



Plant Community Composition and Structure Monitoring for Scotts Bluff National Monument

2016 Data Report

Natural Resource Data Series NPS/NGPN/NRDS—2016/1076



ON THE COVER

Plant Community Composition and Structure Monitoring plot PCM-0004 at Scotts Bluff National Monument, May 2016.
Photograph courtesy of the National Park Service.

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Contents

	Page
Figures.....	iv
Tables.....	iv
Abstract.....	v
Acknowledgments.....	vi
Introduction.....	7
Methods.....	7
NGPN Monitoring Plots 2016.....	7
Plot Layout and Sampling.....	9
Data Management and Analysis.....	12
Results.....	14
Literature Cited.....	19

Figures

	Page
Figure 1. Map of Scotts Bluff National Monument Plant Community Monitoring plots and Fire Plant Community Monitoring plots visited in 2016.	9
Figure 2. Long-term monitoring plot layout used for sampling vegetation in Scotts Bluff National Monument.	10
Figure 3. The Northern Great Plains Inventory & Monitoring vegetation crew.....	11

Tables

	Page
Table 1. Field journal for plant community monitoring in Scotts Bluff National Monument for the 2016 season.....	8
Table 2. Plant community monitoring by NGPFire in Scotts Bluff National Monument for the 2016 season.	8
Table3. Exotic species surveyed for at Scotts Bluff National Monument as part of the early detection and rapid response program within the Northern Great Plains Network.	11
Table 4. Definitions of state and global species conservation status ranks.....	12
Table 5. List of all plant species identified in SCBL long-term plant community monitoring plots in 2016.....	14
Table 6. Number of plant species per plot identified in eight plots at Scotts Bluff National Monument in 2016.	16
Table 7. Woody species data from eight plots visited at Scotts Bluff National Monument in 2016.	17
Table 8. Disturbance type and approximate area observed in 15 plots visited at Scotts Bluff National Monument in 2016.....	17

Abstract

This report presents the results of vegetation monitoring efforts in 2016 at Scotts Bluff National Monument (SCBL) by the Northern Great Plains Inventory and Monitoring Network (NGPN) and Northern Great Plains Fire Ecology Program (NGPFire).

During the sixth full year of field work, crew members from NGPN visited eight long-term monitoring plots on May 23-25, 2016 to collect data on the plant communities at SCBL. This is part of a long-term monitoring effort to better understand the condition of the vegetation at SCBL. NGPN staff captured data relating to species richness, herb-layer height, abundance of individual native and non-native species, ground cover, and site disturbance on each of the eight plots. In plots where woody species were present, we also measured tree regeneration, tall shrub and tree density, and woody fuel load. In addition, crew members from NGPFire visited ten sites (including three that were visited by the NGPN) on September 16-17, 2016 to document the South Bluff Rx (prescribed) Fire. Data from NGPFire are included in the disturbance section of this report.

Our 2016 findings can be summarized as follows: The NGPN monitoring crew identified 78 plant species in eight monitoring plots visited in 2016 at SCBL, of which 14 were exotic species. A single tree was observed at one of the eight plots. Tree regeneration and woody fuel loads were not observed at any plots. The most common disturbances we observed were the South Bluff Rx fire, small mammal use, and grazing.

Acknowledgments

We thank the authors of the NGPN Plant Community Monitoring Protocol, particularly A. Symstad, for outstanding guidance on data collection and reporting. Thank you to the staff at SCBL, particularly R. Manasek, for providing logistical support and safety checks. The 2016 NGPN vegetation field crew of I. Ashton, C. Davis, J. Ladd, L. Mickelson, S. Rockwood, W. Vogel, M. Davis, L. Lafleur, and K. Rugg, and the 2016 NGPFire field crew of D. Swanson, E. Watson, I. Muirhead, and C. Tomford collected all the data included in this report.

Introduction

Scotts Bluff National Monument (SCBL) was established in 1919 to protect and preserve two iconic bluffs and the associated heritage of western expansion. It covers 3,003 acres and is dominated by mixed-grass prairie with smaller areas of juniper woodlands, badlands, and riparian forests. Vegetation monitoring began at SCBL in 1997 by the Heartland Inventory & Monitoring Program (James 2010) and the Northern Great Plains Fire Ecology Program (NGPFire; Wienk et al. 2011). In 2010, SCBL was incorporated into the Northern Great Plains Inventory & Monitoring Network (NGPN). At that time, vegetation monitoring protocols and plot locations were shifted to better represent the entire park and to coordinate efforts with NGPFire (Symstad et al. 2012b). A total of 34 plots were established by NGPFire and NGPN in SCBL and the combined sampling efforts began in 2011 (Ashton and Davis, 2016). In 2014, an additional 20 plots were established in the riparian forest to assess forest condition. In this report, we provide summaries of the data collected in 2016 by NGPN at eight upland plots and by NGPFire at ten plots (including three that were visited by the NGPN) within the South Bluff Rx fire area. Please refer to the “Northern Great Plains Fire Ecology Annual Report: Calendar Year 2016” and the South Bluff Fire Effects Monitoring Report for park burn unit analysis and interpretation of the 2016 monitoring results (available at <https://irma.nps.gov/DataStore>).

Methods

The NGPN Plant Community Composition and Structure Monitoring Protocol (Symstad et al. 2012b, a) describes in detail the methods used for sampling long-term plots. Below, we briefly describe the general approach. For those interested in more detail, please see the protocol publications cited above, and available at <http://science.nature.nps.gov/im/units/ngpn/monitor/plants.cfm>.

NGPN Monitoring Plots 2016

The NGPN and NGPFire implemented a survey to monitor plant community structure and composition in SCBL using a spatially balanced probability design (Generalized Random Tessellation Stratified [GRTS]; Stevens and Olsen 2003, 2004). Using the GRTS design, NGPN selected 20 randomly located sites within the upland grasslands of SCBL to install Plant Community Monitoring plots (PCM plots; Figure 1). These 20 sites are split into five panels containing four sites each. The NGPN visits eight PCM plots (two panels) every year using a rotating sampling scheme where four sites were visited in the previous year and four sites were most recently visited four years previously. In a full five-year rotation, each plot will have been visited twice. In 2016, the NGPN crew visited eight upland PCM plots in panel 1 and panel 5 during the week of May 23-25 (Table 1). The NGPFire crew visited ten sites (including three that were visited by the NGPN) on September 17&19, 2016 (Table 2) for post-burn severity plot visits following the 860 acre South Bluff prescribed fire on September 16.

Table 1. Field journal for plant community monitoring in Scotts Bluff National Monument (SCBL) for the 2016 season. Plant community monitoring was completed using a crew of nine people. On the morning of May 25, 2016, half the crew stayed at SCBL to monitor the eighth plot, while the remaining half of the crew traveled to Agate Fossil Beds National Monument to monitor two plots before returning to Rapid City.

Date	Approximate Travel Time (hrs)	Housing	Plots Read	Plot Notes (number of crew, hours to complete plot, and plot notes)
Monday, May 23, 2016	5	Monument Inn Gering, NE	SCBL_PCM_0020	full crew of 9; 2.5 hrs
			SCBL_PCM_0025	full crew of 9; 1.5 hrs
Tuesday, May 24, 2016	N/A	Monument Inn Gering, NE	SCBL_PCM_0002	crew of 5; 2 hrs; tree needs tag
			SCBL_PCM_0004	crew of 4; 1.5 hrs; easy plot ~25 min from car
			SCBL_PCM_0018	crew of 5; 1.5 hrs; abundant <i>Bromus tectorum</i>
			SCBL_PCM_0021	crew of 4; 2.5 hrs; took ~45 min to find nails and rebar
			SCBL_PCM_0022	crew of 5; 3 hrs
Wednesday, May 25, 2016	5	N/A	SCBL_FPCM_0039	crew of 4; 2.75 hrs; no nails at quads; shrubby plot

Table 2. Plant community monitoring by NGPFire in Scotts Bluff National Monument (SCBL) for the 2016 season. Plant community monitoring was completed using a crew of two to three people. The 860 acre South Bluff prescribed fire was completed on September 16, 2016. Post-burn severity monitoring on ten plots within the unit were completed over two days. * South Bluff fire effects monitoring report contains detailed information on fire objectives, progression, weather, behavior, smoke, and plot analysis.

Date	Plots Read	Plot burn severity: Vegetation & Substrate *
Sept. 19, 2016	SCBL_PCM_0004	Veg: moderate Substrate: light
Sept. 17, 2016	SCBL_PCM_0005	Veg: moderate Substrate: light/moderate
Sept. 17, 2016	SCBL_PCM_0013	Veg: light Substrate: light
Sept. 17, 2016	SCBL_PCM_0018	Veg: light Substrate: scorched
Sept. 19, 2016	SCBL_PCM_0020	Veg: moderate Substrate: light
Sept. 19, 2016	SCBL_PCM_0024	Veg: moderate Substrate: light
Sept. 17, 2016	SCBL_FPCM_0097	Veg: light Substrate: scorched
Sept. 17, 2016	SCBL_FPCM_0130	Veg: light Substrate: scorched
Sept. 17, 2016	SCBL_FPCM_0165	Veg: light Substrate: light
Sept. 17, 2016	SCBL_FPCM_0221	Veg: light Substrate: scorched

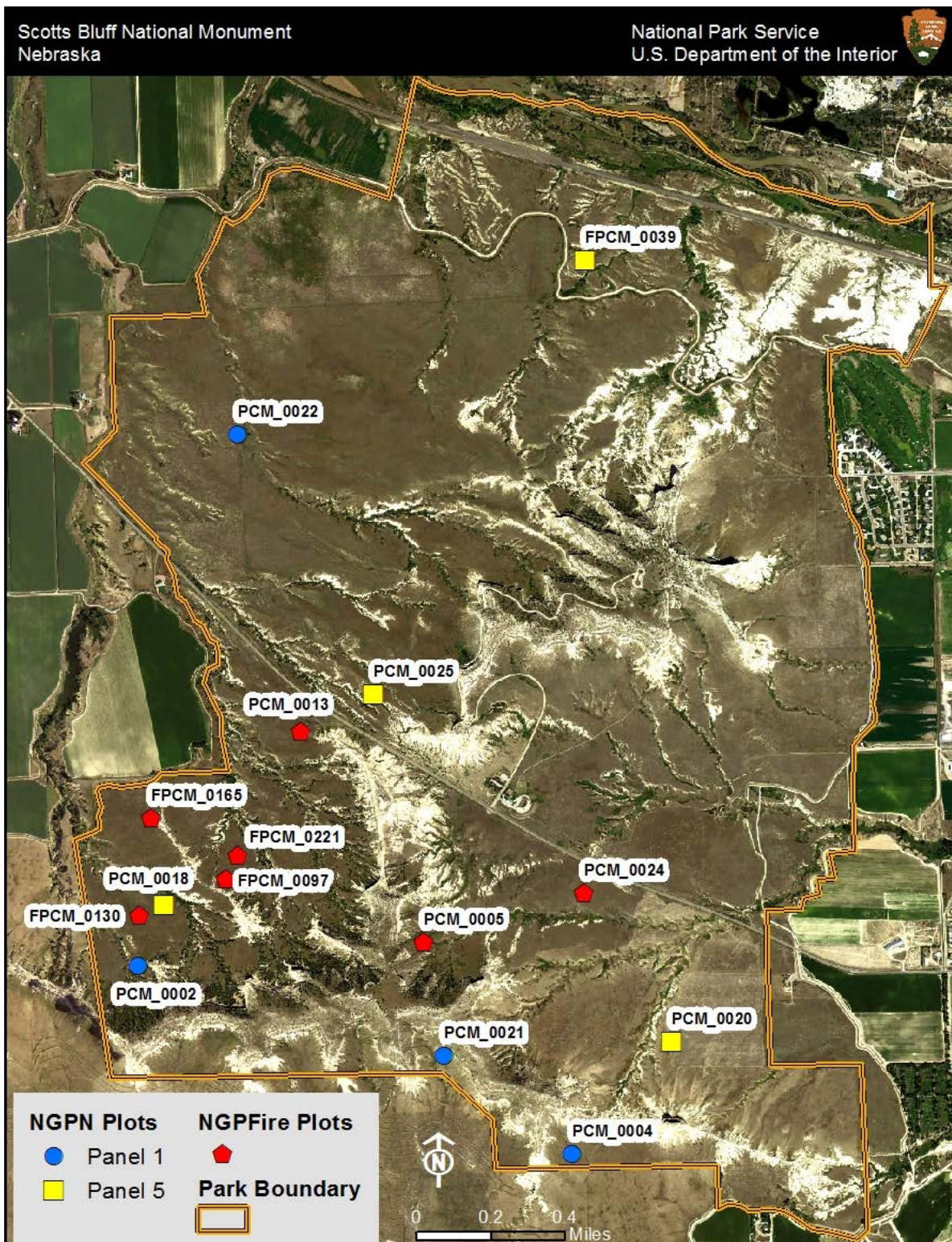


Figure 1. Map of Scotts Bluff National Monument (SCBL) plant community monitoring plots visited in 2016. Four Panel 1 plots (in blue), and four Panel 5 plots (in yellow) were monitored in 2016 by NGPN. An additional seven plots were monitored by NGPFire (in red). NGPFire crews collect post-burn severity data in PCM plots in addition to FPCM monitoring plots when PCM plots are located in the area of a prescribed burn.

Plot Layout and Sampling

At each of the sites visited, the NGPN crew recorded plant species cover and frequency in a rectangular, 50 m x 20 m (0.1 ha), permanent plot (Figure 2). Data on ground cover, herb-layer height ≤ 2 m, and plant cover were collected along two 50 m transects (the long sides of the plot) using a point-intercept method (Figure 3). At 50 locations along each transect, once every 1 meter, a pole was dropped to the ground and all species that touched the pole were recorded, along with ground cover and canopy height. Species richness data from the point-intercept method were supplemented with species presence data collected in five 1 m² quadrats located systematically along each transect (Figure 2). When woody species were also present, tree regeneration and tall shrub density data were collected within a 10 m radius subplot centered in the larger 50 m x 20 m plot (Figure 2). Trees with diameter at breast height (DBH) > 15 cm, located within the entire 0.1 ha plot, were mapped and tagged. For each tree, the species, DBH, status (live or dead), and condition (e.g., leaf-discoloration, insect-damaged, etc.) were recorded. Dead and downed woody fuel load data were also collected at these forested plots along two perpendicular, 100 foot (30.49 m) transects with midpoints at the center of the plot (Figure 2), following Brown's Line methods (Brown 1974, Brown et al. 1982).

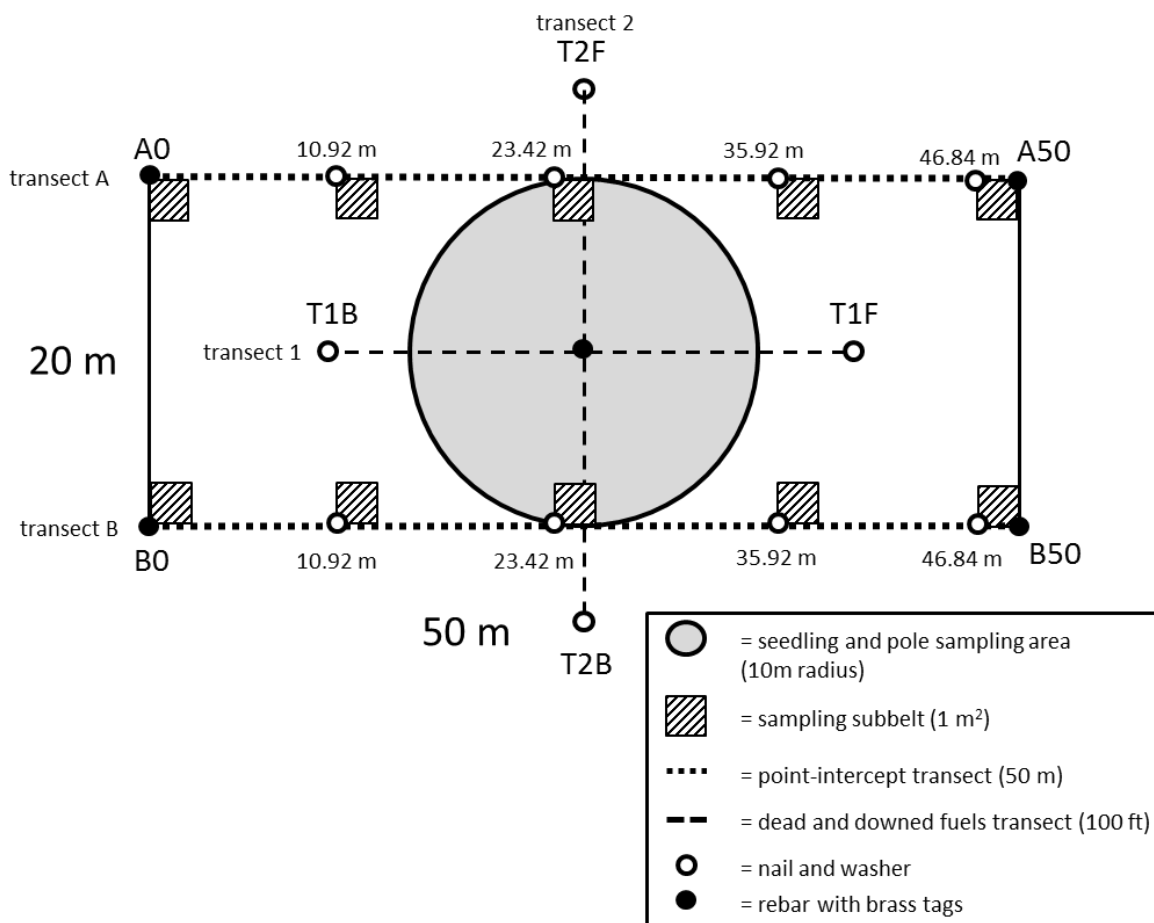


Figure 2. Long-term monitoring plot layout used for sampling vegetation in Scotts Bluff National Monument.

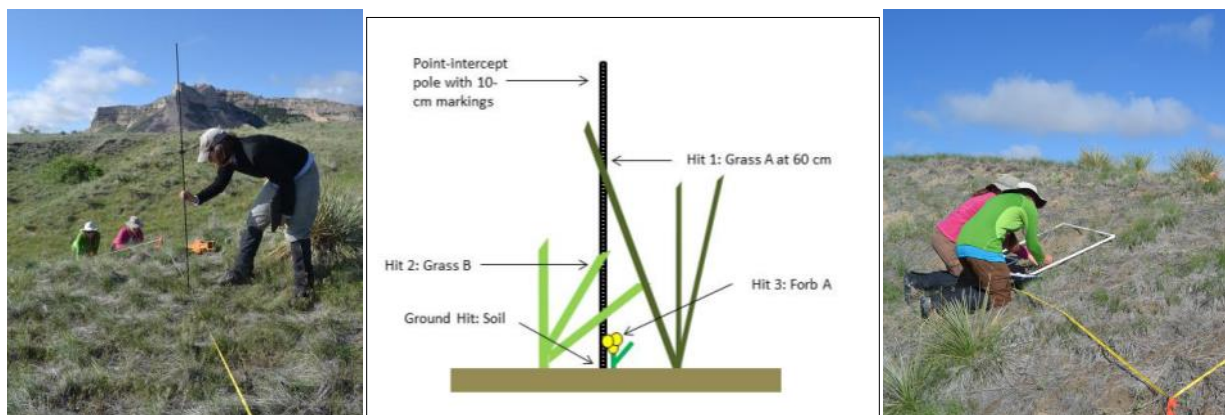


Figure 3. The Northern Great Plains Inventory & Monitoring vegetation crew used point-intercept (left and center panel) and 1m² quadrats (right panel) to document plant diversity and abundance.

At each of the plots visited, common disturbances and target early detection exotic species were also assessed and documented. Common disturbances include such things as prairie dog towns, animal trails, and fire occurrence. For all plots, the type, severity, and approximate area (m²) of the disturbances were recorded. Early detection exotic species have the potential to spread into the park and cause significant ecological impacts were chosen in collaboration with the Midwest Invasive Plant Network, the Exotic Plant Management Team, park managers, and local weed experts (Table 3). For each early detection exotic species present, an abundance class was given on a scale from 1-5 where 1 = one individual, 2 = few individuals, 3 = cover of 1-5%, 4 = cover of 5-25%, and 5 = cover > 25% of the plot. The information gathered from this procedure is critical for early detection and rapid response to such threats.

Table3. Exotic species surveyed for at Scotts Bluff National Monument as part of the early detection and rapid response program within the Northern Great Plains Network.

Scientific Name	Common Name	Habitat
<i>Alliaria petiolata</i>	garlic mustard	Riparian
<i>Polygonum cuspidatum</i> ; <i>P. sachalinense</i> ; <i>P. x bohemicum</i>	knotweeds	Riparian
<i>Pueraria montana</i> var. <i>lobata</i>	kudzu	Riparian
<i>Iris pseudacorus</i>	yellow iris	Riparian
<i>Ailanthus altissima</i>	tree of heaven	Riparian
<i>Lepidium latifolium</i>	perennial pepperweed	Riparian
<i>Arundo donax</i>	giant reed	Riparian
<i>Rhamnus cathartica</i>	common buckthorn	Riparian
<i>Heracleum mantegazzianum</i>	giant hogweed	Riparian
<i>Centaurea solstitialis</i>	yellow star thistle	Upland
<i>Hieracium aurantiacum</i> ; <i>H. caespitosum</i>	orange and meadow hawkweed	Upland
<i>Isatis tinctoria</i>	Dyer's woad	Upland
<i>Taeniatherum caput-medusae</i>	medusahead	Upland

Table3 (continued). Exotic species surveyed for at Scotts Bluff National Monument as part of the early detection and rapid response program within the Northern Great Plains Network.

Scientific Name	Common Name	Habitat
<i>Chondrilla juncea</i>	rush skeletonweed	Upland
<i>Gypsophila paniculata</i>	baby's breath	Upland
<i>Centaurea virgata</i> ; <i>C. diffusa</i>	knapweeds	Upland
<i>Linaria dalmatica</i> ; <i>L. vulgaris</i>	toadflax	Upland
<i>Euphorbia myrsinites</i> & <i>E. cyparissias</i>	myrtle spurge	Upland
<i>Dipsacus fullonum</i> & <i>D. laciniatus</i>	common teasel	Upland
<i>Salvia aethiopis</i>	Mediterranean sage	Upland
<i>Ventenata dubia</i>	African wiregrass	Upland

The conservation status ranks of plant species in Nebraska is determined by the Nebraska Natural Heritage Program (NENHP). For the purpose of this report, a species was considered rare if its conservation status rank was S1, S2, or S3. See Table 4 for a detailed definition of each conservation status rank.

Table 4. Definitions of state and global species conservation status ranks*.

Status Rank	Category	Definition
S1/G1	Critically imperiled	Due to extreme rarity (5 or fewer occurrences) or other factor(s) making it especially vulnerable to extirpation.
S2/G2	Imperiled	Due to rarity resulting from a very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.
S3/G3	Vulnerable	Due to a restricted range, relatively few populations (often 80 or fewer), recent widespread declines, or other factors making it vulnerable to extirpation.
S4/G4	Apparently secure	Uncommon but not rare; some cause for concern due to declines or other factors.
S5/G5	Secure	Common, widespread and abundant.
S#S#/ G#G#	Range rank (e.g. S2S3)	Used to indicate uncertainty about the status of the species or community. Ranges cannot skip more than one rank.

*Adapted from NatureServe status assessment table (<http://www.natureserve.org/conservation-tools/conservation-status-assessment>)

Data Management and Analysis

The FFI database (FEAT/FIREMON Integrated; <http://frames.gov/ffi/>) was used as the primary software environment for managing the sampling data. This database is used by a variety of agencies (e.g., NPS, USDA Forest Service, U.S. Fish and Wildlife Service), has a national-level support system, and generally conforms to the Natural Resource Database Template standards established by the Inventory and Monitoring Program. Species scientific names, codes, and common names are from the USDA Plants Database (USDA-NRCS 2016). Nomenclature follows the Integrated Taxonomic Information System (ITIS) standards (<http://www.itis.gov>). In the rare case where ITIS recognized a new name that was not in the USDA Plants database, the new name was used and a

unique plant code was assigned. After data for the sites were entered into the FFI database, 100% of database records were verified with the original data sheets to minimize transcription errors, followed by a final 10% check. After all data were entered and verified, automated queries were used to check for errors in the data. When errors were identified by the crew or the automated queries, changes were made to the original datasheets and the FFI database as needed.

Results

There are 395 vascular plant species on the SCBL plant species list (<https://irma.nps.gov/NPSpecies/Search/SpeciesList/SCBL>). The NGPN monitoring crew identified 78 plant species in eight monitoring plots visited in 2016 at SCBL (Table 5). Of these plant species, 14 are exotic species at SCBL. All exotic species were either forbs or graminoids (grasses, sedges, and rushes). After reviewing the 2016 plant species list, we determined that one species was likely misidentified: meadow deathcamas (*Toxicoscordion venenosum*), which does not occur in Nebraska. Another species, common evening-primrose (*Oenothera biennis*), is not currently on the park species list but is likely to occur in the park. On a future visit a voucher specimen will be collected to verify identification. Based on species data collected in 2016, SCBL_FPCM_0039, a plot in the northern part of the park, is the most diverse plot, and SCBL_PCM_0025, close to the Oregon Trail Pathway, is the least diverse plot (Table 6). Plots SCBL_PCM_0002 and SCBL_PCM_0022 have the greatest exotic species cover, and SCBL_PCM_0021, a plot in the southern part of the park, has the greatest native species cover. No target early detection exotic species were identified (Table 3). All trees, shrubs and subshrubs we observed were native species.

Table 5. List of all plant species identified in SCBL long-term plant community monitoring plots in 2016. The species are grouped by plant family. An “X” in the exotic column means that species is not native to the park or, in the case where only the genus was identified, there are some species within that genus that are exotic. Species considered to be rare in Nebraska are marked in the final column and the state conservation ranks are provided.

Family	Code	Scientific Name	Common Name	Exotic	Rare
Agavaceae	YUGL	<i>Yucca glauca</i>	soapweed yucca		
Anacardiaceae	RHTR	<i>Rhus trilobata</i>	skunkbush sumac		
Asclepiadaceae	ASPU	<i>Asclepias pumila</i>	plains milkweed		
Asteraceae	AMAR2	<i>Ambrosia artemisiifolia</i>	annual ragweed		
	AMPS	<i>Ambrosia psilostachya</i>	Cuman ragweed		
	ARFI2	<i>Artemisia filifolia</i>	sand sagebrush		
	ARFR4	<i>Artemisia frigida</i>	prairie sagewort		
	CIRSI	<i>Cirsium</i> spp.	thistle	X	
	COCA5	<i>Conyza canadensis</i>	Canadian horseweed		
	ERNA10	<i>Ericameria nauseosa</i>	rubber rabbitbrush		S2S4
	GUSA2	<i>Gutierrezia sarothrae</i>	broom snakeweed		
	HELIA3	<i>Helianthus</i> spp.	sunflower		
	HEVI4	<i>Heterotheca villosa</i>	hairy false goldenaster		S1
	LASE	<i>Lactuca serriola</i>	prickly lettuce	X	
	LYJU	<i>Lygodesmia juncea</i>	rush skeletonplant		
	MUOB99	<i>Mulgedium oblongifolium</i>	blue lettuce		
	PACA15	<i>Packera cana</i>	woolly groundsel		
	RACO3	<i>Ratibida columnifera</i>	upright prairie coneflower		
	RUHI2	<i>Rudbeckia hirta</i>	blackeyed Susan		
	SERI2	<i>Senecio riddellii</i>	Riddell's ragwort		

Table 5 (continued). List of all plant species identified in SCBL long-term plant community monitoring plots in 2016. The species are grouped by plant family. An “X” in the exotic column means that species is not native to the park or, in the case where only the genus was identified, there are some species within that genus that are exotic. Species considered to be rare in Nebraska are marked in the final column and the state conservation ranks are provided.

Family	Code	Scientific Name	Common Name	Exotic	Rare
Asteraceae (continued)	SYMPH4	<i>Symphyotrichum</i> spp.	aster		
	TAOF	<i>Taraxacum officinale</i>	common dandelion	X	
	TRDU	<i>Tragopogon dubius</i>	yellow salsify	X	
Boraginaceae	LAOC3	<i>Lappula occidentalis</i>	flatspine stickseed		
	LIIN2	<i>Lithospermum incisum</i>	narrowleaf stoneseed		
Brassicaceae	DEPI	<i>Descurainia pinnata</i>	western tansymustard		S3S5
	DRRE2	<i>Draba reptans</i>	Carolina draba		
	LEDE	<i>Lepidium densiflorum</i>	common pepperweed		
	SIAL2	<i>Sisymbrium altissimum</i>	tall tumbledustard	X	
Cactaceae	OPPO	<i>Opuntia polyacantha</i>	plains pricklypear		
Caprifoliaceae	SYOC	<i>Symphoricarpos occidentalis</i>	western snowberry		
Caryophyllaceae	ERHO13	<i>Eremogone hookeri</i>	Hooker's sandwort		S3S5
	PADE4	<i>Paronychia depressa</i>	spreading nailwort		
Chenopodiaceae	CHENO	<i>Chenopodium</i> spp.	goosefoot	X	
	KOSC	<i>Kochia scoparia</i>	burningbush, kochia	X	
	KRLA2	<i>Krascheninnikovia lanata</i>	winterfat		S3S5
	SATR12	<i>Salsola tragus</i>	prickly Russian thistle	X	
Cupressaceae	JUSC2	<i>Juniperus scopulorum</i>	Rocky Mountain juniper		
Cyperaceae	CAFI	<i>Carex filifolia</i>	threadleaf sedge		
Euphorbiaceae	CRTE4	<i>Croton texensis</i>	Texas croton		
Fabaceae	ASTRA	<i>Astragalus</i> spp.	milkvetch		
	ASGR3	<i>Astragalus gracilis</i>	slender milkvetch		
	DACA7	<i>Dalea candida</i>	white prairie clover		
	LAPO2	<i>Lathyrus polymorphus</i>	manystem pea		
	MEOF	<i>Melilotus officinalis</i>	yellow sweetclover	X	
	PEAR6	<i>Pedimelum argophyllum</i>	silverleaf Indian breadroot		
	PSTE5	<i>Psoralea tenuiflorum</i>	slimflower scurfpea		
	THRH	<i>Thermopsis rhombifolia</i>	prairie thermopsis		
	VIAM	<i>Vicia americana</i>	American vetch		S2S4
Lamiaceae	SARE3	<i>Salvia reflexa</i>	lanceleaf sage		
Malvaceae	SPCO	<i>Sphaeralcea coccinea</i>	scarlet globemallow		
Melanthiaceae	TOVE2	<i>Toxicoscordion venenosum</i>	meadow deathcamas		
Onagraceae	OEBI	<i>Oenothera biennis</i>	common evening-primrose		
	OESU99	<i>Oenothera suffrutescens</i>	scarlet beeblossom		
Plantaginaceae	PLPA2	<i>Plantago patagonica</i>	woolly plantain		S2S4

Table 5 (continued). List of all plant species identified in SCBL long-term plant community monitoring plots in 2016. The species are grouped by plant family. An “X” in the exotic column means that species is not native to the park or, in the case where only the genus was identified, there are some species within that genus that are exotic. Species considered to be rare in Nebraska are marked in the final column and the state conservation ranks are provided.

Family	Code	Scientific Name	Common Name	Exotic	Rare
Poaceae	ACHY	<i>Achnatherum hymenoides</i>	Indian ricegrass		
	AGCR	<i>Agropyron cristatum</i>	crested wheatgrass	X	
	ARPU9	<i>Aristida purpurea</i>	purple threeawn		S3S5
	BOCU	<i>Bouteloua curtipendula</i>	sideoats grama		
	BOGR2	<i>Bouteloua gracilis</i>	blue grama		
	BRJA	<i>Bromus japonicus</i>	Japanese brome	X	
	BRTE	<i>Bromus tectorum</i>	cheatgrass	X	
	CALO	<i>Calamovilfa longifolia</i>	prairie sandreed		
	ELTR7	<i>Elymus trachycaulus</i>	slender wheatgrass		S1
	HECO26	<i>Hesperostipa comata</i>	needle and thread		
	KOMA	<i>Koeleria macrantha</i>	prairie Junegrass		
	NAVI4	<i>Nassella viridula</i>	green needlegrass		
	PASM	<i>Pascopyrum smithii</i>	western wheatgrass		
	POPR	<i>Poa pratensis</i>	Kentucky bluegrass	X	
	SCSC	<i>Schizachyrium scoparium</i>	little bluestem		
	SPCR	<i>Sporobolus cryptandrus</i>	sand dropseed		
	VUOC	<i>Vulpia octoflora</i>	sixweeks fescue		
Polemoniaceae	PHAN4	<i>Phlox andicola</i>	prairie phlox		
	PHHO	<i>Phlox hoodii</i>	spiny phlox		
Rubiaceae	GAAP2	<i>Galium aparine</i>	stickywilly		
Scrophulariaceae	PEAL2	<i>Penstemon albidus</i>	white penstemon		
Unknown Family	UNKFORB	Unknown forb	unknown forb	X	
Urticaceae	PAPE5	<i>Parietaria pensylvanica</i>	Pennsylvania pellitory		

Table 6. Number of plant species per plot identified in eight plots at Scotts Bluff National Monument in 2016.

MacroPlot Name	Native (number of species)	Exotic (number of species)	Total (number of species)
SCBL_FPCM_0039	33	9	42
SCBL_PCM_0002	12	6	18
SCBL_PCM_0004	14	4	18
SCBL_PCM_0018	11	4	15
SCBL_PCM_0020	24	5	29
SCBL_PCM_0021	32	3	35
SCBL_PCM_0022	14	7	21
SCBL_PCM_0025	10	4	14

We identified nine rare plant species in SCBL monitoring plots in 2016. Two of these are critically imperiled (S1): slender wheatgrass (*Elymus trachycaulus*) and hairy false goldenaster (*Heterotheca villosa*). Seven other species were ranked either imperiled to apparently secure (S2S4) or vulnerable to secure (S3S5) and are noted in the “Rare” column in Table 4. All of the rare species we observed are classified as secure (G5) at the global scale, but are rare in the state because they exist on the edge of their global range in Nebraska.

There was a single live tree present at one of the eight sites visited in 2016 (Table 7). Tree data collected included species name, size class based on diameter at breast height (DBH), status (live or dead), total number of individuals, and density per hectare. DBH categories are tree (DBH>15 cm), pole (2.54 cm<DBH<15 cm), and seedling (DBH<2.54 cm). No poles or seedlings were present at any of the sites visited in 2016.

Table 7. Woody species data from eight plots visited at Scotts Bluff National Monument in 2016. Only one plot (SCBL_PCM_0002) had any trees, poles, or seedlings present. DBH categories are tree (DBH>15 cm), pole (2.54 cm<DBH<15 cm), and seedling (DBH<2.54 cm).

Plot Name	Common Name	DBH	Status	Total Individuals	Density/ha.
SCBL_PCM_0002	Rocky Mountain juniper	Tree	Alive	1	25

Dead and downed wood and surface fuels provide foraging habitat and refugia for wildlife, substrate for mosses and fungi, and microhabitats that can encourage plant establishment. When surface fuels are too abundant they can increase the risk of high intensity fires. We surveyed for surface fuels in one plot, SCBL_PCM_0002, but there were no measurable woody fuels at that plot. Surface fuels were not measured at the other seven plots because no trees were present.

Disturbances occurred in all 15 plant community monitoring plots that were visited at SCBL in 2016 (Table 8). The South Bluff Rx fire, which took place on September 16, 2016, was the most common disturbance observed. Other common disturbances included recently grazed vegetation and small mammal use which includes mounds of dirt left by gophers and badgers. Animal trails, prescribed fire signs, and erosion were also seen.

Table 8. Disturbance type and approximate area observed in 15 plots visited at Scotts Bluff National Monument in 2016. At sites visited by the NGPN for PCM monitoring, the size of the disturbance was approximated estimated in m² of a total area of 1000 m². On September 16, 2016 NGPFire conducted the South Bluff Rx Fire; for those sites, the size of the disturbance was approximated out of a total area of 730 m² per plot.

MacroPlot Name	Disturbance Type	Size (m ²)
SCBL_FPCM_0039	Animal Trail	10
	Small Mammal	2
SCBL_FPCM_0097	South Bluff Rx Fire	730
SCBL_FPCM_0130	South Bluff Rx Fire	730

Table 8 (continued). Disturbance type and approximate area observed in 15 plots visited at Scotts Bluff National Monument in 2016. At sites visited by the NGPN for PCM monitoring, the size of the disturbance was approximated estimated in m² of a total area of 1000 m². On September 16, 2016 NGPFire conducted the South Bluff Rx Fire; for those sites, the size of the disturbance was approximated out of a total area of 730 m² per plot.

MacroPlot Name	Disturbance Type	Size (m ²)
SCBL_FPCM_0165	South Bluff Rx Fire	730
SCBL_FPCM_0221	South Bluff Rx Fire	730
SCBL_PCM_0002	Small Mammal	5
SCBL_PCM_0004	Small Mammal	250
	South Bluff Rx Fire	730
SCBL_PCM_0005	South Bluff Rx Fire	730
SCBL_PCM_0013	South Bluff Rx Fire	730
SCBL_PCM_0018	Grazing	1
	Small Mammal	2
	South Bluff Rx Fire	730
SCBL_PCM_0020	Grazing	1
	Rx Fire	1000
	Small Mammal	150
	South Bluff Rx Fire	730
SCBL_PCM_0021	Small Mammal	2
	Erosion	50
SCBL_PCM_0022	Small Mammal	10
SCBL_PCM_0024	South Bluff Rx Fire	730
SCBL_PCM_0025	Grazing	1
	Small Mammal	10

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