0)	0 (0)	0.008 – 0.3 (28.1)	LI	ML
<u>Species affected by taxonomic and detection issues</u>							
<i>Lonicera</i> spp. (shrub)	honeysuckle	Park Established	0.3 – 3.9 (21.1)	0.4 – 5.8 (18.4)	0.08 – 1.4 (15.8)	--	--
<i>Lonicera tatarica</i>	Tatarian honeysuckle	Park Established	0.0007 – 0.03 (0.9)	0 (0)	0 (0)	M	M
<i>Bromus racemosus</i>	bald brome	Early Detection	0 (0)	0.2 – 2.4 (25.4)	0.2 – 2.2 (23.7)	--	--
<i>Bromus tectorum</i>	cheatgrass	Park Established	0 (0)	0 (0)	0.0007 – 0.03 (0.9)	H	HM
<i>Elaeagnus</i> spp.	oleaster	Park Established	0.03 – 0.5 (3.5)	0 (0)	0 (0)	H	H
<i>Elaeagnus umbellata</i>	autumn olive	Park Established	0 (0)	0.01 – 0.3 (1.8)	0 (0)	H	L

Table 2. Abundance of potentially problematic plants found in Pipestone National Monument and organized 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
<u>Species under management</u>							
<i>Rhamnus cathartica</i>	common buckthorn	Park Established	3.5 – 43.4 (59.6)	0.4 – 8.1 (27.2)	0.1 – 1.9 (29.8)	M	M
<i>Melilotus officinalis</i>	sweetclover	Park Established	1.7 – 28.4 (70.2)	3.3 – 44.9 (43.9)	0.06 – 1.5 (51.8)	M	M
<i>Securigera varia</i>	crownvetch	Park Established	0.8 – 11.1 (18.4)	1.3 – 17.8 (19.3)	0.2 – 3.0 (19.3)	H	L
<i>Cirsium arvense</i>	Canada thistle	Park Established	0.3 – 6.2 (63.2)	0.5 – 8.5 (62.3)	0.07 – 1.9 (49.1)	ML	HM
<i>Cirsium vulgare</i>	bull thistle	Park Established	0.02 – 0.4 (21.9)	0.004 – 0.2 (18.4)	0.006 – 0.2 (13.2)	ML	ML
<i>Carduus nutans</i>	nodding plumeless thistle	Park Established	0.01 – 0.4 (30.7)	0.009 – 0.4 (32.5)	0.006 – 0.2 (20.2)	MI	HM
<i>Cirsium</i> spp.	thistle	Park Established	0.0001 – 0.003 (0.9)	0 (0)	0 (0)	--	--
<i>Lonicera</i> spp. (shrub)	honeysuckle	Park Established	0.3 – 3.9 (21.1)	0.4 – 5.8 (18.4)	0.08 – 1.4 (15.8)	--	--
<i>Lonicera tatarica</i>	Tatarian honeysuckle	Park Established	0.0007 – 0.03 (0.9)	0 (0)	0 (0)	M	M
<i>Elaeagnus</i> spp.	oleaster	Park Established	0.03 – 0.5 (3.5)	0 (0)	0 (0)	H	H
<i>Euphorbia esula</i>	leafy spurge	Park Established	0 (0)	0.008 – 0.2 (3.5)	0.0007 – 0.03 (1.8)	M	H
<i>Elaeagnus umbellata</i>	autumn olive	Park Established	0 (0)	0.01 – 0.3 (1.8)	0 (0)	H	L
<u>Cool-season grass species requiring further consideration of control options</u>							
<i>Poa compressa/pratensis</i>	Bluegrass	Park Established	28.7 – 541.8 (99.1)	21.7 – 368.4 (97.4)	1.9 – 28.9 (97.4)	--	--
<i>Bromus inermis</i>	smooth brome	Park Established	24.1 – 410.3 (95.6)	31.4 – 512.1 (99.1)	20.6 – 282.0 (100)	M	ML
<i>Phalaris arundinacea</i>	reed canarygrass	Park Established	4.2 – 59.3 (50.9)	6.5 – 109.6 (47.4)	4.6 – 81.9 (49.1)	H	HM
<i>Bromus racemosus</i>	bald brome	Early Detection	0 (0)	0.2 – 2.4 (25.4)	0.2 – 2.2 (23.7)	--	--
<i>Bromus tectorum</i>	cheatgrass	Park Established	0 (0)	0 (0)	0.0007 – 0.03 (0.9)	H	HM
<u>Species requiring further management consideration due to potential management difficulty</u>							
<i>Elymus repens</i>	quackgrass	Park Established	0.006 – 0.2 (28.9)	0.007 – 0.1 (0.9)	0.1 – 2.2 (54.4)	ML	HM
<i>Hesperis matronalis</i>	dames rocket	Park Established	0.0007 – 0.03 (9.6)	0.002 – 0.06 (14.0)	0.0001 – 0.003 (0.9)	MI	HL
<i>Linaria vulgaris</i>	butter and eggs	Park Established	0.0003 – 0.009 (3.5)	0.0009 – 0.03 (3.5)	0.009 – 0.2 (9.6)	ML	HM
<i>Rhus glabra</i>	smooth sumac	Native	0 (0)	0 (0)	0.4 – 7.6 (8.8)	Native	Native
<u>Species not requiring management attention</u>							
<i>Typha</i> spp.	cattail	Park Established	0.05 – 0.5 (2.6)	0 (0)	0.07 – 1.5 (1.8)	--	--
<i>Verbascum thapsus</i>	common mullein	Park Established	0.02 – 0.4 (19.3)	0.003 – 0.1 (13.2)	0.002 – 0.06 (5.3)	ML	L
<i>Ulmus pumila</i>	Siberian elm	Park Established	0.007 – 0.1 (4.4)	0.03 – 0.3 (0.9)	0.008 – 0.2 (8.8)	ML	ML
<i>Sonchus arvensis</i>	field sowthistle	Park Established	0.0001 – 0.003 (0.9)	0.008 – 0.2 (4.4)	0.0001 – 0.003 (0.9)	LI	HL
<i>Arctium minus</i>	lesser burdock	Park Established	0 (0)	0 (0)	0.002 – 0.09 (5.3)	LI	MI
<i>Daucus carota</i>	Queen Anne's lace	Park Established	0 (0)	0 (0)	0.0001 – 0.003 (0.9)	I	I
<i>Leonurus cardiaca</i>	common motherwort	Park Established	0 (0)	0 (0)	0.008 – 0.2 (6.1)	--	--
<i>Rumex crispus</i>	curly dock	Park Established	0 (0)	0 (0)	0.008 – 0.3 (28.1)	LI	ML

Pipestone NM Problematic Plant Monitoring



Cover Class



Search Units Park Boundary

