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GUIDE TO THE NATURAL VEGETATION
of
MONTANA

Montana Natural Heritage Program
1515 East Sixth Avenue
Helena, Montana 59620

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CONSIDERATIONS FOR THE REVIEW OF MTNHP STATE RANKS
OF THE NATURAL VEGETATION OF MONTANA

The sheet titled "MTNHP State Ranks for Vegetation" briefly explains the ranking system we use, and its purpose. Note that we track information on "high quality occurrences", but the term is subjective. The rank for a given type is based on an estimate of the acreage remaining in "high quality condition", and the threat to the type. The difference between "few" and "very few" acres is, again, subjective. Yet, the system provides us with a means for focusing our efforts on the types that are most likely to disappear if ignored.

The ranking list has been indexed by state rank. It is essentially in order of relative rarity (assuming that the assigned ranks are appropriate). In some cases, a range is indicated (e.g., "S152"), but sometimes a question mark is used to indicate uncertainty of the rank. The "U" rank is reserved for those cases where we lack enough information even to assign a rank with a question mark. These SU types may be quite rare, but have been placed alphabetically after S5 due to the computer program we used to generate the listing. We would especially like to know what numbered rank to assign these.

The name of each vegetation type on the ranking list is followed by the code we use to track it in our databases. This code can be used in conjunction with the type name to check information in the draft copy of the vegetation guide.

The draft vegetation guide represents an attempt to pull together into a single document a brief description of all the seral and climax plant communities which were found repeatedly in the landscape of Montana before the arrival of Caucasians. The draft is organized in the hierarchical framework developed by UNESCO¹ for the vegetation of the world. The table of contents shows the relevant sections from the UNESCO framework in **bold** type. We have organized (climax) plant associations and (seral) community types within Series under the appropriate UNESCO levels. Some Series appear in more than one place in the hierarchy (e.g., Populus trichocarpa). The index at the back will provide the easiest access to any given vegetation type named in the ranking list, and the computer codes serve as verification.

Nomenclature generally follows the Flora of the Great Plains by the Great Plains Flora Association. Taxa not included there, plus a few exceptions, follow the Flora of the Pacific Northwest by Hitchcock and Cronquist.

Our purpose is to provide a database on biological diversity. It is for this reason that we use the "plant community" concept, focusing on naturally occurring species assemblages rather than habitat types or range sites, which classify the site itself regardless of existing vegetation. This is a different approach than that of most land managing agencies, but it is not incompatible.

¹ UNESCO = United Nations Educational, Scientific, and Cultural Organization

MTNHP STATE RANKS FOR VEGETATION

The Montana Natural Heritage Program has developed, and continues to refine, a list of vegetation types that persisted in the natural landscape. This list includes both seral and climax vegetation types. The Program tracks information on the location and condition of high quality occurrences of the vegetation types that are most threatened. Highly disturbed examples of the vegetation types are not considered to be occurrences for Heritage Program purposes (e.g., logged or overgrazed sites). To focus our attention on vegetation types for which we need to collect occurrence data, ranks are assigned to each type based on the relative rarity and threat to the type.

The following state ranks have been assigned to vegetation types in Montana:

- S1 = Critically imperiled because of extreme rarity (very few remaining acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2 = Imperiled because of rarity (few remaining acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
- S3 = Rare or uncommon for high quality occurrences in the state.
- S4 = Apparently secure in the state, with many high quality occurrences.
- S5 = Demonstrably secure in the state and essentially ineradicable under present conditions.
- SU = Status uncertain, need more information.
- Z = Ranking not applicable. This code has been assigned to types, usually at the Series level (e.g., Pseudotsuga menziesii Series), which are too general to be meaningfully ranked.

Additional ranks which could be used include:

- SH = Of historical occurrence; efforts have been made to relocate examples and none have been found, though the type is suspected to still be extant in the state.
- SX = Apparently extirpated from the state.
- SR = Reported from the state, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.

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Guide to the Natural Vegetation of Montana

Introduction

This draft guide is the first attempt at assembling a single document that briefly describes all of the natural plant associations/communities in Montana. It has been developed through extensive literature review, involving both published and unpublished sources (e.g., journal articles, USFS publications, dissertations, and industry reports). However, there are major gaps in the literature, especially in riparian/wetland vegetation, but also in the eastern grasslands¹ and the alpine. One of the purposes of this document is to bring to light these information gaps.

Natural vegetation types are described in the guide as "plant associations" if considered to be climax types, or as "community types" if considered to be seral (abbreviated "pa" and "ct" respectively). Each type is arranged within a "series" based on the dominant plant species. Each series is in turn arranged in the hierarchical structure developed by the United Nations Educational, Scientific and Cultural Organization for the vegetation of the world.² When information has been insufficient to describe plant associations or community types, series descriptions stand alone indicating a need for documentation of the natural vegetation types within the series.

Each type is briefly characterized by a name, the authority for the name³, synonyms, site characteristics (elevation in feet, slope in percent, aspect, and soil), distribution (within Montana, following the geographic divisions of Arno⁴), and a brief description of the composition plus phases. Comment fields are used for elaboration on any of these attributes and for any additional information. Finally, a list of source codes links each type to relevant literature sources in the bibliography for detailed information.

¹ A great deal of work has been done by the SCS and BLM in the grasslands of eastern Montana. Range site descriptions and productivity figures are available. However, the descriptions of natural vegetation generally lack details on the forb component and are not directly comparable to descriptions of plant associations.

² See Mueller-Dombois, Dieter and Heinz Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Wiley and Sons, N.Y.

³ In cases where the literature description of a type follows a different naming convention, new names have been assigned in an attempt to be consistent with the bulk of the plant association descriptions.

⁴ Arno, S.F. 1979. Forest Regions of Montana. Research Paper

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Species nomenclature follows Flora of the Great Plains⁵, or Flora of the Pacific Northwest⁶ for species not included in the former. To save space, six letter abbreviations have been used in the text, taking the first three letters of both the genus and specific epithet.

The guide is incomplete, but will be ammended as information becomes available. Comments, criticisms, and suggestions are welcome; please direct them to Andrew Kratz at the Montana Natural Heritage Program, 1515 East Sixth Ave., Helena, Montana, 59620, (406) 444-3009.

⁵ Great Plains Flora Association. 1986. Flora of the Great Plains. Univ. Press of Kansas, Laurence, KS.

⁶ Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. Univ. of Washington Press, Seattle, WA.

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ACKNOWLEDGEMENTS

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At the Montana Natural Heritage Program, Lisa Shepperd and Chad Jones developed and implemented the various databases involved. Chad, Ginger King and Janet Goodell entered the information on the computer. Andrew Kratz coordinated with WESTECH, helped guide operations at MTNHP, and edited the draft.

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1A9CCATA	<u>Abies lasiocarpa/Vaccinium cespitosum</u> pa	5
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1A9CEATA	<u>Pseudotsuga menziesii/Symphoricarpos occidentalis</u> pa	8
1A9CEAVA	<u>Pseudotsuga menziesii/Symphoricarpos oreophilus</u> pa	8
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1A9CEAXM	<u>Pseudotsuga menziesii/Viola canadensis</u> pa	9
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1A9CFADA	<u>Thuja plicata/Gymnocarpium dryopteris</u> pa	9
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1A9CGA//	<u>Tsuga heterophylla</u> Series	10
1A9CGABA	<u>Tsuga heterophylla/Asarum caudatum</u> pa	10
1A9CGACA	<u>Tsuga heterophylla/Clintonia uniflora</u> pa	10

1A7C8ADA	<u>Tsuga heterophylla/Gymnocarpium dryopteris</u> pa	104
1A7CHA//	<u>Tsuga mertensiana</u> Series	105
1A7CHABA	<u>Tsuga mertensiana/Luzula hitchcockii</u> pa	106
1A7CHACA	<u>Tsuga mertensiana/Menziesia ferruginea</u> pa	107
1A7CHADA	<u>Tsuga mertensiana/Xerophyllum tenax</u> pa	108

B. Mainly deciduous forests

- 2. Cold-deciduous forests with evergreen trees (or shrubs)
- C. Cold-deciduous forest with evergreen needle-leaved trees

1B2CBA//	<u>Larix lyallii</u> Series	109
1B2CBABA	<u>Larix lyallii-Abies lasiocarpa</u> pa	110
1B2CCA//	<u>Populus angustifolia</u> Series	111
1B2CDA//	<u>Populus deltoides</u> Series	112
1B2CEA//	<u>Populus tremuloides</u> Series	113
1B2CFA//	<u>Populus trichocarpa</u> Series	114

- 3. Cold-deciduous forests without evergreen trees
- B. Montane or boreal cold-deciduous forest

1B3BBA//	<u>Betula papyrifera</u> Series	115
1B3BCA//	<u>Populus tremuloides</u> Series	116
1B3BCABA	<u>Populus tremuloides/Berberis repens</u> pa	117
1B3BCACA	<u>Populus tremuloides/Calamagrostis rubescens</u> ct	118
1B3BCADA	<u>Populus tremuloides/Heracleum sphondylium</u> ct	119
1B3BCAEA	<u>Populus tremuloides/Prunus virginiana</u> ct	120
1B3BCAFA	<u>Populus tremuloides/Spiraea betulifolia</u> ct	121
1B3BCAGA	<u>Populus tremuloides/Symphoricarpos albus</u> ct	122
1B3BCAHA	<u>Populus tremuloides/Symphoricarpos oreophilus</u> ct	123
1B3BCAJA	<u>Populus tremuloides-Populus trichocarpa/Osmorhiza occidentalis</u> ct	124

- C. Subalpine or subpolar cold-deciduous forest

1B3CBA//	<u>Larix lyallii</u> Series	125
1B3CBABA	<u>Larix lyallii</u> ct	126

- D. Cold-deciduous alluvial forest

1B3DA//	<u>Acer negundo</u> Series	127
1B3DCA//	<u>Fraxinus pennsylvanica</u> Series	128
1B3DCABA	<u>Fraxinus pennsylvanica-Ulmus americanus/Prunus virginiana</u> pa	129
1B3DDA//	<u>Populus angustifolia</u> Series	130
1B3DFA//	<u>Populus deltoides</u> Series	131
1B3DFABA	<u>Populus deltoides-Fraxinus pennsylvanica</u> ct	132
1B3DFAA//	<u>Populus trichocarpa</u> Series	133
1B3DFABA	<u>Populus trichocarpa/Betula papyrifera</u> ct	134
1B3DFACA	<u>Populus trichocarpa/Cornus stolonifera</u> ct	135

2. Woodlands (open stands): trees >5m, crowns not touching
 A. Mainly evergreen woodlands

2. Evergreen needle-leaved woodlands

A. Evergreen coniferous woodlands with rounded crowns

BA2ABA//	<u>Juniperus scopulorum</u> Series	13
BA2ABABA	<u>Juniperus scopulorum/Agropyron spicatum</u> pa	13
BA2ABACA	<u>Juniperus scopulorum/Oryzopsis micrantha</u> pa	13
BA2ACA//	<u>Pinus contorta</u> Series	13
BA2ACABA	<u>Pinus contorta/Purshia tridentata</u> pa	14
BA2ADA//	<u>Pinus flexilis</u> Series	14
BA2ADABA	<u>Pinus flexilis/Agropyron spicatum</u> pa	14
BA2ADACA	<u>Pinus flexilis/Festuca idahoensis</u> pa	14
BA2ADADA	<u>Pinus flexilis/Juniperus communis</u> pa	14
BA2AEA//	<u>Pinus ponderosa</u> Series	14
BA2AEABA	<u>Pinus ponderosa/Agropyron spicatum</u> pa	14
BA2AEACA	<u>Pinus ponderosa/Andropogon</u> spp pa	14
BA2AEADA	<u>Pinus ponderosa/Carex heliophila</u> pa	14
BA2AEAEA	<u>Pinus ponderosa/Juniperus horizontalis</u> pa	15
BA2AEAFA	<u>Pinus ponderosa/Purshia tridentata</u> pa	15
BA2AEAGA	<u>Pinus ponderosa-Quercus macrocarpa</u> ct	15

B. Evergreen coniferous woodland with conical crowns prevailing

BA2BBA//	<u>Pseudotsuga menziesii</u> Series	15
BA2BBABA	<u>Pseudotsuga menziesii/Agropyron spicatum</u> pa	15
BA2BBACA	<u>Pseudotsuga menziesii/Festuca idahoensis</u> pa	15
BA2BBADA	<u>Pseudotsuga menziesii/Festuca scabrella</u> pa	15
BA2BBADM	<u>Pseudotsuga menziesii/Juniperus scopulorum</u> pa	15
BA2BBAEA	<u>Pseudotsuga menziesii/Purshia tridentata</u> ct	15
BA2BBAFA	<u>Pseudotsuga menziesii/Vaccinium cespitosum</u> open park ct	15
BA2BBAGA	<u>Pseudotsuga menziesii-Pinus flexilis/Leucopoa kingii</u> pa	16

B. Mainly deciduous woodlands

3. Cold-deciduous woodlands

A. Broad-leaved deciduous woodland

BA3ABA//	<u>Acer negundo</u> Series	16
BA3ABM//	<u>Fraxinus pennsylvanica</u> Series	16
BA3ABMBA	<u>Fraxinus pennsylvanica/Prunus virginiana</u> pa	16
BA3ACA//	<u>Populus deltoides</u> Series	16
BA3ADA//	<u>Populus trichocarpa</u> Series	16
BA3AEA//	<u>Salix amygdaloides</u> Series	16

3. Scrub: shrublands or thickets, woody plants 0.5-5m tall

A. Mainly evergreen scrub

2. Evergreen needle-leaved and microphyllous shrublands

A. Evergreen needle-leaved thicket (or shrubland)

BA2ABA//	<u>Abies lasiocarpa</u> Series	16
BA2ABABA	<u>Abies lasiocarpa krummholz</u> pa	16

193BADA Abies lasiocarpa-Acer glabrum avalanche chute ct169

B. Evergreen microphyllous shrubland (or thickets)

42BBA// Artemisia cana Series178
 42BBABA Artemisia cana/Agropyron smithii pa171

42BCA// Artemisia tridentata Series172
 42BCABA Artemisia tridentata/Agropyron smithii pa173
 42BCACA Artemisia tridentata/Agropyron spicatum pa174

42BDA// Juniperus osteosperma Series175
 42BDABA Juniperus osteosperma/mixed understory ct176

E. Mainly deciduous scrub

4. Cold-deciduous shrublands (or thickets)

A. Temperate deciduous thicket (or shrubland)

34ABA// Acer glabrum Series177
 34ABABA Acer glabrum avalanche chute ct178
 34ABADA Acer glabrum drainage bottom ct179

34ACA// Alnus spp Series180
 34ACABA Alnus spp avalanche chute ct181

34ADA// Alnus incana Series182
 34ADABA Alnus incana ct183

34AEA// Amelanchier alnifolia Series184
 34AEABA Amelanchier alnifolia/Agropyron spicatum ct185

34AFA// Betula glandulosa Series186

34ABA// Betula occidentalis Series187
 34AGABA Betula occidentalis/Potentilla fruticosa ct188

34AHA// Cercocarpus ledifolius Series189
 34AHABA Cercocarpus ledifolius/Agropyron spicatum pa190
 34AHACA Cercocarpus ledifolius-Juniperus scopularum ct191

34ATA// Cornus stolonifera Series192

34AKA// Crataegus douglasii Series193

34ALA// Crataegus succulenta Series194

34ANA// Eleagnus commutata Series195

34ANA// Potentilla fruticosa Series196
 34ABABA Potentilla fruticosa/Carex spp ct197
 34ANACA Potentilla fruticosa/Deschampsia cespitosa ct198

34APA// Prunus americana Series199

34ACA// Prunus virginiana Series200

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B4ARM//	<u>Purshia tridentata</u> Series	2
B4ARMBA	<u>Purshia tridentata/Festuca idahoensis</u> pa	2
B4ARA//	<u>Rhamnus alnifolia</u> Series	2
B4ARM//	<u>Rhus aromatica</u> Series	2
B4ARMBA	<u>Rhus aromatica/Agropyron spicatum</u> pa	2
B4ATA//	<u>Rosa woodsii</u> Series	2
B4ATM//	<u>Shepherdia argentea</u> Series	2
B4ATMBA	<u>Shepherdia argentea-Symphoricarpos occidentalis</u> ct	2
B4AVA//	<u>Symphoricarpos albus</u> Series	2
B4AVM//	<u>Symphoricarpos occidentalis</u> Series	2
B4AWA//	<u>Vaccinium occidentale</u> Series	2
C. Deciduous alluvial shrubland (or thicket)		
B4CAM//	<u>Salix species</u> Series	21
B4CBA//	<u>Salix bebbiana</u> Series	21
B4CCA//	<u>Salix drummondiana</u> Series	21
B4CDA//	<u>Salix exigua</u> Series	21
B4CEA//	<u>Salix farriacae</u> Series	21
B4CFA//	<u>Salix geyeriana</u> Series	21
B4CFM//	<u>Salix planifolia</u> Series	21
B4CGA//	<u>Salix wolfii</u> Series	21
C. Extremely xeromorphic (subdesert) shrublands		
1. Mainly evergreen subdesert shrublands		
B. Semi-deciduous subdesert shrubland		
B4BBA//	<u>Artemisia tridentata</u> Series	22
B4BBABA	<u>Artemisia tridentata-Atriplex confertifolia/Agropyron</u> <u>spicatum</u> ct	22
B4BCA//	<u>Chrysothamnus nauseosus</u> Series	22
2. Deciduous subdesert shrublands		
A. Deciduous subdesert shrubland without succulents		
B4BABA//	<u>Atriplex confertifolia</u> Series	22
B4BACA//	<u>Sarcobatus vermiculatus</u> Series	22
B4BACABA	<u>Sarcobatus vermiculatus/Agropyron spicatum</u> pa	22

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- 4. Dwarf-scrub and related communities: rarely >50cm tall
 - A. Mainly evergreen dwarf-scrub
 - 2. Evergreen dwarf-shrublands
 - B. Evergreen mosaic dwarf-shrubland

APBAM//	<u>Cassiope species</u> Series	226
APBBA//	<u>Kalmia microphylla</u> Series	227
APBDA//	<u>Phyllocladus species</u> Series	228

- 3. Mixed evergreen dwarf-scrub and herbaceous formations
 - B. Partially evergreen dwarf-scrub and herb mixed formations

ASBBBA//	<u>Juniperus horizontalis</u> Series	229
ASBBADA	<u>Juniperus horizontalis/Andropogon scoparius</u> pa	230
ASBBAGA	<u>Juniperus horizontalis/Carex heliophila</u> pa	231

B. Mainly deciduous dwarf-scrub

- 3. Mixed cold-deciduous and evergreen dwarf-thickets
 - A. Mixed cold-deciduous and evergreen caespitose dwarf-thicket

CSACA//	<u>Salix reticulata</u> Series	232
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C. Extremely xeromorphic dwarf-shrublands

- 1. Mainly evergreen subdesert dwarf-shrubland
 - B. Semi-deciduous subdesert dwarf-shrubland

CIBBA//	<u>Atriplex gardneri</u> Series	233
CIACA//	<u>Eriogonum pauciflorum</u> Series	234

2. Deciduous subdesert dwarf-shrubland

- A. Deciduous subdesert dwarf-shrubland without succulents

CEABA//	<u>Artemisia pedatifida</u> Series	235
CEACA//	<u>Artemisia spinescens</u> Series	236

5. Terrestrial herbaceous communities

- B. Steppes and related grasslands
 - 1. Tall-grass steppes
 - B. Tall-grass steppe with shrubs

BIBBA//	<u>Yucca glauca</u> Series	237
BIBBABA	<u>Yucca glauca/Calamovilfa longifolia</u> ct	238

C. Tall-grass steppe without woody plants

BICBA//	<u>Andropogon gerardii</u> Series	239
BICBABA	<u>Andropogon gerardii/Andropogon scoparius</u> ct	240
BICBACA	<u>Andropogon gerardii/Calamovilfa longifolia</u> ct	241
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5B10EABA	<u>Calamovilfa longifolia</u> / <u>Agropyron smithii</u> ct	25
5B10EACA	<u>Calamovilfa longifolia</u> / <u>Carex filifolia</u> ct	25
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5B10GABA	<u>Phalaris arundinacea</u> ct	25
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5B10HABA	<u>Spartina pectinata</u> / <u>Carex</u> spp ct	25
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B. Mid-grass steppe with shrubs

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5B20DABA	<u>Artemisia longiloba</u> / <u>Festuca idahoensis</u> ct	26
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5B20FABA	<u>Artemisia pedatifida</u> / <u>Festuca idahoensis</u> ct	26
5B20GA//	<u>Artemisia tridentata</u> Series	26
5B20GABA	<u>Artemisia tridentata</u> / <u>Festuca idahoensis</u> pa	26
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5B20HABA	<u>Artemisia tripartita</u> / <u>Festuca idahoensis</u> pa	26
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5B20JABA	<u>Gutierrezia sarothrae</u> / <u>Agropyron dasystachyum</u> ct	26
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32BNADA	<u>Rhus aromatica/Festuca idahoensis</u> pa	290
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32BNABA	<u>Sarcobatus vermiculatus/Agropyron smithii</u> pa	292
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32BPABA	<u>Yucca glauca/Agropyron spicatum</u> ct	294

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32CBABA	<u>Agropyron smithii</u> alluvial clay flat ct	296
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52ECMACA	<u>Stipa comata/Carex heliophila</u> pa	3
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Pinus albicaulis Series

Pinus albicaulis-dominated plant associations are fairly common in upper-elevation mountain ranges, particularly east of the Continental Divide. They occur from climatic timberline downward on exposed ridges and southerly aspects and are found on droughty sites within the upper alpine zone.

Pin alb generally appears: 1) in relatively pure stands, 2) in forests mixed with Abi las, and 3) in krumholz stands with Abi las or Pic eng. Pfister et al. (1977, B77PFI@1MT) did not subdivide Pin alb on the basis of understory or overstory species; they recognized Pin alb habitat types occurring in subalpine and timberline elevational ranges within the Abi las series. In their stands, Pin alb was the major tree species. Undergrowth ranged from pure Vac sco on mesic sites to Car gey or Jun par and ultimately to Fes ida and dry-site forbs on the more arid sites.

Weaver and Dale (1974, A74WEA@1MT) described a Pin alb/Vac sco plant association in central Montana. Cooper (1975, U75COO@1MT) described a Pin alb/Vac sco and a Pin alb/Car gey pa in Wyoming, the latter extending into extreme southwest and south-central Montana. Other authors (Habeck, 1969 A69HAB@2MT; Steele et al., 1981 A81STE@1MT; Cooper et al., 1985 U85COO@2MT) have described a Pin alb/Abi las pa in Montana and Idaho.

PINUS ALBICAULIS PA

merge with the other Pinal types

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7000-9000

Slope: 0-15

Aspect: ALL

Soil: Gravelly silt loams and silts, sometimes on calcareous substrates.

Comments: Occurs from climatic timberline downward on exposed ridges and southerly aspects. Found on droughty sites within the upper alpine zone.

DISTRIBUTION: C, SC, SW, NW, WC

COMMENTS: Common on dry mountain ranges east of the Continental Divide.

VEGETATION:

Pin alb appears: 1) in relatively pure stands, 2) below, in forests mixed with Abi las and 3) above, in krumholz stands with Abi las or Pic eng. Pin alb is the major overstory component; Abi las, Pic eng, and Pin com may also occur. Understory is variable; Vac sco occurs on moister sites, Car gey or Jun par on drier sites and Fes ida on driest sites. Additional forbs which may be present include Hie gra, Arn lat, Lup ser, Pot gra and Jun com. (CONT.)

PHASES:

COMMENTS: THIS RECORD IS NOT IN THE WESTECH REPORT !!!!!!!!!!! ALSO, U76HAB@2MT IS NOT IN THE RMSA DATABASE (HOWEVER, THIS IS THE ONLY RECORD WHICH SITES U76HAB@2MT).....CIJ

SOURCE(S):

B77PFI@1MT A76THO@1MT U76HAB@2MT U62PAT@1MT U61TIS@1MT
U74SOU@1MT U75STE@1MT B84ARN@1MT A74WEA@1MT U75COC@1MT

PINUS ALBICAULIS/CAREX GEYERI PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8600-timberline

Slope:

Aspect: SE-NW

Soil: Droughty, acidic

Comments:

DISTRIBUTION: SW

COMMENTS: Found on the west-facing flanks of the southern extremity of the Madison Range, northeast of Henry's Lake, Idaho, and on the Yellowstone Plateau.

VEGETATION:

PINALB CARGEY
 CARROS
 POANER

PHASES: Two phases have been recognized: *Pinus contorta* and *Pinus albicaulis*.

Pin con phase:

Pin alb and Pin con are dominant overstory components; Pin alb is theorized to be climax. The understory is comprised of a patchy distribution of forbs and graminoids with virtually no shrubs (Car gey, Car ros, Dan int, Poa ner, Ach mil, Ago gla, Ant ros, and Lupinus).

Pin alb phase:

The overstory is dominated by widely-spaced Pin alb with accidental occurrences of other tree species. Understory is dominated by Car gey, Poa ner, and Car ros, few forbs, and few, if any, shrubs.

COMMENTS:

SOURCE(S): U75C0001MT

FINUS ALBICAULIS/VACCINIUM SCOPARIUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8170-9600

Slope:

Aspect: S, SW, W

Soil: Deep and stony loams or silt loams.

Comments:

DISTRIBUTION: C, SC

COMMENTS:

VEGETATION: Species included Vac sco, Arn lat, Hie gra, Car gey, Car ros, Pot gra, Fed rac, Lup ser, Pol bis, Cas rhe, Poa alp and Ery gra.

PHASES:

COMMENTS: In 52% of stands sampled, Pin alb was the only conifer found. The understory was a nearly continuous carpet of Vac sco which grew thin or disappeared in patches. Cooper (1975, U75C0001MT) described a similar pa in Wyoming.

SOURCE(S): A74WEA01MT U75C0001MT B77PFI01MT

FINUS ALBICAULIS--ABIES LASIOCARPA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7000-9000

Slope: 0-50+

Aspect:

Soil: Gravelly loams to silts. May be shallow and stony.

Comments: Occurs at timberline at the transitional zone between forest and alpine tundra. Found on ridgetops and upper slopes where snowdrifts may persist well into summer.

DISTRIBUTION: NW, WC, NC, C, SW, SC

COMMENTS:

VEGETATION: Pin alb, Abi las, Lar lya and Pic eng occur in varying amounts. Undergrowth is variable; Vac sco, Arn lat, Hie gra, Luz gla, Xer ten, Phy emp, Phy gla, Cas mer, Jun par, Car ros, Fes ida and Are con may be present, depending upon moisture and direction from the Continental Divide.

PHASES:

COMMENTS: Abi las is often stunted, wind-deformed and shrub-like. Habeck (1969, A69HAB02MT) hypothesized that Abi las establishment in upper timberline areas is often dependent upon the presence of Pin alb. Steele et al. (1981, A81STE01MT) described similar p.a.'s in central Idaho, except that Picea was absent. Cooper et al. (1985, U85C0001MT) described a Pin alb/Abi las p.a. in northern Idaho.

SOURCE(S): B77PFI01MT A69HAB02MT A74WEA01MT A81STE01MT U85C0001MT

Pinus contorta Series

Types within this series occur extensively in all but the extreme eastern portion of the state. Pin con occurs in essentially pure stands and apparently constitutes the topoedaphic potential climax on some sites. On other sites, Pin con is clearly seral. Stands occupy well-drained upland sites on gentle topography. Pfister et al. (1977, B77PFI@1MT) attributed the following factors to the almost exclusive dominance of Pin con:

1. Historic, repeated wildfires over large areas which may eliminate seed sources of potential shade-tolerant competitors.
2. Light ground fires that may remove invading shade-tolerant competitors from understory.
3. Dense stands that may prevent regeneration of all conifers for up to 200 years in the absence of disturbance or stand deterioration.
4. Sites that may be unfavorable for the establishment of other conifers.

There is some evidence to indicate the existence of a Pin con/Arc uva ct. Hoffman and Alexander (1976, A76HOF@1MT) described this type in the Bighorn Mountains of Wyoming. Roberts (1980, U80ROB@1MT) and Scow and Culwell (1986, U86SCO@2MT) included Arc uva dominated stands in the Pin con/Jun com ct in the Little Rocky Mountains. Although Pfister et al. suggested that Pse men would eventually dominate, Roberts hypothesized that Pin con would maintain dominance in the Little Rocky Mountains.

MTNHP: C1A9BCABA0

PINUS CONTORTA/CALAMAGROSTIS RUBESCENS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5900-7500

Slope:

Aspect:

Soil: Generally derived from igneous parent material.

Comments: Found on cool exposures and benches from 5900-6800 ft.
and on south-facing slopes from 6600-7500 ft.

DISTRIBUTION: C, SW, SC

COMMENTS: Near and east of the Continental Divide.

VEGETATION: Overstory is almost pure Pin con with a grassy
understory of Cal rub.

PHASES:

COMMENTS: Similar to Pse men/Cal rub habitat type (Pfiester, 1977, B77PFI01MT), but Pin con could be the potential climax dominant. Cooper (1975, U75C0001MT) described a Pse men/Cal rub pa with pure stands of Pin con in Idaho. Steele et al. (1981, A81STE01MT) described a similar ct in central Idaho.

SOURCE(S): B77PFI01MT A81STE01MT U75C0001MT

PINUS CONTORTA/CEANOETHUS VELUTINUS CT

A merge with other CTs

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope:

Aspect: SE

Soil:

Comments: Found on upper slopes.

DISTRIBUTION: C

COMMENTS: Little Rocky Mountains.

VEGETATION: Major species include Cea vel, Spi bet, Pru vir, Sym occ, Ros woo, and Apo and.

PHASES:

COMMENTS: Scow and Culwell (1986, US6SCO02MT) described two transects dominated by Cea vel as Pin con/mixed shrub. Stand canopy cover ranges from open to dense. This ct is probably a fire induced seral stage to Pin con/Jun com.

SOURCE(S): US6SCO02MT

DRAFT

MTNHP: C1A9BCADM0

PINUS CONTORTA/JUNIPERUS COMMUNIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4200-5400

Slope: Gentle to steep

Aspect: W, S, E

Soil: Rocky and excessively well-drained.

Comments:

DISTRIBUTION: C

COMMENTS: Little Rocky Mountains; Bighorn Mtns., WY.

VEGETATION: Undergrowth is variable, but is usually dominated by Jun con or Spi bet. Other species include Sym occ, Arc uva, Apo and, Ast con, and Sol mis.

PHASES:

COMMENTS: This pa is an edaphic climax on igneous and metamorphic outcrops in the Little Rocky Mountains. It may be a ct of the Pse men series, but Pse men does not appear to be regenerating successfully. Pfister (1977, B77PFI01MT) suggested that these sites would eventually be dominated by Pse men while Roberts (1980, U80ROB01MT) hypothesized that Pin con would maintain dominance in this area. This pa is similar to the Pin con/Arc uva pa described in the Bighorn Mountains of Wyoming (Hoffman and Alexander, 1976, A76HOF01MT).

SOURCE(S): U80ROB01MT B77PFI01MT A76HOF01MT

PINUS CONTORTA/LINNAEA BOREALIS PA

Ct

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4200-7200

Slope:

Aspect: N

Soil: Igneous or metamorphic parent materials; sandy clay with large rock fragments.

Comments: Moist sites on benchlands or north-facing midslopes.

DISTRIBUTION: NW, WC, C, SW, SC

COMMENTS: Common near and east of the Continental Divide; Little Rocky Mountains.

VEGETATION: Undergrowth is dominated by shrubs and sub-shrubs such as Lin bor, Arc uva, Spi bet, She can, and Jun com.

PHASES:

COMMENTS: Roberts (1980, U80ROB01MT) recognizes Pin con/Lin bor as a pa because there is no evidence to indicate that Pse men, although present, will dominate at climax on these parent materials. If shade-tolerant trees are well-represented in the understory, the stand may be described as a successional stage of Abi las/Lin bor-Vas sco, Picea/Lin bor, or Pse men/Lin bor pa's (Pfister, 1977, B77PFI01MT).

SOURCE(S): B77PFI01MT U80ROB01MT

PINUS CONTORTA/VACCINIUM CESPITOSUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4800-7200

Slope:

Aspect:

Soil: Variety of non-calcareous parent materials.

Comments: Cool, well-drained sites on gentle slopes and benches from 6200-7200 feet (east of the Divide) or 4800-6500 feet (west of the Divide).

DISTRIBUTION: WC, NC, C, SW

COMMENTS: Occurs mostly east of the Continental Divide. Stands common on the Beaverhead and Lewis and Clark National Forests.

VEGETATION: Vac ces may be co-dominant with Cal rub; Vac sco and Arc uva are often well represented.

PHASES:

COMMENTS: This may be a seral stage of the Abi las/Vac ces pa with Pin con being a persistent seral dominant. Retarded tree succession may be attributable to establishment difficulties such as undergrowth competition, lack of seed source, or frost damage. This ct was recognized by Steele et al. (1981, A81STE01MT) and Cooper et al. (1985, U85C0002MT) in northern and central Idaho, respectively.

SOURCE(S): B77PFI01MT A81STE01MT U85C0002MT

PINUS CONTORTA/VACCINIUM SCOPARIUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6000-7700

Slope:

Aspect: ALL

Soil: Broad range of soil types.

Comments: Cool, dry sites on gentle middle or upper slopes or broad ridgetops.

DISTRIBUTION: NW, WC, C, SW, SC

COMMENTS: Occurs mostly near and east of the Continental Divide; Bighorn Mountains, WY.

VEGETATION: Stands are typically even-aged, dominated by Pin con and Vac sco. Cal rus, Arc uva, Car gey, and Arn cor are common.

PHASES:

COMMENTS: The presence of fire and very slow succession are responsible for maintaining a seral Pin con-Abi las/Vac sco ct within the Abi las series (Pfister, 1977, B77PFI01MT). Hoffman and Alexander (1976, A76HOF01MT) recognized a similar situation in the Bighorn Mountains, Wyoming, as a pa, as did Cooper et al. (1985, U85C0002MT) in northern Idaho. Arno (1985, B85ARN01MT) recognized one seral ct (fire maintained) within the Abi las/xer ten pa: Pin con/Vas sco-Xer ten (frequency 60-120 years). This seral stage is maintained by intense wildfires following severe outbreaks of mountain pine beetles. Steele et al. (1981, A81STE01MT) recognized similar ct's in central Idaho.

SOURCE(S): B77PFI01MT B85ARN01MT U85C0001MT A76HOF01MT A81STE01MT
U85C0002MT

MTNHF: C1A9BCAGA0

PINUS CONTORTA-PSEUDOTSUGA MENZIESII/XEROPHYLLUM TENAX-VACCINIUM
GLOBULARE CT

SYNONYMS: The ct is identical to Arno's (1985, B85ARN01MT) Pin con-
Pse men/Vac glo-Xer ten type.

SITE CHARACTERISTICS--

Elevation: 5000-7200

Slope: Moderate-steep

Aspect: All; primarily S and W

Soil: Gravelly sandy loams to silts.

Comments: Occurs on steep, dry exposures.

DISTRIBUTION: NW, WC

COMMENTS: West of the Continental Divide.

VEGETATION: Pse men and Pin con dominate with Lar occ and Pin mon
present in lesser amounts. Undergrowth is dominated by
Xer ten and Vac glo with some Pac myr, Tha occ, Cal rub,
Car gey, Arn lat, and Pyr sec.

PHASES:

COMMENTS: This ct is seral to the Abi las/Xer ten ^{pa}vac glo ^{phase} as described
by Pfister (1977, B77PFI01MT); Pin con and Pse men are seral
dominants throughout the type. The understory is maintained
by surface fires.

SOURCE(S): B77PFI01MT B85ARN01MT

Pinus ponderosa Series

Pin pon generally forms a climax forest zone between grassland and climax Pse men forests or a topographic climax on steep, south-facing slopes. These stands usually occur in drier environments. Distribution of Pin pon plant associations appears to be related to soil texture and/or available soil moisture as influenced by topography. Usually Pin pon and Jun sco are the only successfully reproducing trees in the series (Pfister, 1977, B77PFI@1MT).

Pin pon forests occur throughout the state with the exception of the southwestern portion. There are genetic differences (including the number of needles per fascicle and height growth differential) in Pin pon occurring in eastern and western Montana stands. Pin pon woodlands are discussed in detail in the Woodland section.

PINUS PONDEROSA/AMELANCHIER ALNIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3800-4200

Slope: 15-50

Aspect: NW, NE

Soil: Loam

Comments: Occurs on the wettest sites outside the range of distribution of Pse men in the Bear's Paw Mountains.

DISTRIBUTION: C

COMMENTS: Bear's Paw Mountains.

VEGETATION: Pin pon and occasionally Pop tre dominate the overstory. The understory is dominated by Ame aln, Sym occ, Pru vir, Mon fis, Lat och and Ely spi.

PHASES:

COMMENTS: This is similar to Pfister et al.'s (1977, B77FFI01MT) Pin pon/Pru vir, except that Ame aln dominates undergrowth.

SOURCE(S): US0ROB01MT B77FFI01MT

PINUS PONDEROSA/ARCTOSTAPHYLOS UVA-URSI PA

SYNONYMS: This pa is similar to Pfister et al.'s (1977, B77PFI01MT) Pse men/Arc uva occurring in the Lewis and Clark National Forest, except Pin pon is indicated as climax. Pse men is unable to reproduce successfully except in limited protected microsites. Also the pa is similar to a site described by Thilenius (1972, A72THI01MT) in the Black Hills: Pin pon/She can-Sym alb-Arc uva.

SITE CHARACTERISTICS--

Elevation: 3900-5000

Slope: 15-50

Aspect: SE, S, SW, W

Soil: Calcareous parent materials; clay loam-sandy clay loam.

Comments: Warm, well-drained slopes.

DISTRIBUTION: C

COMMENTS: Extensive in Little Rocky Mountains.

VEGETATION: Pin pon is the sole dominant tree. Undergrowth components include Arc uva, Jun com, She can, Sym alb, Ame aln, Agr spi, and Apo and.

PHASES:

COMMENTS:

SOURCE(S): UB0ROB01MT A72THI01MT B77PFI01MT

PINUS PONDEROSA/Berberis repens PA

SYNONYMS: This pa is similar to Pin pon/Jun com-Sym alb-Ber rep and Pin pon/Pru vir-Ame alb described by Thilenius (1972, A72THI01MT) and to Pin pon/Sym alb described by Pfister et al. (1977, B77PFI01MT).

SITE CHARACTERISTICS--

Elevation: <4200

Slope:

Aspect: VARIABLE

Soil: Alluvial and colluvial parent materials; loam to clay loam.

Comments: Creek bottoms and lower slopes.

DISTRIBUTION: C

COMMENTS: Little Rocky Mountains.

VEGETATION: Pin pon and Pop tre dominate overstory coverage; the understory is dominated by Ber rep, Pru vir, Sym occ, She can, Ros woo, Spi bet, Aster, Gal bor, Fra vir and Smi ste.

PHASES:

COMMENTS: Seral stands of Pin pon/Ber rep are dominated by nearly pure stands of Pop tre. Stands not disturbed by fire may be pure Pin pon.

SOURCE(S): U80ROB01MT A72THI01MT B77PFI01MT

PINUS PONDEROSA/JUNIPERUS COMMUNIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 33-50

Aspect:

Soil:

Comments: Gently rolling uplands to moderately steep hillsides.

DISTRIBUTION: SE

COMMENTS: This pa has also been described by Hoffman and Alexander (1976, A76HOF01MT) in the Bighorn Mountains, WY.

VEGETATION: Similar to the Pin pon/Car hel pa, with Jun com present. Other understory species include Car hel, Ber rep, Ame aln, Pru vir and Sym alb.

PHASES:

COMMENTS: Dominated by shrubs and grasses; forbs are poorly represented.

SOURCE(S): U85HAN01MT A76HOF01MT

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MTNHP: C1A9BDAGA0

PINUS PONDEROSA/JUNIPERUS SCOPULORUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2800-3500

Slope: 15-50+

Aspect: VARIABLE

Soil: Heavy textured to rocky soils developed from sandstone and shale (scoria).

Comments: Less exposed, relatively mesic sites along drainageways and on slopes. Often found on knolls at the base of "breaks" slopes.

DISTRIBUTION: SE, NW, C

COMMENTS: Also described for SW North Dakota.

VEGETATION: Pin pon and Jun sco dominate the overstory which at times achieves only a woodland status; Jun sco frequently forms a dense growth. Understory components include Pru vir, Rhu aro, Sym occ, Ribes, Ros ark, Art tri, Ach mil, Cer arv, Geu tri, Aster, Agr spi, Koe pyr, Car hel, Sti com, Bou cur and Cal lon.

PHASES:

COMMENTS:

SOURCE(S): A71BR001MT A70MAC01MT U79ROB01MT U85GIR01MT U85CUL01MT

PINUS PONDEROSA/PHYSOCARPUS MALVACEUS PA

SYNONYMS: Hoffman and Alexander (1976, A76HOF01MT) described a Pin pon/Phy mon pa for the Bighorn Mountains which is floristically and environmentally similar.

SITE CHARACTERISTICS--

Elevation:

Slope: 33-50

Aspect: W, NW, N, NE

Soil: Calcareous substrates.

Comments:

DISTRIBUTION: SC

COMMENTS: Pryor Mountains

VEGETATION:

PHASES:

COMMENTS: This pa occurs as a narrow band on the dry margins of the Fse men/Phy mal pa in the Pryor Mountains. Repeated fires have favored Pin pon. Fse men and Pin con are not present on these sites, otherwise the pa is comparable to the Fse men/Phy mal pa. Cooper et al. (1985, U85C0002MT) described a Pin pon/Phy mal pa in northern Idaho.

SOURCE(S): U85C0001MT A76HOF01MT U85C0002MT

PINUS PONDEROSA/PRUNUS VIRGINIANA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4950

Slope:

Aspect: NW, E, (S)

Soil: Gravelly sandy or silt loams (rock-free).

Comments: Moist lower slopes and draws.

DISTRIBUTION: SE

COMMENTS:

VEGETATION:

A shrubby layer is formed by Pru vir, Ame aln, Cra dou, Spi bet and Sym alb (Fra pen occurs on semi-riparian sites). Typical understory components include Gal bor, Smi rac, Dis tra, Smi ste, Ber rep, Arn cor, Cys fra, Rhu rad, Gal bor, Sch pur and Agr sca. There are no distinguishing graminoids.

PHASES:

Three phases are recognized: Prunus virginiana, Shepherdia canadensis (Pfister et al., 1977, B77PFI01MT) and Viola canadensis (Cooper and Pfister, 1985, U85C0001MT).

Pru vir phase:

This is the common phase of the pa.

She can phase:

This is a minor phase identified in SE Montana. She can forms a dominant shrub layer. Arc uva, Pyrola, Spi bet, and Lin bor also distinguish this phase.

Vio can phase:

This phase has a higher cover of shrubs, occurring on more mesic sites (Spi bet, Cra dou, Ace gla, Pru vir, Cor sto). Forbs include Vio can, Gal tri, and Act rub.

COMMENTS: Similar to habitat units described in Black Hills by Thilenius (1972, A72THI01MT)(HU-2,6,7,8).

SOURCE(S): B77PFI01MT U85C0001MT U85HAN01MT Q72THI01MT

PINUS PONDEROSA/SYMPHORICARPOS ALBUS PA

SYNONYMS: Hoffman and Alexander (1976, A76HOF01MT) described a Pin pon/Spi bet pa in Wyoming that is similar to the Ber rep phase.

SITE CHARACTERISTICS--

Elevation: 2600-6000

Slope: VARIABLE

Aspect: VARIABLE

Soil: Sandy loam-silty clay loam. Soil moisture may account, in part, for the rich floral diversity.

Comments: Rolling benchlands on varying aspects and degree of slope.

DISTRIBUTION: C, SE, WC, NW

COMMENTS: Usually not found west of the Continental Divide.

VEGETATION: Undergrowth is dominated by Sym alb, Pru vir and Ber rep. Understory forbs and grasses are highly diverse: Ach mil, Art lud, Galium, Poa pra and Sti vir.

PHASES: Two phases are recognized: Symphoricarpos albus and Berberis repens. In the more widespread Sym alb phase, bunchgrasses may be co-dominant; soils are gravelly. In the Ber rep phase, forbs have slightly higher coverages and bunchgrasses are poorly represented; soils are non-gravelly. This minor phase has been described in central Montana.

COMMENTS: Disturbance appears necessary to establish regeneration. Steele et al. (1981, A81STE01MT) described a pa similar to the Sym alb phase in central Idaho. Cooper et al. (1995, U85C0002MT) described a similar pa in northern Idaho.

SOURCE(S): B77PFI01MT U85C0001MT A81STE01MT A76HOF01MT U85C0002MT

MTNHP: C1A9BDALA@

PINUS PONDEROSA/SYMPHORICARPOS OCCIDENTALIS PA

SYNONYMS: Similar to Pin pon/Sym alb (Pfister et al., 1977, B77PFI@1MT) except Sym occ replaces Sym alb. Similar to a habitat unit described by Thilenius (1972, A72THI@1MT) in the Black Hills (H.U.S.).

SITE CHARACTERISTICS--

Elevation: 3000-5200

Slope: 0-50

Aspect: VARIABLE

Soil: Well-developed, moister soils.

Comments:

DISTRIBUTION: C, SE

COMMENTS:

VEGETATION: Pin pon is usually the sole tree; Jun sco may be present. The understory has a shrubby aspect. Understory components include Stipa, Car het, Agr das, Fes ida, Agr spi, Koe mac and Poa pra, Ach mil, Art lud, The rho, Cer arv, Aster and Ane pat; Sym occ, Ribes, Pru vir, Rhu rad, Ame aln and Jun com.

PHASES:

COMMENTS:

SOURCE(S): U85CUL@1MT U8@ROB@1MT A72THI@1MT

Abies grandis Series

This series is found on low to mid-elevation sites in northwestern and west-central Montana; its distribution coincides with the maritime-influenced climate. *Abies grandis* frequently overlaps on cooler sites with the *Abies lasiocarpa* series. The overstory may be dominated by *Pseudotsuga* and other conifers while the understory is dominated by numerous moist-site forbs and a diverse mixture of shrubs (Pfister et al., 1977, B77PFI01MT).

Cooper et al. (1985, U85C0002MT) described an *Abies grandis*/*Phacelia* type that is relatively minor but widely distributed in northern Idaho. Proximity of the type justifies further investigation of its potential existence in Montana.

ABIES GRANDIS/CLINTONIA UNIFLORA PA

SYNONYMS: Cooper et al.'s (1985, U85C0002MT) Abi gra/Sen tri pa is similar to the Abi gra/Cli uni-Ara nud pa found in Bitterroot Mountain canyons.

SITE CHARACTERISTICS--

Elevation: 2400-5000

Slope:

Aspect: ALL

Soil: Variable

Comments: Valley bottoms and benches relatively moist sites.

DISTRIBUTION: NW, WC

COMMENTS:

VEGETATION: Following disturbances such as fire or logging, seral species such as Pse men, Lar occ, Picea, Pin con, Pin mon and Pin pon may invade, resulting in a variety of community types. Generally, Abi gra is the only species which continues to reproduce beneath the canopy once a polesized stand has developed.

PHASES: Four phases are recognized: Clintonia uniflora, Aralia nudicaulis, Taxus brevifolia and Xerophyllum tenax.

Cli uni phase:

This is the most extensive phase in the pa. It occurs on dry exposures in wet areas and on wet exposures in dry areas. Overstory is variable, understory is characterized by Cli uni, Ade bic, Dis hoo, Gal tri, Lin bor, Bro vul, and several shrubs. A Pse men-Lar occ-Picea-Abi gra/Cli uni ct is inferred.

Ara nud phase:

This phase is found on bottomlands and moist benches in NW Montana. Picea and Bet pap are common; understory is usually more luxuriant, including Ara lia, Dis hoo, or Ath fil-fem. An Abi gra-Picea-Bet pap/Cli uni-Ara nud ct is inferred.

Tax bre phase:

Antos (1977, U77ANT01MT) recognized this phase to indicate the wettest sites where Abi gra is potentially climax (and those sites closest to the Thu pli series).

Xer ten phase:

This phase occupies cold, well-drained sites. Abi las is common; Vac glo and Xer ten are well represented.

COMMENTS: Cooper et al. (1985, U85C0002MT) and Steele et al. (1981, AB1STE01MT) have described similar pa's with similar phases in northern and central Idaho, respectively.

SOURCE(S): B77PFI01MT U77ANT01MT U85C0002MT AB1STE01MT

ABIES GRANDIS/LINNAEA BOREALIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3700-5500

Slope:

Aspect: N, E, SE

Soil:

Comments: Well-drained slopes or benches.

DISTRIBUTION: NW, WC

COMMENTS: Bitterroot Range, Perma and Hot Springs area.

VEGETATION: Stands are commonly dominated by Pse men, Lar occ, Pin con, or Pin pon; Abi las and Picea are usually absent.

PHASES: There are two phases: the Linnaea borealis phase is found on northerly aspects from 3700-4600 feet and is the more common phase; the Xerophyllum tenax phase occurs on easterly to southeasterly exposures from 4700-5500 feet.

Lin bor phase:

This is the most common phase, occurring on northern aspects. Pin pon, Pse men, and Lar occ are common seral species. A Pin con-Pse men/Lin bor ct is inferred.

Xer ten phase:

This phase is found on easterly and southeasterly aspects. Pin con, Pse men, and Lar occ are common seral species. A Pse men-Lar occ/ Lin bor-Xer ten ct and a Pse men-Pin con/Lin bor-Xer ten ct are implied.

COMMENTS: This pa has been described by Steele et al. (1981, A81STE01MT) and Cooper et al. (1985, U85C0002MT) in Idaho.

SOURCE(S): B77PFI01MT A81STE01MT U85C0002MT

ABIES GRANDIS/XEROPHYLLUM TENAX PA

SYNONYMS: Steele et al. (1981, AB1STE01MT) described an Abi gra/Vac glo pa in central Idaho which may be an extension of Abi gra/Xer ten beyond the range of Xer ten.

SITE CHARACTERISTICS--

Elevation: 4700-5300

Slope:

Aspect:

Soil:

Comments: Well-drained slopes.

DISTRIBUTION: NW, WC

COMMENTS: Western portions of the Lolo and Bitterroot National Forests.

VEGETATION: May be dominated by seral stands of Pse men, Lar occ, and Pin con having understories of Xer ten, Vac glo, Cal rub, Pachistima or Arn lat.

PHASES:

COMMENTS: Driest of the Abi gra series; undergrowth is somewhat sparse. A seral ct, Pse men-Lar occ-Pin con/Xer ten, is thought to be maintained for 50-100 years by dry site conditions. Habeck (1973, B73HAB01MT; 1976, A76HAB01MT) identified an Abi gra/xer ten pa in Idaho as representing sites at the cold, dry limits of the Abi gra series. Cooper et al. (1984, U85C0002MT) described an Abi gra/Xer ten in northern Idaho.

SOURCE(S): B77PFI01MT B73HAB01MT A76HAB01MT AB1STE01MT U85C0002MT

Abies lasiocarpa Series

This is the predominant series at higher elevations in the Montana Rockies and includes all associations potentially dominated at climax by *Abi las*. Moisture and temperature differentiate this series from those adjoining it. These forests occur in the subalpine zone, which Pfister et al. (1977, B77PFI@1MT) subdivided into lower subalpine, upper subalpine, and timberline habitat types.

Lower subalpine plant associations are found on most of the higher mountains in Montana. They are found extensively in northwestern Montana, but are restricted to a narrow belt on cool exposures in the driest mountains east of the Continental Divide. *Pse men*, *Lar occ*, and *Pin con* dominate stands in the lower subalpine category, due to lightning-caused wildfires. Cool, moist conditions and rocky terrain limit the spread of fire in the upper zones.

Upper subalpine plant associations are found throughout the Montana Rockies. These pa's are above the climatic limits of *Pse men*, *Lar occ*, and *Pin mon*. *Pin alb* is usually well represented and is a persistent dominant seral species on all but moist sites. *Picea* is a major, persistent seral component on moist sites; *Pin con* is a major seral component in the lower portion of the upper subalpine zone.

Timberline plant associations occur in the transition zone between alpine tundra and forest. Pfister et al. (1977, B77PFI@1MT) named three habitat types in this category for tree components: *Pin alb-Abi las*, *Lar lya-Abi las*, and *Pin alb*. Tree understory vegetation relationships in this category have not been studied extensively.

Plant associations potentially dominated at climax by *Tsu mer*, *Lar lya*, or *Pin alb* are discussed in this classification under separate series.

The potential exists for inclusion of an *Abi las/Vac occ* community in the classification; the type was observed in the Jocko River drainage (Pfister, pers. comm., PNDPFI@1MT).

ARIES LASIOCARPA/ALNUS SINUATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-8000

Slope: 15-50

Aspect: N

Soil: Loams-silts.

Comments: Relatively cool and moist uplands.

DISTRIBUTION: NW, WC, SC, NC

COMMENTS: Widely distributed in higher mountains, but not extensive.

VEGETATION:

Overstory is dominated by Pin con, Pic eng, Abi las, Pse men and Lar occ. Understory is a dense or patchy layer of Aln sin with Vac glo, Vac sco, Vac mur, Spi bet, or Xer ten well represented. Pyr sec and Arn lat may also be present.

PHASES:

COMMENTS: This pa is widely distributed in higher mountains, but stands are not extensive. Steele et al. (1981, AB1STE01MT) recognized a similar pa in east-central Idaho.

SOURCE(S): B77PFI01MT AB1STE01MT U81C0001MT

ABIES LASIOCARPA/ARNICA CORDIFOLIA PA

SYNONYMS: Cooper (1975, U75C0001MT) described floristically similar stands within his *Abi las*/*Thalictrum-Arn cor pa* in northern Wyoming.

SITE CHARACTERISTICS--

Elevation: 6900-9100

Slope:

Aspect: N (VARIABLE)

Soil: Loams-silty clay loams, frequently on calcareous parent materials.

Comments: Relatively cool, moist sites found in semi-arid mountains on benchlike uplands and slopes.

DISTRIBUTION: SW, C, SC, NC

COMMENTS: Semi-arid mountains east of the Continental Divide.

VEGETATION: Most stands are dominated by *Pse men* or *Pin con* and infrequently, *Abi las*, implying a *Pse men-Abi las/Arn cor* and a *Pin con-Abi las/Arn cor* ct. *Picea* is a major seral species on limestone. Forest canopy is dense. The sparse understory is dominated by *Arn cor*, *Tha occ*, *Osm chi* and *Pyr sec*.

PHASES:

COMMENTS: (Hoffman and Alexander, 1976, A76HOF01MT) described this pa in the Bighorn Mountains, WY.

SOURCE(S): B77PFI01MT U85C0001MT U75C0001MT A76HOF01MT

ABIES LASIOCARPA/ARNICA LATIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4900-5900

Slope:

Aspect: All except steep N and S slopes

Soil: Sedimentary (glacial or pluvial origin) gravelly to silt loams

Comments:

DISTRIBUTION: NW, NC

COMMENTS: Described on Blackfoot Indian Reservation

VEGETATION: Pin con is the dominant seral species. Sites are warm enough to support Pse men. Picea may co-dominate with Abi las at climax. Depending on elevation, Pop tre and Pin alb may be present. Undergrowth is dominated by Arn lat and Tha occ; Osm chi, Goo obl, Ast con, Fed bra, Pyr sec, Vio orb, Spi bet, Rub par, Bro vvl, and Calamagrostis are also present.

PHASES:

COMMENTS: Abi las/ Arn lat occupies sites similar to Abi las/Arn cor except Arn cor is not present.

SOURCE(S): UB1C0001MT

ABIES LASIOCARPA/CALAMAGROSTIS CANADENSIS PA

SYNONYMS: The *Abi las*/*Cal can*-*Gal tri pa* is similar to Cooper et al.'s (1985, U85C0002MT) *Abi las*/*Str amp pa*.

SITE CHARACTERISTICS--

Elevation: 5000-6500

Slope:

Aspect:

Soil: Moist sandy loams-silts, non-gravelly. May be underlain by clay pan.

Comments: Poorly drained sites with surface water during late spring-early summer. Sites border streams and wet meadows, occur as swales at drainage headwaters and on mountain-slope seeps.

DISTRIBUTION: WC, NW, C, SC, SE, SW

COMMENTS:

VEGETATION: *Picea* may be minor climax or co-climax with *Abi las*; *Pin con* is a major seral dominant in young stands. Wet site graminoids (*Cal can*) and forbs (*Led gla*, *Sen tri*) are dominant in undergrowth.

PHASES: Four phases are recognized: *Calamagrostis canadensis*, *Galium triflorum*, *Vaccinium cespitosum* in Pfister et al. (1977, B77PFI01MT) and *Vaccinium occidentale* in Pierce (1986, U86PIE01MT).

Cal can phase:

This is the typical phase of the pa.

Gal tri phase:

This phase occurs at the lower elevational limits of the pa. *Picea*, *Abi las*, and occasionally *Pin con* are the primary overstory components. Understory includes *Cal can*, *Gal tri*, *Rib lac*, *Act rub*, and *Lin bor*. A *Picea-Abi las/Cal can-Gal tri ct* is inferred.

Vac ces phase:

This phase occurs at lower elevational pa limits, sometimes in basins where water table depth is variable, resulting in a mosaic of sedge wet meadows, other associations, and the *Vac ces* phase. *Pin con* is the dominant overstory constituent (*Picea* and *Abi las* are minor). Undergrowth consists of *Vac ces*, *Cal can*, *Ledum*, and *Lin bor*. A *pin con/Cal can-Vac ces ct* is inferred.

Vac occ phase:

Pierce (1986, U86PIE01MT) describes a *Vac occ/Cal can ct* in WC Montana that is probably a phase of *Abi las/Cal can*. His stands were 3-4 foot wide bands of *Vac occ* extending beyond a forested canopy if *Abi las* or *Pin con-Abi las*. Sometimes

Abies lasiocarpa/*Calamagrostis canadensis* pa (continued):

Vac occ occurred in patches in open meadows with an occasional *Abi las* in the center.

COMMENTS: These sites may be skipped by fires due to wet conditions, although the abundance of Pin con suggests some fire activity. Young stands may be represented by a Pin con-Cal can ct while old-growth stands may be represented by a *Picea-Abi las*/Cal can ct. Steele et al. (1981, A81STE01MT), Cooper (1975, U75C00001MT), and Cooper et al. (1985, U85C00002MT) described similar pa's in Idaho and Wyoming.

SOURCE(S): B77PFI01MT U81C0001MT U85C00001MT U75C00001MT U86PIE01MT
A81STE01MT U85C00002MT

ABIES LASIOCARPA/CALAMAGROSTIS RUBESCENS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5800-8400

Slope: 15-33

Aspect: VARIABLE

Soil: Sandy loams to silts; occasionally on limestone substrates.

Comments:

DISTRIBUTION: NC, C, SC, SW

COMMENTS: East of the Continental Divide.

VEGETATION:

Pse men and Pin con dominate, Abi las and Picea are minor stand components, implying a Pse men-Pin con/Cal rub ct. Cal rub and Car gey form a mat in younger stands; at upper limits, these species give way to forbs or Vac sco or Vac glo. Associated forbs include Tha occ, Osm chi and Pyr sec.

PHASES:

COMMENTS: Found at the warm, dry limits of the Abi las series. The type is an extension of the Pse men/Cal rub pa on cool, moist slopes. This pa is abundant in central Idaho (Steele et al., 1981, A81STE01MT). Cooper (1975, U75C0001MT) sampled two stands in NW Wyoming that were similar.

SOURCE(S): B77PFI01MT U75C0001MT U81C0001MT A81STE01MT

MTNHP: C1A9CCAFA0

ABIES LASIOCARPA/CAREX GEYERI PA

SYNONYMS: Stands in Cooper's (1975, U75C0001MT) Abi las/Thalictrum-
Thalictrum pa from northwestern Wyoming appear to be similar
to the Abi las/Car gey pa.

SITE CHARACTERISTICS--

Elevation: 6500-8100

Slope:

Aspect: S (VARIABLE)

Soil: Loams-silts.

Comments:

DISTRIBUTION: SC, C, SW, SE, NC

COMMENTS:

VEGETATION:

PHASES:

Pfister et al. (1977, B77FFI01MT) has identified two phases: Pseudotsuga menziesii and Carex geyeri. Pse men is the persistent seral dominant in the Pse men phase with an undergrowth comprised of Tha occ, Osm chi, Smi rac, Arn cor or Arn lat, implying an Abi las-Pse men/Car gey ct. Pin con is the seral dominant in the Car gey phase; undergrowth is an almost pure cover of Car gey with scattered forbs (Tha occ, Osm chi, Fra vir, Arn cor, Spi bet, Ber rep). This implies an Abi las-Pin con/Car gey ct. Abi las is the indicated climax in both phases.

COMMENTS: This is a minor pa in Montana. It occupies some of the driest sites in the Abi las series. Other authors (Steele et al., 1981, AB1STE01MT; Cooper, 1975, U75C0001MT) have described similar pa's in Idaho and Wyoming.

SOURCE(S): B77FFI01MT U81C0001MT U85C0001MT U75C0001MT AB1STE01MT

MTNHP: C1A9CCAGA0

ABIES LASIOCARPA/CLEMATIS PSEUDOALPINA PA

SYNONYMS: Hoffman and Alexander (1976, A76HOF01MT) sampled similar stands, describing them as *Abi las/Arn cor pa*.

SITE CHARACTERISTICS--

Elevation: 6000-8300

Slope: 33-50

Aspect: VARIABLE (S,W)

Soil: Silts to silty clay loams on calcareous parent materials.

Comments:

DISTRIBUTION: C, SC, SE, NC, SW

COMMENTS: East of the Continental Divide.

VEGETATION: *Pse men* and *Picea* often dominate overstory cover; *Pin con* is a minor stand component. *Pin fle* and *Pin alb* are present in seral stands. *Cle pse* is usually present, being confined to limestone substrates. *Spi bet*, *Jun com*, *Ber rep*, *Arn cor* and *Gal bor* are common understory components.

PHASES:

COMMENTS: This edaphically controlled pa represents the lower warm, dry limits of the *Abi las* series east of the Continental Divide.

SOURCE(S): B77PFI01MT A76HOF01MT U81C0001MT U85C0001MT

ABIES LASIOCARPA/CLINTONIA UNIFLORA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3100-5700

Slope: 0-15; 33-50

Aspect: ALL

Soil: Moderately gravelly to non-gravelly.

Comments:

DISTRIBUTION: NW, WC, NC

COMMENTS: Extensive in the Flathead River drainage, Glacier Park and Lolo National Forest.

VEGETATION: Major overstory associates of *Abi las* in seral stands are *Pic eng*, *Pse men*, *Lar occ*, *Pin con*, *Populus*, and *Pin mon*. Understory components include *Cli uni*, *Ade bic*, *Cop occ*, *Cor can*, *Rub par*, *Dis hoo*, *Gal tri* and *Tia tri*. Northwestern stands of *Abi las/Cli uni* are floristically similar to those found on the Blackfoot Indian Reservation (Cooper and Pfister, 1981, US1C0001MT).

PHASES: There are five phases in this pa: *Clintonia uniflora*, *Aralia nudicaulis*, *Menziesia ferruginea*, *Vaccinium cespitosum* and *Xerophyllum tenax*.

Cli uni phase:

The *Abi las/Cli uni-Cli uni* phase occurs on all exposures on moister sites in NW Montana. It is confined to moist sites in drier areas and in WC Montana. Major overstory components are *Abi las*, *Picea*, *Pse men*, *Lar occ*, and *Pin con*. Understory components were previously listed. This is the most common phase of the pa.

Ara nud phase:

The *Ara nud* phase occurs in bottoms and toe-slope seeps. It is a moist, relatively warm phase characteristic of bottomlands at lower elevations. Major overstory species are *Abi las*, *Picea*, *Lar occ*, *Pse men*, *Pin mon*, and *Bet pap*. *Ara nud*, *Gym dry*, or *Ath fel-fem* are common.

Men fer phase:

The *Men fer* phase is found on cold, moist sites on cool exposures. Major overstory components include *Abi las*, *Picea*, and *Psemen*; *Lar occ* and *Pin con* are minor. *Men fer* and *Arn lat* are abundant in the understory.

. *Abies lasiocarpa*/*Clintonia uniflora* p.a. (continued):

Vac ces phase:

This phase is found on relatively dry, low-elevation benchlands. Pse men and Pin con are dominant to Abi las. Succession appears to be very slow in the phase. Picea, Lar occ, and Pin pon are common minor components. Vac ces and Arc uva-urs are well-represented; Lin bor, Xer ten, Cal rub, and She can are common.

Xer ten phase:

The Xer ten phase occurs on dry, cold sites. Abi las, Pse ment, Picea, Lar occ, and Pin con are present in decreasing abundance. Xer ten dominates the undergrowth in addition to species mentioned previously.

COMMENTS: U85C00@2MT described a similar p.a. in northern Idaho.
A81STE@1MT described a similar p.a. in central Idaho.

SOURCE(S): B77PFI@1MT U85C00@2MT U81C00@1MT A81STE@1MT

MTNHP: C1A9CCAJA0

ABIES LASIOCARPA/GALIUM TRIFLORUM PA

SYNONYMS: Steele et al. (1981, AB1STE01MT) described an Abi las/Str amp pa in central Idaho that is related to the Abi las/Gal tri pa.

SITE CHARACTERISTICS--

Elevation: 5000-6800 (7700) Slope: 0-15
 Aspect: N, S, FLAT
 Soil: Non-gravelly loams, silts.

Comments: Moist bottomlands, benches, northern exposures, seeps on southern exposures. May be restricted to narrow stringers along stream bottoms.

DISTRIBUTION: WC, NW, C, SC, SW, SE, NC

COMMENTS:

VEGETATION: Picea is usually dominant over Abi las, resulting in a Picea-Abi las/Gal tri ct, but Abi las is potentially the climax dominant. Pse men and Pin con are well represented. Undergrowth is variable, but the following species are characteristic: Gal tri, Act rub, Str amp, Cor sto, Ang arg, Pyr uni, Sax arg, and Sen tri.

PHASES: Two phases of this p.a. were identified on the Blackfoot Indian Reservation (Cooper and Pfister, 1981, US1C0001MT):
 Symphoricarpos albus and Vaccinium scoparium.

Sym alb phase:

This phase is found from the lowest, warmest sites in the pa to lower subalpine slopes. Picea is the major seral tree, and Pse men and Pin con are successful seral species. Poptre is an important seral species on lowlands. Abi las success is highly variable, faring more poorly than in the Vac sco phase. Undergrowth species include Sym alb, Ber rep, Vio can, Vio gla, Mel sub, Bro vul, Fra vir, Ery gra, Gal bor, Ped bra, Sen pse, Smi ste, Rub par, Spi bet, Rib lac, and Lon inv.

Vac sco phase:

This phase is found on relatively cold lower subalpine sites. Pse men is well-represented on lower sites. Picea and Pin con are equally important seral species; Populus is conspicuously

Abies lasiocarpa/*Galium triflorum* pa (continued):

absent from this phase. This phase is differentiated from the *Sym alb* phase based on the presence of *Vac myr* (or *Vac sco*), *Vio orb*, and *Xer ten*, and the absence of species characteristic of the *Sym alb* phase. *Aln sin* is sporadically well-represented.

COMMENTS: This is the eastern counterpart to the *Abi las/Cli uni* pa. It is similar to *Abi las/Ci uni* but lacks some moist site indicators which do not extend eastward. It is one of the most extensive pa's on the Blackfoot Indian Reservation (Cooper and Pfister, 1981, U81C00@1MT). Cooper (1975, U75C00@1MT) described a similar pa in NW Wyoming.

SOURCE(S): B77PFI@1MT U85C00@1MT U81C00@1MT U75C00@1MT A81STE@1MT

MTNHP: C1A9CCALA0

ABIES LASIOCARPA/LINNAEA BOREALIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-7300

Slope: 0-15

Aspect: ALL

Soil: Very gravelly sandy loams to silts.

Comments: Relatively moist slopes and benches.

DISTRIBUTION: NW, WC, SW, NC, C, SC

COMMENTS:

VEGETATION: Seral stands are dominated by Pse men, Pin con and/or Picea. Undergrowth varies by phase, typically includes Lin bor, Lon uta, Vac glo, Cal rub, Arn lat and Pyr sec.

PHASES: Three phases are recognized: Linnaea borealis, Vaccinium scoparium, and Xerophyllum tenax.

Lin bor phase:

This phase is usually restricted to north-facing slopes. Pse men, Pin con, and Picea are major dominants, along with Abi las, implying a Pse men-Pin con/Lin bor ct. In the Lolo and Bitterroot National Forests, Pin con and Lar occ were major components, implying a Pin con-Lar occ/Lin bor ct.

Undergrowth was described previously, with the addition of Ame aln, Rub par, and sometimes Gal tri and Act rub. Cooper and Pfister (1981, US100001MT) described an Abi las/Lin bor-Lin bor phase on the Blackfoot Indian Reservation.

Vac sco phase:

The Vac sco phase is common on the Deerlodge and Beaverhead Forests, near Eureka in NW Montana, and in the Little Belt Mountains on gentle north slopes and benches. The phase may be dominated by seral stands of Pin con. Picea and Pse men are minor overstory components; understory is dominated by Vac sco, Lin bor, and Cal rub. Seral stands in dry mountains near Eureka are dominated by Lar occ and Pin con with Picea and Pse men, indicating a Lar occ/Vac sco-Lin bor ct.

Abies lasiocarpa/*Linnaea borealis* pa (continued):

Xer ten phase:

This phase has been identified only in the Flathead, Lolo and Bitterroot National Forests, occurring on all aspects. Major associates of *Abi las* are *Pse men*, *Pin con*, *Lar occ*, and *Picea*. *Xer ten* and *Vac glo* are dominant understory components, accompanied by *Ame aln*, *Pac myr*, *Rub par*, *Vac sco*, and species listed previously. An *Abi las*/*Lin bor*-*Xer ten* ct is inferred.

COMMENTS: Common throughout the Montana Rockies. Roberts (1980, U80ROB01MT) identified an *Abi las*/*Lin bor* pa in the Little Rocky Mountains in NC Montana which could key to the *Abi las*/*Vac ces* pa of Pfister et al. (1977, B77PFI01MT) but occurs on sites more characteristic of *Abi las*/*Lin bor*.

SOURCE(S): B77PFI01MT U80ROB01MT U81COO01MT

ABIES LASIOCARPA/LUZULA HITCHCOCKII PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5700-8900

Slope: 0-33

Aspect: VARIABLE

Soil: Very acidic gravelly loams to silts.

Comments: Dry exposures in NW Montana, moister sites in WC Montana.

DISTRIBUTION: NW, WC, SW, NC

COMMENTS:

VEGETATION: *Abi las* is the designated climax species. *Pin alb*, *Pic eng* and *Pin con* are seral species. The type occurs above the limits of *Pse men*, *Lar occ* and *Pin mon*. Major undergrowth species are *Luz hit*, *Vac sco*, *Xer ten* and *Arn lat*. *Luz hit* may be lacking.

PHASES: Two phases are recognized: *Vaccinium scoparium* and *Menziesia ferruginea*.

Vac sco phase:

This phase is mainly restricted to dry exposures in NW Montana, northern Idaho, and moist exposures in WC Montana and central Idaho. *Pin alb* is a long-lived seral species; *Picea* is normally present, being abundant on moist sites. *Pin con* is a major seral component of seral stands in WC Montana at the lower limits of the phase. Undergrowth is dominated by *Vac sco*, *Xer ten*, *Aln lat*, *Vac glo*, *Car gey*, and *Phy emp*. Two ct's are implied in this phase: *Abi las-Pin alb/Luz hit-Vac sco* and *Abi las-Pin con/Luz hit-Vac sco*.

Men fer phase:

This phase is generally restricted to N aspects. *Abi las*, *Picea*, *Pin alb*, and sometimes *Pin con* and *Lar lya* are represented in varying coverages, depending on site. On coarse talus, *Lar lya* often forms pure groves representing an edaphic climax (*Lar lya/Luz hit-Men fer ct*). *Men fer* and occasionally *Rho alb* dominate undergrowth which is similar to the *Vac sco* phase.

COMMENTS: This is the major upper subalpine forest pa from the Continental Divide westward. Cooper et al. (1985, U85C0002MT) identified a similar more restricted pa in northern Idaho; Steele et al. (1981, A81STE01MT) also recognized this pa in central Idaho.

SOURCE(S): B77PFI01MT U85C0002MT U81C0001MT A81STE01MT

MTNHP: C1A9CCANA0

ABIES LASIOCARPA/MENZIESIA FERRUGINEA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5300-7500

Slope: 33-50

Aspect: N

Soil: Gravelly loams to silts.

Comments: Cool exposures on sheltered slopes.

DISTRIBUTION: NW, WC, SW, SC, NC

COMMENTS:

VEGETATION: Abi las is usually abundant, Picea is conspicuous; Pin con and Pse men are common components. Men fer forms a patchy to dense layer, often accompanied by Aln sin. Understory components include Vac glo, Vac sco, Xer ten and Arn lat.

PHASES: Arno et al. (1985, B85ARN01MT) describe community types within this series as warm phases (5000-6800 feet) and cold phases (6000-7300 feet).

Abi las/Men fer-Vac glo (warm) phase:

Abi las-Pin con/Men fer ct: This ct is maintained by undertory wild fires.

Abi las (others but not Pin con)/Men fer ct: This is an old-growth stand maintained by fire. Co-dominants with Abi las can include Lar occ, Picea, and/or Pse men.

Abi las/Men fer-Vaccinium (cold) phase:

Abi las-Fic eng/Men fer-Vacc. ct: This ct is maintained by frequent ground fires.

Pin con-Abi las/Men fer ct: This ct is maintained by infrequent ground fires.

COMMENTS: Abundant in moist, high elevation forests of western MT. This type coincides with the geographic area having a maritime-influenced climate. Steele et al. (1981, A81STE01MT) described a similar pa in west-central Idaho. Cooper et al. (1985, U85C0002MT) described a similar pa with four phases for northern Idaho.

SOURCE(S): B77PFI01MT B85ARN01MT U85C0002MT U81C0001MT A81STE01MT

MTNHP: D1A9CCAFPA0

ABIES LASIOCARPA/OPLOPANAX HORRIDUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3900-5000

Slope: 0-15

Aspect:

Soil: Very acidic, non-gravelly loams; duff very deep.

Comments: Restricted to ravine bottoms, seeps, springs and streams where water table is near surface year-round.

DISTRIBUTION: NW

COMMENTS:

VEGETATION: Overstory is dominated by Abi las and Picea; minor components include Pse men, Lar occ, Pin mon, and Thu pli. Undergrowth dominated by Opl hor and Tax bre; Cli uni, Tia tri, Ath fil and Gym dry are well represented.

PHASES:

COMMENTS: Rare pa in Montana.

SOURCE(S): B77PFI@1MT

MTNHP: C1A9CCAQA0

ABIES LASIOCARPA/RIBES MONTIGENUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8300-9500

Slope: 0-15

Aspect:

Soil: Very acidic non-gravelly silts.

Comments: Plateau-like sites, cool exposures. Above limits of Pse men and unfavorable for Pin con.

DISTRIBUTION: SW, SC, SE

COMMENTS: Minor pa found in upper subalpine areas in southern Montana ranges.

VEGETATION:

Stands dominated by Abi las and Picea or Pin alb. Undergrowth is sparse with small, scattered clumps of Rib mon and Arnica spp.

PHASES:

COMMENTS: This pa alternates with Fes ida-dominated mountain grasslands. Steele et al. (1981, AB1STE01MT) described a similar pa in central Idaho dominated by Pin alb and Abi las.

SOURCE(S): B77PFI01MT AB1STE01MT UB5C0001MT

MTNHP: C1A9CCAQM0

ABIES LASIOCARPA/SYMPHORICARPOS ALBUS FA

SYNONYMS: These stands would key to Pfister et al.'s (1977, B77PFI@1MT)
Abi las/Cal rub or Abi las/Car gey.

SITE CHARACTERISTICS--

Elevation: 4600-5650

Slope: 0-15

Aspect: All but north

Soil: Gravelly sandy loams to silt loams

Comments:

DISTRIBUTION: NC, NW

COMMENTS: Identified in Montana only on the Blackfoot Indian
Reservation.

VEGETATION: Undergrowth is luxuriant in Pop tr-dominated stands. Spi
bet, Sym alb, Ber rep, Car gey, Mel sub, Bro vul, The
occ, Ast con, and Osm chi are characteristic.

PHASES:

COMMENTS: Abi las/Sym alb stands represent the lowest elevation sites
that will progress in the absence of fire from Pop tre seral
dominance to Abi las or Picea climax dominance.

SOURCE(S): U81C00@1MT

MTNHP: C1A7CCARA0

ABIES LASIOCARPA/THALICTRUM OCCIDENTALE PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7400-8900

Slope:

Aspect: N, NE

Soil:

Comments: Slopes and alluvial benches in warm, dry subalpine and montane forests.

DISTRIBUTION: SW

COMMENTS: Near the Centennial Mountains; Yellowstone Park. The pa has not been described for Montana but occurs along the MT-ID border.

VEGETATION:

PHASES: Cooper (1975, U75C0001MT) has described two phases: *Thalictrum occidentale* and *Arnica cordifolia*. In both phases, *Abi las* is the indicated dominant. *Pic eng* is the major seral dominant in the *Thalictrum* phase; the understory is dominated by *Thalictrum*, *Osmorhiza*, *Arn cor*, minor amounts of *Cal rub* and *Car gey* and few shrubs. In the *Arn cor* phase, *Abi las*, *Pic eng* and *Pse men* are major overstory components. The understory has low total coverage, mainly *Arn cor*, *Thalictrum*, *Osm chi* and *Ast con*.

COMMENTS:

SOURCE(S): U75C0001MT

MTNHF: C1A9CCATA@

ABIES LASIOCARPA/VACCINIUM CESPITOSUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6000-7200

Slope: 0-15

Aspect: VARIABLE

Soil: Well-drained gravelly and non-gravelly sandy loams and silts.

Comments: Benchlands and frosty basins where cold air accumulates.

DISTRIBUTION: C, NW, WC, SW, SE

COMMENTS: Near the Continental Divide and in the Little Belt and Pryor Mountains.

VEGETATION: Pin con is generally the only dominant conifer; Abi las and Picea are common in understory. Understory is a dense mat of Vac ces, Vac sco, Cal rub and Lin bor.

PHASES:

COMMENTS: Retarded tree succession has been attributed to frequent summer frosts coupled with warm daily maximum temperatures, undergrowth competition, wildlife damage, or lack of seed source. Steele et al. (1981, AB1STE@1MT) reported an Abi las/Vac ces pa in central Idaho.

SOURCE(S): B77FFI@1MT U85C00@2MT U85C00@1MT AB1STE@1MT U81C00@1MT

ABIES LASIOCARPA/VACCINIUM SCOPARIUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5200-9000

Slope: 0-33

Aspect: VARIABLE

Soil: Sandy loams to silts.

Comments: Broad ridges, gentle slopes, benches.

DISTRIBUTION: NW, SW, WC, C, SC

COMMENTS: Near and east of the Continental Divide; locally common west of the Divide and in the Pryor and Bighorn Mountains.

VEGETATION: *Abi las* is the designated climax, *Pin con* is the dominant seral species. Undergrowth is dominated by *Vac sco*, occasionally by *Vac myr*. *Spi bet*, *Sym alb*, *Ber rep*, *Arn lat*, *Arn cor*, *Car gey* and *Cal rub* are somewhat inconspicuous understory elements.

PHASES: Cooper (1975, U75C0001MT) describes a *Pinus contorta* phase and a *Pinus albicaulis* phase of this pa. Ffister et al. (1977, B77PFI01MT) describes three phases: *Vaccinium scoparium*, *Calamagrostis rubescens*, and *Thalictrum occidentale*.

Vac sco phase:

This phase is found on cold, relatively dry sites. *Pin con* is the major dominant; *Abi las*, *Pse men*, and *Picea* are scarce. The understory is dominated by *Vac sco*, *Arn cor*, *Arn lat*, *Car gey*, and *Cal rub*.

Cal rub phase:

This phase occurs in warmer environments than the other phases. *Pin con* and *Pse men* dominate seral stands, indicating a *Pin con*-*Pse men*/*Vac sco*-*Cal rub* ct. The type is often near *Abi las*'s lower altitudinal drought limits. *Picea* is a minor overstory component. Understory components include *Vac sco*, *Cal rub*, *Arc uva-urs*, *Ber rep*, *Jun com*, *Spi bet*, and *Vac glo*.

Abies lasiocarpa/Vaccinium scoparium pa (continued):

Tha occ phase:

This phase occupies moist, cool sites within the pa. *Abi las*, *Pic eng*, and *Pin con* share dominance, indicating an *Abi las-Pin con-Picea/Vac sco-Tha occ* ct. *Tha occ* is common. *Val sit* or *Vio orb*, *Dsm dri*, and *Fyr sel* are present.

COMMENTS: This is one of the most abundant pa's in its range. *Vac myr* can be used as an alternative indicator to *Vac sco*, although they are not considered ecological equivalents. Cooper et al. (1985, U85C00@2MT) and Steele et al. (1981, A81STE@1MT) have identified a similar pa in Idaho. Other authors have identified the pa in Wyoming (Cooper, 1975, U75C00@1MT; Cooper and Pfister, 1985, U85C00@1MT; Hoffman and Alexander, 1976, A76HOF@1MT).

SOURCE(S): B77PFI@1MT U85C00@2MT U81C00@1MT A81STE@1MT A76HOF@1MT
U75C00@1MT U85C00@1MT

MTNHP: C1A9CCAXA0

ABIES LASIOCARPA/XEROPHYLLUM TENAX PA

SYNONYMS: Arno et al. (1985, B85ARN01MT) describes a Pinus contorta-Pseudotsuga menziesii/Vaccinium globulare-Xerophyllum tenax community type. An identical ct, Pin con-Pse men/Xer ten-Vac glo is discussed in the Pin con series.

SITE CHARACTERISTICS--

Elevation: 5000-7500

Slope: 0-50

Aspect: VARIABLE

Soil: Gravelly sandy loams-silts.

Comments: Dry exposures; benches, ridgetops and upper slopes.

DISTRIBUTION: NW, WC, SW, SC, NC

COMMENTS: The eastern limits of Xer ten are usually associated with the fringes of maritime-influenced climates.

VEGETATION: Abi las is the indicated climax species; Picea and Pin alb are minor components of most stands. Pin con is a seral dominant while Pse men's role varies by phase. Undergrowth species include Xer ten, Vac sco, Cal rub, Car gey, Arn lat and Pyr sec.

PHASES: Pfister et al. (1977, B77PFI01MT) describes two phases: Vaccinium globulare and Vaccinium scoparium.

Vac glo phase:

This phase is abundant on dry slopes and ridges. Pse men and Pin con typically dominate seral stands. Arno et al. (1985, B85ARN01MT) identified an Abi las-Pse men/Vac glo-Xer ten c.t. found in old-growth stands maintained by fire. Overstory components of seral stands include Pse men, Pin con, Lar occ, Pin mon, and Picea. Understory components include Xer ten, Vac glo, Pac myr, Tha occ, Vac sco, Cal rub, Car gey, and Arn lat.

Vac sco phase:

This phase is found on gentle slopes and cool, well-drained benches. Abi las and Picea are overstory components of most stands; Pse men is widely scattered and Pin con is a major seral dominant. Vac glo is scattered or absent while Vac sco and Xer ten are dominant. Arno et al. (1985, B85ARN01MT) described two fire-maintained ct's within this phase: Pin con-Abi las/Vac sco (fire frequency = 140-220 years) and Pin con/Xer ten-Vac sco (fire frequency = 140-220 years).

COMMENTS:

SOURCE(S): B77PFI01MT U81C0001MT B85ARN01MT

MTNHP: C1A9CCAYA0

ABIES LASIOCARPA-PINUS ALBICAULIS/VACCINIUM SCOPARIUM PA

SYNONYMS: This pa is similar to Cooper's (1975, U75C0001MT) Abi las/Vac sco-Pin alb phase.

SITE CHARACTERISTICS--

Elevation: 7200-9000

Slope:

Aspect: VARIABLE

Soil: Gravelly loams-silts.

Comments:

DISTRIBUTION: SW, SC, C, SC, NC

COMMENTS: Extensive high elevation forest belt east of the Continental Divide in all but the driest mountain ranges.

VEGETATION: Abi las is the indicated climax species. Pin alb is a persistent seral dominant. Pic eng is a long-lived dominant on moist sites, Pin con is a major seral species at lower elevations. Understory components include Vac sco, Car gey, Xer ten, Hie gra, Arn lat, Phyllodoce and Ledum.

PHASES:

COMMENTS:

SOURCE(S): B77PFI01MT U75C0001MT

Picea spp. Series

This series occurs on cool, moist sites throughout Montana between the Pse men and Abi las series. The hybridization of Pic gla with Pic eng has resulted in the lumping by many authors of the Picea species. Climax stands are dominated by Picea; overstory and understory composition of seral stands is variable, depending on plant association and geographic area.

PICEA SP/CLINTONIA UNIFLORA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4100

Slope:

Aspect: N

Soil: Acidic loams and silt loams with a variable gravel content.

Comments: Moist benches and gentle north slopes.

DISTRIBUTION: NW

COMMENTS: Common in the Flathead Valley and found in Flathead National Forest.

VEGETATION:

Pse men, Pin con or Lar occ often dominate seral stands; Pin pon is found on warm, dry sites. Undergrowth is dominated by Cli uni, Ara nud or Cor can.

PHASES: Two phases are recognized (Pfister et al., 1977, B77PFI@1MT):
Clintonia uniflora and Vaccinium cespitosum.

Cli uni phase:

This is the typical phase of the pa, marked by the absence of Vac ces.

Vac ces phase:

This phase occurs on gravelly benches and is subject to frosts. Pin con is a major seral species.

COMMENTS:

SOURCE(S): B77PFI@1MT

PICEA SP/EQUISETUM ARVENSE PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2900-3600; 5300-6800 Slope: @
Aspect:
Soil: Variable texture; wet throughout the year

Comments: Found on flat areas with poor drainage (broad valley bottoms), from 2900-3600 feet in northwestern Montana and 5300-6800 feet east of the Continental Divide. The pa is usually confined to poorly drained swales and benches, subirrigated slopes, the border of streams, and the periphery of marshes.

DISTRIBUTION: NW, SW, C, SC, NC

COMMENTS: Locally common near White Sulphur Springs (Meagher Co.), the Flathead Valley, the Gallatin National Forest, Red Rock Lakes, and the eastern Rocky Mountain Front.

VEGETATION: High water tables restrict growth of conifers other than Picea. Pin con may be well represented on alluvial substrates. Pop bal and Bet pap may be abundant. Understory growth is dominated by Equ arv, wet-site shrubs, forbs, and grasses.

PHASES:

COMMENTS:

SOURCE(S): B77PF1@1MT U85C00@1MT U69DOR@1MT U75C00@1MT U81C00@1MT
A81STE@1MT

PICEA SP/GALIUM TRIFLORUM PA

SYNONYMS: Cooper (1975, U75C000@1MT) described a fairly similar Picea-Abi las/Gal tri pa in Wyoming.

SITE CHARACTERISTICS--

Elevation: 6000-7000

Slope:

Aspect:

Soil: Loams to silts

Comments: Found on cool, moist sites bordering streams or on moist toe-slopes.

DISTRIBUTION: WC, C, SW, SC, SE

COMMENTS: Abundant in south-central Montana (Gallatin and Custer National Forests); infrequent elsewhere. Found along eastern Rocky Mountain Front.

VEGETATION: Stands are dominated by Picea. Seral stands may have Pse men, Pin con or Abi las present in minor amounts. Wet-site forbs such as Gal tri, Act rub or Str amp dominate the understory.

PHASES:

COMMENTS: Steele et al. (1981, A81STE@1MT) described a similar pa in central Idaho.

SOURCE(S): B77PFI@1MT A81STE@1MT U75C000@1MT U85C000@1MT

PICEA SP/JUNIPERUS COMMUNIS CT

SYNONYMS: The ct occurs on sites similar to the Picea/Senecio streptanthifolius pa (Pfister et al., 1977, B77PF101MT) except for parent material differences.

SITE CHARACTERISTICS--

Elevation: Above 6500'

Slope:

Aspect:

Soil: Extremely rocky

Comments: Found as patches of forest in scree at or near the top of Mount Baldy. Sites are directly exposed to sun and wind.

DISTRIBUTION: C

COMMENTS: Mount Baldy, Bear's Paw Mountains.

VEGETATION: Tree and undergrowth vegetation is depauperate. Picea is the dominant tree; Pin fle is the only other tree present. Undergrowth is dominated by Jun com, She can, and Epi ang.

PHASES:

COMMENTS: This is a unique community restricted to one site.

SOURCE(S): U80ROB01MT

PICEA SP/LINNAEA BOREALIS PA

SYNONYMS: Cooper (1975, U75C0001MT) identified a Picea-Abi las/Lin bor pa in NE Yellowstone Park that ranges up to 8200 feet.

SITE CHARACTERISTICS--

Elevation: 4200-7800

Slope:

Aspect: NE

Soil: Gravelly sandy loams to silts

Comments: Found on cool, well-drained benches and gentle northeast slopes.

DISTRIBUTION: WC, C, SW, SC

COMMENTS: Mostly east of the Continental Divide (Identified in Yellowstone Park, Bear's Paw Mountains, Gallatin National Forest).

VEGETATION: Pin con, Pse men and Picea successively dominate stands. Understory components may include Vac glo, Vac sco, Aln sin, Cal rub or Sym alb.

PHASES:

COMMENTS: Nearly all of Pfister et al.'s (1977, B77PFI01MT) sample stands became established after wildfires.

SOURCE(S): B77PFI01MT U80ROB01MT U75C0001MT

PICEA SP/LYSICHITUM AMERICANUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000

Slope: 0-15

Aspect:

Soil:

Comments: Found near the center of seep complexes on poorly drained sites.

DISTRIBUTION: NW

COMMENTS: Mission Valley.

VEGETATION: Picea, Lys ame

PHASES:

COMMENTS:

SOURCE(S): U79SER01MT

PICEA SP/PHYSOCARPUS MALVACEUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5900-8000

Slope:

Aspect: N

Soil: Associated with a calcareous substrate; gravelly loams to silts.

Comments: Moist, north-facing slopes.

DISTRIBUTION: SC

COMMENTS: South-central Montana in the Gallatin National Forest and the Bighorn Mountains.

VEGETATION: Pse men is the overstory dominant in seral stands; Pin con, Pin pon, and Pop tre are occasionally well represented, and Abi las may be present at higher elevations. Common associates of Phy mal include Sym alb, Ace gla, and Spi bet; Act rub and Gal tri are usually present.

PHASES:

COMMENTS:

SOURCE(S): B77PFI@1MT U85C00@1MT

PICEA SP/SENECIO STREPTANTHIFOLIUS PA

SYNONYMS: This pa is similar to Roberts's (1980, US0ROB01MT) Picea/Jun
com ct in the Bear's Paw Mountains.

SITE CHARACTERISTICS--

Elevation: 7200-8600

Slope:

Aspect: N, NE, E

Soil: Limestone soils.

Comments: Mid to upper slopes or ridgetops.

DISTRIBUTION: WC, NC, C, SW

COMMENTS: Beaverhead and Little Belt Mountains, Lewis and Clark and
Helena National Forests.

VEGETATION: Near climax stands are dominated by Picea; Abi las may be
present at higher elevations. The major seral dominant
is Pse men, the minor seral dominants are Pin fle and Pin
alb. Undergrowth is composed of Sen str, Pyr sec, Arn
cor and several grasses.

PHASES: Two phases are recognized: Pseudotsuga menziesii and Picea.
Pse men phase:

Pse men is a major seral dominant in this phase; She
can is an indicator, inferring a Pse men-Picea/Sen
str-She can ct.

Picea phase:

This phase is found only in the Little Belt
Mountains. Pse men and She can are absent.

COMMENTS:

SOURCE(S): B77PFI01MT

PICEA SP/SMILACENA STELLATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-7000

Slope:

Aspect:

Soil: Gravelly loams to silts

Comments: Found on warm, moist benches and lower slopes.

DISTRIBUTION: WC, C, SW, SC

COMMENTS: Near or east of the Continental Divide; Gallatin and Deerlodge National Forests.

VEGETATION: Pse men and occasionally Pin con dominate in seral stands. Picea is the climax dominant. The undergrowth is composed of a luxuriant growth of forbs, including Smi ste, Tha occ, Smi rac, Dis tra, and Ger ric. Cal rub and Sym alb also dominate.

PHASES:

COMMENTS:

SOURCE(S): B77PFI01MT

MTNHP: C1A9CDALA0

PICEA SP/VACCINIUM CESPITOSUM FA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3100-4200

Slope: 0-15

Aspect:

Soil: Loams, silt loams

Comments: Typically located on gravelly terraces or gentle slopes.

DISTRIBUTION: NW, NC, SW

COMMENTS: Common in northwestern Montana; also identified in NC and SW Montana.

VEGETATION: Pse men, Lar occ and Pin con are major seral dominants, although Picea is the indicated climax. Undergrowth is composed of Cal rub, Vac ces, Spi bet, Sym alb, and Lin bor.

PHASES:

COMMENTS: Stands seldom reach a near climax state. Wildfires appear to recycle stands where mature Pin con have begun to die.

SOURCE(S): B77PFI01MT

Pseudotsuga menziesii Series

This series occurs on well-drained mountain slopes and valleys, extending from lower to moderate elevation forests in northwestern Montana and from lower timberline up to 7500 feet on warm aspects in southern Montana (Pfister et al., 1977, B77PFI@1MT). As a species, Pse men displays a very wide environmental amplitude (Cooper et al., 1985, U85C00@2MT).

Common associates of Pse men include Pin pon, Pin con, Pop tre, and Lar occ, all of which regenerate well following fire. In the absence of disturbance, Pse men becomes dominant. Undergrowth is variable. This plant associations support drier-site bunchgrasses to associations similar to those of the Abi las series.

PSEUDOTSUGA MENZIESII/AMELANCHIER ALNIFOLIA PA

SYNONYMS: This pa is similar to Pfister et al.'s (1977, 877PFI@1MT) Pse men/Sym alb pa (Sym alb phase). The Pse men/Ame aln p.a. has higher coverages of Ame aln and Pru vir and has lower coverages of Ber rep and Arc uva-urs.

SITE CHARACTERISTICS--

Elevation: 4000-5000

Slope: 15-50

Aspect: NW, N, NE

Soil: Loam to sandy loam-gravelly

Comments:

DISTRIBUTION: C

COMMENTS: Bear's Paw Mountains.

VEGETATION: Overstory is dominated by Pse men; Pin pon is a major seral dominant. Understory is dominated by shrubs, including Ame aln, Pru vir and Spi bet.

PHASES:

COMMENTS:

SOURCE(S): US@ROB@1MT

PSEUDOTSUGA MENZIESII/ARCTOSTAPHYLOS UVA-URSI PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4000-6500

Slope: 0-50

Aspect: VARIABLE

Soil: Gravelly loams to silt loams

Comments:

DISTRIBUTION: C, SC

COMMENTS: Mostly found in central Montana (Lewis and Clark and Helena National Forests), the Little Rocky Mountains, and the Custer National Forest.

VEGETATION:

Pin pon is a major seral associate of Pse men, implying a Pse men-Pin pon/Arc uva-urs ct. Pin fle occurs on calcareous parent material. Pin con occurs as a seral species in the Little Rocky Mtns. Understorey dominants include Arc uva, Jun com, Spi bet, Pse spi, Fes ida, Fes cam and Bal sag.

PHASES:

COMMENTS: This is one of the warmest, driest pa's in the series.

SOURCE(S): B77FFI01MT U80ROB01MT

MTNHP: C1A9CEADA0

PSEUDOTSUGA MENZIESII/ARNICA CORDIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5900-7000

Slope: 0-15

Aspect: ALL

Soil: Gravelly sandy loams to silts

Comments: Cool, dry.

DISTRIBUTION: C, SW, SE, SC

COMMENTS:

VEGETATION: The overstory is usually dominated solely by Pse men, but Pin fle may be present. Undergrowth is dominated by Arn cor, Ant rac, Astragalus miser, Tha occ and Jun com. Grasses are weakly represented.

PHASES:

COMMENTS: Stands in this p.a. are similar to the Pse men/Cal rub-Cal rub pa, but are too dry to support Cal rub or Car gey. Steele et al. (1981, A81STE01MT) described a similar pa in central Idaho.

SOURCE(S): B77PFI01MT A80HAR01MT A81STE01MT

PSEUDOTSUGA MENZIESII/BERBERIS REPENS PA

SYNONYMS: Hoffman and Alexander (1976, A76HOF01MT) recognized a Pse men/Ber rep pa in the Bighorn Mountains, Wyoming which occurs on similar sites but supports a different union of species with Ber rep.

SITE CHARACTERISTICS--

Elevation: 3900-5200

Slope: 15-50%

Aspect:

Soil: Calcareous parent material. Well-drained sandy soils (Ber rep phase); clayey to rocky soils (Arc uva phase).

Comments: Occurs on warm, moist sites over a wide range of aspects on moderate to steep slopes, benches and creek bottoms.

DISTRIBUTION: C

COMMENTS: Little Rocky Mountains.

VEGETATION: Major seral species include Pin pon, Pin con and Pop tre. Ber rep is common, as is Sym occ, Spi bet and Fru vir.

PHASES: Two phases are recognized (Pfister et al., 1977, B77PFI01MT): Berberis repens and Arctostaphylos uva-ursi.

Ber rep phase:

Shrubs are similar to the association description, except that Arc uva-urs and She can are scarce.

Arc uva-urs phase:

In addition to species listed previously, Arc uva-urs is well represented and She can is common.

COMMENTS: Steele et al. (1981, A81STE01MT) recognized a Pse men/Ber rep pa in central Idaho.

SOURCE(S): UB0ROB01MT A81STE01MT A76HOF01MT

Pseudotsuga menziesii/*Calamagrostis rubescens* pa (continued):

Agr spi phase:

Found on moderately dry mountainsides and upper slopes. Agr spi, *Fes ida*, and *Fes sca* are usually well-represented, as is *Bal sag*. *Pin pon* is the major seral dominant. A *Pin pon*-*Pse men/Cal rub ct* is inferred.

COMMENTS: Most ubiquitous forest pa in Montana. Steele et al. (1981, A81STE01MT) and Cooper et al. (1985, U85C0002MT) describe a *Pse men/Cal rub pa* in central and northern Idaho, respectively.

SOURCE(S): B77PFI01MT A81STE01MT U85C0002MT U75C0001MT A80HAR01MT
U69DOR01MT

MTNHP: C1A9CEAGA0

PSEUDOTSUGA MENZIESII/CAREX GEYERI PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6100-7600

Slope:

Aspect: S

Soil: Gravelly sandy loams to silts

Comments: Mid to upper slopes

DISTRIBUTION: WC, C, SW, SC

COMMENTS: Locally abundant east of the Continental Divide; limited in westcentral Montana.

VEGETATION: Pse men is normally the only coniferous tree in seral stands; Pin fle is present on calcareous soils and Pin alb is present at high altitudes. Car gey is usually abundant and Arn cor is frequently well represented.

PHASES:

COMMENTS: Pse men/Car gey pa may be an ecological replacement for Pse men/Cal rub beyond the limits of Cal rub. Steele et al. (1981, A81STE01MT) and Cooper et al. (1985, U85C0002MT) both describe a Pse men/Car gey pa in central and northern Idaho, respectively.

SOURCE(S): B77PFI01MT A81STE01MT A80HAR01MT U85C0002MT

PSEUDOTSUGA MENZIESII/CORNUS CANADENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4800-5600

Slope: 33-50

Aspect: NW, N, NE

Soil: Sandy loam, loam

Comments: Upper mountain slopes and protected drainages.
Restricted to sites having abundant soil moisture.

DISTRIBUTION: C

COMMENTS: Bear's Paw Mountains.

VEGETATION: Seral stands may be dominated by Pin con. Spi bet and Cal rub are common in this association.

PHASES: There are two phases: Vaccinium myrtillus and Linnaea borealis.

Lin bor phase:

This phase occurs at lower elevations. Lin bor and She can are usually well represented. Vac ces, Vib edu, and Lat och are common or present.

Vac myr phase:

Vac myr is present and Vac glo sometimes dominates. Rub par and Ast con are also characteristic.

COMMENTS: Fire has played an historically active role in this pa. Sites with similar undergrowth are usually Picea potential climax elsewhere in Montana (Pfister et al., 1977, B77PFI01MT). Cor can is considered by Pfister et al. (1977, B77PFI01MT) to be an alternate indicator for Clintonia uniflora.

SOURCE(S): UB0ROB01MT

MTNHP: C1A9CEAJA0

PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS PA

SYNONYMS: Stands sampled by Cooper and Pfister (1985, U85C0001MT) on the Crow and Cheyenne Indian Reservations correspond to the Jun com phase of the Pse men/Ber rep pa describd by Hoffman and Alexander (1976, A76HOF01MT) in Wyoming.

SITE CHARACTERISTICS--

Elevation: 5500-8000

Slope: 0-15; 35-50

Aspect: N, S

Soil: Granitic, sandstone and calcareous substrates.

Comments: Cool, dry, excessively well-drained sites.

DISTRIBUTION: NC, C, SW, SC

COMMENTS: Deerlodge, Lewis and Clark, and Custer National Forests.

VEGETATION: Pin con is a persistent seral species on granitic substrates; succession to Pse men is very slow. On calcareous substrates, Pin con and Pin fle are minor seral components with Pse men dominating. Dominant understory species include Jun com, (Jun hor), Arc uva, Spi bet and Arn cor. Graminoids are inconspicuous.

PHASES:

COMMENTS: This is the driest pa in the Pse men series which still supports Pin con. On granitic substrates, a Pin pon-Pse men/Jun com ct is inferred. On calcareous substrates, a Pse men-Pin pon-Pin fle/Jun com ct is implied. Steele et al. (1981, A81STE01) recognized a Pse men/Jun com pa in central Idaho.

SOURCE(S): B77PFI01MT U85C0001MT A81STE01MT

PSEUDOTSUGA MENZIESII/LINNAEA BOREALIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2600-7200 Slope: 15-50
 Aspect: All but driest
 Soil: Variable; primarily noncalcareous

Comments: Relatively moist sites.

DISTRIBUTION: NW, WC, C, SW

COMMENTS:

VEGETATION: Pse men forms the climax and is a vigorous member of seral communities. Pin con is a major seral component on cooler sites; Lar occ and Pin pon are components of seral stands in NW and WC Montana. Undergrowth components include Cal rub, Lin bor, Arc uva, Spi bet, and Arn cor.

PHASES: Four phases are recognized: Arctostaphylos uva-ursi Roberts (1980, U80ROB01MT), Calamagrostis rubescens, Symphoricarpos albus, and Vaccinium globulare Pfister et al. (1977, B77PFI01MT). Hann (1982, U82HAN01MT) describes numerous successional stages of this pa in western MT.

Arc uva-urs phase:

This phase occupies moistest upland sites in the Little Rockies. Pin pon, Pin con, and Pop tre may dominate seral stands. Undergrowth dominated by shrubs: Lin bor, She can, Spi bet, Arc uva-urs, and Sym occ.

Cal rub phase:

This phase is found on cold, dry sites. Pin con is a major seral component, implying a Pincon-Pse men/Lin bor ct. Undergrowth includes Vac sco, Arn lat, Osm chi, Smi ste, and Tha occ. In the Little Rocky Mountains, Vac myr replaces Vac sco.

Pseudotsuga menziesii/*Linnaea borealis* p.a. (continued):

Sym alb phase:

This phase is found on benches and cool exposures. Sites are moist with mild temperatures. Pin con is seldom a seral component. Sym alb and Arn cor are well represented, Osm chi, Smi ste, and Thi occ are conspicuous. Stands in Bear's Paw Mountains have Sym occ rather than Sym alb.

Vac glo phase:

This is the coolest, moistest phase of the p.a. Pin con is a major seral component; Vac glo is well represented. Xer ten, Arn lat, and Arn cor are also abundant. A Pin con-Pse men/Lin bor-Vac glo ct is indicated.

COMMENTS: This pa often forms a transition between the Pse men series and the Picea, Abi gra, or Abi las series. Steele et al. (1981, A81STE01) described a Pse men/Lin bor pa in central Idaho.

SOURCE(S): B77PFI01MT U82HAN01MT A81STE01MT U80ROB01MT

DRAFT 60

MTNHP: C1A9CEAMA0

PSEUDOTSUGA MENZIESII/MUHLENBERGIA CUSPIDATA PA

SYNONYMS:

merge as a
phase of
Pswc/Jswc

SITE CHARACTERISTICS--

Elevation: 2700-3200

Slope: 15-50

Aspect: NW-NE

Soil:

Comments: Restricted to moist sites

DISTRIBUTION: C, SE, NE

COMMENTS: Missouri River Breaks

VEGETATION:

Pse men is the indicated climax dominant; Pin pon is seral due to shade intolerance, regenerating after fire or disturbance. Undergrowth is luxuriant; Jun sco and Muh cus are dominant. There is a carpet of moss. Sym occ is well represented, and Agr spi is common.

PHASES:

COMMENTS:

SOURCE(S): U79RQB01MT

MTNHP: C1A9CEANA0

PSEUDOTSUGA MENZIESII/PHYSOCARPUS MALVACEUS PA

SYNONYMS: Hoffman and Alexander (1976, A76HOF01MT) recognized a Pse men/Phy mon pa which is similar in the Bighorn Mountains, Wyoming.

SITE CHARACTERISTICS--

Elevation: 2000-6900

Slope: 15-50

Aspect: N, E, S, W

Soil: Variable

Comments: Cool, moist slopes and southerly exposures.

DISTRIBUTION: NW, WC, C, SC, SE, SW

COMMENTS: Widespread, abundant in western Montana.

VEGETATION: Pse men is usually the dominant species; west of the Continental Divide, Pin con, Pin pon and Lar occ may be minor seral components. Pin fle is a major associate on limestone substrates in SC Montana.

PHASES: Three phases are recognized: Calamagrostis rubescens, Physocarpus malvaceus (Pfister et al., 1977, B77PFI01MT), and Smilacena stellata (Cooper et al., 1985, U85C0002MT).

Cal rub phase:

This phase occurs on warm exposures in west-central Montana. Cal rub and Car gey are dominant beneath a scattered layer of Phy mal. Agr spi and Bal sag are common and may dominate in seral stages. Pin pon is a major seral dominant (Pin con and Lar occ are absent). A Pin pon-Pse men/Phy mal-Cal rub-Car gey ct is inferred.

Phy mal phase:

Phy mal or Hol dis form a dense shrubby layer in this phase. Sym alb, Spi bet, Cal rub, Arn cor, and Car gey are well represented; Dis tra, Smilacena, Tha occ, and other moist site forbs are common. This phase is found on north or east aspects.

Smi ste phase:

This phase was described by Cooper et al. (1985, U85C0002MT) in northern Idaho. Scow et al. (1986, U86SC001MT) identified it near Noxen, Montana. This phase represents the wettest environment on which Pse men is the climax dominant. Lar occ and Pin pon can retain co-dominance into late seral stages.

Pseudotsuga menziesii/*Physocarpus malvaceus* pa (continued):

Characteristic understory species are *Dis tra*, *Smi ste*, *Gal tri*, *Osm chi*, *Tha occ*, *Arc mac*, and *Ane pip*.

COMMENTS: Steele et al. (1981, A81STE01MT) identified a similar pa and both phases in central Idaho. Cooper (1975, U75C00001MT) recognized a similar pa in Wyoming.

SOURCE(S): B77PFI01MT U85C00001MT B85ARN01MT U75C00001MT A76HOF01MT
U85C00002MT A81STE01MT

PSEUDOTSUGA MENZIESII/PHYSOCARPUS MALVACEUS--(AMELANCHIER
ALNIFOLIA-CALAMAGROSTIS RUBESCENS) CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3200-5800

Slope: 15-50

Aspect: Variable

Soil: Variable

Comments: Cool, moist NE slopes (moist phase) or moderate - steep
S- or W-facing slopes (dry phase).

DISTRIBUTION: NW, WC, SW, C

COMMENTS: Dry phase widespread, abundant in western Montana.
Moist phase more restricted.

VEGETATION: This ct encompasses a number of fire-induced ct's discussed by Arno et al. (1985, B85ARN01MT). His dry phase ct's (Pse men-Pin pon/Phy mal-Ame aln and Pse men/Ame aln-Phy mal) are defined as those where Lar occ is poorly represented. These ct's develop under the influence of surface fires at 5-50 and 60-70 year intervals, respectively.

Arno et al.'s (1985, B85ARN01MT) moist phase ct's include Pse men-Lar occ-Pin pon/Phy mal-Ame aln (develops with surface fires at 10-50 year intervals) and Pse men-Lar occ/Phy mal-Cal rub (mature seral stage maintained by occasional severe fires).

PHASES:

COMMENTS:

SOURCE(S): B85ARN01MT

MTNHP: C1A9CEAQA@

PSEUDOTSUGA MENZIESII/SPIRAEA BETULIFOLIA PA

SYNONYMS: Cooper et al. (1985, U85C00@1MT) combined Pse men/Car gey with Pse men/Spi bet due to the mosaic nature of their distribution.

SITE CHARACTERISTICS--

Elevation: 3500-6900

Slope: 15-33

Aspect: S, W, (N)

Soil: Gravelly sandy loams to silts.

Comments: Warm, dry slopes.

DISTRIBUTION: WC, C, SC, SE, NW, NC

COMMENTS:

VEGETATION: Pin pon and Pin con are major seral dominants, implying Pse men-Pin pon/Spi bet and Pse men-Pin con/Spi bet ct's. Pop tre and Pin fle are minor seral dominants. Undergrowth associates include Spi bet, Ber rep, Arn cor, Ast con and Fra vir. On drier sites, Jun com is well represented; on moister sites, Pru vir, Ame aln and She can may be common.

PHASES:

COMMENTS: This is an incidental pa in northern Idaho (Cooper et al., 1985, U85C00@2MT). It is common in central Idaho (Steele et al., 1981, A81STE@1MT).

SOURCE(S): B77FFI@1MT U85C00@1MT A81STE@1MT U85C00@2MT

MTNHP: C1A9CEARA0

PSEUDOTSUGA MENZIESII/SYMPHORICARPOS ALBUS PA

SYNONYMS:

SITE CHARACTERISTICS---

Elevation: 2700-8200

Slope: 30-80

Aspect: ALL

Soil: Variable, often shallow, rocky substrates.

Comments: Warm slopes and benches.

DISTRIBUTION: NW, WC, NC, C, SW, SC, SE

COMMENTS:

VEGETATION:

Seral stands at low elevations are often dominated by Pin pon. Pse men and Pin con dominate at higher elevations. Undergrowth is characterized by Sym alb, Cal rub, Fes ida and Agr spi. Sym ore replaces Sym alb in stands in the Bighorn Mountains.

PHASES:

Three phases are discussed by Pfister et al. (1977, B77PFI01MT): Agropyron spicata, Calamagrostis rubescens, and Symphoricarpos albus.

Agr spi phase:

This phase represents the droughty extreme of the pa. It generally occurs on warm, dry southern exposures. Agr spi, Fes ida, and Bal sag are well represented. Pin pon is a major seral dominant, implying a Pin pon-Pse men/Sym alb-Agr spi ct.

Cal rub phase:

Pin pon and Pin con are seral dominants; Pse men often dominates most stages of succession. Cal rub and Car gey are major undergrowth components. Two ct's are inferred from this phase: Pin pon-Pse men/Sym alb-(Cal rub)-(Car gey) and Pin pon-Pse men-Pin con/Sym alb.

Sym alb phase:

This phase is similar environmentally to the Cal rub phase. Pin pon is a major seral component. Pse men often dominates most seral stages. Cal rub and Car gey are usually poorly represented. A Pse men-Pin pon/Sym alb pa is inferred.

Pseudotsuga menziesii/Symphoricarpos albus p.a. (continued):

COMMENTS: Cooper (1975, U75C000@1MT) described a *Pse men/Sym alb pa* in Wyoming. Steele et al. (1981, A81STE0@1MT) described the *pa* in central Idaho. It is an incidental *pa* in northern Idaho (Cooper et al., 1985, U85C000@2MT).

SOURCE(S): B77PFI@1MT US1C000@1MT A81STE@1MT A8@HAR@1MT U85C000@1MT
U75C000@1MT U85C000@2MT

MTNHP: C1A9CEATA@

PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OCCIDENTALIS PA

SYNONYMS: This pa is similar to Pfister et al.'s (1977, B77RFI@1MT) Pse men/Sym alb-Agr spi, except Sym occ replaces Sym alb.

SITE CHARACTERISTICS--

Elevation: 4000-4800

Slope: 15-50

Aspect: S, W

Soil: (Gravelly) sandy loam

Comments:

DISTRIBUTION: C

COMMENTS: Bear's Paw and Little Rocky Mountains--extensive in this limited area.

VEGETATION:

Pse men is the indicated climax species. Pin pon dominates seral stands. Sym occ and Agr spi dominate understory; Pru vir and Ame aln are common. The rho and Bal sag are characteristic.

PHASES: Two phases are recognized: Chrysopsis villosa (Bear's Paw Mountains) and Shepherdia canadensis (Little Rocky Mountains).

COMMENTS:

SOURCE(S): US@ROB@1MT

DRAFT

MTNHP: C1A9CEAVA*

PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500

Slope: 33-50

Aspect: S

Soil: Shallow, coarse-textured, rocky; excessively well-drained

Comments:

DISTRIBUTION: SW

COMMENTS: Bighole and Madison drainages (Pfister et al., 1977, B77PFI01MT) and Gallatin River (Schaeffer, 1978, U78SCH02MT).

VEGETATION: Overstory is nearly pure Pse men; undergrowth is dominated by Sym ore, Agr spi and Art tri.

PHASES:

COMMENTS: This pa represents the eastward extension of the Pse men/Sym ore-Sym ore pa common in east-central Idaho (Steele et al., 1981, A81STE01MT).

SOURCE(S): B77PFI01MT U78SCH02MT A81STE01MT

PSEUDOTSUGA MENZIESII/VACCINIUM CESPITOSUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-6400

Slope: 0-15

Aspect:

Soil: Gravelly sandy loams, loams

Comments: Relatively warm, moist, well-drained benches and gentle slopes. Many sites located in "frost pockets".

DISTRIBUTION: NW, WC, C, NC

COMMENTS:

VEGETATION:

Pin pon or Lar occ dominate in northwest MT; Pin con dominates east of the Continental Divide and on cold sites in northwest MT. Understory components include Cal rub, Car gey, Vac ces, Arc uva, Lin bor and Sym alb.

PHASES:

COMMENTS: Steele et al. (1981, A81STE01MT) and Cooper et al. (1985, U85C0002MT) have recognized a Pse men/Vac ces pa in central and northern Idaho, respectively.

SOURCE(S): B77PFI01MT A81STE01MT U85C0002MT

PSEUDOTSUGA MENZIESII/VACCINIUM GLOBULARE PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4300-6800

Slope: 15-50

Aspect: NW, N, E, S

Soil: Well-drained, acidic.

Comments: Relatively cold sites.

DISTRIBUTION: NW, WC, C, SW, SC

COMMENTS:

VEGETATION: Pse men is present in seral and climax stages. Pin con, Lar occ and Pin pon are seral components whose abundance varies considerably by phase. Undergrowth components include Vac glo, Cal rub, Car gey, Spi bet and Xer ten.

PHASES: Three phases are recognized (Pfister et al., 1977, B77PFI01MT): Arctostaphylos uva-ursi, Vaccinium globulare and Xerophyllum tenax.

Arc uva-urs phase:

This phase occurs on relatively warm sites on south-facing slopes. Pin pon is a major seral dominant. Vac glo, Arc uva-urs, Car gey, and Xer ten are common. A Pin pon/Vac glo ct is implied.

Vac glo phase:

This phase is restricted to cool exposures on moderately steep slopes. Pin con is a major seral component; Lar occ and Pin pon are minor components of some stands. Vac glo is well represented, Arn lat is sometimes common. Arc uva-urs and Xer ten are scarce. Two ct's are inferred from this phase: Pin con/Vac glo ct and Pin con-Lar occ/Vac glo ct.

Xer ten phase:

Pin con and Lar occ are major seral components of this phase. Pin pon is minor or absent. Vac glo is well represented and Xer ten is common. A Pin con-Lar occ/Vac glo-Xer ten c.t. is inferred. B85ARN01MT described a Pse men/Vac glo-Cal rub ct that represents old growth stands which have developed in the absence of fire. They also describe a Pin con-Pse men/Vac glo-Arn lat ct and a Pin con-Pse men/Vac glo-Cal rub ct maintained by fire at a frequency of 80 years.

Pseudotsuga menziesii/Vaccinium globulare pa (continued):

COMMENTS: Major. Cooper (1975, U75C00@1MT) recognized a similar pa in Wyoming. Cooper et al. (1985, U85C00@2) and Steele et al. (1981, A81STE@1MT) also recognized a *Pse men/Vac glo* pa in northern and central Idaho, respectively.

SOURCE(S): B77PFI@1MT U75C00@1MT A81STE@1MT U85C00@2MT B85ARN@1MT

PSEUDOTSUGA MENZIESII/VIOLA CANADENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4100-4800

Slope: 15-50

Aspect: W, N, E, SE

Soil: Loam, sandy loam.

Comments: Mesic sites.

DISTRIBUTION: C

COMMENTS: Bear's Paw Mountains.

VEGETATION:

Pop tre, Pin pon and Pin con may be major seral dominants. Moist-site understory components include Vic can, Act rub, Tha occ, Osm chi, Arn cor, Ast con and Dis tri; Spi bet, Pru vir, Sym occ, Cal rub and Agr sca.

PHASES:

COMMENTS: Extensive in the Bear's Paw Mountains.

SOURCE(S): US0ROB01MT

DRAFT

98

MTNHP: C1A9CEAYA0

PSEUDOTSUGA MENZIESII-PINUS CONTORTA/CALAMAGROSTIS RUBESCENS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope:

Aspect:

Soil:

Comments:

DISTRIBUTION:

COMMENTS:

VEGETATION: PFI'77 P.101: FIRE MAINTAINED, LEADS TO ABLA/CARU.

PHASES:

COMMENTS: THIS RECORD NOT IN WESTECH'S REPORT!!!!!!!!!! (DELETE OR ADD INFORMATION).

SOURCE(S): B77PFI01MT

Thuja plicata Series

The Thu pli series is most common in the extreme northwestern portion of Montana, extending eastward to the Swan Valley, the Mission Range, the Missoula area, and riparian areas in the Bitterroot Range. The series is found on moist sites within the maritime influenced climatic zone of the northern Rockies (Pfister et al., 1977, B77PFI@1MT). Stands normally occupy bottomland and northerly exposures between 2,000 and 5,000 feet where precipitation exceeds 32 inches annually.

Both Thu pli and Tsu het are shade-tolerant climax conifers that grow in similar environments. According to Pfister, et al. (1977, B77PFI@1MT), Thu pli extends onto slightly drier sites than Tsu het, and it has a larger range in Montana. Tsu het ultimately attains dominance over Thu pli at climax due to its ability to reproduce under dense forest canopy. Thu pli can maintain a minor climax role in the Tsu het series because of its longevity (up to 1,000 years), ability to reproduce vegetatively, and its shade tolerance.

The Daubenmires (1968, A68DAU@1MT) found Thu pli and Tsu het codominance to be typical of most wet sites, with no understory differentiation to indicate the eventual domination by either species.

Dominant seral tree species include Pse men, Lar occ, and Picea. Pin con, Pin mon, and Bet pap are minor seral components. Moist-site forbs and shrubs comprise the understory.

THUJA PLICATA/ASARUM CAUDATUM PA

SYNONYMS: This pa is comparable to Pfister et al.'s (1977, B77PFI@1MT)
Thu pli/Cli uni-Ara nud pa.

SITE CHARACTERISTICS--

Elevation: 2200-5200

Slope: 10-30

Aspect: All

Soil: Loam to silt loam

Comments:

DISTRIBUTION: NW

COMMENTS: This pa occurs commonly throughout northern Idaho (Cooper et al., 1985, U85C00@2MT) and has been reported in NW Montana near Noxon (Scow et al., 1986, U86SC0@1MT).

VEGETATION: Thu pli is the climax dominant. Seral overstory species include Pse men, Abi gra, Lar occ, and Pin mon. Abi las and Pic eng are present on colder sites. The understory is species-rich. Asa can is scattered throughout (Vic gla is an equivalent indicator when > 1%). Other forbs include Pte aqu, Pol mun, Cli uni, Cop occ, Dis hoo, and Tia tri.

PHASES: Cooper et al. (1985, U85C00@2MT) recognized three phases of this pa: *Menziesia ferruginea*, *Taxus brevifolia*, and *Asarum caudatum*.

Men fer phase:

This phase occurs on the coldest sites within the pa, predominantly on norther exposures. Men fer forms a 3-6 foot tall shrub layer. Vac glo, Lon uta, Rub par, and Ace gla are associated species.

Tax bre phase:

This pa occupies cool, moist sites within the pa. Tax bre is a dominant tall shrub.

Asa can phase:

This phase is the warmest and driest of the pa. It occurs over a wide range of aspect, slope, and position. Major seral tree species are Pse men, Abi gra, and Pin mon.

COMMENTS:

SOURCE(S): U85C00@2MT U87SC0@1MT U86PAR@1MT

THUJA PLICATA/CLINTONIA UNIFLORA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2000-5300

Slope: 10-30

Aspect: N

Soil: Acidic gravelly loams to silts

Comments: Associated with bottomlands, benches and northerly exposures.

DISTRIBUTION: NW, WC

COMMENTS: This pa is found in Idaho and NW and WC Montana, extending east to Glacier Park and the Swan River Valley and south to the Bitterroot Mountains.

VEGETATION:

Thu pli is the major dominant species (sometimes co-dominant with Abi gra). Seral stand components include Pse men, Larix, Picea, and Abi las. Understory is dominated by Cli uni, Rub par, Vac glo, Lin bor, Geo obl, Pyr sec, and Vic orb.

PHASES: Three phases are recognized: Aralia nudicaulis, Clintonia uniflora, and Menziesia ferruginea.

Ara nud phase:

This phase occurs on moist bottoms and slopes at lower elevations. Ara nud, Ath fil-fem, and Gym dry are common. There is a luxuriant cover of Ade bic, Tia tri, and Gal tri. An Abi las-Pse men-Lar occ/Cli uni-Ara nud ct is inferred in this wetter phase.

Cli uni phase:

Men fer, Ara nud, and fern indicators are scarce in this pa. Associates of Cli uni were mentioned previously. An Abi gra-Picea/Cli uni ct is inferred. This ct is maintained by dryness of the sites.

Men fer phase:

This pa occupies cold, moist sites on north-facing slopes or ravines. Menziesia is common, and Xer ten and Arn lat may be conspicuous. Abi las may be a co-dominant. Seral stands are composed of Lar occ, Pse men, Pin con, and Picea, indicating a Thu pli-Abi las-(Lar occ)-(Pse men)-(Picea)/Cli uni-Men fer ct.

Thuja plicata/*Clintonia uniflora* p.a. (continued):

COMMENTS: This is the most common pa in the Thu pli series. Cooper et al. (1985, U85C00@2MT) described a Thu pli/Cli uni pa for northern Idaho. They described two phases in addition to Pfister et al.'s (1977, B77PFI@1MT): *Taxus brevifolia* and *Xerophyllum tenax*. They do not recognize an *Aralia nudicaulis* phase.

SOURCE(S): B77PFI@1MT U77ANT@1MT U85C00@2MT U86FAR@1MT

MTNHP: CIA9CFADA0

THUJA FLICATA/GYMNOCARPIUM DRYOPTERIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3200-4500

Slope: 15-50

Aspect: W, N

Soil: Gravelly loam to silty clay loam

Comments:

DISTRIBUTION: NW

COMMENTS: This pa has been described for northern Idaho by Cooper et al. (1985, U85C0002MT). It was identified near Noxon, MT by Scow et al. (1986, U86SC001MT).

VEGETATION: Thu pli is the climax dominant tree. Abi gra and Pic eng are late seral species. Pse men and Pin mon occur occasionally. Shrubs include Ace gla, Lon uta, Ros gym, Lin bor, Rub par, Tax bre, Men fer, and Vac mem. Gym dry, Asa can, Cli uni, Cop occ, Dis hoo, Smi ste, and Tia tri are characteristic forbs.

PHASES:

COMMENTS:

SOURCE(S): U85C0002MT U86SC001MT

THUJA PLICATA/OPLOPANAX HORRIDUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <4200

Slope: 0-10

Aspect: Variable

Soil: Acidic, non-gravelly loams

Comments: Wet bottoms and toe-slope seeps. Opl hor is usually found in bottoms having high water tables and cold air drainage through them.

DISTRIBUTION: NW,WC

COMMENTS:

VEGETATION: This topoedaphic pa is minor in Montana. It is seldom affected by fire. Stands are typically very old with diverse, luxuriant undergrowth dominated by Opl hor, Ath fil-fem, Gym dry, Cli uni, Tia tri, Smi ste, Gal tri and Ade bic. Tsu het can be a coclimax dominant. Small amounts of Pse men, Picea and Abi las are found in most stands.

PHASES:

COMMENTS: This pa corresponds to the Thu pli/Opl hor p.a. described in northern Idaho by Steele et al. (1981, A81STE01MT).

SOURCE(S): B77PFI01MT U77ANT01MT U85C0002MT

SECRET

MTNHP: C1A906A///

Tsuga heterophylla Series

This series is found in the maritime-influenced climatic zone in extreme northwestern Montana, extending from the Idaho border to Glacier National Park and the Swan Valley. It occupies moist bottomlands and northerly exposures from 2000 to 5000 feet elevation where precipitation exceeds 32 inches annually. Tsu het has a very restricted environmental amplitude, being intolerant of excess moisture, drought and frost. It is very shade-tolerant. It can be a dominant or co-dominant climax species with Thu pli, or it may replace Thu pli altogether (see Thu pli series discussion).

Many tree species including Pse men, Lar occ, Picea, Pin con, Pin mon, and Bet pap act as major seral dominants. Some are long-lived and co-dominate stands for extended periods. The undergrowth is comprised of moist-site forbs and shrubs.

TSUGA HETEROPHYLLA/ASARUM CAUDATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2200-5000

Slope: Variable

Aspect: Variable

Soil: Loam, silty loam, clay loam

Comments:

DISTRIBUTION: NW

COMMENTS: This pa is broadly distributed in northern Idaho (Cooper et al., 1985, U85C00@1MT) and has been identified by Scow et al. (1987, U87SC0@1MT) near Noxon, Montana.

VEGETATION:

Tsu het is the climax dominant tree. Seral species include Abi gra, Lar occ, Thu pli, Pin mon, Pse men, and Pin con. Asa cau, Cli uni, Cop occ, Dis hoo, Ade bic, and Tia tri are characteristic. Lin bor, Lon uta, Pac myr, Ros gym, and Vac glo have high constancy.

PHASES: Three phases have been described by Cooper et al. (1985, U85C00@2MT): Aralia nudicaulis, Menziesia ferruginea, and Asarum caudatum. Scow et al. (1987, U87SC0@1MT) identified the Ara nud and Asa cau phases in Montana.

Ara nud phase:

This is the warmest, moistest phase of the p.a. It is found on bottomlands, toe slopes, and first benches above a wet bottom area. The phase is characterized by the presence of Ara nud. Ath fil-fem and Gym dry are present in trace amounts. Thu pli is the major seral species, often remaining as a climax co-dominant.

Asa cau phase:

This is the typical phase found on all aspects and landforms, but more commonly on warm exposures. High constancy forbs include Asa cau, Cli uni, Cop occ, Dis hoo, Ade bic, and Tia tri. Major tree species include Tse het, Abi gra, Lar occ, Pin mon, Pse men, and Thu pli.

COMMENTS:

SOURCE(S): U85C00@2MT U87SC0@1MT

TSUGA HETEROPHYLLA/CLINTONIA UNIFLORA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 1800-4000

Slope:

Aspect:

Soil:

Comments: Moist valley bottoms, benches and cool exposures.

DISTRIBUTION: NW, WC

COMMENTS: Extreme NW and WC Montana in the Libby-Thompson Falls area, extending to Glacier Park and the Swan Valley; northern Idaho.

VEGETATION: Old-growth stands are co-dominated by Tsuga and Thuja. Younger stands have a diverse mix of numerous coniferous species, varying by phase.

PHASES: Pfister et al. (1977, B77PF101MT) describe two phases: Clintonia uniflora and Aralia nudicaulis. Cooper et al. (1985, U85C0002MT) described an additional Xerophyllum tenax phase in northern Idaho. Scow et al. (1987, U875C001MT) identified all three phases near Noxon, Montana.

Cli Uni phase:

In this phase, Lar occ, Pse men, Pin mon, Pin con, and Pin pon are well represented. Undergrowth is dominated by forbs: Cli uni, Pyr sec, Tia tri, and Vio orb; and shrubs: Lin bor, Pac myr, Tax bre and Vac glo. There is more Lin bor and Vac glo in the Cli uni phase. A Lar occ-Pse men-Tsu het/Cli uni ct is inferred.

Ara nud phase:

In this phase, Abi gra, Abi las, and Picea are common. This phase is associated with wetter sites. Indicator species include Ara nud, Ath fil-fem, and Gym dry. A Tsu het/Cli uni-Ara nud ct is inferred.

Xer ten phase:

The Xer ten phase is the driest within the pa. Major early seral tree species are Pse men, Lar occ, Pin con, and Pin mon. Late seral species include Abi gra and Thu pli. Xer ten and Vac glo are abundant.

COMMENTS:

SOURCE(S): B77PF101MT U77ANT01MT U85C0002MT U875C001MT

Tsuga mertensiana Series

This series includes three plant associations in which *Tsu mer* is potentially the climax dominant. According to Cooper et al. (1965, US5C00@2MT), distribution of *Tsu mer* in northern Idaho appears to be related to a strong maritime influence, but the species occurs as discontinuous tracts within the subalpine zone occupied by *Abi las*. Pfister et al. (1977, B77PFI@1MT) lumped *Tsu mer* within the *Abi las* series discussion. The presence of *Tsu mer* reproducing successfully to become at least a climax codominant with *Abi las* distinguishes the *Tsu mer* series from the *Abi las* series.

Major overstory components include *Tsu mer*, *Abi las*, *Picea*, *Pin con*, *Lar occ*, and *Pse men*. Undergrowth components include *Men fer*, *Vac glo*, *Vac sco*, and *Xer ten*.

TSUGA MERTENSIANA/LUZULA HITCHCOCKII PA

SYNONYMS: This pa corresponds to Cooper et al.'s (1985, U85C00002MT) Tse mer/Men fer and Tse mer/Xer ten pa's in northern Idaho.

SITE CHARACTERISTICS--

Elevation: 6000-6500

Slope:

Aspect: VARIABLE

Soil: Very acidic gravelly loams to silts.

Comments: Exposed ridgetops, southerly exposures, sheltered slopes or cool aspects.

DISTRIBUTION: WC, NW

COMMENTS: Found on and adjacent to the Montana-Idaho Divide from Cabinet Gorge to Lolo Pass, and in Idaho.

VEGETATION: Vegetation is similar to the Abi las/Luz hit pa, with the addition of Tse mer. Tse mer is a major climax dominant, sometimes the sole dominant or sometimes forming a co-climax with Abi las.

PHASES: Pfister et al. (1977, B77PFI01MT) describe two phases: Menziesia ferruginea and Vaccinium scoparium.

Vac sco phase:

This phase is found on exposed ridgetops and southerly exposures. Undergrowth is dominated by Xer ten and Vac sco. It is comparable to the Abi las/Luz hit-Vac sco pa.

Men fer phase:

This phase is found on sheltered slopes and cool aspects. It is comparable to the Abi las/Luz hit-Men fer pa.

COMMENTS:

SOURCE(S): B77PFI01MT U85C00002MT

MTNHP: C1A9CHACA0

TSUGA MERTENSIANA/MENZIESIA FERRUGINEA PA

SYNONYMS:

SITE CHARACTERISTICS---

Elevation: 5400-6400

Slope:

Aspect:

Soil: Gravelly loams to silts.

Comments:

DISTRIBUTION: NW, WC

COMMENTS: Restricted to the border region of NW Montana between Lolo Pass and Libby.

VEGETATION: This pa differs from the Abi las/Men fer pa due to the presence of successfully reproducing Tsu mer. It is associated with climates having a strong oceanic influence. Tsu mer may be dominant or co-climax with Abi las; small amounts of Picea, Lar occ, Pin mon and Pse men may be present. Undergrowth components include Men fer, Aln sin, Vac glo, Vac sco, Xer ten and Arn lat.

PHASES:

COMMENTS: Cooper et al. (1985, U85C0002MT) defined a broader Tsu mer/Men fer pa, including a Xer ten phase and a Luz hit phase.

SOURCE(S): B77PF101MT U85C0002MT

Larix lyallii Series

Lar lya occurs on cool aspects and is associated with heavily glaciated acidic rocky sites at, near, or above the timberline. Alpine larch is a climax species on sites that are too severe for evergreen conifers because of rocky terrain, shortness of growing season, avalanches, blizzards, droughtiness, or bogginess. The establishment of Lar lya stands in strictly alpine habitats apparently modifies the surface environment, allowing the establishment of subalpine understory species. The species is restricted to the outer fringe of maritime-influence mountain environments, west of the Continental Divide in Montana (Arno and Habeck, 1972, A72ARN01MT). According to Pfister et al. (1977, B77PFI01MT), stands of Lar lya are found at high elevations in the Bitterroot, Anaconda-Pintlar, Cabinet, Whitefish, Swan, south Mission, Sapphire, and Flink Creek ranges, in Glacier National Park, and near the headwaters of the Teton and Sun rivers.

Lar lya may form pure groves of erect trees on sites above the tree limits of evergreen conifers or it may be associated with variable amounts of Pin alb, Abi las, and Pic eng.

The understory of Lar lyan stands is generally depauperate, often with fewer than ten species. Arno and Habeck (1972, A72ARN01MT) plotted dominant understory vegetation within a three-dimensional ordination. They found that Luz hit-dominated understories were restricted to relatively dry, high altitude sites. Vac sco dominated a broader range of habitats within relatively dry sites. Phy emp-dominated stands were more mesic and were located at lower elevations.

The position of Lar lya along a transitional belt between major vegetation zones makes the identification of distinct, repeatable community types or plant associations difficult. The identification of associations will require more investigation to determine patterns of similarity among stand data.

A72ARN01MT U66ARN01MT B77PFI01MT U85C0002MT B84ARN01MT U67HAB02
U70ARN01MT

LARIX LYALLII-ABIES LASIOCARPA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-9900

Slope:

Aspect: N, (S)

Soil: Acidic gravelly loams derived from granitic and quartzite parent materials or shale. Little soil development; rocky.

Comments: Cool exposures in timberline areas in maritime mountain environments.

DISTRIBUTION: NW, WC, SW, SC, C, NC

COMMENTS: West of the Continental Divide.

VEGETATION:

PHASES:

COMMENTS: Abilas frequently reproduces through layering and is more stunted than Lar lya.

SOURCE(S): B77PFI01MT

Populus angustifolia Series

This series occurs along streambanks and seeps in west, central and southeastern Montana. Quantitative data are lacking, however, Hansen (1986, UB6HAN01MT) indicates the presence of a Pop ang-Jun scc ct in southcentral Montana.

Populus deltoides Series

This series occurs along major streams in central and eastern Montana. Quantitative data is lacking in Montana. Girard (1985, U85GIRØ1MT) described a Pop del/Jun sco ct in northwestern North Dakota that may occur in eastern Montana. This ct was found on broad, level floodplains on silt to sandy loam soils having a high water holding capacity. Tree canopy was comprised of Pop del, Jun sco and Fra pen. Dominant shrubs were Sym occ and Ros woo; forbs included Tha das, Tox ryd and Mel off. Girard (1985, U85GIRØ1MT) theorized that this ct could be a seral stage of Pop del/Fra pen.

Populus tremuloides Series

Aspen groves are generally small and occur within or adjacent to coniferous forests. Stands have apparently been maintained by fire (Cooper, 1975, U75C000@1MT). Fire suppression and wildlife damage favor conifer replacement in many stands. Habeck (1970, A70HAB01MT) documented conifer invasion of aspen stands in the foothills on the eastern side of Glacier National Park. Regeneration of Abi las, Picea, Pse men and other conifers results in plant associations dominated by these species. Cooper (1975, U75C000@1MT) discussed Pop tre-dominated communities in northwestern Wyoming which were slowly being invaded by Abi las and Pse men and had understories that were similar to these coniferous series. Mueggler and Campbell (1982, A82MUE01MT) describe the following communities in southeastern Idaho:

Pop tre-Abi las/Sym ore
Pop tre-Abi las/Tha fen
Pop tre-Pse men/Ame aln
Pop tre-Pse men/Sym ore
Pop tre-Pse men/Cal rub
Pop tre-Pin con/Cal rub

Further investigation of potentially occurring community types within this series is needed. No communities have presently been described in the Pop tre (coniferous) series.

Populus trichocarpa Series

According to Pfister et al. (1977, B77PFI01MT), Pop tri-dominated communities are widespread east of the Continental Divide in brook valleys that are isolated from conifer forests, especially in the Jefferson, Gallatin and Yellowstone River drainages. They typically occur at lower to middle elevations.

No known quantitative data have been collected for communities within this series and successional status to other series is unknown. The following communities which potentially occur in Montana have been qualitatively described:

Pop tri-Jun sco	(Hansen, 1986, U86HAN01MT)
Pop tri-Picea	(Habeck, U67HAB02MT; Foote, U65F0001MT)
Pop tri-Pin pon	(Foote, 1965; Habeck, 1967; Hansen, 1986)
Pop tri-Thu pli	(Foote, 1965, U65F0001MT)

Understories are variable in these communities and reflects historical grazing use.

MTNHF: C1B3B8A///

Betula papyrifera Series

Bet pap is prevalent across Canada and the northeastern U.S.; it is locally scattered in the northern Great Plains. It is generally associated with other species in climax communities. It is intolerant of competition and will usually last one generation before being replaced (Girard, 1985, U85GIR01MT). No Bet pap-dominated communities have been described for Montana.

Populus tremuloides Series

Self-perpetuating, climax Pop tre communities are found in prairies east of Glacier National Park; they are apparently the southern extension of the Canadian groveland which is found from the foot of the Rocky Mountains in Alberta, across Saskatchewan and Southwestern Manitoba to Minnesota (Lynch, 1955, A55LYN01MT). Other aspen-dominated stands have been described in SE, SC, SW, NC, and NW Montana. Conifers are only marginally present in these stands.

Aspen communities have been described by numerous authors within the region; ct's which have been qualitatively described in Montana or that have been described in adjacent states and could potentially occur in Montana include:

Pop tre/Ace gla	(Thompson and Kuijt, 1976, A76THO01MT)
Pop tre/Art tri	(Alexander, 1985, A85ALE01MT; Mueggler and Campbell, 1982, A82MUE01MT)
Pop tre/Cor sto	(Lee and Jonkel, 1980, U80LEE01MT)
Pop tre/Crataegus spp.	(Kamps, 1969, U69KAM01MT)
Pop tre/Equ arv	(Pierce, 1986, U86PIE01MT)
Pop tre/Ger vis	(Alexander, 1985; Mueggler and Campbell, 1982)
Pop tre/Lup arg	(Alexander, 1985, A85ALE01MT)
Pop tre/Ros nod	(Lesica, 1982, U82LES01MT; Culwell et al., 1984, U84CUL01MT; Severson and Thilenius, 1976, A76SEV01MT)
Pop tre/Salix	(Gordon, 1968, U68GOR01MT; Culwell, 1978, U78CUL01MT)
Pop tre/Sal beb	(Harvey, 1980, A80HAR01MT; Lesica, 1982)
Pop tre/She can	(Lee and Jonkel, 1980, U80LEE01MT)
Pop tre/Wye amp	(Alexander, 1985, A85ALE01MT)
Pop tre/Bet pap	(Girard, 1985, U85GIR01MT; Scow and Culwell, 1986, U86SCO02MT)

MTNHP: C1B3BCAHA0

POPULUS TREMULOIDES/SYMPHORICARPOS OREOPHILUS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6600

Slope:

Aspect:

Soil:

Comments: Moderately moist uplands and wet lowlands.

DISTRIBUTION: SW

COMMENTS: Red Rock Lakes National Wildlife Refuge, more common to the south in Idaho, Wyoming, Colorado and Utah (Alexander, 1985, A85ALE01MT).

VEGETATION: Floristic components include Pop tre, Sym ore, Ber rep, Tar off, Tha ven, Tri lon and Carex.

PHASES:

COMMENTS:

SOURCE(S): U69DOR01MT A85ALE01MT A82MUE01MT

MTNHP: C1B3BCAJA0

POPULUS TREMULOIDES-POPULUS TRICHOCARPA/OSMORHIZA
OCCIDENTALIS CT

Lynch merge into Pop tr/Osm

SYNONYMS: This ct incorporates Lynch's (1955, A55LYN01MT) Pop tre/Osm occ and Pop tre/Ast lae associations.

SITE CHARACTERISTICS--

Elevation:

Slope: 0-20

Aspect: All but S

Soil: Alluvial; surface is relatively gravel free.

Comments: Occurs in bottoms of narrow mountain valleys, intra and inter-morainal depressions, areas underlain by clay lenses and fringing on kettle lakes

DISTRIBUTION: NC,NW

COMMENTS: Blackfeet Indian Reservation

VEGETATION: Both Pop tre and Pop tri produce relatively even-aged stands; Pop tre usually dominates. Conifers are incidental. Dominant shrubs include Sym alb, Ame ala and Ber rep. Indicator and/or dominant forbs include Osm occ, Vio can, Her lan, Act rub, Gal tri and Ang arg.

PHASES:

COMMENTS:

SOURCE(S): U81C0001MT

POPULUS TREMULOIDES/Berberis repens PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3600-3800

Slope: 2-15

Aspect: N

Soil: Variable.

Comments: Upland ravines and along drainages.

DISTRIBUTION: SE

COMMENTS: Long Pines and Ekalaka Hills. Described by Severson and Thilenius (1976, A76SEV01MT) in the Black Hills.

VEGETATION: Associated species include Ber rep, Sym alb, Rub ida, Tox ryd, Rib mis, Pru vir, Poa pra, Gal bor, Smi ste, Car spr and Ely vir.

PHASES:

COMMENTS: Infrequent.

SOURCE(S): U85HAN01MT A76SEV01MT

POPULUS TREMULOIDES/CALAMAGROSTIS RUBESCENS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-7000

Slope: 33-50

Aspect: Variable

Soil:

Comments: This ct is widely distributed in southeastern Idaho (Mueggler and Campbell, 1982, A82MUE01MT).

DISTRIBUTION: SW, NC

COMMENTS: Blackfoot Indian Reservation; Johnny Gulch (near Ennis), NW Wyoming and SE Idaho.

VEGETATION:

Pse men may occasionally be present; conifers are usually incidental. Distinct shrub layers are lacking! Associated understory species include Cal rub, Rub ida, Osm chi, Lup arg, Ger vis, Vic ame, Lat och, Gal bor and Ant ana.

PHASES:

COMMENTS:

SOURCE(S): U84STE01MT U75C0001MT UB1C0001MT A82MUE01MT

POPULUS TREMULOIDES/HERACLEUM SPHONDYLLIUM CT

SYNONYMS:

Same as Potr/Tall Forb of Mueggler 1988

SITE CHARACTERISTICS--

Elevation: 6500-7500

Slope: 0-33

Aspect: VARIABLE

Soil:

Comments:

DISTRIBUTION: SC

COMMENTS: North of Yellowstone Park (Culwell and Scow, 1982, US2CUL01MT); identified in western Wyoming (Alexander, 1985, A85ALE01MT; Collins, 1984, US4COL01MT).

3?

VEGETATION:

Her lan was a prominent forb in Pop tre stands sampled. Pop tre dominated the overstory; Pse men was a minor component. Numerous shrubs and forbs are present. According to Collins (1984, US4COL01MT), Her spo is an indicator of pristine condition.

PHASES:

COMMENTS: HERACLEUM LANATUM = H. SPHONDYLLIUM SUBSP. MONTANUM

SOURCE(S): US2CUL01MT A85ALE01MT US4COL01MT

3?
US2CUL01MT

Rosebud County!
(not GYA!)

describe POTR/SYAL
(not POTR/HESP)
just

MTNHP: C1B3BCAEEA0

POPULUS TREMULOIDES/PRUNUS VIRGINIANA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3500-4500

Slope: 0-33

Aspect: VARIABLE

Soil: Variable.

Comments: Seeps, springs and drainages in uplands.

DISTRIBUTION: SE

COMMENTS: Little Wolf Mtns. Also described for SW North Dakota.

VEGETATION:

Girard (1985, U85GIR01MT) lists dominant species as Pop tre, Fra pen, Pru vir, Ame aln, Sym occ, Apo and Ara nud, Carex, Dis tra and Gal bor.

PHASES:

COMMENTS: Quantitative data lacking.

SOURCE(S): U79CDE01MT U85GIR01MT

POPULUS TREMULOIDES/SPIRAEA BETULIFOLIA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6000-6800

Slope: 15-30

Aspect: S

Soil:

Comments:

DISTRIBUTION: SW ?

COMMENTS: Identified in SE Idaho and western Wyoming (Alexander, 1985, A85ALE01MT; Youngblood and Mueggler, 1981, A81YOU01MT). Mueggler and Campbell (1982, A82MUE01MT) describe a Pop tre/Spi bet-Cal rub ct which occurs on the western edge of the Yellowstone Plateau.

VEGETATION:

Conifers are incidental; a pronounced tall shrub layer is absent. A low shrub layer is dominated by Spi bet and Sym alb. The herb layer is dominated by Cal rub and Tha fen.

PHASES:

COMMENTS: No quantitative data; not identified in Montana, but present in region.

SOURCE(S): A85ALE01MT A82MUE01MT A81YOU01MT

MTNHP: C183BCAGA0

POPULUS TREMULOIDES/SYMPHORICARPOS ALBUS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-7500

Slope: 0-33

Aspect: VARIABLE

Soil: Variable.

Comments: Slopes and upland swales.

DISTRIBUTION: SC, C, NC

COMMENTS:

VEGETATION: This ct typically has a dense canopy of even-aged Pop tre; other conifers are accidental. Undergrowth is lush: Sym alb, Spi bet, Rosa, Ame aln and Ber rep are well represented. Well represented forbs include Ast lae, Ger vis, Lat och, Tha occ, Vic ame and Cal rub.

THIS RECORD WAS NOT INCLUDED IN THE WESTECH REPORT!!!!

..... CIJ

PHASES:

COMMENTS:

SOURCE(S): A55LYN01MT U81C0001MT U75C0001MT U67HAB02MT A80HAR01MT

Larix lyallii Series

Lar lya occurs on cool aspects and is associated with heavily glaciated acidic rocky sites at, near or above timberline. Alpine larch is a climax species on sites that are too severe for evergreen conifers because of rocky terrain, shortness of growing season, avalanches, blizzards, droughtiness or bogginess. The establishment of Lar lya stands in strictly alpine habitats apparently modifies the surface environment, allowing the establishment of subalpine understory species. The species is restricted to the outer fringe of maritime-influenced mountain environments, west of the Continental Divid in Montana (Arno and Habeck, 1972, A72ARN01MT).

According to Pfister et al. (1977, B77PFI01MT), stands of Lar lya are found at high elevations in the Bitterroot, Anaconda-Pintlar, Cabinet, Whitefish, Swan, south Mission, Sapphire and Flint Creek Ranges, in Glacier National Park and the headwaters of the Teton and Sun rivers.

LARIX LYALLII CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7000-9000

Slope:

Aspect: N

Soil:

Comments: Dry, rocky, severe timberline sites. Frequently found on passes, saddles, divides and near high cirques.

DISTRIBUTION: NW, NC, WC, SW, C, SC

COMMENTS: Occurs in the Bitterroot, Sapphire and Pintlar Mountains and in mountains in northwestern Montana.

VEGETATION: Stands examined by Arno and Habeck (1972, A72ARN01MT) had understories dominated by Vac sco, Luz gla, Phy emp, Cas mer and Sax bro. Stands examined by DeSanto (1971, U71DES01MT) had understories dominated by Luz wah, Ery gra and Vac sco

PHASES:

COMMENTS: Lar lya forms essentially pure parks with various understories. Numerous investigators have concluded that there are no identifiable overstory-understory correlations. Apparently the environment is too severe to allow other conifers to establish.

SOURCE(S): A72ARN01MT U68KNU01MT U66ARN01MT U67HAB02MT U71DES01MT
BB4ARN01MT

Acer negundo Series

Acer negundo grows along rivers at moderate elevations in the northern Great Plains. Many of these riparian areas reflect past heavy grazing use; understory composition is poorly documented and quantitative data are lacking.

Three ct's that potentially occur in southeastern Montana include:

Ace neg-Fra pen/Ros woo (McAllister, 1981, US1MCA01MT)
Ace neg-Fra pen/Pru vir (Culwell and Scow, 1981, US1CUL01MT)
Ace neg-Pop ang/Pru vir (Culwell and Scow, 1981, US1CUL01MT)

Collins (1984, US4COL01MT) listed the following communities from Wyoming:

Ace neg-Fra pen
Ace neg-Fra pen-Ulm ame
Ace neg-Pop ang

Fraxinus pennsylvanica Series

Fraxinus pennsylvanica is widely distributed in the northern Great Plains and is often an early seral species on alluvial soils. It is found on alluvial deposits of floodplains and terraces and on upland soils in draws where moisture is sufficient. Many Fra pen-dominated stands have been impacted by livestock grazing. Common associates of Fra pen include Ace neg and Ulm ame in the tree canopy and Pru vir and Sym occ in the shrub canopy.

Limited quantitative data are available for communities in this series in Montana. Girard (1985, U85GIR01MTUS) described a Fra pen/Sym occ pa in southwestern North Dakota; Culwell and Scow (1981, U81CUL01MT) sampled Fra pen-Ace neg/Sym occ stands in southeastern Montana. Culwell and Scow (1982, U82CUL02MT) also sampled a stand in Custer County dominated by Fra pen-Ace neg/Rib ame. A Fra pen-Pru vir woodland pa is discussed in the woodland section of this classification.

FRAXINUS PENNSYLVANICA-ULMUS AMERICANA/PRUNUS VIRGINIANA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <2500

Slope: 0-15

Aspect:

Soil: Alluvial; loam-silty clay loam.

Comments: Along streams and upland ravines.

DISTRIBUTION: SE, NE

COMMENTS: Identified in SW North Dakota, probably occurs in adjacent Montana.

VEGETATION: Similar to Fra pen/Pru vir pa with Ulm ame. Overstory is dominated by Fra pen and Ulm ame, Pru vir and Sym occ are dominant shrubs. The herbaceous layer is diverse and includes Carex, Smi ste and Fra ves.

PHASES:

COMMENTS: Quantitative data lacking for Montana.

SOURCE(S): .U85GIR@1MT A84HAN@1MT

Populus angustifolia Series

This series is found along riparian corridors and on seeps in west, central and southeastern Montana. Quantitative data are lacking, although Culwell and Scow (1981, U81CUL01MT) sampled a Pop ang-Fra pen/Ely cin stand in Bighorn County and Lesica (1982, U82LES01MT) described a Pop ang-Pop tri community in Teton County. Collins (1984, U84COL01MT) lists Pop ang-dominated ct's in Wyoming (including a Pop ang-Pop tri ct) for which no quantitative data exists.

Populus deltoides Series

P. deltoides is common on stream and river banks, on sandbars and on subirrigated uplands. This species is very moisture-dependent and it is intolerant of shade. Maintenance of these stands requires periodic flooding. P. deltoides-dominated communities are frequently impacted by livestock grazing.

Communities which may occur in Montana include:

Pop del/Ely can-Muh rae	(Boggs, 1984, U84B06@1MT)
Pop del/Ely cin	(Collins, 1984, U84COL@1MT)
Pop del/Ros ark-Sym occ	(Prodgers, 1978, A78PRO@1MT)
Pop del/Ros woo	(Culwell, 1986, U86CUL@1MT)
Pop del/Salix spp.	(Boggs, 1984; Collins, 1984)
Pop del/Sal flu	(Boggs, 1984, U84BDG@1MT)
Pop del-Ace neg-Fra pen	(McAllister, 1981, U81MCA@1MT)

MTNHP: C1B3DEAKA@

POPULUS DELTOIDES-FRAXINUS PENNSYLVANICA CT

SYNONYMS:

↓ merge into
Frpe/Prvi

SITE CHARACTERISTICS--

Elevation: <2500

Slope: 0-15

Aspect:

Soil: Alluvial (silty clay loam-loam).

Comments: Along major streams on floodplains and terraces.

DISTRIBUTION: NE, SE

COMMENTS: Described for SW North Dakota (Girard, 1985, U85GIR@1MT); likely occurs in SE, NE Montana.

VEGETATION: The ct is dominated by Pop del, Fra pen, Jun sco, Rhu aro, Ace neg, Salix, Ros woo, Sym occ, Tha ven, Smi ste, Carex and Ely can.

PHASES:

COMMENTS: Quantitative data lacking for Montana. This is a seral ct to Fra pen/Sym occ pa.

SOURCE(S): U85GIR@1MT

Populus trichocarpa Series

This series is widespread east of the Continental Divide in broad valleys at lower to mid-elevations. Limited quantitative data are available. In addition to the two ct's listed, the following communities potentially occur in Montana:

Pop tri/Aln inc	(Foote, 1965, U65F0001MT)
Pop tri/Ros woo	(Foote, 1965, U65F0001MT)
Pop tri-Pop del	(Thompson and Kuijt, 1976, A76TH001MT)
Pop tri-Pop tre	(Lesica, 1982, U82LES01MT)

Pierce(1986, U86PIE01MT) described an early primary successional stage on river gravels in west central Montana--Pop tri/Undefined.

POPULUS TRICHOCARPA/BETULA PAFYRIFERA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <3500

Slope: 0-15

Aspect: VARIABLE

Soil: Entisols.

Comments: Along major streams.

DISTRIBUTION: NW

COMMENTS:

VEGETATION: These communities often contain Picea, in addition to Pop tri and Bet pap.

PHASES:

COMMENTS: The ct may be successional to Picea pa's in the absence of flooding.

SOURCE(S): B77PFI01MT

MTNHP: C1B3DFACA0

POPULUS TRICHOCARPA/CORNUS STOLONIFERA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3020-5000

Slope: 0-1

Aspect: FLAT

Soil: Entisols.

Comments: Along major streams and rivers on alluvial gravels.

DISTRIBUTION: WC, SC, NW

COMMENTS:

VEGETATION: Pop bal has at least 25% cover and Cor sto at least 5% cover. Associated species include Sym spp, Osm chi, Agr alb and Cra spp.

PHASES:

COMMENTS:

SOURCE(S): U86PIE01MT U67TUI01MT U80ALL01MT

Juniperus scopulorum Series

According to Pfister et al. (1977, B77PFI@1MT), J. scopulorum occurs either in pure stands on rocky, dry sites in higher valleys near the Continental Divide or as a minor associate with other conifers on low-elevation sites within the Pin fle, Pse men and Pin pon series. Jun sco woodlands are apparently an extension of the Great Basin pinyon/juniper zone.

A Jun sco/Cer led ct was described by Chafee (1981, U81CHA@1MT) in the Limestone Hills in Broadwater County. Mackie (1970, A7@MAC@1MT) described a Pin pon-Jun sco association that was dominated by Jun sco; Collins (1984, U84COL@1MT) lists a Jun sco-Pin pon/Cer led ct from the Black Hills. McCullough (1980, U8@MCC@1MT) described a Jun sco-Pop ang-Pop tre ct on Mission Creek at Moiese National Bison Range. Delineation of additional communities and associations will require more investigation.

MTNHP: CE2ABABAB@

JUNIPERUS SCOPULORUM/AGROPHYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-3500

Slope: 33-50+

Aspect: (N)

Soil: Frequently found on shale-derived soils (clay loams and loams). Rock and soil are often exposed.

Comments: Found on steep slopes and at the head of secondary drainages, on cool exposures, frequently in or near badlands.

DISTRIBUTION: NE, SE, C

COMMENTS:

VEGETATION: Species diversity is quite high. Species components include Jun sco, Agr spi, And sco, Car fil, Cal ion, Bou cur, Car ele, Ach mil, Cer arv, Mel off, Art fri, Gut sar, Art tri, Chr nau, Jun com, Rhu tri, Rib cer, Ros ark, She arg, Sym occ, Pru vir.

PHASES: Chaffee (1981, US1CHA@1MT) identified two ct's in the Limestone Hills near Townsend, MT, which may be phases: Jun sco-Fin fle/Agr spi and Jun sco/Uuc gla-Agr spi. Both phases occur on dry, rocky slopes.

COMMENTS:

SOURCE(S): U85HAN@1MT A71BR0@1MT A78PR0@1MT U72KNA@1MT U79ROB@1MT
US1CHA@1MT

JUNIFERUS SCOPULORUM/DRYZOPSIS MICRANTHA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 33-50+

Aspect: N

Soil: Loam, sandy loams; considerable rock and mineral soil is exposed on these sites. Comments: Found in localized areas in relatively moist microenvironments; displays a close relationship to the Jun sco/Agr spi pa.

DISTRIBUTION: SE, NE

COMMENTS: This type has also been described for SW North Dakota.

VEGETATION:

Canopy is more closed, allowing for growth of more mesophytic species with higher cover. Dominant species include Jun sco, Dry mic, Agr can, Car hel, (Agr spi may be absent), Cam rot, Ach mil, Cer arv, Smi ste, Gal bor, Gut sar, Ber rep and Sym alb. There is a conspicuous lack of shrubs.

PHASES:

COMMENTS: Infrequent.

SOURCE(S): U85HAN01MT A84HAN01MT U85GIR01MT U65BRO01MT U86CUL01MT

Pinus contorta Series

Only one plant association has been described in this series: Pin con/Pur tri. It occurs on obsidian sands and outwash material from the Central and Madison Ryolite Plateau formations found in Yellowstone National Park and the Gallatin National Forest. Collins (1984, US4CQLØ1MTUS) lists a Pin con/Car ros ct that occurs in Yellowstone National Park for which quantitative data are lacking.

PINUS CONTORTA/PURSHIA TRIDENTATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6600

Slope: 0

Aspect:

Soil: Obsidian-sand benchland of alluvial origin.

Comments: Sites are dry, well-drained, flat, monotonous areas having little plant diversity (Schaeffer, 1978, U78SCH02MT).

DISTRIBUTION: SC

COMMENTS: A 100-square mile area near West Yellowstone, in the Gallatin National Forest and Yellowstone Park.

VEGETATION:

Fur tri is the main understory plant. This site is probably too dry (excessively well-drained) for Abies and Picea, and too frosty for Pseudotsuga (Pfister et al., 1977, B77PFI01MT). Cooper (1975, U75C0001MT) and Schaeffer (1978, U78SCH02MT) qualitatively describe canopy cover as "open", while Pfister et al. (1977, B77PFI01MT) lists average canopy cover at three sites in the Gallatin Forest at 70 percent. This pa is also described under woodland-open forest.

PHASES:

COMMENTS: Cooper (1975, U75C0001MT) described a similar pa in the vicinity of West Yellowstone.

SOURCE(S): B77PFI01MT U75C0001MT U78SCH02MT

Pinus flexilis Series

P. flexilis is found on extremely dry sites, commonly east of the Continental divide in the foothills and northern Great Plains. Pin fle woodlands are found on steep, dry, rocky slopes at lower to mid elevations bordering either grassland or the Pse men series; it is also found on sites below the forest zone (Pfister et al., 1977, B77PFI@1MT). Pin fle may occur as a pure stand on rocky, dry sites at lower elevations commonly with Agr spi dominating the understory. Where Pin fle is co-dominant with Pse men, the undergrowth is dominated by Fes ida or Fes sca. At high elevations, the understory is dominated by Jun com, Jun hor and dry-site forbs.

Chaffee (1981, U81CHA@1MT) described two ct's which are probably phases of the Pin fle/Agr spi pa: Jun sco-Pin fle/Agr spi and Jun sco-Pin fle/Yuc gla-Agr spi. Miller (1978, U78MIL@1MT) described a Pin fle/Jun hor association in which Jun hor is the only common shrub; further investigation is needed to determine the status of this association. Collins (1984, U84COL@1MT) lists two communities which occur in Wyoming and extend into Montana: Pin fle-(Pse men)/Fes ida and Pin fle(Pse men)/Lev kin. More information is needed before these communities are included in the classification.

MTNHP: C2A2ADABA0

PINUS FLEXILIS/AGROPHYRON SPICATUM PA

SYNONYMS: Hes kin is present in SC and SE Montana stands. They may be related to the Pin fle/Hes kin described by Wirsing (1973, U73WIR01MT) in the Medicine Bow Mountains of Wyoming. Chaffee (1981, U81CHA01MT) sampled stands dominated by Jun sco-Pin fle/Agr spi and Jun sco-Pin fle/Yuc gla-/agr spi; both are probably phases of the Pin fle/Agr spi pa.

SITE CHARACTERISTICS--

Elevation: 4400-6600

Slope:

Aspect:

Soil: Shallow, gravelly loams to gravelly silts. Primarily derived from limestone and sandstone.

Comments: Low elevation, dry, rocky sites adjacent to or within the grassland zone.

DISTRIBUTION: C, SW, SC, SE, NE

COMMENTS: This type also described for SW North Dakota.

VEGETATION: Pin fle is the dominant climax tree with Jun sco often a major climax associate. Pse men and Pin pon may be present. Dry site forbs and grasses include Agr spi, Hes kin, Dry hym, Koe mac, Bou gra, Yuc gla, Opuntia, Phlox, Draba, Hymenopappus and Liatrus.

PHASES:

COMMENTS: Widely distributed east of the Continental Divide.

SOURCE(S): B777FI01MT U85GIR01MT U73WIR01MT U81CHA01MT

PINUS FLEXILIS/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4800-6200

Slope:

Aspect:

Soil: Shallow; gravelly sandy loams to silts; frequently on calcareous substrates.

Comments: Dry, wind exposed slopes.

DISTRIBUTION: C, NC, SW, NW

COMMENTS:

VEGETATION: Pin fle is the dominant climax species, often sharing dominance with Pse men. Jun sco is a minor component. The undergrowth is dominated by bunchgrasses (Fes ida, Fes sca, Koe mac, Agr spi) and Geu tri, All cer, Art fri, Ach mil, Lit rud and Bal sag.

PHASES: Two phases are recognized: Festuca idahoensis and Festuca scabrella.

Fes ida phase:

This phase is widely distributed; Fes sca is scarce.

Fes sca phase:

This phase is found in central Mt. Fes sca is common and co-dominant with Fes ida. This phase occupies cooler less rocky sites where the phases occur together.

COMMENTS: Cooper (1975, U75C0001MT) found a minor representation of similar communities in NW Wyoming. Steele et al. (1981, A81STE01MT) described a Pin fle/Fes ida-Fes ida pa in east-central Idaho.

SOURCE(S): B77PFI01MT U75C0001MT A81STE01MT A80HAR01MT

MTNHP: C2A2ADADA0

PINUS FLEXILIS/JUNIFERUS COMMUNIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4600-8300

Slope: 33-50

Aspect: S, SW

Soil: Shallow gravelly loams to gravelly clay loams.

Restricted to limestone or other calcareous parent materials.

Comments: Severe southerly slopes and ridges.

DISTRIBUTION: SC, SE, C, NC

COMMENTS:

VEGETATION:

Pin fle frequently shares climax status with Pee men; Pin alb is rarely a minor climax associate. Dry site shrubs and forbs include Jun com, Jun hor, Art tri, Rib cer, Cle pse, Arn cor, Ast con, Cam rot, Gal bor, Ast mis, Ane mul and Fra spe. Bunchgrasses are scarce, but include Fes ida, Hes kin and Koe mac.

PHASES:

COMMENTS: Widespread in dry mountain areas east of the Continental Divide.

SOURCE(S):

B77PFI01MT U81C0001MT A81STE01MT U85C0001MT A80HAR01MT
U78MIL01MT

Pinus ponderosa Series

The pin pon series usually forms the zone between grassland and the Pee man series. Pin pon is usually climax at lower elevations and seral at higher, more mesic elevations. The canopy of plant associations within this series ranges from dense to scattered, but overall, stands are open.

The role of fire in the maintenance and creation of woodlands is two-fold. Woodlands were historically more extensive because sporadic fires reduced the number of seedlings capable of attaining sufficient size to withstand fire, thence keeping stands open (Daubenmire, 1978, Q78DAU01MT). Recurrent fires also reduced conditions favorable to seedling establishment, by removing grass and litter and exposing mineral soil. Conversely, fire repression during the last 50-60 years has resulted in pine invasion at the grassland ecotone and the creation of numerous Pin pon-"prairie" communities.

Potential communities that may exist within this series include:

Pin pon/Art can	(Coenberg and Depuit, 1979, U79COE01MT)
Pin pon/Art tri	(Jorgensen, 1979, A79JOR01MT)
Pin pon/Cal lon	(Mackie, 1970, A70MAC01MT)
Pin pon/Rhu tri	(Martin, 1972, U72MAR01MT)
Pin pon/Stipa	(Culwell and Scow, 1982, Q82CUL01MT)
Pin pon/Sti com	(Culwell and Scow, 1982, Q82CUL01MT)

Pinus ponderosa/Agropyron spicatum pa (continued):

COMMENTS: This is the most widespread dry site Pin pon pa in MT. This pa was described in the Bighorn Mountains, Wyoming by Hoffman and Alexander (1976, A76HOF01MT) and in central Idaho by Steele et al. (1981, A81STE01MT).

SOURCE(S): B77PFI01MT U85C0001MT U85CUL01MT U85HAN01MT U80DUS01MT
U80ROB01MT U78EC001MT A70MAC01MT A76HOF01MT

PINUS PONDEROSA/ANDROPOGON SPP PA

SYNONYMS: In the Black Hills, Thilenius (1972, A72THI@1MT) described two habitat units that are physiognomically similar to this pa.

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 0-50

Aspect: S, W

Soil: Rocky, coarse or sandy textured.

Comments: Frequently found near lower forest margins or set apart as small stands in open grasslands and breaks. Stands occupy the driest forested sites and are mostly open and savanna-like.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Open, savanna-like stands of Pin pon are typical. The understory is dominated by Andropogon spp. (mainly And sco), Bou cur, Agr spi, Cal lon, Muh cus, Car fil, Agr smi, Sti com and Sti vir. Forb diversity may be high, but overall cover is low. Typical forbs include Gau coc, Het vil, Pso esc. Shrubs are poorly represented.

PHASES:

COMMENTS: Minor in SE Montana, increases in importance near the Black Hills. Hansen (1985, U85HAN@1MT) argues that based on data collected in the Custer National Forest and data from Hoffman (1985, Q85HOF@1MT) in the Black Hills the Pin pon/Andropogon pa is neither climax nor a pa. It is a seral stage of the Pin pon/Car hel and Pin pon/Agr spi pa's (although there may be locations elsewhere where it is a pa).

SOURCE(S): U85C00@1MT B77PFI@1MT U8@DUS@1MT U85CUL@1MT A72THI@1MT
U79CUL@1MT U76TAY@1MT

MTNHP: C2A2AEAEA0

PINUS PONDEROSA/JUNIPERUS HORIZONTALIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <4000

Slope: 15-50

Aspect: VARIABLE

Soil: Usually found on sandstone substrates; sandy loams.

Comments:

DISTRIBUTION: C, SE

COMMENTS:

VEGETATION: Pin pon is the dominant overstory component. The understory is dominated by Jun hor, Jun com, Rhu tri, Sym occ, Rhu rad, Agr spi, Car hel, Fes ida and Fes sca.

PHASES:

COMMENTS:

SOURCE(S): U80ROB01MT U82CUL01MT U79MIL01MT U80DUS01MT

MTNHP: C2A2AEAFAG

PINUS PONDEROSA/PURSHIA TRIDENTATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: lower elevations Slope: 0-33
Aspect:
Soil: Gravelly.

Comments: Dry benches, rocky slopes.

DISTRIBUTION: NW, WC, C

COMMENTS:

VEGETATION: .Vegetation composition is similar to Pin pon/Agr spi and Pin pon/Fes ida with the addition of Pur tri including Fru vir, Rhu tri, Bal sag, Fes ida, Agr spi and Fes sca. Fru vir and Rhu tri may share dominance with Pur tri; Cer led is an associate of Pur tri in WC Montana.

PHASES: There are two phases in this pa:

Agr spi phase:

These sites are drier with more bare ground present; Agr spi is dominant.

Fes ida phase:

Dominant grasses are Fes ida, Fes sca and Agr spi. Undergrowth is more developed, bare ground is less obvious.

COMMENTS:

SOURCE(S): B77PFI01MT

PINUS PONDEROSA-QUERCUS MACROCARPA CT

SYNONYMS: Thilenius (1972, A72THI01MT) described a Pin pon-Que mac/Pru vir-Sym alb-Ber rep unit on the north end of the Black Hills in South Dakota.

SITE CHARACTERISTICS--

Elevation: 3400-3700

Slope:

Aspect:

Soil: Alluvial clayey deposits and shale.

Comments:

DISTRIBUTION: SE

COMMENTS: Northern edge of the Black Hills, west of Alzada.

VEGETATION:

Overstory cover of Pin pon, Que mac and Jun sco ranged from relatively dense to relatively open. Understory cover showed an inverse relationship to canopy cover. Understory components included Agr smi, Bou gra, Carex, Ach mil and Cer arv.

PHASES:

COMMENTS: Restricted to extreme SE Montana.

SOURCE(S): A83MAC02MT A72THI01MT U75ECO02MT

MTNHF: C2A2B6A//

Pseudotsuga menziesii Series

Plant associations and communities within this series generally occur on relatively warm, dry sites on well-drained soils. The series is frequently bordered by Pin pon, Pin fle or grassland series. Available moisture appears to be the limiting factor to tree growth, consequently typical stands are woodland or open forest.

PSEUDOTSUGA MENZIESII/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-7600

Slope: 0-30

Aspect: ALL

Soil: loamy sand to silt

Comments: Occurs on steep southern or western aspects or on gentle to moderate slopes on all exposures. This is the warmest and driest pa in this series.

DISTRIBUTION: NW, WC, C, SW, SC

COMMENTS: Common in central, southwestern, southcentral, and westcentral Montana, including the Gallatin, Deerlodge, Custer, Lewis and Clark, Helena, Bitterroot and Flathead National Forests.

VEGETATION:

Usually sparsely timbered with an understory primarily comprised of Agr spi and Bal sag. Seral communities may be dominated by Pin pon (also a climax associate) and Pin con; Pin fle is a minor seral component on limestone-derived soils.

PHASES: A Pin pon-Pse men/Agr spi ct exists which has a fire frequency of 10-30 year.

COMMENTS: Steele et al. (1981, AB1STE01MT) describe a similar pa in central Idaho.

SOURCE(S): B77PFI01MT

PSEUDOTSUGA MENZIESII/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5300-8000

Slope:

Aspect: VARIABLE

Soil: sandy loam to silt

Comments: Dry sites.

DISTRIBUTION: NW, WC, SW, SC

COMMENTS: Common in westcentral, southcentral and southwestern Montana; rare elsewhere.

VEGETATION: Occurs above the cold limits of Pin pon; Pin fle may occur on limestone substrates. Undergrowth cover is sparse, dominated by Fes ida, Rib cer, Art tri and Agr spi.

PHASES:

COMMENTS: Steele et al. (1981, A81STE01MT) describe a similar pa in central Idaho.

SOURCE(S): B77PFI01MT

PSEUDOTSUGA MENZIESII/FESTUCA SCABRELLA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2700-6200

Slope: 0-15

Aspect: S, W

Soil: loam to silt

Comments: Gentle slopes.

DISTRIBUTION: NW, WC, C, NC

COMMENTS:

VEGETATION: Pin pon. is often a major seral component with Pse men; Pin fle is a minor component on calcareous substrates. Major understory components include Fes sca, Agr spi, Fes ida, Koe mac, Bal sag, and Lit rud.

PHASES:

COMMENTS: A fire-maintained ct, Pin pon-Pse men/Fes sca is inferred from Pfister et al. (1977, B77PFI01MT).

SOURCE(S): B77PFI01MT

PSEUDOTSUGA MENZIESII/JUNIPERUS SCOPULORUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2250-3100

Slope: 15-50

Aspect: N, SW

Soil:

Comments: Cool, mesic sites.

DISTRIBUTION: C

COMMENTS: Missouri River Breaks.

VEGETATION: Well developed tree layer dominated by Pse men (occasionally Pin pon) and Jun sco with a dense shrub undergrowth consisting of Sym occ, Art can, Chr vis and Pru vir. Herbaceous undergrowth includes Agr spi, Agr sca, Carex, Agr tra, Ach mil, Gal apa and Geu tri.

PHASES:

COMMENTS: Pse men is the indicated climax dominant; Pin pon is a climax co-dominant. Available moisture is the limiting factor to tree growth, consequently typical stands are woodland or open forest.

SOURCE(S): U79ROB01MT A70MAC01MT

MTNHP: C2A2BBBAEAO

PSEUDOTSUGA MENZIESII/PURSHIA TRIDENTATA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5400-5800

Slope: 33-50

Aspect: VARIABLE

Soil: Shallow-sandy gravelly loams.

Comments:

DISTRIBUTION: C

COMMENTS:

VEGETATION: Understory is similar to the Pse men/Fes sca pa.

PHASES:

COMMENTS: In Jefferson Co., two Pse men stands sampled by Culwell and Scow (1984, U84CUL01MT) were dominated by Pur tri, indicating a Pse men/Pur tri ct. Pfister et al. (1977, B77PFI01MT) recognize a Pin pon/Pur tri pa and show the Pur tri union extending into the Pse men series. Two of Pfister et al.'s (1977, B77PFI01MT) stands in the Pse men/Fes sca pa were dominated by Pur tri, however Pur tri was not assigned habitat type or phase status in the Pse men series, probably because of small sample size. This may represent a Pur tri/Fes sca pa with Pse men invasion due to fire suppression.

SOURCE(S): U84CUL01MT B77PFI01MT

PSEUDOTSUGA MENZIESII/VACCINIUM CESPITOSUM OPEN PARK CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-6400

Slope: 0-15

Aspect:

Soil: gravelly sandy loams, loams

Comments:

DISTRIBUTION: NW, WC, C, NC

COMMENTS:

VEGETATION: Overstory and understory components are similar to the Pse men/Vac ces forested pa.

PHASES:

COMMENTS: A history of frequent ground fires is theorized based on open, park-like conditions in this ct and evidence of fire-scarred seral trees in undisturbed stands. In some cases, Pse men has only recently begun to regenerate (possibly due to soil moisture depletion caused by heavy stocking of old growth seral tree species and dense undergrowth.

Two fire-maintained, early seral stage ct's (Pin pon/Cal rub-Car gey-Vac ces-Arc uva-urs and Lar occ/Cal rub-Car gey-Vac ces-Arc uva-urs) are inferred for northwestern Montana.

An early seral stage, fire-maintained ct (Pin con/Cal rub-Car gey-Vac ces-Arc uva-urs-Xer ten) is implied east of the Continental Divide and in northwestern Montana.

SOURCE(S): B85ARN01MT

PSEUDOTSUGA MENZIESII-PINUS FLEXILIS/HESPEROCHLOA KINGII PA

SYNONYMS: This pa is similar floristically and environmentally to Pfister et al.'s (1977, B77PFI01MT) Pse men/Agr spi, Pse min/Fes ida, Pin fle/Agr spi and Pin fle/Fes ida. Chaffee (1981, U81CHA01MT) described similar stands in Broadwater County except Hes kin was not present; Fes sca was a dominant understory component.

SITE CHARACTERISTICS--

Elevation: 5200-8200

Slope: Variable

Aspect: S-SW

Soil: Sedimentary parent material; coarse, semi-scrub.

Comments: This pa frequently occurs as a discontinuous fringe at timberline. It is associated with ridgetops and the most windswept, xeric forested slopes.

DISTRIBUTION: SC

COMMENTS: Found near Gardiner, Montana, in Yellowstone Park and in mountain ranges in NW Wyoming.

VEGETATION: This topocedaphic climax is dominated by Pin fle or Pse men or mixtures of the two species. Graminoids are scarce, but include Hes kin, Agr spi, Fes ida, Dry hym, Koe cfi and Car ros. Forbs include Lit rud, Phl mul, Cre acu, Bal sag, Ach mil and Ant ros. Jun sco and Cer led are characteristic.

PHASES:

COMMENTS:

SOURCE(S): U75C0001MT

Acer negundo Series

Acer negundo grows along rivers at moderate elevations in the northern Great Plains (see Forested Ace neg series description). The following communities have been documented as occurring in Montana, but further investigation is needed to determine applicability to the classification:

Ace neg/Dra col	(Culwell et al., 1985, U65CUL01MT)
Ace neg/Pru vir-Pru ame	(Culwell et al., 1985, U65CUL01MT)
Ace neg/Ros woo	(Culwell and Scow, 1981, U81CUL01MT)
Ace neg/Salix spp.	(Culwell and Scow, 1981, U81CUL01MT)
Ace neg/Sym occ	(Culwell, 1977, U77CUL01MT)

There are currently no communities included in this series.

Fraxinus pennsylvanica Series

This species is widespread in the northern Great Plains, occurring along rivers and in upland draws wherever moisture is sufficient (see Forested Fra pen series description). Quantitative data are limited for this series. The following communities have been documented as occurring in Montana, but have not been included in the classification until further information is collected:

Fra pen/Fru ame	(Culwell and Scow, 1982, U82CUL01MT)
Fra pen/Ros ark-Sym occ	(Prodgers, 1978, A78PRD01MT)
Fra pen/Ros woo-Sym occ	(Culwell and Scow, 1982, U82CUL01MT)
Fra pen/Sym occ	(Boggs, 1984, U84BOG01MT; Girard, 1985, U85GIR01MT)
Fra pen-Ace neg/undefined	(Jones, 1966, A66JCN01MT)

FRAXINUS PENNSYLVANICA/PRUNUS VIRGINIANA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 0-15

Aspect: VARIABLE

Soil: Loam - clay loam.

Comments: Occurs in upland ravines and broad valleys on moderately steep slopes and along permanent or ephemeral streams. Sampled in Carter, Frairie, and Powder counties; also described in SW North Dakota.

DISTRIBUTION: NE, SE

COMMENTS:

VEGETATION:

Tree stratum is dominated by Fra pen and Ace neg. Undergrowth is comprised of two layers: the taller layer is dominated by Fru vir, Ros woo, Ame aln, and Ame san. The lower layer supports Car spr, Ely vir, Smi ste, Agr can, Tha das, and Tha ven.

PHASES:

COMMENTS:

SOURCE(S): U85HAN01MT U85GIR01MT A85HAN01MT

Populus deltoides Series

This series is found on stream and riverbanks and sandbars as well as on subirrigated uplands (see Forested Pop del series description). Data for the series is limited. Communities which have not been included in the classification but which may occur in Montana are:

Pop del/Ros woo-Tox ryd	(Boggs, 1984, U84B0G01MT)
Pop del/Sym occ	(Jorgensen, 1979, A79JOR01MT; Culwell and Scow, 1982, Q82CUL01MT)

No communities are presently included in this series.

Populus trichocarpa Series

This species is widespread east of the Continental Divide (see Forested Pop tri series description). No communities have been described in this series. Two potentially occurring communities for which quantitative data are lacking include:

Pop tri/Sal beb (Harvey, 1980, A80HAR01MT)
Pop tri/Salix spp. (Stewart, 1975, U75STE01MT)

Salix amygdaloides Series

This species occurs along streambanks and shores in the northern Great Plains. Although no communities have been identified in this series, there are two which potentially occur in the state:

- Sal amy/Cor sto (Boggs, 1984, US4BOG01MT)
- Sal amy/Ros woo-Sym occ (Boggs, 1984, US4BOG01MT)

Abies lasiocarpa Series

Most Abi las types are listed under Closed forests (1A9CCA//). Where environmental conditions preclude development of trees, an Abi las dominated shrub type occurs. Two situations where shrubby Abi las are dominant include high elevation Krummholz communities and avalanche chutes with recurring snow movement. In Montana, this series is restricted to upper elevation sites in the western half of the state.

ABIES LASIOCARPA KRUMMHOLZ PA

↑ merge into various timberline PA's

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5700-7200
Aspect: E
Soil:

Slope:

Comments:

DISTRIBUTION: NW, NC
COMMENTS:

VEGETATION:

Vac mem and Tha occ occur where Abi las density is high in the Logan Pass area. In stands with low Abi las density, alpine species including Pfy gla, Tof glu, Sib pro, Kal pol and Tro lax are found.

PHASES:

COMMENTS:

SOURCE(S): A69HAB02MT A63HAB03MT

ABIES LASIOCARPA-ACER GLABRUM AVALANCHE CHUTE CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:
Aspect: SE
Soil:

Slope: 18-60

Comments: Incised avalanche chutes.

↑ Although these are important communities for conservation. I think it would be better to discuss them as they relate to surrounding Pa's rather than have specific communities

DISTRIBUTION: NW

COMMENTS: Avalanche chutes in Glacier National Park.

VEGETATION:

Abi las is more prevalent in run-out zones with Ace gla, Sor sco, and Alnus spp. more common in chutes.

PHASES:

COMMENTS: Abi las is stunted by frequent avalanches.

SOURCE(S): A79BUT01MT

Artemisia cana Series

Morris et al. (1976, A76MOR01MT) describe the distribution of Art can in Montana. To date, only one shrub-dominated plant association has been described: Artemisia cana/Agropyron smithii. Two additional Art can types (Art can/Car hel and Art can/Fes ida) are listed under herbaceous communities because of relatively low Art can cover. Numerous other Art can dominated types have been sampled, however, insufficient data are available to determine their presence in the presettlement landscape. Art can communities that have been described which merit additional investigation include:

Artemisia cana/Agropyron spicatum
Artemisia cana/Bouteloua gracilis
Artemisia cana/Buchloe dactyloides
Artemisia cana/Koeleria macrantha
Artemisia cana/Stipa comata
Artemisia cana/Stipa viridula
Artemisia cana-Artemisia tridentata

ARTEMISIA CANA/AGROPYRON SMITHII PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 1925-4500

Slope: 0-15

Aspect: VARIABLE

Soil: Variable, usually deep and silty but ranging from clayey to sandy loam.

Comments: Generally found in swales, drainage bottoms, terraces or floodplains; occasionally on uplands. Sites frequently receive supplemental moisture from overflow; less often subirrigation.

DISTRIBUTION: SE, NE, C, SC

COMMENTS: Widely distributed in central and eastern MT. Also identified in WY and ND including TRNP.

VEGETATION: Many graminoids may be co-dominant or sub-dominant to Pas smi including Sti vir, Koe mac, Car hel, Sti com, Bou gra, Buc dac and Poa pra. Most increase with grazing pressure except Sti vir and perhaps Car pen.

PHASES: None recognized by Hanson (1985, US5HAN01MT) or Jorgensen (1979, A79JOR01MT). Stipa viridula is important on loamy sites, Stipa comata on sandy sites.

COMMENTS:

SOURCE(S): US5HAN01MT A79JOR01MT

Artemisia tridentata Series

Morris et al. (1976, A76MOR01MT) describe the distribution of the three subspecies of Art tri in Montana. Two shrub-dominated plant associations are listed. Additionally, the Art tri/Atr con/Agr spi type is listed under xeromorphic shrublands and two types (Art tri/Fes ida and Art tri/Fes sca) are listed under herbaceous communities. Numerous other Art tri dominated types have been sampled, however, insufficient data are available to determine their presence in the presettlement landscape. Art tri communities that have been described which merit additional investigation include:

Artemisia tridentata-Artemisia tripartita
Artemisia tridentata-Atriplex 'gardneri'/Agropyron smithii
Artemisia tridentata/Bouteloua gracilis
Artemisia tridentata-Chrysothamnus nauseosus
Artemisia tridentata/Distichlis spicata
Artemisia tridentata/Agropyron dasystachyum
Artemisia tridentata/Koeleria macrantha
Artemisia tridentata-Sarcobatus vermiculatus/Agropyron smithii
Artemisia tridentata/Stipa comata
Artemisia tridentata/Stipa viridula

ARTEMISIA TRIDENTATA/AGROPYRON SMITHII PA

SYNONYMS: *Artemisia tridentata*/*Agropyron spicatum*-*Agropyron smithii* phase (Jorgensen, 1979, A79JOR01MT).

SITE CHARACTERISTICS--

Elevation: 2500-5000

Slope: 0-20

Aspect: VARIABLE

Soil: Clayey to sandy loams, generally preferring deeper, finer textured soils.

Comments:

DISTRIBUTION: SE, NE, C

COMMENTS: Common throughout central and eastern MT. Also described in western Dakotas and northern WY.

VEGETATION: In stands in good range condition, *Sti vir* is abundant. Other important grasses may include *Koe mac*, *Bou gra*, *Sti com*, *Poa san*, *Poa pra*, *Buc dac*, *Ely len* and *Car pen*.

PHASES: Many phases may be recognized as dominant or sub-dominant species are variable.

COMMENTS:

SOURCE(S): U85HAN01MT
A78PRO01MT

ARTEMISIA TRIDENTATA/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-6000

Slope: 0-75

Aspect: VARIABLE

Soil: Shallow to moderately deep from a variety of parent materials.

Comments:

DISTRIBUTION: SW, SC, C, SE, WC, NW, NC, NE

COMMENTS: Statewide, primarily southern half. Described in WY, so. ID, OR, NV, UT, WA and so. BC.

VEGETATION: Art tri Agr spi
 Art fri Koe mac
 Gut sar Poa san
 Sti com
 Bou gra

PHASES: Art tri/Agr spi-Bouteloua gracilis phase (Jorgensen, 1979, A79JOR01MT).

COMMENTS: Generally drier sites than Art tri/Agr smi.

SOURCE(S): Mueggler and Stewart (1980, A80MUE01MT)
 Jorgensen (1979, A79JOR01MT)
 Proegers (1978, A78PRO01MT)
 Hanson (1985, U85HAN01MT)
 Brown (1971, A71BRO01MT)

Juniperus osteosperma Series

This series is uncommon in Montana and has been described only for the southern portion of the Pryor Mountains in Carbon County. No data describing this series has been located. Possible types include Jun ost/Agr spi and Jun ost/Art nov.

JUNIPERUS OSTEOSPERMA/MIXED UNDERSTORY CT

Ag. spicatum pa

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-6000

Slope: 8-35%

Aspect: S

Soil: Shallow, well-drained, formed from limestone.

Comments: Rocky ridges, toe slopes and fans.

DISTRIBUTION: SC

COMMENTS: Southern edge of Pryor Mountains.

VEGETATION: Jun ost Agr spi
 Art nov Sti com
 Cer led

PHASES:

COMMENTS: Quantitative data lacking.

SOURCE(S): U74SOU01MT

Acer glabrum Series

The Ace gla series is found in avalanche chutes and drainage bottoms of central and western Montana. Types within the series are not well defined.

ACER GLABRUM AVALANCHE CHUTE CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 30-55

Aspect:

Soil:

Comments: Avalanche chute.

DISTRIBUTION: NW

COMMENTS: Avalanche chutes in Glacier National Park north and east of Lake McDonald.

VEGETATION: Ace gla Ery gra
 Cra dou
 Aln spp

PHASES:

COMMENTS: Seral community maintained by frequent avalanches.

SOURCE(S): A85BUT01MT
 A79BUT01MT

ACER GLABRUM DRAINAGE BOTTOM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5100

Slope: 20

Aspect: ENE

Soil:

Comments: Upland drainage bottom.

DISTRIBUTION: C

COMMENTS:

VEGETATION: Ace gla, Phi lew and Poa pal.

PHASES:

COMMENTS:

SOURCE(S): Scow et al. (1986, U86SC001MT)

Alnus spp Series

This is a minor series in Montana apparently restricted to avalanche chutes. *Alnus* thickets may, however, form a fire-induced seral community in some mesic forest types.

ALNUS SPP AVALANCHE CHUTE CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 18-55

Aspect: SSW, NW

Soil: Rocky.

Comments: Incised avalanche chutes.

DISTRIBUTION: NW

COMMENTS: Avalanche chutes in Glacier National Park.

VEGETATION: Aln spp Ver vir
 Abi las Ery gra
 Bet pap
 Pic eng
 Vac mem

PHASES:

COMMENTS: Abi las are small and damaged by frequent avalanches.

SOURCE(S): A79BUT@1MT

Alnus incana Series

This is a riparian series of western Montana. Other Aln inc types are described for western Wyoming and eastern Idaho (Youngblood et al., 1985, ASSYOUØ1MT).

ALNUS INCANA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3500-4000

Slope: 0-2

Aspect: FLAT

Soil: Histosols or mollisols; parent material is glacial till with argillite a primary component.

Comments: Water table at the soil surface, associated with year-round seeps and springs in valley bottoms.

DISTRIBUTION: SC, WC

COMMENTS:

VEGETATION: Aln inc Agr alb Equ arv
 Sal beb

PHASES:

COMMENTS: Uncommon in WC Montana.

SOURCE(S): U86PIE01MT

Amelanchier alnifolia Series

This series occurs on a gravelly alluvial fan in north-central Montana (Harvey, 1980, A80HAR01MT) and along some drainages in central and eastern Montana (Hemmer, 1975, U75HEM01MT). An Ame aln drainage bottom ct may be appropriate but is not presently quantified. Qualitative descriptions (Hemmer, 1975, U75HEM01MT) indicate that Pru vir and Ros spp may be important associates of Ame aln along drainages.

Betula glandulosa Series

Sampled in west-central Montana in wet meadows or beside lakes and streams. Pierce (1986, US6PIE01MT) identified two separate community types: Bet gla/Car ros on wetter sites and Bet gla/Des ces on drier sites. These types occurred on histosols and mollisols in cool, moist to wet valley bottoms, at 4,000-6900 feet in elevation. Slopes were about 0-5%. Species included: Bet gla, Sal dru, Sal gla, Car ros, Des ces, Jun bal, Pet sag, Men arv, Swe per.

Betula occidentalis Series

Minor series described in Montana only from the north-central region, possibly also occurring in the south-central region.

BETULA OCCIDENTALIS/POTENTILLA FRUTICOSA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-4800

Aspect: VARIABLE

Soil:

Slope: 0-15

Comments: Subirrigated.

DISTRIBUTION: NC

COMMENTS: Pine Butte and Antelope Butte wetlands.

VEGETATION: Bet occ and Pot fru.

PHASES:

COMMENTS: Quantitative data lacking.

SOURCE(S): Lee and Jonkel (1980, US0LEE01MT)

Cercocarpus ledifolius Series

Duncan (1975, U75DUN01) discusses the range of Cer led in Montana. Given the extensive range, additional types and/or phases can be expected to occur. For example, a Cer led/Fes ida type can be inferred from Duncan (1975, U75DUN01MT) but no quantitative data are available to support the type.

CERCOCARPUS LEDIFOLIUS/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3500-7000

Slope: 33-100

Aspect: VARIABLE

Soil: Dry, rocky soils.

Comments: Frequently on limestone outcrops.

DISTRIBUTION: SW, SE, SC, C

COMMENTS: Primarily southwestern and south-central MT, although outlying stands may be found as far east as Big Horn and Rosebud counties. Also found in central and southern ID, eastern OR, northern NV and WY. See Duncan (1975, U75DUN01MT) for range of Cer led in MT.

VEGETATION:	Cer led	Agr spi	Phl alb
	Art tri	Sti com	
	Art nov	Ory hym	
	Chr nau	Koc cri	
	Rhu tri		
	Gut sar		
	Art fri		

PHASES: A Rhu tri phase may be present in southeastern Montana.

COMMENTS:

SOURCE(S): AB0MUE01MT

MTNHP: C3B4AHACA@

CERCOCARPUS LEDIFOLIUS-JUNIPERUS SCOPULORUM CT

SYNONYMS: Where Jun sco is dominant, the closely related Jun sco-Cer led ct occurs.

SITE CHARACTERISTICS--

Elevation: 4000-4500

Slope: 15-50

Aspect: VARIABLE

Soil: Rocky limestone soils (shallow gravelly loams).

Comments:

DISTRIBUTION: C

COMMENTS: Sampled west of Townsend (Limestone Hills along Indian Creek).

VEGETATION: Cer led Agr spi Hap aca
 Jun sco Car spp Hym pic
 Koe mac Lom mac
 Dry hym Sen can
 Dou mon
 Phi hoo

PHASES:

COMMENTS: Jun sco is dominant on some sites; Cer led on others.

SOURCE(S): US1CHA@1MT

Cornus stolonifera Series

Only described for west-central Montana but likely present in other regions of western Montana. The series has also been described for western Wyoming and eastern Idaho (Norton, 1981, U81NOR01MT; Youngblood et al., 1985, A85YOU01MT).

Pierce (1986, U86PIE01MT) described a *Cornus stolonifera* ct associated with stream banks, and probably flooded in the spring. The soils were entisols, mollisols or histosols of alluvium on 0-5% slopes. Species included: *Cor sto*, *Cra dou*, *Rha aln*, *Aln inc*, *Bet occ*, *Geu mac*, *Gal tri*. Originally Pierce considered there to be separate *Rha aln* and *Cra dou* communities, but they clustered with *Cor sto* in ordinations.

Crataegus succulenta Series

A minor series of drainage bottoms in southeastern Montana. Dusek (1980, USDDUS01MT) described a type containing Cra suc, Pru vir, Ros woo, and Pru ame. It occurs at 3,000-4,500 feet in elevation on slopes of about 0-15%. Aspect is variable. The successional status is unknown.

Crataegus douglasii Series

Poorly defined series. Quantitative data lacking; successional status unknown. Servheen and Lee (1979, U79SERØ1MT) have described a Cra dou type in northwestern and west-central Montana (Mission and Jocko valleys). Deput et al. (1975, U75DEPØ1MT) describe a Cra dou type in upland drainages of the Little Wolf Mountains of southeastern Montana. Pierce (1986, U86PIEØ1MT) combined Cra dou dominated riparian communities in west-central Montana in his Cornus stolonifera type.

Eleagnus commutata Series

Described only for north-central Montana. Harvey (1980, AS@HAR@1MT) designated a Ele com/Carex spp ct at 4,300-6,000 feet elevation on the Sun River Game Range. It occurred on stream terraces above water level on gravelly soils. Species included: Ele com, Salix, Car aqu, Car lan, and Car ros. Slopes were about 0-15% and aspect was variable.

Potentilla fruticosa Series

The Pot fru series is found primarily in central Montana east of the Continental Divide (Mueggler and Stewart, 1980, A80MUE01MT) but also in west-central Montana (Pierce, 1986, US6PIE01MT). The series has also been described from Wyoming and eastern Idaho (Collins, 1984, US4COL01MT; Youngblood et al., 1985, A85YOU01MT).

Two Pot fru plant associations are listed under herbaceous communities (Pot fru/Fes sca and Pot fru/Fes ida) as shrub cover is generally low. The two shrubland Pot fru communities (Pot fru/Carex and Pot fru/Des ces) could also be considered herbaceous types since Pot fru increases with grazing and existing cover may be a reflection of grazing. Another Pot fru type potentially occurring in southwestern Montana is Pot fru/Jun bal (P. Lesica, pers. comm.).

POTENTILLA FRUTICOSA/CAREX SPP CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-4800

Slope: 0-15

Aspect: VARIABLE

Soil: Light gumbo.

Comments: Probably subirrigated.

DISTRIBUTION: NC

COMMENTS: Pine Butte and Antelope Butte wetlands.

VEGETATION: Pot fru and Car spp.

PHASES:

COMMENTS: Quantitative data lacking, successional status unknown.

SOURCE(S): Lee and Jonkel (1980, US0LEE01MT)

POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5940

Slope: 1

Aspect:

Soil: Glacial till.

Comments: Mid-elevation meadow.

DISTRIBUTION: WC, SC?

COMMENTS: Described in western WY and eastern ID (Youngblood et al., 1985 A85YDU01MT).

VEGETATION: Pot fru Des ces
 Art can Muh fil
 Ros spp Sti occ
 Fes ida
 Jun bal

PHASES:

COMMENTS: Water table more than 1 meter below surface at time of sampling.

SOURCE(S): UB6PIE01MT

Prunus americana Series

Limited distribution in Montana. Described only from the Pine Hills in southeastern Montana. There, Culwell and Scow (1962, US2CUL02MT) sampled stands on drainage bottoms at 3,000-3150 feet in elevation. Associated subdominants varied, but included: *Fru vir*, *Rib set*, *Ros woo*, and *Sym occ*. The soils were loams, and slope was 2-5% with variable aspect.

Prunus virginiana Series

Found in ephemeral drainages of central and eastern Montana where additional moisture is available. Data are insufficient to designate discrete types. Successional status unknown.

Culwell and Scow (1981, U81CUL01MT) sampled stands in drainage bottoms dominated by Pru vir with Sym occ or Ros woo or both. These stands occurred at 2,500-5,000 feet in elevation on slopes of 0-15% with variable aspects.

Purshia tridentata Series

Mueggler and Stewart (1980, A80MUE01MT) describe three Pur tri plant associations; two are listed in the herbaceous class (Pur tri/Agr spi and Pur tri/Fes sca) and Pur tri/Fes ida is included as a shrubland. Quantitative data, however, are lacking for the Pur tri/Fes ida pa and it may ultimately be assigned to the herbaceous class also.

PURSHIA TRIDENTATA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: >5000

Slope: 33-50

Aspect: S

Soil: Shallow and rocky of granitic origin.

Comments:

DISTRIBUTION: WC, SW

COMMENTS: Found south of 47 deg. latitude west of the Continental Divide; observed northeast of Deerlodge.

VEGETATION: Pur tri Fes ida Arc con
Agr spi Pfl hoo
Koe mac Eri umb
Poa san Lup ser

PHASES:

COMMENTS: Quantitative data lacking. Mueggler and Stewart's (1980, AB0MUE01MT) one stand was not quantitatively sampled. Seldom encountered in MT.

SOURCE(S): AB0MUE01MT

Rhamnus alnifolia Series

This series is poorly described in Montana. Tisch (1961, U61TIS@1MT) qualitatively described a Rha aln dominated snowslide type in the Whitefish Range at 3,800-7,500 feet in elevation. Slopes were about 33-50% or greater; aspect was S and SW. Species included: Rha aln, Aln sin, Lonicera, Symphoricarpos, Salix, Pte aqu, Ang arg, Epi ang, Her lan, Osm occ, Ver vir, and Bro car.

Pierce (1986, US6PIE@1MT) placed Rha aln dominated riparian stands in west-central Montana in his Cornus stolonifera type.

Rhus aromatica Series

The Rhu aro series is widespread in central, southcentral and southeastern Montana but generally does not form extensive stands. Of four plant associations or community types in the series, only one (Rhu aro/Agr spi) has shrub cover sufficient for a shrubland type. Numerous additional Rhu aro types have been described, however, insufficient data are available to determine their presence in the presettlement landscape. Rhu aro communities that merit additional investigation include:

Rhus aromatica-Artemisia cana
Rhus aromatica-Artemisia tridentata
Rhus aromatica/Bouteloua curtipendula
Rhus aromatica/Bouteloua gracilis
Rhus aromatica/Calamovilfa longifolia
Rhus aromatica/Agropyron smithii
Rhus aromatica/Stipa comata

RHUS AROMATICA/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <5000 Slope: 15-50
Aspect: S, W
Soil: Shallow, rocky, derived from sandstone or scoria.

Comments:

DISTRIBUTION: C, SE, SC

COMMENTS: Tributaries of the upper Missouri River and throughout southeastern MT.

VEGETATION:	Rhu aro	Agr spi	Vic ame
	Opu pol	Ory hym	Chr vil
	Art fri	Agr smi	Ach mil
	Bou cur	Sph coc	
	Gau coc		

PHASES:

COMMENTS: Rhu aro coverage quite variable among stands sampled.

SOURCE(S): A80MUE01MT U85HAN01MT A71BR001MT

U82CULP2MT

Rosa woodsii Series

Poorly defined series in Montana. Ros woo dominated drainage bottoms have been described by Culwell and Scow (1981, US1CUL01; 1982, US2CUL02MT) for southeastern Montana and by Boggs (1984, US4B0G01MT) for terraces along the Yellowstone River in southeastern Montana. They occur on sandy to loamy soils on slopes of 0-15%, from 1,900-3,200 feet in elevation, with variable aspects. Species include: Ros woo, Sym occ, Rhu aro, and Agr smi. Boggs (1984, US4B0G01MT) described his Ros woo/Sym occ community as seral to grassland on the Yellowstone River floodplain.

Sheperdia argentea Series

Widely destributed in central and eastern Montana but restricted to upland swales, drainages or sites with increased available moisture.

MTNHF: C3B4ATMBA0

SHEPHERDIA ARGENTEA-SYMPHORICARPOS OCCIDENTALIS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000

Slope: 0-15

Aspect: VARIABLE

Soil: Variable.

Comments: Upland swales, drainages and north to northeast facing slopes. Runoff, drifted snow, shade and decreased wind velocity combine to make these sites suitable to tall shrubs.

DISTRIBUTION: NE, SE, C

COMMENTS:

VEGETATION: She arg Foa pra Fra pen
 Sym occ And sco
 Agr spi
 Agr smi

PHASES:

COMMENTS: Hansen (1985, U85HAN01MT) thought She arg stands in southeastern MT may be long-lived seral stages of the Fra pen/Pru vir pa. Ros ark important in McCone Co. stands. And sco and Agr spi important in Cascade Co. stands.

SOURCE(S): U85HAN01MT A78PRO01MT

Symphoricarpos albus Series

Poorly defined series in Montana. Described by McAllister (1983, US3MCA01MT) for drainage bottoms and snow accumulation areas in north-central and northwestern Montana on 0-15% slopes of variable aspect at 2,600-4,500 feet in elevation. May also occur as a seral community where fire removes tree overstory in Pin pon/Sym alb, Pse men/Sym alb and Abi las/Sym alb plant associations.

Symphoricarpos occidentalis Series

Common in upland swales, ephemeral drainages and along floodplains at 3,000-5,000 feet elevation in central and eastern Montana. Species include: Sym occ, Ros ark, Ros woo, Art can, Agr smi, Mon fis, Par pen, Gal bor, and Art lud. Potential community types include Sym occ/Art can, Sym occ/Car pen, Sym occ/Mon fis, Sym occ/Par pen, Sym occ/Ros ark and Sym occ/Ros woo. Successional status is unknown but Hansen (1985, U85HAN01MT) speculates that his stands may be successional to Fra pen/Pru vir.

Vaccinium occidentale Series

Described only for west-central Montana. Tentative et described by Pierce (1986, US&FIE&MT) is Vac occ/Cal can. It occurred at 5,900-7,300 feet elevation in meadows and on streamsides which may be flooded from spring through early summer. The water table is high, soils are histosols, and slopes are 0-2%. Species included: Vac occ, Abi las, Led gla, Kal mic, Cal can, and Dod jef. Successional status is unknown.

Salix species Series

Numerous authors describe Salix dominated types. Frequently several Salix species are codominant in a stand or species are not identified in a study and are lumped.

Pfister et al. (1977, B77FFI@1MT) describe a Sal spp/Bet occ community type in high valleys near or east of the Continental Divide. The successional status is unknown. The sites may be too cold for Pop tri.

Salix bebbiana Series

Described only for Sun River Game Range in north-central Montana. There, Harvey (1980, AB0HAR01MT) described a Sal beb/Carex spp ct on gravelly soils at 4,300-6,000 feet in elevation, with slopes of 0-15%. Species included: Sal beb, Sal exi, Sal rig, Car aqu, Car lan, and Car ros.

Salix drummondiana Series

Described in Montana only in the west-central region. There, Pierce identified a Sal dru ct and a Sal dru/Pot pal ct at 4,100-6,270 feet in elevation. Soils were mollisols, entisols, or histosols, and slopes were 0-3%. The sites were moist with water at the surface, or as much as a meter below. They are probably flooded in the spring. Species included: Sal dru, Sal myr, Aln inc, Bro cil, Car ros, Car dia, Geu mac, Men arv, and Pot pal. Successional status is unknown.

Series also described in Idaho by Tuhy (1981, UB1TUH01MT) who designated a Sal dru/Cal can ct.

Salix exigua Series

Described in Montana only for the west-central and north-central regions but likely present in other regions. Pierce (1986, US6PIE@1MT) and Harvey (1980, A80HAR@1MT) described types at 5,000-6,000 feet elevation along permanent streams on the driest ground. Spring flooding is common. Soils are gravelly (entisols), and slopes are 0-15% with variable aspect. Species included: Sal exi, Sal beb, Sal rig, Poa pal, Men arv, Equ arv, and Tan vul. The communities are seral.

The Sal exi is also described for western Wyoming and eastern Idaho (Youngblood et al., 1985, A85YOU@1MT).

Salix farriæ Series

Poorly described series. Only one site sampled in Montana. Pierce (1986, US&PIE@1MT) designated a Sal far ct at 7,800 feet in elevation on a mollisol with 4% slope. Species included: Sal far, Car sco, Jun bal, Dod jef. The type occurs in wet areas and along streams. Its successional status is unknown.

Not described for adjacent states.

Sal far may be dwarf shrub (less than 0.5 m) in some areas.

MTNHP: C3B4CFA///

Salix oeyeriana Series

Described for west-central and south-central Montana. Pierce (1986, US6PIE01MT) designated a Sal gei ct at 5,500-6,100 feet in elevation on entisols or mollisols with 0-2% slope. The type occurred on stream banks and moist meadows, usually flooded in the spring. Species included: Sal gei, Sal myr, Car ros, Poa pal, and Geu mac. Successional status is unknown.

Similar communities have also been described for Idaho and Wyoming (Tuhy, 1981, US1TUH01MT; Youngblood et al., 1985, A85YOU01MT).

Salix planifolia Series

In Montana, types have been described by Pierce (1986, U86PIE@1MT) as well as Johnson and Billings (1962, A62JOH@1MT). The Sal plan communities were reported from the west-central and south-central regions at elevations of 6,600-9,000 feet or more. They occurred in subalpine and alpine valley bottoms below snow accumulation area, often with the water table at the soil surface. Soils were histosols with 0-10% slope. Species included: Sal pla, Sal com, Sal bra, Sal gau, Car ros, Car sco, Ele pal, and Fed gro. The successional status is unknown.

This series may be a dwarf-shrubland in alpine settings.

Types in the series also described for western Wyoming and eastern Idaho by Youghlood et al. (1985, A85YOU@1MT).

Salix wolfii Series

Described in the Little Belt Mountains by Bamberg (1961, U61BAM01MT) in moist to wet sites on histosols with 0-5% slope. The successional status is unknown.

The series is also described for the Sawtooth Valley, Idaho.

Artemisia tridentata Series

The Art tri series may usually be considered shrubland or herbaceous with shrubs. In southeastern Montana, however, Art tri dominates on some badlands or breaks situations where moisture is very limiting. Total plant cover is very low.

ARTEMISIA TRIDENTATA-ATRIPLEX CONFERTIFOLIA/AGROPYRON SPICATUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-4000

Slope: 33-50+

Aspect: VARIABLE

Soil: Poorly developed.

Comments: Aspect often south. Badlands sites.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Art tri Agr spi
 Atr con Dry hym
 Gut sar Agr smi

PHASES:

COMMENTS: Total cover is generally low; bare ground is high. A closely related type which may merit separation is Atr con/Art tri (Brown, 1971, A71BR001MT).

SOURCE(S): A71BR001MT

Chrysothamnus nauseosus Series

Poorly defined series in Montana. Described for gumbo knobs in SE region by ECON, Inc. (1975, U75ECON01MT?) at 3,000-3,500 feet in elevation. Slopes were 33-50% or more, and the aspect was south. Species included: Chr nau, Eri pau, Gut sar, Agr spi, and Dry hym. Successional status in unknown. Possibly edaphically controlled.

Atriplex confertifolia Series

Limited to badland sites in southeastern Montana and perhaps to the area of Great Basin influence in Carbon County (SC). There, Brown (1971, A71BR001MT) described a type at 3,000-4,500 feet in elevation on clays and silty shales, primarily on south aspects with slopes of 33-50% or more. Species included: Atr con, Art tri, Eri pau, Chr nau, Gut sar, Agr spi, and Dry hym. He also identified an Atr con-Art tri type which likely merits separate recognition.

Sarcobatus vermiculatus Series

Most types in the Sar ver series are listed under herbaceous with shrubs. The series also occurs on xeric badland sites in the SE region of Montana.

MTNHP: CSCBACABA0

SARCOBATUS VERMICULATUS/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-4000

Slope: 15-50+

Aspect: S, W

Soil: Poorly developed.

Comments: Badlands, contouring microbenches resulting from interbedding of strata.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Sar ver Agr spi
 Art tri
 Atr con
 Gut sar

PHASES:

COMMENTS: Very low total vegetative cover.

SOURCE(S): UB5HAN01MT A71BRO01MT

Cassiope species Series

Alpine series of NW, NC and C Montana described qualitatively for Glacier National Park (Sammons, 1959, U59SAM01MT) and quantitatively in Big Belt Mountains (Bamburg, 1961, U61BAM01MT). The types were found in areas where water accumulates in depressions at 6,600-9,500 feet in elevation. Soils are skeletal and slopes are 0-15%. Aspect is variable. Species involved are: Cas tet, Cas mer, Sal niv, Sal ret, Car sco, Jun dru, Sph spp, Sib pro, Eri mel, Sel den, Geu ros, and Hym gra. Cas tet is the dominant in Glacier National Park. Cas mer is dominant in the Big Belt Mountains. Successional status is unknown.

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MTNHF: CAA288A///

Kalmia microphylla Series

Poorly defined series in Montana. Described only for west-central region but may be expected in other high elevation mountain ranges.

Pierce (1986, U86PIE@1MT) sampled two stands at 7,100-7,900 feet in elevation on histosols with 0-3% slope. These moist meadows are probably not flooded in the spring. He designated a Kal mic ct. Species included: Kal mic, Car nig, Car sco, Dan int, and Dod jef. Successional status is unknown.

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MTNHP: C4A2BDA//

Phyllodoce species Series

Described by Sammons (1959, U59SAM01MT) for Logan Pass, Glacier NP, and by Bamberg (1961, U61BAM01MT) in the Flint Creek Range, as a winter snow-accumulation stand type. Probably also occurs in other alpine mountain ranges. Occurs at 6,600-9,300 feet in elevation on slopes of 0-5%, in moderately moist to wet alpine meadows, sheltered slopes and ledges. Species include: Phy emp, Phy gla, Sal ret, Car sco, Sib pro, Sel den, Geu ros, Ran esc, and Ant cor. Successional status is unknown.

Juniperus horizontalis Series

Jun hor is widespread in central and eastern Montana, but limited in distribution west of the Continental Divide (Miller, 1978, U78MILØ1MT). Two dwarf shrubland types have been defined (Jun hor/And sco ct and Jun hor/Carex hel pa). Numerous other types have been described, however insufficient data are available to determine presence in the presettlement landscape. Types that merit additional investigation include:

- Juniperus horizontalis/Agropyron smithii
- Juniperus horizontalis/Agropyron spicatum
- Juniperus horizontalis/Calamovilfa longifolia
- Juniperus horizontalis/Carex parryana
- Juniperus horizontalis/Carex species
- Juniperus horizontalis/Festuca idahoensis
- Juniperus horizontalis/Festuca scabrella
- Juniperus horizontalis/Helictotrichon hookeri
- Juniperus horizontalis/Stipa comata (Rhus aromatica)
- Juniperus horizontalis-Potentilla fruticosa

MTNHP: C4A3EBADA0

JUNIPERUS HORIZONTALIS/ANDROPOGON SCOPARIUS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-3500

Slope: 15-35

Aspect: N, (E)

Soil: Loamy to sandy.

Comments: Generally found on cool moist northerly aspects of scoria or sandstone hills or steep coulee banks. Slope mostly moderate, occasionally gentle or steep.

DISTRIBUTION: SE, C, NE

COMMENTS: Also identified in western ND (Hansen et al., 1984, A84HAN01MT).

VEGETATION:	Jun hor	And sco	Sol miss
	Agr spi	Ech pal	
	Car fil	Lin per	
	Car hel	Pet pur	
	Koe pyr	Art dra	

PHASES:

COMMENTS: Successional status unclear. Hansen (1985, U85HAN01MT) considered Jun hor/And sco to be successional to Jun hor/Car hel in SE Montana but Hansen et al. (1984, A84HAN01MT) described a Jun hor/And sco topocedaphic climax in western North Dakota. Prodgers (1978, A78PRO01MT) described a Jun hor/And soc/Agr spi ct with no Car hel recorded in his study area.

SOURCE(S): A78PRO01MT U82CUL02MT

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MTNHP: C4A3BBAGA0

JUNIPERUS HORIZONTALIS/CAREX HELIOPHILA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3560

Slope: 35

Aspect: NNE

Soil: Sandy loam.

Comments: Typically found on steep north-facing slopes with sandy loam soils.

DISTRIBUTION: SE

COMMENTS: Sampled in the Long Pines (Custer National Forest).

VEGETATION: Jun hor Car hel The rho
 And sco Ane pat
 Car fil Pet pur
 Koe pyr
 Agr das
 Agr spi

PHASES:

COMMENTS: Only one stand sampled in Montana (Hansen stand 130, U85HAN01MT), apparently more common to the east in the Slim Buttes of South Dakota. Considered by Hansen (1985, U85HAN01MT) as topocedaphic climax.

SOURCE(S): U85HAN01MT

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MTNHP: C488ACA///

Salix reticulata Series

Little description of types in the series in Montana. Bamberg (1964, U64BAM01MT) discussed a type on irregular stone stripes at 7,600-8,100 feet in elevation at Siyeh Pass, Glacier National Park. Slopes were 0-25%. Species included: Sal ret, Kob myo, Car rup, Dry oct, Pol viv, Hyp rev, and Pol bis. Successional status is unknown.

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MTNHP: D4C16BA///

Atriplex gardneri Series

Limited quantitative sampling in Atr gar Series. The types occur in SE, SC, and NE regions of Montana at elevations of 2,200-5,000 feet. Soils are usually clayey, slopes 0-33%, and aspect is variable. Frequently a dense clay range site. Species include: Atr gar, Sar ver, Art spi, Art ped, Agr smi, Dry hym, and Opu pol. Several community types may be present including: Atr gar/Agr smi, Atr gar/Dry hym, Atr gar/Sar ver and Atr gar/Art spi. Successional status is unknown.

MTNHP: C4C1BCA///

Eriogonum pauciflorum Series

The series is not well defined. *Eriogonum pauciflorum* occurs on clay breaks of eastern Montana, frequently in association with *Chrysanthemum*. Branson, et al. (1970, A70BRA01MT) discuss a type occurring on xeric gumbo knobs on slopes of 0-75% at elevations of 2,000-3,500 feet. Species include: *Eri pau*, *Chr nau*, *Gut sar*, *Agr spi*, *Agr das*, *Agr smi*, *Opu pol*, and *Mac spp*. Successional status is unknown.

MTNHP: C4C2ABA///

Artemisia pedatifida Series

Art ped is found in SC and SW Montana. Stands occur on shallow rocky soils at elevations of 4,500-5,000 feet. Slopes are 0-65%, and aspect is variable. Associated species include: Atr gar, Agr spi, Pca, Ory hym, Sti com, and Car fil. Stands dominated by Art ped in SC Montana (primarily Carbon County) represent an extension of Great Basin vegetation and occur in the 5-9 inch precipitation zone. Types that may be present in SC Montana include Art ped/Agr spi and Art ped/Atr gar. The driest sites have very low total cover dominated by Art ped, Atr gar and Agr spi while more mesic sites have higher total cover and also include Car fil, Sti com and higher forb cover. An Art ped/Fes ida ct in SW Montana is described under herbaceous types. Art ped may be an increaser with grazing. Successional status unknown.

Artemisia spinescens Series

Art spi is found in Montana only in the SC region, primarily in Carbon County. The elevation is about 4,000-4,500 feet, slopes are about 0-10%, and aspect is variable. Soils may be mostly clayey. Quantitative data are lacking, but observers have suggested that the species involved include: Art spi, Atr gar, Agr spi, Dry hym, and Sit hys. Because Art spi frequently occurs with *Atriplex gardneri* and may be placed in that series.

It has been identified as a cover type in Wyoming.

Yucca glauca Series

The Yuc gla series is found on well-drained slopes and ridges of the foothills and prairies of the eastern two-thirds of Montana. Soils are generally coarse, often with moderately high rock content (Yuc gla/Agr spi).

Since Yuc gla usually averages less than 25 percent cover, the series is placed in the "grassland steppe with shrubs" formation. However, Yuc gla may well exceed 25 percent cover in some stands, and could be considered shrubland. The series may be placed in various formations, depending on stature of the dominant graminoid associates.

The presence of a Yuc gla/Sti com type in southeast Montana may be grazing induced, but merits consideration. Yuc gla/Bou gra is likely a result of livestock grazing.

YUCCA GLAUCA/CALAMOVILFA LONGIFOLIA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000

Slope: 25-75

Aspect: VARIABLE

Soil: Coarse textured derived from sandstone or scoria.

Comments: Well-drained uplands.

DISTRIBUTION: NE

COMMENTS:

VEGETATION: And sco is important graminoid.

PHASES:

COMMENTS: Yuc gla (an increaser) averaged 22.5% cover on sites sampled in McCone Co.

SOURCE(S): A78PR001MT

Andropogon gerardii Series

The And ger series is found in east-southeast Montana on silt loams and sandy loams, often in association with Ponderosa pine types. It occupies somewhat more mesic sites with relatively finer soil textures than does the And hal series.

And ger is more common east of Montana.

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MTNHP: 05B1CBABA0

ANDROPOGON GERARDII/ANDROPOGON SCOPARIUS CT

SYNONYMS: Other names include And sco/And ger.

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 0-20

Aspect: N

Soil: Sandy loams (silt loams also?).

Comments: Aspect often north.

DISTRIBUTION: SE

COMMENTS: ESE

VEGETATION: Fes ida (cool sites) or Cal lon (coarse soils) may be important associates.

PHASES:

COMMENTS: Rather uncommon; often substantially higher cover of And sco than And ger may sometimes reflect a decrease in the latter due to extended grazing (or early succession?).

SOURCE(S): U76TAY01MT U82CUL02MT U81CUL01MT

MTNHP: C551CBACA0

ANDROPOGON GERARDII/CALAMOVILFA LONGIFOLIA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3200-4000

Slope: 0-20

Aspect: S ?

Soil: Sandy loams.

Comments: Aspect mostly south?

DISTRIBUTION: SE

COMMENTS: ESE

VEGETATION: And ger

Cal lon

Bou cur

PHASES:

COMMENTS: Uncommonly reported; Taylor and Holst (1976, U76TAY01MT)
stands 35 and 52.

SOURCE(S): U76TAY01MT

ANDROPOGON GERARDII/FESTUCA IDAHOENSIS CT

SYNONYMS: Fes ida/And ger.

SITE CHARACTERISTICS--

Elevation: 3500-4500

Slope: 5-25

Aspect: N

Soil: Silt loams.

Comments: Aspect mostly north; foothills type.

DISTRIBUTION: SE

COMMENTS: ESE

VEGETATION: Carex (heliophila?) is generally important, and Fes ida may have substantially more cover than And ger.

PHASES:

COMMENTS: Uncommonly reported; in Taylor and Holst (1976, U76TAY01MT) stands 12, 29, 46. Poa pra is a common exotic associate.

SOURCE(S): U76TAY01MT

Andropogon hallii Series

The And hal series is found in east-southeastern Montana on sandy loams and sands, occupying generally less mesic sites with coarser soil textures than does the And ger series.

The series is more common east of Montana.

ANDROPOGON HALLII/CAREX HELIOPHILA CT

↓
Place into
Calo/Anha

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-3700

Slope: 0-12

Aspect: VARIABLE

Soil: Sandy loams, sands.

Comments: Aspect seldom north.

DISTRIBUTION: SE

COMMENTS: ESE

VEGETATION: Cal lon and Sch sco may be mutually or independently
subdominant; Sti com.

PHASES: Tentative phases - Cal lon, And sco, Sti com.

COMMENTS: Quantitative data more common than for And hal/Sti com.
Mitchell (1983, U83MIT01MT) stands 9, 64, 96, 118. The Sti
com phase is likely ecotonal to Sti com/Car hel pa etc. or
perhaps represents more advanced (?) succession.

SOURCE(S): U83MIT01MT U82CUL02MT

ANDROPOGON HALLII/STIPA COMATA CT

*↓ place into
Calo/Anha*

SYNONYMS: See above.

SITE CHARACTERISTICS--

Elevation: 2500-3500

Slope: 5-15

Aspect: S

Soil: Sands.

Comments: Aspect southerly.

DISTRIBUTION: SE

COMMENTS: ESE

VEGETATION: Cal lon, Yuc gal.

PHASES: Tentative phase - Cal lon (Yuc gla may be important).

COMMENTS: Site 47 in Ross et al. (1973, B73ROS01MT) had 33% cover of And hal; And hal often has sparser, patchier cover on what appear to be later successional (or overgrazed?) sites; these sites may be called Cal lon/Sti com-And hal phase.

SOURCE(S): A73ROS01MT U83JOH01MT

Calamagrostis canadensis Series

The Cal can series is not well quantified in Montana. Pierce (1986, US6PIE01MT) described a Cal can community type in west-central Montana, on moist bottoms at 4100-7600 feet elevation.

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MTNHP: C5B1CDABA0

CALAMAGROSTIS CANADENSIS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4100-7600

Slope: 0-4

Aspect: VARIABLE

Soil: Mollisols or histosols, water table from surface to 3 dm below, parent = argillite and quartzite to granite.

Comments: Moist bottoms, mid- to high elevations, probably flooded in spring.

DISTRIBUTION: WC, NW

COMMENTS: Probably western third or half of MT.

VEGETATION: Cal can dominates (includes Cal ine or Cal str); other important species are Car rost, Bro cil, Alo alp, also Des ces at high elevations.

PHASES:

COMMENTS: See Pierce (1986, U86PIE01MT) for adjacent ct's. Production was 1560-10,500 lbs/ac, average 3475.

SOURCE(S): U86PIE01MT

Calamovilfa longifolia Series

The Cal lon series is found in eastern Montana on sandy loams and sands of riparian terraces and toeslopes or uplands. Quantitative data are lacking for its limited distribution farther west in Montana. It is a more common and widely distributed tall-grass prairie steppe series in Montana than are the And ger and And hal series.

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MTNHP: C5B1CEABA@

CALAMOVILFA LONGIFOLIA/AGROPYRON SMITHII CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 1900-2050

Slope: 0

Aspect: FLAT

Soil: Sandy

Comments: Terraces (3-4 meters high) along lower Yellowstone River, probably subirrigated (Boggs, 1984, U84B0G@1MT).⁸⁴ Less mesic sites in Bull Mountains and near Ashland.

DISTRIBUTION: NE, SE

COMMENTS: Lower Yellowstone River between Glendive and Sidney; also see Bull Mtns (Moore and Culwell, 1981, U81M00@1MT) and Ashland (Taylor, 1976, U76TAY@1MT).

VEGETATION: Taylor and Holst (1976, U76TAY@1MT) stand 10E (note Bou gra). Ely can, Muh rac, Poa pra.

PHASES: Ely can and Muh rac may be important sub-dominants (phases?) in stands 1, 9, 16 and 17 in Boggs (1984, U84B0G@1MT). Stand 6 in Moore and Culwell (1981, U81M00@1MT) may represent a Cal lon/Agr smi (Poa pra phase).

COMMENTS: Apparently the climatic climax in some areas of the Yellowstone River flood-plain where erosion and flooding are mostly absent (Boggs, 1984, U84B0G@1MT).

SOURCE(S): U84B0G@1MT U76TAY@1MT

CALAMOVILFA LONGIFOLIA/CAREX FILIFOLIA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-3000 ? Slope: 2-8
Aspect: VARIABLE
Soil: Sandy loam.

Comments:

DISTRIBUTION: SE, (NE?)
COMMENTS: ESE

VEGETATION: Note Bou gra in Culwell et al. (1986, US6CUL01MT) (sites 2, 3).

PHASES:

COMMENTS: Sites 38 and 51 in Ross et al. (1973, A73ROS01MT).

SOURCE(S): A73ROS01MT US6CUL01MT

CALAMOVILFA LONGIFOLIA/CAREX HELIOPHILA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2000-3500 ?

Slope: 5-15

Aspect: VARIABLE

Soil: Sandy loams, loamy sand and sand (textures 65-90% sand), very low clay.

Comments: Stands are highly irregular in size, scattered across gently rolling landscape.

DISTRIBUTION: SE

COMMENTS: ESE. Uncommon for Hansen (1985, U85HAN01MT) even in the western Dakotas.

VEGETATION: Bou gra, Art lud.

PHASES:

COMMENTS: An edaphic climax. Uncommon pa for Hansen (1985, U85HAN01MT), and none of his stands were in MT. Unlike Hansen's type, nearly all stands of the Cal lon-Sti com-Car hel complex in MT literature have Sti com well represented, usually at least equal to Cal lon (undisturbed stands of Hansen's have Cal lon, Car hel and little else with significant cover). Possibly Culwell and Scow (1982, U82CUL02MT) stand 152; SCS (1979, F79SCS01MT) in which note Artemisia longifolia, Ros ark, The rho on a shallow to clay range site in Rosebud Co.

SOURCE(S): U85HAN01MT

Elymus cinereus Series

Although stands dominated by Ely cin are widely distributed in Montana, they generally occur as relatively small patches on saline-alkaline soils along low-elevation stream courses (Mueggler and Stewart, 1980, A80MUE01MT) and protected slopes. More quantitative data are required to better define types and successional relationships in the series. Ely cin/Agr can and Ely cin/Poa com types have also been reported (the latter likely a degraded sere?).

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MTNHP: C5B1CFACA0

ELYMUS CINEREUS/AGROPYRON SMITHII CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope: 0-37

Aspect: FLAT

Soil: Saline-alkaline.

Comments: Small patches along low-elev. streambanks usually; however, dominates much of a broad valley 6 mi west of Polson (Mueggler and Stewart, 1980, B80MUE01MT).

DISTRIBUTION: NW

COMMENTS: Western Montana?

VEGETATION: Ely cin dominates over Agr smi, Puc dis, some Chr nau.

PHASES:

COMMENTS: Suspected habitat type (Mueggler and Stewart, 1980, A80MUE01MT).

SOURCE(S): A80MUE01MT

ELYMUS CINEREUS/FESTUCA IDAHOENSIS CT

SYNONYMS: Note Ely cin/Agr can type.

SITE CHARACTERISTICS--

Elevation: About 6500 ? Slope:

Aspect:

Soil: Clay loam?

Comments: Gentle toeslope?

DISTRIBUTION: SW

COMMENTS:

VEGETATION: Sti ric and Agr can also important.

PHASES:

COMMENTS: Site 010 in Ross et al. (1973, B73ROS01MT).

SOURCE(S): A73ROS01MT

Phalaris arundinacea Series

The Pha aru series is not well quantified in Montana. Pierce (1986, US6PIE01MT) described a Pha aru community type in west-central Montana on areas at 3200-4100 feet elevation that are probably flooded during spring to early summer.

PHALARIS ARUNDINACEA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3230-4100

Slope: 0

Aspect: FLAT

Soil: Histosols or entisols, water table at, to 6 dm, below soil surface; argillite or granite alluvium parent material.

Comments: Low to mid elevation areas, probably flooded spring to early summer.

DISTRIBUTION: WC

COMMENTS: Probably western half of MT.

VEGETATION: Pha aru clearly dominant over Car rostr, Men arv, Gal trifidum.

PHASES:

COMMENTS: See Pierce (1986, U86PIE01MT) for adjacent types. Production was 11,950-21,460 lbs/ac (mostly graminoids), the second-most productive of riparian types in Pierce (1986, U86PIE01MT).

SOURCE(S): U86PIE01M

Spartina pectinata Series

The Spa pec series is found on subirrigated silt loams in eastern Montana. Little quantitative data available; identification of types within the series will likely rely on analysis of moisture/alkalinity relationships and degree of disturbance.

The presence of a *Spartina gracilis* series requires quantitative definition.

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MTNHP: C5B1CHABAØ

SPARTINA PECTINATA/CAREX SPP CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-3500

Slope: 0-2

Aspect: FLAT

Soil: Subirrigated silt loams.

Comments: See Spa pec/Sci pun.

DISTRIBUTION: SE

COMMENTS: Roughly, SE quarter of MT.

VEGETATION: Various sedges, spikesedges and/or rushes may be important in the understory, e.g. Car neb, Car pra, Car lan, Ele pai, Jun bal etc. See Spa pec/Sci pun ct.

PHASES: See Spa pec/Sci pun ct.

COMMENTS:

SOURCE(S): U85CULØ1MT U82CULØ2MT

SPARTINA PECTINATA/SCIRPUS PUNGENS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-3500

Slope: 0-2

Aspect: FLAT

Soil: Subirrigated silt loams.

Comments: Perhaps more alkaline or more moisture, or both, than Spa pec/Carex spp.

DISTRIBUTION: SE

COMMENTS: Roughly, SE quarter of MT.

VEGETATION: Depending on moisture and alkalinity, various taxa found in Spa pec/Carex type may be important (also Agr can and Hor jub). Pan vir may also be common (see Pan vir/Cal lon ct on adjacent, sandy, overflow sites).

PHASES: Many phases possible, will require further investigation. Where there is less Spa pec (less alkaline sites?), a Car neb/Sci pun type may replace it.

COMMENTS: Culwell et al. (1985, U85CUL01MT) stands 77, 83, 84. Very productive type on subirrigated sites.

SOURCE(S): U85CUL01MT U82CUL02MT

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MTNHP: C5B2BBA//

Artemisia arbuscula Series

Art arb var. arbuscula is found only in southwestern Montana (Morris et al., 1976, A76MOR01MT). Mueggler and Stewart (1980) did not separate variety arbuscula from variety nova, following Hitchcock and Cronquist (1973, B73HIT01MT). The two plant associations in this series therefore can be considered tentative until additional data are available. Morris et al. (1976, A76MOR01MT), however, indicated that Agr spi and some Fes ida form the understory in Art arb var. arb stands, supporting the two types described by Mueggler and Stewart (1980).

ARTEMISIA ARBUSCULA/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-7700

Slope: <37

Aspect: S, W

Soil: Rocky

Comments: Foothill areas. One of driest mountain shrubland types in W Montana.

DISTRIBUTION: SW

COMMENTS: Found primarily on foothill areas of western MT east of the Continental Divide and south of 47 deg. latitude. Type described for east OR, so. ID, no. NV and northwest WY.

VEGETATION: Shrub cover of neither phase exceeded 25%, however, it can be expected that shrub cover would be higher in some stands.

Art arb	Agr spi	Phl hoo
Gut sar	Koe pyr	Cas ang
Art tri	Sti com	Lin per
Art fri	Leu kin	
Dry hym		

PHASES: Mueggler and Stewart (1980, A80MUE01MT) identified two phases: a typical phase (Agr spi) and a Sti com phase which occurred on sandier soils.

COMMENTS:

SOURCE(S): A80MUE01MT A76MOR01MT

ARTEMISIA ARBUSCULA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6200-9100

Slope: 15-33

Aspect: VARIABLE

Soil: Weathered limestone

Comments: Dry mountain slopes; less xeric conditions than Art arb/Agr spi. Aspect often east.

DISTRIBUTION: SW

COMMENTS: SW MT extending into YNF and adjacent areas of ID. Also described for eastern OR, central ID and northern NV.

VEGETATION: Art arb cover in Mueggler and Stewart's (1980, AB0MUE01MT) 2 stands averaged only 8%. Shrub cover may, however, exceed 25% in some stands although quantitative data are lacking.

Art arb	Fes ida	Ant mic
Agr spi	Oxy ser	
Koe pyr	Fhl hoo	
Poa san	Cle hir	
Eri com		

PHASES:

COMMENTS: Infrequent according to Mueggler and Stewart (1980, BB0MUE01MT).

SOURCE(S): AB0MUE01MT A76MOR01MT

Artemisia cana Series

Morris et al. (1976, A76MOR01MT) describe the distribution of Art can in Montana. Two Art can types are listed here under herbaceous communities because of their relatively low Art can cover. An additional type, Art can/Agr smi pa is listed as a shrub type. Numerous other Art can dominated types have been sampled; however, insufficient data are available to determine their presence in the presettlement landscape. Art can communities that have been described which merit additional investigation include:

Art can/Arg spi
Art can/Bou gra
Art can/Buc dac
Art can/Koe pyr
Art can/Sti com
Art can/Sti vir
Art can-Art tri

ARTEMISIA CANA/CAREX HELIOPHILA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 0-15

Aspect: VARIABLE

Soil: Loamy to sandy.

Comments: Mesic drainage bottoms, lower to middle slopes.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Sti com usually important, Art can cover usually less than 20%. Also,

Agr emi Art lud

Bou gra Ast fal

Sti vir Cer arv

(Poa pra) Pso arg

Pat col

PHASES: Phases likely similar to Sti com/Car hel.

COMMENTS: Similar to Sti com/Car hel pa, except for abundance of Art can, and may often represent grazing (or fire suppression) induced sere of the former?

SOURCE(S): U82CUL02MT U83MIT01MT

ARTEMISIA CANA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-7000

Slope: 0-15

Aspect: VARIABLE

Soil: Deep loamy, generally alluvial.

Comments: Along stream bottoms or alluvial fans.

DISTRIBUTION: SW, C, SC, SE

COMMENTS: Described for WY.

VEGETATION: Sites sampled in Big Horn Co. have higher cover of Agr smi and may be considered a phase of that type; site sampled in Broadwater county has been heavily grazed and Poa pra is common. Art can cover is generally low (less than 20%).

PHASES: Agr smi?

COMMENTS: Observed for SW MT by Mueggler and Stewart (1980, B80MUE01MT).

SOURCE(S): A80MUE01MT U77CUL04MT U86SCO01MT

Artemisia longiloba Series

Artemisia longiloba is restricted in Montana to three areas, all in the southwestern region (Morris et al., 1976, A76MOR01MT). The series has not been quantitatively sampled in Montana (to our knowledge). Hironaka et al. (1983, Q83HIR01MT) described an *Art lon/Fes ida* type for southern Idaho.

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MTNHF: C582BDABA0

ARTEMISIA LONGILOBA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: >7000

Slope:

Aspect: VARIABLE

Soil: Derived from limestone or shale, often eroded.

Comments:

DISTRIBUTION: SW

COMMENTS: Probably occurs in SW MT; identified in southern Idaho.

VEGETATION: Art lon Fes ida
Agr smi
Agr das
Agr spi
Spa gra

PHASES:

COMMENTS: Quantitative data lacking.

SOURCE(S): A80MUE01MT A76MOR01MT

Artemisia nova Series

Art nov (or Art arb var. nova using Hitchcock and Cronquist, 1973, 173HIT@1MT) is more widely distributed in Montana than Art arb var. arbuscula, being found in the southwestern, south-central and central regions. It is most commonly found on shallow limestone outcrops or talus and seldom on north exposures.

The two vegetation types listed have also been described for southern Idaho (Hironaka et al., 1983, 083HIR@1MT).

ARTEMISIA NOVA/AGROPHYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-5000 ?

Slope: <25

Aspect:

Soil: Gravelly loams to sandy loams derived from limestone.

Comments: More xeric than Art nov/Fes ida; sampled on fans, terraces and swales west of Townsend.

DISTRIBUTION: SW, C, SC

COMMENTS: Seven stands sampled by Chaffee (1981, U81CHA01MT) on Indian Creek west of Townsend in Limestone Hills.

VEGETATION: Average 18% cover Art nov (Chaffee, 1981, U81CHA01MT). A stand in Carbon Co. averaged 10% cover Art nov (Westech, 1987, U97WES02MT).

Gut sar	Koe pyr	Ant mic
Jun sco	Foa san	Dou mon
Art fri	Eri cae	
Hap aca		
Phl hoo		

PHASES:

COMMENTS:

SOURCE(S): U81CHA01MT A76MOR01MT A80MUE01MT

ARTEMISIA NOVA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope:

Aspect: VARIABLE

Soil: Rocky loams derived from limestone.

Comments: Aspect seldom north.

DISTRIBUTION: SW, C?

COMMENTS:

VEGETATION: Art nov Fes ida
 Agr spi

PHASES:

COMMENTS:

SOURCE(S): A80MUE01MT A76MOR01MT

Artemisia pedatifida Series

Poorly defined series in Montana. Art ped occurs in southwestern and south-central Montana. Mueggler and Stewart (1980, A80MUE01MT) observed a stand near Bannock Pass which they discussed as an Art ped/Fes ida type. In south-central Montana (Carbon County), Westech (1987, U87WES02MT) sampled two stands with Art ped and Agr spi as dominants; this type is listed under extremely xeromorphic dwarf-shrubland, because occurs in the 5-9 inch precipitation zone.

ARTEMISIA PEDATIFIDA/FESTUCA IDAHOENSIS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Aspect:

Soil:

Slope:

Comments: Not sampled.

DISTRIBUTION: SW

COMMENTS: Near Bannock Pass.

VEGETATION:

PHASES:

COMMENTS: Probably uncommon. Quantitative data lacking, observed by Mueggler and Stewart (1980, B80MUE01MT).

SOURCE(S): A80MUE01MT

Artemisia tridentata Series

Morris et al. (1976, A76MOR01MT) describe the distribution of the three subspecies of Art tri in Montana. Two shrub-dominated plant associations are listed. Additionally, the Art tri/Atr con/Agr spi type is listed under xeromorphic shrublands and two types (Art tri/Fes ida and Art tri/Fes sca) are listed under herbaceous communities. Numerous other Art tri dominated types have been sampled, however, insufficient data are available to determine their presence in the presettlement landscape. Art tri communities that have been described which merit additional investigation include:

Artemisia tridentata-Artemisia tripartita
Artemisia tridentata-Atriplex 'gardneri'/Agropyron smithii
Artemisia tridentata/Bouteloua gracilis
Artemisia tridentata-Chrysothamnus nauseosus
Artemisia tridentata/Distichlis spicata
Artemisia tridentata/Agropyron dasystachyum
Artemisia tridentata/Koeleria macrantha
Artemisia tridentata-Sarcobatus vermiculatus/Agropyron smithii
Artemisia tridentata/Stipa comata
Artemisia tridentata/Stipa viridula

ARTEMISIA TRIDENTATA/FESTUCA IDAHOENSIS FA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-8000

Slope: <40

Aspect: VARIABLE

Soil: Typic Cryoboroll and Pachic Cryoboroll 16-33 inches deep.

Comments:

DISTRIBUTION: WC, SW, C, SC, NC

COMMENTS: West and central MT, mostly south of 46 deg. 30 min latitude. Also described for S. Idaho, Wyoming and British Columbia.

VEGETATION: Art trid averaged 18% cover in typical phase (8 stands) and 23% cover in Ger vis phase (4 stands).

Agr can* Koe pyr Ach mil*
 Agr spi Sti occ* Ant mic
 Bro car* Are con*
 Car ray* Eri umb*
 Dan int* Ger vis*
 Geu tri*
 Hel uni*
 (*=Ger vis phase) Lup ser
 Pot gra*

PHASES: Two phases recognized by Mueggler and Stewart (1980, B80MUE01MT): a typical phase and a Ger vis phase which occupies deeper soils.

COMMENTS: Common.

SOURCE(S): A80MUE01MT A80HAR01MT

ARTEMISIA TRIDENTATA/FESTUCA SCABRELLA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3800-6000

Slope: <30

Aspect: S

Soil: Moderately deep from various parent materials.

Comments:

DISTRIBUTION: NW, NC, WC, C

COMMENTS: Western Montana on both sides of Continental Divide but generally north of 46 deg. latitude.

VEGETATION: Art tri cover generally less than 25% (21% for 6 stands in Mueggler and Stewart, 1980, AB0MUE01MT), although some sites may exceed 25%.

Agr spi Ant mic
Fes ida Are con
Sti ric Lup ser

PHASES:

COMMENTS:

SOURCE(S): AB0MUE01MT

Artemisia tripartita Series

Art trip is found primarily in southwestn Montana with less extensive stands near Helmville, Ovando and Niarada (Morris et al., 1976, A76MORØ1MT). The typical understory union is Fes ida although Morris et al. (1976) mentioned Fes sca in a stand in the upper Blackfoot, indicating the potential presence of an Art trip/Fes sca type. In addition, an Art trip/Agr spi type is listed for Wyoming (Collins, 1984, U84COLØ1MT) and southern Idaho (Hironaka et al., 1983, ØB3HIRØ1MT) and it may occur in Montana.

ARTEMISIA TRIPARTITA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6000-7500

Slope: 0-15

Aspect: VARIABLE

Soil: Moderately deep.

Comments: Gentle alluvial slopes or benches.

DISTRIBUTION: SW, WC, C?, NW?

COMMENTS:

VEGETATION: Average cover of Art trip at five sites sampled by Mueggler and Stewart (1980, 880MUE01MT) was 12% although total shrub cover averaged 20%. Three stands sampled by Payne (1983, 83PAY01MT), however, had shrub cover exceeding 25% with one at 42% Art trip cover.

Chr vis Agr can Lup ser
Tet can Agr das Phl hoo
Art trid? Cal mon
Koe pyr

PHASES:

COMMENTS:

SOURCE(S): 80MUE01MT 83PAY01MT 76MOR01MT

Gutierrezia sarothrae Series

The Gut sar series is found in the eastern two-thirds of Montana on clayey sites of variable slope and aspect. Vegetation cover is often relatively sparse and lacking in floristic diversity. Many sites represent grazing induced seres of other mid-grass/steppe types, however the type was undoubtedly a component of the pre-settlement landscape on unstable soils.

GUTIERREZIA SAROTHRAE/AGROPYRON SPICATUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 2500-3500

Slope: 0-25+

Aspect: VARIABLE

Soil: Unstable clayey sites, often lower shale slopes below steeper breaks scoria and shale slopes.

Comments:

DISTRIBUTION: NC, C, SC, NE, SE

COMMENTS: Extends into intermountain valleys of western MT.

VEGETATION: See site 3 in Ross et al. (1973, A73ROS01MT). See stands 4, 66, 72, 99, 103, 120, 122, 155, 174, 175, 178 in VTN Environmental Consultants (1977, U77VTN01MT), in which Koe pyr is usually the third dominant.

PHASES:

COMMENTS: Very depauperate veg. cover, may be early successional to Agr spi/Koe pyr, followed by Agr spi/Sti com or Agr spi/Car fil.

SOURCE(S): U77VTN01MT A73ROS01MT U79NER01MT

Potentilla fruticosa Series

The Pot fru series is found primarily in central Montana east of the Continental Divide (Mueggler and Stewart, 1980, A80MUE01MT) but also in west-central Montana (Pierce, 1986, U86PIE01MT). The series has also been described from Wyoming and eastern Idaho (Collins, 1984, U84COL01MT; Youngblood et al., 1985, A85YOU01MT).

Two Pot fru plant associations are listed under herbaceous communities (Pot fru/Fes sca and Pot fru/Fes ida) as shrub cover is generally low. The two shrubland Pot fru communities (Pot fru/Carex and Pot fru/Des ces) could also be considered herbaceous types since Pot fru increases with grazing and existing cover may be a reflection of grazing. Another Pot fru type potentially occurring in southwestern Montana is Pot fru/Jun bal (P. Lesica, pers. comm.).

POTENTILLA FRUTICOSA/FESTUCA IDAHOENSIS FA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-8600

Slope: 0-15

Aspect: VARIABLE

Soil: Moderately deep of granitic origin.

Comments:

DISTRIBUTION: NC, C

COMMENTS: East side of Continental Divide. Uncommon according to Mueggler and Stewart (1980, BS0MUE01MT).

VEGETATION: Dan int
Car obt

PHASES:

COMMENTS: Pot fru cover averaged 10% on stands sampled.

SOURCE(S): AS0MUE01MT

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MTNHP: C5B2BKACA0

POTENTILLA FRUTICOSA/FESTUCA SCABRELLA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-6000

Slope: 0-15

Aspect:

Soil: Moderately deep, usually of limestone or sandstone parent materials.

Comments:

DISTRIBUTION: NC, C

COMMENTS: North of 46 deg. latitude and primarily east of Continental Divide. Sampled at Pine Butte Swamp and Sun River Game Range; noted in Sweet Grass Hills.

VEGETATION: Typical phase: Agr spi, Fes ida.

Dan int phase: Are uva, Fes ida, Poa pra, Car obt.

PHASES: Two phases recognized by Mueggler and Stewart (1980, AB0MUE01MT): a typical phase and a Dan int phase.

COMMENTS: Pot fru cover varies from 5 to 30% (average 14% for 11 stands).

SOURCE(S): AB0MUE01MT

Purshia tridentata Series

Mueggler and Stewart (1980, AS0MUE01MT) describe three Pur tri plant associations; two are listed in the herbaceous class (Pur tri/Agr spi and Pur tri/Fes sca) and Pur tri/Fes ida is included as a shrubland. Quantitative data, however, are lacking for the Pur tri/Fes ida pa and it may ultimately be assigned to the herbaceous class also.

PURSHIA TRIDENTATA/AGROPYRON SPICATUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3500-5500

Slope: 45-75

Aspect: S

Soil: Dry, shallow, rocky, granitic in origin.

Comments: Semiarid type confined to sites with high evapotranspiration in the 10-15 inch precipitation zone.

DISTRIBUTION: SW

COMMENTS: Occupies extensive foothill areas in the Bitterroot Valley (Ravalli Co.); elsewhere found as small patches less than 20 acres west of Continental Divide.

VEGETATION: Bal sag.

PHASES:

COMMENTS: Pur tri typically grows in somewhat open stands with cover less than 20%.

SOURCE(S): AB0MUE01MT

PURSHIA TRIDENTATA/FESTUCA SCABRELLA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-5700

Slope: >30

Aspect: S, E

Soil: Shallow, well drained, colluvial.

Comments:

DISTRIBUTION: NW, WC, C

COMMENTS: Principally west of the Continental Divide and north of 47 deg. latitude. Sampled in Jefferson Co. east of the divide.

VEGETATION: Agr spi, Fes ida and Bal sag.

PHASES:

COMMENTS: Pur tri cover averaged 17% in four stands in Mueggler and Stewart (1980, A80MUE01MT), although it exceeded 25% in two stands sampled in Jefferson County (Culwell et al., 1984, U84CUL01MT; see relationship with Pse men/Pur tri, Pse men/Fes sca).

SOURCE(S): A80MUE01MT U84CUL01MT

Rhus aromatica Series

The Rhu aro series is widespread in central, southcentral and southeastern Montana but generally does not form extensive stands. Of four plant associations or community types in the series, only one (Rhu aro/Agr spi) has shrub cover sufficient for a shrubland type. Numerous additional Rhu aro types have been described, however, insufficient data are available to determine their presence in the presettlement landscape. Rhu aro communities that merit additional investigation include:

Rhus aromatica-Artemisia cana
Rhus aromatica-Artemisia tridentata
Rhus aromatica/Bouteloua curtipendula
Rhus aromatica/Bouteloua gracilis
Rhus aromatica/Calamovilfa longifolia
Rhus aromatica/Agropyron smithii
Rhus aromatica/Stipa comata

RHUS AROMATICA/ANDROPOGON SCOPARIUS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 15-50

Aspect: NE

Soil: Sandy

Comments:

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Cal lon and Bou cur may be important associates.

PHASES:

COMMENTS: Uncommon. Generally open Rhu aro stands with shrub cover less than 20%, often less than 10%.

SOURCE(S): U85CUL01MT U82CUL02MT

RHUS AROMATICA/FESTUCA IDAHOENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: <4500

Slope: 0-33

Aspect: VARIABLE

Soil: Sandy loam, high coarse fragment content.

Comments: Occurs as patches or strips on convex shoulders and slopes of gently rolling hills; more mesic than Rhu aro/Agr spi.

DISTRIBUTION: C, SE

COMMENTS: Sampled SW of Great Falls, in the Ashland Division of the Custer N.F. and in southern Big Horn County (Youngs Creek area).

VEGETATION: Agr spi and Car hel.

PHASES:

COMMENTS: Infrequent according to Mueggler and Stewart (1980, A80MUE01MT).

SOURCE(S): A80MUE01MT U85HAN01MT

RHUS AROMATICA/CAREX FILIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-3500

Slope: 8-20

Aspect: SE (N, NE, E, S)

Soil: Sandy derived from sandstone.

Comments: Often found at the base of sandstone outcrops or on sandy knolls.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Not particularly species rich, however many unions represented. Muh cas, Sti com and Bou gra.

PHASES:

COMMENTS: Rhu and cover generally less than 25%.

SOURCE(S): U85CUL01MT U85HAN01MT

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MTNHP: C582BNA777

Sarcobatus vermiculatus Series

The Sar ver series...

***** NEED SERIES DESCRIPTION *****8

SARCOBATUS VERMICULATUS/AGROPHYRON SMITHII PA

SYNONYMS: Many stands may be considered Agr smi/Sar ver using UNESCO classification.

SITE CHARACTERISTICS--

Elevation: 2200-4500

Slope: 0-15

Aspect: VARIABLE

Soil: Loams to clay loams, mostly alkaline or saline.

Comments: Alluvial deposits of terraces, fans and floodplains of major streams; frequently subirrigated.

DISTRIBUTION: SE, NC, C

COMMENTS:

VEGETATION: Relatively undisturbed stands are floristically depauperate. Bou gra and Poa can.

PHASES:

COMMENTS: Sar ver cover varies considerably from stand to stand; Mueggler and Stewart (1980, BS0MUE01MT) report low cover, Hansen (1985, U85HAN01MT) reports higher cover; reported values range from 3 to 30%.

SOURCE(S): U85HAN01MT AB0MUE01MT

Yucca glauca Series

The Yuc gla series is found on well-drained slopes and ridges of the foothills and prairies of the eastern two-thirds of Montana. Soils are generally coarse, often with moderately high rock content (Yuc gla/Agr spi).

Since Yuc gla usually averages less than 25 percent cover, the series is placed in the "grassland steppe with shrubs formation". However, Yuc gla in some stands may well exceed 25 percent cover and could be considered shrubland. The series may be placed in various formations, depending on stature of the dominant graminoid associates. The presence of a Yuc gla/Sti com type in southeast Montana may be grazing induced, but merits consideration. Yuc gla/Bou gra is likely a result of livestock grazing.

MTNHP: C5B2BFABA@

YUCCA GLAUCA/AGROPYRON SPICATUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3300-3500

Slope: >50

Aspect: E, S

Soil: Sandy to sandy-gravelly.

Comments: Generally found on very steep coulee banks, soil creep is often evident.

DISTRIBUTION: C

COMMENTS: Northeast of Great Falls.

VEGETATION: And sco may codominate with Agr spi.

PHASES:

COMMENTS: Little quantitative data available, may also occupy bluffs near Missouri River south of Great Falls (e.g. near Cascade, Craig, Wolf Creek). Average cover of Yuc gla at three sites was 15%.

SOURCE(S): UNDMULØ1MT

Agropyron smithii Series

The Agr smi series is found in the plains and foothills of the eastern two-thirds of Montana on fine-textured soils (clays, clay loams and loams). It is commonly associated with drainages, lower slopes and alluvial flats, but not limited to them. These sites are often dominated by increaser and invader species encouraged by intensive grazing or agriculture.

MTNHP: C5B2CBABA0

AGROPYRON SMITHII ALLUVIAL CLAY FLAT CT

SYNONYMS: Discussed under Agr spi/Agr smi in Harvey (1980, A60HAR01MT).

SITE CHARACTERISTICS--

Elevation: 2500-3500

Slope: 0

Aspect: FLAT

Soil: Alluvial clay flats.

Comments: Agr smi is found as the sole dominant on alluvial clay flats.

DISTRIBUTION: NC, C, SC, NE, SE

COMMENTS: Eastern two-thirds of MT. Perhaps more abundant on glaciated plains than sedimentary plains of eastern MT.

VEGETATION: Often nearly pure stands of Agr smi (less commonly with Koe pyr, Poa san, Gut sar) and distinguished by rarity or absence of Bou gra and Sti com.

PHASES:

COMMENTS: Coupland's (1950, A50COU01^{? Alberta?}MT) Agr smi consocieties in Alberta was found on slightly alkaline clay flats and held in subclimax by salts or sediment deposition.

SOURCE(S): A73AND01MT A50COU01MT

AGROPYRON SMITHII/BOUTELOUA GRACILIS CT

SYNONYMS: Bou gra/Agr smi; Agr smi/Bou gra/Buc dac; Buc
dac/Bou gra/Agr smi.

SITE CHARACTERISTICS--

Elevation: 2500-3500 Slope: 0-10
Aspect: VARIABLE
Soil: Heavy soils, often in swales, lower slopes.
Comments:

DISTRIBUTION: NC, C, SC, NE, SE

COMMENTS: Eastern two-thirds of MT. Very common, especially in the
eastern half of MT (generally a grazing disclimax?).

VEGETATION: In ESE MT, Buchloe dactyloides often shares or assumes
dominance in the Bou gra union of this type (see Culwell
and Scow, 1982, U82CUL02MT and Anderson, 1973, A73AND01MT).

PHASES: Tentative phases - Sti vir, Buc dac, Car fil, Spo cry, (Koe
pyr ? disturbed?).

COMMENTS: Many (if not most) stands represent degraded seres of Agr
smi/Sti vir, Agr smi/Car fil and perhaps Sti com/Agr smi on
certain sites. Few sources in MT indicate relatively
undisturbed stands of Agr smi/Bou gra as a presettlement pa.

SOURCE(S): U82CUL02MT A73AND01MT U79HUS01MT A78PRD01MT

AGROPYRON SMITHII/CAREX FILIFOLIA PA

SYNONYMS: Note Agr smi/Car ele for Carter County (MacCracken et al., 1983, A83MAC01MT). Other names: Agr smi/Bou gra.

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 2-10

Aspect: VARIABLE

Soil: Fine textured, clay loams to loams (clay = 12-40%). Poor water balance, poor species diversity.

Comments: Nearly level upland depressions, gently sloping hillsides, or floodplains along major streams.

DISTRIBUTION: SE

COMMENTS: ESE. Possibly in NE? Only one of ten Agr smi/Car fil stands in Hansen (1985, U85HAN01MT) was located in MT - the rest were in NW SD and SW ND where the pa seems to be more common (see Hansen's review of the lit.). (Also see Ross et al., 1973, A73ROS01MT, site #1). Culwell and Scow (1982, U82CUL01MT) stands 82, 76 (Bou gra phase).

VEGETATION: Undisturbed stands are nearly pure swards of Agr smi, with limited Car fil and Car ele (Sti vir).

PHASES: Tentative phase - Bou gra.

COMMENTS: Edaphic climax. Hansen's MT stand was degraded to Agr smi/Bou gra. Often disturbed by grazing, with invasion of many weedy species.

SOURCE(S): U85HAN01MT

AGROPYRON SMITHII/STIPA VIRIDULA CT

SYNONYMS: Sti vir/Agr smi; Agr smi; Agr smi/Bou gra; Agr
smi/Sti vir/Bou gra; Sti vir/Agr smi-Poa pra.

SITE CHARACTERISTICS--

Elevation: 2000-4000

Slope: 0-10 or 15

Aspect: VARIABLE

Soil: Silt loams with relatively high clay and clay loams.

Comments: Usually swales and lower slopes, drainage bottoms and alluvial terraces (with little or no Art can or Art tri). Often disturbed.

DISTRIBUTION: NC, C, SC, NE, SE

COMMENTS: Mostly eastern two-thirds of MT; possibly in SW (uncommon), especially common in eastern half of MT.

VEGETATION: Important species - see phases, also Car fil (4 of 10 stands in Taylor and Holst, 1976, U76TAY01MT).

PHASES: Culwell and Scow (1982, U82CUL02MT) stand 116 (Bou gra phase), 173 & 174 (And ger phase). Most stands in Prodgens (1978, U78PRO01MT) were Bou gra phase. Econ Inc. (1976, U76ECO01MT) had drier site Poa san phase with much reduced coverage of Sti vir than did wetter site Poa pra phase. Poa pra, And ger (transitional to And ger/Poa pra ct on coarse textured drainages and lower slopes).

COMMENTS: Sti vir often strongly decreases due to grazing, type often degraded in E MT to Agr smi/Bou gra, Agr smi/Poa san, etc. See sites 50 and 5 in Ross et al. (1973, A73ROS01MT). Diagnostic of type: lack of Agr spi; Bou gra a very common phase.

SOURCE(S): A73ROS01MT U82CUL02MT ^{really?} A75MOR01MT U76TAY01MT U77CUL02MT
U83JOH01MT

Agropyron spicatum Series

The Agr spi series is one of the most prevalent mid-grass steppe series in Montana, found virtually throughout the state on a variety of soils with a wide range of site parameters. Additional quantitative work is needed to substantiate Agr spi types subdominated by Cal mon, Car hel, Muh cus or Sti vir (these may be phases of recognized types). Agr spi is in many stands strongly reduced due to grazing, leaving Sti com and various increasers (often "phase species") more conspicuous. Since Sti com is so often codominant with Agr spi, even in less disturbed stands, many recognized types might be considered phases of a widespread Agr spi/Sti com type.

AGROPYRON SPICATUM/AGROPYRON SMITHII PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4000-5700

Slope: <20 (40)

Aspect: VARIABLE

Soil: Entic Haploborolls, ustic or aridic, frigid. See Munn
(1977,U77MUN01MT).

Comments: Moderately arid, 12-18" ppt..

DISTRIBUTION: WC, SW, NC, C, SC, NE, SE

COMMENTS: All but extreme northwest? Mostly east of Continental
Divide, occasionally west.

VEGETATION: Art fri Koe pyr Chr vil

Gut sar Poa cus

Poa san

~~Sti com~~

Sti vir

PHASES: The typical phase of this pa (Mueggler and Stewart, 1980, B80MUE01MT; Jorgensen, 1979, A79JOR01MT) might be considered to represent an Agr spi/Sti com pa - Koe pyr or Agr smi phase (similarly for Agr spi/Bou gra-Lia pun and Agr spi/Poa san-Sti com). Similarly, the Sti vir phase of this pa might often be regarded as a Agr spi/Sti vir pa where Agr smi, Sti com and Koe pyr are also common.

COMMENTS: 800 lbs/ac (about 80% graminoids, Mueggler and Stewart, 1980, A80MUE01MT). See also sites 11, 8, 014 and 37 in Ross et al. (1973, A73ROS01MT) and stands 5,26 in Culwell (1977, U77CUL02MT).

SOURCE(S): A80MUE01MT A79JOR01MT A73ROS01MT

AGROPYRON SPICATUM/BOUTELOUA CURTIPENDULA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4000

Slope: 25-55

Aspect: S

Soil: Coarse soils with much scoria (porcellanite) debris on surface.

Comments: Aspect mostly south. Foothills and hillsides along major drainages.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Similar to Rhu aro/Agr spi except for absence (or low cover) of Rhu aro. Car fil, Cal lon, Agr smi, And sco are often important.

PHASES: Tentative phases - Car fil, Cal lon.

COMMENTS: A topocedaphic climax. Hansen (1985, U85HAN01MT) described this pa from 3 sites. See also Olson-Elliott & Associates (1980, U80DLS01MT) stands 38, 122, 132; Taylor and Holst (1976, U76TAY01MT) stands 14, 78, 79.

SOURCE(S): U85HAN01MT

AGROPYRON SPICATUM/CAREX FILIFOLIA PA

SYNONYMS: Agr spi/Sti com. Other names - Agr spi/Bou gra/Car fil; Sti com/Car fil/Koe pyr; Agr spi/Koe pyr.

SITE CHARACTERISTICS--

Elevation: 3000-4500? Slope: 2-25
 Aspect: OFTEN N, SELDOM S
 Soil: Silt loams to relatively shallow, sandy loams, depending on phase.
 Comments: Distinction from Agr spi/Sti com is probably often a result of relatively minor edaphic differences (perhaps also grazing history).

DISTRIBUTION: SE, NE, (SC?)

COMMENTS: Roughly, the SE quarter of MT.

VEGETATION: Art fri Sti com Ast fal
 Koe pyr Pso arg

PHASES: Hansen (1985, U85HAN01MT) describes a Sti com phase on nearly level upland plateaus. Tentative phases - Sti com (transitional to Sti com/Car fil), Bou gra (Proddgers, 1978, A78PRO01MT 12 stands), Bou cur, Koe pyr and/or Gut sar (transitional to Agr spi/Koe pyr or /Gut sar - see VTN Environmental Consultants, 1977, U77VTN01MT, stands 39, 40, 111, 125). Sti com phase in Culwell et al. (1985, U85CUL01MT) (1, 44, 67, 108); VTN Environmental Consultants (1977, U77VTN01MT) (21, 62, 71, 77, 93, 124, 137).

COMMENTS: Considered edaphic climax by Hansen (1985, U85HAN01MT) (Sti com phase on plateau tops), but also found commonly on thin hilly range site, on ridges and upper slopes. See site 2 in Ross et al. (1973, A73ROS01MT).

SOURCE(S): U85HAN01MT A73ROS01MT U85CUL01MT

MTNHF: C5B2CCAGAZ

AGROPYRON SPICATUM/ERIOGONUM OVALIFOLIUM CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope:

Aspect:

Soil:

Comments:

DISTRIBUTION:

COMMENTS: Found on giant ripple marks near Markle Pass.

VEGETATION:

PHASES:

COMMENTS:

SOURCE(S): PNDLES01MT

MTNHP: 056200AHA0

AGROPHYRON SPICATUM/KOELERIA PYRAMIDATA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-5200

Slope: 5-50

Aspect: VARIABLE

Soil: Mostly silt loams (clay loams) with high coarse fragment content, well drained.

Comments:

DISTRIBUTION: SW, NC, C, SC, NE, SE, (WC?)

COMMENTS:

VEGETATION: Koe pyr is a very common associate of Agr spi in the MT literature.

PHASES:

COMMENTS: Common, but often may represent degraded sere of other Agr spi types. This ct probably often represents a grazing degraded sere of Agr spi/Sti com (also Agr spi/Agr smi and Agr spi/Car fil), however see near-pristine sites 12, 13, 14 and 011 in Ross et al. (1973, B73ROS01MT). Perhaps a few stands in Culwell and Scow (1981, U81CUL01MT), VTN Environmental Consultants (1977, U77VTN01MT), Chaffee (1981, U81CHA01MT), McAllister (1983, U83MCA01MT).

SOURCE(S): A73ROS01MT

AGROPHYRON SPICATUM/MUHLENBERGIA CUSPIDATA CT

SYNONYMS: Muh cus/Agr spi.

SITE CHARACTERISTICS--

Elevation: 2500-3000

Slope: 5-25

Aspect:

Soil: Mostly immature loams and silt loams on convex upper slopes.

Comments: Aspect often north, seldom south. Typically rather limited ground cover on dry, stony slopes, often eroded slopes where A horizon has been lost.

DISTRIBUTION: NE, SE, (C?)

COMMENTS:

VEGETATION: Eleven stands in Proegers (1978, A78PRO01MT); important associates appear to be Bou cur, Car fil, And sco, Sti com (coarse soils).

PHASES:

COMMENTS:

SOURCE(S): A78PRO01MT

Andropogon scoparius Series

The And sco series is found in eastern Montana on relatively coarse soils, often on north aspects. Other And sco types or stands reported in the literature codominated by Agr spi, Bon cur or Cal Ion may represent distinct types separable on the basis of site parameters, or may be phases or ecotones of types recognized in this classification, pending further investigation.

ANDROPOGON SCOPARIUS/CAREX FILIFOLIA PA

SYNONYMS: "Sidehill" grassland; And sco; often combined with other And sco ct's and pa's.

SITE CHARACTERISTICS--

Elevation: 2500-3600

Slope: 5-35

Aspect: N

Soil: Loams to loamy sands, quite coarse.

Comments: Aspect mostly north, seldom south. Shoulders and backslopes of buttes and hills.

DISTRIBUTION: C, SC, NE, SE

COMMENTS: Eastern half of MT.

VEGETATION: Art fri Bou cur Ast fal
 Car hel Dal par
 Koe pyr Ech ang

PHASES: Tentative phases - Cal lon (grading to And sco/Cal lon-Car fil phase) and Agr spi with Bou cur sometimes important (grading to And sco/Agr spi-Car fil phase). Sti com phase (e.g. Johnson and Youmans, 1983, U83JQH01MT; Schwarzkoph and Sell 1978, U78SCH01MT) may likely represent ecotone with Sti com/Car fil pa.

COMMENTS: A topocedaphic climax. Hansen (1985, U85HAN01MT) recognized as a pa. Appears throughout MT lit.

SOURCE(S): U85HAN01MT U82CUL02MT U85CUL01MT A78PRO01MT

ANDROPOGON SCOPARIUS/MUHLENBERGIA CUSPIDATA CT

SYNONYMS: Muh cus/And sco HT of Jorgensen (1979, A79JOR01MT).

SITE CHARACTERISTICS--

Elevation: 3800-4200

Slope: 15-30?

Aspect: N

Soil: Loam or clay loams (stony), immature, eroded.

Comments: Confined to particular stratum of shaley or silty parent material in the Kootenai Formation (Yellow water triangle) - Jorgensen (1979, B79JOR01MT) "moderately steep slopes in uplands".

DISTRIBUTION: NE

COMMENTS:

VEGETATION: Other important species are Agr spi, Gut sar and Ari pur.

PHASES:

COMMENTS:

SOURCE(S): A79JOR01MT

MTNHP: C5B2CDACA0

ANDROPOGON SCOPARIUS/CAREX HELIOPHILA CT

SYNONYMS: Generally quite similar to Car hel-Cal lon phase of And sco/Bou cur type, but Car hel more conspicuous than Bou cur.

SITE CHARACTERISTICS--

Elevation: 3000-3500

Slope: 5-15

Aspect: VARIABLE

Soil: Sandy loams.

Comments: Aspect often north.

DISTRIBUTION: SE

COMMENTS: ESE. Not common, often may represent ecotones.

VEGETATION: Bou cur
Sti com
Cal lon

PHASES:

COMMENTS: The few stands in the literature often have fairly abundant Sti com, which may represent ecotones between And sco/Bou cur and types e.g. Cal lon/Sti com/Car hel complex or Sti com/Car fil. See Mitchell (1993, U83MIT01MT) stands 87, 142; Culwell and Scow (1982, U82CUL02MT) stand 19.

SOURCE(S): U83MIT01MT U82CUL02MT

Calamagrostis rubescens Series

**** Need series description!!!! *****

CALAMAGROSTIS RUBESCENS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation:

Slope:

Aspect:

Soil:

Comments:

DISTRIBUTION:

COMMENTS: Western two-thirds of MT.

VEGETATION:

PHASES:

COMMENTS: Historically maintained as grass parks by fire on deeper soils in the Pse men/Cal rub pa. Now being invaded by trees due to fire suppression and grazing.

SOURCE(S): A86ARNØ1MT

Deschampsia cespitosa Series

The Des ces series is found in western Montana on poorly drained (mid- to) high elevation meadows and valley bottoms, on gentle slopes. Additional study may identify various associations according to Carices or other species codominant with Des ces. At higher elevations, these stands may be accommodated in Formation 5C2A ("closed alpine mat").

DESCHAMPSIA CESPITOSA/CAREX SPP PA

SYNONYMS: At higher elevations, this type may fit formation 5C2A (e.g. Des ces/Car scopul).

SITE CHARACTERISTICS--

Elevation: 6000-9000

Slope:

Aspect: FLAT

Soil: Deep, poorly drained, flooded spring and early summer.

Comments: (Mid- to) high elevation meadows and valley bottoms, poorly drained (wettest grassland habitat type in western MT).

Slope is flat to very gentle.

DISTRIBUTION: NW, WC, SW, NC, C, SC

COMMENTS: Both sides of Contintal Divide in western MT.

VEGETATION: Mueggler and Stewart (1980, A80MUE01MT) - Des ces abundant with one or more Carices (e.g. Car athro, Car par, Car rup, Car scopul), also usually Dan int, Phl alp, Agrostis, Juncus, Pote grac, Ant cor, Pol bis.

PHASES:

COMMENTS: Production about 2600 lbs/ac.

SOURCE(S): A80MUE01MT

Festuca idahoensis Series

The *Fes ida* series is very common in Montana, but probably absent from most of northeast Montana. It occurs on a variety of soils, exposures and topographical positions, from 3500 to 8600+ feet elevation.

FESTUCA IDAHOENSIS/AGROPYRON CANINUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-8600

Slope: 5-25

Aspect:

Soil: Argic or Pachic Cryoborolls, ustic, cryic, loamy
(Mueggler and Stewart, 1980, B80MUE01MT). Also, see Munn
(1977, U77MUN01MT).

Comments: Moderate to high elevation mountain slopes, moderately
mesic, 18-30" ppt.; Ger vis phase more mesic, usually
north and east aspects.

DISTRIBUTION: NW, WC, SW, NC, C, SC

COMMENTS: Mostly east of the Continental Divide, usually south of
47 deg. latitude.

VEGETATION: Also important - Sti occ, Koe pyr, Dan int, Car pet, Geu
tri, Pot gra, Ach mil.

PHASES: Mueggler and Stewart (1980, A80MUE01MT) recognize a typical
and a moister Geranium viscosissimum phase.

COMMENTS: For range condition, see Davis (1975, U75DAV01MT).

SOURCE(S): A80MUE01MT

FESTUCA IDAHOENSIS/AGROPYRON SMITHII PA

SYNONYMS: For recognition of *Fes ida*/*Agr smi*-*Agr das*, also see Davis (1975, U75DAV01MT) and *Fes ida*/*Agr das* in Vogel (1960, U60V0G01MT) (site 4).

SITE CHARACTERISTICS--

Elevation: 4000-6000 (8000)

Slope: 0-15

Aspect: VARIABLE?

Soil: Moderately deep, sedimentary origin.

Comments: Generally a "foothills" type. Variable production: 720-1300 lbs/ac (50-65% graminoids).

DISTRIBUTION: SW, SC, C, SE, NC

COMMENTS: East of the Continental Divide; probably absent from most of northeast MT.

VEGETATION: In ten stands of Mueggler and Stewart's (1980, B80MUE01MT), *Agr das* averaged greater cover and constancy than did *Agr smi*, and may merit recognition. See stands 68, 70, 94, 95 in Taylor and Holst (1976, U76TAY01MT) for E MT (where *Sti vir* and *Carex* may be important - note *Fes ida*/*Car hel pa* in E MT). Note *Sti occ* and *Poa pra* in Johnson (1976, U76JOH01MT).

PHASES:

COMMENTS:

SOURCE(S): A80MUE01MT

FESTUCA IDAHOENSIS/AGROPYRON SPICATUM PA

SYNONYMS: Art tri/Fes ida; Agr spi/Fes ida.

SITE CHARACTERISTICS--

Elevation: 4500-7500

Slope: VARIABLE

Aspect: N, S

Soil: Typic Haploboroll, or Typic or Calcic Cryoboroll, ustic, cryic (Mueggler and Stewart, 1980, B80MUE01MT). Also, see Munn (1977, U77MUN01MT).

Comments: Intermediate elevation mountain slopes, Sti occ phase (mesic) is usually at higher elevations; moderately mesic, 14-20" ppt.; 650-1290 lbs/ac (35-70% graminoids, Mueggler and Stewart, 1980, B80MUE01MT). Aspect often N at lower elev. and S at higher.

DISTRIBUTION: NW, WC, SW, NC, C, SC, SE

COMMENTS: Very common, especially SW, SC MT (south of 46 deg. latitude); probably uncommon (or absent) only in most of NE MT.

VEGETATION: Car obt Koe pyr Ach mil
 Car pet Sti occ Ago gla
 Car ele Ant mic
 Cer arv
 Lup ser
 Phl hoo

PHASES: Mueggler and Stewart (1980, B80MUE01MT) recognized a typical (Sti com) and a moister Stipa occidentalis phase. See site 24 in Ross et al. (1973, B73ROS01MT). Culwell and Stewart's (1981, U81CUL01MT) stands 53, 135, 159 in SE MT are Sti com phase. Tentative phases: Sti com, Sti occ, Car hel?, Car obt? - note Fes ida/Car obt type in Big Horn Mtns., WY.

COMMENTS: The most common pa in Fes ida series in W MT. Hann (1982, U82HAN01MT) discussed successional communities of this pa in W MT. Site 4 in Vogel (1960, U60VOG01MT) note abundance of Cal mon where ungrazed and of Agr das where grazed by sheep. For range condition, see Davis (1975, U75DAV01MT).

SOURCE(S): A80MUE01MT B73ROS01MT

FESTUCA IDAHOENSIS/CAREX HELIOPHILA PA

SYNONYMS: Fes ida/Sti com; Fes ida/Carex.

SITE CHARACTERISTICS--

Elevation: 3500-4200

Slope: 5-20

Aspect: VARIABLE

Soil: Loams to sandy loams.

Comments: Upland plateaus or open parks in Pin pon. Aspect often north? Occupies sites quite similar to Sti com/Car hel, perhaps slightly higher elevations and cooler aspects?, more exposed soil.

DISTRIBUTION: SE, SC

COMMENTS:

VEGETATION: Ros ark Agr smi Art lud
 Koe pyr Ast fal
 Sti com

PHASES: "Fes ida/Carex" in Taylor and Holst (1976, U76TAY01MT) must be Fes ida/Car hel (stands 43, 60, 74, 54, 90; Sti vir phase = 85, 29, 32; And ger phase = stand 9). Tentative phases: Sti vir, And ger?, Sti com? (note in Johnson (1976, U76JOH01MT)).

COMMENTS: Climatic climax.

SOURCE(S): U85HAN01MT

FESTUCA IDAHOENSIS/STIPA RICHARDSONII PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3600-6900

Slope: 0-15?

Aspect: VARIABLE?

Soil: Moderately deep.

Comments: Moderately mesic. Gentle slopes.

DISTRIBUTION: NW, WC, SW, NC, C, SC

COMMENTS: Western third of MT; both sides of the Continental Divide, widely scattered, but rather uncommon.

VEGETATION: Also important: Dan int, Sti occ, Ger vis.

PHASES:

COMMENTS: Fairly productive (about 1200 lbs/ac, 60% graminoids - Mueggler and Stewart, 1980, A80MUE01MT). For range condition, see Davis (1975, U75DAV01MT).

SOURCE(S): A80MUE01MT

Festuca scabrella Series

The Fes sca series is found in the western half of Montana, primarily north of 46 deg. latitude (Mueggler and Stewart, 1960, AB0MUE01MT). It occupies loamy soils on level to moderately steep topography of variable aspect in the foothills and mountains. Other Fes sca associations have been described in B.C., Alberta and Saskatchewan.

FESTUCA SCABRELLA CT

SYNONYMS:

Do not recognize this CT
(describe how this relates to
the adjacent pa's)

SITE CHARACTERISTICS--

Elevation: 2,700-7,400

Slope:

Aspect: mostly S and W

Soil: loams to silts derived from a variety of calcareous and noncalcareous parent materials.

Comments:

DISTRIBUTION: NW, WC, C

COMMENTS:

VEGETATION: Similar to Fes sca true grasslands adjacent to this seral type.

- Fes sca Bal sag
- Agr spi Lit rud
- Koe pyr

PHASES:

COMMENTS: This fire-induced ct seems to be logically implied in Pfister's (1977, B77PFI01MT) discussion of the Pse men/Fes ida habitat type.

SOURCE(S): B77PFI01MT

FESTUCA SCABRELLA/AGROPYRON SPICATUM PA

SYNONYMS: Art tri/Fes sca, Fes sca/Fes ida-Agr spi.

SITE CHARACTERISTICS--

Elevation: 3000-6000

Slope: 0-30?

Aspect: VARIABLE

Soil: Ustic or aridic, frigid, fine loams. Also, see Munn (1977, U77MUN01MT).

Comments: Slope level to moderately steep, usually below 4000 ft. west of the Continental Divide; moderately arid.

DISTRIBUTION: NW, WC, SW, NC, C

COMMENTS: Western half of MT, primarily north of 46 deg. latitude.

VEGETATION: See sites 44, 6, 025, 46, 22, 23, 41, 42, 028, 03 in Ross et al. (1973, B73ROS01MT), most of which indicate Fes ida as the most common associate to Fes sca/Agr spi.

Art fri	Sti com	Ach mil
Fes ida	Art mic	
Koe pyr	Cer arv	
Poa san	Lup ser	

PHASES: Mueggler and Stewart (1980, B80MUE01MT) recognized a typical phase and a drier, more eastern Stipa comata phase; based on cover/constancy data, it could be argued that the former is a Fes sca/Fes ida pa - Agr spi phase and that the latter is the same or a Fes sca/Agr spi pa - Fes ida phase.

COMMENTS: Production 890-1200 lbs/ac (65-90% graminoids, Mueggler and Stewart, 1980, B80MUE01MT).

SOURCE(S): A80MUE01MT A73ROS01MT

FESTUCA SCABRELLA/FESTUCA IDAHOENSIS PA

SYNONYMS: "Pot fru/Fes sca".

SITE CHARACTERISTICS--

Elevation: 3000-7000

Slope: 0-30

Aspect: VARIABLE, (N)

Soil: Loamy, ustic, cryic. See Munn (1977, U77MUN01MT).

Comments: Can occupy higher, more mesic sites than Fes sca/Agr spi.
Aspect often north.

DISTRIBUTION: NW, WC, SW, NC, C

COMMENTS: Western half of MT, primarily north of 46 deg. latitude.

VEGETATION: Agr can Ach mil
Agr spi Ant mic
Car fil Are con
Car obt Cer arv
Car hel Eri umb
Car pet Gal bor
Dan int Ger vis
Koe pyr Geu tri
Sti occ Lup ser
Sti ric Pot grac

Carex filifolia is usually important in the Sti ric phase (see sites 024 and 026 in Ross et al, 1973, B73ROS01MT - other Fes sca/Fes ida sites: 021, 022, 7, 27, 9, 10, 027, 02, 19, 28).

PHASES: Mueggler and Stewart (1980, B80MUE01MT) recognized 3 phases: typical, Geranium viscosissimum and Stipa richardsonii. Strong Sti ric phase in Koterba (1968, U68KOT01MT) and SCS (1977, P77SCS01MT) (Fes sca/Sti ric type?).

COMMENTS: A very productive grassland pa, especially where Fes sca has not been depleted by heavy grazing: 1125-1630 lbs/ac (70-90% graminoids, Mueggler and Stewart, 1980, B80MUE01MT).

SOURCE(S): A80MUE01MT A73ROS01MT

Glyceria borealis Series

The Gly bor series is not well quantified in Montana; Pierce (1986, US6FIE01MT) described a Gly bor/Ele pal type in west-central Montana in wet meadows associated with ponds at 5,940-7,200 feet in elevation. Soils were vertisols or histosols with the water table at 0-5 dm below the surface. Species composition was low in diversity with Gly bor dominant and Ele pal always present.

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MTNHP: CSBECKA///

Panicum virgatum Series

Pan vir may be dominant or codominant in the eastern edge of SE Montana on the overflow range site ("Pan vir/Cal lon") or on silty soils on the subirrigated range site ("Pan vir/Carex"). Little quantitative data are available.

Stipa comata Series

The Stipa comata series is very widespread in Montana. It occupies well-drained loams to loamy sands on variable aspects and topography, extending into western Montana in intermontane valleys.

STIPA COMATA/BOUTELOUA GRACILIS PA

SYNONYMS: Bou gra/Sti com; Bou gra/Car fil/Sti com; Art dra/Sti com, Sti com/Agr smi.

SITE CHARACTERISTICS--

Elevation: <5000 (6100)

Slope: 0-15?

Aspect: VARIABLE

Soil: Fine loamy Borollic Calciorthids, arid, frigid (Mueggler and Stewart, 1980, B80MUE01MT). Also, see Munn (1977, U77MUN01MT). Gentle (moderate) slopes.

Comments: Generally 8-14" ppt., intermontane valleys E of Cont. Div. and E plains; broad alluvial benches and fans, valley floors, and plains.

DISTRIBUTION: WC, SW, NC, C, SC, NE, SE

COMMENTS: All but NW? Very widespread in MT.

VEGETATION: Agr smi / Art fri / Phl hoo /
Car fil / Art dra
Car ele / Koe pyr /

PHASES: Typical phase of Mueggler and Stewart's (1980, B80MUE01MT) is good Sti com/Bou gra (note Car ele), however, may in some cases represent a grazing disclimax. Majority of above stands were in Agr smi phase, which probably are often degraded seres of Sti com/Agr smi and Sti com/Car fil pa's (see these). This is true also for eastern MT (see stands 45, 016, 04, 023 of Ross et al., 1973, B73ROS01MT).

Tentative phases: Car fil, Agr smi, Car ele, Art dra. All 5 stands in Husby et al. (1979, U79HUS01MT) were in Art dra phase.

COMMENTS: Driest grassland pa in MT (Mueggler and Stewart, 1980, B80MUE01MT), W MT production 240-850 lbs/ac (80-95% graminoids).

SOURCE(S): A80MUE01MT A73ROS01MT

STIPA COMATA/CAREX FILIFOLIA PA

SYNONYMS: Sti com/Car fil/Koe pyr; Sti com/Bou gra (-Car fil); Bou gra-Car fil/Sti com.

SITE CHARACTERISTICS--

Elevation: 2000-4500

Slope: 5-10 (10)

Aspect: VARIABLE

Soil: Loams to loamy sands, high moisture availability, but low moisture-holding capacity.

Comments: Nearly level plateaus, isolated buttes, gentle slopes without excessive erosion.

DISTRIBUTION: NC, C, SC, NE, SE

COMMENTS: Eastern two-thirds of MT. Extends into inter-montane valleys of Rockies.

VEGETATION: Agr smi Koe pyr Sel den
 Agr spi Car hel Gan coc
 Bou gra Dal pur Pso arg
 Sph coc
 Tra dub

PHASES: Possibly a Sti occ phase in W MT (Pase, 1958, U88PAB01MT).
 Tentative phases: Agr smi (transitional to Sti com/Agr smi),
 Agr spi (trans. to Agr spi/Car fil; Bou gra and/or Koe pyr
 (heavily grazed?); Car hel (trans. to Sti com/Car hel); Yuc
 gla (heavily grazed loamy sands?)

COMMENTS:

SOURCE(S): U85HAN01MT A73ROS01MT U85CUL01MT

STIPA COMATA/CAREX HELIOPHILA PA

SYNONYMS: Sti com/Car hel/Cal lon; Sti com/Koe pyr; Sti com/Agr smi.

SITE CHARACTERISTICS--

Elevation: 2500-4100

Slope: 2-10

Aspect: VARIABLE

Soil: Loams to loamy sands.

Comments: Usually upland plateaus or open parks in Fin pon.

DISTRIBUTION: SE

COMMENTS:

VEGETATION: Art fri Agr smi Art lud
 Ros ark Cal lon Ant mic
 Koe pyr Gau coc
 Sti vir Ast fal
 Dal pur

PHASES: Tentative phases: Cal lon, Agr smi.

COMMENTS: Climatic climax. All of Hansen's (1985, U85HAN01MT) sites were in MT; see Culwell and Scow (1981, U81CUL01MT) stands 56, 145, 146, 149, 185, 192; Mitchell (1983, U83MIT01MT) stands 55, 97, 115, 124, 133, 56, 74, 93, 101, 114, 119, 135, 136, 148, 149. Similar to Sti com/Car fil, but Carex unions different and forb cover much higher in Sti com/Car hel (Hansen, 1985, U85HAN01MT).

SOURCE(S): U85HAN01MT U81CUL01MT U83MIT01MT

Bouteloua gracilis Series

Outliers of true short-grass prairie may exist in Montana, particularly in extreme SE. However, their existence has not been satisfactorily documented, since mid-grass species are present in the stands that have been quantitatively documented. These include Bou gra/Agr smi and Bou gra/Sti com types which are widespread in the eastern two thirds of MT, especially in the eastern half. Bou gra/Agr smi is found on 0-15% slopes of variable aspect, with fine loamy soils, generally below 4,000 feet. Bou gra/Sti com is found on similar sites, usually below 5,000 feet, but soils are somewhat coarser. The Bou gra/Agr smi community is usually recognized where Bou gra has much greater cover than does Agr smi, lending a short-grass appearance. This is usually attributable to sustained grazing pressure, although (natural ?) successional status may on some sites also be accountable as Coupland (1950) has described for Bou gra/Sti com to Sti com/Bou gra in SE Alberta. He also notes overgrazing can cause this short-grass disclimax as it does in Bou gra/Sti com, but he felt mid-grasses were important enough to call them mixed-grass, not short-grass prairie. In SE Alberta, Coupland (1950) reported successional relationships of Bou gra/Sti com preclimax to Sti com/Bou gra in terms of soils and moisture (also grazing disclimax. Smoliak (1965) reported in the same area that light grazing of Sti com/Bou gra produced a Bou gra/Sti com cover type.

If true short-grass prairie is present in SE MT, it is likely similar to one of the following types reported by Moir and Trlica for northeastern Colorado on rolling uplands of the Ascalon soil series: Bou gra/Car hel, Bou gra/Art fri, Bou gra/Ari pur, Car hel/Bou gra, or Buc dac/Bou gra. Collins (1984) listed types dominated by Bou gra and/or Buc dac in Wyoming.

***** Smoliak (1965) ????????? *****
 Moir and Trlica ???????
 Collins 1984 ???????????

Carex geveeri Series

(Though not a true short-grass type, Car gey dominated grasslands fit best here in the UNESCO heirarchy.)

Little quantitative data are available for Car gey dominated grasslands in Montana. Such types have been noted by Schwarzhopf (1973, U73SCH@1MT), Erickson et al (1985, U55ERI@1MT), and Scow (personal communication, FNDSCO@1MT). In central Idaho, Car gey dominated types were tentatively identified by Mueggler and Harris (1969, Q69MUE@1MT).

These grasslands occur in mid to upper montane parks near forest stands in the Pse men and Abi las series. Soils are usually thin with some deeper pockets, and are often on or near "slabrock" outcrops. Slopes are about 30-60%, and aspect is usually S (?). The type is distributed the NW, WC, SW, (NC, C, SC ?) regions of Montana. Species involved include: Car gey, Carex spp, Agrostis spp, Agr spi, Cal pur, Mel spe, Fes ida, Bal sag, Che gra, Cry cri, (and Cal mon?).

***** FNDSCO@1MT ???????? *****
Q69MUE@1MT ????????
U73SCH@1MT ????????

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MTNHP: C5C2ABA//

Carex species Series

***** NEED SERIES DESCRIPTION *****

CAREX SPP/GEUM ROSSII CT

SYNONYMS: "Carex-Geum Meadow" of Bamberg (1961, U61BAM01MT).

SITE CHARACTERISTICS---

Elevation: 8600-9700+

Slope: 0-20?

Aspect: S, SE, E

Soil: Turf, Turf-meadow, and Meadow (Bamberg, 1961, U61BAM01MT).

Comments: More mesic and less exposed than Carex/Geum ros and Geum ros/cushion plant; slope gentle to moderate.

DISTRIBUTION:

COMMENTS: Alpine - igneous.

VEGETATION: 9 quadrats in 5 mountain ranges were dominated in order by various sedges (saxat., scopu., nova, phaeo., hayden., filif., scirp.), Geum ros, Pol bis, Fes baf, Pot con.

PHASES:

COMMENTS: Considered a topoedaphic climax.

SOURCE(S): U61BAM01MT

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MTNHP: C5C8ACA//

Carex elynoides Series

***** NEED SERIES DESCRIPTION *****

Festuca idahoensis Series

***** NEED SERIES DESCRIPTION *****

FESTUCA IDAHOENSIS/CAREX FILIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7800-9200

Slope: 5-20

Aspect: VARIABLE

Soil: Loams.

Comments: Higher elevations in or near mountain saddles in SW MT.

DISTRIBUTION: SW

COMMENTS:

VEGETATION: Also important: Dan cal, Geu tri, Gen aff, Agr can, Car pet, occasionally Car rup. Shrubs absent.

PHASES:

COMMENTS: Generally short grass aspect due to higher elevations; may sometimes be placed in 5B2c at lower elevs. and 5C2a at higher. For range condition, see Davis (1975, U75DAV01MT). Production probably about 800 lbs/ac (50% graminoids, Mueggler and Stewart, 1980, B80MUE01MT).

SOURCE(S): A80MUE01MT

FESTUCA IDAHOENSIS/CAREX SCIRPOIDEA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8500

Slope: Gentle to moderate?

Aspect: VARIABLE?

Soil: Loams.

Comments:

DISTRIBUTION: SC

COMMENTS: Fryor Mountains (East Fryor Mtn.).

VEGETATION: Cover - 40% Car scirp, 10% Fes ida, also Phl hoo, Geu tri.

PHASES:

COMMENTS: May be valid pa, if not actually the result of past sheep grazing.

SOURCE(S): AB0MUE01MT

FESTUCA IDAHOENSIS/DESCHAMPSIA CESPITOSA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8000-10000

Slope: 0-5?

Aspect: VARIABLE

Soil: Loamy, many parent materials.

Comments: A subalpine meadow type; gentle slopes.

DISTRIBUTION: NW, WC, SW

COMMENTS: Western third of MT; subalpine.

VEGETATION: Also important - Agr can, Phl alp, Luz spi, Dan cal, Car scirp, Pol bis, Pot div, Trifolium spp. - Fes ovi may replace Fes ida at highest elevations.

PHASES:

COMMENTS: Production probably 1200-1500 lbs/ac (graminoids and forbs about equal, Mueggler and Stewart, 1980, AB0MUE01MT).

SOURCE(S): AB0MUE01MT

FESTUCA IDAHOENSIS/LEUCOPOGON KINGII CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8650

Slope: 16

Aspect: N

Soil: Shallow range site; argic cryoboroll, loamy-skeletal.

Comments: Ruby Mtns., 10-14 ppt.

DISTRIBUTION: SW

COMMENTS:

VEGETATION: Percent composition by weight: 26% Leu kin, 22% Fes ida, 5% Dan int on a shallow range site in the Ruby Mtns., 65% range condition (SCS, 1979, U79SCS01MT).

PHASES: Leu kin grasslands described by Mosely (1987, U87MOS01MT) for east-central Idaho were stable or unstable (soil stability); stable Lue kin had 3 phases: one transitional to "Carex elynoides turfs", one transitional to "fellfields", and one similar to high-elevation Fes ida ct, but without Fes ida.

COMMENTS: 102 lbs/ac, 84% cover.

SOURCE(S): UNDS01MT U87MOS01MT

Leucopoa kingii Series

The Leu kin series occurs in SW Montana at upper elevations. Unpublished SCS data from the Ruby Mtns indicate Leu kin grassland on a shallow range site in the 10-14" precipitation zone. Soils were argic cryoboroll, loamy-skeletal. Slope was 16% on a northerly aspect. Total cover was 84% and production was 102 lbs/ac. Percent composition by weight was 26% Leu kin, 22% Fes ida, 5% Dan int, with range condition estimated at 65%. Moseley (1987, U87M0S01MT) described Leu kin grasslands for east-central Idaho along the Montana border. He described communities on stable and unstable soils. The stable grasslands had three phases: one transitional to "Carex elynoides turfs", one transitional to "fellfields", and one similar to high-elevation Fes ida ct but without Fes ida.

Polygonum bistortoides Series

The Pol bis series is retained in the pre-settlement classification to represent a grazing-induced disclimax (native ungulates) of the Des ces/Carex pa.

A Pol bis/moss meadow has been described for Glacier National Park by Bamberg (1961, U61BAM01MT). It occurred at about 7400 feet in elevation on deep, poorly drained soil. The meadow was dominated by mosses, Pol bis, Poa alp, Pot div, Pol viv, and Phl alp.

In the Medicine Bow Mtns of Wyoming, Billings (1969, A69BIL01MT) described a Pol bis meadow with Art sco, Des ces, Sib pro and Cal lep as important components.

Silene acaulis Series

***** NEED SERIES DESCRIPTION *****

SILENE ACAULIS MAT-CUSHION PLANT CT

SYNONYMS: "Fellfield" (Bamberg, 1961, U61BAM01MT).

SITE CHARACTERISTICS--

Elevation: 8500-10400+

Slope: See below

Aspect: S

Soil: See Bamberg (1961, U61BAM01MT) (skeletal, turf, turf-scrub or turf-gravel mulch).

Comments: Slope seldom steep; aspect usually southerly. High wind, low moisture, winter snow-free areas on igneous/metamorphic substrate.

DISTRIBUTION:

COMMENTS: Alpine - igneous.

VEGETATION: Most common plants other than Sil aca are Are obt, Sel den, Geu ros, Car ely. For WY (Billings, 1969, A69BIL01MT), see two stands: Are obt-Eri pin-Tri par-Sil aca-Car scopu; also Tri par-Art sco-Are obt-Fes baf.

PHASES:

COMMENTS:

SOURCE(S): U61BAM01MT A69BIL01MT

Xerophyllum tenax Series

***** NEED SERIES DESCRIPTION *****

085SER01MT?

Dryas integrifolia Series

***** NEED SERIES DESCRIPTION *****

Rare high-elevation series restricted to the Big Snowy Mountains of central Montana.

DRYAS INTEGRIFOLIA/CAREX SPP CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 8350-8650+

Slope: 0-30

Aspect: VARIABLE

Soil: Thin over limestone parent material - see Bamberg and Major (1968, A68BAM01MT).

Comments: Aspect not NW. Very dry, windy - see Dry oct/Carex spp.

DISTRIBUTION: C

COMMENTS: Central MT. Alpine - sedimentary, Big Snowy Mtns.

VEGETATION: Dry int found in Big Snowy Mtns. by Bamberg and Major (1968, A68BAM01MT) (also see Bamberg, 1964, U64BAM01MT) - these Dryas stands are almost unique (see Dry oct/Carex). Dominant sedge is Car rup. Other common species are Car sci, Arc uva, Llo ser, Fol viv, Oxy ser, And leh, Hed bor, Hed sul.

PHASES: Car sci phase ("meadow") and Arc uva phase.

COMMENTS:

SOURCE(S): A68BAM01MT U64BAM01MT

Dryas octopetala Series

***** NEED SERIES DESCRIPTION *****

A relatively common high-elevation series in the mountainous western part of Montana.

DRYAS OCTOPETALA/CAREX SPP CT

SYNONYMS: "Dryas terraces" and "Dryas islands"; "Dryas Polygon"; "Dry oct/Car sci meadow".

SITE CHARACTERISTICS--

Elevation: 7700-9500+

Slope: 0-35

Aspect: S, SE, E, (NE)

Soil: Sedimentary (limestone) substrate; thin soil - see Bamberg and Major (1968, A68BAM01MT).

Comments: Includes Bamberg's (1961, U61BAM01MT) winter snow-free types of sedimentary areas (high wind, 50-90% of sed. alpine veg.); (as above, but gentler slopes, thinner A horizon) and (frost sorting); on winter snow-covered areas.

DISTRIBUTION: NW, WC, SW, C, SC

COMMENTS: Sedimentary alpine in western half of MT.

VEGETATION: Bamberg's (1961, U61BAM01MT) "Dryas Terrace" had 75-100% cover of Dry oct mats, also Car sci, Car spp., Llo ser, Pol viv. "Bare" intermittent gravel had Sed ros, Sal niv, And leh, Sil aca. Further refined in Bamberg (1968, A68BAM01MT) (see also Bamberg, 1964, U64BAM01MT) in Glacier N.P. and Flint Creek Mtns. as having any of following as most important subordinate sedge-like: Car rup, Car ely, Kob myo. See Dry int/Carex for more on Car sci. Harvey (1980, A80HAR01MT) had Dry oct/Car rup with Are obt, Are ros, Sax bro. Bamberg and Major (1968, A68BAM01MT) had Car rup, Kob myo, some Car sci, Car ely, with Pol bis, Pol viv, Hed sul, Oxy ser, Lup ser, Sal niv.

PHASES:

COMMENTS: Can be edaphic climax or climatic climax (Bamberg, 1961, U61BAM01MT).

SOURCE(S): A68BAM01MT U61BAM01MT

Carex aquatilis Series

A *Carex aquatilis* type has been described as an "uncommon type" by Pierce (1986, US6FIE01MT) for west-central Montana. It occurred at 6,600-6,700 feet in elevation on mollisols derived from granitics with the water table at the surface. They were on the shoreline of inlet depressions of small, mid- to high-elevation lakes and were usually flooded through mid-summer. Species diversity was very low, with *Carex aquatilis* and *Carex lasiocarpa* usually the only vascular plants. Production was 1260-2540 lbs/ac. The type was associated with *Pinus albicaulis*/*Abies lasiocarpa* and *Carex scopulorum*.

Carex athrostachya Series

A Carex ath type has been described as "uncommon" by Pierce (1986, US&PIE&IMT) for west-central Montana. It is restricted to the bottom of reservoirs and lakes that are 15-20 feet deep in spring but are dry by mid-summer. Soils are entisols. The type was dominated by Carex ath and Poa pal. Production was 1360 lbs/ac. It was associated with Abi las/Lin bor pa, Poa pal ct and Equ ary ct.

Carex buxbaumii Series

A Carex bux type has been described as rather "uncommon" by Pierce (1986, US&PIE&1MT) for west-central Montana. It occurred at 5580-5620 feet in elevation on mollisols derived from limestone to argillite parent materials with the water table at or several dm below the surface. It was along the edges of (or in) wet meadows which were usually flooded in spring, and occasionally into summer. Carex bux is dominant; other important species include Jun bal, Des ces, and Carex sar. Production was 1600-4280 lbs/ac.

Carex flava Series

A *Carex flava* type was described in an unpublished report by WESTECH (1985, U85WES01MT) from Lincoln County in northwestern Montana. It occurred at 3000 feet in elevation in a marl fen. The vegetation was underlain by a water-saturated calcareous peat more than three feet deep. *Carex flava* was dominant; other important species were *Eleocharis acicularis*, *Tripsacum dextratum*, *Lobelia spicata*, *Carex aquatica*, *Carex lasiocarpa*, and *Scirpus acutus*. The site had received some grazing by horses.

Carex lasiocarpa Series

Two Carex las types have been described by Pierce (1986, U26PIE01MT) for west-central Montana. They occurred at 4020-6030 feet in elevation. Soil parent materials were limestone to argillite. The common type was on mollisols with a water table from 1 dm above to slightly below the soil surface. These sites were cool moist meadows usually flooded in spring to early summer. The Pot grm phase ("Carex las/Pot grm" of Pierce) was on histosols with the water table at, or as much as 3 dm above, the surface. These were similar wet sites, probably flooded from spring to mid- or late-summer. The common type was dominated by Carex las and/or Carex lan; other important species were Carex ros, and Jun bal. The Pot grm phase was dominated by Carex las and/or Carex lan, with Pot grm always present in the understory; other important species were Carex rost and Sci acu. Production in the common type was 1000-4100 lbs/ac, while in the Pot grm phase it averaged 1500 lbs/ac (420-2500 lbs/ac).

Carex limosa Series

A Carex lim type was described by Pierce (1986, US6PIE01MT) for west-central Montana. It occurred at 5860-7900 feet in elevation in meadows and ponds on floating or quaking histosols with the water table from 2 cm above to 1 dm below the soil surface. Argillite, quartzite, or granite parent material. The type was dominated by Carex lim and/or Carex liv. Other important species were Carex ros, Drosera spp, and Eriophorum spp. Production was 520-3000 lbs/ac, averaging about 1500. Usually no beaver activity, therefore stable hydric conditions.

At higher elevations the series might be placed with low-sedge swamps (SD18).

Carex nebraskensis Series

A Car neb type was described as "uncommon" by Pierce (1986, US&PIE@1MT) for west-central Montana. It occurred at 3960-4020 feet in elevation on mollisols or entisols with the water table at to 2 dm below the soil surface. Argillite glacial till was the parent material. The type occurs on seeps and springs, usually flooded in spring. Car neb is dominant, associated species include Epi wat, Aln inc, Equ arv, and Gly ela. Production was 2800-4500 lbs/ac, averaging about 3500. Adjacent types are Abi gra/Cli uni pa, Fse men/Sym alb pa, Car las ct.

Since Car neb occurs widely in eastern Montana, several community types dominated by this species can be expected.

Carex rostrata Series

Pierce (1986, U86PIE01MT) described three different types dominated by *Carex rostrata* in west-central Montana, though the series probably occurs commonly in the western half of the state. Pierce's types occurred at 3040-8220 feet in elevation on histosols, mollisols, or entisols with the water table 2 dm above to 5 dm below the soil surface. These wet meadows, seeps, ponds and lake margins were usually flooded in spring to early summer. The soil parent material was argillite, quartzite, or granite. The typical phase was "very common", with *Carex rostrata*, *Carex vesicaria*, and *Carex acutata* together or separately exceeding 25% cover. Other important species included *Glyceria*, *Galium triflorum*, *Menyanthes arvensis*, and *Geum maculatum*. The "*Carex rostrata*/Potamogeton" type included *Potamogeton*, *Carex lasiocarpa*, and *Carex aquatica*. The "*Carex rostrata*/Potamogeton palustris" type included *Potamogeton palustris*, *Scirpus gallicus*, *Equisetum fluviatile*, *Carex aquatica*, and *Scirpus micropodus*. Production in the typical type was 2660-13,460 lbs/ac, averaging about 6500. The *Potamogeton* type averaged 2300, and the *Potamogeton palustris* averaged 8600 lbs/ac. The *Carex rostrata* series extends from the Pinon to the Pin alb zone.

Carex simulata Series

A *Carex sim* type has been described by Lesica (1986, AS6LE901MT) in north-central Montana, at the Pine Butte fen in Teton County. The type occurs at 5000 feet in elevation on poorly drained fibrous peat of the Dougcliff series, underlain by calcareous glacial outwash. The surface of the peat shows string and flark patterning, with strings dominated by graminoids and flarks dominated by aquatic dicots and mosses. The type is rather unique floristically, due to the less mesic climate than that in which most patterned fens occur. This "open fen" type occurs on hummocks and includes *Carex sim*, *Carex aqu*, *Jun bal*, *Muh glo*, forbs and mosses. In some instances, *Sci acu* partially replaces *Carex sim*.

Dulichium arundinaceum Series

The Dul aru series is not well quantified in Montana; Pierce (1986, US6PIE01MT) described a Dul aru community type as rare in west-central Montana in mid-elevation wet meadows. The type occurred at 5860 feet in elevation on a histosol with the water table 1 dm below the surface. The meadows were flooded spring through mid-summer. Species diversity was low, with only Dul aru and Car aqu. Production was low for a sedge-type meadow, at only 840 lbs/ac. Adjacent types were Abi las/Vac ces pa, Car ros/Pot grm ct, and Car lim ct.

Eleocharis palustris Series

The Ele pal series is not well quantified in Montana. Pierce (1986, US6PIE01MT) described a Ele pal community type in west-central Montana along low elevation river banks and in wet, mid-elevation meadows. The type occurred at 3000-5580 feet in elevation on entisols along rivers, and on histosols in meadows. The soil parent material was argillite glacial till. The water table was at the surface or as much as 3 dm below. The areas are probably flooded from spring to early-summer. The species included Ele pal, Equ arv, Pla maj, Men arv, and Pot grm. Production was 1400-9200 lbs/ac, averaging 5635 (75% graminoids, 25% forbs).

Juncus balticus Series

The Jun bal series is not well quantified in Montana. Pierce (1986, US6PIE01MT) described a Jun bal community type in west-central Montana in wet meadows at low to high elevations. It occurred at 4000-8140 feet in elevation on histosols, mollisols, or entisols with the water table at to 2 dm below the soil surface. Soil parent material was argillite, granite, or limestone. The sites may be flooded in spring. Species composition included Jun bal, Cal lep, Poa pra, Pot fru, Car int, and Ped gro. Production was 2500-4200 lbs/ac, averaging about 3250 (70% graminoids, 30% forbs).

Harvey (1980, AB0HAR01MT) described a related type ("Jun bal/Carex") on deep, fine, often alkaline soils, floodplains of permanent streams, snow-melt drainages, rings around vernal pools, and potholes. Species included Jun bal, Car pra, and Car sci.

Since Jun bal is widespread in Montana, a number of communities await quantitative definition, especially those with various Carex species subordinants. This may also prove true for other Juncus species at the series level.

Scirpus acutus Series

The Sci acu series is not well quantified in Montana. Pierce (1986, U86PIE01MT) described a Sci acu community type in west-central Montana in wet meadows and lake margins at 4100-5900 feet in elevation. The soils were histosols or entisols with the water table 6 dm above to 1 dm below the soil surface. The areas were probably flooded from spring to mid- or late-summer. Soil parent material was argillite or limestone. Sci acu dominated over Pot grm and Ele pal. Production was 2620-5640 lbs/ac, mostly graminoids.

The series probably occurs throughout the state.

Scirpus pungens Series

The Sci pun series is not well quantified in Montana and community types are presently poorly defined. However, Prodgers (1978, A78PRO01MT) and Culwell et al (1986, U86CUL02MT) have described vegetation types dominated by Sci pun in the eastern half of Montana (though, the series probably extends at least into the intermountain valleys of the eastern Rockies). The communities occurred at elevations of 2500-4000 feet, on very gentle slopes of 0-3%. Soils were silty, subirrigated bottoms that were poorly drained. Prodgers' (1978, A78PRO01MT) five stands averaged 78% cover Sci pun, 8% Poa jun. Culwell et al's (1986, U86CUL02MT) site was Sci pun/Jun bal (subirrigated).

Carex saxatilis Series

The Carex sax series is not well quantified in Montana. Pierce (1986, US6FIE01MT) described two "uncommon" Carex sax community types in west-central Montana in meadows at elevations of 7660-8200 feet. The types occurred on mollisols or entisols with the water table at or 2 dm below the surface. Soil parent material was granitic. The sites were flooded from spring to early- or late-summer. Species composition in one type was dominated by Carex sax, with Dod jef the only other significant species. The other type was similar, but Pot grm was always present, and Carex aqu was also important. When the types were bordered by Pin alb/Abi las pa, or Des ces ct, production was 840 lbs/ac (90% graminoids). But in areas bordered by Abi las/Cal can or Carex ros/Pot grm ct, production was 1160 lbs/ac (90% graminoids).

Carex scopulorum Series

The Car sco series has some documentation in west-central and south-central Montana. Pierce (1986, U86PIE@1MT) described types dominated or co-dominated by Car sco at elevations of 6660-8220 feet in west-central Montana. Bamberg (1961, U61BAM@1MT) and Johnson & Billings (1962, A62JOH@1MT) have described Car sco types at 8500-10,400 feet in the alpine zone of south-central Montana.

The types were found on slopes of 0-6%, with variable aspect, on soils derived from quartzite to agrillite parent materials. Pierce's sites were on histosols (seldom mollisols) with the water table at to 4 dm below the soil surface. The sites are snow-covered in winter, and tend to be flooded in spring. Bamberg's carex meadow was considered a topographic climax.

In Pierce's (1986, U86PIE@1MT) typical type, Car sco dominated over Dod jef, Lig ten, Des ces, Car nig, and Gen cal. An "uncommon" type was similar in composition to the Car ros ct, but Car sco is always present; other species included Car can, Ele pau and Cal mic. Pierce (1986, U86PIE@1MT) found production to be 1080-5280 lbs/ac. In Bamberg's (1961, U61BAM@1MT) "Carex hummocks" type, the dry hummock tops are dominated by Car sco and Car cap, while the the sides are dominated by Jun par and Cal lep. For 15 quadrats in three mountain ranges, dominance order was Car sco, mosses, Des ces, Jun par, Pot div, Fes bra, Sib pro, Cal lip, Pol bis, Sal wol, Dod pul, Sal ret, and Car cap. Bamberg's (1961, U61BAM@1MT) "Carex meadow" was dominated by several Carices: Car sco, Car pyr, Car pha and others, with good diversity of forbs and other graminoids (little or no Dry oct, however). The "Car sco Bog" of Johnson & Billings (1962, A62JOH@1MT) could be described as a Car sco/Eri cal type with mosses and Cal lep also important.

Eleocharis pauciflora Series

The Ele pau series is not well quantified in Montana. Pierce (1986, US&PIE01MT) described an Ele pau type in west-central Montana in wet meadows and year-round seeps at elevations of 5860-8220 feet. The sites were probably flooded in from spring to early summer. Slopes were 0-8% and aspect was variable. The type occurred on histosols with the water table 3 cm above to 1 dm below the surface. Soil parent materials were granite, argillite, or quartzite. Species composition included Ele pau, Car aqu, Car sim, Car sco, Cal lep, and Des ces. The type was bordered on uplands by Abi las/Cal can, Pin alb/Abi las, or Car sco ct. Adjacent wetter types, if present, were aquatic communities (ponds or slow streams).

Distichlis spicata Series

The Dis spi series is not well documented in Montana. However, Prodgers (1978, A78PRO01MT) and Culwell et al (1985, U85CUL01MT) have reported on types in the series. The series seems to be widespread, but there is little quantitative data. It apparently occurs in all but the northwest and west-central regions of the state, though it is seldom found in the southwest region. The communities seem to be rather restricted in size.

The series occurs at elevations of 2500-4500 feet on slopes of 0-3%. Soils are slightly to very alkaline and fine textured. They are often near vernal pools or water courses.

Culwell et al's (1985, U85CUL01MT) stand 32 had the following cover figures: 29% Dis spi, 28% Hor jub (a strong increaser), and 23% Car pra. Prodgers' (1978, A78PRO01MT) 19 stands yielded the following average cover figures: 58% Dis spi, 2% Spa gra, and 2% Poa jun.

Equisetum fluviatile Series

The Equ flu series is not well quantified in Montana. Pierce (1986, U86PIE01MT) described an Equ flu type in west-central Montana associated with small lakes and inlets of larger lakes. It occurred at elevations of 3990-4120 feet. The soils were floating or quaking histosols with the water table at the surface, or as much as 7 dm below. The soil parent material was Argillite glacial till. The sites were flooded from spring to mid- or late-summer. Species composition includes Equ flu, Pot grm, Elo can, and Epi wat. Production was 4200-13520 lbs/ac (forbs).

Typha latifolia Series

The Typ lat series is not well quantified in Montana, although relatively common statewide. Pierce (1986, US6PIE01MT) described Typ lat types in west-central Montana at elevations of 3200-4000 feet. His "Typ lat ct" occurred on entisol, and his "Typ lat/Pot pal ct" on quaking histosol. The water table was 3 cm to 3 dm below the surface. The sites were flooded from spring to mid- or late-summer. The soil parent materials were granite or argillite alluvium. Species composition in the "Typ lat ct" included Typ lat, Lem min, Spa ang, and Myo law. In the "Typ lat/Pot pal ct", species included Typ lat, Pot pal, Gal trf, and Men tri. Production was 16,540-32,420 lbs/ac, nearly all forbs (this was the highest of all Pierce's riparian types).

Ecological relationships of various potential communities merit study.

Alpine Rock Series

At upper elevations in the mountains, rock outcrops (and talus, scree, cliffs, etc.) sometimes support unusual vegetation assemblages difficult to classify as community types. Bamberg (1961, U61BAM01MT) and Choate & Habeck (1967, A67CHO01MT) list some of the alpine species commonly (or uniquely) found on rock.

Abies lasiocarpa Series

In central and south-central Montana, scattered open stands of *Abies lasiocarpa* occur with a sparse understory of variable species composition. These types occur on steep unstable rocky slopes, at elevations of 5000-6700 feet. Aspects tend to be S, SW, and W.

Pfister (1977, A77PFI01MT) grouped all forested scree types in a single series.

Pinus contorta Series

In central and north-central Montana, scattered open stands of Pin
con occur with a depauperate understory of shrubs and forbs (Pru vir,
Rosa, Rub ida, and Sol spa). These types occur at an elevation of about
5000 feet, on steep unstable rocky slopes in the Little Rocky Mountains
and the Sweetgrass Hills. (See U76CUL01MT and U76THO01MT).

Pinus flexilis Series

In central and south-central Montana, scattered open stands of Pinus flexilis occur with a sparse understory of variable species composition. These types occur at elevations of 5000-6700 feet, on steep unstable rocky slopes. Aspects tend to be S, SW, and W.

Pfister (1977, A77PFI@1MT) grouped all forested scree types in a single series.

Pinus ponderosa Series

In central, north-central, and west-central Montana, scattered open stands of Pin pon occur with a sparse understory of variable species composition. These types occur on steep unstable rocky slopes, at elevations of 3100-7150 feet. Aspects tend to be S, SW, and W.

Pfister (1977, A77PFI@1MT) grouped all forested scree types in a single series.

DRAFT 378

MTNHP: C6A2BFA///

Populus tremuloides Series

***** NEED SERIES DESCRIPTION *****

POPULUS TREMULOIDES/PHYSOCARPUS MALVACEUS-AMELANCHIER
ALNIFOLIA CT

↳ merge with Potr / Amal

SYNONYMS: Designated Populus tremuloides-talus slope ct by Servheen and Lee (1979, U79SER01MT).

SITE CHARACTERISTICS--

Elevation: 4000-6500

Slope: 30-75

Aspect: S, SW, W, NW

Soil: Talus.

Comments: Slightly concave upper drainage bottoms to steep sideslopes adjacent to ravines or developing channel networks.

DISTRIBUTION: WC

COMMENTS: Mission Valley.

VEGETATION:

PHASES:

COMMENTS: Seral community maintained by fire, lack of soil development and low moisture availability.

SOURCE(S): U79SER01MT

Pseudotsuga menziesii Series

In central, north-central, and west-central Montana, scattered open stands of Pae men occur with a sparse understory of variable species composition. These types occur on steep unstable rocky slopes, at elevations of 3100-7150 feet. Aspects tend to be S, SW, and W.

Pfister (1977, A77PFI01MT) grouped all forested scree types in a single series.

Potamogeton species Series

The Potamogeton series has not been well documented in Montana. It likely occurs throughout the state, but little quantitative data are available.

A few unpublished reports describe types in this series. Lesica (1982, US2LES01MT) found the following species composition: Pot nod, Pot fil, Pot pec, Cal het, Myr spi, Pol amp, and Ranunculus sp. WESTECH (1986, US6WES01MT) found in water over 8 feet deep: Pot grm, Pot ill; in shallow water: Pot grm, Nup lut, Naj fle, Utr mac, Elo nut, Myr spi, Chara spp, and other Potamogeton species. WESTECH (1985, US5WES01MT) found Pot grm, Nup var, with Pot pec, Naj fle, and Chara spp.

DRAFT 382

MTNHP: C7E2BBA///

Lemna minor Series

***** NEED SERIES DESCRIPTION *****

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REF. TO U86KRA01MT
 U87WES02MT

MTNHP: C3B4ADADA0

ALNUS INCANA/CALAMAGROSTIS CANADENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3700-6800

Slope:

Aspect:

Soil: Usually Entisols or Inceptisols. Consistently poorly developed alluvial sand deposits over cobbles or bedrock. Sand depths vary from 10 to 75 cm. Profiles remain moist throughout the growing season.

Comments: Usually confined to moist stream edges, overflow channels, and hillside seeps.

DISTRIBUTION: SW

COMMENTS: A minor riparian type at low to mid-elevations.

VEGETATION: ALNINC forms a dense cover over a diverse understory. Scattered CORSTO may be present. Other species include: CALCAN, CALSTR, EQUARV, EQUALAE, HERSPH, ASTOCC.

Species	Mean % canopy cover	Constancy
ALNINC	46	100
EQUARV	10	53
Introduced		
AGRSTO	8	53
PHLPRA	8	60
POAPRA	13	60
TRIREP	6	53

PHASES:

COMMENTS: ALNINC not browsed

SOURCE(S): N88HAN01MTUS

Tuhy & Jensen 1982

Mutz & Queiroz 1983

Youngblood et al 1985

Chadde et al 1988

BETULA OCCIDENTALIS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4400-5600

Slope:

Aspect:

Soil: Cryofluvents. Texture varies from sands to loams, often with a large component of gravel. Profiles are thin, overlying cobbles. Water tables may remain near the surface through summer.

Comments: Occurs on alluvial terraces, streambanks, and floodplains.

DISTRIBUTION: SW

COMMENTS: A minor riparian type at low to mid-elevations. Occurs in many drainages including the Bitterroot, Clark Fork, Madison, and Boulder Rivers.

VEGETATION:

BETOCC dominates over a shrub layer which may include CORSTO, SALEXI, PRUVIR, ROSWOO (ROSACI), and RIBSET. No diagnostic species were found in the diverse herbaceous layer. Introduced graminoids are common now, but originally CALCAN may have been the major grass.

Species	Mean % canopy cover	Constancy
BETOCC	59	100
ROSWOO (+ ROSACI)	12	50
Introduced		
AGRSTO	23	50
POAPRA	32	88
CIRARV	11	50

PHASES:

COMMENTS: The potential vegetation may be SALGEY/CALCAN on some sites, and coniferous communities on others.

SOURCE(S):

N88HAN01MTUS

Chadde et al 1988 Padgett et al 1988

MTNHP: C2A2ABAAM0

JUNIPERUS SCOPULORUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4500-5000

Slope:

Aspect:

Soil: Variable - from thin & rocky in canyons to moist, sandy alluvium on floodplains. Typically Mollisols and Entisols (Cryofluvents) up to 1 m deep over river gravels or cobbles; or Inceptisols. Surface textures vary from coarse sands to loams. Water tables generally drop below 1 m in summer. Soils generally well drained with low available water holding capacity.

Comments:

DISTRIBUTION: SW

COMMENTS: A minor riparian type at low elevations in SW MT.

VEGETATION:

Forms either a narrow band along streams of V-shaped canyons, or broader stands on older alluvial terraces.

Widely scattered JUNSCO with quite variable undergrowth which may include RHUARO, SMISTE, & ELYCAN.

PHASES:

COMMENTS: Seral stands may be dominated by POPTRI and POPANG community types.

SOURCE(S): N88HAN01MTUS

MTNHP: C1B3DEM///

POPULUS TREMULOIDES Series

Aspen typically occurs in small stands within or adjacent to coniferous forests, and tend to be fire maintained or successional to conifers. However, aspen stands may also occur as riparian community without conifers, and may be regenerated through fluvial disturbance.

MTNHP: C1B3DEMCA0

POPULUS TREMULOIDES/SALIX GEYERIANA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4125-6900

Slope:

Aspect:

Soil: Cryaquolls and Cryoborolls on wettest sites, but sites adjacent to streams may be shallow Cryofluvents over cobbles. Texture is coarse, and varies from sandy to silty loam. Water tables generally high in mid summer, but may be more than 1 m deep.

Comments: Typically on alluvial terraces adjacent to streams and rivers.

DISTRIBUTION: SW

COMMENTS: Minor riparian type along most major rivers, including Boulder, Jefferson, Big Hole, Clark Fork, and Blackfoot.

VEGETATION: Overstory of POPTRE, dense understory of willows (including SALGEY, SALB00, and SALDRU) and other shrubs, with diverse forb stratum.

Species	Mean % canopy cover	Constancy
POPTRE	51	100
CORSTO	29	76
ROSACI	10	53
SALB00	9	53
EQUARV	22	53
GALTRI	10	53
SMISTE	7	65

PHASES:

COMMENTS: Grazing and browsing reduce cover and reproduction of POPTRE and willows. SALGEY is considered here to include SALLEM.

SOURCE(S): N88HAN01MTUS

ABIES LASIOCARPA/LEDUM GLANDULOSUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000-8000

Slope: < 5%

Aspect:

Soil: Histosols and Entisols, typically with thick organic layer over glacially deposited material. Water tables at surface in early spring. Water tables typically do not drop below 0.5 m during growing season. Sites moist by not saturated throughout growing season. Soils are acidic.

Comments:

DISTRIBUTION: SW

COMMENTS: A major riparian type at mid- to high elevations in SW MT. Also in Idaho and western Wyoming where described as a phase of ABILAS/CALCAN.

VEGETATION: ABILAS dominates old-growth stands; PINCON and PICENG are major seral dominants. Understory dominated by LEDGLA with lesser amounts of other shrubs. CALCAN absent or poorly represented.

Species	Mean % canopy cover	Constancy
ABILAS	15	100
PICENG	32	100
PINALB	4	56
PINCON	21	67
LEDGLA	26	100
VACSCO	33	100
CALCAN	5	56
ARNLAT	8	89
DODJEF	4	67
SENTRI	5	89
VERVER	7	67

PHASES:

COMMENTS: PINCON is a major seral dominant in many younger stands. Pfister (A77PFIØ1) considered this as part of the ABILAS/CALCAN habitat type. Steele, et al. (A81STEØ1)

SOURCE(S): N88HANØ1MTUS

POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3820-6700

Slope:

Aspect:

Soil: Usually Cryofluvents (up to 1 m deep) over cobbles. After long periods of stability, Mollisols may develop. Texture varies from coarse sands to loams. Upper profile may remain moist even though water table drops below 1 m in mid-summer.

Comments: On alluvial terraces adjacent to larger streams and rivers (Jefferson, Madison, Gallatin, Missouri Rivers).

DISTRIBUTION: SW

COMMENTS: A major riparian type at low to mid-elevations, but restricted to east of continental divide. Youngblood, et al., 1985 (A85YOU01MTUS) described a similar type for eastern Idaho and western Wyoming.

VEGETATION: Cottonwoods over potentially dense layer of shrubs and herbaceous plants. If present, POPDEL and POPTRI are subordinant to POPANG. CORSTO is the diagnostic shrub.

Species	Mean % canopy cover	Constancy
POPANG	43	100
CORSTO	28	60
SYMOCC	17	60
AGRSTO	15	53
SMISTE	6	53

PHASES:

COMMENTS: Unless flood deposition enables continued cottonwood reproduction, succession will lead toward a variety of other communities. Conifers may form the new overstory, and most sites are probably successional to PICEA/GALTRI or PINPON/CORSTO. If conifers are absent, understory shrubs may persist as dominants.

SOURCE(S): N88HAN01MTUS

PINUS PONDEROSA/CORNUS STOLONIFERA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-4500

Slope:

Aspect:

Soil: Typically, Mollisols and Entisols (Cryofluvents) up to 1 m deep over gravels or cobbles. Texture varies from coarse sands to loams. Water table generally drops below 1 m in summer, but upper profile may remain moist. Water table may fluctuate enough for mottling. Generally well drained with low available water holding capacity.

Comments:

DISTRIBUTION: SW

COMMENTS: Minor riparian type at low to mid-elevations in SW MT. Occurs on alluvial benches or terraces of major streams and rivers.

VEGETATION: Overstory of PINPON, may have scattered POPTRI. Dense, shrubby understory of CORSTO, ROSWOOD (ROSACI), PRUVIR, and SYMPHO. Graminoids and forbs well represented.

PHASES:

COMMENTS: Seral stands may be dominated by POPTRI/CORSTO with scattered PINPON successfully reproducing. Similar to PINPON/SYMBOLB-floodplain association described by Kovalchick (1987) in central Oregon.

SOURCE(S): NSSHAN01MTUS

MTNHP: C5F1DCABA0

TYPHA LATIFOLIA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4550-6600

Slope:

Aspect:

Soil: Thick organic matter over fine silts and clays.
Gleying is common. Water depths are usually 30-
100 cm.

Comments: Occurs in pond margins, ditches, oxbows, and
backwater areas.

DISTRIBUTION: SW

COMMENTS: A minor to major type at low to mid-elevations.

VEGETATION: TYPLAT is dominant, but may be accompanied by
small amounts of GLYBOR, BECSYZ, and MENARV.

PHASES:

COMMENTS: Relatively stable type.

SOURCE(S): N88HAN01MTUS
Pierce & Johnson 1985 Chadde et al 1988

EQUISETUM FLUVIATILE PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: low to mid-elevations

Slope:

Aspect:

Soil: Varying from mineral to organic. Histosols, Mollisols, and Entisols. Mineral soils usually have a thick organic layer. Poorly to very poorly drained. Water holding capacity is high. Standing water usually present all through the growing season.

Comments: Occurs in shallow water or on wet ground along lake or pond margins, and backwater areas of rivers and streams.

DISTRIBUTION: SW, NW

COMMENTS: An incidental riparian type at low to mid-elevations of southwestern Montana, but common to the northwest near Flathead Lake and the Swan Valley.

VEGETATION: Usually dense monotypic stands of EQUFLU. Sometimes accompanied by small amounts of ELEACI, SAGCUN, and MYOLAX.

Species	Mean % canopy cover	Constancy
EQUFLU	19	100
GALTRI	3	67
POTGRA	3	67

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS
Dirshl et al 1974

MTNHP: C5E2BBABA0

DISTICHLIS SPICATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: low to mid

Slope:

Aspect:

Soil: Cryaquolls or Cryoborolls in cold, wet basins. Argiborolls or Haploborolls on Piedmont glacial moraines. Parent materials include alluvium and sediments. Soils are mineral, varying from clays to silt loams. Usually highly saline or alkaline. Water holding capacity ranges from medium to high. Tolerant of prolonged seasonal flooding.

Comments: Occurs in basins, swales, pond and lake margins, and saline or alkaline seeps.

DISTRIBUTION: SW, NW, NE, SE, C,

COMMENTS: Common in eastern Montana, also occurs near Eureka in NW Montana.

VEGETATION: DISSPI forms a nearly pure sward, with PUCNUT and widely scattered HORJUB.

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS
Daubenmire 1970

ELEOCHARIS PAUCIFLORA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7200-8300

Slope:

Aspect:

Soil: Usually thick Histosols with the water table at or near the surface all year. Slightly acidic to neutral.

Comments: Occurs in wet basins and adjacent to streams and ponds

DISTRIBUTION: SW

COMMENTS: A minor type at mid- to high elevations.

VEGETATION: Dominated by ERIPAU. Other plants include: DESCES, CARAQU, PHLALP, CALLEP, DODJEF, PEDGRO, and SENCYM.

Species	Mean % canopy cover	Constancy
DESCES	5	64
ELEPAU	48	100
SENCYM	3	57

PHASES:

COMMENTS: ELEPAU is an early colonizer that can persist under wet conditions.

SOURCE(S): N88HAN01MTUS
 Mattson 1984 Kovalchik 1987

CAREX SCOPULORUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6500-8300

Slope: 0-8%

Aspect:

Soil: Usually Histosols (e.g., Typic or Terric Borofibrists) consisting of partially decomposed organic matter over bedrock or alluvium. Can occur on Mollisols. Usually have standing water in summer. Alluvial sites usually have coarse-textured mineral soils with buried organic horizons. Poorly to very poorly drained. Moderate to high water holding capacity. Commonly flooded. Water tables within the rooting zone through summer. Saturated conditions promote accumulation of organic matter. Acidic (pH about 5.0).

Comments: Occurs in cold, moist, low to moderate gradient mountain meadows or basins, seeps. Also occurs on alluvial terraces of first- to second-order streams or lake margins in the subalpine to alpine. Snow-free season may be only two or three months.

DISTRIBUTION: SW

COMMENTS: Minor to major type at mid- to high elevations.

VEGETATION:

Species	Mean % canopy cover	Constancy
CARSCO	42	100
DESCES	14	92
ELEPAU	15	54
PHLALP	8	62
CALLEP	30	69
LIGTEN	15	62
PEDGRO	8	54
SENCYM	9	54

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS

Kovalchik 1987

Cole 1982

Campbell 1977 Rameley 1919

SCIRPUS ACUTUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4100-6650

Slope:

Aspect:

Soil: Histosols with thick accumulations of organic matter. Also gleyed, silty soils (sometimes developed in volcanic ash) in the Yellowstone area. Water table high in spring and early summer, but may drop below soil surface by mid-summer. Slightly basic to basic.

Comments: Usually at pond or lake margins, and backwater areas.

DISTRIBUTION: SW

COMMENTS: Minor riparian type at low to mid-elevations.

VEGETATION: SCIACU forms a fringe along the shore in water about 2 m deep, or occurs in basins with high water tables that drop below the soil surface. Few other plant species are present, but CARROS, TRIMAR, EPIWAT, and MENARV may be present.

PHASES:

COMMENTS: SCIACU is an initial colonizer that persists for a long time.

SOURCE(S): N88HAN01MTUS

Pierce & Johnson 1986 Chadde et al 1988

ELEOCHARIS PALUSTRIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-7950

Slope:

Aspect:

Soil: Histosols, Mollisols, and occasionally Entisols. May have organic surface horizons. Textures of mineral soils ususally fine silts or clays. Water tables vary from the soil surface to 1 m below.

Comments: Occurs on stream and lake margins, or wet basins. Most sites are subject to annual flooding.

DISTRIBUTION: SW

COMMENTS: Minor riparian type at low to mid-elevations. Examples can be found along the Clark Fork, Big Hole, and Red Rock Rivers, and the shore of Browns Lake.

VEGETATION: ELEPAL dominates, ELEACI and HORJUB are common. Minor amounts of SENHYD, POTANS, and POLAMP.

PHASES:

COMMENTS: ELEPAL is apparently an initial colonizer that persists under wet conditions. ELEPAL stands are considered here to include all combinations of ELEPAL and ELEACI.

SOURCE(S): N88HANØ1MTUS

Chadde et al 1988 Padgett et al 1988

MTNHP: C5D1AKABA0

CAREX SIMULATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5950-7400

Slope:

Aspect:

Soil: Histosols with thick accumulations of organic matter. May also occur on gleyed, silty to clayey soils. Water tables usually remain at or near the surface during the growing season. Neutral to slightly acidic.

Comments: Occurs in broad meadows, on gentle slopes below seeps, and on flat alluvial terraces next to streams.

DISTRIBUTION: SW

COMMENTS: Minor riparian type at mid- to high elevations.

VEGETATION: Dominated by CARSIM, but CARROS and CARAQU are usually present. Other plants may include: TRIMAR, EPIWAT, and MULFIL, plus occasionally small amounts of BETGLA, SALCAN, SALWOL, and FOTFRU.

Species	Mean % canopy cover	Constancy
SALCAN	1	60
CARROS	3	60
CARSIM	76	100
TRIMAR	6	60

PHASES:

COMMENTS: High water tables limit establishment of many species.

SOURCE(S): N88HAN01MTUS

CAREX ROSTRATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-8200

Slope:

Aspect:

Soil: Commonly Histosols with accumulations of organic matter greater than 1 m thick. May be Mollisols (Cryaqualls or Cryoborolls), or Entisols. Textures vary from sandy loams to loamy clays. Mottling or gleying is common. Water tables usually are within 1 m of the soil surface in the growing season. Neutral to slightly acidic.

Comments: Adjacent to low gradient streams in wide valley bottoms, or associated with perennial seeps. Often occur in old beaver ponds that have filled in. One of the wettest riparian communities.

DISTRIBUTION: SW

COMMENTS: A major riparian type, widely distributed from low elevations to the subalpine.

VEGETATION: CARROS dominates, or is codominant with CARAQU in the CARAQU Phase. Sometimes CARATH and CARVES may be intermixed or can dominate similar sites, but are considered ecological equivalents and are lumped into this plant association. Three phases generally reflect a gradual moisture/aeration gradient. All phases may include: EPIWAT, GEUMAC, MENARV, and EQUARV.

PHASES: CARROS Phase - wettest phase, other plant species sparse or absent.

CARAQU Phase - intermediate moisture. CARAQU and CARROS usually codominant, small amounts of DESCES may occur.

DESCES Phase - driest phase, appreciable amounts of DESCES.

COMMENTS: CARROS may colonize exposed mineral substrates, and may persist. High water tables and rhizome network limit establishment of other plants.

SOURCE(S): N88HAN01MTUS
 Norton 1981 Tuhy & Jensen 1982 Mutz & Queiroz 1983
 Mattson 1984 Youngblood et al 1985 Chadde et al 1988
 Padgett et al 1988

MTNHP: C5D1AHABA0

CAREX NEBRASKENSIS CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4000-6350

Slope:

Aspect: Variable

Soil: Limited data indicate Mollisols with loam to clay loam textures. Saturated through summer.

Comments: Occurs on smooth surfaces of flat to gently wide sloping meadows, and on lower slopes. May occur next to streams or rivers.

DISTRIBUTION: SW

COMMENTS: An incidental riparian type at low to mid-elevations.

VEGETATION: Dominated by CARNEB. Other plants present in small amounts include: CALCAN, GEUMAC, EPIWAT.

Species	Mean % canopy cover	Constancy
CARNEB	85	100
EPICIL	2	50
GEUMAC	8	50

PHASES:

COMMENTS: CARNEB may have increase at the expense of more palatable plants.

SOURCE(S): N88HAN01MTUS

Norton 1981 Mutz & Queiroz 1983

Youngblood et al 1985

Fadgett et al 1988

CAREX LIMOSA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5800-8000

Slope:

Aspect:

Soil: Histosols (e.g., Typic Borofibrists) consisting of deep fibric peat, saturated with standing water in spring. Very poorly drained. High water holding capacity. Acidic (pH about 5.0).

Comments: Associated with pond and lake margins, usually developing on floating or quaking organic mats. May occur on low gradient outflows of ponds or lakes.

DISTRIBUTION: SW

COMMENTS: Minor riparian type at mid- to high elevations.

VEGETATION: Diagnostic sedges are CARLIM, CARLIV, and CARPAU.

Species	Mean % canopy cover	Constancy
CARLIM	17	100
CARROS	3	60

PHASES:

COMMENTS: CARLIM stands are considered here to include all combinations of CARLIM, CARLIV, and CARPAU.

SOURCE(S): N88HAN01MTUS
Mattson 1984

CAREX LASIOCARPA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4020-6030

Slope:

Aspect:

Soil: Variable. Meadow and basin sites usually have mineral soils with accumulations of partially decomposed organic matter. Surface textures are usually organic loams. Poorly to very poorly drained with moderate to high water holding capacity. Often flooded until July or August, with water tables within the rooting zone through the growing season.

Comments: Occurs in meadows, basins, glacial depressions, and along lake margins favorable to anaerobic buildup of organic soils.

DISTRIBUTION: SW

COMMENTS: A minor riparian type at mid-elevations.

VEGETATION: Diagnostic sedges include: CARLAS, CARLAN, CARBUX.

Species	Mean % canopy cover	Constancy
CARBUX	32	40
CARLAN	30	40
CARLAS	52	40
CARROS	2	40
DESCES	6	40
JUNBAL	18	40

PHASES:

COMMENTS: CARLAS stands are considered here to include all combinations of CARLAS, CARLAN, CARBUX, as ecological equivalents.

SOURCE(S): N88HAN01MTUS
Kovalchik 1987 Mattson 1984

CAREX AQUATILIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6200-8400

Slope:

Aspect:

Soil: Usually the CARAQU Phase is on Histosols, but may be associated with Mollisols or Entisols. Soil textures vary from sandy loams to clays. Water tables are at or near the surface all year. The DESCES Phase is often on coarse to medium textured mineral soils with thin accumulations of organic matter at the surface. Water tables may drop 1 m below the surface by mid-summer in the DESCES Phase. Soils in both Phases range from neutral to slightly acidic.

Comments: Occurs on smooth, flat, broad benches or valley bottoms immediately adjacent to open water. Sites include silted-in beaver ponds, old oxbow lakes, depressions left by migrating stream channels, or narrow bands next to small streams.

DISTRIBUTION: SW

COMMENTS: A minor riparian type at mid- to high elevations.

VEGETATION: CARAQU dominates or is codominant with DESCES, depending on phase. Associated plants may include: SALWOL, POTFRU, CALSTR, GEUMAC, ASTOCC, JUNBAL.

PHASES: CARAQU Phase - slightly wetter. May include small amounts of SALWOL, POTFRU, CALSTR, GEUMAC.

DESCES Phase - drier. Codominated by CARAQU and DESCES, with JUNBAL and lesser amounts of ASTOCC and GEUMAC.

COMMENTS: CARAQU is apparently a colonizer of exposed mineral substrates, and is persistent due to high water tables and a vigorous network of rhizomes. CARAQU stands are considered here to include all combinations of CARAQU and CARLEN.

SOURCE(S): N88HAN01MTUS

Mutz & Queiroz 1983

Mattson 1984

Youngblood et al 1985

Chadde et al 1988

GLYCERIA BOREALIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5500-7500

Slope: 0-1%

Aspect:

Soil: Varying from mineral to organic, including Histosols, Mollisols, and Entisols. Mineral soils usually have a thick organic layer. Poorly to very poorly drained. Water holding capacity is moderate to high. Water tables are high and often above the soil surface all summer. Neutral to slightly acidic.

Comments: Occurs on pond and lake margins, and on low-gradient streams in shallow water. Occasionally in wet meadows.

DISTRIBUTION: SW

COMMENTS: An incidental riparian type at mid- to high elevations.

VEGETATION: Dominated by GLYBOR.

Species	Mean % canopy cover	Constancy
ELEPAL	7	50
GLYBOR	24	100
RANFLA	41	50

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS
Jeglum et al 1974

DESCHAMPSIA CESPITOSA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5620-82890

Slope:

Aspect:

Soil: Mollisols (Cryaquolls and Cryoborolls) and Entisols. Wet stands may have substantial organic matter at the surface. Texture varies from silt loams to organic loams on moist sites. Drier sites vary from silt loams to clay loams. Usually water tables are at or above the surface at snowmelt, but may drop below 1 m on the driest sites. Water tables are generally higher on organic soils than on mineral soils. Poorly drained. Water holding capacity is moderate to high.

Comments: Occurs on many landforms, including basins, wet meadows, nearly level stream terraces, and seeps. Commonly flooded snowmelt in late spring and early summer.

DISTRIBUTION: SW

COMMENTS: Minor to major riparian type at mid- to high elevations.

VEGETATION: DECES dominates in a dense sward. Species composition varies along a moisture gradient. Moist sites include: CARROS, CARAQU, CARNEB, JUNBAL, PEDGRO, POTANS, GALTRI, and GEUMAC. Intermediate and drier sites have TRIWOL and DANINT, with POTGRA and ASTFOL on the drier sites. Usually there are no shrubs.

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS

Mueggler & Steward 1980

Kovalchik 1987

Youngblood et al 1985

Tuhy & Jensen 1982

KALMIA MICROPHYLLA/CAREX SCOPULORUM PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6660-7950

Slope: 0-4%

Aspect:

Soil: Histosols (Typic or Terric Borofibrists), consisting of partially decomposed organic material overbedrock or alluvium. Poorly drained, moderate to high water holding capacity, saturated through the growing season. Slow decomposition and subsequent organic matter accumulation. Water table usually within 5 cm of the surface. Acidic (pH about 5.0).

Comments: Occurs in cold, moist, low gradient mountain meadows, and along small streams and lake margins in the alpine and subalpine.

DISTRIBUTION: SW

COMMENTS: An incidental riparian type at mid- to high elevations.

VEGETATION: Typically occurs in small patches raised slightly above adjacent wetter community types.

Species	Mean % canopy cover	Constancy
KALMIC	22	100
PHYEMP	1	60
CARNIG	47	60
CARSCO	47	60
DANINT	8	80
DESCES	10	100
ASTFOL	18	80
DODJEF	8	80
GENCAL	38	80
LIGTEN	30	60
POTNOR	15	60

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS

SARCOBATUS VERMICULATUS/ELYMUS CINERIUS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 5000

Slope:

Aspect:

Soil: Typically on heavy, poorly drained saline or alkaline soils.

Comments: Usually a narrow band along the floodplains of rivers and streams. May occur more on toeslopes than on the flat.

DISTRIBUTION: SW, WC, NW?

COMMENTS: In low precipitation zones throughout western MT.

VEGETATION: Presence of ELYCIN distinguishes this type from SARVER/AGRSMI. AGRSMI is usually abundant, and AGRSPI, KOEPYR and CARFIL may be present. Forbs are more common than in SARVER/AGRSMI, and include ASTCHI, IVAAXI, and SPHCOC.

PHASES:

COMMENTS: Environmental differences from SARVER/AGRSMI are uncertain. May be on better drained, less saline sites.

SOURCE(S): AB0MUE01MTUS

SALIX WOLFII/CAREX AQUATILIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 7350-8500

Slope:

Aspect:

Soil: Histosols in basins and broad valleys. Cryofluvents may be present in streamside sites. Organic horizons 70-100 cm thick, mottling and gleying often evident. Water table usually high and within 1 m of the surface through growing season. Acidic to neutral.

Comments: Occurs in wet basins and valley floors adjacent to low gradient streams.

DISTRIBUTION: SW

COMMENTS: A minor riparian type restricted to sites east of the Continental Divide.

VEGETATION: SALWOL forms an open layer 60-100 cm tall, over a dense stand of CARAQU. May include minor amounts of SALPLA, POTFRU and BETGLA, plus incidental conifers. Common graminoids include: CARAQU, CARROS, DESCES and JUNBAL. Forbs include: FEDGRO, ASTOCC and POTGRA.

Species	Mean % canopy cover	Constancy
SALWOL	35	100
CARAQU	25	76
CARROS	19	53
DESCES	12	76

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS

Youngblood et al 1985 Chadde et al 1988
?? Mutz & Queir 1983 (disturbed)

SALIX WOLFII/DESCHAMPSIA CESPITOSA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6000-8600

Slope:

Aspect:

Soil: Usually Cryofluvents or Cryaquolls with thin sandy loams over gravels or cobbles. Sites near seeps are Histosols. Gleying indicates that sites remain wet throughout growing season.

Comments: Occurs on stream terraces, basin margins, and adjacent to seeps.

DISTRIBUTION: SW

COMMENTS: A major riparian type east of the Continental Divide. Located near Lower Red Rock Lake and along major drainages like the Madison, Big Hole and Ruby Rivers.

VEGETATION: Low, open shrub layer over a dense stand of herbaceous plants. SALWOL is dominant, but POTFRU, ARTCAN and BETGLA may also be present. Graminoids: DESCES, JUNBAL, and AGRCAN. Forbs: FRAVIR, CIRSCA, and POTGRA.

Species	Mean % canopy cover	Constancy
POTFRU	13	59
SALWOL	36	100
AGRCAN	2	53
DESCES	13	71
JUNBAL	19	65
FRAVIR	7	59
POTGRA	1	59

PHASES:

COMMENTS:

SOURCE(S): N88HAN01MTUS

Youngblood et al 1985 Chadde et al 1988
 ?? Mutz & Queiroz 1983 (disturbed type) ??

SALIX PLANIFOLIA/CAREX AQUATILIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6620-8830

Slope:

Aspect:

Soil: Histosols (Typic or Terric Borofibrists), Entisols (Cryaquents), occasionally Mollisols (Histic or Typid Cryaquolls). Usually include partially decomposed organic matter over mineral horizons of alluvial sands, silts, and clays or occasionally gravels. Acidic pH. Gleyed at or near upper boundary. Poorly drained, with high water holding capacity. Sites may be flooded until summer, and root zone is usually permanently saturated.

Comments: Meadows adjacent to lakes, streams and springs. Often the wettest terrestrial willow sites.

DISTRIBUTION: SW

COMMENTS: Minor riparian type at mid- to high elevations.

VEGETATION: Diagnostic shrubs are Salix commutata and Salix planifolia var. monica, which is shorter and has broader leaves than the lower elevation variety (planifolia).

Species	Mean % canopy cover	Constancy
SALPLA	17	94
CARAQU	32	68
CARROS	31	52
DESCES	6	68

PHASES:

COMMENTS: Youngblood et al (1985) described a lower elevation type dominated by Salix planifolia var. planifolia. SALPLA is considered here to include all combinations of SALPLA and SALCOM as ecologically equivalent.

SOURCE(S): N88HAN01MTUS

SALIX GEYERIANA/CALAMAGROSTIS CANADENSIS PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4550-7260

Slope:

Aspect:

Soil: Usually Cryaquolls and Mollic Cryofulvents.
 Surface accumulations of organic matter common.
 Water table variable, but usually seasonally high.
 Wettest sites may have water near surface all
 summer.

Comments: Along streams.

DISTRIBUTION: SW

COMMENTS: Major riparian type along major drainages and
 tributaries, including the Blackfoot, Big Hole,
 Boulder, Gallatin, Jefferson and Clark Fork Rivers

VEGETATION: Overstory potentially dominated by SALGEY, SALBOO
 and SALDRU, but smaller amounts of SALLUT, SALBEB,
 CORSTO and ALNINC may be present. Understory
 dominated by CALCAN and CALSTR. A variety of
 forbs may be present.

Species	Mean % canopy cover	Constancy
SALBOO	24	63
SALGEY	34	66
CALCAN	30	63
ASTOCC	5	50
GEUMAC	3	63

PHASES:

COMMENTS: Heavy browsing may reduce willow cover and produce a
 more open community. SALGEY is considered here to
 include SALLEM. All combinations of SALGEY, SALBOO,
 SALDRU, and SALLUT are considered ecological
 equivalents here.

SOURCE(S): N88HAN01MTUS

Youngblood +, 1985; Tuhy & Jensen, 1982.

SALIX GEYERIANA/CAREX ROSTRATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 4100-7800

Slope:

Aspect:

Soil: Typically, fine-textured Cryaquolls and Cryborolls, but rarely Inceptisols and Entisols. Water tables near surface all summer; gleying evident at 20-25 cm. Neutral to slightly basic.

Comments: Occurs in broad valley bottoms, along lakeshores, and abandoned beaver ponds.

DISTRIBUTION: SW

COMMENTS: A major riparian type at mid- to moderately high elevations in major drainages and tributaries, including the Big Hole, Beaverhead, Boulder, Clark Fork, and Jefferson Rivers.

VEGETATION: The most common shrubs are SALGEY, SALDRU, SALBOD, and SALLUT, but SALWOL, SALBEB, and POTFRU may also be present. Understory is dominated by CARROS and CARAQU. Common forbs include EQUARV and GEUMAC.

Species	Mean % canopy cover	Constancy
SALGEY	21	62
CARROS	39	82
GEUMAC	3	59

PHASES:

COMMENTS: On disturbed sites, JUNBAL, POAPAL and POAPRA may be common. Beaver activity may reduce willow cover and lead to dominance by CARROS and CARAQU. Stream downcutting can cause the site to dry and convert to dominance by JUNBAL, POAPAL and POAPRA. SALGEY is considered here to include SALLEM. All combinations of SALGEY, SALBOD, SALDRU, and SALLUT are considered ecological equivalents here.

SOURCE(S): N88HAN01MTUS

Norton, 1981; Mutz & Queiroz, 1983; Youngblood +, 1985; Chadde +, 1988; Padgett +, 1988.

SALIX GEYERIANA/DESCHAMPSIA CESPITOSA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3700-7100

Slope:

Aspect:

Soil: Vary from Entisols with some development (Mollic Cryofluvents) to Mollisols (Cryaquolls, Cryborolls). Textures are from sandy loams to clay loams. Neutral to slightly basic. Water tables usually 20-50 cm below surface in summer. Mottling and gleying is common at these depths.

Comments: Occurs on alluvial terraces along rivers, small streams, and adjacent to seeps. Topographic position is between wetter sedge or willow communities and drier grass or shrub communities.

DISTRIBUTION: SW

COMMENTS: A major riparian type at low to mid-elevations in SW MT. On most major drainages: upper Galatin, Ruby, Big Hole, Beaverhead, Red Rock, and Clark Fork Rivers.

VEGETATION: Dominated by SALGEY and SALBOO, but may have smaller amounts of SALBEB, SALLUT, (SALDRU?), BETOCC and POTFRU. Most constant graminoids are DESCES and JUNBAL. Common forbs include ACHMIL, FRAVIR, GEUMAC and TAROFF.

Species	Mean % canopy cover	Constancy
POTFRU	9	68
SALBOO	23	52
SALGEY	13	50
DESCES	7	73
JUNBAL	16	85
ACHMIL	1	50
FRAVIR	4	52

PHASES:

COMMENTS: Heavy browsing by wildlife or livestock can reduce vigor of willows and prevent successful regeneration. SALGEY is considered here to include SALLEM, and all combinations of SALGEY, SALBOO, SALDRU, and SALLUT are considered to be ecologically equivalent.

SOURCE(S): N88HAN01MTUS

Similar communities from: Padgett et al 1988

Norton 1981

Tuhy & Jensen 1982

Mutz & Queiroz 1983

Mattson 1984

Youngblood et al 1985

Chadde et al 1988

MTNHP: C3B4CFG///

SALIX LASIANDRA Series

Riparian communities of this Series have been described only in southwestern Montana by Hansen, et al., 1988 (N88HAN01MTUS). The communities are pioneer or early seral on newly deposited coarse alluvial material.

SALIX LASIANDRA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3040-5400

Slope:

Aspect:

Soil: Entisols (Cryofluvents, or less commonly Fluvaquents and Cryaquents). Infrequently Mollisols (Cryoborolls). Texture usually coarse. Water table high throughout growing season.

Comments: Occurs immediately adjacent to streams and rivers on alluvial sands and gravels, on sites which flood frequently. May occur on islands.

DISTRIBUTION: SW

COMMENTS: An incidental riparian type at low to mid-elevations. Found along the Madison and Big Hole Rivers.

VEGETATION: At lower elevations, SALLAS may become a medium-sized tree, overtopping associated willows: SALEXI, SALLUT, and also CORSTD and ROSWOO (ROSACI). At mid-elevations, SALLAS has a more shrubby form, and may be associated with SALB00, SALDRU and ALNINC.

Species	Mean % canopy cover	Constancy
SALEXI	13	50
SALLUT	17	100
CARAQU	32	67
DESCES	15	50
ELEPAL	2	67
EQUARV	13	50
MENARV	9	83

PHASES:

COMMENTS: Pioneer or early seral on coarse alluvial materials. May persist with repeated fluvial disturbance. Displaced if silts and sands are deposited, enabling cottonwoods or other willows to establish.

SOURCE(S): N88HAN01MTUS

SALIX EXIGUA CT

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 3000-5250

Slope:

Aspect:

Soil: Cryofluvents, rarely Mollisols. Thin sandy loams over deposits of sand, gravel, or cobbles. Usually moist in spring and early summer, may remain saturated throughout growing season.

Comments: Sites include lakeshores and ditches, and sand or gravel deposits subject to annual flooding.

DISTRIBUTION: SW

COMMENTS: A major, widespread riparian type at low to mid-elevations. Found along the Bitterroot, Clark Fork, Beaverhead, Gallatin, East Gallatin, Jefferson, and Missouri Rivers.

VEGETATION: Major shrubs include SALEXI, ROSWOO, ROSACI and CORSTO. Commonly now includes introduced grasses and forbs.

Species	Mean % canopy cover	Constancy
SALEXI	45	100
Introduced:		
AGRSTO	27	54
CIRARV	5	61

PHASES:

COMMENTS: Presence of other willow species may indicate successional trend toward dominance by SALLUT, SALGEY or SALBOO.

SOURCE(S): N88HAN01MTUS

Norton et al 1981 Mutz & Queiroz 1983 Tuhy & Johnson 1982
 Youngblood et al 1985 Chadde et al 1988

SALIX CANDIDA Series

A riparian plant association described by Chadde, et al. (1988) (N88??????MTUS) from northern Yellowstone National Park, and a "dwarf carr" described by Lesica (1986) (U86LES??MTUS) at Pine Butte Swamp along the Rocky Mountain Front. Thought to occur elsewhere in Montana.

SALIX CANDIDA/CAREX ROSTRATA PA

SYNONYMS:

SITE CHARACTERISTICS--

Elevation: 6650-7100

Slope:

Aspect:

Soil: Histosols (Borofibrists) with organic horizons over 1 m thick. Water table at or near the surface throughout the growing season.

Comments: Restricted to anchored organic mats along pond and lake margins.

DISTRIBUTION: SW

COMMENTS: A riparian type described in northern Yellowstone National Park, but thought to occur elsewhere in Montana.

VEGETATION: Characterized by scattered clumps of SALCAN and SALPLA over a dense stand of CARROS. Other important plants include: CARAQU and Calamagrostis spp. Low species diversity.

Species	Mean % canopy cover	Constancy
POTFRU	1	50
SALCAN	7	100
SALWOL	2	50
CALSTR	8	83
CARAQU	13	67
CARDIA	3	50
CARROS	43	50
CARSIM	10	67
JUNBAL	14	50
ASTFOL	1	50
TRIMAR	2	67
VIOLAX	1	50

PHASES:

COMMENTS:

SOURCE(S): NB8HAN01MTUS