

# Sagebrush Steppe Ecosystems of Southwest Idaho - A Preliminary Conservation Strategy

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## Introduction

Decline in sagebrush-steppe habitats in the Northwest has been documented and described by a number of authors (Pellant 1990; Whisennant 1990; and others). Loss and fragmentation of sagebrush-steppe habitats has contributed to the decline of species that require these habitats for all or portions of their life cycle (e.g., sage grouse, *Lepidium papilliferum*, and others) (Connelly et al. 2000; Mancuso 2001; Moseley 1994; Paige and Ritter 1999; Sather-Blair et al. 2000). Relatively few large, high quality, expansive stands of sagebrush-steppe remain in southwestern Idaho. High quality stands in the region are threatened by the ecological stresses and cumulative effects of exotic species establishment, altered fire disturbance regimes, intensive range resource utilization, and urbanization. The objective of this study is to assist in the identification and documentation of priority sites within Southwest Idaho for the protection or restoration of sagebrush-steppe plant communities and rare plant species habitats.

## Methods

Field and Office Methods: The identification of high priority sagebrush stands occurred through (1) an initial expert opinion process; (2) field reconnaissance of stands identified through the expert opinion process; (3) a supervised classification of Landsat TM and ETM scenes trained on the spectral signatures of selected stands visited during field reconnaissance; and (4) an unsupervised classification of Landsat TM and ETM scenes and subsequent comparison of spectral similarity to the training stands. The expert opinion process consisted of a series of interviews with individuals knowledgeable of the distribution of remnant sagebrush stands within the study area. Stands were delineated from memory on 1:100,000 scale topographical maps.

Stand level point observation data were used to describe the distribution, composition, and structure of stands identified by expert interviewees. These data were collected using the protocol described by Rust and Moseley (1999).

Individual stands of sagebrush and rare species occurrences are grouped into sites on the basis of geographical proximity and functional connectedness. The conservation significance of each inventoried site is ranked on the basis of the number of rare plant species and plant community element occurrences; the global and regional rarity of species and community occurrences; and constituent element occurrence ranking specifications (e.g., for plant community occurrences, specific criteria for size, condition, and landscape context).

Study Area: The study area consists of the Idaho portion of the Owyhee Uplands ecoregional section (McNab and Avers 1994; Jensen et al. 1997). The study area encompasses the lower Snake River Plain, Owyhee Plateau, Owyhee Mountains, and Camas Prairie of southwestern Idaho. Elevation ranges from approximately 2,150 to 8,300 feet. A continental climatic regime is predominant. The climate is hot and very dry; most precipitation occurs in the summer. Higher elevation regions of the Owyhee Plateau, Owyhee Mountains, and Camas Prairie are moderately maritime influenced - summers are warm and dry, winters are cold and moist; most precipitation occurs in winter. Prominent geologic formations are Pleistocene and Pliocene alluvial stream and lake deposits, flow basalts, and associated tufts.

## Results and Discussion

Thirty-nine sites for potential visits were identified through interviews with three regional experts. Field inventory work focused on stands within the Snake River Plain region. Sixteen sagebrush-steppe remnant sites were visited (Figure 1) between May and August, 2001. Nine plant associations were observed at these sites. A summary of the conservation status of plant associations observed in the study area, the number of stands observed and the distribution of element occurrence ranks for these stands is provided in Table 1. Sixty-four rare plant species are known from the study area. Information regarding the species is summarized in Table 2.

The conservation significance of remnant sagebrush-steppe sites within the study area is ranked on the basis of the number and status of element occurrences present at the site. The status of element occurrences, or element occurrence rank, is based on objective criteria developed for the element or a group of elements. Examples of plant species element occurrence specifications are provided in Appendix A. Element occurrence specifications applied to *Artemisia tridentata wyomingensis* plant associations within the study area are provided in Appendix B. Summary of the application of the *Artemisia tridentata wyomingensis* element occurrence rank specifications to stands observed within the study area is provided in Table 3. The conservation significance of sites observed within the study area is summarized in Table 4.

## Conclusions

Decline of sagebrush-steppe habitats is evident and widespread on Snake River Plain. The objective of this study is to assist in the identification and documentation of priority sites within Southwest Idaho for the protection or restoration of sagebrush-steppe plant communities and rare plant species habitats. The study focused on *Artemisia tridentata wyomingensis*-dominated vegetation on the Snake River Plain. Relatively significant remnant stands are present on Orchard Training Range and in the vicinity of Blair Trail Reservoir. Additional work is needed to assess the significance of remnant sagebrush-steppe identified through interpretation of remotely sensed imagery.

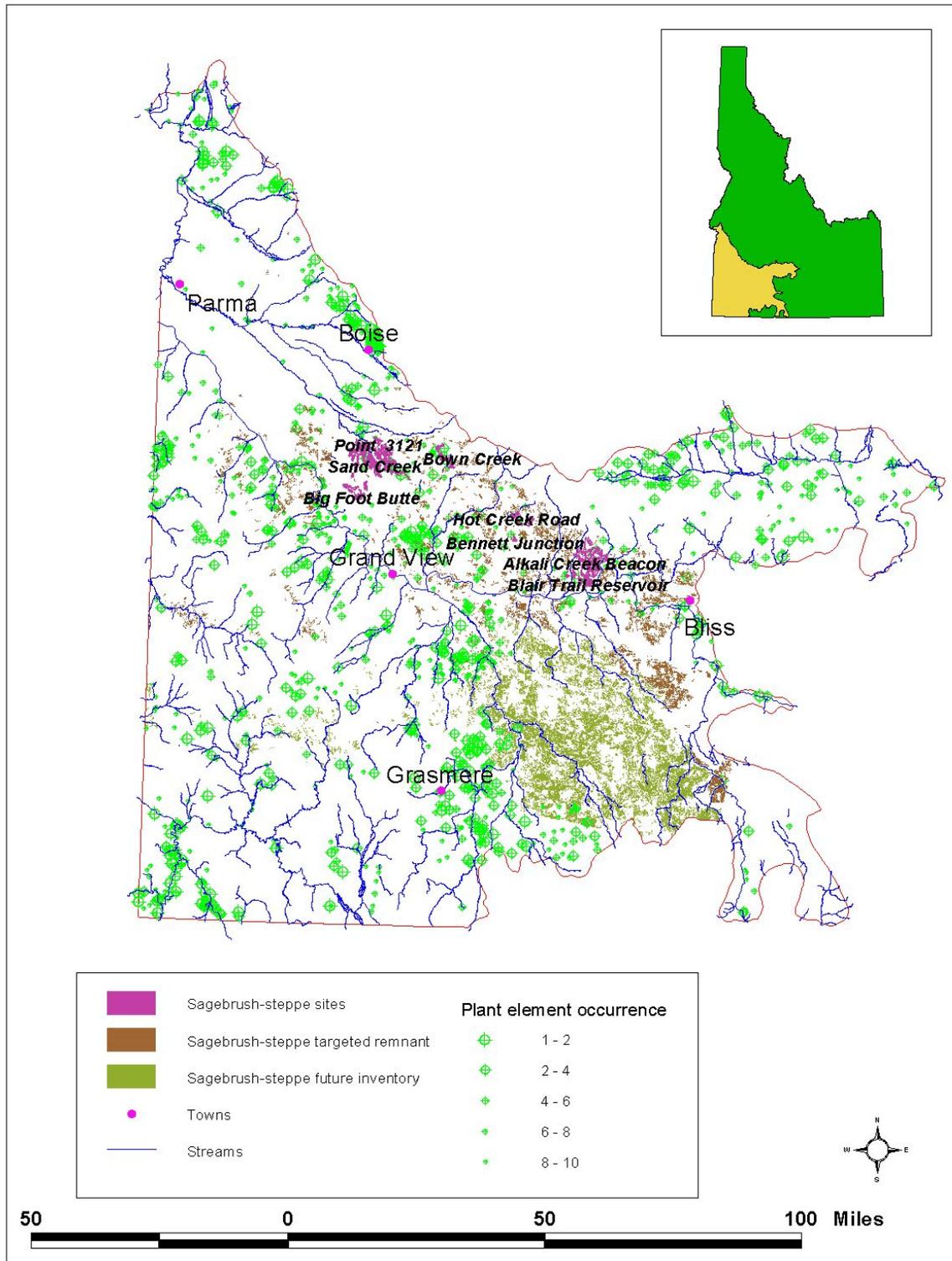
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**Figure 1.** Southwest Idaho sagebrush-steppe conservation strategy study area.



**Figure 1.** Southwest Idaho sagebrush-steppe conservation strategy study area. The study area consists of the Idaho portion of the Owyhee Upland ecoregional section. Sites visited are shown with targeted stands and stands identified for future study. Rare plant locations are display on the basis of element occurrence rank (small value = high rank).

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**Table 1.** Plant associations observed at selected sites on Snake River Plain. Plant associations are listed alphabetically with the global rarity rank (G Rank<sup>1</sup>) and state rarity rank (S Rank), number of stands observed, and the distribution of element occurrence ranks within these stands.

Plant Association	Common Name	G Rank / S Rank	Number of stands observed	Element occurrence rank (percent of area)				
				AB	B	BC	C	CD
<i>Artemisia tridentata tridentata/Elymus cinereus</i>	basin big sagebrush/basin wildrye	G2 / S1	2					100
<i>Artemisia tridentata tridentata/Poa secunda</i>	basin big sagebrush/Sandberg's bluegrass	G3G5 / S?	1					100
<i>Artemisia tridentata wyomingensis/Agropyron spicatum</i>	Wyoming big sagebrush/bluebunch wheatgrass	G4 / S3	8		38	36	24	
<i>Artemisia tridentata wyomingensis/Oryzopsis hymenoides</i>	Wyoming big sagebrush/Indian ricegrass	G5 / S?	1			100		
<i>Artemisia tridentata wyomingensis/Poa secunda</i>	Wyoming big sagebrush/Sandberg's bluegrass	G4 / S2	52	23	36	15	22	1

<sup>1</sup> Summary of Natural Heritage rarity ranks: The rank is primarily based on the number of known occurrences, but other factors such as habitat quality, estimated number of individuals, narrowness of range of habitat, trends in populations and habitat, threats to the element, and other factors are also considered. The ranking system is meant to exist alongside national and state rare species lists because these lists often include additional criteria (e.g., recovery potential, depth of knowledge) that go beyond assessing threats to extinction.

Rank Components:

G = Global rank indicator; denotes rank based on rangewide status.

T = Trinomial rank indicator; denotes rangewide status of infraspecific taxa.

S = State rank indicator; denotes rank based on status within Idaho.

1 = Critically imperiled because of extreme rarity or because some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences).

2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences).

3 = Rare or uncommon but not imperiled (typically 21 to 100 occurrences).

4 = Not rare and apparently secure, but with cause for long-term concern (usually more than 100 occurrences).

5 = Demonstrably widespread, abundant, and secure.

E = Exotic or introduced.

U = Unknown.

H = Historical occurrence (i.e., formerly part of the native biota with the implied expectation that it might be rediscovered).

X = Presumed extinct or extirpated.

Q = Indicates uncertainty about taxonomic status.

? = Not yet ranked.

Plant Association	Common Name	G Rank / S Rank	Number of stands observed	Element occurrence rank (percent of area)				
				AB	B	BC	C	CD
<i>Artemisia tridentata wyomingensis/Sitanion hystrix</i>	Wyoming big sagebrush/squirreltail	G4G5 / S1	4		96	2	1	
<i>Artemisia tridentata wyomingensis/Stipa comata</i>	Wyoming big sagebrush/needle-and-thread	G2 / S2	1					100
<i>Artemisia tridentata wyomingensis/Stipa thurberiana</i>	Wyoming big sagebrush/Thurber's needlegrass	G3 / S1	6			73	24	1
<i>Atriplex confertifolia/Sitanion hystrix</i>	shadscale/squirreltail	G3G5 / S2?	1				100	

**Table 2.** Rare plant species known to occur within southwest Idaho. Species are listed with global and state rarity rank (G Rank and S Rank, respectively), the number of occurrences within the study area, and the distribution of element occurrence ranks.

Species	Common Name	GRank / SRank	Number of occurrences	Element occurrence rank (percent of occurrences)										No occurrence rank	
				A	AB	B	BC	C	CD	D	H	X			
<i>Allium anceps</i>	two-headed onion	G4 / S2	2												100
<i>Allium aaseae</i>	Aase's onion	G3 / S3	66	18	2	17	3	9							52
<i>Angelica kingii</i>	Nevada angelica	G4 / S1	2	50		50									
<i>Aspicilia fruticulosa</i>	vagrant aspicilia	G? / S?	3			67		33							
<i>Astragalus mulfordiae</i>	Mulford's milkvetch	G2 / S2	40	18		30	3	20		18			10		3
<i>Astragalus purshii</i> var <i>ophiogenes</i>	Snake River milkvetch	G5T3 / S3	51			8	2	10		4	2				75
<i>Astragalus salmonis</i>	trout creek milk-vetch	G? / S?	16	13		31	6	6			19				25
<i>Astragalus newberryi</i> var <i>castoreus</i>	Newberry's milkvetch	G5T5 / S2	7			57		14			29				
<i>Astragalus cusickii</i> var <i>packardiae</i>	Packard's milkvetch	G5T1 / S1	6	50		17		33							
<i>Astragalus sterilis</i>	barren milkvetch	G5T2 / S1	5			60	20								20
<i>Astragalus oniciformis</i>	Picabo milkvetch	G3 / S3	2			50		50							
<i>Astragalus tetrapterus</i>	four-wing milkvetch	G4 / S1	3	33		33									33
<i>Astragalus atratus</i> var <i>inseptus</i>	mourning milkvetch	G4G5T3 / S3	59	5		22	2	14	2	2	2				53
<i>Astragalus yoder-williamsii</i>	mud flat milkvetch	G3 / S3	32	19	3	19	6	9							44
<i>Blepharidachne kingii</i>	King's desertgrass	G4 / S1	2	50		50									
<i>Camissonia pterosperma</i>	winged-seed evening primrose	G4 / S2	1					10 0							
<i>Camissonia palmeri</i>	Palmer's evening primrose	G3? / S1	1												100
<i>Carex tumulicola</i>	foothill sedge	G4 / S1	1												100

Species	Common Name	GRank / SRank	Number of occurrences	Element occurrence rank (percent of occurrences)										No occurrence rank	
				A	AB	B	BC	C	CD	D	H	X			
<i>Carex buxbaumii</i>	Buxbaum's sedge	G5 / S3	1	100											
<i>Catapyrenium congestum</i>		G4 / S2	4												100
<i>Chaenactis cusickii</i>	Cusick's false yarrow	G2G3 / S2	9	11		33		22	11		11	11			
<i>Chaenactis stevioides</i>	desert pincushion	G4 / S2	21			5	5	10	10	10					62
<i>Cleomella plocasperma</i>	alkali cleomella	G4 / SH	1								100				
<i>Coryphantha vivipara</i>	cushion cactus	G5 / S2	1												100
<i>Cymopterus acaulis var greeleyorum</i>	Greeley's wavewing	G5T2 / S2	11			36		18		9					36
<i>Cyperus rivularis</i>	shining flatsedge	G5 / S2	12	8		17									75
<i>Cypripedium parviflorum var pubescens</i>	small yellow lady's-slipper	G5T4T5 / S1	1			100									
<i>Damasonium californicum</i>	fringed waterplantain	G4 / S2	20	15		15	5	10			15	5			35
<i>Dimeresia howellii</i>	dimeresia	G4? / S2	11	9		9					9				73
<i>Downingia bacigalupii</i>	Bacigalupi's downingia	G4 / S2	18	6		11		17		6	6				56
<i>Downingia insignis</i>	downingia	G4 / S1	2												100
<i>Eatonella nivea</i>	white eatonella	G4 / S3	19			32	5	21					5		37
<i>Epipactis gigantea</i>	giant helleborine	G3 / S3	11	18		27	9	18			9	9			9
<i>Eriogonum ochrocephalum var calcareum</i>	calcareous buckwheat	G5T3 / S2	6	33	17			17			33				
<i>Eriogonum shockleyi var shockleyi</i>	matted cowpie buckwheat	G5T4 / S2	12	17		33		33		17					
<i>Eriogonum shockleyi var packardiae</i>	Packard's buckwheat	G5T2 / S2	18	11	6	33		17							33
<i>Glyptopleura marginata</i>	white-margined wax plant	G4 / S3	53			21	8	6	4	8	11				43

Species	Common Name	GRank / SRank	Number of occurrences	Element occurrence rank (percent of occurrences)										No occurrence rank	
				A	AB	B	BC	C	CD	D	H	X			
<i>Hackelia ophiobia</i>	rattlesnake stickseed	G3 / S2	13	46											54
<i>Hackelia cronquistii</i>	Cronquist's stickseed	G2 / S1	4	10 0											
<i>Haplopappus insecticuriis</i>	bugleg goldenweed	G3 / S3	58	9		24	12	28	5	14	3				5
<i>Haplopappus radiatus</i>	Snake River goldenweed	G3 / S3	16					19		6			13		63
<i>Ipomopsis polycladon</i>	spreading gilia	G4 / S2	16				6	25		6					63
<i>Lepidium papilliferum</i>	slick spot peppergrass	G2 / S2	88	7		10	2	24	1	19	5	15			17
<i>Lepidium davisii</i>	Davis' peppergrass	G3 / S3	167	15	2	43	4	17	2	2			1		14
<i>Leptodactylon glabrum</i>	Bruneau River prickly phlox	G2 / S2	4												100
<i>Limosella acaulis</i>	southern mudwort	G? / S?	1												100
<i>Lomatium packardiae</i>	Packard's desert-parsley	G2 / S2	7												100
<i>Lupinus uncialis</i>	inch-high lupine	G4 / S2	11	18	9	27		18							27
<i>Mentzelia mollis</i>	smooth stickleaf	G2 / S2	18	11		6		11		11					61
<i>Nemacladus rigidus</i>	rigid threadbush	G4 / S2	18			17	11	17				11			44
<i>Pediocactus simpsonii</i>	Simpson's hedgehog cactus	G4 / S3	20	15		15	10	10							50
<i>Penstemon janishiae</i>	Janish's penstemon	G4 / S2	19			32	5	21				11			32
<i>Peraphyllum ramosissimum</i>	squaw apple	G4 / S2	1												100
<i>Peteria thompsoniae</i>	spine-noded milkvetch	G4 / S2	13	8		23	15	15							38
<i>Phacelia minutissima</i>	least phacelia	G3 / S2	20			30	5	20		5	5				35
<i>Psathyrotes annua</i>	annual brittlebrush	G5 / S2	11			27		18							55
<i>Sphaeromeria potentilloides</i>	cinquefoil tansy	G5 / S1	4		50							50			

Species	Common Name	GRank / SRank	Number of occurrences	Element occurrence rank (percent of occurrences)										No occurrence rank	
				A	AB	B	BC	C	CD	D	H	X			
<i>Stanleya confertiflora</i>	biennial princesplume	G1 / S1	7	29					29						43
<i>Stylocline filaginea</i>	stylocline	G4 / S2	11					9				18			73
<i>Teucrium canadense var occidentale</i>	American wood sage	G5T5? / S2	7	29								29			43
<i>Texosporium sancti-jacobi</i>	wovenspore lichen	G2 / S2	21	10	10	14	10	5	5				14		33
<i>Townsendia scapigera</i>	scapose townsendia	G4G5 / S1	1					10							
<i>Trifolium owyheense</i>	Owyhee clover	G2 / S1	2			50		50							

**Table 3.** Summary of plant community element occurrence ranking information. Sagebrush steppe plant community element occurrences observed at selected sites within the southwest Idaho study area are list by macrosite and site with assignments of occurrence quality, landscape context, and size components of the element occurrence rank.

Macrosite	Site	Plant Association	Quality	Landscape Context	Size	Element Occurrence Rank	Number of Stands	Size (acres)
Bennett Junction		ARTRW/POSE	C	C	C	C	1	384
Blair Trail Reservoir	Alkali Creek Beacon	ARTRW/POSE	CD	BC	A	BC	1	1,032
		ARTRW/POSE	CD	BC	C	C	1	413
		ARTRW/POSE	CD	BC	D	CD	3	403
	Blair Trail Reservoir	ARTRW/POSE	BC	BC	C	BC	1	467
		ARTRW/POSE	BC	BC	D	C	2	125
		ARTRW/POSE	C	BC	A	B	1	2,620
		ARTRW/POSE	C	BC	D	C	2	315
		ARTRW/POSE	CD	BC	B	C	1	481
		ARTRW/SIHY	BC	BC	A	B	1	3,401
		ARTRW/SIHY	BC	BC	D	C	1	50
	Cold Spring Creek Road	ARTRW/AGSP	BC	BC	C	BC	1	408
		ARTRW/AGSP	C	BC	D	C	4	295
	Cold Spring SW	ARTRW/STTH	C	BC	D	C	2	241
	Little Canyon Creek	ARTRW/POSE	CD	BC	C	C	1	356
		ARTRW/POSE	CD	BC	D	CD	1	42
McGuinness Ranch Road	ARTRW/POSE	D	BC	B	C	1	608	
Bown Creek		ARTRW/AGSP	C	C	A	B	1	1,073
		ARTRW/AGSP	C	C	B	BC	1	599
		ARTRW/AGSP	C	C	C	C	1	377

Macrosite	Site	Plant Association	Quality	Landscape Context	Size	Element Occurrence Rank	Number of Stands	Size (acres)
Hoffman Reservoir		ARTRW/POSE	BC	C	D	C	1	137
Hot Creek Road		ARTRW/STTH	AB	C	D	C	1	285
		ARTRW/STTH	B	C	B	BC	1	852
		ARTRW/STTH	C	C	B	BC	1	702
		ARTRW/STTH	C	C	D	CD	1	41
Orchard Training Range	Big Foot Butte	ARTRW/SIHY	B	B	B	B	1	939
		ARTRW/SIHY	B	B	D	BC	1	125
	Boundary	ARTRW/POSE	C	B	C	BC	1	349
		ARTRW/POSE	C	B	D	C	4	606
		ARTRW/POSE	CD	B	B	BC	1	624
	Point 3121	ARTRW/POSE	BC	B	A	B	1	5,671
		ARTRW/POSE	BC	B	C	BC	1	425
		ARTRW/POSE	BC	B	D	C	9	579
	Sand Creek	ARTRW/POSE	AB	B	A	AB	1	4,350
		ARTRW/POSE	B	B	A	AB	1	1,577
		ARTRW/POSE	B	B	B	B	1	763
		ARTRW/POSE	B	B	C	BC	1	478
		ARTRW/POSE	BC	B	C	BC	1	473
ARTRW/POSE		BC	B	D	C	13	1,662	

**Table 4.** Summary of biodiversity significance rankings. Plant community and rare plant elements present at sites visited within the study area are summarized with the assigned biological diversity significance rank<sup>2</sup> of the site.

Macrosite	Site	Element	Element occurrence rank							Biological Diversity Significance Rank
			A	AB	B	BC	C	CD	D	
Bennett Junction		ARTRW/POSE					1			B2
		<i>Lepidium papilliferum</i>			1					
Blair Trail Reservoir	Alkali Creek Beacon	ARTRW/POSE				1	1	3		B5
	Blair Trail Reservoir	ARTRW/POSE			1	1	5			B2
		ARTRW/SIHY			1		1			
		<i>Lepidium papilliferum</i>	1		1					
		<i>Astragalus atratus var insepatus</i>						1		
	Cold Spring Creek Road	ARTRW/AGSP				1	4			B4
	Cold Spring SW	ARTRW/STTH					2			B5
<i>Lepidium papilliferum</i>						1				

<sup>2</sup> Biodiversity significance ranks are applied using the following conventions:

B1 - Outstanding significance, such as the only known occurrence of any Element, the best or an excellent (A-ranked) occurrence of a G1 Element, or a concentration (4+) of high-ranked (A- or B-ranked) occurrences of G1 or G2 Elements. Site should be viable and defensible for targeted Elements and ecological processes contained.

B2 - Very high significance, such as one of the most outstanding occurrences of any community Element (regardless of its Element rank). Also includes areas containing any other (B-, C- or D-ranked) occurrence of a G1 Element, a good (A- or B-ranked) occurrence of a G2 Element, an excellent (A-ranked) occurrence of a G3 Element, or a concentration (4+) of B-ranked G3 or C-ranked G2 Elements.

B3 - High significance, such as any other (C- or D-ranked) occurrence of a G2 Element, a B-ranked occurrence of a G3 Element, an A-ranked occurrence of any community, or a concentration (4+) of A- or B-ranked occurrences of (G4 or G5) S1 Elements.

B4 - Moderate significance, such as a C-ranked occurrence of a G3 Element, a B-ranked occurrence of any community, an A- or B-ranked or only state (but at least C-ranked) occurrence of a (G4 or G5) S1 Element, an A-ranked occurrence of an S2 Element, or a concentration (4+) of good (B-ranked) S2 or excellent (A-ranked) S3 Elements.

B5 - Of general biodiversity interest or open space.

Macrosite	Site	Element	Element occurrence rank							Biological Diversity Significance Rank
			A	AB	B	BC	C	CD	D	
		<i>Astragalus purshii</i> var <i>ophiogenes</i>								
	Little Canyon Creek	ARTRW/POSE					1	1		B5
		<i>Astragalus atratus</i> var <i>inseptus</i>								
	McGuinness Ranch Road	ARTRW/POSE					1			B5
Bown Creek		ARTRW/AGSP			1	1	1			B2
		<i>Lepidium papilliferum</i>	1		1				1	
		<i>Texosporium sancti-jacobi</i>	1							
Hoffman Reservoir		ARTRW/POSE					1			B5
		<i>Stylocline filaginea</i>					1			
Hot Creek Road		ARTRW/STTH				2	1	1		B3
		<i>Lepidium papilliferum</i>					1			
Orchard Training Range	Big Foot Butte	ARTRW/SIHY			1	1				B4
	Boundary	ARTRW/POSE				2	4			B5
	Point 3121	ARTRW/POSE			1	1	9			B2
		<i>Lepidium papilliferum</i>	1		1		1			
		<i>Texosporium sancti-jacobi</i>		1				1		
	Sand Creek	ARTRW/POSE		2	1	2	13			B2
<i>Lepidium papilliferum</i>		1						1		

**Appendix A.** Plant species element occurrence rank specifications. Example rank specifications are shown for selected species.

<i>Species</i>	A element occurrence rank specifications	B element occurrence rank specifications	C element occurrence rank specifications
<i>Hackelia cronquistii</i>	Henry's Gulch, 1000s of plants in several square miles, not much grazing, habitat management plan.	Several 100 plants, not much grazing, native vegetation.	
<i>Lepidium davisii</i>	1,000's of individuals on an undisturbed playa, minimal disturbance.	1,000's of individuals on a slightly disturbed playa, used by stock for watering (but no development)	
<i>Lepidium papilliferum</i>	A-ranked occurrences include those with large population numbers occurring in high quality shrub-steppe communities. The occurrences also tend to be large in area, consisting of many slick spots spread over a contiguous area. Populations generally consist of greater than 1000 above-ground individuals in sagebrush stands consisting mostly of native perennials; these sites generally have not burned and have not subsequently been invaded by exotic annuals.	B-ranked occurrences consist of about 400 to 2000 individuals. Populations in this range must occur in high quality habitat and/or be protected to some degree from inappropriate disturbances (such as closed to tank training). The B-ranked occurrences consisting of thousands of individuals occur in fair to low quality sites (crested wheatgrass seedlings or burned over cheatgrass stands). The "average" occurrence here consists of several hundred plants in good to high quality sites.	C-ranked occurrences consist of as few as 25 to >1000 individuals. The occurrences with small populations occur in large tracts of high quality habitat and the large populations are in highly disturbed habitats or those that are adjacent to recent developments and are not expected to remain viable. The "average" occurrence here consists of 100-200 individuals in fair to low-quality habitat.
<i>Trifolium owyheense</i>	100 or more individuals in a pristine community, well protected.		

## Appendix B. Element occurrence specifications - *Artemisia tridentata wyomingensis* Group

### **Artemisia tridentata ssp. wyomingensis / Bunchgrass associations on loamy soil**

Wyoming Big Sagebrush / Bunchgrass associations on loamy soils

#### **SPECS.GROUP**

*Artemisia tridentata* Shrub Herbaceous Alliance, zonal or loamy soil group

#### **GEL.SUMMARY:**

Matrix community type whose native indicators are bunchgrasses, such as *Pseudoroegneria spicata* (*Agropyron spicatum*) and *Festuca idahoensis*, which have >5-10% cover; shrubs, predominately *Artemisia tridentata*, vary from 10 - 40% cover. Vascular plant cover may be <30% cover, with an herb layer that can contain a mix of natives and non-natives. Native annual increasers or non-native invaders may be >20% cover and >30% relative dominance in the herb layer. Cryptogamic crust varies from intact to degraded or absent. Soils in this subgroup are typically fine textured loams usually derived from loess:

#### **EOSPECS:**

EOs are separated by either:

- a barrier between patches (e.g., a four-lane highway, urban development, open body of water); or,
- an area of cultural vegetation (including ruderal vegetation, such as old-fields) greater than 0.5 km; or,
- a different intervening natural or semi-natural community greater than 2 km.

Justification: The separation distances for cultural vegetation are based primarily on the suggested minimum value, since little is known about limitations on sagebrush and herb seed dispersal. The separation distance for intervening natural or semi-natural communities seemed to be a pragmatically useful distance. Justification for the separation distances is based on experience and discussion with WA, OR, and ID heritage ecologists and need to be fully developed. Primary criteria considered are reaction of native species to disturbance, seed dispersal by dominant shrubs, biology of shrub steppe passerines, and general conservation biology principles.

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#### **RANK. PROCEDURE**

As matrix community: size is a primary factor, landscape is a secondary factor, and condition is a tertiary factor. Standard weightings for these three factors are used.

#### **SIZE.SPECS**

**“A” rated size:** Very Large (>2500 ha; 1000 ac).

**“B” rated size:** Large (1200 -2500 ha; 480-1000 ac).

**“C” rated size:** Moderate: (800 – 1200 ha; 320- 480 ac).

**“D” rated size:** Small (< 800 ha; 320 ac).

Justification for minimum “A”-rated criteria: Data on shrub steppe obligate sage sparrow indicates that it does not nest successfully in stands less than 800 ha (320 acres) and optimally nest in stands over 2500 ha (1000 acres) (Vander Haegen 1999 personal communication). Stands this size would be able to support natural disturbance processes such as fire, and would contain sufficient internal variability to represent variability within the type.

Justification for “C”/“D” threshold: Data on shrub steppe obligate sage sparrow indicates that it does not nest successfully in stands less than 800 ha (320 acres) and optimally nest in stands over 2500 ha (1000 acres) (Vander Haegen 1999 personal communication). Stands lack variability, and are prone to being eliminated by a single disturbance event.

Comments: Justification is based on the assumption that sage sparrow indicates a functional habitat and on experience and discussion with WA, OR, and ID heritage ecologists and needs to be completely developed. Primary criteria considered are seed dispersal by dominant shrubs, biology of shrub steppe passerines, and likely of an area completely burning in a single event.

Comments: D-rated size occurrences may not be worth considering below 4 ha, practically speaking.

### LANDSCAPE.CONTEXT.SPECS

**“A” rated landscape context:** Highly connected - landscape has been little altered, and the EO is completely surrounded by other EO quality communities and extensive shrubsteppe defined as 50 minimum nesting areas for sage sparrow or 45,000 ha; 18,000 ac.

**“B” rated landscape context:** Moderately connected - EO is surrounded by moderate to extensive low-quality shrubsteppe (much not EO quality), an extensive landscape that is used or has been extensively used for grazing or training.

**“C” rated landscape context:** Moderately fragmented: EO is surrounded by a mix of intensive agriculture and adjacent natural/semi-natural shrubsteppe, or by a relatively small area (total area smaller than twice the minimum EO size) of shrubsteppe in an agriculturally fragmented landscape.

**“D” rated landscape context:** Highly fragmented - area around the EO is entirely or almost entirely surrounded by agricultural or urban land use; EO is at best buffered on one side by natural communities. The surrounding landscape is primarily intensive agriculture or suburban development.

Justification for minimum “A”-rated criteria: Natural disturbances, such as fire, can occur on a scale that permits maintenance of patches of the community in a variety of fire-maintained conditions.

Justification for “C”/“D” threshold: Processes such as natural disturbances are essentially irretrievable.

Comments: Justification is based on experience and discussion with WA, OR, and ID heritage ecologists and needs to be completely developed. Primary criteria considered are seed dispersal by dominant shrubs, biology of shrub steppe passerines, and likely of an area completely burning in a single event.

### CONDITION.SPECS

#### **“A” rated condition:**

a) Cryptogamic crust intact, covers >80% of vascular plant interspace (see exceptions below); high diversity of lichens and/or mosses in crust;

b) non-native species and native annual increasers (e.g. *Plantago patagonica*, annual fescues) absent or incidental;

- b) fire-sensitive shrubs (if part of described association) mature and recovered from past fires; shrubs well-spaced if present (generally <20-25% cover);
- c) diverse forb layer within expected range for the type; native perennial increasers not particularly prominent. This is now very rare to non-existent and is meant to represent a community that is indistinguishable from a community that has never been grazed and has not burned for some time. Fire was probably part of the “natural” landscape; but fires have increased in frequency unnaturally such that unburned areas are of greater natural value than recently burned areas.

**“B” rated condition:**

- a) Cryptogamic crust well-developed, >60% cover of vascular plant interspace; cryptogam crust little disturbed or may have recovered well from long-past grazing; cryptogamic crust diverse in species composition (at least 3-4 species prominent);
- b) community dominated by natives; non-natives and native annual increasers <10% total cover and <20% relative dominance in the herb layer; cheatgrass not thick under shrub crowns;
- c) fire-sensitive shrubs (if part of described association) prominent but may not be mature or fully recovered from fire; shrubs well-spaced if present; diverse forb layer within expected range for the type; native perennial increasers do not predominate. This is generally the best of what’s left in the landscape.

**“C” rated condition:**

- a) Cryptogamic crust moderately degraded or recovering, >30% cover of vascular plant interspace (although monotypic early-successional moss may be more abundant); species diversity of crust may be relatively low; lichens likely to have low percent cover;
- b) community clearly dominated by natives in the herb layer; non-natives and native annual increasers <20% total cover and <30% relative dominance in the herb layer; bunchgrasses >50% relative dominance in the herb layer; indicator bunchgrasses (*Pseudoroegneria spicata*, *Festuca idahoensis*) clearly more important than increasers or non-natives; forb diversity may be somewhat lower than expected for the type; native perennial increasers may be relatively prominent but do not dominate. Cheatgrass can often be dense under shrub crowns;
- c) fire-sensitive shrubs may be present or absent; shrubs that increase (e.g. *Artemisia tridentata* ssp. *tridentata*) may be somewhat more dense than pre-disturbance but still <35% cover.

**“D” rated condition:**

- a) Cryptogamic crust degraded or absent, <30% cover of vascular plant interspace; crust often low diversity;
- b) community may not be clearly dominated by natives; herb layer is a mix of natives and non-natives; native annual increasers or non-native invaders may be >20% cover and >30% relative dominance in the herb layer; native indicator bunchgrasses (*Pseudoroegneria spicata*, *Festuca idahoensis* combined) >5-10% cover;
- c) shrubs may be quite dense, with >40% cover.

Justification for minimum “A”-rated criteria: The “A” rated criteria are based on description of relict communities and key plant species reaction to anthropogenic disturbances.

Justification for “C”/”D” threshold: This threshold is described to separate C occurrences that will naturally improve in condition when released from livestock or other anthropogenic disturbance from “D” occurrences that will not improve and are prone to irreversible changes in composition.