



Sand Creek Massacre National Historic Site

2011 Exotic Plant Monitoring

Exotic plants represent one of the most significant threats to natural resources in national parks. Exotic plants are a concern due to their abilities to reproduce prolifically, rapidly colonize new areas, displace native species, alter ecosystem processes across multiple scales, and detract from the interpretive value of park resources. In the Great Plains, grasslands have been increasingly degraded and fragmented, which results in increasing chances of exotic plant species invasions.

Invasive exotic plants have been consistently ranked as a top vital sign for long-term monitoring as part of the NPS Inventory & Monitoring Program. During final selection of vital signs in 2006, invasive exotic plant monitoring was recognized across all Southern Plains Network (SOPN) parks as the most important shared monitoring need. The objectives of monitoring high-priority exotics in areas of high and low invasion probability are to: (1) detect exotic species introductions early, (2) determine changes in the status and trend (density, abundance, or extent), and (3) determine changes in species composition.

Methods

Overall sampling at Sand Creek Massacre National Historic Site (NHS) occurs on unpaved roads over its full three-year rotation. In 2011, exotic plant monitoring occurred at Sand Creek Massacre NHS in late June. The vector sampled was the unpaved interior road from the grove to the northwestern boundary. A total of 110 vector blocks were monitored, for a total of 2.75 linear kilometers sampled on both sides (Figure 1). In addition, 12 permanent transects within the landscape were sampled for a total of 60 2x1 meter plots. Eight species of exotics were detected with primary and secondary monitoring (Table 1). No exotics were observed in twenty-five vector blocks. SOPN has now completed one full rotation of panels and re-visits will begin in 2012.

Results

Past land use has impacted the current plant communities, and possibly introduced many of the exotics found today. Wind efficiently spreads the seed of many of the worst exotics found on site, and disturbance from prairie dog towns and nearby agricultural lands also provide propagule pools for re-infestation of treated areas.

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NPS/JIM PISAROWICZ

Common lambsquarters (*Chenopodium album*) was the most frequently encountered exotic in 2011 at Sand Creek Massacre NHS.

Common lambsquarters (*Chenopodium album*) was the most frequently encountered exotic in 2011, found in 50% of the primary vector blocks and one secondary transect. It was found in scattered patches primarily along the vector itself. This drought-tolerant annual is found throughout the west, seeding prolifically and primarily occupying disturbed ground, although once established it has the capacity to persist in the landscape. Botanists debate its nativity, some treating it as an exotic from Eurasia, while others think there is a native strain. A word of caution must be offered: positive identification of this species can be difficult. Common lambsquarters has variable traits that mimic other native and exotic lambsquarters. SOPN continues to verify this species whenever encountered, but we do believe we have identified it correctly.

Prickly Russian thistle (*Salsola tragus*) was the second most commonly detected species in 37% of the primary vector

blocks and 25% of the secondary transects. This drought-tolerant annual produces abundant seed and disperses them widely when it breaks from its roots and tumbles across the prairie. As long as it has access to sunlight, prickly Russian thistle is efficient at establishing in small bare-ground areas among existing vegetation in the landscape. The resulting widespread distribution makes it difficult to control.

A similar species, kochia (*Kochia scoparia*) was found in 28% of the primary vector blocks and 50% of the secondary

transects. This drought-tolerant annual exotic produces abundant seed that are widely distributed as the spent plant breaks from its roots and blows across the prairie. Kochia is an early successional plant that readily establishes in sites with soil disturbance, outcompeting other native early successional and responding favorably to increased nitrogen in the soil. It persists in the landscape by developing dense stands and maintaining increased nitrogen levels through annual foliage shedding. Kochia can also increase the fine-fuel load leading to a more intense fire capacity.

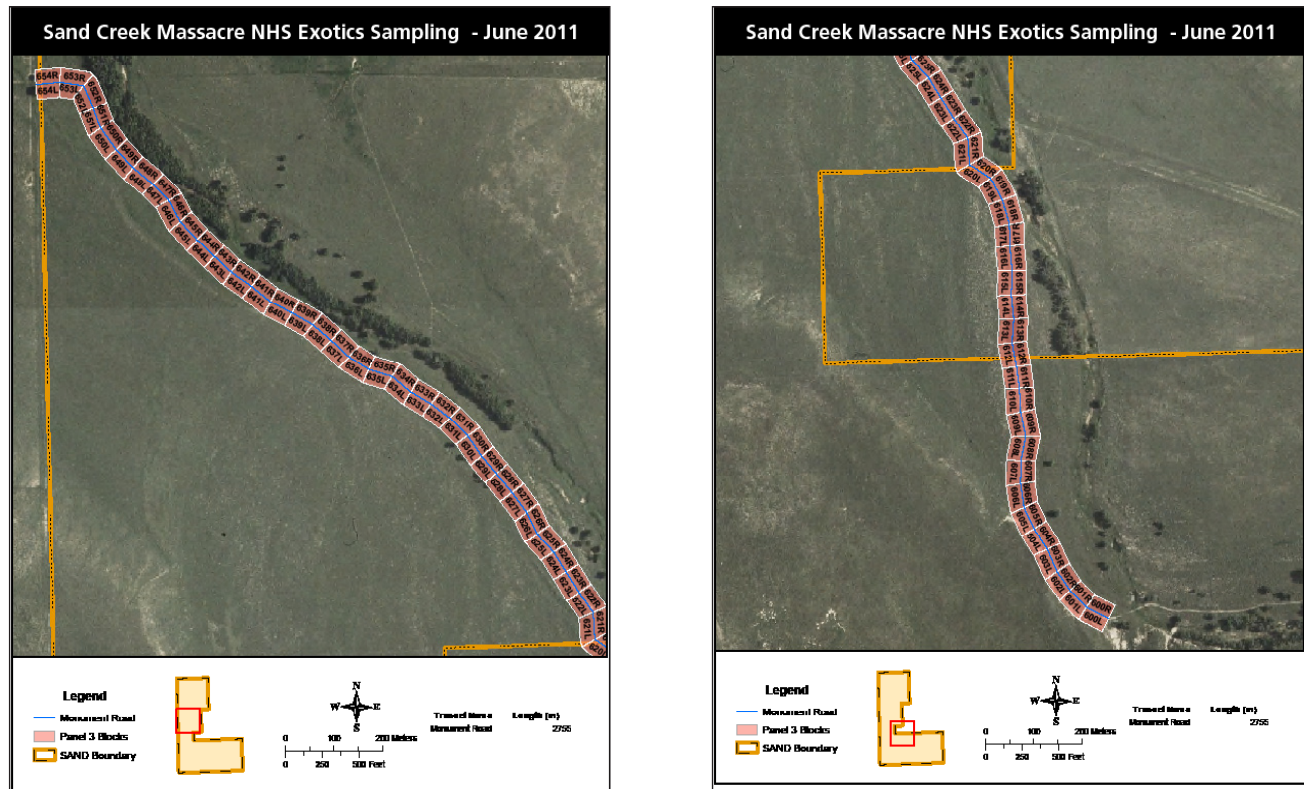


Figure 1. Individual vector blocks sampled, north section (left) and south section (right), Sand Creek Massacre NHS, 2011.

Table 1. Number and percentage of primary and secondary sample units where each species was detected, Sand Creek Massacre NHS, 2011.

Scientific name	Common name	Primary sample units (n=122)		Secondary sample units (n=12)	
		Total	% blocks	Total	% transects
<i>Chenopodium album</i>	common lambsquarters	66	60.00	1	8.33
<i>Salsola tragus</i>	prickly Russian thistle	41	37.27	3	25.00
<i>Kochia scoparia</i>	kochia	31	28.18	6	50.00
<i>Cirsium vulgare</i>	bull thistle	3	2.73	-	-
<i>Tragopogon dubius</i>	western salsify	2	1.82	-	-
<i>Convolvulus arvensis</i>	field bindweed	1	0.91	1	8.33
<i>Meilotus officinalis</i>	yellow sweetclover	1	0.91	1	8.33
<i>Rumex crispus</i>	curly dock	1	0.91	-	-