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VEGETATION MAP OF THE RARE PLANT COMMUNITY TYPES
IN THE PRYOR MOUNTAINS AND PRYOR MOUNTAIN DESERT,
CARBON COUNTY, MONTANA

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Vegetation Map of Rare Plant Community Types
in the Pryor Mountains and Pryor Mountain Desert,
Carbon County, Montana

Introduction

The Pryor Mountains and adjacent desert lowlands of Carbon County, Montana support a diverse array of plant communities (Lesica et al. 1992). Many of these are rare in Montana, and some are considered globally rare (DeVelice and Lesica 1993). Plant communities are a good surrogate for overall biological diversity (Lesica 1993, Noss 1987, Ryti 1992). Thus, protecting high-quality examples of rare plant communities should protect populations of less conspicuous organisms such as invertebrates and fungi. The ability to locate critical plant communities on the landscape is essential to managing for biological diversity.

DeVelice and Lesica (1993) sampled vegetation on lands administered by the Bureau of Land Management (BLM) in the Pryor Mountains and the desert areas south of the mountains in Montana. They used data from their survey to develop a classification system, and they provided descriptions of the plant communities. In addition, they assigned global and state conservation ranks to these communities following Natural Heritage Program methods (DeVelice and Lesica 1993). Fourteen of the 33 plant community types described were ranked as globally threatened or endangered (G1-G3).

The purpose of this study was to use the classification system developed by DeVelice and Lesica (1993) to map occurrences of rare plant communities on BLM lands in the Pryor Mountain study area. A secondary goal was to refine the classification system based on observations made in areas that were not sampled during the original study.

The Study Area

The Pryor Mountains and Pryor Mountain Desert are described in DeVelice and Lesica (1993), Lesica and Achuff (1992) and Knight et al. (1987). I mapped vegetation north of the Wyoming border and south of the Crow Indian Reservation. My study area was bounded on the east by the Big Horn River and on the west by the Clarks Fork of the Yellowstone River. Within this area, I confined my mapping to public lands administered by BLM. I did not attempt to map isolated parcels or areas with large private inholdings.

Methods

On June 11-17, 1993 I drove and hiked through the study area and mapped plant community types onto aerial photographs (1:29000) provided by BLM. I mapped ca. 35% the area east of Hwy

310 on the ground and ca. 20% west of Hwy 310 from the ground. The remaining area was mapped by extrapolation from the ground-truthed areas. Lines enclosing community types were transferred to 1:24000 USGS topographic maps after completion of field work. During field work I took notes on community composition when it deviated from descriptions provided by DeVelice and Lesica (1993).

Plant communities are often not discrete entities on the landscape, but rather blend into one another across ecotones of varying widths (Gleason 1926, Whitaker 1975). Lines separating community types were generally drawn along ecotones. Areas mapped as one community type may have inclusions of locally less common types. The minimum mapping unit was ca. 40 acres. Stands smaller than 40 acres were usually included within larger surrounding mapping units.

Results

A list of all community types reported by DeVelice and Lesica (1993) is provided below. Each entry is followed by the current Natural Heritage Program global and state ranks as well as any additional information acquired during 1993 field studies.

Global and state ranks are defined as follows:

- G1 or S1 1-5 occurrences or less than 2,000 acres in world or state respectively.
- G2 or S2 6-20 occurrences or 2,000-10,000 acres in world or state respectively.
- G3 or S3 21-100 occurrences or 10,000-50,000 acres in world or state respectively.
- G4 or S4 Apparently secure in the world or state respectively
- G5 or S5 Demonstrably secure in the world or state respectively

All community types with a global rank of 1-3 and/or a state rank of 1-2 were considered rare and were mapped. These types are shown in bold below. The number in front of each type is used to identify that type on the maps. Numbers of community types ranked G1 are in red; those ranked G2 are in green; and those ranked G3 are in black.

1. *Abies lasiocarpa*/*Arnica cordifolia* c.t. G5/S5
2. *Abies lasiocarpa*/*Clematis columbiana* c.t. G4/S3
3. *Abies lasiocarpa*/*Ribes montigenum* c.t. G5/S4

4. *Abies lasiocarpa/Vaccinium scoparium* c.t. G5/S5
5. *Pinus flexilis/Festuca idahoensis* c.t. G5/S5
6. *Pinus flexilis/Juniperus communis* c.t. G5/S4
7. *Pseudotsuga menziesii/Agropyron spicatum* c.t. This type has a very limited distribution in the Pryor Mountains and is probably best considered an ecotone between *Artemisia nova/Agropyron spicatum* c.t. and *Pseudotsuga menziesii/Symphoricarpos oreophilus* or *Pinus flexilis/Juniperus communis* c.t.s.
8. *Pseudotsuga menziesii/Festuca idahoensis* c.t. G5/S4. This type has a very limited distribution in the Pryor Mountains.
9. *Pseudotsuga menziesii/Cercocarpus ledifolius* c.t. G3/S3. This type has a very limited distribution in the Pryor Mountains. It is very similar to the *Cercocarpus ledifolius/Agropyron spicatum* habitat type described by Mueggler and Stewart (1980). but is high enough to be at the lower limits of the tolerance of *Pseudotsuga menziesii*. Most stands have only juvenile Douglas fir present, but larger snags were observed in some stands.
10. *Pseudotsuga menziesii/Symphoricarpos oreophilus* c.t. G5/S3
11. *Juniperus osteosperma/Agropyron spicatum* c.t. G4?/S3. The two phases, *Gutierrezia sarothrae* and *Artemisia nova*, may warrant treatment as separate community types.
12. *Juniperus osteosperma/Artemisia tridentata* c.t. G5/S2
13. *Juniperus osteosperma/Cercocarpus ledifolius* c.t. G3/S3. There appear to be two phases of this type: the *Artemisia nova* phase on deeper soils and the nearly barren *Agropyron spicatum* phase on shallow soils.
14. *Juniperus scopulorum/Artemisia nova* c.t. G2/S2
15. *Pinus flexilis/Juniperus osteosperma* c.t. G2?/S2
16. *Pinus flexilis/Juniperus scopulorum* c.t. G4/S3
17. *Artemisia nova/Agropyron spicatum* c.t. G5/S4
18. *Artemisia pedatifida/Agropyron spicatum* c.t. G4/S2. This appears to be similar to the *Artemisia pedatifida/Sitanion hystrix* c.t. reported for Wyoming.
19. *Artemisia pedatifida/Agropyron smithii* c.t. G4/S3. DeVelice and Lesica (1993) called this type *Artemisia*

pedatifida/Atriplex nuttallii but a similar type under the former name has been described for Wyoming. There appear to be two phases of this type in the study area: *Atriplex nuttallii* phase in the eastern portion of the study area and the *Agropyron smithii* phase in the west part.

20. *Artemisia tridentata/Agropyron smithii* c.t. G5/S5
21. *Artemisia tridentata/Agropyron spicatum* c.t. G5/S5
22. *Artemisia tridentata/Atriplex confertifolia* c.t. G4/S4
23. *Sarcobatus vermiculatus/Artemisia tridentata* c.t. G4/S4. Typical examples of this community type occur in silty soil along stream terraces. However, there are stands dominated by *Sarcobatus vermiculatus*, *Artemisia tridentata* and *Grayia spinosa* on sandy calcareous soils east of Warren and just north of the Wyoming border. These unusual associations may warrant recognition.
24. *Artemisia tridentata/Stipa comata* c.t. G4/S4
25. *Atriplex nuttallii/Artemisia spinescens* c.t. G1/S1
26. *Artemisia tridentata/Atriplex nuttallii* c.t. G3?/S3?
27. *Atriplex nuttallii/Monolepis nuttalliana* c.t. G3?/S2. This community occurs on barren bentonitic soils, usually in a mosaic of badlands community types. It is difficult to determine its relationships to similar community types in the intermountain region.
28. *Potentilla fruticosa/Festuca idahoensis* c.t. G4/S3
29. *Sarcobatus vermiculatus/Atriplex nuttallii* c.t. G4/S3. This community usually occurs in a mosaic of badlands community types.
30. *Agropyron spicatum/cushion plant* c.t. G3/S3
31. *Chrysothamnus nauseosus/Eriogonum brevicaule* c.t. G2/S2
32. *Festuca idahoensis/Agropyron caninum* c.t. G4/S4
33. *Carex rupestris/Potentilla ovina* c.t. G4/S3. This type has very limited distribution in the study area.

Eleven Community types in the study area are ranked G3, S2 or higher. These rare community types, their ranks and the estimated acreage for each in the study area are given below:

9. *Pseudotsuga menziesii/Cercocarpus ledifolius* c.t. G3/S3.
110 acres
12. *Juniperus osteosperma/Artemisia tridentata* c.t. G5/S2
670 acres
13. *Juniperus osteosperma/Cercocarpus ledifolius* c.t. G3/S3.
1990 acres
14. *Juniperus scopulorum/Artemisia nova* c.t. G2/S2
250 acres
15. *Pinus flexilis/Juniperus osteosperma* c.t. G2?/S2
2510 acres
18. *Artemisia pedatifida/Agropyron spicatum* c.t. G4/S1.
240 acres
25. *Atriplex nuttallii/Artemisia spinescens* c.t. G1/S1
310 acres
26. *Artemisia tridentata/Atriplex nuttallii* c.t. G3?/S3?
3080 acres
27. *Atriplex nuttallii/Monolepis nuttalliana* c.t. G3?/S2.
720 acres
30. *Agropyron spicatum/cushion plant* c.t. G3/S3
3970 acres
31. *Chrysothamnus nauseosus/Eriogonum brevicaule* c.t. G2/S2
1540 acres
- BL. **Badlands (mosaic of 19, 22, 26, 27)**
2020 acres

Discussion

The presence of 11 rare community types makes the Pryor Mountains-Big Horn Basin area one of the most biologically unique areas in Montana. Many of these plant communities are currently known from nowhere else in the world (DeVelice and Lesica 1993). Threats to these communities have been discussed by DeVelice and Lesica (1993). The two high ranking (G1 or G2) plant communities that are currently most threatened are *Atriplex nuttallii/Artemisia spinescens* and *Chrysothamnus nauseosus/Eriogonum brevicaule*. Both occupy very arid and edaphically harsh environments. Vegetation is sparse and not resistant to livestock grazing or invasion by exotics such as *Halogeton glomeratus*. Management options that minimize the impacts of livestock grazing in these areas should be considered.

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