



Monitoring Problematic Plants in Tallgrass Prairie National Preserve - 2014

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, 2010, and 2014, we sought plant species on two watch lists: early detection and park-established.
- Observers used handheld GPS units to follow 400-m line transects, along which they observed target plants (Figure 1).
- Along each transect, 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 2010 and 2014, 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) (Morse et al. 2004) were listed when available.

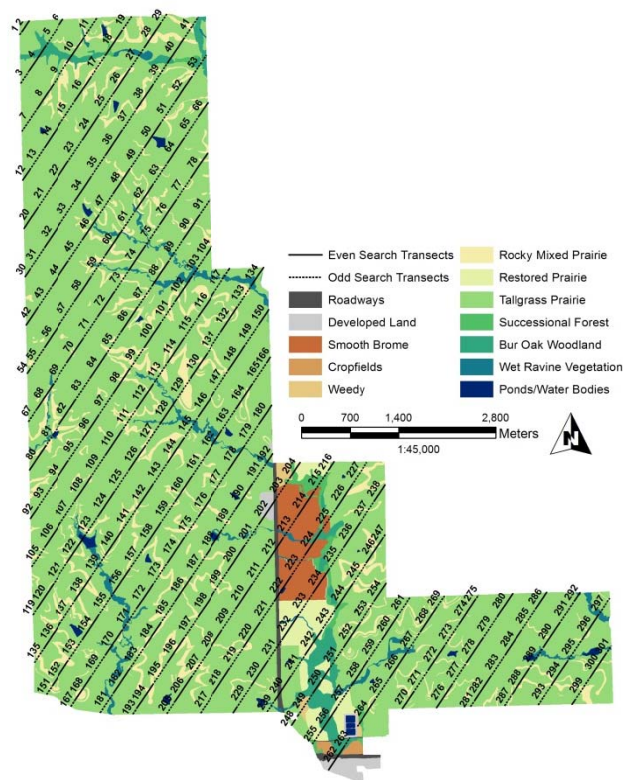


Figure 1. Vegetation cover (Kindscher et al. 2011) and line transects for invasive plant monitoring at Tallgrass Prairie National Preserve.

Summary of Findings:

Two tables summarize the results of this study. Table 1 summarizes frequency and abundance estimates during 2006, 2010, and 2014. 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:

- Bell, J. C., C. C. Young, L. W. Morrison, and C. S. Gross. 2011. Invasive exotic plant monitoring at Tallgrass Prairie National Preserve: Year 2 (2010). Natural Resource Technical Report NPS/HTLN/NRTR—2011/476. National Park Service, Fort Collins, Colorado.
- Kindscher, K., H. Kilroy, J. Delisle, Q. Long, H. Loring, K. Dobbs, and J. Drake. 2011. Vegetation mapping and classification of Tallgrass Prairie National Preserve: Project report. Natural Resource Report NRR/HTLN/NRR—2011/346. 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.
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<<http://www.nps.gov/policy/mp2006.pdf>>. Accessed 22 January 2014.
- 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. L. Haack, J. T. Cribbs, and H. J. Etheridge. 2007b. Invasive exotic plant monitoring at Tallgrass Prairie National Preserve: Year 1 (2006). Natural Resource Technical Report NPS/HTLN/NRTR—2007/014. National Park Service, Fort Collins, Colorado.

Table 1. Overview of potentially problematic plants found in Tallgrass Prairie National Preserve. The first 25 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 /), not available (-), or native.

Scientific Name	Common Name	2006 Park-wide acres (freq.)	2010 Park-wide acres (freq.)	2014 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
<i>Ailanthus altissima</i>	tree of heaven	0 - 0 (0)	0.008 - 0.03 (0.3)	0.009 - 0.4 (0.9)	ML	ML
<i>Alliaria petiolata</i>	garlic mustard	0.1 - 2.9 (1.7)	2.8 - 6.3 (2.7)	0.02 - 0.7 (0.9)	ML	M
<i>Arctium minus</i>	lesser burdock	0.002 - 0.09 (0.9)	0.02 - 0.06 (0.7)	0 - 0 (0)	LI	MI
<i>Bothriochloa bladhii</i>	Caucasian bluestem	0 - 0 (0)	0.08 - 0.3 (0.3)	1 - 20.7 (1.9)	-	-
<i>Bothriochloa ischaemum</i>	yellow bluestem	0 - 0 (0)	0 - 0 (0)	0.02 - 0.7 (0.7)	-	-
<i>Bromus inermis</i>	smooth brome	32.1 - 572.6 (6.9)	827.8 - 1546.9 (8.9)	103.1 - 1795.9 (9.6)	M	ML
<i>Carduus nutans</i>	nodding plumeless thistle	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	MI	HM
<i>Cirsium vulgare</i>	bull thistle	0.02 - 0.7 (0.9)	4.3 - 4.1 (2.3)	0.003 - 0.1 (1.3)	ML	ML
<i>Cynanchum louiseae</i>	Louise's swallow-wort	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	HM	H
<i>Elymus repens</i>	quackgrass	0 - 0 (0)	0.008 - 0.03 (0.3)	0 - 0 (0)	ML	HM
<i>Hedera helix</i>	English ivy	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	M	ML
<i>Hypericum perforatum</i>	common St. Johnswort	0 - 0 (0)	0.8 - 1.6 (0.3)	0 - 0 (0)	ML	M
<i>Juniperus virginiana</i>	eastern redcedar	0.03 - 1.1 (2.3)	2.6 - 5.6 (1.7)	0.1 - 2.7 (2.3)	Native	Native
<i>Lespedeza cuneata</i>	sericea lespedeza	0 - 0 (0)	0 - 0 (0)	0.08 - 1.6 (0.3)	ML	ML
<i>Lonicera japonica</i>	Japanese honeysuckle	0 - 0 (0)	0 - 0 (0)	0.008 - 0.3 (0.3)	M	HM
<i>Maclura pomifera</i>	osage orange	0 - 0 (0)	16.2 - 18.5 (5.6)	0 - 0 (0)	ML	L
<i>Melilotus officinalis</i>	sweetclover	0.009 - 0.4 (0.7)	1.4 - 3.9 (3.3)	0.0008 - 0.03 (0.3)	M	M
<i>Morus alba</i>	white mulberry	0.09 - 1.9 (0.9)	4.3 - 4.1 (2.3)	0.8 - 16.9 (2.7)	ML	ML
<i>Pyrus calleryana</i>	Callery pear	0.08 - 1.6 (0.3)	0.8 - 1.6 (0.3)	0.008 - 0.3 (0.3)	LI	ML
<i>Robinia pseudoacacia</i>	black locust	0.08 - 1.6 (0.3)	0.08 - 0.3 (0.3)	0 - 0 (0)	HM	M
<i>Rosa multiflora</i>	multiflora rose	0 - 0 (0)	0 - 0 (0)	0.4 - 3.4 (0.9)	L	L
<i>Rumex crispus</i>	curly dock	0 - 0 (0)	3.4 - 10.1 (20.3)	0.2 - 4.3 (4.9)	-	-
<i>Sorghum halepense</i>	Johnsongrass	0.9 - 14.8 (3.9)	12.7 - 21.1 (2.3)	1.4 - 23.4 (1.9)	ML	HM
<i>Ulmus pumila</i>	Siberian elm	0 - 0 (0)	0 - 0 (0)	0.04 - 1.4 (2.7)	ML	ML
<i>Verbascum thapsus</i>	common mullein	0 - 0 (0)	0 - 0 (0)	0.08 - 1.7 (0.9)	ML	L
Species likely affected by detection or identification issues						
<i>Bromus arvensis</i>	field brome	0 - 0 (0)	326.5 - 524.9 (35.5)	1.5 - 26.4 (10.9)	-	-
<i>Bromus racemosus</i>	bald brome	11.6 - 224.9 (13.9)	0 - 0 (0)	0 - 0 (0)	-	-
<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	0.0008 - 0.03 (0.3)	0 - 0 (0)	0 - 0 (0)	M	HL
<i>Lolium</i> sp.	ryegrass	0.2 - 3.6 (0.9)	0 - 0 (0)	0 - 0 (0)	-	-
<i>Schedonorus phoenix</i>	tall fescue	0 - 0 (0)	25.8 - 47.1 (4.7)	2.3 - 41.5 (4.3)	M	HM

Table 1 (cont.). Overview of potentially problematic plants found in Tallgrass Prairie National Preserve. 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	2006 Park-wide acres (freq.)	2010 Park-wide acres (freq.)	2014 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
<u>Species likely affected by detection or identification issues (cont.)</u>						
<i>Poa pratensis</i>	Kentucky bluegrass	0 - 0 (0)	6.9 - 16.1 (7.3)	0.4 - 3.3 (0.7)	M	ML
<i>Torilis arvensis</i>	spreading hedgeparsley	0 - 0 (0)	13.1 - 17.9 (6.9)	0.6 - 6.6 (1.3)	-	-
<i>Torilis japonica</i>	erect hedgeparsley	0.05 - 1.9 (2.3)	0 - 0 (0)	0 - 0 (0)	-	-
<i>Typha xglauca</i>	hybrid cattail	0 - 0 (0)	1.6 - 3.3 (0.7)	0 - 0 (0)	-	-
<i>Typha angustifolia</i>	narrowleaf cattail	0.02 - 0.9 (0.9)	0 - 0 (0)	0.8 - 16.5 (0.7)	HM	M
<u>Aquatic species likely affected by search effort</u>						
<i>Nasturtium officinale</i>	watercress	0 - 0 (0)	0 - 0 (0)	0.08 - 1.6 (0.3)	-	-

Table 2. Categorization of potentially problematic plants in Tallgrass Prairie National Preserve as to the action that is 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	2006 Park-wide acres (freq.)	2010 Park-wide acres (freq.)	2014 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
<u>Species under management</u>						
<i>Ailanthus altissima</i>	tree of heaven	0 - 0 (0)	0.008 - 0.03 (0.3)	0.009 - 0.4 (0.9)	ML	ML
<i>Bothriochloa bladhii</i>	Caucasian bluestem	0 - 0 (0)	0.08 - 0.3 (0.3)	1 - 20.7 (1.9)	-	-
<i>Bothriochloa ischaemum</i>	yellow bluestem	0 - 0 (0)	0 - 0 (0)	0.02 - 0.7 (0.7)	-	-
<i>Cynanchum louiseae</i>	Louise's swallow-wort	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	HM	H
<i>Hypericum perforatum</i>	common St. Johnswort	0 - 0 (0)	0.8 - 1.6 (0.3)	0 - 0 (0)	ML	M
<i>Juniperus virginiana</i>	eastern redcedar	0.03 - 1.1 (2.3)	2.6 - 5.6 (1.7)	0.1 - 2.7 (2.3)	Native	Native
<i>Lespedeza cuneata</i>	sericea lespedeza	0 - 0 (0)	0 - 0 (0)	0.08 - 1.6 (0.3)	ML	ML
<i>Maclura pomifera</i>	osage orange	0 - 0 (0)	16.2 - 18.5 (5.6)	0 - 0 (0)	ML	L
<i>Melilotus officinalis</i>	sweetclover	0.009 - 0.4 (0.7)	1.4 - 3.9 (3.3)	0.0008 - 0.03 (0.3)	M	M
<i>Robinia pseudoacacia</i>	black locust	0.08 - 1.6 (0.3)	0.08 - 0.3 (0.3)	0 - 0 (0)	HM	M
<i>Sorghum halepense</i>	Johnsongrass	0.9 - 14.8 (3.9)	12.7 - 21.1 (2.3)	1.4 - 23.4 (1.9)	ML	HM
<u>Early detection species that may require immediate control</u>						
<i>Carduus nutans</i>	nodding plumelless thistle	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	MI	HM
<i>Centaurea stoebe ssp. micranthos</i>	spotted knapweed	0.0008 - 0.03 (0.3)	0 - 0 (0)	0 - 0 (0)	M	HL
<i>Elymus repens</i>	quackgrass	0 - 0 (0)	0.008 - 0.03 (0.3)	0 - 0 (0)	ML	HM
<i>Hedera helix</i>	English ivy	0 - 0 (0)	0 - 0 (0)	0.0008 - 0.03 (0.3)	M	ML
<i>Lonicera japonica</i>	Japanese honeysuckle	0 - 0 (0)	0 - 0 (0)	0.008 - 0.3 (0.3)	M	HM
<i>Rosa multiflora</i>	multiflora rose	0 - 0 (0)	0 - 0 (0)	0.4 - 3.4 (0.9)	L	L
<u>Woodland species requiring further assessment</u>						
<i>Alliaria petiolata</i>	garlic mustard	0.1 - 2.9 (1.7)	2.8 - 6.3 (2.7)	0.02 - 0.7 (0.9)	ML	M
<i>Morus alba</i>	white mulberry	0.09 - 1.9 (0.9)	4.3 - 4.1 (2.3)	0.8 - 16.9 (2.7)	ML	ML
<i>Torilis arvensis</i>	spreading hedgeparsley	0 - 0 (0)	13.1 - 17.9 (6.9)	0.6 - 6.6 (1.3)	-	-
<i>Torilis japonica</i>	erect hedgeparsley	0.05 - 1.9 (2.3)	0 - 0 (0)	0 - 0 (0)	-	-
<i>Ulmus pumila</i>	Siberian elm	0 - 0 (0)	0 - 0 (0)	0.04 - 1.4 (2.7)	ML	ML
<u>Aquatic and wetland species requiring further assessment</u>						
<i>Nasturtium officinale</i>	watercress	0 - 0 (0)	0 - 0 (0)	0.08 - 1.6 (0.3)	-	-
<i>Typha angustifolia</i>	narrowleaf cattail	0.02 - 0.9 (0.9)	0 - 0 (0)	0.8 - 16.5 (0.7)	HM	M
<i>Typha xglauca</i>	hybrid cattail	0 - 0 (0)	1.6 - 3.3 (0.7)	0 - 0 (0)	-	-
<u>Cool season grasses requiring further evaluation of control options</u>						
<i>Bromus arvensis</i>	field brome	0 - 0 (0)	326.5 - 524.9 (35.5)	1.5 - 26.4 (10.9)	-	-
<i>Bromus inermis</i>	smooth brome	32.1 - 572.6 (6.9)	827.8 - 1546.9 (8.9)	103.1 - 1795.9 (9.6)	M	ML
<i>Bromus racemosus</i>	bald brome	11.6 - 224.9 (13.9)	0 - 0 (0)	0 - 0 (0)	-	-

Table 2 (cont.). Categorization of potentially problematic plants in Tallgrass Prairie National Preserve as to the action that is 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	2006 Park-wide acres (freq.)	2010 Park-wide acres (freq.)	2014 Park-wide acres (freq.)	Ecological Impact	Management Difficulty
<u>Cool season grasses requiring further evaluation of control options (cont.)</u>						
<i>Lolium</i> sp.	ryegrass	0.2 - 3.6 (0.9)	0 - 0 (0)	0 - 0 (0)	-	-
<i>Schedonorus phoenix</i>	tall fescue	0 - 0 (0)	25.8 - 47.1 (4.7)	2.3 - 41.5 (4.3)	M	HM
<i>Poa pratensis</i>	Kentucky bluegrass	0 - 0 (0)	6.9 - 16.1 (7.3)	0.4 - 3.3 (0.7)	M	ML
<u>Species not requiring immediate management attention</u>						
<i>Arctium minus</i>	lesser burdock	0.002 - 0.09 (0.9)	0.02 - 0.06 (0.7)	0 - 0 (0)	LI	MI
<i>Cirsium vulgare</i>	bull thistle	0.02 - 0.7 (0.9)	4.3 - 4.1 (2.3)	0.003 - 0.1 (1.3)	ML	ML
<i>Pyrus calleryana</i>	Callery pear	0.08 - 1.6 (0.3)	0.8 - 1.6 (0.3)	0.008 - 0.3 (0.3)	LI	ML
<i>Rumex crispus</i>	curly dock	0 - 0 (0)	3.4 - 10.1 (20.3)	0.2 - 4.3 (4.9)	-	-
<i>Verbascum thapsus</i>	common mullein	0 - 0 (0)	0 - 0 (0)	0.08 - 1.7 (0.9)	ML	L

Tallgrass Prairie NPres Problematic Plant Moniotring

