



# Sagebrush Steppe Vegetation Monitoring in Grand Teton National Park

## *2012 Annual Report*

Natural Resource Data Series NPS/UCBN/NRDS—2013/461



**ON THE COVER**

UCBN and GRTE staff estimating and recording cover of vegetation in a quadrat in Grand Teton National Park, 2012  
Photograph courtesy of UCBN

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# **Sagebrush Steppe Vegetation Monitoring in Grand Teton National Park**

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## Executive Summary

As part of the NPS enhanced monitoring for climate change initiative launched in 2010, the Upper Columbia Basin Network (UCBN) adapted its sagebrush steppe vegetation monitoring protocol (Yeo et al. 2009) for use in Grand Teton National Park (GRTE; Yeo and Rodhouse, *unpublished*). This report presents data from the first year of field sampling which occurred in July 2012. Recently, the Greater Yellowstone Network adapted the UCBN protocol for use in Bighorn Canyon National Recreation Area (Tercek et al. 2013), which now brings seven parks from across the two networks together under a common framework for monitoring. Following Yeo and Rodhouse (*unpublished*), thirty permanent 10-ha sampling frames were established in sagebrush dry shrubland and sagebrush/antelope bitterbrush vegetation in the park for long-term monitoring. Within these frames, 50 temporary point locations for guiding the placement of cover estimation quadrats were drawn using a spatially-balanced sampling design. As part of the protocol (Yeo and Rodhouse *unpublished*), new locations will be drawn within frames prior to each future survey event. In 2012, all 30 frames were inspected to ensure appropriate placement and long-term viability. In addition, 10 frames were identified as high priority to be visited annually or as frequently as possible, allowing GRTE staff the flexibility to vary the resources allocated to the project over time (Yeo and Rodhouse *unpublished*). In 2012, 698 quadrat locations in 14 frames were surveyed, including all 10 high priority frames and 4 additional frames. Survey methodology consisted of estimating exposed bare ground and foliar cover (in classes) of principal native and non-native species within each quadrat, following Yeo et al. (2009). This provides a description of vegetation patterns in frames that can inform management decisions over time.

Winter and spring weather patterns prior to sampling in 2012 were cooler and drier than the long-term average, which may have slowed plant growth and resulted in relatively lower than typical foliar cover. Survey results indicated that each of the frames contain diverse native plant communities. Relatively few principal non-native invasive species were found in frames. Dandelion (*Taraxacum officinale*) and salsify (*Tragopogon dubius*) were frequently encountered principal non-native forbs. Spotted knapweed, a more serious concern, was encountered in one quadrat in one frame at 1-5% cover. No other principal non-native forbs were reported. Non-native invasive grasses were relatively uncommon, but non-native bluegrasses (*Poa spp.*) were found in most frames. Quackgrass (*Elymus repens*), Japanese brome (*Bromus japonicus*), and bulbous bluegrass (*Poa bulbosa*) were encountered in several frames as well. Diversity of native grasses and forbs was high in all frames, with more than a half dozen principal grass species (as many as 12 in some frames) and more than a dozen principal forbs found in every frame. Buckwheats (*Eriogonum spp.*) were typically the most dominant forbs, often being recorded with >25% cover. Balsamorhiza (*Balsamorhiza sagittata*) was also often conspicuous and recorded with >25% cover. Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) were the most dominant grasses. Sedges (*Carex spp.*) and needlegrasses (*Stipa spp.*) were also abundant in many frames as well. Sagebrush (*Artemisia spp.*) was abundant and the dominant overstory shrub in all frames. Bitterbrush (*Purshia tridentata*) also represented a substantial overstory component in 6 frames. These patterns represent an important early step in the developing baseline of sagebrush steppe ecological information that will inform future comparisons and enable GRTE staff to make more informed management decisions.

## **Acknowledgments**

Mike Britten, Lisa Garrett, and Kristin Legg facilitated this project by directing NPS funds from the FY11 enhanced monitoring for climate change initiative. Kelly McCloskey, Sue Wolff, and Ken Stella provided helpful guidance and information on GRTE management objectives and information needs in park sagebrush steppe communities that facilitated sampling design development and the positioning of sampling frames. Meghan Lonneker provided GIS support. Kristin Legg, Kelly McCloskey, and Ken Stella provided much appreciated comments and edits to a previous draft of the report. Kristin Legg, Kelly McCloskey, Ken Stella, Mike Tercek, Cathie Jean, Devin Stucki, Dan Esposito, and several additional GRTE staff assisted with data collection in July 2012. Kelly McCloskey provided staff orientation, safety training, and camping opportunities for all field participants.

## Introduction

In 2010, three National Park Service Inventory & Monitoring Networks that contained high elevation parks collaborated to develop monitoring strategies adapted for anticipated accelerated climate change (NPS 2010). These networks were: the Greater Yellowstone Network (GRYN), the Rocky Mountain Network (ROMN), and the Upper Columbia Basin Network (UCBN). Sagebrush steppe monitoring was identified as a key component of this strategy and the group decided to adapt the existing UCBN sagebrush steppe protocol (Yeo et al. 2009) to establish a baseline of data for Grand Teton National Park's (GRTE) sagebrush steppe communities. Yeo and Rodhouse (*unpublished*) describe the adaptations of the original Yeo et al. (2009) protocol for GRTE. In addition, GRYN recently completed an adaptation of the Yeo et al. (2009) protocol for Bighorn Canyon National Recreation Area (BICA; Tercek et al. 2013), another GRYN park unit.

GRTE covers about 310,000 acres (excluding John D. Rockefeller, Jr. Memorial Parkway) with the Teton Range rising dramatically along the western half of the park. Expansive flats dominated mostly by sagebrush communities extend south and east of Jackson Lake (Figure 1 and cover photo). Elevations range from about 6300 feet to over 6800 feet on these flats. Sagebrush communities (or areas that were once sagebrush) occupy almost a quarter of the land area of the park. On the eastern side of Blacktail Butte (Figure 1), historic hayfields occupy flats that once were sagebrush, and now GRTE managers are in the process of restoring some of these former farmed lands to native sagebrush steppe. Since the middle of the 1990s, fire has burned about 10% of existing or former sagebrush steppe habitat. Except for the old hayfields, most of the vegetation in the sagebrush ecosystem is native. However, as anywhere within sagebrush steppe across the western United States, invasion by non-native plants is an ongoing concern.

The sagebrush steppe ecosystem in GRTE is comprised of 5 principal plant associations (Figure 1). Sagebrush dry shrubland, dominated by mountain big sagebrush (*Artemisia tridentata* subsp. *vaseyana*) with diverse perennial native grasses and forbs, occupies about 61% of sagebrush steppe habitat in GRTE. Rangeland dominated by herbs, including the historic hayfields, occupies about 18% of sagebrush steppe. Communities dominated by mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*) cover about 11% of sagebrush steppe. Two other associations, low sagebrush (*A. arbuscula*) and mountain big sagebrush-shrubby cinquefoil (*Dasiphora floribunda*) occupy about 4-5% of the remainder of sagebrush steppe in the park. Sagebrush steppe vegetation monitoring is focused in the two most widespread associations: sagebrush dry shrubland and mountain big sagebrush/antelope bitterbrush. An additional focus is to provide reference conditions for restoration of the Kelly hayfields which are adjacent to these two plant associations.

This report describes results from the first year of monitoring in GRTE following the Yeo and Rodhouse (*unpublished*) protocol adaptation. This represents an important step forward for the park in establishing baseline quantitative descriptions of sagebrush steppe community patterns that can be used to evaluate long-term changes resulting from climate change, fire, biological invasions, park development, and wildlife and human useage patterns. The monitoring approach for GRTE has been adapted from the UCBN protocol (Yeo et al. 2009) to address principal threats and disturbances to sagebrush steppe habitat in GRTE. The reader should refer to Yeo

and Rodhouse (*unpublished*) and Yeo et al. (2009) for detailed descriptions of the various methodological components of the sagebrush steppe monitoring protocol. Tercek et al. (2013) provide an additional reference for similar monitoring efforts underway in BICA.

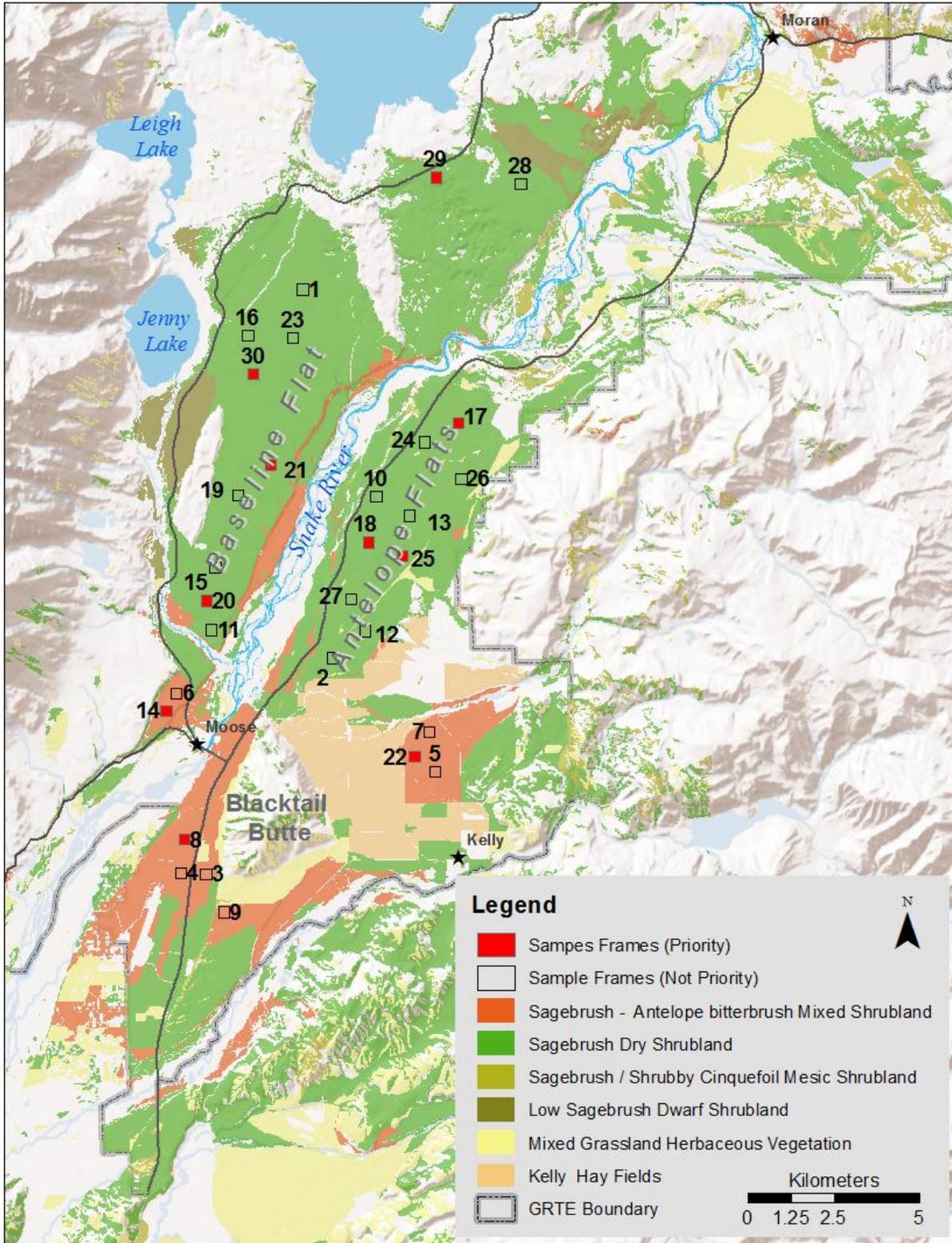
## **Objectives**

One of the park's long-term resource management goals is to maintain and restore native ecosystems and ecological processes (i.e., ecosystem integrity/health). The extent and severity of exotic plant invasion, altered community composition, and altered species abundances in GRTE sagebrush steppe can be used to measure changes in these native ecosystems. Sagebrush steppe vegetation monitoring in GRTE adapted from the Yeo et al. (2009) protocol will provide managers with the information necessary to evaluate current conditions and trends in native shrub steppe communities, including changes in non-native species composition and abundance.

The foundation of the sagebrush steppe monitoring protocol is a view of ecosystem health sustained by natural succession or natural variability within communities of native plants. Divergence of sagebrush steppe communities from these natural states (e.g., invasion of non-native plants, increased fire frequencies, long-term trends of increasing cover of exposed soil, declines in cover of principal native plants) signifies a loss of health, and provides the feedback to park managers for effective adaptive management strategies. Simple monitoring objectives that focus on the status and trends of key indicators of biotic integrity, soil stability, and hydrologic function follow directly from this view:

- Determine the status (current condition) and trends (change in condition over time) in the composition and abundance (cover) of principal native plant species.
- Determine the status and trends in composition and abundance (cover) of principal invasive plant species, including annual grasses.
- Determine the status and trend in the amount of exposed soil (cover), a fundamental indicator of soil stability.

Specific to GRTE, these objectives will be pursued through regular monitoring in the 2 most widespread and important sagebrush steppe communities in the park: sagebrush dry shrubland and sagebrush-bitterbrush steppe (Figure 1). An additional goal for GRTE is for this monitoring program to also provide baseline information about sagebrush communities in the park that can be used as reference sites to assess the success of restoration efforts in former agricultural fields northeast of Blacktail Butte.



**Figure 1.** Monitoring sampling frame distribution (30 frames) within sagebrush steppe vegetation types in Grand Teton National Park. The 10 priority frames are highlighted in red.

## Study Area and Methods

Thirty 10-ha (316m x 316m) sampling frames were placed within sagebrush dry shrubland and sagebrush-bitterbrush steppe plant associations (Yeo and Rodhouse *unpublished*, Figure 1). In July 2012, reconnaissance was conducted in all 30 frames and 10 were selected as high priority. All 10 priority frames and 4 additional frames were surveyed in July, 2012. Table 1 provides a list of the 14 frames surveyed in 2012. Within each frame, cover estimation of bare ground and principal native and non-native plant species were made in fifty 1 m<sup>2</sup> quadrats, following Yeo et al. (2009). Appendix A lists the principal species targeted for monitoring. Cover estimation was done using ocular estimation of cover in Daubenmire cover classes (Table 2). Plant cover was defined as the natural spread of current year's growth outlined using a minimum convex polygon with small gaps included in the cover estimate. Exposed bare ground was defined as soil surface not overlain by plant cover, litter, and rock.

**Table 1.** Sample frames and sample sizes achieved within each frame during the 2012 survey.

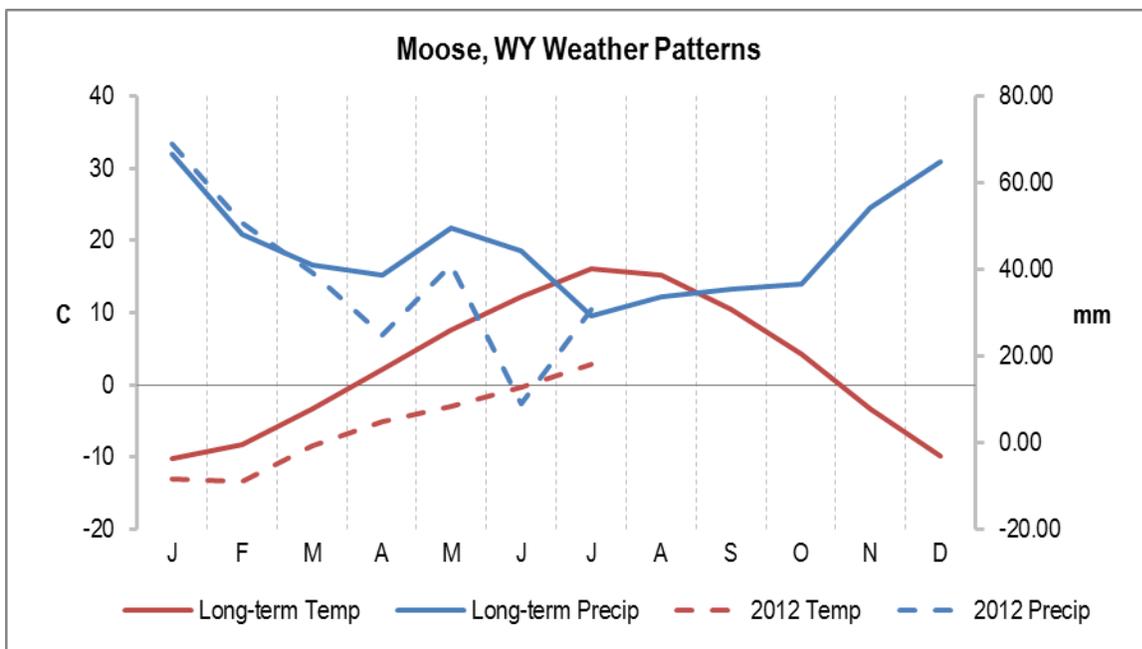
Frame Number	2012 Sample Size
1	50
3	50
7	50
8	50
10	49
14	50
17	49
18	50
20	50
21	50
22	50
25	50
29	50
30	50

A spatially-balanced sampling design (the generalized random-tessellation stratified [GRTS] design described by Stevens and Olsen [2004]) was used to locate quadrats. The sample size of 50 was determined through a combination of power analysis and ad hoc practical considerations to ensure sufficient power to estimate status and trend with adequate precision within sampling frames (Yeo et al. 2009, Irvine and Rodhouse 2010). Note that in two frames, one plot each was accidentally overlooked, resulting in sample sizes of 49 for those frames (Table 1).

**Table 2.** Daubenmire's cover classes used for visually estimating vegetation cover in 1 m<sup>2</sup> square quadrats.

Cover Class	Range
1	>0-5%
2	>5-25%
3	>25-50%
4	>50-75%
5	>75-95%
6	>95%

Weather patterns for 2012 as recorded by the Moose, Wyoming National Weather Service Cooperative Network station (COOP station #486428) indicate that the 2012 growing season was cooler and drier than average conditions over the period of record (1958-2012).



**Figure 2.** Temperature and precipitation patterns recorded at the Moose COOP weather station. Long-term averages are from the period of record, 1958-2012.

## Results and Discussion

Surveys occurred during the weeks of July 9 and July 16. The timing of field work relative to plant phenology was good, although due to the cooler and drier spring weather some species were thought to be relatively under-represented in cover and frequency relative to anecdotal observations made in recent “good” years (K. Stella, *personal communication*). No quadrats were dropped due to safety or other considerations and in general the reconnaissance of frames indicated that all were in relatively good positions and no changes to frame placement were needed. In frames 10 and 17, one plot each was accidentally overlooked, resulting in a total achieved sample size of 698.

Survey results indicated that each of the frames contain diverse native plant communities. Appendix B provides tables of the percentage of quadrats within each frame estimated within each Daubenmire cover class for bare ground and for each principal species encountered. Relatively few principal non-native invasive species were found in frames. Dandelion (*Taraxacum officinale*) and salsify (*Tragopogon dubius*) were frequently encountered principal non-native forbs. Spotted knapweed, a more serious concern, was encountered in one quadrat in one frame at 1-5% cover. No other principal non-native forbs were reported. Non-native invasive grasses were relatively uncommon, but non-native bluegrasses (*Poa spp.*) were found in most frames. Quackgrass (*Elymus repens*), Japanese brome (*Bromus japonicus*), and bulbous bluegrass (*Poa bulbosa*) were encountered in several frames as well. Diversity of native grasses and forbs was high in all frames, with more than a half dozen principal grass species (as many as 12 in some frames) and more than a dozen principal forbs found in every frame. Buckwheats (*Eriogonum spp.*) were typically the most dominant forbs, often being recorded with >25% cover. Balsamorhiza (*Balsamorhiza sagittata*) was also often conspicuous and recorded with >25% cover. Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) were the most dominant grasses. Sedges (*Carex spp.*) and needlegrasses (*Stipa spp.*) were also abundant in many frames as well. Sagebrush (*Artemisia spp.*) was abundant and the dominant overstory shrub in all frames. Bitterbrush (*Purshia tridentata*) also represented a substantial overstory component in 6 frames. These patterns represent an important early step in the developing baseline of sagebrush steppe ecological information that will inform future comparisons and enable GRTE staff to make more informed management decisions.

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## Appendix A. Principal Species List for Monitoring Sagebrush Steppe in Grand Teton National Park

**Table A-1.** Principal species list for monitoring sagebrush steppe in Grand Teton National Park. This list has been uploaded to the project database to provide “pick lists” for quick data entry.

<b>Common Name</b>	<b>Species Name</b>
<b>Sagebrush</b>	
low sagebrush	<i>Artemisia arbuscula</i>
silver sagebrush	<i>Artemisia cana</i>
fringed sagebrush	<i>Artemisia frigida</i>
big sagebrush	<i>Artemisia tridentata</i>
threetip sagebrush	<i>Artemisia tripartita</i>
<b>Other Shrubs</b>	
serviceberry	<i>Amelanchier alnifolia</i>
green rabbitbrush	<i>Chrysothamnus viscidiflorus</i>
grey rabbitbrush	<i>Ericamerica nauseosa</i>
creeping barberry	<i>Mahonia repens</i>
shrubby cinquefoil	<i>Dasiphora floribunda (Potentilla fruticosa)</i>
chokecherry	<i>Prunus virginiana</i>
antelope bitterbrush	<i>Purshia tridentata</i>
gooseberry	<i>Ribes spp.</i>
snowberry	<i>Symphoricarpos spp.</i>
<b>Native Perennial Grasses</b>	
Indian ricegrass	<i>Achnatherum hymenoides (Oryzopsis hymenoides)</i>
mountain brome	<i>Bromus marginatus</i>
sedges	<i>Carex spp.</i>
onespike danthonia	<i>Danthonia unispicata</i>
slender wheatgrass	<i>Elymus trachycaulus</i>
Idaho fescue	<i>Festuca idahoensis</i>
prairie junegrass	<i>Koeleria macrantha (Koeleria cristata)</i>
oniongrass	<i>Melica spp.(Melica bulbosa)</i>
Sandberg bluegrass	<i>Poa secunda</i>
bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>
squirreltail	<i>Elymus elymoides (Sitanion hystrix)</i>
needleandthread grass	<i>Hesperostipa comata (Stipa comata)</i>
Nelson's needlegrass	<i>Achnatherum nelsonii (Stipa nelsonii)</i>
<b>Persistent Native Forbs</b>	
yarrow	<i>Achillea millefolium</i>
pussytoes	<i>Antennaria spp.</i>
sandwort	<i>Arenaria spp.</i>
aster	<i>Aster spp.</i>
milkvetch	<i>Astragalus spp.</i>

**Table A-1** (continued). Principal species list for monitoring sagebrush steppe in Grand Teton National Park. This list has been uploaded to the project database to provide “pick lists” for quick data entry.

<b>Common Name</b>	<b>Species Name</b>
<b>Persistent Native Forbs (continued)</b>	
arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>
paintbrush	<i>Castilleja spp.</i>
clematis	<i>Clematis hirsutissima</i>
bastard toadflax	<i>Comandra umbellata</i>
hawksbeard	<i>Crepis spp (Crepis acuminata)</i>
daisy	<i>Erigeron spp.</i>
buckwheat	<i>Eriogonum spp.</i>
green gentian	<i>Frasera speciosa</i>
sticky geranium	<i>Geranium viscosissimum</i>
helianthella	<i>Helianthella spp.</i>
western stoneseed	<i>Lithospermum ruderale</i>
lomatium	<i>Lomatium spp.</i>
yampah	<i>Periderdia montana</i>
lupine	<i>Lupinus spp.</i>
penstemon	<i>Penstemon spp.</i>
phacelia	<i>Phacelia hastata</i>
phlox	<i>Phlox spp.</i>
cinquefoil	<i>Potentilla spp.</i>
<b>Other Native Forbs</b>	
agoseris	<i>Agoseris spp.</i>
rockcress	<i>Arabis spp.</i>
prairie smoke	<i>Geum triflorum</i>
stonecrop	<i>Sedum spp.</i>
violet	<i>Viola spp.</i>
<b>Non-native Invasive Grasses</b>	
crested wheatgrass	<i>Agropyron cristatum</i>
smooth brome	<i>Bromus inermis</i>
Japanese brome	<i>Bromus japonicus</i>
cheatgrass	<i>Bromus tectorum</i>
orchard grass	<i>Dactylis glomerata</i>
quackgrass	<i>Elymus repens</i>
timothy	<i>Phleum pratense</i>
bulbous bluegrass	<i>Poa bulbosa</i>
bluegrass	<i>Poa spp.</i>
<b>Non-native Invasive Forbs</b>	
Russian knapweed	<i>Acroptilon repens</i>
whitetop	<i>Cardaria draba</i>
musk thistle	<i>Carduus nutans</i>
diffuse knapweed	<i>Centaurea diffusa</i>

**Table A-1** (continued). Principal species list for monitoring sagebrush steppe in Grand Teton National Park. This list has been uploaded to the project database to provide “pick lists” for quick data entry.

<b>Common Name</b>	<b>Species Name</b>
<b>Non-native Invasive Forbs (continued)</b>	
spotted knapweed	<i>Centaurea maculosa</i>
bull thistle	<i>Cirsium vulgare</i>
dyer's woad	<i>Isatis tinctoria</i>
kochia	<i>Kochia scoparia</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
yellow toadflax	<i>Linaria vulgaris</i>
sulfur cinquefoil	<i>Potentilla recta</i>
dandelion	<i>Taraxacum officinale</i>
salsify	<i>Tragopogon dubius</i>
alfalfa	<i>Medicago sativa</i>
sweetclover	<i>Melilotus spp.</i>

## Appendix B. 2012 survey results

**Table B-1.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 1 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	0	26	56	18	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	38	62	0	0	0	0	0
<i>Arabis spp</i>	98	2	0	0	0	0	0
<i>Sedum spp</i>	62	38	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	28	54	18	0	0	0	0
<i>Danthonia unispicata</i>	92	8	0	0	0	0	0
<i>Festuca idahoensis</i>	70	30	0	0	0	0	0
<i>Koeleria macrantha</i>	4	84	12	0	0	0	0
<i>Melica bulbosa</i>	98	2	0	0	0	0	0
<i>Melica spp</i>	68	32	0	0	0	0	0
<i>Poa secunda</i>	82	18	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	38	56	6	0	0	0	0
<i>Sitanion hystrix</i>	86	14	0	0	0	0	0
<i>Stipa nelsonii</i>	28	68	4	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	98	0	2	0	0	0	0
<i>Aster spp</i>	86	14	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	62	38	0	0	0	0	0
<i>Erigeron spp</i>	96	4	0	0	0	0	0
<i>Eriogonum spp</i>	2	30	44	18	4	2	0
<i>Lomatium spp</i>	80	20	0	0	0	0	0
<i>Lupinus spp</i>	88	12	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	78	20	2	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	58	6	34	2	0	0	0
<i>Artemisia tridentata</i>	42	6	32	18	2	0	0

**Table B-2.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 3 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	16	74	10	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	28	72	0	0	0	0	0
<i>Arabis spp</i>	94	6	0	0	0	0	0
<i>Geum triflorum</i>	98	2	0	0	0	0	0
<i>Sedum spp</i>	88	12	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	56	40	4	0	0	0	0
<i>Festuca idahoensis</i>	28	52	20	0	0	0	0
<i>Koeleria macrantha</i>	40	60	0	0	0	0	0
<i>Poa secunda</i>	58	40	2	0	0	0	0
<i>Pseudoroegneria spicata</i>	12	52	30	6	0	0	0
<i>Stipa comata</i>	92	4	4	0	0	0	0
<i>Stipa nelsonii</i>	74	24	2	0	0	0	0
Native Persisten Forbs							
<i>Achillea millefolium</i>	98	2	0	0	0	0	0
<i>Antennaria spp</i>	20	58	16	6	0	0	0
<i>Arenaria spp</i>	94	6	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	48	50	2	0	0	0	0
<i>Comandra umbellata</i>	78	22	0	0	0	0	0
<i>Erigeron spp</i>	66	30	4	0	0	0	0
<i>Eriogonum spp</i>	18	38	38	4	2	0	0
<i>Lithospermum ruderale</i>	94	6	0	0	0	0	0
<i>Lupinus spp</i>	48	50	2	0	0	0	0
<i>Phlox spp</i>	98	2	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	62	38	0	0	0	0	0
<i>Tragopogon dubius</i>	84	16	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	30	64	6	0	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	38	22	24	12	4	0	0
Shrubs							
<i>Purshia tridentata</i>	68	6	12	10	4	0	0
<i>Symphoricarpos spp</i>	98	2	0	0	0	0	0

**Table B-3.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 7 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	36	56	6	2	0	0	0
Native Other Forbs							
<i>Agoseris</i> spp	36	64	0	0	0	0	0
<i>Arabis</i> spp	88	12	0	0	0	0	0
Native Perennial Grasses							
<i>Carex</i> spp	84	16	0	0	0	0	0
<i>Elymus trachycaulus</i>	92	8	0	0	0	0	0
<i>Festuca idahoensis</i>	34	48	18	0	0	0	0
<i>Koeleria macrantha</i>	68	32	0	0	0	0	0
<i>Poa secunda</i>	76	24	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	20	68	10	2	0	0	0
<i>Stipa nelsonii</i>	94	6	0	0	0	0	0
Native Persistent Forbs							
<i>Antennaria</i> spp	94	6	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	30	24	44	2	0	0	0
<i>Castilleja</i> spp	72	28	0	0	0	0	0
<i>Comandra umbellata</i>	48	50	2	0	0	0	0
<i>Erigeron</i> spp	68	32	0	0	0	0	0
<i>Eriogonum</i> spp	26	50	24	0	0	0	0
<i>Helianthella</i> spp	20	52	28	0	0	0	0
<i>Lithospermum ruderale</i>	64	36	0	0	0	0	0
<i>Lomatium</i> spp	94	6	0	0	0	0	0
<i>Lupinus</i> spp	52	26	22	0	0	0	0
<i>Penstemon</i> spp	98	2	0	0	0	0	0
<i>Phlox</i> spp	72	28	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	82	18	0	0	0	0	0
<i>Tragopogon dubius</i>	78	22	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa</i> spp	22	64	14	0	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	30	26	30	14	0	0	0
Shrubs							
<i>Amelanchier alnifolia</i>	96	4	0	0	0	0	0
<i>Mahonia repens</i>	18	60	18	4	0	0	0
<i>Purshia tridentata</i>	36	4	16	14	14	10	6
<i>Symphoricarpos</i> spp	94	2	0	4	0	0	0

**Table B-4.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 8 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	52	48	0	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	66	34	0	0	0	0	0
<i>Arabis spp</i>	64	36	0	0	0	0	0
<i>Geum triflorum</i>	96	4	0	0	0	0	0
<i>Sedum spp</i>	88	12	0	0	0	0	0
<i>Viola spp</i>	86	14	0	0	0	0	0
Native Perennial Grasses							
<i>Bromus marginatus</i>	98	2	0	0	0	0	0
<i>Carex spp</i>	68	30	2	0	0	0	0
<i>Elymus trachycaulus</i>	98	2	0	0	0	0	0
<i>Festuca idahoensis</i>	86	10	4	0	0	0	0
<i>Koeleria macrantha</i>	88	12	0	0	0	0	0
<i>Melica bulbosa</i>	98	2	0	0	0	0	0
<i>Melica spp</i>	94	6	0	0	0	0	0
<i>Poa secunda</i>	90	10	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	46	50	4	0	0	0	0
<i>Sitanion hystrix</i>	98	2	0	0	0	0	0
<i>Stipa nelsonii</i>	74	24	2	0	0	0	0
Native Persistent Forbs							
<i>Achillea millefolium</i>	92	8	0	0	0	0	0
<i>Antennaria spp</i>	58	36	6	0	0	0	0
<i>Arenaria spp</i>	82	18	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	84	12	4	0	0	0	0
<i>Castilleja spp</i>	92	8	0	0	0	0	0
<i>Comandra umbellata</i>	86	14	0	0	0	0	0
<i>Erigeron spp</i>	64	36	0	0	0	0	0
<i>Eriogonum spp</i>	28	24	40	6	2	0	0
<i>Frasera speciosa</i>	98	2	0	0	0	0	0
<i>Helianthella spp</i>	78	20	2	0	0	0	0
<i>Lomatium spp</i>	98	2	0	0	0	0	0
<i>Lupinus spp</i>	50	48	2	0	0	0	0
<i>Penstemon spp</i>	98	2	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	80	20	0	0	0	0	0
<i>Tragopogon dubius</i>	94	6	0	0	0	0	0
Non-native Invasive Grasses							
<i>Elymus repens</i>	94	6	0	0	0	0	0
<i>Poa bulbosa</i>	98	2	0	0	0	0	0
<i>Poa spp</i>	42	58	0	0	0	0	0

**Table B-4** (continued). Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 8 during the July 2012 survey.

		0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Sagebrush								
	<i>Artemisia tridentata</i>	12	22	36	24	6	0	0
Shrubs								
	<i>Mahonia repens</i>	98	2	0	0	0	0	0
	<i>Purshia tridentata</i>	30	8	24	24	6	8	0

**Table B-5.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 10 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	14	51	35	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	53	47	0	0	0	0	0
<i>Arabis spp</i>	78	22	0	0	0	0	0
<i>Sedum spp</i>	98	2	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	59	27	14	0	0	0	0
<i>Elymus trachycaulus</i>	98	2	0	0	0	0	0
<i>Festuca idahoensis</i>	8	57	35	0	0	0	0
<i>Koeleria macrantha</i>	61	39	0	0	0	0	0
<i>Melica bulbosa</i>	80	20	0	0	0	0	0
<i>Melica spp</i>	76	24	0	0	0	0	0
<i>Poa secunda</i>	90	10	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	29	57	10	4	0	0	0
<i>Sitanion hystrix</i>	92	8	0	0	0	0	0
<i>Stipa comata</i>	96	4	0	0	0	0	0
<i>Stipa nelsonii</i>	78	20	2	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	65	24	10	0	0	0	0
<i>Balsamorhiza sagittata</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	78	22	0	0	0	0	0
<i>Comandra umbellata</i>	71	29	0	0	0	0	0
<i>Crepis acuminata</i>	96	4	0	0	0	0	0
<i>Erigeron spp</i>	49	47	4	0	0	0	0
<i>Eriogonum spp</i>	0	14	63	20	2	0	0
<i>Helianthella spp</i>	96	4	0	0	0	0	0
<i>Lomatium spp</i>	76	24	0	0	0	0	0
<i>Lupinus spp</i>	12	76	12	0	0	0	0
<i>Phlox spp</i>	51	49	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	78	22	0	0	0	0	0
Non-native Invasive Grasses							
<i>Bromus japonicus</i>	96	4	0	0	0	0	0
<i>Poa spp</i>	63	29	8	0	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	0	12	29	37	18	4	0
Shrubs							
<i>Chrysothamnus viscidiflorus</i>	86	14	0	0	0	0	0
<i>Ericameria nauseosa</i>	98	2	0	0	0	0	0

**Table B-6.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 14 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	0	64	36	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	38	62	0	0	0	0	0
<i>Arabis spp</i>	90	8	0	0	2	0	0
<i>Sedum spp</i>	44	54	2	0	0	0	0
Native Perennial Grasses							
<i>Bromus marginatus</i>	98	2	0	0	0	0	0
<i>Carex spp</i>	90	8	2	0	0	0	0
<i>Elymus trachycaulus</i>	98	2	0	0	0	0	0
<i>Festuca idahoensis</i>	14	34	50	2	0	0	0
<i>Koeleria macrantha</i>	46	54	0	0	0	0	0
<i>Melica bulbosa</i>	80	20	0	0	0	0	0
<i>Poa secunda</i>	72	28	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	52	38	10	0	0	0	0
<i>Stipa nelsonii</i>	62	34	4	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	94	6	0	0	0	0	0
<i>Arenaria spp</i>	92	8	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	68	24	6	2	0	0	0
<i>Castilleja spp</i>	68	32	0	0	0	0	0
<i>Comandra umbellata</i>	90	10	0	0	0	0	0
<i>Crepis acuminata</i>	96	4	0	0	0	0	0
<i>Erigeron spp</i>	98	2	0	0	0	0	0
<i>Eriogonum spp</i>	4	40	38	16	2	0	0
<i>Lomatium spp</i>	98	2	0	0	0	0	0
<i>Lupinus spp</i>	42	46	12	0	0	0	0
<i>Penstemon spp</i>	98	2	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	86	14	0	0	0	0	0
<i>Tragopogon dubius</i>	92	8	0	0	0	0	0
Non-native Invasive Grasses							
<i>Bromus japonicus</i>	98	2	0	0	0	0	0
<i>Poa spp</i>	64	34	2	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	92	0	6	2	0	0	0
<i>Artemisia tridentata</i>	6	14	44	22	12	2	0
<i>Artemisia tripartita</i>	88	6	6	0	0	0	0
Shrubs							
<i>Mahonia repens</i>	90	6	2	2	0	0	0
<i>Purshia tridentata</i>	90	2	0	6	2	0	0

**Table B-7.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 17 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	2	76	20	2	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	47	53	0	0	0	0	0
<i>Arabis spp</i>	86	14	0	0	0	0	0
<i>Sedum spp</i>	94	6	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	37	63	0	0	0	0	0
<i>Elymus trachycaulus</i>	94	6	0	0	0	0	0
<i>Festuca idahoensis</i>	33	67	0	0	0	0	0
<i>Koeleria macrantha</i>	29	69	2	0	0	0	0
<i>Melica bulbosa</i>	82	18	0	0	0	0	0
<i>Melica spp</i>	82	18	0	0	0	0	0
<i>Poa secunda</i>	57	43	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	4	71	24	0	0	0	0
<i>Sitanion hystrix</i>	98	2	0	0	0	0	0
<i>Stipa nelsonii</i>	92	8	0	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	71	27	2	0	0	0	0
<i>Aster spp</i>	96	4	0	0	0	0	0
<i>Castilleja spp</i>	49	51	0	0	0	0	0
<i>Comandra umbellata</i>	69	31	0	0	0	0	0
<i>Crepis spp</i>	82	18	0	0	0	0	0
<i>Erigeron spp</i>	39	61	0	0	0	0	0
<i>Eriogonum spp</i>	0	6	53	35	4	2	0
<i>Helianthella spp</i>	94	6	0	0	0	0	0
<i>Lithospermum ruderale</i>	98	2	0	0	0	0	0
<i>Lomatium spp</i>	69	31	0	0	0	0	0
<i>Lupinus spp</i>	20	69	10	0	0	0	0
<i>Phlox spp</i>	53	47	0	0	0	0	0
Non-native Invasive Forbs							
<i>Centaurea maculosa</i>	98	2	0	0	0	0	0
<i>Taraxacum officinale</i>	88	12	0	0	0	0	0
<i>Tragopogon dubius</i>	90	10	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	43	55	2	0	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	6	35	29	14	14	2	0
Shrubs							
<i>Mahonia repens</i>	98	2	0	0	0	0	0

**Table B-8.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 18 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	8	68	24	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	56	42	2	0	0	0	0
<i>Arabis spp</i>	72	28	0	0	0	0	0
<i>Geum triflorum</i>	98	2	0	0	0	0	0
<i>Sedum spp</i>	92	8	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	12	64	24	0	0	0	0
<i>Festuca idahoensis</i>	4	58	36	2	0	0	0
<i>Koeleria macrantha</i>	74	26	0	0	0	0	0
<i>Melica bulbosa</i>	92	8	0	0	0	0	0
<i>Poa secunda</i>	54	46	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	42	50	8	0	0	0	0
<i>Sitanion hystrix</i>	92	8	0	0	0	0	0
<i>Stipa nelsonii</i>	40	58	2	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	46	36	16	2	0	0	0
<i>Arenaria spp</i>	92	8	0	0	0	0	0
<i>Castilleja spp</i>	70	30	0	0	0	0	0
<i>Comandra umbellata</i>	84	16	0	0	0	0	0
<i>Crepis acuminata</i>	94	6	0	0	0	0	0
<i>Erigeron spp</i>	40	52	6	2	0	0	0
<i>Eriogonum spp</i>	0	24	50	26	0	0	0
<i>Lomatium spp</i>	76	24	0	0	0	0	0
<i>Lupinus spp</i>	16	64	20	0	0	0	0
<i>Phlox spp</i>	24	74	2	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	68	32	0	0	0	0	0
<i>Tragopogon dubius</i>	98	2	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	72	20	8	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	98	2	0	0	0	0	0
<i>Artemisia tridentata</i>	6	12	42	28	10	2	0

**Table B-9.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 20 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	0	82	16	2	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	62	38	0	0	0	0	0
<i>Arabis spp</i>	90	10	0	0	0	0	0
<i>Geum triflorum</i>	56	44	0	0	0	0	0
<i>Sedum spp</i>	40	60	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	92	8	0	0	0	0	0
<i>Danthonia unispicata</i>	96	4	0	0	0	0	0
<i>Elymus trachycaulus</i>	98	2	0	0	0	0	0
<i>Festuca idahoensis</i>	94	6	0	0	0	0	0
<i>Koeleria macrantha</i>	54	46	0	0	0	0	0
<i>Melica bulbosa</i>	72	28	0	0	0	0	0
<i>Melilotus spp</i>	80	20	0	0	0	0	0
<i>Poa secunda</i>	72	28	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	48	50	2	0	0	0	0
<i>Stipa comata</i>	98	2	0	0	0	0	0
<i>Stipa nelsonii</i>	72	28	0	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	88	10	2	0	0	0	0
<i>Arenaria spp</i>	96	4	0	0	0	0	0
<i>Aster spp</i>	88	12	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	96	4	0	0	0	0	0
<i>Castilleja spp</i>	56	44	0	0	0	0	0
<i>Comandra umbellata</i>	80	20	0	0	0	0	0
<i>Eriogonum spp</i>	4	24	62	8	2	0	0
<i>Frasera speciosa</i>	96	2	2	0	0	0	0
<i>Lithospermum ruderale</i>	98	2	0	0	0	0	0
<i>Lomatium spp</i>	94	6	0	0	0	0	0
<i>Lupinus spp</i>	46	44	10	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	84	16	0	0	0	0	0
<i>Tragopogon dubius</i>	96	4	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	48	48	4	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	36	22	40	2	0	0	0
<i>Artemisia cana</i>	98	0	2	0	0	0	0
<i>Artemisia tridentata</i>	16	26	38	14	6	0	0

**Table B-10.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 21 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	0	50	50	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	26	74	0	0	0	0	0
<i>Arabis spp</i>	84	16	0	0	0	0	0
<i>Sedum spp</i>	46	54	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	46	40	14	0	0	0	0
<i>Danthonia unispicata</i>	72	28	0	0	0	0	0
<i>Festuca idahoensis</i>	74	26	0	0	0	0	0
<i>Koeleria macrantha</i>	14	82	4	0	0	0	0
<i>Melica bulbosa</i>	56	42	2	0	0	0	0
<i>Poa secunda</i>	34	62	4	0	0	0	0
<i>Pseudoroegneria spicata</i>	32	42	26	0	0	0	0
<i>Sitanion hystrix</i>	96	2	2	0	0	0	0
<i>Stipa nelsonii</i>	16	62	22	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	92	6	2	0	0	0	0
<i>Arenaria spp</i>	78	22	0	0	0	0	0
<i>Aster spp</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	52	48	0	0	0	0	0
<i>Comandra umbellata</i>	94	6	0	0	0	0	0
<i>Erigeron spp</i>	98	2	0	0	0	0	0
<i>Eriogonum spp</i>	2	28	64	6	0	0	0
<i>Lomatium spp</i>	98	2	0	0	0	0	0
<i>Lupinus spp</i>	80	20	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	86	14	0	0	0	0	0
<i>Tragopogon dubius</i>	98	2	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	90	8	2	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	16	18	46	20	0	0	0
<i>Artemisia tridentata</i>	52	14	16	16	2	0	0

**Table B-11.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 22 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	68	26	4	2	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	50	50	0	0	0	0	0
<i>Arabis spp</i>	94	6	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	98	2	0	0	0	0	0
<i>Festuca idahoensis</i>	92	6	2	0	0	0	0
<i>Koeleria macrantha</i>	98	2	0	0	0	0	0
<i>Poa secunda</i>	90	10	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	14	54	22	8	2	0	0
<i>Stipa comata</i>	98	2	0	0	0	0	0
<i>Stipa nelsonii</i>	92	8	0	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	98	0	2	0	0	0	0
<i>Aster spp</i>	98	2	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	40	30	22	6	2	0	0
<i>Castilleja spp</i>	94	6	0	0	0	0	0
<i>Comandra umbellata</i>	62	38	0	0	0	0	0
<i>Eriogonum spp</i>	24	44	28	4	0	0	0
<i>Helianthella spp</i>	46	30	22	2	0	0	0
<i>Lithospermum ruderale</i>	50	28	22	0	0	0	0
<i>Lomatium spp</i>	98	2	0	0	0	0	0
<i>Lupinus spp</i>	48	50	2	0	0	0	0
<i>Phlox spp</i>	94	6	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	48	50	2	0	0	0	0
<i>Tragopogon dubius</i>	38	60	2	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	12	64	20	4	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	22	24	26	22	4	2	0
Shrubs							
<i>Mahonia repens</i>	60	16	18	6	0	0	0
<i>Purshia tridentata</i>	14	12	22	26	12	14	0
<i>Symphoricarpos spp</i>	96	2	2	0	0	0	0

**Table B-12.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 25 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	24	70	6	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	72	28	0	0	0	0	0
<i>Arabis spp</i>	84	16	0	0	0	0	0
<i>Sedum spp</i>	94	6	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	30	52	16	2	0	0	0
<i>Festuca idahoensis</i>	80	12	8	0	0	0	0
<i>Koeleria macrantha</i>	66	34	0	0	0	0	0
<i>Melica bulbosa</i>	74	26	0	0	0	0	0
<i>Poa secunda</i>	86	14	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	14	54	32	0	0	0	0
<i>Stipa nelsonii</i>	52	40	8	0	0	0	0
Native Persistent Forbs							
<i>Antennaria spp</i>	90	6	4	0	0	0	0
<i>Arenaria spp</i>	96	4	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	92	8	0	0	0	0	0
<i>Comandra umbellata</i>	76	24	0	0	0	0	0
<i>Eriogonum spp</i>	0	18	62	20	0	0	0
<i>Lomatium spp</i>	90	10	0	0	0	0	0
<i>Lupinus spp</i>	8	66	26	0	0	0	0
<i>Phlox spp</i>	96	4	0	0	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	64	36	0	0	0	0	0
<i>Tragopogon dubius</i>	96	4	0	0	0	0	0
Non-native Invasive Grasses							
<i>Bromus japonicus</i>	98	2	0	0	0	0	0
<i>Poa spp</i>	68	20	10	2	0	0	0
Sagebrush							
<i>Artemisia tridentata</i>	6	12	32	30	18	2	0
Shrubs							
<i>Mahonia repens</i>	96	4	0	0	0	0	0

**Table B-13.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 29 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	6	92	2	0	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	44	56	0	0	0	0	0
<i>Arabis spp</i>	96	4	0	0	0	0	0
<i>Geum triflorum</i>	88	12	0	0	0	0	0
Native Perennial Grasses							
<i>Carex spp</i>	18	74	8	0	0	0	0
<i>Danthonia unispicata</i>	54	42	4	0	0	0	0
<i>Festuca idahoensis</i>	0	20	78	2	0	0	0
<i>Koeleria macrantha</i>	66	34	0	0	0	0	0
<i>Melica spp</i>	90	8	2	0	0	0	0
<i>Poa secunda</i>	80	20	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	56	26	18	0	0	0	0
<i>Stipa comata</i>	98	2	0	0	0	0	0
<i>Stipa nelsonii</i>	56	40	4	0	0	0	0
Native Persistent Forbs							
<i>Achillea millefolium</i>	98	2	0	0	0	0	0
<i>Antennaria spp</i>	18	68	10	4	0	0	0
<i>Arenaria spp</i>	56	44	0	0	0	0	0
<i>Balsamorhiza sagittata</i>	98	2	0	0	0	0	0
<i>Castilleja spp</i>	76	24	0	0	0	0	0
<i>Crepis acuminata</i>	94	6	0	0	0	0	0
<i>Erigeron spp</i>	34	62	4	0	0	0	0
<i>Eriogonum spp</i>	2	32	60	6	0	0	0
<i>Lomatium spp</i>	96	4	0	0	0	0	0
<i>Lupinus spp</i>	8	82	8	2	0	0	0
Non-native Invasive Forbs							
<i>Taraxacum officinale</i>	96	4	0	0	0	0	0
<i>Tragopogon dubius</i>	98	2	0	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	90	10	0	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	76	6	16	2	0	0	0
<i>Artemisia tridentata</i>	28	14	28	24	6	0	0
Shrubs							
<i>Purshia tridentata</i>	98	0	0	2	0	0	0

**Table B-14.** Percentage of quadrats estimated within each cover class for bare ground and principal species observed in frame 30 during the July 2012 survey.

	0%	1-5%	>5-25%	>25-50%	>50-75%	>75-95%	>95%
Bare Ground	0	46	46	8	0	0	0
Native Other Forbs							
<i>Agoseris spp</i>	18	82	0	0	0	0	0
<i>Arabis spp</i>	94	6	0	0	0	0	0
<i>Sedum spp</i>	38	62	0	0	0	0	0
Native Perennial Grasses							
<i>Bromus marginatus</i>	98	2	0	0	0	0	0
<i>Carex spp</i>	68	28	4	0	0	0	0
<i>Danthonia unispicata</i>	96	4	0	0	0	0	0
<i>Festuca idahoensis</i>	98	2	0	0	0	0	0
<i>Koeleria macrantha</i>	4	74	22	0	0	0	0
<i>Melica spp</i>	4	94	2	0	0	0	0
<i>Poa secunda</i>	86	14	0	0	0	0	0
<i>Pseudoroegneria spicata</i>	46	46	8	0	0	0	0
<i>Sitanion hystrix</i>	80	20	0	0	0	0	0
<i>Stipa comata</i>	96	4	0	0	0	0	0
<i>Stipa nelsonii</i>	24	70	6	0	0	0	0
Native Persistent Forbs							
<i>Castilleja spp</i>	38	62	0	0	0	0	0
<i>Comandra umbellata</i>	96	4	0	0	0	0	0
<i>Eriogonum spp</i>	2	26	62	10	0	0	0
<i>Lupinus spp</i>	44	54	2	0	0	0	0
Non-native Invasive Grasses							
<i>Poa spp</i>	78	20	2	0	0	0	0
Sagebrush							
<i>Artemisia arbuscula</i>	24	24	36	16	0	0	0
<i>Artemisia tridentata</i>	36	12	30	16	2	4	0