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Identification of the *Artemisia Tridentata* ssp. *Wyomingensis*/*Festuca Idahoensis* Habitat Type in Eastern Oregon¹

Abstract

Six stands of the *Artemisia tridentata* ssp. *wyomingensis*/*Festuca idahoensis* (ARTRW/FEID) habitat type were assessed for vegetation and soils information. *Festuca idahoensis* was the dominant understory species with frequency values ranging from 16.7 to 100%. *Poa sandbergii*, *Sitanion hystrix* and *Stipa thurberiana* were common associates in this habitat type. *Bromus tectorum* was most prevalent on sites with coarse textured soils. Soil textures ranged from silt loam, sandy loams and loamy sands. The distribution of *Artemisia tridentata* ssp. *wyomingensis*/*Festuca idahoensis* habitat type appears unique to Oregon.

Introduction

In eastern Oregon, approximately 10,000,000 hectares of rangeland support sagebrush/grassland vegetation (Winward 1980). The most common woody species on these sites, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), is considered more xeric than other members of the big sagebrush group. Although habitat types dominated by Wyoming big sagebrush have been recognized, classification of these plant communities has primarily been developed in other regional areas. The most comprehensive evaluations have been performed in Idaho. Common understory associates which have been used to delineate habitat types include: bluebunch wheatgrass (*Agropyron spicatum*), Thurber's needlegrass (*Stipa thurberiana*), needle-and-thread (*Stipa comata*), Sandberg bluegrass (*Poa sandbergii*), and squirreltail (*Sitanion hystrix*) (Winward 1970, Hironaka and Fosberg 1983).

Although sagebrush dominated lands in Oregon are similar to those encountered in Idaho, one plant community not described is the *Artemisia tridentata* ssp. *wyomingensis*/*Festuca idahoensis* (ARTRW/FEID) association. Generally, Idaho fescue (*Festuca idahoensis*) has been associated with the more mesic portions of the

region and has not been reported to occur in conjunction with the relatively xeric Wyoming big sagebrush (Hironaka and Fosberg 1983). It is important for land managers to be aware of this habitat type when resource-use plans are formulated for sagebrush grasslands. The purpose of this report is to describe the vegetation and soils in the ARTRW/FEID habitat type.

Materials and Methods

In order to clarify synecological relationships which exist within the ARTRW/FEID habitat type, six stands were located in eastern Oregon and sampled for vegetation and soil characteristics. Three of the sites were situated near Baker (B₁, B₂, and B₃), two at Squaw Butte Experiment Station west of Burns (S₁ and S₂) and one in close proximity to Hampton (H₁). Site locations are given in Table 1.

The following procedures, modified from Poulton and Tisdale (1961), were used to gather vegetation information. At each site, a circular macroplot with a 25 m radius was empirically located so as to be representative of the plant species present within the stand. Through the center of each plot, a randomly located baseline was established. During the summer of 1980 three 30 m X 1 cm transects at distances of 8 and 16 m on one side of the plot center and 8 m on the other side of the plot center were established perpendicular to the baseline. Along each transect at 3 m intervals, frequency of all plant species present was determined utilizing a

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TABLE 1. Site descriptions and soil information for six eastern Oregon stands of *Artemisia tridentata* ssp. *wyomingensis*/*Festuca idahoensis* habitat type.

	Stand					
	B ¹	B ²	B ³	S ¹	S ²	H ¹
County	Baker	Baker	Baker	Harney	Harney	Deschutes
Township and Section	9S 21(N $\frac{1}{4}$ E $\frac{1}{4}$ N $\frac{1}{4}$)	9S 27(N $\frac{1}{4}$ E $\frac{1}{4}$ N $\frac{1}{4}$)	8S 7(SW $\frac{1}{4}$ SE $\frac{1}{4}$)	23S 34(SE $\frac{1}{4}$ NE $\frac{1}{4}$)	24S 22(SE $\frac{1}{4}$ NW $\frac{1}{4}$)	21S 33(SW $\frac{1}{4}$ NW $\frac{1}{4}$)
Range	41E	41E	41E	25E	25E	21E
Elevation (meters)	1100	1100	1100	1341	1432	1341
Aspect and Percent Slope	NE8	W10-15	N3	N2-4	E2	N5-10
15 Year Precipitation Average (1962-1977) cm/yr		26.2			26.7	24.9
Soil Family	Xerollic durorthid clayey/sandy skeletal, fr.	Xerollic durorthid fine loamy, frigid	Haploxerollic durorthid coarse loamy, frigid	Xerollic durorthid coarse loamy, frigid	Aridic durixerollic coarse loamy, frigid	Xerollic durorthid fine frigid
Soil Depth to Restrictive Horizon (cm)	31	42	48	51	76	61
Soil Surface: Texture	Silt Loam	Silt Loam	Silt Loam	Sandy Loam	Sandy Loam	Loamy Sand
pH	7.4	7.4	7.0	7.2	6.7	7.2
% OM	1.4	2.0	2.2	0.8	2.1	1.76
Parent Material	Alluvium basaltic	Alluvium	Basalt	Rhyolite alluvium	Alluvium basaltic	Alluvium basaltic

30 cm x 60 cm sampling frame. Thirty samples at each site were recorded. Shrub cover using a line-intercept approach was also determined along each 30 m transect. Herbage production of understory species was measured the following year utilizing the same sampling scheme as that used for plant frequency analysis. Plants were clipped and oven dried at 60°C for 48 hours.

Soils were classified according to Soil Conservation Service (1975) definitions, and topographic characteristics noted at each location. Soil pH, surface texture, percent organic matter and parent material were also determined. Estimates of mean annual precipitation values for each site were taken from U.S. Department of Commerce records from the nearest weather stations and averaged during the years 1962 to 1977.

Results and Discussion

Vegetation and Soils

Graminoids were the prominent understory species in the ARTRW/FEID habitat type, with Idaho fescue the dominant bunchgrass present on all sites (Table 2). Thurber's needlegrass was found to be a frequent associate particularly on sites with sandy soil, but contributed less to understory biomass than Idaho fescue. Sandberg bluegrass and squirreltail were common members of the plant association. At the Squaw Butte and Hampton locations, scattered individuals of bluebunch wheatgrass, western wheatgrass, and junegrass were encountered, but contributed little to the understory component. Cheatgrass brome achieved maximum expression within stands found on coarse textured soils. Although perennial forbs did not constitute a very large percentage of the understory component, pussytoes (*Antennaria dimorpha*) was ubiquitous. Annual forbs as a group tended to be clustered under shrub canopies and were less common in shrub interspaces. Canopy coverage of Wyoming big sagebrush ranged from 7 percent to 25 percent. Green rabbitbrush (*Chrysothamnus viscidiflorus*) did not appear to be an important component of the ARTRW/FEID habitat type, but did occur on sites with coarse textured soils.

Evaluation of soil characteristics within the sampled stands revealed differences in texture in relation to geographic area as soils on the Squaw Butte and Hampton sites were coarser tex-

ured than those encountered at the Baker location (Table 1). Soil textures ranged from silt loams to loamy sands. Soil pH's ranged from 6.7 to 7.4 and soils parent materials were generally derived from an alluvial source. Soil families, keying principally to xerollic durorthids, were relatively shallow, ranging from 31 cm to 76 cm to a restrictive layer.

Except for the presence of Idaho fescue and the absence of bluebunch wheatgrass, the ARTRW/FEID habitat type encountered in eastern Oregon appeared to be similar in physiognomy to the *Artemisia tridentata* ssp. *wyomingensis*/Agropyron *spicatum* (ARTRW/AGSP) habitat type described in Idaho (Winward 1970, Hironaka and Fosberg 1983). Both plant communities exist where annual precipitation is generally less than 30 cm and they share common understory species. Further, these two habitat types tend to be less floristically diverse than higher elevation plant communities dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Winward 1970).

Although the extent of ARTRW/FEID habitat type stands in eastern Oregon has not been assessed, it appears to occur only along the northern edge of the Great Basin in Oregon. This relationship is consistent with extensive observations of eastern Oregon rangelands. In the southeastern portion of the state, where sagebrush/grassland is the primary vegetation type, similar associations of Idaho fescue and Wyoming big sagebrush have not been located. On these sites, plant communities are like those described in Idaho, with the ARTRW/AGSP habitat type the most prevalent Wyoming big sagebrush habitat type.

Conclusions

The ARTRW/FEID habitat type encountered in eastern Oregon represents a unique plant association between Idaho fescue and Wyoming big sagebrush. Idaho fescue is probably at the edge of its tolerance range for limited moisture. Whether or not compensatory moisture relationships have enabled Idaho fescue to extend its range into Wyoming big sagebrush stands, or ecotypic development has resulted in the development of genotypes adapted to those sites has yet to be determined. Land managers may need to be extra cautious in manipulating this habitat

TABLE 2. Shrub cover, understory herbage production, relative seral stage and plant frequency for six eastern Oregon stands of the *Artemisia tridentata* ssp. *wyomingensis*/*Festuca idahoensis* habitat type.

	Stand					
	B ¹	B ²	B ³	S ¹	S ²	H ¹
SHRUB CANOPY COVER						
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	19.7	13.0	13.7	13.3	25.0	6.7
<i>Chrysothamnus viscidiflorus</i>				6.7	0.7	4.3
HERBAGE PRODUCTION (1981) kg/ha	304	178	676	393	418	320
PERENNIAL GRAMINOIDS						
(Frequency)				3.3		3.3
<i>Agropyron smithii</i>				30.0	10.0	3.3
<i>Agropyron spicatum</i>				23.3	53.3	56.7
<i>Carex</i> sp.	36.7	16.7	100.0		36.7	6.7
<i>Festuca idahoensis</i>				13.3	50.0	50.0
<i>Koeleria cristata</i>	96.7	96.7	80.0	30.0	13.3	36.7
<i>Poa sandbergii</i>	40.0	23.3	6.7	30.0	13.3	13.3
<i>Sitanion hystrix</i>	36.7					
<i>Stipa thurberiana</i>						
<i>Stipa comata</i> v. <i>comata</i>						
ANNUAL GRAMINOIDS						
<i>Bromus tectorum</i>	3.3	30.0	6.7	90.0	86.7	13.3
<i>Vulpia octiflora</i>		3.3				
PERENNIAL FORBS						
<i>Achillea millefolium</i>		10.0		3.3		
<i>Allium</i> sp.						
<i>Antennaria dimorpha</i>			10.0	10.0	3.3	3.3
<i>Arabis hirsuta</i> v. <i>glabrata</i>		6.7	16.7	10.0		
<i>Aster scorolorum</i>	36.7			3.3		
<i>Astragalus curvicaarpa</i>					23.2	
<i>Astragalus salmonensis</i>			23.3			
<i>Calochortus</i> sp.	53.3			10.0		
<i>Chaenactis douglasii</i>				3.3	3.3	
<i>Crepis acuminata</i>				3.3		
<i>Erigeron linearis</i>		6.7				
<i>Erigeron poliosperum</i>	70.0		6.7			
<i>Eriogonum heracleoides</i>						3.3

TABLE 2. Continued.

	Stand					
	B ¹	B ²	B ³	S ¹	S ²	H ¹
PERENNIAL FORBS (continued)						
<i>Leptodactylon pungens</i>						10.0
<i>Lomatium</i> sp.	3.3	36.7	3.3			
<i>Lomatium rollinsii</i>				3.3		
<i>Lomatium triternatum</i>		16.7		16.7		
<i>Lupinus caudatus</i>	76.7	60.0	23.3		13.3	
<i>Phlox hoodii</i>						
ANNUAL FORBS						
<i>Alyssum alyssoides</i>		26.7	10.0		60.0	86.7
<i>Collinsia parviflora</i>		6.7	83.3	40.0	16.7	10.0
<i>Descurainia pinnata</i>						
<i>Epilobium paniculatum</i>		40.0				3.3
<i>Eriastrum sparsiflorum</i>						16.7
<i>Eriogonum vimineum</i>						13.3
<i>Gayophytum ramosissimum</i>		33.3	3.3			
<i>Lepidium perfoliatum</i>		16.7	60.0	96.7	90.0	76.7
<i>Microsteris gracilis</i>	33.3	16.7				
<i>Plectritis macrocera</i>		16.7				
<i>Ranunculus testiculatus</i>						
SHRUBS						
<i>Artemisia tridentata</i> sp.		33.3	23.3		46.7	6.7
<i>wyomingensis</i>	50.0			23.2		3.3
<i>Chrysothamnus viscidiflorus</i>				6.7		36.7

type. With Wyoming big sagebrush growing well within its ecological range and Idaho fescue at

its edge, Idaho fescue may be very sensitive to heavy livestock utilization.

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