PLANT COMMUNITIES OF NORTHEASTERN MONTANA: A FIRST APPROXIMATION

Robert L. DeVelice
U.S. Forest Service
Chugach National Forest
201 East 9th Avenue
Anchorage, Alaska 99501

Stephen V. Cooper & J. Tim McGarvey
Montana Natural Heritage Program
1515 East 6th Avenue, Helena, MT 59620

Juanita Lichthardt
Moscow, Idaho 83843

Patrick S. Bourgeron
The Nature Conservancy
Boulder, CO 80302

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MISSION STATEMENT

This study is a working component of the Montana Natural Heritage Program's (MTNHP) grasslands/shrublands ecological classification project (GSCP) and The Nature Conservancy's ecology program in the western United States. The Nature Conservancy program provides key information on plant communities to be used for conservation planning, management, research, and moni-toring. Although grasslands and shrublands cover over 75% of the Montana landscape, an exhaustive review of existing information (MTNHP 1990) revealed them to be the least documented vegetation types of the state. Therefore, the GSCP is designed as a first approximation classification over the full range of ecological conditions. This document will serve as a baseline for regional correlations of existing classifications. The information provided by the project will be the basis for programs to model the effects of management, global changes, and other variables on the vegetation types and diversity patterns, and their implications for further management and conservation planning. The project will continue to focus on strong collaborative work with the various state and federal agencies (BLM, USFS, BIA, DOD) and other institutions (e.g. Montana universities) in order to contribute to the development of a tightly integrated state-wide classification system.

ABSTRACT

Interrelationships between vegetation composition and envi-ronment were studied using 125 vegetation plots sampled in a 12.5 million acre (50,000 km^2) area of predominantly mixed-grass prairie in northcentral to northeastern Montana. Using a combination of two-way indicator species analysis, detrended correspondence analysis, and detrended canonical correspondence analysis (DCCA), 24 community types were identified. The patterns in community composition were strongly correlated with soil disturbance and moisture gradients and these relationships are discussed. Keys are provided for each community type sampled (and 54 additional types docu-mented in the literature).

CONTENTS

INTRODUCTION

This study provides a classification of plant communities (primarily grasslands and shrublands) throughout northeastern Montana (Figure 1). The study emphasized locating and describing rare or previously undescribed communities and common communities in good to excellent ecological condition. Such a classification will be useful in identifying sensitive communities and natural areas where management activities may need to be adjusted to maintain habitat values. Additionally, the classification provides a reference system for baseline monitoring of environmental impacts and vegetation recovery and provides an ecological basis for categorizing environmental variation.

This study represents a step towards developing a comprehensive classification of Montana plant communities that will provide land managers and scientists a state-wide perspective of community variation (nation-wide when correlated with other state classifications). Such a perspective is invaluable towards making sound management prescriptions and predictions, designing and interpreting experiments, and identifying areas of critical importance for conservation.

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PREVIOUS RESEARCH

Grasslands and shrublands cover over 75 percent of the Montana landscape, yet are the most poorly described vegetation types of the state. Figure 1 highlights both the vast expanse of Montana grasslands and the sparseness of available detailed community characterizations (particularly in northeastern Montana). To date, studies characterizing grassland and shrubland communities of Montana have been of limited geographical and ecological scope. The most extensive existing studies include Mueggler and Stewart's (1980) in western Montana, Jorgensen's (1979) and Harvey's (1982) studies in east-central Montana, and Hansen and Hoffman's (1985) work in southeastern Montana. A recent dissertation (Harvey 1990) describing the major component species of grassland/shrubland communities of south-central Montana in relation to water availability gradients has bearing on community distribution on regional landscapes.

Grassland and shrubland studies available for the northeastern Montana study area, that at least in part are classifications, include Branson et al. (1970), Mackie (1970), and Dusek (1971); but, all of these studies cover relatively small geographic areas and have no associated formal taxonomies (keys to community types or plant associations).

Relevant grassland/shrubland classifications from adjacent states and provinces include: Whitman and Hanson (1939), Coupland (1950; 1961), Hansen et al. (1984), Hansen (1985), Girard et al. (1989), and Jones (1992).

In contrast to grasslands and shrublands, the classification of forest types of Montana is largely complete, at least for late seral (mature) to climax associations. The upland forest classification of Pfister et al. (1977), based largely on sampling National Forest and immediately adjacent lands, has been refined and complemented by the work of Cooper and Pfister (1981; 1985) and Roberts et al. (1979) on Montana indian reservations and Roberts (1980), Hoffman and Hansen (1981), and Hansen and Hoffman (1985) for other publicly held lands. A Montana-wide habitat/community type classification of riparian/wetland sites (including forest-, shrub-, and herb-dominated plant associations and communities) has recently been completed (Hansen et al. 1995).

Prior to initiating field sampling, literature review and data from previous research was used to develop a preliminary classification of northeastern Montana's plant communities. Forested communities in the study area have been largely described by Roberts (1980) and Roberts et al. (1979) while riparian community types have been defined by Hansen et al. (1995). Grasslands and shrublands were found to be the least documented plant communities of the area and were thus the focus of data collection in this study.

Figure 1. Number of grassland plant community Element Occurrence Records (EOR's) in the Montana Natural Heritage Program database (as of 11/21/89), by county. The shaded area represents grassland ecoregions of Montana as defined by Omernik (1987). The northeastern Montana study area is delimited by the thick black line.

STUDY AREA

The study area (Figure 1) includes all lands north of the Missouri River in Blaine, Phillips, Valley, Daniels, Roosevelt, and Sheridan counties; Hill County east of the Milk River; and Hill and Choteau Counties east of the Northeastern Montana Glaciated Plains Ecoregion (as defined by Omernik and Gallant [1987]).

Physiography

The study area encompasses approximately 12.5 million acres and ranges in elevation from about 1,900 feet on the Missouri River at the North Dakota border to 6,900 feet at the summit of Mount Baldy in the Bear's Paw Mountains. Except for the Bear's Paw and Little Rocky Mountains, the area lies entirely within the Glaciated Missouri Plateau section of the Great Plains Physio-graphic Province (see Fig. 6 in Montagne et al. 1982). The southern boundary of this section is defined by the southern limit of continental glaciation during the last ice age (Pleistocene Epoch). For the most part, these plains consist of relatively flat to gently rolling sedimentary (particularly shale) and glacial till surfaces modified by stream erosion and past glaciation (Veseth and Montagne 1980). Some areas of moderately to sharply dissected badlands topography do occur, particularly along the Missouri River and Frenchman Creek drainages.

The Bear's Paw and Little Rocky Mountains occur as isolated "island" uplifts within the study area. A wide range of parent materials occur within these mountain ranges although the central portions of both ranges are predominantly intrusive igneous (Veseth and Montagne 1980).

Climate

Most of the study area experiences the extreme summer heat and winter cold of a continental climate and lies directly in the path of many arctic air masses from the north (Montagne et al. 1982). Average annual precipitation varies from over 30 inches at the crest of the Bear's Paw Mountains to between 10 and 12 inches throughout the bulk of the study area (see sheet 2 in Ross and Hunter 1976). The average length of the freeze-free season varies from less than 70 days at the crest of the Bear's Paw Mountains to greater than 130 days along portions of the Milk River (see Fig. 13 in Montagne et al. 1982).

METHODS

Data Collection

To maximize the efficiency in sampling the range of vegetation and environmental variation, sample sites were selected using a modification of the "gradsect" (gradient transect) method described and evaluated by Gillison and Brewer (1985) and applied successfully by Austin and Heyligers (1989). The method, as applied in the present study, involved selecting a set of USGS 7.5' (1:24,000) topographic quadrangle maps containing the maximum perceived range of shrubland/grassland environmental variation in the overall study area. Emphasis was placed on representing the range of moisture, temperature, radiation, and soil nutrient regimes since these factors are presumed (and well documented elsewhere) to have a primary influence on species occurrence and growth.

The following site attribute information was overlaid onto a USGS quadrangle index map of the study area to select quadrangles for sampling among the approximately 470 potentially available:

a) **land use** (from Fig. 23 of Montagne et al. 1982) - quadrangles falling predominately (i.e., over 50%) in agricultural land uses were excluded from further consideration.

b) **average annual precipitation** (from Sheet 2 of Ross and Hunter 1976) - three classes were subjectively defined, i.e., <12 inches, 12 - 16 inches, >16 inches. This attribute was regarded as an indicator of moisture regime.

c) **average length of freeze-free season** (from Fig. 13 of Montagne et al. 1982) - three classes were subjectively defined, i.e., <100 days, 100 - 120 days, and >120 days. This attribute was regarded as a indicator of temperature regime.

d) **surficial geology** (from Figs. 9, 13, 17, 21, 23, 25, and 32 of Veseth and Montagne 1980) - the six classes represented by the Veseth and Montagne figures were used (Figs. 21 and 23 were subjectively merged). This attribute was regarded as a surrogate for nutrient regime.

e) **Radiation regime** was considered and rejected in the process of defining gradsect units since it varies greatly at relatively fine geographic scales for different slopes and aspects, particularly in complex, finely dissected terrain. However plot selection in the field attempted to include a wide range of slope/aspect combinations in each sampling area as a means to capture vegetation response to radiation differences.

A total of 175 plots were targeted for sampling based on the time available for this study (note: only 125 plots were ultimately sampled via the gradsect approach). A total of 5 plots/selected quadrangle were chosen as a reasonable average to represent local-scale patterns in community composition. Thus, 35 quadrangle maps were selected for sampling (i.e., 5 x 35 = 175).

After eliminating agriculturally dominated quadrangles from the pool (this reduced the number of quadrangles from about 470 to 221), a matrix of precipitation/freeze-free classes was constructed and the number of quadrangles in each class was recorded. The percentage in each class relative to the total number of quadrangles (221) was used to determine the number of quadrangles (by class) to be included in the pool to be sampled (e.g., 25% in class Z x 35 sample quadrangles = 9 plots of class Z in the sample pool).

An attempt was made to maximize surficial geology variation within the sample pool by including as many geologic classes as possible within each of the above sample classes. Also, sample quadrangle selection was biased towards quadrangles that included the greatest number of geologic classes within a precipitation/ freeze-free class. Additionally, an attempt was made to maximize the geographic dispersion of quadrangles selected while maintaining the primary objective of maximizing environmental variation.

Finally, in cases of an equal choice between selecting a quadrangle encompassing primarily private land versus one encompassing primarily public land, the public land quadrangle was selected. This was done to enhance the ease of land access.

To minimize the confounding nature of heavy disturbance on vegetation composition areas intensively grazed (overgrazed), herbicide treated, mechanically disturbed, artificially seeded, or irrigated were not sampled. Plots were established within portions of stands that appeared to be relatively uniform in topography and vegetation structure and compostion. Within an area, one to five plots were chosen to reflect the different topographic positions, aspect/slope combinations and where judgement indicated a marked change in vegetation composition.

Plot selection focused on contemporary stands of vegetation without reference to successional relationships among stands. No attempt was made to solely locate and sample remnants of presettlement vegetation.

The data were recorded on a Natural Heritage Program Community Survey Form for each plot. These forms basically contain the same information as the general plot data and ocular plant species data forms used by the USDA Forest Service within their ECODATA sampling regime (USDA 1987). Complete lists and canopy cover estimates of vascular plant species were recorded within each 375 m^2 circular study plot. Site information such as altitude, slope, aspect, parent material, landform, and erosion type were also recorded for each plot (Table 1). Soil taxon was recorded when a survey report was available for the site.

Two additional partial field seasons were spent collecting community data following the initial data collection and analysis. In 1992 R. DeVelice and L. Roe inventoried additional sites in the Big Dry Resource Area. In 1993 S. Cooper sampled two specific areas that have potential as ACEC's, Saddle Butte just south of the Little Rockies and Bitter and Frenchman Creek drainages, a vast area of badlands-like topography northwest of Glasgow, MT. Data sets from Big Dry R. A., Saddle Butte and Bitter Creek areas were compared with the preliminary classification (DeVelice et al. 1991) and were found to fit, with only minor modifications to the vegetation key and reallocation of plots to community types. Several community types new to the state were discovered with both the extensive sampling in the Big Dry R.A. and with intensive sampling of the Bitter Creek area .

Data Analysis

Analysis focused on using a combination of classification, to determine community types, and ordination (gradient analyses), to describe general patterns of communities in relation to environmental factors. All information regarding site variables and plant composition was converted to an ECODATA database format and analyzed with programs based in ECADS (Ecosystem Classification and Description System, USDA Forest Service R-1). Classification was accomplished using two-way indicator species analysis (TWINSPAN; Hill 1979a) in the ECODATA analysis package. Ordination was achieved using the detrended correspondence analysis (DCA) and detrended canonical correspondence analysis (DCCA) algorithms in the CANOCO computer package (Ter Braak 1988). The input data were species cover values recorded in each plot and, in the case of DCCA, the 18 environmental variables recorded (Table 1; note - radiation index was used in these analyses rather than aspect). Both TWINSPAN and DCA are based on the same mathematical strategy (i.e., reciprocal averaging; Hill 1979a,b) and thus offer direct comparisons between the results of ordination and classification.

All default options in the TWINSPAN algorithm were used except that pseudospecies cut levels were set at 0, 2, 5, 20, and 50 percent cover. Also, all default options were used in running the ordinations except that rare species were downweighted. First, the entire data matrix of 170 stands and 230 species was analyzed. To reduce the amount of variation being considered, which is substantial in the whole matrix, the data set was also subdivided into forest, shrubland, and grassland groups which were analyzed separately.

In some instances, a particular TWINSPAN class included a plot or plots that, based on field experience and ordination patterns, appeared to be better placed in a different existing TWINSPAN class. These plots were repositioned in the classification as appropriate.

In addition to helping refine the classification, the ordinations assisted in describing and interpreting general patterns of vegetation communities and environment. For example, DCA extracts the dominant compositional gradients from the species data matrix, irrespective of site variables, whereas DCCA extracts the dominant gradients given the constraint that they must be orthogonal linear combinations of the supplied environmental variables (Ter Braak 1988).

Table 1.--Environmental variables measured at each sample plot.

ABBREVIATION	VARIABLE	VARIABLE TYPE
elev	elevation (ft)	quantitative
aspect	aspect (°)	quantitative
slope	slope (%)	quantitative
rad	radiation index	quantitative
soil	soil cover (%)	quantitative
gravel	gravel cover (%)	quantitative
rock	rock cover (%)	quantitative
litter	litter cover (%)	quantitative
wood	wood cover (%)	quantitative
moss	moss cover (%)	quantitative
basal	basal veg. cov. (%)	quantitative
	parent material	categorical
alluv	alluvium	
eolian	eolian	
till	glacial till	
sedm	sedimentary	
igne	igneous	
	landform	categorical
mtn	mountains	
rolling	rolling uplands	
break	breaklands	
plat	plateaus	
kame	kames and kettles	
flood	alluvial forms	
	plot position	categorical
vall	valley bottom	
draw	draw	
short	short slope	
lower	lower slope	
mid	mid slope	
ridge	ridge	
	slope shape	categorical
even	even	
convex	convex	
concave	concave	
undulate	undulating	

Table 1.--(continued)

ABBREVIATION	VARIABLE	VARIABLE TYPE
	soil surface status	categorical
stable	stable	
stable-	stable (erosion trend)	
unstable	unstable	
unstable+	unstable (stable trend)	
	erosion type	categorical
noeros	none	
sheet	sheet	
rill	rill	
shril	sheet and rill	
shgul	sheet and gully	
gully	sheet, rill, and gully	
wind	wind	
	ground cov. disturbance	categorical
undistur	undisturbed	
low	low	
mod	moderate	
high	high	

Taxonomic Considerations

Nomenclature follows Kartesz and Kartesz (1985) with the exception of graminoids. With the current flux in graminoid taxonomy (e.g. such a common rangeland dominant as bluebunch wheatgrass having scientific epithets *Agropyron spicatum*, *Elymus spicatus*, *Elytrigia spicata* and *Pseudoroegneria spicata*) we opted to follow the conservative approach of the U.S. Forest Service ECODATA manual, appendix K, 1992). In an preliminary version of this document (DeVelice et al. 1991) we did not discriminate between *Stipa spartea* var. *curtiseta* and *S. comata* in respect to ecological information conveyed by their respective occurrences (only two for *S. spartea* v. *curtiseta*). Further sampling in northernmost MT and comparison with ecological classifications of Canandian Provinces (Coupland 1961) and exhaustive taxonomic descriptions by Barkworth (1978) lead to the conclusion that *S. comata* and *S. curtiseta* (ne. *S. spartea* v. *curtiseta*) are valid taxonomic entities with rather distinct ecologies. Scientific names of all species in this study, their code names, and their synonyms (from GPFA 1986) are listed in Appendix A.

RESULTS

Vegetation/Community Type Classification

Classification of the original 125 plots resulted in the definition of 24 community types. In addition to the 24 types sampled an additional 54 community types were documented thru a literature and database query and these 78 types constituted the vegetation types of the preliminary analysis. With extension of sampling to the Big Dry R.A.., the intensive sampling at Birch-Frenchman Creek drainages and Saddle Butte vicinity and a more extensive database and report query, particularly of the Montana Riparian Association reports of vegetation analyses of specific drainages, an additional 35 community types were added to make the regional total 113.

Dichotomous keys to community/habitat types were abstracted from existing classifications and modified to suit any peceived changes in defining parameters for these types. Robert's (1980) keys for forest types of the Little Rockies and Bears Paw Mountains and Missouri River Breaks were only slightly modified to incorporate some forest types with bunchgrass or xeric site rhizomatous grass dominated undergrowth; these drier forest types largely represent range extensions of common types previously described by Pfister et al. (1977) and Hansen and Hoffman (1988). The above noted authors have adequately described the various types and no description is provided herein for types previously described, especially since our n-number is low.

Montana's wetland/riparian vegetation has been classified and described by the Montana Riparian Association (Hansen et al. 1995) and we have followed their Northern Great Plains keys in constructing our study area specific keys. We have modified some of their type defining coverage values to better reflect conditions as we perceived them in study area. Based on an informal agreement to partition sampling between MRA (riparian/wetlands) and MTNHP (uplands) we did not collect wetlands data except in the instance of some badlands areas that had received little sampling by MRA.

The eastern Montana grasslands have been incorporated into a key-accessible classfications only in the work of Hansen and Hoffman (1988) for some districts of the Custer National Forest and Jorgensen (1979) for the Yellow Water Triangle. Mueggler and Stewart's (1980) habitat type classification for western Montana describes many community types that extend with some slight floristic modification (and more signifianct change in landscape position or other defining parameters) to eastern Montana). We have attempted to synthesize these classifications with our interpretations of environment-vegetation relationships to derive workable keys.

Regardless of physiognomic type, in constructing vegetation keys our defining precept has been to identify types in order according to their occurrence on a hypothetical moisture gradient, from wet to dry. Community types with extroidinary defining physical site attributes, such as those of saline playas or erosive shale substrates are also given priority in the keys.

Those community/habitat types with written descriptions in this manuscript have been highlighted in the keys and in the community type listing (Appendix C), that also records their S and G ranks. Appendix D is a listing of plot placement by community type. The constancy/cover tables (Appendix C) can be used to check the cover values listed in the written descriptions of the various types. Constancy is the percentage of plots in which a given species occurs, whereas species cover is the average value for canopy cover computed only for those plots in which the species occurs. Consulting constancy/cover tables gives a more complete picture of community type composition. In order to streamline the constancy/cover tables only species occurring with at least 3% cover are listed; in most cases this has not removed from the tables those species used to characterize certain of the types, however some species never occur with appreciable cover values and thus they may not be listed, though their constancy is high (they will be named in the community type narrative).

Vegetation-Environment Relationships

Plots within a community type/plant association of the DCA and DCCA ordinations (see Figure 3 and Appendix H respectively, see DeVelice et al. 1991) cluster together indicating that they occupy similar compositional and environmental multidimensional space. The primary environmental factors affecting community composition gradients appear to be effective moisture and soil disturbance. Temperature gradients are relatively truncated within the study area (excepting the few mountainous environments with appreciable relief) and inferred to be of minor importance. All of the plots sampled were selected within similar thermal environments characterized by extreme summer heat and winter cold.

DCA ordinations of the initial 125 plot data set revealed that 116 plots cluster near the origin of axes 1 and 2 and that the outliers were composed of the "badlands" types such as *Artemisia longifolia/Oryzopsis hymenoides* and *Sarcobatus vermiculatus-Atriplex gardnerii* (Figure 2a). When axes 1 and 3 are plotted (Figure 2b) another outlier community type, *Juniperus horizontalis/Andropogon scoparius*, typical of eroded

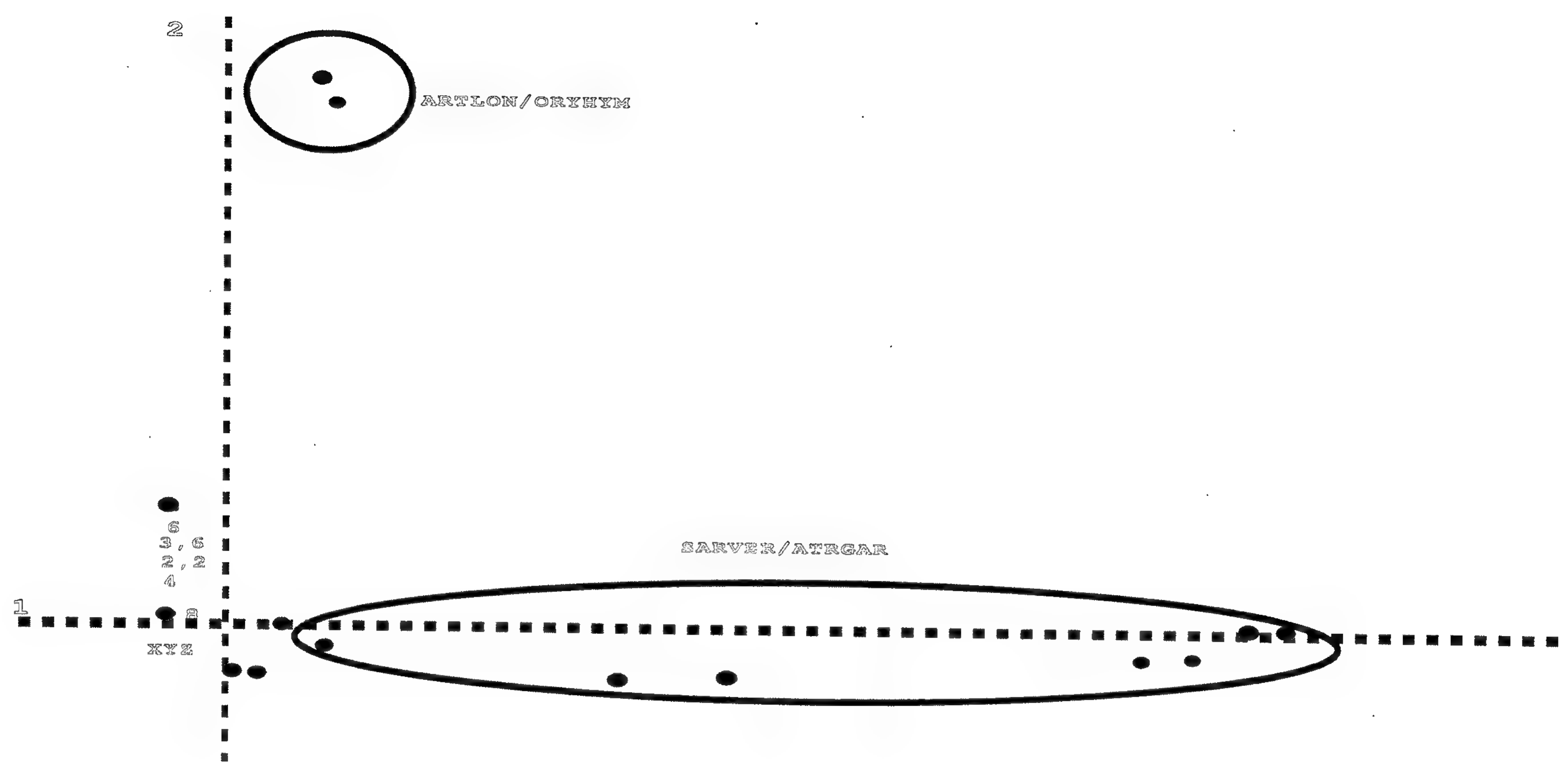

Figure 2a. DCA (Detrended Correspondence Analysis) ordinations. The first axis is the horizontal axis and the second axis is the vertical axis. Initial dataset of all 125 plots displayed; dots represent individual plots; single digit numbers or those separated by comma indicate the number of multiple plots at that locus on ordination diagram; X, Y, and Z represent 12, 54, and 14 plots at their respective ordination positions.

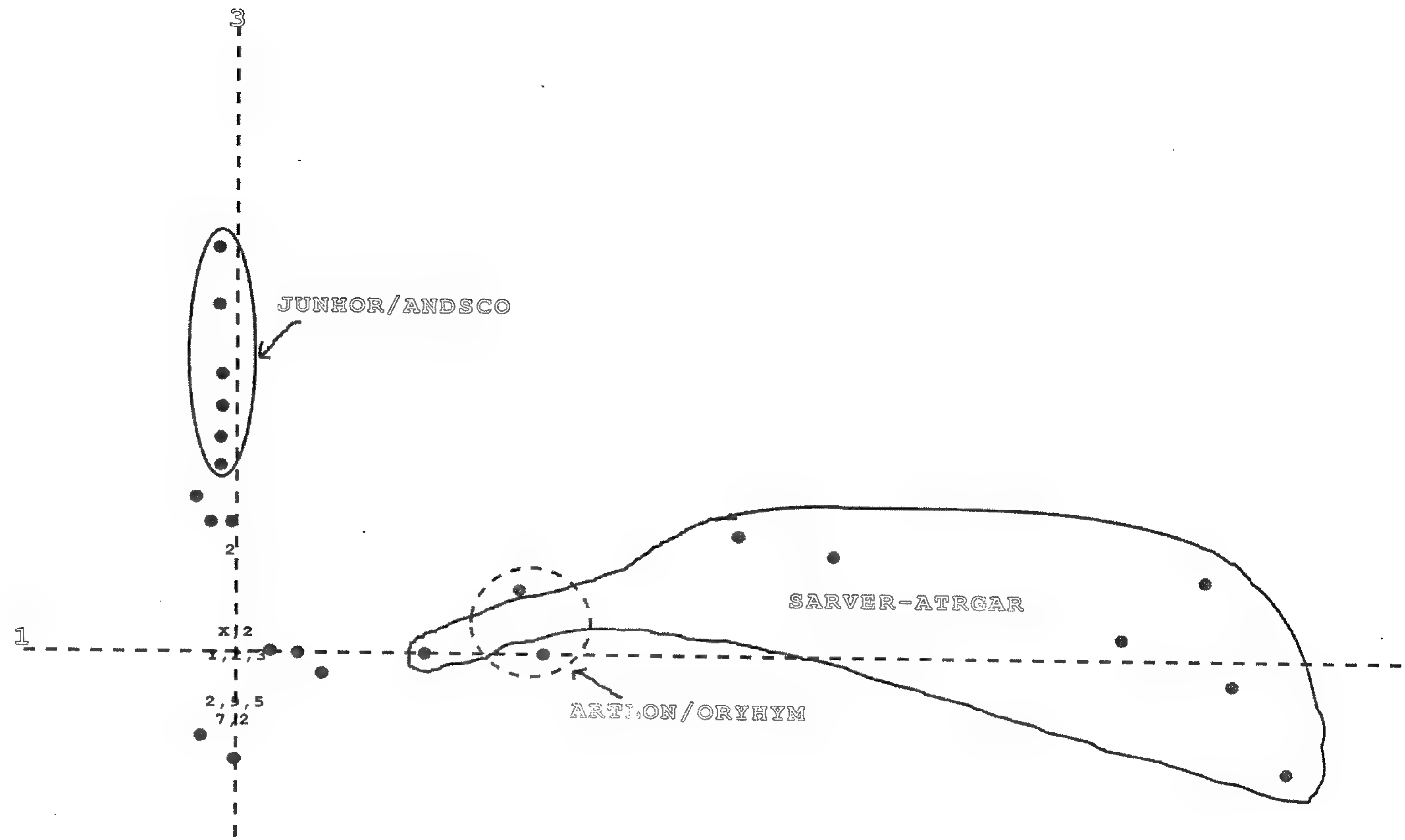

Figure 2b. DCA (Detrended Correspondence Analysis) ordinations. The first axis is the horizontal axis and the vertical axis displays the variation of plots in the third dimension of environmental space. Initial dataset of all 125 plots displayed; single digit numbers or those separated by comma indicate the number of multiple plots at that locus on ordination diagram; X, Y, and Z represent 20, 27, and 21 plots at their respective ordination positions.

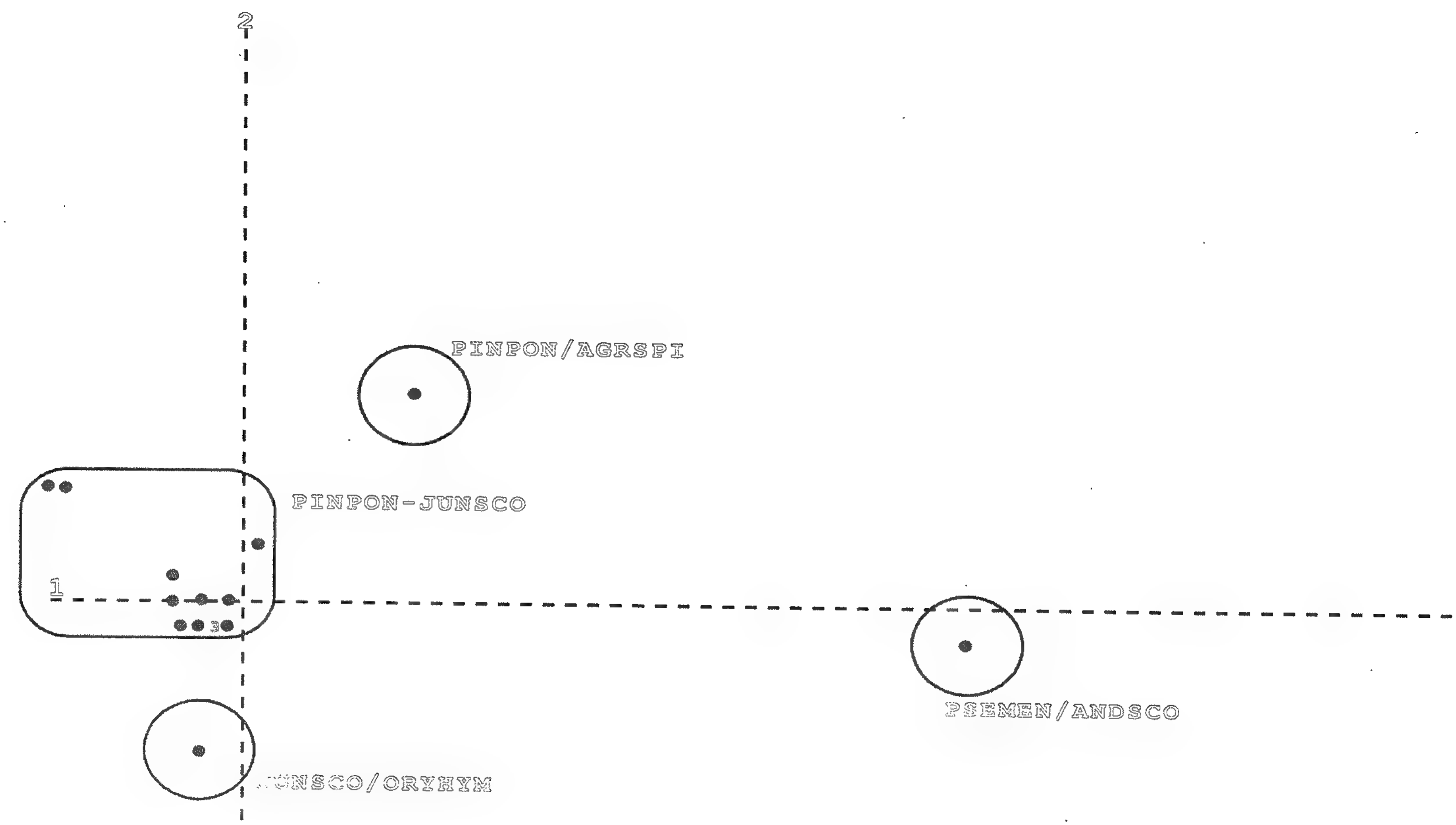

Figure 2c. DCA (Detrended Correspondence Analysis) ordinations. Initial 16 forested plots of the original 125 plot sample, plotted on first (horizontal) and second (vertical) axes. Community types encapsulated and named by six letter species acronyms (see appendix A for listing).

"blowout" sites is revealed. Stratification of the dataset by dominant lifeform revealed more detail about environment-vegetation relations by allowing the variability in environmental factors to be displayed, rather than compressed toward the origin as occurs with a highly heterogeneous dataset representing all lifeforms. Similarity indices computed between plots the initial dataset and those of subsequent sampling indicated that the subsequent plots were, with but two exceptions (*Juniperus horizontalis*- and *Populus tremuloides*-dominated sites), highly similar to those composing the original dataset and thus further ordinations were deemed superfluous.

CONCLUSIONS

One function of the MTNHP is the development of a statewide database of plant community occurrences. A major limitation is the current lack of a comprehensive grassland/shrubland community classification. This study represents a step towards achieving such a comprehensive classification.

Another function of the MTNHP is to provide information regarding communities and sites for conservation. A classification such as this is necessary to define and identify key elements and sites in northeastern Montana for potential long-term preservation. Similarly, government agencies could use the classification for the identification and design of natural areas.

This classification can be usefully applied in stratifying vegetation/environmental variation to assess management options and results. The classification can also assist in minimizing impacts from intensive management by identifying sensitive plant communities (e.g., PSEMEN/SCHSCO). The classification also provides a tool for baseline monitoring and predicting long-term vegetation responses to management activities. This capability would also assist agencies in meeting regulatory mandates (e.g., requirements of FLPMA).

Even following this study, existing classifications and data inadequately describe the grassland and shrubland communities of Montana. Major additional field sampling is necessary before a comprehensive grassland/shrubland community classification can be developed. This study in eastern Montana will continue over the next two years. This effort will provide additional knowledge regarding community patterns, processes, and physical environment relations. Such knowledge will be invaluable towards developing full capability to inventory eastern Montana communities and to increase predictive capability (e.g., build vegetation and biodiversity models).

Table 2. Key to plant associations/community types of northeastern Montana study area (Bureau of Land Management Havre, Valley, Phillips and Big Dry Resource Areas).

The following canopy coverage and reproductive success terms are applied when referring to species in the keys.

Present: species on site and not confined to microsite
Absent: species lacking on site or confined to obvious microsite that does not represent overall plot environment

Common:with 1% or more canopy cover, versus
Scarce: having less 1% canopy cover.

Well represented: having 5% or more canopy cover, versus
Poorly represented: having less than 5% canopy cover

Abundant: having 25% or greater canopy cover
Not abundant: having less than 25% canopy cover

Reproducing successfully: Generally at least 10 seedlings/ saplings per acre and not confined to microsites

Caveats when using keys: 1) In applying the key to actual field conditions the definitions below may need to be adjusted to the next lower coverage class, e.g. "well represent" becomes "common." This may be necessary when closed canopy stage of forest succession obtains, or when grazing pressure (intense) has altered community composition. 2)In the case of early successional stages, particularly with regard to potentially forested sites, the current stand composition may not "key out" to a described c.t. or h.t.; this is because the keys are intended for use with relatively mature vegetation. See Keane and Arno (1987) or Steele (1988) for an approach dealing with classification and description of seral vegetation (forest).

KEY TO LIFEFORM CATEGORIES

(**Note** that within each lifeform category there are separate keys for upland sites (listed first), those with better drainage and thought not to meet all three criteria for jurisdictional wetlands (i.e. hydric soils, hydrophytic plants, and wetland hydrology) and wetland and riparian sites; some community types are encompassed in both wetland and upland keys because site conditions may span the range between jurisdictional and functional wetlands (wherein only one of the above listed criteria may be met).

1. Trees (coniferous or deciduous, regardless of size-age class) having at least 25% canopy cover .... Forests and Woodlands
1. Trees with less than 25% canopy cover 2

2. Shrub species (from prostrate forms to tall extremes of woody growth at 25 ft.), singly or considering their combined cover, having at least 10% canopy cover (or in young stands accepting that fututre development will

eventuate in at least !0% canopy cover) . . . . Shrub Communities
2. Shrub species or their combined cover having less than 10% canopy cover or not as above 3

3. Herbaceous species (forbs and graminoids [grass-like plants, such as rushes and sedges] having at least 5% canopy cover . . . . Herbaceous Communities
3. Herbaceous species having less than 5% canopy cover (due either to natural habitat factors or processes or human-induced impacts . . . . Depauperate sites

KEY TO UPLAND FORESTS AND WOODLANDS

(largely based on Roberts [1989] and Roberts et al. [1979] as being most regionally appropriate classifications, though certain types are also described by Pfister et al.[1977] and Hansen and Hoffman [1988])

Series Key

1. *Abies lasiocarpa* (subalpine fir) present and reproducing successfully . . . . *Abies lasiocarpa* Series
1. *A. lasiocarpa* absent or not reproducing successfully 2

2. *Picea* (spruce) spp. (including *P. engelmannii* [Engelmann spruce] and/or *P. glauca* [white spruce] or their hybrids) present and reproducing successfully . . . . *Picea* spp. Series
2. *Picea* spp. (including hyrids) absent or not reproducing successfully 3

3. *Pseudotsuga menziesii* (Douglas-fir) present and reproducing successfully . . . . *Pseudotsuga menziesii* Series
3. *P. menziesii* absent or not reproducing successfully 4

4. *Pinus flexilis* (limber pine) present and reproducing successfully (although episodically at times) . . *Pinus flexilis* Series
4. *P. flexilis* absent or not successfully reproducing 5

5. *Pinus contorta* (lodgepole pine) in virtually pure stands, not necessarily reproducing, lacking evidence as to climax potential . . . . *Pinus contorta* Series
5. *P. contorta* absent or not reproducing, *Pinus ponderosa* (ponderosa pine) and/or *Juniperus scopulorum* (Rocky Mountain juniper) present and not accidental 6

6. *Pinus ponderosa* present, not accidental or confined to microsites . . . . *Pinus ponderosa* Series
6. *P. ponderosa* absent or accidental, *Juniperus scopulorum* the indicated site dominant . . . . *Juniperus scopulorum* Series

Key to *Abies lasiocarpa* (subalpine fir) plant associations/community types

1. *Linnaea borealis* (twinflower) common . . . . *Abies lasiocarpa/Linnaea borealis* p.a
1. *L. borealis* scarce 2

2. *Juniperus communis* (common juniper) or *Festuca idahoensis* (Idaho fescue) dominate the undergrowth . . . . *Abies lasiocarpa/Juniperus communis* p.a.
2. Not as above . . . . Undefined Type, but first consult Roberts (1980) or Pfister et al. (1977)

Key to *Picea* (spruce) spp. plant associations/community types

1. *Equisetum* spp. (horsetails, principally *E. arvense*) abundant . . . . *Picea* spp./*Equisetum arvense* p.a.
1. *Equisetum* spp. not abundant 2

2. *Cornus stolonifera* (*C. sericea*, red osier dogwood) present . . . . *Picea* spp./*Cornus stolonifera* p.a.
2. *C. stolonifera* absent 3

3. *Linnaea borealis* (twinflower) common . . . . *Picea* spp./*Linnaea borealis* p.a.
3. *L. borealis* scarce 4

4. *Juniperus communis* dominates undergrowth . . . . *Picea* spp./*Juniperus communis* p.a.
4. *J. communis* not undergrowth dominant . . . . . . Undefined type, but first consult Roberts (1980) or Pfister et al. (1977)

Key to *Pseudotsuga menziesii* (Douglas-fir) plant associations/ community types

1. *Cornus canadensis* (bunchberry) common . . . . *Pseudotsuga menziesii/Cornus canadensis* p.a.
1. *C. canadensis* scarce 2

2. *Linnaea borealis* (twinflower) common . . . . *Pseudotsuga menziesii/Linnaea borealis* p.a.
2. *L. borealis* scarce 3

3. Two of the following three species present and not confined to microsites; *Viola canadensis, Thalictrum occidentalis, Osmorhiza* spp. (mostly *O. chilensis*, respectively Canada violet, western meadworue, mountain sweet-root) . . . . *Pseudotsuga menziesii/Viola canadensis* p.a.
3. Not as above 4

4. *Amelanchier alnifolia* (western serviceberry) or *Spiraea betulifolia* (shiny-leaf spiraea) well represented . . . . *Pseudotsuga menziesii/Amelanchier alnifolia* p.a.
4. *A. alnifolia* and *S. betulifolia* poorly represented 5

5. *Berberis repens* (creeping barberry) common . . . . *Pseudotsuga menziesii/Berberis repens* p.a.
5. *B. repens* scarce 6

6. *Arctostaphylos uva-ursi* (kinnikinnick) well represented . . . . *Pseudotsuga menziesii/Arctostaphylos uva-ursi* p.a.
6. *A. uva-ursi* poorly represented 7

7. *Symphoricarpos occidentalis* (western snowberry or *S. albus*, common snowberry) well represented . . . . *Pseudotsuga menziesii/Symphoricarpos occidentalis* p.a.
7. *S. occidentalis* (or *S. albus*) poorly represented 8

8. *Muhlenbergia cuspidata* (plains muhly) well represented . . . . *Pseudotsuga menziesii/Muhlenbergia cuspidata* p.a.
8. *M. cuspidata* poorly represented 9

9. *Juniperus scopulorum* (Rocky Mountain juniper) well represented . . *Pseudotsuga menziesii/Juniperus scopulorum* p.a.
9. *J. scopulorum* poorly represented 10

10. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented or undergrowth dominant . . . . *Pseudotsuga menziesii/Agropyron spicatum* p.a.
10. *A. spicatum* poorly represented or not the undergrowth dominant 11

11. *Andropogon scoparius* (little bluestem) undergrowth dominant . . . *Pseudotsuga menziesii/Andropogon scoparius* p.a.
11. Not as above, *A. scoparius* not dominating undergrowth . . . . Undefined type, but first consult Roberts (1980) Pfister et al. (1977)

Key to *Pinus contorta* (lodgepole pine) plant associations/community types

1. *Linnaea borealis* (twinflower) common . . . . *Pinus contorta/Linnaea borealis* p.a.
1. *L. borealis* scarce 2

2. *Juniperus communis* (common juniper) or *Arctostaphylos uva-ursi* (kinnikinnick) the dominant undergrowth . . . . *Pinus contorta/Juniperus communis* p.a.
2. *J. communis* and/or *A. uva-ursi* not undergrowth dominants . . . . Undefined type but first consult Roberts (1980) or Pfister et al. (1977)

Key to *Pinus flexilis* (limber pine) plant associations/community types

1. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented or the undergrowth dominant . . . . *Pinus flexilis/Agropyron spicatum* p.a.
1. *A. spicatum* poorly represented, not the undergrowth dominant . . . Undefined/unreported type, see Pfister el al. (1977)

Key to *Pinus ponderosa* (ponderosa pine) plant associations/community types

1. *Amelanchier alnifolia* (western serviceberry) well represented (be sure to consider browsing intensity when assigning cover values . . . . *Pinus ponderosa/Amelanchier alnifiolia* p.a.
1. *A. alnifolia* poorly represented 2

2. *Arctostaphylos uva-ursi* (kinnikinnick) well represented . . . . *Pinus ponderosa/Arctostaphylos uva-ursi* p.a.
2. *A. uva-ursi* poorly represented 3

3. *Berberis (Mahonia) repens* (creeping barberry) well represented . . . . *Pinus ponderosa/Berberis repens* p.a.
3. *B. repens* poorly represented 4

4. *Symphoricarpos occidentalis* (western snowberry) well represented . . . . *Pinus ponderosa/Symphoricarpos occidentalis* p.a.
4. *S. occidentalis* poorly represented 5

5. *Juniperus horizontalis* (creeping juniper) or *Rhus trilobata* (*R. aromatica*, skunk-bush sumac) common . . . . *Pinus ponderosa/Juniperus horizontalis* p.a.
5. *J. horizontalis* and *R. trilobata* scarce 6

6. *Juniperus scopulorum* (Rocky Mountain juniper) well represented . . . . *Pinus ponderosa-Juniperus scopulorum* p a
6. *J. scopulorum* poorly represented 7

7. *Carex pensylvanica* (*C. inops*, *C. heliophila*, long stolon or sun sedge) and/or *Andropogon scoparius* (*Schizachyrium scoparium*, little bluestem) dominate the undergrowth 8
7. Neither *C. pensylvanica* nor *A. scoparius* dominate undergrowth 9

8. *A. scoparius* well represented or dominates the undergrowth . . . . *Pinus ponderosa/Andropogon scoparius* c.t.
8. *Carex pensylvanica* dominates the undergrowth, usually well represented . . . . . *Pinus ponderosa/Carex heliophila* p.a.

9. *Festuca idahoensis* (Idaho fescue) or *F. scabrella* (*F. campestris*, rough fescue) common . . . . *Pinus ponderosa/Festucal idahoensis* p.a.
9. *F. idahoensis* and *F. scabrella* scarce 10

10. *Agropyron spicatum* (bluebunch wheatgrass) well represented or the undergrowth dominant . . . . *Pinus ponderosa/Agropyron spicatum* p.a.
10. Not as above...Undefined type, see Hansen and Hoffman (1988) or Pfister et al. (1977)

Key to *Juniperus scopulorum* (Rocky Mountain juniper) plant associations/community types

1. *Oryzopsis micrantha* (littleseed ricegrass) common . . . . *Juniperus scopulorum/Oryzopsis micrantha* p.a.
1. *O. micrantha* scarce, not undergrowth dominant 2

2. *Agropyron spicatum* well represented or undergrowth dominant . . . . . . *Juniperus scopulorum/Agropyron spicatum* p.a.
2. *A. spicatum* poorly represented, not dominant . . . . Undefined type, see Pfister et al.(1977)

Key to Upland Shrub Plant Associations/Community Types

1. Combined cover of all species in tall shrub (≥ 4.5 ft.) layer at least well represented 2
1. Tall shrub species combined cover poorly represented 5

2. *Crataegus succulenta* (succulent hawthorn) or *C. douglasii* (black hawthorn) well represented or the dominant shrubs . . . . *Crataegus succulenta* c.t.
2. *C. succulenta* and *C. douglasii* poorly represented 3

3. *Shepherdia argentea* (silver or thorny buffaloberry) well represented or dominant species of tall shrub layer . . . . *Shepherdia argentea* c t
3 *S. argentea* poorly represented and not the dominant of the tall shrub layer 4

4. *Eleagnus commutata* with at least 15% canopy cover . . . . *Eleagnus commutata* c.t.
4. *E. commutata* with less than 15% canopy cover 5

5. *Prunus virginiana* well represented and dominant species of tall shrub stratum . . . . *Prunus virginiana* c.t.
5. *P. virginiana* poorly represented and not the dominant tall shrub . . . . Undefined/unrecorded tall shrub p.a./c.t.

6. *Sarcobatus vermiculatus* (black greasewood), *Atriplex nuttallii* (*A. gardnerii*, Gardner's saltsage) or *Atriplex confertifolia* (shadscale) ,singly or in aggregate, well represented or dominants of shrub layer 7
6. *S. vermiculatus*, *A. nuttallii* and *A. confertifolia*, singly or in aggregate, poorly represented, not shrub layer dominants 18

7. *A. confertifolia* (shadscale) well represented or the layer dominant/co-dominant 8
7. *A. confertifolia* poorly represented, not layer dominant 9

8. *Artemisia* spp. poorly represented and not layer dominant/co-dominant . . . . *Atriplex confertifolia* c.t.
8. *Artemisia tridentata* (big sagebrush) well represented or layer do-dominant with *A. confertifolia* . . . . *Artemisia tridentata-Atriplex confertifolia* p.a.

9. *Atriplex nuttallii* (Gardner's saltsage) well represented or layer dominant/co-dominant ... 10
9. *A. nuttallii* poorly represented, not layer dominant ... 16

10. Shrubs in addition to *A. nuttallii* (Gardner's saltsage) well represented or layer dominant/co-dominant ... 11
10. Excepting *A. nuttlallii*, shrubs poorly represented and not shrub layer dominants/co-dominants ... 13

11. *Sarcobatus vermiculatus* (black greasewood) well represented or at least co-dominant with *A. nuttallii* ... *Sarcobatus vermiculatus-Atriplex nuttallii* c.t.
11. *S. vermiculatus* poorly represented, not approaching *Atriplex nuttallii* in degree of dominance ... 12

12. *Artemisia tridentata* (big sagebrush) well represented or layer codominat ... *Artemisia tridentata-Atriplex nuttallii* c.t.
12. *A. tridentata* poorly represented and not the layer dominant/co-dominant ... Undefined/unrecorded shrub type

13. *Eriogonum pauciflorum* (few-flowered buckwheat) common or dominant of forb-grass layer ... *Atriplex nuttallii/Eriogonum paucilforum* c.t.
13. *E. pauciflorum* scarce or not forb-grass layer dominant ... 14

14. *Sporobolus airoides* (alkali sacaton) well represented or dominant of forb-grass layer ... *Atriplex nuttallii/Sporobolus airoides* c.t
14. *S. airoides* poorly represented & not grass-forb layer dominant ... 15

15. *Agropyron* (*Pascopyrum*) *smithii* (western wheatgrass) or *A. dasystachyum* (thickspike wheatgrass) well-represented or layer dominants, singly or combined ... *Atriplex nuttlallii/Agropyron smithii* c.t.
15. *A. smithii* & *A. dasystachyum* poorly represented, not layer dominants, singly or combined ... Undefined/unrecorded *Atriflex nuttallii* Series c.ts.

16. *Sarcobatus vermiculatus* (black greasewood) well represented or layer dominant/co-dominant ... 17
16. *S. vermiculatus* poorly represented, not layer dominant/co-dominant ...

17. *Agropyron smithii* (western wheatgrass) well represented or layer dominant ... *Sarcobatus vermiculatus/Agropyron smithii* c.t.
17. *A. smithii* poorly represented & not layer dominant ... Undefined *Sarcobatus vermiculatus* Series c.ts.

18. *Artemisia cana* (silver sagebrush) well represented; if other spp. of *Artemisia* present, coverage of *A. cana* not more than one cover class less ... 19
18. *A. cana* poorly represented or having significantly less coverage than other shrubby *Artemisia* spp. ... 23

19. *Agropyron smithii* (western wheatgrass) or A. *dasystachyum* (thickspike wheatgrass) well represented (only common if grazing moderate to intensive) ... *Artemisia cana/Agropyron smithii* c.t.
19. *A. smithii* and *A. dasystachyum* poorly represented (or scarce under intensive grazing) ... 21

20. *Stipa comata* (needle-and-thread) or *Bouteloua gracilis* (blue grama) well represented or dominate the herbaceous layer ... *Artemisia cana/Stipa comata* c.t.
20. *S. comata* and *B. gracilis* poorly represented, not dominant herbs ... Undefined/unrecorded *Artemisia cana* Series c.t.

21. *Ceratoides* (*Eurotia, Kraschenínnikovia*) *lanata* (winterfat) well represented ... 18
21. *C. lanata* poorly represented ... 19

22. *Stipa comata* (needle-and-thread) well represented ... *Ceratoides lanata/Stipa comata* c.t.
22. *S. comata* poorly represented ... Undefined/unrecorded *Ceratoides lanata* Series c.t.

23. *Juniperus horizontalis* (creeping juniper) well represented or the dominant shrub ... 24

23. *J. horizontalis* poorly represented or not dominant shrub 30

24. *Juncus balticus* (baltic rush) or *Juncus* (rush) spp. common . . . . *Juniperus horizontalis/Juncus balticus* c.t.
24. *J. balticus* or *Juncus* spp. scarce 25

25. *Andropogon scoparius* (*Schizachyrium scoparium*, little bluestem) well represented . . . . *Juniperus horizontalis/Andropogon scoparius* c.t.
25. *A. scoparius* poorly represented 26

26. *Agropyron dasystachyum* (thickspike wheatgrass), *Stipa viridula* (green needlegrass) or *Stipa curtiseta* (porcupine needlegrass) well represented, singly or combined cover, or common under grazing pressure . . . . *Juniperus horizontalis/Agropyron dasystachyum* c.t.
26. *A. dasystachyum*, *S. viridula*, and *S. curtiseta*, singly or combined, poorly represented 27

27. *Carex pensylvanica* (*C. inops*, *C. heliophila*, long-stonon or sun sedge) well represented . . . . *Juniperus horizontalis/Carex pensylvanica* p.a.
27. *C. pensylvanica* poorly represented 28

28. *Calamovilfa longifolia* (prairie sandgrass) or *Calamagrostis montanensis* (plains reedgrass) well represented or dominating the herbaceous layer . . . . *Juniperus horizontalis/Calamovilfa longifolia* c.t.
28. *C. longifolia* and *C. montanensis* poorly represented, or not the layer dominants 29

29. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented (common if under grazing pressure) . . . . *Juniperus horizontalis/Agropyron spicatum* c.t.
29. *A. spicatum* poorly represented . . . . Undefined *Juniperus horizontalis* Series c.t.

30. *Artemisia tridentata* (big sagebrush) well represented (adjust cover upwards if burned shrub skeletons on site or try to estimate pre-burn shrub cover) 31
30. *A. tridentata* poorly represented 36

31. *Festuca scabrella* (*F. campestris*, rough fescue) well represented (common, if grazing pressure, including wildlife, > moderate) . . . . *Artemisia tridentata/Festuca scabrella* h.t.
31. *F. scabrella* poorly represented 32

32. *Festuca idahoensis* (Idaho fescue) well represented (common, if grazing pressure, including wildlife, > moderate) . . . . *Artemisia tridentata/Festuca idahoensis* p a
32. *F. idahoensis* poorly represented 33

33. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented (reduce to only common with grazing) . . . . *Artemisia tridentata/Agropyron spicatum* p.a.
33. *A. spicatum* poorly represented 34

34. *Agropyron* (*Pascopyrum*) *smithii* (western wheatgrass) the dominant grass or if well represented (only common if grazing pressure intensive) . . . . *Artemisia tridentata/Agropyron smithii* c.t.
34. *A. smithii* not the dominant grass and poorly represented 35

35. *Stipa comata* (needle-and-thread) and/or *Bouteloua gracilis* (blue grama) the dominant grasses . . . . *Artemisia tridentata/Stipa comata* p.a.
35. *S. comata* and *B. gracilis* not the dominant grasses . . . . . . Undefined/unrrecorded *Artemisia tridentata* Series c.t./h t.

36. *Rhus trilobata* (*R. aromatica*, skunk-bushwell sumac) well represented or dominant shrub 37
36. *R. trilobata* poorly represented, not dominant shrub 39

37. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented (common, if grazing moderate to intensive) . . . . *Rhus trilobata/Agropyron spicatum* p.a.
37. *A. spicatum* poorly represented 38

38. *Calamovilfa longifolia* (prairie sandgrass) well represented . . . . *Rhus trilobata/Calamovilfa longifolia* p.a.
38. C. longifolia poorly represented . . . . .Undescribed/unreported *Rhus trilobata* Series p.a./c.t.

39. *Yucca glauca* (soapwell) well represented 40
39. *Y. glauca* poorly represented . . . . Shurb-dominated c.t./p.a. undescribed/unreported for study area

40. *Calamovilfa longifolia* (prairie sandgrass) well represented . . . . *Yucca glauca/Calamovilfa longifolia* c.t.
40. *C. longifolia* poorly represented . . . . Undefined/unreported *Yucca glauca* Series c.t./p.a. for study area

KEY TO UPLAND GRASSLANDS AND FORB-DOMINATED PLANT ASSOCIATIONS/COMMUNITY TYPES

1. Herbaceous vegetation (graminoids & forbs) dominant; shrubs, if present, widely scattered with coverage less than 5% or is half-shrubs such as *Artemisia frigida* (fringed sage) or *Gutierrezia sarothrae* (broom snakeweed); if desire to establish nature of potential natural vegetation determine site's fire and grazing history 2
1. Woody plants well represented or the site indicating potential to support at least 10% shrub coverage . . . . see heading "**Upland Shrub Key**"

2. *Deschampsia cespitosa* (tufted hairgrass) or various moist-site *Carex* spp. dominant (sites supporting *Carex* spp. such as *C.rostrata,C.aquatilis, C. athrostachya, C. nebrascensis* tend to wetland conditions and sho uld be tracked through wetland key) . . . . *Deschampsia cespitosa-Carex* spp. c.t.
2. Not as above 3

3. *Juncus balticus* (baltic rush) common, not restricted to microsites . . . . *Juncus balticus* c.t.
3. *J. balticus* scarce, or confined to microsites 3

4. *Poa pratensis* (Kentucky bluegrass) abundant or the dominant graminoid (may be wetland site, soils and hydrology need examination; see wetland key of Hansen et al. (1995) . . . . *Poa pratensis* c.t
4 *P. pratensis* not abundant and not the graminoid dominant 5

5. *Artemisia longifolia* (longleaved sagewort) common or the dominant/co-dominant species on sites with depauperate canopy cover (usually <10% total cover) a high percentage of exposed substrate, usually clays typical of badlands topograpy . . . . *Artemisia longifolia* c.t.
5. Not as above, *A. longifolia* not dominant/co-dominant 6

6. *Andropogon scoparius* (*Schizachyrium scoparium*, little bluegstem) or *A. gerardii* (big bluestem) well represented 7
6. *Andropogon* spp. poorly represented 10

7. *A. gerardii* (big bluestem) well represented, *Calamovilfa longifolia* (prairie sandgrass) common . . . . *Andropogon gerardii-Calamovilfa longifolia* c.t.
7. *A. gerardii* poorly represented 8

8. *Muhlenbergia cuspidata* (plains muhly) well represented . . . . *Andropogon scoparius-Muhlenbergia cuspidata* c t.
8. *M. cuspidata* poorly represented 9

9. *Carex filifolia* (thread-leaved sedge) common . . . . *Andropogon scoparius-Carex filifolia* c.t.
9. *C. filifolia* scarce . . . . Undefined/unrecorded *Andropogon* spp. c.t.

10. *Festuca scabrella* (*F. campestris*, rough fescue) well represented (or only common if grazing pressure appears moderate to intensive 11
10. *F. scabrella* poorly represented 12

11. *F. iahoensis* (Idaho fescue) well represented or co-dominant with *F. scabrella* (rough fescue), *Agropyron spicatum* a minor component, if present . . . . *Festuca scabrella-Festuca idahoensis* h.t.
11. Not as above . . . . Undocumented study area *Festuca scabrella* Series c.t.

12. *Festuca idahoensis* (Idaho fescue) well represented (only common with intensive grazing) 13
12. *F. idahoensis* poorly represented 14

13. *Carex heliophila* (*C. inops*, *C. pensylvanica*, sun or long-stolon sedge) well represented or co-dominant or second in cover to *F. idahoensis* . . . . *Festuca idahoensis-Carex heliophila* c.t.
13. *C. heliophila* poorly represented, not co-dominant or second in cover to F. idahoensis . . . . Undescribed study area *Festuca idahoensis* Series c.t.

14. *Stipa curtiseta* (porcupine needlegrass) well represented (only common if grazing pressure appreciable) 15
14. *S. curtiseta* poorly represented (or scarce if grazed) 16

15. *Stipa viridula* (green needlegrass) well represented . . . . *Stipa curtiseta-Stipa viridula* c.t.
15. *S. viridula* poorly represented . . . . Undescribed/unrecorded study area *Stipa curtiseta* Series c.t.

16. *Agropyron spicatum* (*Pseudoroegneria spicata*, bluebunch wheatgrass) well represented (only common, if grazing pressure moderate to intensive 17
16. *A. spicatum* poorly represented (or scarce if grazed) 22

17. *Agropyron smithii* (western wheatgrass) well represented (only common, if grazed . . . . *Agropyron spicatum-Agropyron smithii* p.a.
17. *A. smithii* poorly represented 18

18. *Muhlenbergia cuspidata* (plains muhly) well represented . . . . *Agropyron spicatum-Muhlenbergia cuspidata* c.t.
18. *M. cuspidata* poorly represented 19

19. *Carex filifolia* (thread-leaved sedge) well represented and the dominant/co-dominant of low grass layer . . . . *Agropyron spicatum-Carex filifolia* c.t.
19. *C. filifolia* poorly represented and not dominant/co-dominant of short grasses 20

20. *Bouteloua gracilis* (blue grama grass) well represented . . . . *Agropyron spicatum-Bouteloua gracilis* c.t.
20. *B. gracilis* poorly represented 21

21. Rhizomatous wheatgrasses *(Agropron* spp.) absent; *Poa secunda* (Sandberg's bluegrass) usually, but not always, present . . . . *Agropyron spicatum-Poa secunda* c.t.
21. Not as above . . . . Undescribed/unrecorded *Agropyron spicatum* Series c.t.

22. *Agropyron smithii* (western wheatgrass) well represented 23
22. *A. smithii* poorly represented 23

23. *Stipa viridula* (green needlegrass) well represented . . . . *Agropyron smithii-Stipa viridula* c.t
23. *S. viridula* poorly represented 24

24. *Carex filifolia* (thread-leaved sedge) and *C. stenophylla* (*C. eleocharis*, narrow-leaved sedge) singly or combined, well represented and dominant of short grass layer . . . . *Agropyron smithii-Carex filifolia* c t
24. *C. filifolia* and *C. stenophylla* poorly represented 25

25. *Bouteloua gracilis* (blue grama) well represented . . . . *Agropyron smithii-Boutleloua gracilis* c.t.
25. *B. gracilis* poorly represented . . . . Undescribed/unrecorded *Agropyron smithii* Series c.t.

26. *Calamovilfa longifolia* (prairie sandweed) well represented 27
26. *C. longifolia* poorly represented 28

27. *Carex pensylvanica* (*C. heliophila*, *C. inops*, long-stolon or sun sedge) well represented . . . . *Calamovilfa longifolia-Carex pensylvanica* c.t.
27. *C. pensylvanica* poorly represented . . . . Undescribed/unreported *Calomovilfa longifolia* Series c.t.

28. *Stipa comata* (needle-and-thread) or *Boutelous gracilis* (blue grama) well represented or dominant/co-dominant grasses 29
28. Not as above . . . . Unrecorded/undescribed study area forb-dominated c.t.

29. *Calamovilfa longifolia* (prairie sandreed) well represented or the dominant graminoid . . . . *Stipa comata-Calamovilfa longifolia* c.t.
29. *C. longifolia* poorly represented, not the dominant grass 30

30. *Bouteloua gracilis* (blue grama) dominant or co-dominant with *S. comata* . . . . . . *Stipa comata-Bouteloua gracilis* c..t.
30. Not as above . . . . Undefined/unrecorded *Stipa comata* Series c.t., see North Dakota classifications

KEY TO RIPARIAN VEGETATION

(based on/modified from Hansen et al. 1995)

Key to Lifeform Groups

1. Coniferous trees present and reproducing successfully, not restricted to microsites . . . . Coniferous Tree Communities
1. Coniferous trees absent or, if present, not as successfully reproducing as deciduous tree spp., not microsite restricted 2

2. *Fraxinus pennsylvanica* (green ash), *Acer negundo* (box elder) or *Populus tremuloides* (quaking aspen), singly or combined with at least 5% canopy cover or deciduous tree species, other than three named above, with single or combined coverages of at least 25% (abundant) . . . . Deciduous Tree Communities
2. Not as above 3

3. Shrub species, singly or their combined cover, at least 10% . . . . Shrub Communities
3. Shrub species, singly or combined cover, less than 10% . . . . Herbaceous Communities

Key to Coniferous Wetland Communities

1. *Picea* (spruce) spp. present and reproducing successfully 2
1. *Picea* spp. absent or not successfully reproducing 3

2. *Equisetum arvense* (field horsetail) or *Equisetum* (scouring ruch) spp. abundant . . . . PICEA/EQUARV h.t.
2. *Equisetum* spp. not abundant . . . . Undefined PICEA SERIES c.t.

3. *Pseudotsuga menziesii* (Douglas-fir) present and successfully reproducing 4
3. *P. menziesii* absent or not reproducing successfully 5

4. *Populus* (cottonwood) spp. well represented or following species, single or combined cover 1%, *Cornus stolonifera* (red osier dogwood), *Salix* (willow) spp., *Actaea rubra* (baneberry), *E. arvense* . . . . PSEMEN/CORSTO h.t.
4. Not as above . . . . Undefined PSEMEN SERIES c.t.

5. *Pinus ponderosa* (ponderosa pine) present and reproducing successfully 6
5. *P. ponderosa* absent or not successfully reproducing 8

6. *Populus* (cottonwood) spp. well represented or *Cornus stolonifera* common . . . . PINPON/CORSTO h.t.
6. *Populus* spp. poorly represented and *C. stolonifera* scarce 7

7. *Prunus virginiana* (common chokecherry) or *Amelanchier alnifolia* (western serviceberry) well represented, singly or combined cover . . . . PINPON/PRUVIR h.t.
7. *P. virginiana* or *A. alnifolia*, singly or combined cover, poorly represented . . . . Undescribed PINPON wetland c.t.

8. *Juniperus scopulorum* (Rocky Mountain juniper) present and reproducing and *Populus tremuloides* (quaking aspen) and *Fraxinus pennsylvanica* (green ash) poorly represented 9
8. *P. tremuloides* or *F. pennsylvanica* or their combined greater than 5% . . . . GO TO DECIDUOUS KEY

9. *Populus* (cottonwood) spp. well represented **or** *C. stolonifera*, *Poa pratensis*, *Agrostis stolonifera*, singly or combined cover, greater than 1% . . . . JUNSCO/CORSTO h.t.
9. *Populus* spp. poorly represented **and** *C. stolonifera*, *P. pratensis*, *A. stolonifera*, singly or combined with less than 1% cover . . . . Unclassified riparian-wetland site

Key to Broad-leaved, Cold-deciduous, Wetland Forests

1. *Fraxinus pennsylvanica* (green ash) common (canopy cover >5%) . . . . FRAPEN/PRUVIR h.t.
1. *F. pennsylvanica* scarce 2

2. *Acer negundo* (box elder) common . . . . ACENEG/PRUVIR h.t.
2. *A. negundo* scarce3

3. *Populus trichocarpa* (black cottonwood) with greater canopy cover than other *Populus* or *Salix* (willow) spp. 4
3. *P. trichocarpa* with less canopy cover than other Populus spp. 6

4. Seedling or sapling classes of *Populus trichocarpa* (black cottonwood) dominate the site; site a recently deposited alluvial bar . . . . POPTRI/RECENT ALLUVIAL BAR c.t.
4. Pole or larger size classes of *P. trichocarpa* dominate the site (not a recent gravel bar deposition) 5

5. Shrub species abundant (>25% c.c.) . . . . POPTRI/CORSTO c.t.
5. Shrub species not abundant . . . . POPTRI SERIES c.t. not documented for study area

6. *Populus deltoides* (Great Plains cottonwood) with greater canopy cover than other tree species 7
6. *P. deltoides* with less canopy cover than other tree spp. 9

7. Seedling and sapling (<5.0 in) size classes dominate the site; site is recently deposited alluvial bar .... POPDEL/RECENT ALLUVIAL BAR c.t.
7. Pole and larger (>5.0 in) size classes dominate the site 8

8. Shrub species abundant .... POPDEL/CORSTO c.t.
8. Shrub species not abundant .... POPDEL/POAPRA c.t.

9. *Salix amygdaloides* (peach-leaf willow) with greater canopy cover than other tree species .... SALAMY c.t.
9. *S. amydaloides* canopy cover less than that of other tree species ..... DECIDUOUS TREE SERIES not documented for study area

Key to Wetland Shrub Communities

1. *Salix* (willow) spp. with at least 10% canopy cover 2
1. *Salix* spp. having less than 10% canopy cover 5

2. *Salix lutea* (yellow willow) having at least 10% canopy cover 3
2. *S. lutea* with less than 10% canopy cover 4

3. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (slimstem reedgrass) or *Deschampsia cespitosa* (tufted hair-grass) , individual or combined canopy cover,at least %5 .... SALLUT/CALCAN h.t.
3. *C. canadensis*, *C. stricta* and *D. cespitosa*, individually or combined, with less than 5% coverage; undergrowth dominated by one or a combination of following disturbance species; *Agrostis stolonifera*, *Juncus balticus*, *Phleum pratense*, *Poa palustris* or *Poa pratensis* .... SALLUT/POAPRA c.t.

4. *Salix exigua* (sandbar willow) having greater canopy coverage than any other *Salix* (willow) spp. (excepting *S. bebbiana*) .... SALEXI c.t
4. Other Salix spp. with greater canopy coverage than *S. exigua* .... Unclassified riparian-wetland site

5. *Sarcobatus vermiculatus* (black greasewood) well represented 6
5. *S. vermiculatus* poorly represented 7

6. *Agropyron smithii* (western wheatgrass) the dominant graminoid .... SARVER/AGRSMI h.t.
6. *A. smithii* not the dominant graminoid .... Undefined SARVER SERIES c.t.

7. *Crataegus succulenta* (succulent hawthorn) or *C. douglasii* (black hawthorn), individually or combined cover, well represented .... CRASUC c.t.
7. *C. succulenta* and *C. douglasii*, singly or combined coverages, poorly represented 8

8. *Prunus virginiana* (common chokecherry) with at least 10% canopy cover and having greatest canopy cover amongst the tallest statum .... PRUVIR c.t.
8. Not as above 9

9. *Shepherdia argentea* (silver buffaloberry) having at least 15% canopy cover and with the greatest canopy cover in the tallest layer .... SHEARG c.t.
9. *S. argentea* having less than 15% canopy cover and not having greatest canopy cover of tallest layer species 10

10. *Artemisia cana* (silver sagebrush) well represented 11
10. *A. cana* poorly represented 12

11. *Agropyron smithii* (western wheatgrass) the dominant graminoid . . . . ARTCAN/AGRSMI h.t.
11. *A. smithii* not the dominant graminoid . . . . Undescribed wetland site ARTCAN SERIES c.t.

12. *Symphoricarpos occidentalis* (western snowberry) or *S. albus* (common snowberry) singly or their combined coverages at least 15% . . . . SYMOCC c.t.
12. *S. albus* or *S. occidentalis*, combined or singly, with less than 15% coverage and lacking most cover of species in tallest layer 13

13. *Rosa woodsii* (woods rose) or *R. acicularis* (prickly rose), individually or their combined cover, having at least 15% coverage and with the greatest coverage in the tallest layer . . . . ROSWOO c.t.
13. *R. woodsii* and *R. acicularis* or any combination of the two having less than 15% coverage and without greatest coverage of the tallest layer . . . . Unclassified riparian-wetland site

Key to Wetland Herbaceous Communities

1. *Carex* (sedge) spp. with a combined canopy cover of at least 25% or dominant taxa of herbaceous component 2
1. Carex spp. less than 25% coverage and not the dominant herbceous taxa 5

2. *Carex rostrata* (beaked sedge), *C. versicaria* (inflated sedge), or *C. atherodes* (slough sedge), singly or combined coverages, well represented . . . . CARROS h.t.
2. *C. rostrata*, *C. vesicaria* or *C. atherodes*, individually or combined coverages, poorly represented 3

3. *Carex aquatilis* (water sedge) or *C. lenticularis* (lentil-fruit sedge), coverages considered separately or combined, well represented . . . . CARAQU h.t.
3. *C. aquatilis* or *C. lenticularis* poorly represented, separate or combined coverages 4

4. *Carex nebrascensis* (Nebraska sedge) having a greater coverage than any other individual *Carex* spp. . CARNEB c.t.
4. *C. nebrascensis* not having the greatest coverage of any individual *Carex* spp. . . . . Unclassified wetland c.t. or possibly not wetland site

5. *Typha latifolia* (common cattail) or *T. angustifolia* (lesser cattail), individually or combined, having at least 25% coverage . . . . TYPLAT h.t.
5. T. latifolia and *T. angustifolia*, singly or combined, having less than 25% coverage 6

6. *Scirpus* (bulrush) spp. well represented 7
6. *Scirpus* spp. poorly represented 10

7. *Scirpus acutus* (hardstem bulruch) or *S. validus* (softstem bulrush), individually or combined cover, well represented . . . . SCIACU h.t.
7. S. acutus and S. validus, considered singly or combined, poorly represented 8

8. *Scirpus maritimus* (alkali bulrush) well represented . . . . SCIMAR h.t.
8. *S. maritimus* poorly represented 9

9. *Scirpus pungens* (bulruch) well represented . . . . SCIPUN h.t.
9. *S. pungens* poorly represented . . . . Unclassified Scirpus SERIES c.t.

10. *Phragmites australis* (plume reed) well represented . . . . PHRAUS h.t.
10. *P. australis* poorly represented 11

11. *Phalaris arundinacea* (reed canarygrass) well represented .... PHAARU h.t.
11. *P. arundinacea* poorly represented 12

12. *Spartina pectinata* (prairie cordgrass) or *S. gracilis* (alkali cordgrass), individually or their combined coverage, well represented .... SPAPEC h t
12. *S. pectinata* and *S. gracilis*, singly or combined coverage, poorly represented 13

13. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spikesedge), individually or combined. well represented .... ELEPAL h t
13. *E. palustris* and *E. acicularis*, singly or combined coverage, poorly represented 14

14. *Deschampsia cespitosa* (tufted hairgrass) well represented (only common in presence of grazing pressure) DESCES h.t.
14. *D. cespitosa* poorly represented 15

15. *Distichlis spicata* (inland or alkali saltgrass) well represented .... DISSPI h.t.
15. *D. spicata* poorly represented 16

16. *Agropyron smithii* (western wheatgrass) well represented .... AGRSMI h.t.
16. *A. smithii* poorly represented .... READ THE FOLLOWING KEY

Key to herbaceous communities representing putative seral or anthropogenic conditions

[Before using key do the following: 1) Examine the stand and determine if any shrub species are present. If so, go back through shrub key and reduce all canopy coverages to present class; 2) Lacking shrubs, retrace herbaceous key with coverage classes reduced by one class; 3) If stands still does not fit key, then use the following key to seral or disturbance induced types or unclassified wetland types.]

1. *Polygonum amphibium* with greater cover than any other herbaceous species .... POLAMP c.t.
1. Other herbaceous species having greater coverage than *P. amphibium* 2

2. *Salicornia rubra* with a greater canopy cover than any other herbaceous species .... SALRUB c.t.
2. *S. rubra* with less cover than any single herbaceous species 3

3. *Glycyrrhiza lepidota* with greater coverage than any single herbaceous species .... GLYLEP c.t.
3. *G. lepidota* having less cover than any single herbaceous species 4

4. *Juncus balticus* well represented or with greater canopy coverage than any other herbaceous species .... JUNBAL c.t.
4. *J. balticus* poorly represented and not having greater coverge than any other herbaceous species 5

5. *Agrostis stolonifera* well represented having a greater coverage than any single herbaceous species .... AGRSTO c.t.
5. *A. stolonifera* poorly represented and other single herbaceous species with greater cover than A. stolonifera 6

6. *Hordeum jubatum* with greater cover than any other single herbaceous species .... HORJUB c.t.
6. Other herbaceous species with greater cover than *H. jubatum* 7

7. *Poa pratensis* well represented or having greater cover than any other single herbaceous species ..... POAPRA c.t.
7. *P. pratensis* poorly represented and other single herbaceous species having greater cover ....
Unclassified wetland site; see "Riparian Dominance Types of Montana" by Hansen et al. (1991) for possible description of stand. Dominance types are named by species with greatest canopy cover the uppermost layer; however, dominant species must have at least 25% cover.

TREE-DOMINATED PLANT ASSOCIATIONS/COMMUNITY TYPES:

Juniperus scopulorum/Agropyron spicatum p.a.

(JUNSCO/AGRSPI; rocky mountain juniper/bluebunch wheatgrass; 3 plots
WHTF designation JUNSCO/*Pseudoroegneria spicata*)

Environment: This community type was found in low to moderate relief rolling uplands as well as in badland arroyos/drawss, often occurring adjacent to JUNSCO/ORYMIC h.t., but on warmer exposures (not strictly north-facing) with the same moderate to steep slopes. JUNSCO/AGRSPI also has more exposed soil and rock, often exceeding 50%. Three of the four sampled stands were on calcareous substates, though this h.t. is not confined to these substrates.

Vegetation: As a result of past cutting for fencing stands of JUNSCO/AGRSPI were rather open, with coverage of 8 to 12 ft tall *Juniperus scopulorum* not exceeding 50%; we speculate tree coverage does not much exceed this figure due to limitations of site factors. The higher coverage of shrubs (up to 20 % for *Artemisia tridentata* and *A. frigida*) reported here than in southeastern Montana (Hansen and Hoffman 1988) is also attributable to seral conditions. The undergrowth is dominated by graminoids, chief among which and diagnostic of the type is *Agropyron spicatum*, always well represented (40% ave. cover). *Carex filifolia* and *Koeleria cristata* have high constancy and *Bouteloua curtipendula* is consistently present in the easternmost occurrences of this type. Forb diversity is moderately high, but coverages are generally low, not exceeding 10% except in the most open stands.

Other Studies: In a study centered on southeastern Montana Hansen and Hoffman (1988) have best documented this type and Brown (1971) has also described it for badland drainages of the Ashland District, Custer National Forest. This h.t. has been described as relatively common in North Dakota and Wyoming and extends as far south as South Dakota and Colorado.

Juniperus scopulorum/Oryzopsis micrantha p.a.

(JUNSCO/ORYMIC; Rocky Mountain juniper/little-seed ricegrass; 6 plots)

Environment: JUNSCO/ORYMIC is a minor type within the study area. It is usually associated with unique substates,sandstones or other well-drained surfaces, and predominantly moderate to steep north-facing slopes. In badland topography JUNSCO/ORYMIC it is associated with draws, especially cove-like positions that are protected from winds or that moisture collecting. Adjacent more exposed and warmer positions are often characterized by high erosion rates and early seral commuity types with no characteristic vegetation.

Vegetation: Although *Juniperus scopulorum* now usually forms a nearly closed canopy 9 to 14 ft tall, all sampled stands had been heavily cut in the past for fenceposts. An occasional Acer negundo was found in moist microsites, usually near ravine toeslopes. The undergrowth is invariably dominated by *Oryzoposis micrantha* with coverages ranging from 10 to 70%; this species is not found outside these sites. Though grass-dominated, these stands support a rich diversity of forbs, including those associated with relatively mesic sites e.g. *Smilacina stellata*, *Galium boreale*, *Geum triflorum* and *Campanula rotundifolia*.

Other Studies: This plant association has been described by Hansen and Hoffman (1988) for southeastern Montana and Hansen et al. (1984) for Theodore Roosevelt National Park (North Dakota). Our stands are much more similar to those of southwestern Montana, having much less undergrowth combined canopy cover than those of North Dakota; the presenceand occasionally well represented bunchgrasses indicate these sites are either drier or in earlier seral stages than those described by Hansen and Hoffman (1988).

***Pinus ponderosa/Agropyron spicatum* p.a.**

(PINPON/AGRSPI; ponderosa pine/bluebunch wheatgrass; 9 plots
WHTF designation PINPON/*Pseudoroegneria spicata*)

Environment: In areal extent PINPON/AGRSPI is not a major study area h.t. but it is one of the most broadly distributed across MT, occurring on diverse substrates and within quite different climatic zones (due to factor compensation). In the study area this type is found predominantly on non-glaciated, well-drained sedimentary substrates (sandstone, calcareous and non, shale, calcareous and non) but was also sampled on igneous substrates. Over most of the study area in non-mountainous settings PINPON/AGRSPI is found in low to moderate relief landscapes on cooler exposures (northwest thru north to east-facing slopes) and all degrees of slope inclination; it also noted to form a ribbon along slope shoulders. Where the type is found at higher elevations in mountain foothills its position may shift to warmer exposures, including steep south-facing slopes.

All the above-cited environments are fire-prone and several of the sample stands had been recently burned. A lack of trees with fire scars probably reflects low fuel levels but could also reflect effective fire suppression. The amount of exposed substrate and litter varied widely, depending on fire history and vegetation cover, particularly that of the tree layer.

Vegetation: Our sampling included all but early seral stages (lacking trees or with very low density) and old-growth stages. This type most often approximates a woodland structure with *P. ponderosa* canopy cover ranging between 20 and 70%. *Juniperus scopulorum* may occur as scattered individuals. In a plains environment PINPON/AGRSPI grades to various grassland types (generally *Agropyron spicatum* dominated) on drier exposures or occasionally to PINPON-JUNSCO. In foothills/mountain settings PINPON/AGRSPI usually represents the driest forested sites.

Shrub cover, even in early seral conditions, generally does not exceed 10% and regularly includes *Artemisia tridentata*, *A. frigida*, *Rhus trilobata*, *Rosa arkansana*, and *Ribes* spp. High coverages of *Juniperus horizontalis* found occasionally in easternmost MT represent a departure from the norm but factors producing this condition were not identified; we have provisionally identified a PINPON/JUNHOR c.t. to represent this condition. Undergrowth is dominated by graminoids with the highest coverages found in early to mid-seral stands; even in this woodland type it appears that higher tree canopy cover tends to depress undergrowth cover. This type is recognized by AGRSPI being at least well represeted, usually it is abundant. Other graminoids with 50% or higher constancy are *Carex filifolia*, *C. rossii*, *Stipa comata*, and *Muhlenbergia cuspidata*; their coverages seldom exceed 10%. There are no forbs that distinguish this type and species richness varies widely (as few as 4 forbs, as many as 44). Combined forb cover does not exceed 5%, except in the case of introduced species (e.g. *Melilotus officinalis*).

Other Studies: This h.t. spans a broad geographic range, from just east of the Cascade Crest to Nebraska and south to Colorado, but its greatest areal extent (judged by S-rank) is in Montana. Pfister et al. (1977) first documented its extent in Montana, especially the western portion. Hansen and Hoffman (1988) and Cooper and Pfister (1984) have characterized it for southeastern MT and Roberts (1980) documented it for the Bears Paw Mtns and our study has extended its known range to the Little Rocky Mountains and the study area at large. The study area representation of the type fits, with minor floristic differecnces such as the prevalence of *Muhlenbergia cuspidata*, the type description for southeastern MT.

***Pinus ponderosa/Carex pensylvanica* p.a.**

(PINPON/CARPEN; ponderosa pine/long-stolon sedge; 5 plots
WHTF designation PINPON/*Carex inops*)

Environment: Sampled at only five locations all within (Garfield Co.) PINPON/CARPEN (syn. *C. heliophyla* of Hansen and Hoffman 1988 and *C. inops*) is probably only an incidental type within the study area. It occurrs on both lower slopes and ridge shoulders with sandstone (calcareous and non) substrates. Ground surface has a nearly continuous litter layer, as opposed to more open, woodland-like PINPON stands that have a high percentage of exposed substrate. Adjacent vegetation was *Artemisia cana/Agropyron spicatum* or ARTCAN/ *Stipa comata* on flats below and PINPON/AGRSPI on warmer-drier upland sites, denoting this type as relatively more mesic than others in upland landscape mosaics.

Vegetation: PINPON/CARHEL within the study area generally fits the type description outlined by Hansen and Hoffman (1988) for southeastern MT; the overstory is dominated by *Pinus ponderosa* but is not closed and also includes *Juniperus scopulorum* well represented. Study area stands were mature so their lack of overstory closure may reflect relatively drier environments than those occupied by this type in southeastern MT (Hansen and Hoffman 1988) or past disturbance (underburning).

Shrub dominance shifted among the four (*Artemisia tridentata*, *Rhus trilobata* and Symphoricarpos occidentalis, *Juniperus horizontalis*) commonly present and combined coverages did not exceed 10%. Undergrowth was graminoid dominated, with *Carex pensylvanica* usually abundant and *Stipa comata* and *S. spartea* important components. Because stands are (still) relatively open, coverages of shade-intolerant *Andropogon scoparius* remain high. Forbs were recorded in only trace amounts. It is possible in such a fire prone enviroment that some stands of ANDSCO-CARPEN h.t. represent early seral stages of PINPON/CARPEN.

Other Studies: Hansen and Hoffman (1988) have provided the most complete description of this h.t. in MT and study area examples of the type generally fit the type profile in terms of environment and species composition. Hansen and Hoffman (1988) present an argument that a very similar type, PINPON/ANDSCO described by Pfister et al. (1977), though a valid community type, is simply an earlier seral stage of PINPON/CARHEL. PINPON/CARHEL, or equivalents, have also been described from Colorado (Hoffman and Alexander 1983), Wyoming, North and South Dakota (Hoffman and Alexander 1987) and possibly Oregon (Bourgeron and Engelking 1994).

Pinus ponderosa/Festuca idahoensis p.a.

(PINPON/FESIDA; ponderosa pine/Idaho fescue; 1 plot)

Environment: We sampled only one stand of PINPON/FES (Saddle Butte vicinity) but noted numerous occurrences in this area south of the main mass of the Little Rocky Mountains; this sampled stand and others observed document the northeasternmost known range of this type (was not described by Roberts [1980] for the Little Rocky Mountains immediately to the north). The sampled stand, typical for the vicinity, was on a moderate, west-facing slope with igneous parent material weathered to a well-drained sandy loam. Other stands noted generally have west- or east-facing aspects. Ground cover is dominated by litter in excess of 80% coverage. Warmer exposures supported PINPON/AGRSPI or *Festuca idahoensis-Agropyron spicatum* dominated grasslands and on cooler exposures PINPON/FESIDA grades to PINPON/*Arctostaphylos uva-ursi* or PINPON/*Amelanchier alnifolia* (also undocumented for the Little Rocky Mountains vicinity).

Vegetation/Other Studies: Little Rocky Mountains occurrences of PINPON/FEIDA qualify as the FESIDA phase, as they lack *Festuca scabrella* (syn. *F. campestris*); immediately to the west (Bears Paw Mtns.) Roberts (1980) found only the FESCSA phase. The Little Rocky Mountains do support scattered populations of *F. scabrella*, but this mountain range and immediate vicinity would appear to be the northeasternmost extent of this important range grass. This area is also at the distributional limits of *F. idahoensis*. Thus this h.t. is found east of the Cascade Crest extending to eastern MT and south to Colorado and Utah; it has not been cited for the Midwest Regional Classification 1993)

Study area stands have an open, woodland aspect with widely spaced older *Pinus ponderosa*. The undergrowth is dominated by graminoids, the diagnostic *F. idahoensis* being well represented unless intensively grazed. *Agropyron spicatum* and *Carex heliophila* are also well represented. Forb species present indicating sites more mesic than PINPON/AGRSPI include *Galium boreale*, *Geum triflorum* and *Campanula rotundifolia*. In undergrowth composition study area stands appear closer to the type as described for southeastern MT by

Hanson and Hoffman (1988) and Cooper and Pfister (1984).

Pinus ponderosa/Juniperus horizontalis p.a.

(PINPON/JUNHOR; ponderosa pine/creeping juniper; 3 plots)

Environment: The three sampled stand represents a considerable range extension for PINPON/JUNHOR which was previously known only from the calcareous sandstones of the Little Rocky Mountain's foothills (Roberts 1980). These stands were all found on calcareous substrate (shale). They occurred in rolling terrain near the crests of gentle slopes.

Vegetation: These stands conform to the type description of Roberts (1980) wherein *Juniperus horizontalis* and *Rhus trilobata* are the dominant species in what is otherwise a relatively depauperate undergrowth; in more open stands J. horizontalis superficially appears to form a sward at 50% and greater coverage. These stands also shared 3/4 of the herbaceous species listed for the type by Roberts (1980).

Other Studies: Only Roberts (1980) has described this type (Little Rocky Mountains foothills). Miller (1978) has described a type from the Rocky Mountain Front, Pinus/JUNHOR/*Festuca idahoensis*, that apppears to represent an intergrade between PINPON/JUNHOR and *Pinus flexilis*/JUNHOR. Structurally PINFLE/JUNHOR is very similar to *Pinus flexilis/Juniperus communis*, also found almost exclusively on calcareous substrates (Pfister et al. 1977).

Pinus ponderosa-Juniperus scopulorum p.a.

(PINPON-JUNSCO; ponderosa pine-Rocky Mountain juniper; 14 plots)

Environment: PINPON-JUNSCO was found exclusively on sedimentary parent materials, mostly shales and sandstones, both calcareous and not. It is found predominantly on gentle to steep northerly aspects of rolling terrain from Blain County eastward; however in the far eastern portion Montana it is more associated with badlands topography, the coulee slopes thereof. This type is also associated with the tops and shoulders of ridges and draws. Because we sampled relatively young to mature stands substrate conditions varied appropriately, from 70% exposed soil in young stands to 70-90% litter in older stands. Soil textures were mostly loams and sandy loams.

Vegetation: The variety of seral stages contributes to the broad spectrum of tree coverages from very open (20% canopy cover) to nearly closed with *Pinus ponderosa* dominating the overstory. *Juniperus scopulorum* being at least well represented is diagnostic for the type and usually, especially in mid-aged stands it is abundant; in what are ostensibly the oldest stands its cover may drop relative to that of *P. ponderosa*. Many stands appear to be hybrids between PINPON/ Carex heliophila of southeastern MT, PINPON/*Agropyron spicatum* of western and central MT, and/or JUNSCO/AGRSPI.

The undergrowth is dominated by varying combinations of *Carex heliophila*, *Agropyron spicatum* and *Oryzopsis micrantha*. *Muhlenbergia cuspidata* and *Carex filifolia* have high constancy but low coverage, usually not exceeding 10%. Calamovilfa longifolia was dominant in several young stands developed on sandstone. Forb cover seldom exeeded 5% and forb composition was highly variable in composition; *Solidago missouriesis* and *Psoralea argophylla* were the forbs even approaching 50% constancy.

Other Studies: Roberts (1980) has described PINPON-JUNSCO from the Missouri River Breaks as characterizing the very driest forested slopes (and benches) whereas in badlands of southeastern MT (Ashland District, Custer National Forest) Brown (1971) cited it as occurring on relatively moist, protected exposures. This type is common in North and South Dakota and Wyoming (see Hoffman and Alexander 1987) and extends south to Colorado and New Mexico (Bourgeron and Engelking 1994).

Pseudostuga menziesii/Symphoricarpos occidentalis p.a.

PSEMEN/SYMOCC; Douglas-fir/western snowberry; 3 plots)

Environment: According to Roberts (1980), PSEMEN/SYMOCC is the driest plant association within the *Pseudotsuga menziesii* series of north-central MT and the fact that all our sampled stands occurred on southerly exposures with convex surfaces with at least 20% exposed substrate tends to confirm this observation. Our sampled stands occurred just south of the Little Rocky Mountains on syenitic parent materials whereas just north in the Little Rocky Mountains Robests (1980) reported this as a minor type on calcareous parent materials. PSEMEN/SYMOCC occurs in a fine-scale mosaic with PSEMEN/ *Amelanchier alnifolia* and PSEMEN/Berberis repens, which occupy more moist/sheltered positions, and PSEMEN/ *Viola canadensis*, which occurs in yet more moist sites, generally downslope in collecting positions. PSEMEN/SYMOCC grades to *Pinus ponderosa/Festuca idahoensis* and bunchgrass-dominated steppe of yet drier exposures.

Vegetation: Because our samples of this type were of relatively early seral stages (< 50 years since stand-replacing wildfire) their membership in this plant association is somewhat speculative. *Pseudotsuga menziesii* is just beginning to establishon these sites that apparently were intensively burned. *Pinus ponderosa* is the seral dominant and counter to the observations of Roberts (1980) *Populus tremuloides* and *Pinus contorta* are capable of fuctioning as seral species as well; seral success of *P. contorta* and *P. tremuloides* may owe to the fact that our stands occupied acidic igneous, rather than calcareous, substrates.

Sample stands may have been subject to underburns since stand-replacing fire because tree cover is low and bunchgrasses *(Schizachyrium scoparium*, *Agropyron spicatum*, Koeleria cristata, *Stipa comata*) are still an important component, their combined coverages generally exceeding 30%. Shrub cover is low in stature owing to heavy ungulate browsing on potentially tall shrubs (*Prunus virginana*, *Amelanchier alnifolia*, *Shepherdia canadensis*) and site severity; *Rosa woodsii/acicularis* and *Symphoricarpos occidentalis* dominate the shrub layer but their combined coverage seldom exceeds 10%. *Artemisia frigida* is constant pointing up the early to mid-seral nuture of these stands. Solidago missouriensis, *Achillea millifolium* and *Thermopsis montana* are 100% constant but hardly diagnostic for the type.

Other Studies: PSEMEN/SYMOCC was first described by Roberts (1980) for the core of the Little Rockies and Bears Paw Mountains and its range has now been confirmed for the surrounding high terrain by this study; PSEMEN/SYMOCC is apparently unique to these mountain masses rising in the midst of Montana's Great Plains.

SHRUB-DOMINATED PLANT ASSCIATIONS/COMMUNITY TYPES:

Artemisia cana/Agropyron smithii p.a.

(ARTCAN/AGRSMI; silver sagebrush/western wheatgrass; 6 plots
WHTF designation ARTCAN/*Pascopyrum smithii*)

Environment: The ARTCAN/AGRSMI h.t. is found on level to gently sloping, narrow to extremely broad alluvial (floodplain) terraces and coalescing alluvial fans and upslope may occur in swales and gentle depressions. These sites are moister than contiguous upslope vegetation and in some cases may constitute wetland sites (none of our sampled stands were, this can only be determined by hydrological monitoring or examination of soil characteristics). Substrates are generally moderately fine to fine textured, being derived from sediments deposited in low energy environments (or in the case of basins and swales from slopewash), have a high water holding capacity and are well- to imperfectly drained. As speculated in other studies (Jorgenson 1979, Hansen et al 1991) perched or high water tables may influence the rooting zone for a portion of the year. A variety of community types were found to occur adjacent on upland sites, most commonly *Stipa comata-Bouteloua gracilis* and *Agropyron smithii-Stipa comata*, whereas moister positions were frequently dominated by the *Symphoricarpos occidentalis*, *Rosa woodsii* c.ts. or *Sarcobatus vermiculatus*-dominated types in highly erosive to badlands topography.

Vegetation: *Artemisia cana* having at least 5% canopy cover is diagostic of this type, but its cover usually exceeded 30%. None of the sites supported the robust 4-5 ft tall specimens cited by Hansen and Hoffman (1988) or Mueggler and Stewart (1980) for favorable site conditions. *Artemisia frigida* was consistently present in low amounts (greater than 10% where cattle grazing intensive) and other shrub species were only sporadic. Graminoids dominate the herbaceous layer with *Agropryon smithii* usually dominant, but in our samples *Stipa viridula*, *S. comata* and *Bouteloua gracilis* were all dominant or co-dominant in at least one stand (also had greater than 75% constancy). This variability is speculated to reflect differing grazing pressure as stands were not chosen for pristine condition (stand with *B. gracilis* dominant had *A. smithii* and *S. viridula* confined to canopies of *A. cana*). The forb component is insignificant; none had even 50% constancy.

Other Studies: This, or closely related, types have been documented in other areas of MT; southeastern (Hansen and Hoffman 1988), southwestern (Mueggler and Stewart 1980) and central (Jorgensen 1979). The most comprehensive sampling (43 stands) of this type is that performed by the Montana Riparian Association (Hansen et al. 1995) for the entire state. This type has been described only for Montana, North and South Dakota (Hansen et al. 1984).

Artemisia cana/Stipa comata c.t.

(ARTCAN/STICOM; silver sagebrush/needle-and-thread; 9 plots)

Environment: ARTCAN/STICOM is a newly described minor c.t. distributed sporadically across northern MT. from Blaine to Garfield Counties. It is found on benches to gently inclined slopes (extreme of 30% inclination) often in the vicinity of breaklands. It was sampled on well-drained alluvium, sandstone and igneous parent materials but most often encountered on mixed-origin glacial till. The ground cover was highly variable with some plots having a sward of *Selaginella densa* and lichens and other sites had 70% litter and trace amounts of *S. densa*; only one plot had as much as 10% exposed soil, gravel or rock (combined cover). ARTCAN/STICOM apparently is the driest environment capable of supporting *Artemisia cana*; this c.t. grades to a variety of graminoid-dominated, upland range sites, most often STICOM- *Bouteloua gracilis* or STICOM- *Carex filifolia*. Adjacent moister sites often support ARTCAN/AGRSMI or SARVER/AGRSMI.

Vegetation: All of the sites were sampled following three years of lower than normal precipitation and were in the midst of range that had been intensively grazed for years. Because only one protected site could be found (and this due to extraordinary topographic features) this species assemblage is noted as a community type. Sites are recognized by *Artemisia cana* being at least well represented; its cover averages 27% and usually does not exceed 40%, relatively low values for a shrub type. *Artemisia frigida* is the only other shrub exceeding 50% constancy and its cover does not exceed 3%.

Graminoids are definitely the dominant component with an average cover of 42%. *Stipa comata* with well represented coverage is diagnostic for the type but its average coveris 38% and on favorable sites is as great as 70%; other grasses had as high or higher cover values in several stands. *Stipa comata* is primarily associated with sandy substrates as are two other grasses consistently present within this community type, *Calamovilfa longifolia* and *Andropogon scoparius* (very reduced in cover due to high palatability). The grass composition and cover is quite variable, possibly reflecting past grazing practices. In stands judged to be intensively grazed *Bouteloua gracilis* had higher cover and *Selaginella densa* formed a nearly continuous carpet. Forbs are an insignificant component, present in only trace amounts; only *Sphaeralcea coccinea*, *Psoralea argophylla* and *Gaura coccinea* were at least 50% constant.

Other Studies: This c.t. has not been described in the literature and we fail to see what other recognized type of which ARTCAN/STICOM could possibly be a degraded representative. ARTCAN/STICOM occupies unique landscape positions (drier) relative to those of other *A. cana*-dominated types. Some stands have trace amounts of palatable species but also have significant coverages of other palatable species arguing that disturbance has not totally altered this type's expression.

Artemisia tridentata/Agropyron smithii h.t.

(ARTTRI/AGRSMI; big sagebrush/western wheatgrass; 13 plots
WHTF designation ARTTRI/*Pascopyrum smithii*)

Environment: ARTTRI/AGRSMI is an extensive h.t. in the western portion of the study area but its coverage drops dramatically to the east and in Valley County only widely scattered, generally less than 5 acre stands are present. This h.t. is typically found on gently rolling (slope inclination < 10%), till-mantled surfaces; it is also found in breaklands and on well-drained alluvial terraces. Others (Hansen and Hoffman 1988, Hansen et al. 1984, Tisdale and Hironaka 1981, Jorgensen 1979, Mackie 1970) have described this type as an edaphic or topoedaphic climax, associated with heavy soils in southeastern MT or shallow, gravelly, or claypan surface soils in north-central MT; lacking adequate soils information we can only speculate based on landscape positionthat most of our sites represent edaphically controlled conditions. The amount of exposed substrate is generally considerably higher (ave. 50%, ranging to 80%) than for adjacent communities.

Vegetation: This type is recognized (in part) by *Artemisia tridentata* being well represented in the shrub layer, usually its cover does not exceed 50%, averaging 32%. Therer are no other shrubs with high constancy but *Chrysothamnus nauseosus*, *Artemisia frigida* and *Gutierrezia sarothrae* are regularly present with low coverages. Well represented *Agropyron smithii* is diagnostic for the herbaceous layer, though intensively grazed areas may have lower coverages (ave. cover 19%). Ease of livestock access makes these sites prone to overgrazing; none of the sampled sites were even close to pristine. Even in livestock exslosures weedy or invader species (e.g. *Melilotus officinalis*, *Taraxacum officinalis*, *Bromus tectorum*) are agressively expanding (having gained a foothold prior to exclosure creation). Somewhat inexplicably *Selaginella densa* does not seem to increase on these sites tha way it does on say ARTCAN/STICOM or other grassland sites, but it can occur with high cover values.

Graminoids with moderate to high constancy are *Stipa viridula*, *Koeleria cristata*, *Poa secunda*, and *Carex filifolia* (or C. stenophylla); of these, only *S. viridula* was noted to be an occasional layer dominant, as was *Agropyron spicatum*. *Stipa comata* was well represented on sandier sites (sandy loams). Forbs are a minor component, those with greater than 50% constancy are *Sphaeralcea coccinea* and *Vicia americana*.

Other Studies: ARTTRI/AGRSMI is distributed from central MT (Jorgensen 1979, Mackie 1971) east to southeastern MT and contiguous portins of North and South Dakota (Hansen and Hoffman 1988, Hansen et al. 1984) and south to Wyoming, Utah and Colorado; it is absent from far northeastern MT and not reported for the Canadian prairies.

Artemisia tridentata/Agropyron spicatum h.t.

(ARTTRI/AGRSPI; big sagebrush/bluebunch wheatgrass; 5 plots
WHTF designation ARTTRI/*Pseudoroegneria spicata*)

Environment: ARTTRI/AGRSPI is a major shrubland type throughout non-forested regions of MT, except for the extreme norhteastern corner. Within the study area it is associated with gently rolling upland of low to moderate relief of the till-mantled glaciated plains and is also found in breaklands and on well-drained alluvial terraces. No difinitive environmental breaks could be identified to separate ARTTRI/AGRSPI from ARTTRI/AGRSMI sites but the explanation likely resides in the soil/substrate component. Jorgensen (1979) has noted both ARTTRI/AGRSPI and ARTTRI/ *Agropyron dasystachyum-Agropyron spicatum* phase (our ARTTRI/AGRSMI h.t.) on the certain members of the Colorado shale formation in the same restricted geographic area and speculated the difference is the degree of soil development. The young soils lack horizonation and are vertically active, features favoring *A. smithii* and *Stipa viridula* over *A. spicatum* because of differences in their rooting response to vertical mixing. From our cursory data it would appear ARTTRI/AGRSPI is developed on coarser textured substrates than is ART/AGRSMI.

Vegetation: Well represented *Artemisia tridentata* and *Agropyron spicatum* are diagnostic for this type Shrubs with high constancy include *Gutierrezia sarothrae*, *Artemisia frigida* and *Opuntia polyacantha*, all recognized increaser species with overgrazing. Rhizomatous wheatgrasses *A. dasystachyum* and *A. smithii* are poorly represented, if present. High constancy graminoids are *Stipa viridula*, *Carex filifolia*, *Poa secunda* and *Bouteloua gracilis*, the last three being recognized increasers in this type. On sandstone substrates *Muhlenbergia cuspidata*, *Stipa comata* and *Calamovilfa longifolia* were present, frequently well represented. Though we attempted to sample at least good condition sites the accessibility ARTTRI/AGRSPI to livestocks coupled with the potential to support highly palatable grasses and fire susceptibility of the shrub component has resulted in wholesale alteration of the vegetation. Burned sites require years for *A. tridentata* to reestablish; in interval they support the AGRSPI-Bouteloua gracilis or AGRSPI-*Carex filifolia* or *Stipa comata*-BOUGRA community types.

The combined forb coverage is generally less than 5% with only *Sphaeralcea coccinea* and *Vicia americana* having high constancy. Despite intensive grazing pressure these sites have only trace amounts of *Selaginella densa*; a similar condition was observed by Jorgensen (1979) for this type in central MT.

Other Studies: This is a broadly distributed habitat type, from Washington State where it constitutes the climatic climax of vast acreages east of the Cascade Crest (Daubenmire 1970) east to extreme southeastern MT where it is a topographic climax (Hansen and Hoffman 1988, Brown 1971). In central MT ARTTRI/AGRSPI is considered primarily a climatic climax type, at least in areas where the prevailing substrates are Colorado Shales; in western MT it constitutes a climatic climax type under much of a 12-18 precipitation zone. Study area representations of the type conform to the type desciption given for western (Mueggler and Stewart 1980) and central MT (Jorgensen 1971) in regard to flora, landscape positions occupied and the fact that it is found on diverse parent materials.

Atriplex confertifolia-Artemisia tridentata c.t.

(ATRCON-ARTTRI; shadscale-big sagebrush; 5 plots)

Environment: Within the study area ARTCON-ARTTRI is found exclusively on badlands/breaklands. The possibly unique physical/chemical nature of these sites seem to be the major factor exerting control on the distribution of this and allied communities; this borne out by fact that the community was found on contrasting aspects and positions, from low-gradient toeslopes and benches to steep slopes. Substrates were not characterized as to geological formation, but they were noted to be fine-textured (clay loams and silty clays), high in shrink-swell clays (noted by surface fissures) and highly erosive, to both water (rill and gully features, pedicelling of larger forbs and grasses) and wind (blowout depressions). The sparse vegetation contributes little litter and typically sites have 80% plus exposed substrate. Some sites have in excess of 60% exposed gravel; it could originate from surface deflation or as slopewash from upslope postions. This type often graded to ARTTRI/*Agropyron spicatum* or *Stipa comata-Bouteloua gracilis* on more conventional substrates and to *Atriplex nuttallii/Sporolobus airoides* on other badland surfaces.

Vegetation: Low (<10%) to moderate (<40%) combined coverages of *Artemisia tridentata* and *Atriplex confertifolia* characterize this type; in all but one plot *A. tridentata* cover exceeded that of *A. confertifolia* Other shrubs are poorly represented and only *Atriplex nuttallii* had greater than 50% constancy. Graminoid coverage is highly variable, highest on benchlands and less than 10% on moderate to steep, south-facing slopes. Grasses having higher cover and constancy here as opposed to adjacent communities on more normal soils include *Sporolobus airoides*, *Aristida longiseta*, and *Oryzopsis hymenoides*. *Agropyron spicatum* may be abundant. relating these sites to ARTTRI/AGRSPI. Forbs and bryophytes are present in only trace amounts; *Oenothera cespitosa* and *Eriogonum pauciflorum* are forbs more associated with badlands than zonal sites.

Other Studies: Study area examples of ATRCON-ARTTRI appear to be very similar in vegetation and environment to a c.t. of same name described by Brown (1971) for southeastern MT badlands; our conception of ATRCON-ARTTRI includes a additional Brown-defined type (ATRCON-ARTTRI/Agropyron spicatum) described as being the most extensive of southeastern badland types. In southcentral MT the Pryor Mountains vicinity and Bighorn Canyon NRA support a compositionally similar type termed ARTTRI-ATRCON by DeVelice and Lesica (1993) and sagebrush desert shrubland by Knight et al. (1987). ARTTRI-ATRCON occurs on very different habitat, terraces and alluvial fans derived from calcareous sandstone and having a silty texture.

Atriplex nuttallii/perennial grass c.t.

(ATRNUT/GRASSP; saltsage/perennial grass; 4 plots)

Environment: ATRNUT/GRASSP is a minor type restricted to badland sites with highly erodable substrates derived from dark shales and mudstone. Please note that that in the vegetation key and various appendices, such as constancy/cover, that ARTNUT/GRASSP is split into three tentative types, ATRNUT/*Agropyron smithii*, ATRNUT/*Sporobolus airoides*, and ATRNUT/*Agropyron spicatum*. Insufficient plot data did not permit unequivocal recognition of these tentative community types, thus they have been lumped under ATRNUT/GRASSP until such time that they can be individually substantiated by plot data and their ecological conditions described. ATRNUT/GRASSP was sampled on moderate to steep slopes of various aspects. Combinations of the above conditions result in nearly continuous sheet, rill and gully erosion and more than 80% exposed soil and gravel preclude significant soil development. Though the fine soil fraction is dominated by clay and silt at least 40% of the soil consists of sand- and gravel-sized shale shards resulting in relatively well-drained substrates. This type usually exists in a matrix of other badland types, *Sarcobatus vermiculatus*-ATRNUT, ATRNUT/ERIPAU, *Artemisia tridentata-Atriplex confertifolia* and *Juniperus horizontalis/Andropogon scoparius* (on more mesic sites).

Vegetation: Sites are depauperate with combined canopy cover not exceeding 50%, the shrub and grass components sharing dominance. These sites differ from other badland sites by having at least 5% cover of perennial grasses, of which the following have dominated at least one site, *Agropron dasystachyum*, *A. spicatum*, *Sporobolus airoides* and *Oryzopsis hymenoides*. Only *S. airoides* is associated with adverse soil conditions of high alkali content suggesting these sites span a catena of soil chemistry and water balance. Either *Atriplex nuttallii* or *Sarcobatus vermiculatus* is always well represented. *Artemisia tridentata* and *Gutierrhiza sarothrae* are consistently present but generally poorly represented. The forb component is negligible with no species even moderately constant.

Other Studies: For central MT Harvey (1982) has described (from one plot) a ATRNUT/*Agropyron smithii* c.t. on shale derived alluvium; site conditions are not those of a badland and high vegetative cover reflects the less adverse site conditions relative to ATRNUT/GRASSP. In the Pryor Mountains vicinity DeVelice and Lesica (1993) describe compositionally similar types, ARTTRI-ATRNUT and ATRNUT/ *Monolepsis nuttalliana*, that possibly because of livestock grazing have a very sparse grass cover; badland conditions also obtain at these sites with erosive bentonitic soils and conspicuous rill and gully erosion.

Atriplex nuttallii/Eriogonum pauciflorum c.t.

ATRNUT/ERIPAU; saltsage/few-flowered wild buckwheat; 4 plots)

Environment: This c.t. has been documented from only Rosebud County where it is a minor type restricted to benches or flats with heavy-textured, shrink-swell-cracked, poorly drained soils derived from shale (formation unidentified). With vegetation sparse the amount of exposed soil and gravel usually exceeds 90% and sheet and rill erosion is ubiquitous; though relief is slight these would be considered "badland" sites.

Vegetation: These site are depauperate in cover (combined cover usually less than 40%) and diversity (average 8 species per plot). The shrub layer dominant *Atriplex nuttallii* is well represented but seldom abundant. *Chrysothamnus nauseosus* is 100% constant, its cover not exceeding 10%. *Artemisia tridentata* dominated one stand on an area transitional to ARTTRI/AGRSPI, the most commonly noted bordering community. *Agropyron dasystachyum* and *Oryzopsis hymenoides* are grasses with the highest cover (not exceeding 5%) and constancy (>50%). *Eriogonum pauciflorum* is the dominant forb (cover to 30%) and often the only forb noted over broad expanses.

Other Studies: There are a number of community types recognized for MT with *Atriplex nuttallii* dominant/co-dominant but only ARTNUT/ *Monolepsis nuttallii* in the Pryor Mountains vicinity (DeVelice and Lesica 1993) and ATRNUT/ *Oryzopsis hymenoides* of southwestern MT (DeVelice 1992) occur in similar habitats, sedimentary (mostly shale) badlands with poorly-drained substrates. ATRNUT/ERIPAU sites occur in the same types of landscapes with ostensibly similar substrates (shales, bentonite) as the *Artemisia longifolia-Eriogonum pauciflorum* c.t. and share the same forb dominant. ATRNUT/ERIPAU may simply represent a local variation of types common to shale-derived badland environments throughout the Intermountain West (Bourgeron and Engelking 1991).

Ceratoides lanata/ Stipa comata c.t.

(CERLAN/STICOM; winterfat/needle-and-thread; 5 plots
WHTF designation *Krascheninnikovia lanata/Stipa comata*)

Environment: This type is tentatively referred to as CERLAN/ *Stipa comata* c.t.; with the input of plots from the Big Dry R.A. and reanalysis it appears this is a type potentially dominated by *Agropyron spicatum*. We speculate *Stipa comata* is currently dominant due only to intensive cattle grazing and thus this type represents a seral stage of a putative CERLAN/ *Agrpyron spicatum* plant association (it should be noted that there is no CERLAN/ Agropyron spicatum p.a. recognized in the western U.S.). CERLAN/STICOM is a minor c.t. scattered across the complete extent of study area, on the periphery of badlands or breaklands, usually on flats and footslopes of gentle terrain. CERLAN/AGRSPI frequently forms sharp ecotones with sites dominated by AGRSPI-Carex filifolia or STICOM-CARFIL. Various investigators (Daubenmire 1970, Gates et al. 1956) have tried without success to establish what soil variables lead to the frequently noted sharp discontinuites between *Ceratoides*-dominated stands and adjacent vegetation; neither excessive $CaCO_3$ nor defieciency of N,P,K or S seem to controlling.

Vegetation: All but two of the sampled stands had been highly impacted by grazing; both *Ceratoides lanata* and *Agropyron spicatum* the potential dominants of shrub and herb layer, respectively are highly preferred browse/forage and have been severely impacted, leading to the increase of *S. comata Carex filifolia* and *Bouteloua gracilis*. Both stands lightly to ungrazed (far from water) had double to triple the cover of *C. lanata* and *A. spicatum* of grazed stands. *Stipa viridula* also had higher cover under reduced grazing. *Artemisia frigida* and *A. tridentata* were the only shrubs exceeding 50% constancy and only *A. frigida* was well represented; apparently *A. frigida* does not expand on CERLAN/AGRSPI as it does on other rangeland sites. Forbs are a minor component, only *Sphaeralcea coccinia* and *Plantago patagonica* (a weed) were at least 50% constant. This type is notable for not supporting *Selaginella densa* as a major increaser species.

Other Studies: The only other documented example of *Ceratoides* (*Eurotia*) *lanata /Stipa comata* c.t., that of Washington State, is noted to be quite rare (S1); its composition and site characteristics are not currently published (Bourgeron and Engelking 1991).

***Juniperus horizontalis/Agropyron dasystachyum* c.t.**

(JUNHOR/AGRDAS; creeping juniper/thick-spike wheatgrass; 7 plots
WHTF designation *Juniperus horizontalis/Elymus lanceolatus*)

Environment: JUNHOR/AGRDAS was found only as small patches (<< 1 acre) in erosion prone landscapes associated with or in vicinity of badlands in Phillips and Valley Counties; it can be expected in other localities where similar substrates exist. Usually patches of JUNHOR/AGRDAS are embedded in a matrix of eroded bare spots, JUNHOR/ANDSCO, JUNHOR/JUNBAL and grades to AGRSMI-STIVIR and STICUR-STIVIR.

JUNHOR/AGRDAS sites are generally characterized by weathered shales, including bentonite deposits and alluvium, and bedded shales with a thin layer of glacial drift. All sites evidenced some degree of sheet erosion, most were both rilled and gullied and still others are sinks for erosional processes. Soils were high in clays and two sites had weak mottling and gleying. Several sites had soils with a textural fraction dominated by shales decomposed to sand-sized or larger particles and supported *Calamovilfa longifolia* and *Calamagrostis montanensis*, grasses associated with sandy soils. Positions ranged alluvial terraces to all variety of slope features from toeslopes to slope shoulders, but never on warmer aspects. Ground cover characteristics varied widely, the most typical situation being a high percentage (>60%) of exposed soil (due to erosion) or low gradient slopes and flats having a nearly continuous litter layer. Only one stand had abundant *Selaginella densa* so typical of adjacent upland sites.

Vegetation: *Juniperus horizontalis* well represented is diagnostic; it's cover ranged from 10 to 60%, averaging 42%. It apparently spreads relatively rapidly, colonizing areas recently denuded. Shrubs associated with moister environments, *Symphoricarpos occidentalis*, *Rosa* spp., and *Artemisia cana* are more than 50% constant, but their coverages do not exceed 5%. Grass cover ranges widely depending in part on degree of active erosion and probably length of time since colonization. *Agropyron dasystachyum* is 100% constant, usually dominant and diagnostic at the well represented level, but in some areas shares dominance with *A. smithii.* On moister positions *Stipa curtiseta* and *Stipa viridula* are present with as much as 30% canopy cover. *Carex pensylvanica* (*C. inops*) is an important graminoid on more than half the plots. *Vicia americana* is the only forb exceeding 50% constancy. The presence of *Eriogonum pauciflorum* and *Artemisia longifolia* reflect the badland setting of these sites.

Other Studies: Jorgensen (1979) describes for the Yellow Water Triangle a very similar type, JUNHOR/*Carex parryana* (lacking only *A. dasystachyum*), developed on "sandy" shales; he hypothesizes JUNHOR/CARPAR to be seral to ARTTRI/AGRDAS. In central and southcentral Montana Miller (1978) sampled several plots that would key to JUNHOR/AGRDAS (by virtue of *A. smithii* cover). In southeastern Montana a number of plots within what Hansen and Hoffman (1988) consider a topoedaphic climax, JUNHOR/ *Carex heliophila* h.t. (syn. *C pensylvanica*), appear closely similar in vegetation to JUNHOR/AGRDAS but occur only on sandy substrates This community type or homologues confined to sandy soils extend into western North Dakota (Redmann 1975, Hansen et al. 1984, Hanson and Whitman 1938).

***Juniperus horizontalis/Andropogon scoparius* c.t.**

(JUNHOR/ANDSCO; creeping juniper/little bluestem; 11 plots;
WHTF designation JUNHOR/ *Schizachyrium scoparium*)

Environment: This newly defined type occurs as small patches (<1 acre), often part of a *J. horizontalis*-dominated complex, in the midst of badlands or breaklands or on adjacent gently rolling terrain. It develops mostly on benches (alluvial terraces) but positions included toe or footslopes and backslopes (to the crest). Substrates are sedimentary, mostly shales decomposed to gravelly sands (fines outwashed?) or glacial drift. These sites are highly erosive and and where *J. horizontalis* cover is low there is extensive sheet, rill, and gully eroion. Even where sites are stabilized by appreciable vegetation (>70%) erosion encroaches from all sides due to alluvial processes from below and above and wind generated blowouts from above. JUNHOR/ANDSCO is found in a complex with JUNHOR/JUNBAL (moister positions), JUNHOR/AGRDAS (unknown relationship), JUNHOR/CALLON (coarser-textured substrates) and grades to ARTTRI/AGRSPI, AGRSPI-BOUGRA, AGRSPI-CARFIL and STICOM-CARFIL on the uplands.

Vegetation: *Juniperus horizontalis* dominates the shrub layer, occurring in widely varying (20-80+%) coverages. *Rosa arkansana* is the only other shrub with constancy exceeding 50%, but occurs with low cover values. Scattered *Symphoricarpos occidentalis*, *Shepherdia argentea* and *Arctostaphylos uva-ursi* occur on sites presumed to be more moist. Well represented (common where grazing impact significant) *Andropogon scoparius* and/or *Agropyron spicatum* are diagnostic for this type. The preliminary classification recognized two types (JUNJOR/ANDSCO & JUNHOR/AGRSPI) but subsequent analysis could find no difference in their site parameters and continuous variation in cover of diagnostic species; these observations resulted in a merging of the types. Both grasses are highly palatable and relative grazing impacts cannot be addressed without exclosure studies. Graminoids with high constancy include *Carex filifolia* and *Koeleria cristata*. *Calamovilfa longifolia* was well represented on sites well drained and sandy. Though poorly represented, the mere presence of *Juncus balticus* and *Agropyron dasystachyum* denotes transitions to moister sites. The forb component has slightly greater coverages than in other non-wetland shrub types; *Thermopsis rhombifolia* was well represented in about 30% of the plots.

Other Studies: The study area examples of JUNHOR/ANDSCO are compositionally intermediate between JUNHOR/*Carex heliophila* (syn. *C. pensylvanica*, *C. inops*) h.t. of southeastern MT and contiguous portions of North and South Dakota (Hansen and Hoffman 1988) and JUNHOR/ANDSCO described for western North Dakota (Hansen et al. 1984). Both JUNHOR/CARHEL and JUNHOR/ANDSCO (ND) occur as a topoedaphic climaxes on steep, north-facing slopes with sandy substrates. In Custer County Culwell and Scow (1982) describe a JUNHOR/sidehill type (*A. scoparius* dominant) for sandy, north-facing slopes; this type is a homologue of both JUNHOR/ANDSCO and JUNHOR/CARFIL. Jorgensen (1979) describes a JUNHOR/ *Carex parryana* (*C pensylvanica* ?) h.t. for central Montana that occurs on sites very similar (sandy shales) to those of study area and which he considers successional to ARTTRI/AGRSPI. Miller's (1978) extensive *J. horizontalis* study included plots identified as JUNHOR/AGRSPI and JUNHOR/ANDSCO-FESIDA that would be placed in our JUNHOR/ANDSCO c.t. *J. horizontalis*-dominated vegetation has been descibed for Alberta (Coupland 1961) but not south of MT.

Juniperus horizontalis/Calamovilfa longifolia c.t.

(JUNHOR/CALLON; creeping juniper/prairie sandreed; 4 plots)

Environment: JUNHOR/CALLON is a minor type associated with the badland topography northwest of Glasgow, MT and probably can be expected in similar highly erosive, shale-dominated environments. Whether found on butte tops or slopes, toeslopes or alluvial bottoms erosion was a dominant process (mostly sheet and rill) with up to 90% exposed substrate. Soils are single-grained and, even though derived from shales or siltstones, are dominated by sand and larger-sized particles. We posit that this type is a relatively early seral stage of other *J. horizontalis*-dominated (e.g. JUNHOR/ANDSCO) or possibly grassland types. It occurred both on wetland sites (gleyed and mottled soils) and well-drained sandy uplands with the only compositional differences between the two situations being cover of species represented.

Vegetation: *J. horizontalis* is well represented but coverages are not, on the average, so high as in other *J. horizontalis* -dominated types. *Calamagrostis montanensis* and *Calamovilfa longifolia* are well represented on all sites; *Andropogon scoparius* is also 100% constant but occurrs in only trace amounts. Forb composition is much like that of JUNHOR/JUNBAL, depauperte with *Thermopsis rhombifolia* and *Solidago nemoralis* 100% constant.

Other Studies: Miller (1978) named a JUNHOR/CALLON type but compositionally it bears little resemblance to the type named identically and described herein, though Miller does characterize the sites as having much bare ground and evidence of erosion. No other examples of this type have been descibed.

Juniperus horizontalis/Juncus balticus c.t.

(JUNHOR/JUNBAL; creeping juniper/Baltic rush; 4 plots)

Environment: JUNHOR/JUNBAL is a minor c.t. described only from the badlands northwest of Glasgow, MT. This type occurs as small patches on narrow alluvial benches intercalated between drainages and upslope postions; it extends to toeslope postions of north-facing slopes. Substrates are alluvium (stream and slope-wash depostitions) derived from shales, including bentonite. All plots had weakly mottled and gleyed soil (at 8 in depth) which points to their quite probably being wetland sites. These sites are subject to erosion through overland flow but due to cladding effect of high *J. horizontalis* coverages the erosion amounts are minimal, less than 5% of the surface area. Adjacent sites are often part of a *J. horizontalis*-dominated complex, including JUNHOR/ANDSCO and JUNHOR/CALLON.

Vegetation: *J. horizontalis* coverage generally exceeds 30% and was noted to completely blanket some sites (unsampled). *Rosa* spp. are 100% constant. *Juncus balticus* is at least well represented, often abundant. *Calamagrostis montanensis*, *Calamovilfa longifolia* and *Andropogon scoparius* were 100% constant, occasionally more abundant than *J. balticus*. The combined cover of graminoids appears to be inversely related to *J. horizontalis* cover. *Thermopsis rhombifolia*, *Achillea millifolium* and *Antennaria neglecta* were characteristic of a depauperate forb layer; only *T. rhombifolia* was well represented.

Other Studies: JUNHOR/JUNBAL has not been previously described, nor has *J. horizontalis* been previously identified as a wetland dominant. *Juncus balticus* is associated with anthropogenically modified wetlands (Hansen et al. 1994) but not even trace amounts of possibly displaced previous true wetland species (graminoids) could be found on sampled sites.

Rhus trilobata/Agropyron spicatum h.t.

(RHUTRI/AGRSPI; skunk-bush sumac/bluebunch wheatgrass; 3 plots; WHTF designation *Rhus aromatica/Pseudoroegneria spicata*)

Environment: RHUTRI/AGRSPI is a minor type in the study area, occurring as small patches on gently to steeply sloping breaklands, mostly on slope shoulders but capable of extending to footslopes. Exposures are generally the warmest in a local mosaic. Substrates included calcareous sandstones and shales and a lone instance on an extrusive volcanic; all soils were shallow and coarse-textured. Surface coverage varied between high coverages of soil/gravel (>50 %) and swards of *Selaginellla densa* (on overgrazed land). Adjacent c.ts. are often of the *Artemisia tridentata* series or *Stipa commata-Boutloua gracilis* (on uplands).

Vegetation: Well represented *Rhus aromatica* is diagnostic for the type; coverage ranges to 20%. Other shrubs include *Artemisia frigida*, *Gutierrezia sarothrae* and *Yucca glauca*. *Agropyron spicatum* is well represented, but due to site severity (and grazing), does not exist in high coverages. *Stipa comata* and *Muhlenbergia cuspidata* have 100% constancy and *S. comata* tends to have relatively higher coverage on accessible sites with grazing pressure. *Phlox hoodii* and *Liatris punctata* were present in all plots.

Other studies: Brown (1971) first described this c.t. for slope shoulders in southeastern MT badlands (porcellanite substrates). Hansen and Hoffman (1988) described virtually the same type over a greater extent in southeastern MT. Mueggler and Stewart (1980) extended the known occurrences to breaklands of the Missouri River's major tributaries, especially in the vicinity of the Yellowstone River drainage; though floristic composition differs slightly their type is essentially the same in landscape position and environmental variables as described herein.

Sarcobatus vermiculatus/Agropyron smithii c.t.

SARVER/AGRSMI; black greasewood/western wheatgrass; 3 plots; WHTF designation SARVER/*Pascopyrum smithii*)

Environment: Based on our small sample size SARVER/AGRSMI would appear to be a minor c.t., but Hansen et al. (1991), having extensively sampled characteristic habitats of this c.t., state it to be a major type of central and eastern MT. Our sampled stands were associated with older alluvial terrace deposits derived from shale (or at least fine-grained sedimentary material). Sites were in a matrix of badland washes and no doubt received considerable input from overland flow. We speculate for at least for a portion of the year soils, due to the water perching potential of the heavy-textured soils, are saturated at a depth tapped by *S. vermiculatus*. None of our sites possessed hydric soils and hydrologic regime necessary to confirm a jurisdictional wetland, as found for a portion of this c.t. by Hansen et al. (1995).

Vegetation: As noted elsewhere (Mueggler and Stewart 1980) this type has a shrubland aspect, despite *S vermiculatus* cover often not exceeding 10%, due to the robust stature of *S. vermiculatus* compared to that of the herbaceous layer. As noted by Branson et al. (1970), Johnson and Nichols (1982) and Brown (1971) *S. vermiculatus* has high alkali (especially sodium) tolerance, but other factors must be invoked to explain its floodplain presence. Other shrubs present include Artemisia frigida, *A. cana* and *A. tridentata* (occasionally noted to be well represented). *Agropyron smithii* dominated the herbaceous layer despite being heavily grazed; no other herbs were consistently present.

Other Studies: In Montana Mackie (1970) first described this c.t. (as SARVER/ *Agrpyron* spp. **h.t.**) for the Missouri River Breaks. Mueggler and Stewart (1980) noted its presence on floodplains of arid portions of western MT and playas and lakeshores of north-central MT. Hansen et al. (1995) are the source of the most encompassing vegetation description. Jorgensen's (1978) SARVER/*Agropyron dasystachyum* h.t., described from the Yellow Water Triangle, is an ecological analogue both in flora and environmental variables. Branson et al. (1970) describe how communities very similar to this c.t. relate to several Valley County badland soil catenas and driving variables of vegetation composition.

***Sarcobatus vermiculatus-Atriplex nuttallii* c.t.**

(SARVER-ATRNUT; black greasewood-Gardner's saltsage; 10 plots;
WHTF designation SARVER- *Atriplex gardneri*)

Environment: This is a common type restricted to "badlands" characterized by acid shale, bentonite or some other highly erodable heavy-textured substrate. Rill, gully and sheet erosion is natural to and omnipresent on these moderately to steeply sloping sites. The strength of substrate as controlling factor is reflected in fact that SARVER-ATRNUT occurs on steep slopes of all aspects. The principal factors controlling plant distribution are low infiltration rates, low available water holding capacity and high total soluble cations (alkaline) and sodium (saline) Branson et al. (1970). All stands had at least 80% exposed soil and gravels; only trace amounts of rock were exposed. With few exceptions litter cover is less than 5%. Adjacent c.ts. on non-badlands substrates were usually *Stipa comata-Bouteloua gracilis*, STICOM-*Carex filifolia* and *Artemisia tridentata*-dominated community types or SARVER/Agropyron smithii on water receiving positions.

Vegetation: Shrubs are the dominant lifeform on these sites but their combined cover seldom exceeds 40%. Well represented *Sarcobatus vermiculatus* or *Atriplex nuttallii* are diagnostic for the c.t. but on especially eroded or otherwise inimical substrates (small patches) they may be poorly represented. *Atriplex confertifolia* is consistently present in the easternmost examples of this type whereas *A. nuttallii* is more likely to occurr in the northcentral counties. *Artemisia tridentata* is present in increasing amounts where SARVER-ATRNUT grades to ARTTRI/AGRSMI. Graminoids are notably low in cover, not exceeding 5% in the aggregate. Forb coverage is highly variable in cover and composition. The annual, *Atriplex dioica*, was abundant on several sites; only *Iva axillaris*, *Suaeda moquinii* and *Machaeranthera canescens* had constancies approaching 50%

Other Studies: DeVelice and Lesica (1993) have described a SARVER/*Atriplex nuttallii* c.t. from bentonite substrates in the Pryor Mtns. of MT; in the same vicinity SARVER-ATRNUT is subsumed within the saltbush desert shrubland of Knight et al. (1987). Brown (1971) also described a SARVER type and documented associated soil properties; his SARVER type had notably higher sodium concentrations and pH values than the next most alkaline c.t., *Atriplex confertifolia-Artemisia tridentata*. The SARVER c.t. described here includes all of the above-cited types. This c.t. extends into Wyoming (Bourgeron and Engelking 1992) on substrates comparable to those of MT. Branson et al. (1970) describe the assciation between chemical/physical properties of Bearpaw shales of northeastern MT and alluvium derived therefrom to plant communities, including several dominated by *A.*

nuttallii and *S. vermiculatus* and a combination of the two species. Other *S. vermiculatus*-dominated types with an appreciable grass component probably differ in site factors.

***Shepherdia argentea* c.t.**

(SHEARG; thorny buffaloberry; 3 plots)

Environment: SHEARG is a minor study area c.t., documented only from Valley and Phillips Counties where it occurs as small stands (mostly < 1/5 acre) on the most mesic positions in a rolling uplands or badlands landscape mosaic. (In our sampling scheme we have not found SHEARG to be associated with alluvial bottoms, with the exception of drainage headlands; this constrasts with observations of Hansen et al. [1991] who targeted riparian areas specifically and found the type along the Sun, Milk, Missouri and Yellowstone Rivers.) Stands are not only small, but show much internal heterogeniety in both microtopography and vegetation, with clumpy distribution of S. argentea (and other shrubs). The smallest stands, not much more than individual clumps or stringers of S. argentea, occur on lee-slope positions, freqeuently on northwest- to east-facing slope brows and in swales; these are moisture-collecting positions, either as snow or runoff.

Soils were developed from glacial drift or shales. One sampled stand at drainage headlands qualified as jurisdictional wetland with gleying and mottling within 6 in of surface. Being productive sites, the ground cover is primarily litter, though much bare soil is exposed where animal trails are concentrated.

Due to position and structure these sites are heavily used by wild ungulates for cover; domestic stock also use these sites preferentially. Either/both of these groups are probably implicated in the introduction of *Euphorbia esula* (leafy spurge) to these moist habitats that are so favorable to its propogation.

Vegetation: *Shepherdia argentea*, mostly 4 to 7 ft tall, is usually abundant, forming a patchily distributed dominant shrub stratum, though *Symphoricarpos occidentalis* or *Juniperus horizontalis* may have greater cover, but in a low shrub layer. *Ribes setosum* is consistently present as a mid to tall shrub. The forb layers form two sampled stands were very different, apparently reflecting differences in soil moisture. The wet-site stand herb layer was dominated by *Poa palustris* whereas the drier stands were dominated by *Agropyron smithii.*

Other Studies: For Montana, SHEARG was first described in the southeast by Hansen and Hoffman (1988) and subsequently documented to range from southwestern, through central, to eastern sections by Hansen et al. (1995). Other northern Great Plains occurrences are described from North Dakota (Nelson 1961 and Boldt et al. 1978) and cited from South Dakota (Faber-Langendoen 1993).

GRASS- AND FORB-DOMINATED PLANT ASSOCIATIONS/COMMUNITY TYPES

Agropyron smithii-Bouteloua gracilis c.t.

(AGRSMI-BOUGRA; western wheatgrass-blue gramma; 24 plots
WHTF designation *Pascopyrum smithii*-BOUGRA)

Environment: The largest expanses of AGRSMI-BOUGRA, an important grassland type, occur on alluvial flats and basins and upper level stream terraces where fines (silts and clays) have accumulated in low energy environments. It is also found extensively on rolling upland sites where glacial drift is shallow or nonexistent and the underlying fine-textured soils are derived from shales and siltstone or even sandstone (with higher coverages of *Stipa comata* and *Calamovilfa longifolia*). Small stands are associated with swales or other collecting positions (toeslopes). Soils range from sandy loams to clay loams. Ground cover is characterized by high coverages (>60%) of either *Selaginella densa* (presumed result of overgrazing) or exposed soil; litter cover seldom exceeds 10%. AGRSMI-BOUGRA often grades to STICOM-BOUGRA and STICOM-CARFIL h.ts., which are found on better drained positions with coaser-textured soils, or the STICOM-BOUGRA c.t . which represents a grazing impacted area.

Vegetation: The accessibility of this type and palatability of the putative dominant (and diagnostic) species, *Agropyron smithii* and *A. dasystachyum*, has resulted in marked alteration of composition. Severe overgrazing alters this c.t. to STICOM-BOUGRA, BOUGRA (appearance of short-grass prairie) or weed-dominated pastures; we have documented fenceline contrasts with 90% *A. smithii* on the protected side and virtual extirpation on impacted side. The relative proportions *A. smithii/dasystachyum* versus *B. gracilis* and *Carex filifolia* appear inversely related to grazing intensity; a similar response has been documented for this type on Canadian prairies (Coupland et al 1960). *Koelèria cristata* and *Carex filifolia* exhibit high constancy and coverages occasionally exceeding 20%. *Muhlenbergia cuspidata* and *Andropogon scoparius* colonize areas where disturbance has resulted in localized erosion. We speculate that the high coverages of *Stipa comata* found in some stands (and not on sandsstone derived soils) result from grazing-reduced competition from rhizomatous grasses. Hansen and Hoffman (1988) note *S. comata* cover does not exceed 5% in undisturbed stands of *Agropyron smithii-Carex filifolia*, a very similar type of southeastern Montana and southwestern North Dakota.

Artemisia frigida is the only shrub of note (nearly 100% constant) but its cover seldom exceeds 5%, even with overgrazing. Aggregate cover of forbs does not exceed trace amounts except under intensive grazing where increaser species (*Plantago patagonica*, *Opuntia polyacantha*, *Phlox hoodii*, etc.) proliferate; *P. hoodii*, *O. polyacantha* and *Sphaeralcea coccinea* are the only forbs with greater than 50% constancy.

Other Studies: Under various designations, this c.t. is well documented to occur on gentle terrain with fine-textured soils (having a greater than normal proportion of clay/silt); from the brown soil zone of southern Canada as *Bouteloua-Agropyron* faciation (Coupland 1961), western ND as *Agropyron smithii-Bouteloua gracilis-Carex* spp. (Hanson and Whitman 1938, Quinnald and Crosby 1958) and AGRSMI-CARFIL (Hansen et al. 1984 and Hansen and Hoffman 1988), southeastern MT as AGRSMI-CARFIL (Hansen and Hoffman 1988), central and eastern MT as BOUGRA-AGRSMI (Anderson 1973), Custer County as AGRSMI-BOUGRA-*Buchloe dactyloides* (Culwell and Scow 1982) and Bull Mountains as BOUGRA-AGRSMI (Culwell 1977c). We have conservatively employed the designation AGRSMI-BOUGRA c.t. because it reflects the indicator significance of *A. smithii* regarding soil conditions and the generally greater constancy and coverage of *B. gracilis* (versus *C. filifolia*).

Agropyron smithii-Stipa viridula c.t.

(AGRSMI-STIVIR; western wheatgrass-green needlegrass; 23 plots
WHTF designation *Pascopyrum smithii-Nasella viridula*)

Environment: AGRSMI-STIVIR was probably a major community type throughout the study area (Coupland 1961) but has been put to the plow because of its favoribility for agriculture. Its occurrence is also much reduced and degraded because the gentle terrain affords ready access to cattle. AGRSMI-STIVIR is found on a broad variety of topographic positions, from rolling upland of low to moderate relief to swales of breaklands and moderate to steep, cooler aspects of coulees. It occurs on protected exposures, moister or water receiving positions in the landscape that possess fine-textured soils, though frequently a thin mantle of glacial drift may cover the sedimentary substrates which provide the majority of rooting medium. This type often grades to STICOM-BOUGRA, STICOM-CARFIL or AGRSMI-BOUGRA on adjacent uplands and *Artemisia cana* -dominated or *Symphoricarpos occidentalis* communities on lowland positions. Intensive grazing of AGRSMI-STIVIR has resulted in much conversion to STICOM-BOUGRA and ASRSMI-BOUGRA c.ts. or weed-dominated c.ts. with a high percentage of introduced annual grasses (*Bromus japonicus*, B. tectorum, *Festuca octoflora*, etc.).

Vegetation: *Agropyron smithii* and/or *A. dasystachyum* and*Stipa viridula* well represented are diagnostic for this type, however fenceline contrasts indicate that *A. smithii* can be reduced to trace amounts and even extirpated by intensive grazing. On lightly grazed rolling terrain *A. smithii* cover approached 95%. Ascertain intensity of grazing before relaxing cover criteria for type identification. *Stipa viridula* was chosen as an indicator of "favorable habitats" being associated with "heavy soil, by protection from wind, or by extra moisture from runoff.", Coupland 1961. *Bouteloua gracilis* and *Carex filifolia* (*S. comata* on sites with better drainage) are capable of dramatic increase with grazing and prolonged drought (Coupland 1961). Various mixes of *Carex* spp. (*C. stenophylla*, C. filifolia, *C. heliophyla*) and *Koeleria cristata* are highly constant and range widely in cover values.

Selaginella densa cover is high (> 70%) on severely overgrazed lands; other overgrazed sites support only trace amounts. High constancy forbs include *Phlox hoodii*, *Sphaeralcea coccinea*, *Antennaria parviflora* and *Psoralea argophylla*. *Artemisia frigida* is the only shrub with greater than 50% constancy; on overgrazed pastures its cover approaches 20%.

Other Studies: Moore and Culwell (1981) described a community type, identically named, from the Bull Mountains of Musselshell County, MT. Culwell and Scow (1982) sampled two c.ts. (AGRSMI-BOUGRA-BUCDAC and STICOM-AGRSMI) for Custer County that contained plots that would key to AGRSMI-STIVIR. Hansen and Hoffman (1988) describe a AGRSMI-CARFIL h.t. for southeastern MT and western North and South Dakota containing stands with *S. viridula* prominent; these stands are comparable to AGRSMI-STIVR in site variables and composition. In general the *Agropyron smithii* -dominated c.ts. described for western North Dakota (Hanson and Whitman 1938, Hansen et al. 1984, Quinnald and Crosby 1958) reflect more xeric conditions than those of AGRSMI-STIVIR. However, data presented by Quinnald and Crosby (1958) for ungrazed North Dakota mesas shows *S. viridula* to be an important component of *A. smithii*- and *A. dasytachyum* -dominated stands and Whitman (1976) documents a AGRSMI-STIVIR-BOUGRA c.t from southwestern ND occurring on silty clays, clay loams, and clays. For the prairies of Alberta the community closest in composition is *Agropyron* (mostly *dasystachyum*)-*Koeleria* (*cristata*) faciation (Coupland 1961) and is described as occurring only on rolling terrain with lacustrine clay soils.

Agropyron ***spicatum-Bouteloua gracilis*** **c.t.**

(AGRSPI-BOUGRA; bluebunch wheatgrass-blue grama; 4 plots;
WHTF designation *Pseudoroegneria spicata*-BOUGRA)

Environment: AGRSPI-BOUGRA is a common type in western MT, east of the Continental Divide, declining in prominence to the east. Within the study area it most common in foothills to Little Rockies and Bears Paw Mountains, generally associated with warmer exposures and well-drained soils. and becomes very sporadic in the easternmost counties (where associated with protected positions). It is Study area soils were derived only from sandstone (calcareous and non-calcareous) or glacial drift but this type was noted to develop on other substrates. It was most often observed to grade to STICOM-BOUGRA and AGRSPI-POASEC on drier exposures and ARTTRI/AGRSPI, AGRSMI-BOUGRA on gently rolling topography. Several fenceline contrasts reveal that *Agropyron spicatum* can be virtually extirpated by grazing. This type was sampled only on range minimally impacted by grazing. Given the accessibilty of this type and its vulnerbility to grazing, it is quite probable its potentially occupied acreage is much greater than that currently occupied.

Vegetation: Sites are dominated by *Agropyron spicatum* (20-70% cover); other highly constant graminoids include *Bouteloua gracilis*, *Stipa comata*, *Carex filifolia* and *Muhlenbergia cuspidata*. The first three named graminoids increase storngly with grazing. Combined cover shrub layer may exceed 5%, but individual species cover does not, with the exception of *Yucca glauca* (one site). *Artemisia frigida*, *Gutierrhizia sarothrae*, and *Yucca* *glauca* are the only high constancy (>75%) shrubs. Although forb diversity is relative high (> 15 species per plot), only *Phlox hoodii* and *Opuntia polyacantha* are highly constant.

Other Studies: Mueggler and Stewart (1980) have documented this as an important type for western Montana; it is very similar in composition and landscape position to AGRSPI-POASEC. In southeastern MT Hansen and Hoffman (1988) descibe two types, AGRSPI-*Carex filifolia* and AGRSPI-*Bouteloua curtipendula*, similar to AGRSPI-BOUGRA, but both types lack the importance of *B. gracilis*. Ross et al. (1973) list several near pristine occurrences of AGRSPI-BOUGRA on the sedimentary plains of eastern MT. This type ranges south into Wyoming and Colorado as a very extensive cover type (Bourgeron et al. 1994).

***Agropyron spicatum-Poa secunda* h.t.**

(AGRSPI-POASEC; bluebunch wheatgrass-Sandberg's bluegrass; 7 plots;
WHTF designation *Pseudoroegneria spicata*-POASEC)

Environment: This bunchgrass-dominated type is common in western MT (Mueggler and Stewart 1980), progressively declining in importance to the east; it is sporadically distributed within the western portion (Blaine and Phillips Counties) of the study area, extends as far as Rosebud Co. and not documented from the counties bordering ND. It was found on glacial drift and various igneous materials weathered to loams and sandy loams. It is found on southerly aspects of higher terrain such as foothills of and within the Little Rockies and Bears Paw Mountains, as well as on cooler exposures within rolling uplands. Ground cover is highly variable with high coverages of *Selaginella densa* on overgrazed sites, high moss cover on sheltered sites and exposed soil and gravel exceeding 70% on others. In Little Rocky Mtns vicinity this type is noted to be a seral community on PINPON/AGRSPI following fire. AGRSPI-POASEC was noted to grade to PINPON/AGRSPI or FESIDA-dominated c.ts. on moister positions and to *Stipa comata-Bouteloua gracilis* of drier positions.

Vegetation: *Agropyron spicatum* well represented is diagnostic for the type but its coverages may range from trace to 80% plus. Because *A. spicatum* is highly preferred forage for cattle and AGRSPI-POASEC sites are quite accessible resulting in severe grazing impacts to this type. We lowered criteria (A. spicatum well represented, >5% canopy cover) for inclusion in this type where grazing intensive had been severe. Several fenceline contrasts suggested more than 80% reduction in current season *A. spicatum* cover; Mueggler and Stewart (1980) and Daubenmire (1970) document the longterm reduction in palatable forage (virtual extirpation of *A. spicatum*) due to excessive grazing. *Bromus tectorum* and *B. japonicus* are strong increasers with disturbance. *Poa secunda* and *Koeleria cristata* are 100% constant though their coverages don't exceed 20%. *P. secunda* need not be present for type identification; Mueggler and Stewart (1980) and this study treat AGRSPI-POASEC as a default type within the AGRSPI series. About half our stands have conspicuous amounts of *Stipa comata*, denoting the STICOM phase of Mueggler and Stewart (1980).

The subshrub *Artemisia frigida* is omnipresent but only exceeds trace amounts with intensive grazing. Contrary to the relatively high (30% average) cover cited by Mueggler & Stewart (1980), total forb cover in our samples generally does not exceed 10% except in the case of heavy grazing, where *Cerastium arvense*, *Phlox hoodii*, *Comandra umbellata* and other increaser forbs totaled as much as 40% cover. *Gaillardia aristata*, *Liatris punctata*, *Thermopsis rhombifolia* and *Chrysopsis villosa* are the only forbs with greater than 50% constancy.

Other Studies: The center of importance of AGRSPI-POASEC lies west of the Cascade Crest in Washington (Daubenmire 1970), Oregon (Johnson and Simon 1987, Hall 1973), and British Columbia (Samilkameen Valley, McLean 1970) however, the type extends with various floristic and environmental permutations to Idaho, Wyoming, Utah and Montana. AGRSPI-POASEC is scattered throughtout western MT (Mueggler and Stewart 1980) but decreases in importance to the east (northeast especially) where both diagnostic grasses approach their distributional limits (western ND and SD). Hansen and Hoffman (1988) describe a AGRSPI- *Carex filifolia* h.t. of very limited extent for southeastern MT which is virtually identical to the STICOM phase of AGRSPI-POASEC, especially when the ecological similarity (and taxonomic intergradation) of *P. secunda* and *P. canbyi* are considered.

***Andropogon scoparius-Carex filifolia* c.t.**

(ANDSCO-CARFIL; little bluestem (-) thread-leaved sedge; 9 plots;
WHTF designation *Schizachyrium scoparium -Carex filifolia*)

Environment: This is a minor type that apparently increases in abundance in the study area from west to east; it was found mainly as small (<.1 acre) patches. Landscape position varied from slope brow to backslope to toeslope and alluvial flat. Slope exposure included steep southwest (slope shoulders) to protected northeast aspects (backslopes). Soils are mostly sandy loams and loamy sands derived from sandstone (calcareous and not), shale and alluvium (including fluvio-glacial material). Active rill and sheet erosion was nearly ubiquitous and some sites had developed gullies. Southerly aspects had been more eroded, with more exposed soils and gravel (to 80%), and considerably lower herbaceous cover.

Vegetation: Cover of the diagnostic (well represented) *Andropogon scoparius* varies widely; 10% on south-facing slopes to 80% on steep north-facing slopes, toeslopes and subirrigated terraces. *Carex filifolia* is 100% constant and second in coverage (average 28%) to *A. scoparius.* High constancy graminoids generally associated with sandy substrates include *Calamovilfa longifolia*, *Stipa comata*, and *Muhlenbergia cuspidata*; other psammophytes sporadically present include *Oryzopsis hymenoides*, *Aristida longiseta* and *Sporobolus cryptandrus*. Grazing pressure appreared less here than adjacent types, though occasionally more than 80% of *A. scoparius* annual production was consumed.

Only two shrubs, *Rhus trilobata* and *Yucca glauca*, exceed 50% constancy; their cover was always less than 5%. Combined forb cover seldom exceeds 1%; those exceeding 50% constancy are *Liatris puctata*, *Psoralea argophylla*, and *Lygodesmia juncea*. *Echinacea angustifolia* is present with greater frequency in this type than all other c.ts.

Other studies: For western North Dakota Hanson and Whitman (1938) descibe an *Andropogon scoparius* c.t. from steep north-facing slopes and areas of snow accumulation; they speculate *A. scoparius* is established during erosional episodes, acts to protect slopes from excessive erosion, and thus may be merely a seral stage (albeit longlived). None of following cited studies indicate a successional status for this, or closely allied types. Redmann (1975) also describes an *A. scoparius*-dominated type from western North Dakota occurring on steep south-facing slopes that receive above average moisture due to slope runoff and winter snowdrifts. Redmann (1975) also notes *A. scoparius*-dominated vegetation occurs on uplands having sandy soils, a common association noted for the whole of the tall-grass prairie.

Hansen and Hoffman (1988) report a habitat type with the name used here, ANDSCO-CARFIL, that is ubiquitous across southeastern MT, northwestern SD and southwestern ND and note its similarity to ANDSCO-CARFIL (Hansen et al. 1984) of west-central ND. These authors and Morris and Lovegrove (1975) treat ANDSCO-CARFIL as a topoedaphic climax associated with coarse-textured soils and slope shoulders and cooler, northwest- through northeast-facing slopes. These sites are both more mesic than other upland sites due to moisture redistribution and reduced insolation; their coarse texture favors deep percolation of moisture and the following rootsystems of *A. scoparius* and *Calamovilfa longifolia.* Dense layers of litter and duff (relatively undisturbed stands) and the importance of *Bouteloua curtipendula* are features distinguishing our type from the samples of Hansen and Hoffman (1988), Morris and Lovegrove (1975) from southeastern MT, Culwell and Scow (1982) from Custer Co and Quinnild et al. (1978) from Richland Co.

***Artemisia longifolia/Oryzopsis hymenoides* c.t.**

(ARTLON/ORYHYM; long-leaved sagewort/indian ricegrass; 4 plots)

Environment: This is a minor community type associated with highly distinctive sites, eroded acid-shale badlands. The sampled stands occurred on steep (>40%) slopes with south- to west-facing aspects, but the type was noted to occupy other less stressful, less eroded positions. These sites are so unfavorable for vegetation that plant cover seldom exceeds 20%, often not reaching even 10%. Given the active erosion and that litter production is virtually nill and it follows that exposed soil approaches 100% cover. Soils evidence no horizonation. Though derived from shales, these soils may be reacted to by vegetation as sands because though the fine, weathered fraction is clay-dominated more than 50% of the volumn is occupied by coarse shale shards. Without soil chemistry profiled, factors distinguishing this type from adjacent badland types, SARVER-ATRNUT most characteristically, cannot be identified.

Vegetation: Shrubs rarely establish on these sites. The taprooted forb *Artemisia longifolia* generally has the greatest cover but may share this status with *Eriogonum pauciflorum*, another forb characteristic of badlands. *Calamovilfa longifolia* and *Orzopsis hymenoides* (spp. generally associated with sandy soils) are also regularly present in trace amounts.

Other Studies: This type or a close homologue has been described from dark shales (Colorado, Clagget, and Bearpaw) in Musselshell and Petroleum Counties by Harvey (1982). Most notably Harvey characterized the soils as acid (pH <5) with low conductivity. He notes this to be a pioneer community of shale barrens but it may also be the long-term stable community due to the predominance of ongoing erosion.

Calamovilfa longifolia-Carex pensylvanica c.t.

(CALLON-CARPEN; prairie sandreed (-) long-stolon sedge; 9 plots)

Environment: CALLON-CARPEN is a minor c.t. occurring as small stands (<1/2 acre) restricted to upland sites with sandy soils (derived from sandstone) or on toeslopes and badland benches mantled with coarse-textured colluvium and slopewash derived from various sedimentary parent materials, including shales and bentonite. Generally narrow ecotones, indicating a steep soil (moisture?) gradient, exist between CALLON-CARPEN and adjacent c.ts. (most often STICOM-CARFIL, STICOM-BOUGRA, and ARTCAN/STICOM). Erosion (sheet, rill, and gully) is a consistent process on these sites, even on low gradient examples, but is more prominent on moderate to steep slopes. Given the ubiquity of erosion the percentage of exposed soil and gravel is generally high (>50%)

Vegetation: Cover of the diagnostic species, *Calamovilfa longifolia* and *Carex pensylvanica* (syn. *C. inops*, *C heliophila*), is highly variable. Graminoid cover generally is higher (to 80%) on the upland sites with sandy soil and gentle slopes, the same habitat described for this type in southeastern MT (Hansen and Hoffman 1988). *Andropogon scoparius* is sometimes well represented on collecting positions whereas *Calamagrostis montanensis* and *Stipa comata* are more apt to have high coverages (may even be dominant) on upland sites. Forb cover and richness is low; averaging only trace amounts and 10 species, respectively. *Thermopsis rhombifolia* is the only forb exceeding 50% constancy. *Rosa* spp. are consistenty present in the toe-slope and lower terrace stands whereas *Yucca glauca*, *Rhus aromatica* and *Artemisia* spp. occur in trace amounts on upland sites.

Other Studies: Hansen and Whitman (1938) describe a *Calamovilfa longifolia* type for sandy ridges and hills of western North Dakota. They speculate the CALLON type is seral to STICOM-BOUGRA-CAREX type, but in the described state it is very similar to our CALLON-CARPEN c.t. Whitman (1976) records a type for southwestern North Dakota, CALLON-STICOM-CAREX, that is similar to ours in composition and especially in range of togographic positions occupied. We have retained the name CALLON-CARPEN applied by Hansen and Hoffman (1988) to similar communities/habitats of southeastern MT, but used c.t. because some of our stands are clearly seral. In brown soil zone of Canada, Coupland (1961) recognizes a successional community of sandy sites dominated by a suite of tall "sand" grasses (*Sporobolus cryptandrus*, *Oryzopsis hymenoides*, *Elymus canadensis*, *Calamagrostis montanensis*) foremost of which is *C. longifolia*. Coupland (1961) envisions autogenic processes driving these sites to the *Stipa* (*comata*)-*Bouteloua* (*gracilis*)-*Agropyron* (*dasystachyum*) faciation (broad c.t.) but we agree with Hanson and Hoffman that this type is an edaphic climax. Under current conditions (grazing, climate) autogenic soil forming processes can't keep pace with the ubiquitous erosional processes.

Stipa comata-Bouteloua gracilis p.a.

(STICOM-BOUGRA; needle-and-thread (-) blue gramma; 13 plots)

Environment: STICOM-BOUGRA is a major plant association throughout the study area on upland sites with well drained substrates, mostly derived from materials associated with glacical processes. It was also found on residual sandstone. Soils are predominantly sandy loams, loamy sands and loams; numerous others (Daubenmire 1970, Coupland 1961, Dix 1960, Hansen et al. 1984) have noted the association between the high sand content of soils and the dominance of *Stipa comata.* STICOM-BOUGRA also occurs on gentle to steep slopes with west- through south-facing aspects. STICOM-BOUGRA also represents a seral condition (usually grazing, occasionally fire induced) for more productive sites that would support long-term stable dominance of *Agropyron smithii*, *A. dasystachyum* and/or *Agropyron spicatum.*

This c.t. is most frequently noted to grade to STICOM-*Carex filifolia* or *Agropyron smithii* -BOUGRA c.ts. (on moister sites or with finer textured soils).

Vegetation: The easy accessibility of this type has led to its being intensively grazed across its range. No exclosures were sampled so a description of unimpacted sites is not possible but based on several fenceline contrasts observed we hypothesize much compositional alteration has occurred. In the less impacted examples *S. comata* is a strongly dominant mid-grass (coverages to 70%) with *Bouteloua gracilis* usually dominating the short-grass layer. Intensively grazed sites may have only trace amounts of *S. comata* and *B. gracilis* whereas *Selaginella densa* has increased to create a green sward (early season aspect). *Koeleria cristata* may dominate portions of degraded sites. Other graminoids with greater than 50% constancy are *Poa secunda*, *Carex filifolia*, *C. stenophylla*, and *Agropyron smithii* (or its near ecological equivalent, *A. dasystachyum*). On especially sandy or eroded sites *Calamagrostis montanensis* and/or *Calamovilfa longifolia* may be well represented.

Artemisia frigida is a ubiquitous shrub in this type and increases notably with increased grazing. No forbs, with the exception of *S. densa*, occur with greater than 5% coverage; those with greater than 50% constancy include Sphaeralcea coccinea, Opuntia polyacantha, Phlox hoodii and Chrysopsis villosa. All the above forbs apparently increase with increased grazing. Observed, but unsampled, examples of badly degraded range of this community type were dominated by *Plantago patagonica*, *Hedeoma hispidula*, *Alyssum alyssoides* and various other "weedy" species.

Other studies: Our results are difficult to relate to published results because other studies have concentrated on sampling "relatively undisturbed" vegetation. For the northern prairies Coupland (1950) originally described a *Stipa* (*comata & curtiseta*?)-*Bouteloua* (*gracilis*) faciation (later proposed as STICOM-BOUGRA-CAREX spp. faciation [Coupland 1961]) and a *Bouteloua-Stipa* faciation (later changed [Coupland 1961] to *Bouteloua-Stipa* **facies** to denote a syntaxonomic unit of seral conditions). Both syntaxa are characteristic of undifferentiated glacial till deposits on rolling topography in the drier part of the brown soil zone (which would include eastern MT). Faciations are generally more inclusive than community or habitat types. Coupland provides insufficient quantitative criteria for discriminating between his two named syntaxa, but most of BOUGRA-STICOM and the drier portions of STICOM-BOUGRA correspond in composition to what we have described here as STICOM-BOUGRA c.t. Because we have not been able to separate grazing effects from vegetation composition conditioned by intrinsic site variables our type spans a greater environmental range.

For Montana, Mueggler and Stewart (1980) describe a STICOM-BOUGRA h.t. from intermountain valleys east of the Continental Divide; of the two phases AGRSMI is quite similar floristically and in topographic setting to the type described here. Given the palatability of *A. smithii* and *A. dasystachyum* we feel that where these species occur with 5% or greater coverage, especially in areas with appreciable grazing pressure, that they are indicative of different site conditions (more mesic) than would be indicated by their absence. Hansen et al. (1984) and Hansen and Hoffman (1988) have described for western North Dakota and southeastern Montana, respectively, a STICOM-*Carex filifolia* h.t., that in composition and environment, is very similar to STICOM-BOUGRA; we have discriminated these types based only on the abolute amounts of *C. filifolia* and *B. gracilis* present (which may be quite artificial given that both are increasers under grazing and respond dramatically to short-term climatic fluctuations). Coupland (1961) has remarked that *C. filifolia* increases in abundance southward from Canadian prairies, thus northeastern MT may be a transition zone with mixed representation of STICOM-BOUGRA and

STICOM-CARFIL as the dominant climatic climax types.

Stipa comata-Carex filifolia c.t.

(STICOM-CARFIL; needle-and-thread (-) thread-leaved sedge; 14 plots)

Environment: Within the study area the habitat of STICOM-CARFIL virtually matches that of STICOM-BOUGRA; rolling uplands of low to moderate relief, usually mantled with glacial drift or with soils derived from coarser textured sedimentaries. It also occurs on gentle to moderate slopes with southerly exposures.
Soils are well drained, ranging from loams to loamy sands. Ground cover characteristics are related to history of use with intensively grazed stands having either a high cover of *Selaginella densa* or much (>60%) exposed soil and gravel (recent grazing intensive). Litter cover exceeded 40% only on those few stands judged lightly grazed STICOM-CARFIL grades to STICOM-BOUGRA (site differences unknown) and AGRSMI-BOUGRA on finer textured substrates or collecting positions.

Vegetation: *Stipa comata* and *Carex filifolia* well represented are diagnostic for this type, but on heavily grazed areas *S. comata* coverage may be less than 5%. The only notable compositional difference in graminoids between STICOM-CARFIL and STICOM-BOUGRA is the relative amount of *B. gracilis* and *C. filifolia*. Reasoning that because *B. gracilis* increases more strongly with (over)grazing than does *C. filifolia* we would recognize a significant coverage of *C. filifolia* a better register of site differences and hence gave STICOM-CARFIL priority in the key. Graminoids with constancy greater than 70% are *Koeleria cristata*, *B. gracilis*, *Poa secunda*, and *Agropyron smithii/dasystachyum*. Stands or microsites with sandier soils (derived from sandstone) or actively being eroded support *Muhlenbergia cuspidata*, *Sporobolus cryptandrus* and *Andropogon scoparius*. The low coverages (< 5%) of *A. smithii/dasystachyum* in study area examples of STICOM-CARFIL relative to those reported for a c.t. of same name in southeastern Montana (Hansen and Hoffman 1988) reflect our interpretation of the significance of these species' presence as indicators of more mesic conditions (different plant associations); their absence or highly reduced cover is potentially indicative of overgrazing.

Artemisia frigida is present and generally well represented in more than 90% of the plots; *Gutierrhizia sarothrae* and *Ceratoides lanata* are the only other shrub with more than 50% constancy. If these sites have been intensively sheep-grazed then *C. lanata* coverages, which are currently 5% or less, may be much reduced from potential (and indicative of CERLAN/STICOM c.t.). Aggregate forb cover (excepting *Selaginella densa*) seldom exceeds 5%; those with 50% or greater constancy are *Phlox hoodii*, *Antennaria parvifolia*, *Gaura coccinia*, *Sphaeralcea coccinea*, *Chrysopsis villosa* and *Liatris punctata*. Stand to stand cover of viability of *Selaginella densa* (0 to 90%) is notable. If *S. densa* is the increaser it is reputed to be, then 70% of the plots have been heavily impacted, at least in the past. Some currently intensively grazed pastures were noted to have no *S. densa* but a prolific weed population.

Other Studies: This c.t. was first described by Hanson and Whitman (1938) under the name *Bouteloua-Stipa-Carex*. STICOM-CARFIL c.t. has been further documented (as h.t. of same name) from near pristine and lightly impacted sites in western North Dakota (Hansen et al. 1984) and southeastern Montana (Hansen and Hoffman 1988); these examples of the type have slight vegetation differences as noted above (vegetation section). The *Agropyron smithii* phase of STICOM-BOUGRA described by Mueggler and Stewart (1980) for western MT is very similar in habitat to our STICOM-CARFIL c.t. and has only minor floristic and vegetation differences (higher *B. gracilis* and *A. smithii* cover). The *Stipa-Bouteloua* (*Carex* spp. ?) faciation described for brown soils of southern Canadian prairies (Coupland 1961) is very similar to STICOM-CARFIL, occurring in more xeric positions than the faciation that dominates most of the landscape, *Stipa-Agropyron* (*dasystachyum*). Coupland (1961) describes how the relative proportions of *A. dasystachyum* and *B. gracilis* shift with extended periods of drought and above average moisture; cover changes are sufficient to shift stands between c.ts. (faciations).

Stipa curtiseta-Stipa viridula p.a.

(STICUR-STIVIR; porcupine needlegrass-green needlegrass; 9 stands)

Environment: This c.t. has not previously been described from Montana: it was sampled only in the northern portion of Phillips and Valley Counties and is subsumed within what Coupland (1950) termed the *Stipa* (*curtiseta*)-*Agropyron* (*dasystachyum*) Faciation. We speculate that STICUR-STIVIR possibly constituted a significant fraction of the landscape put to the plow in this vicinity. Remnants of this c.t. are found on sheltered (e.g. north- and east-facing draw slopes, swales) and collecting positions (toeslopes and swales and lee slopes of ridges). Most of the stands were developed on glacial drift over sedimentary substrates (mostly shales). Substrate surfaces were highly variable from 80% cover of litter to 80% cover of *Selaginella densa*, mosses and lichens; in general exposed soil does not exceed 40%.

The sampled expressions of STICUR-STIVIR were mostly beyond the distribution limits of *Festuca scabrella*, *F. idahoensis* and *Agropyron spicatum*, or at least where these species constitute community dominants. STICUR-STIVIR most often grades to STICOM-CARFIL and STICOM-BOUGRA on uplands and adjacent drier exposures.

Vegetation: *Artemisia frigida* and *Ceratoides lanata* are the only shrubs with 50% or greater constancy, their cover not exceeding 5%. *Stipa curtiseta* or *S. viridula*, considered singly or combined having at least 5% cover, are considered diagnostic for the type. In several stands *Agropyron dasystachyum* was the dominant grass creating an aspect virtually identical to the condition described for relatively undisturbed stands of STIPA-AGROPYRON faciation (Coupland 1961) on Canadian mixed-grass prairies. The relatively large stature of the above grasses when contrasted with the low coverage of short grasses gives ungrazed examples of this type a more luxuriant aspect than those types of the surrounding grassland matrix. Several stands with an abundance of *Calamovilfa longifolia* and/or *Stipa comata* had loamy-sand soils. Appreciable coverages of *Muhlenbergia cuspidata* appear to be associated with sandy or eroded substrates. *Andropogon scoparius* was present in about 50% of the plots but coverages were less than 5%. *Psoralea argophylla* was the only forb with greater than 50% constancy. With the exception of *Selaginella densa*, found in high coverages on grazing impacted sites, forb cover seldom exceeds 5%, even in the aggregate.

Other studies: This type has not been previously described from Montana or the western US, quite possibly because *S. curtiseta* has not been long recognized at the species level (Barkworth 1978). *S. curtiseta* has previously been recognized as *S. spartea* var. *curtiseta* in the northwestern U.S. and Canada; often researchers did not track it as a separate taxon at the variety level. Coupland's monographs (1950, 196?) regarding northern Great Plains grassland classification describe a *Stipa-Agropyron* faciation which subsumes our STICUR-STIVIR c.t. Coupland notes that *Stipa comata* and *S. curtiseta* are coextensive dominants throughtout the Canadian Prairie Provinces on brown and dark brown soil zones but that *S. curtiseta* is confined, at least as a dominant, to north of 49 N. Where coextensive, *S. curtiseta* occurrs in much higher coverages on north slopes and protected positions whereas *S. comata* is more abundant on south-facing exposures. For western North Dakota Redmann (1975) has reported a mesic *S. spartea* v. *curtiseta* c.t. occupying north-facing slopes, well below the slope break; it is also floristically similar to STICUR-STIVIR. At this time it would appear that the Montana occurrences define the southern limit of this type and that it (or a floristically quite similar type) extends as far north as the boreal forest zone where, owing to factor compensation, it occurs on better drained, south-facing slopes (Redmann and Schwarz 1986).

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Appendix A. List of plant species occurring in sample plots by six character US Forest Service R-1 (Northern Region) acronym, latin binomial and common name; arranged alphabetically within lifeform (457 total taxa).

TREES (8 species):

BETPAP	Betula	papyrifera	Paper Birch
FRAPEN	Fraxinus	pennsylvanica	Green Ash
JUNSCO	Juniperus	scopulorum	Rocky Mountain Juniper
PINCON	Pinus	contorta	Lodgepole Pine
PINFLE	Pinus	flexilis	Limber Pine
PINPON	Pinus	ponderosa	Ponderosa Pine
POPTRE	Populus	tremuloides	Quaking Aspen
PSEMEN	Pseudotsuga	menziesii	Douglas-fir

SHRUBS (48 taxa):

AMEALN	Amelanchier	alnifolia	Western Serviceberry
ARCUVA	Arctostaphylos	uva-ursi	Kinnikinnick
ARTCAN	Artemisia	cana	Silver Sagebrush
ARTFRI	Artemisia	frigida	Fringed Sagewort
ARTTRI	Artemisia	tridentata	Big Sagebrush
ATRCAN	Atriplex	canescens	Four-wing Saltbush
ATRCON	Atriplex	confertifolia	Shadscale
ATRGAR	Atriplex	gardneri	Gardner's Saltsage
ATRNUT	Atriplex	nuttallii	Saltsage
BERREP	Berberis	repens	Creeping Oregongrape
BETOCC	Betula	occidentalis	Water Birch
CERLAN	Ceratoides	lanata	Winterfat
CHRNAU	Chrysothamnus	nauseosus	Common Rabbitbrush
CHRVIS	Chrysothamnus	viscidiflorus	Green Rabbitbrush
CLECOL	Clematis	columbiana	Columbia Clematis
CORSTO	Cornus	stolonifera	Red-osier Dogwood
ELACOM	Elaeagnus	commutata	Silverberry
EURLAN	Eurotia	lanata	Winterfat
GUTSAR	Gutierrezia	sarothrae	Broom Snakeweed
JUNCOM	Juniperus	communis	Common Juniper
JUNHOR	Juniperus	horizontalis	Creeping Juniper
POTFRU	Potentilla	fruticosa	Shrubby Cinquefoil
PRUVIR	Prunus	virginiana	Common Chokecherry
RHUTRI	Rhus	trilobata	Skunk-bush Sumac
RIBAUR	Ribes	aureum	Golden Currant
RIBCER	Ribes	cereum	Squaw Currant
RIBESX	Ribes	spp.	Currant; Gooseberry
RIBLAC	Ribes	lacustre	Swamp Currant
RIBOXY	Ribes	oxyacanthoides	Northern Gooseberry
RIBSET	Ribes	setosum	Missouri Gooseberry
ROSACI	Rosa	acicularis	Prickly Rose
ROSARK	Rosa	arkansana	Arkansas Rose
ROSAXX	Rosa	spp.	Rose

SHRUBS CONTINUED:

ROSWOO	Rosa	woodsii	Woods Rose
SALGEY	Salix	geyeriana	Geyer Willow
SALLUT	Salix	lutea	Watson Willow
SALSCO	Salix	scouleriana	Scouler Willow
SARVER	Sarcobatus	vermiculatus	Black Greasewood
SHEARG	Shepherdia	argentea	Thorny Buffaloberry
SHECAN	Shepherdia	canadensis	Canada Buffaloberry
SPIBET	Spiraea	betulifolia	Shiny-leaf Spiraea
SYMALB	Symphoricarpos	albus	Common Snowberry
SYMOCC	Symphoricarpos	occidentalis	Western Snowberry
SYMORE	Symphoricarpos	oreophilus	Mountain Snowberry
SYMPHO	Symphoricarpos	spp.	Snowberry
TETCAN	Tetradymia	canescens	Gray Horse-brush
TOXRYD	Toxicodendron	rydbergii	Poison Ivy
YUCGLA	Yucca	glauca	Yucca

GRAMINOIDS (82 taxa):

AGRCAN	Agropyron	caninum	Bearded Wheatgrass
AGRCRI	Agropyron	cristatum	Crested Wheatgrass
AGRDAS	Agropyron	dasystachyum	Thickspike Wheatgrass
AGROPY	Agropyron	spp.	Wheatgrass
AGROST	Agrostis	spp.	Bentgrass
AGRREP	Agropyron	repens	Quackgrass
AGRSCA	Agrostis	scabra	Tickle-grass
AGRSMI	Agropyron	smithii	Western Wheatgrass
AGRSPI	Agropyron	spicatum	Bluebunch Wheatgrass
ANDHAL	Andropogon	hallii	Sand Bluestem
ANDSCO	Andropogon	scoparius	Little Bluestem
ARILON	Aristida	longiseta	Red Threeawn
ARIPUR	Aristida	purpurea	Red Threeawn
BOUCUR	Bouteloua	curtipendula	Sideoat Grama
BOUGRA	Bouteloua	gracilis	Blue Grama
BROCIL	Bromus	ciliatus	Fringed Brome
BROINE	Bromus	inermis	Smooth Brome
BROJAP	Bromus	japonicus	Japanese Brome
BROMOL	Bromus	mollis	Soft Brome
BROTEC	Bromus	tectorum	Cheatgrass
BUCDAC	Buchloe	dactyloides	Buffalo Grass
CALLON	Calamovilfa	longifolia	Prairie Sandreed
CALMON	Calamagrostis	montanensis	Plains Reedgrass
CARBRE	Carex	brevior	Short-beaked Sedge
CARELE	Carex	eleocharis	Narrow-leaved Sedge
CAREXX	Carex	spp.	Sedge

GRAMINOIDS CONTINUED:

CARFIL	Carex	filifolia	Thread-leaved Sedge
CARFOE	Carex	foenea	Silvertop Sedge
CAROBT	Carex	obtusata	Blunt Sedge
CARPEN	Carex	pensylvanica	Long-stolon Sedge
CARPET	Carex	petasata	Liddon's Sedge
CARPRA	Carex	praegracilis	Clustered Field Sedge
CARPVV	Carex	pensylvanica	vLong-stolon Sedge
CARROI	Carex	rossii	Ross Sedge
CARROS	Carex	rostrata	Beaked Sedge
CARSTE	Carex	stenophylla	Narrow-leaved Sedge
DANUNI	Danthonia	unispicata	Onespike Oatgrass
DESCES	Deschampsia	cespitosa	Tufted Hairgrass
DISSPI	Distichlis	spicata	Inland Saltgrass
DISSTR	Distichlis	stricta	Alkali Saltgrass
ELYGLA	Elymus	glaucus	Blue Wildrye
FESIDA	Festuca	idahoensis	Idaho Fescue
FESOCT	Festuca	octoflora	Six-weeks Fescue
FESOVR	Festuca	ovina	Sheep Fescue
FESSCA	Festuca	scabrella	Rough Fescue
HORJUB	Hordeum	jubatum	Foxtail Barley
JUNBAL	Juncus	balticus	Baltic Rush
KOECRI	Koeleria	cristata	Prairie Junegrass
KOEMAC	Koeleria	macrantha	Prairie Junegrass
MUHCUS	Muhlenbergia	cuspidata	Plains Muhly
ORYASP	Oryzopsis	asperifolia	Roughleaf Ricegrass
ORYHYM	Oryzopsis	hymenoides	Indian Ricegrass
ORYMIC	Oryzopsis	micrantha	Little-seed Ricegrass
PHRCOM	Phragmites	communis	Common Reed
POAARI	Poa	arida	Plains Bluegrass
POACUS	Poa	cusickii	Cusick's Bluegrass
POAGLA	Poa	glaucifolia	Pale-leaf Bluegrass
POAINT	Poa	interior	Inland Bluegrass
POAJUN	Poa	juncifolia	Alkali Bluegrass
POANER	Poa	nervosa	Wheeler's Bluegrass
POANEV	Poa	nevadensis	Nevada Bluegrass
POAPAL	Poa	palustris	Fowl Bluegrass
POAPRA	Poa	pratensis	Kentucky Bluegrass
POASCA	Poa	scabrella	Pine Bluegrass
POASEC	Poa	secunda	Sandberg's Bluegrass
POAXXX	Poa	spp.	Bluegrass
PUCNUT	Puccinellia	nuttalliana	Nuttall's Alkaligrass
SCHPAN	Schedonnardus	paniculatus	Tumblegrass
SITHYS	Sitanion	hystrix	Bottlebrush
			Squirreltail
SPAGRA	Spartina	gracilis	Alkali Cordgrass
SPAPEC	Spartina	pectinata	Prairie Cordgrass
SPOAIR	Sporobolus	airoides	Alkali Sacaton
SPOASP	Sporobolus	asper	Rough Dropseed
SPOCRY	Sporobolus	cryptandrus	Sand Dropseed
STICOM	Stipa	comata	Needle-and-thread
STICUR	Stipa	curtiseta	Porcupine Needlegrass
STIOCC	Stipa	occidentalis	Western Needlegrass
STISPA	Stipa	spartea	Porcupine-grass
STIVIR	Stipa	viridula	Green Needlegrass
TRISET	Trisetum	spp.	Trisetum
TRISPI	Trisetum	spicatum	Spike Trisetum
VULOCT	Vulpia	octoflora	Six-weeks Fescue

FORBS (319 taxa):

ACHMIL	Achillea	millefolium	Common Yarrow
AGOGLA	Agoseris	glauca	Pale Agoseris
ALLCER	Allium	cernuum	Nodding Onion
ALLGEY	Allium	geyeri	Geyer's Onion
ALLTEX	Allium	textile	Textile Onion
ALYALY	Alyssum	alyssoides	Pale Alyssum
ALYDES	Alyssum	desertorum	Desert Alyssum
ANDOCC	Androsace	occidentalis	W. Fairy-candelabra
ANDSEP	Androsace	septentrionalis	N. Fairy-candelabra
ANEMUL	Anemone	multifida	Cliff Anemone
ANENUT	Anemone	nuttalliana	Pasqueflower
ANEPAT	Anemone	patens	Pasqueflower
ANTCOR	Antennaria	corymbosa	Meadow Pussy-toes
ANTMIC	Antennaria	microphylla	Rosy Pussy-toes
ANTNEG	Antennaria	neglecta	Field Pussy-toes
ANTPAR	Antennaria	parvifolia	Nuttall's Pussy-toes
APOAND	Apocynum	androsaemifolium	Spreading Dogbane
APOCAN	Apocynum	cannabinum	Hemp Dogbane
APOSIB	Apocynum	sibiricum	Clasping-leaved Dogbane
ARABIS	Arabis	spp.	Rockcress
ARADRU	Arabis	drummondii	Drummond's Rockcress
ARAHIR	Arabis	hirsuta	Hairy Rockcress
ARAHOL	Arabis	holboellii	Holboell's Rockcress
AREACU	Arenaria	aculeata	Prickly Sandwort
ARECAP	Arenaria	capillaris	Thread-leaved Sandwort
ARECON	Arenaria	congesta	Ballhead Sandwort
ARELAT	Arenaria	lateriflora	Bluntleaf Sandwort
AREMAC	Arenaria	macrophylla	Bigleaf Sandwort
ARENAR	Arenaria	spp.	Sandwort
ARENUT	Arenaria	nuttallii	Nuttall's Sandwort
ARNCOR	Arnica	cordifolia	Heart-leaf Arnica
ARNFUL	Arnica	fulgens	Orange Arnica
ARTCAM	Artemisia	campestris	Pacific Sagewort
ARTDRA	Artemisia	dracunculus	Tarragon
ARTLON	Artemisia	longifolia	Long-leaved Sagewort

FORBS CONTINUED:

ARTLUD	Artemisia	ludoviciana	Prairie Sagewort
ASCVER	Asclepias	verticillata	Whorled Milkweed
ASCVIR	Asclepias	viridiflora	Green Milkweed
ASTABO	Astragalus	aboriginum	Indian Milk-vetch
ASTADS	Astragalus	adsurgens	Standing Milk-vetch
ASTAGR	Astragalus	agrestis	Field Milk-vetch
ASTARG	Astragalus	argophyllus	Silver-leaved Milk-vetch
ASTBIS	Astragalus	bisulcatus	Two-Groove Milk-vetch
ASTCHI	Aster	chilensis	Long-leaved Aster
ASTCIL	Aster	ciliolatus	Lindley Aster
ASTCON	Aster	conspicuus	Showy Aster
ASTCRA	Astragalus	crassicarpus	Ground Plum
ASTDRU	Astragalus	drummondii	Drummond's Milk-vetch
ASTEAT	Aster	eatonii	Eaton's Aster
ASTERX	Aster	spp.	Aster
ASTFAC	Astragalus	falcatus	Russian Sickle Milk-vetch
ASTFAL	Aster	falcatus	White-prairie Aster
ASTFIL	Astragalus	filipes	Threadstalk Milk-vetch
ASTFLE	Astragalus	flexuosus	Wiry Milk-vetch
ASTFOL	Aster	foliaceus	Leafy Aster
ASTGIL	Astragalus	gilviflorus	Plains Orophaca
ASTLAE	Aster	laevis	Smooth Aster
ASTLOT	Astragalus	lotiflorus	Lotus Milk-vetch
ASTMIS	Astragalus	miser	Weedy Milk-vetch
ASTPAN	Aster	pansus	Tufted White Prairie Aster
ASTPAU	Aster	pauciflorus	Few-flowered Aster
ASTPEC	Astragalus	pectinatus	Tine-leaved Milk-vetch
ASTPUR	Astragalus	purshii	Pursh's Milk-vetch
ASTRAG	Astragalus	spp.	Milk-vetch; Orophaca
ASTSIB	Aster	sibiricus	Artic Aster
ASTSPA	Astragalus	spatulatus	Draba Milk-vetch
ASTTEN	Astragalus	tenellus	Pulse Milk-vetch
ATRARG	Atriplex	argentea	Silverscale
ATRDIO	Atriplex	dioica	Rillscale
BALSAG	Balsamorhiza	sagittata	Arrowleaf Balsamroot
BESWYO	Besseya	wyomingensis	Wyoming Kittentail
CALNUT	Calochortus	nuttallii	Sego-lilly
CALSER	Calylophus	serrulatus	Plains Yellow Primrose
CAMMIC	Camelina	microcarpa	Littlepod Falseflax
CAMROT	Campanula	rotundifolia	Harebell
CAMSAT	Camelina	sativa	Gold-of-pleasure
CASSES	Castilleja	sessiliflora	Downy Painted-cup
CERARV	Cerastium	arvense	Field Chickweed
CERNUT	Cerastium	nutans	Nodding Chickweed
CHADOU	Chaenactis	douglasii	Hoary Chaenactis
CHANUT	Chamaesyce	nutans	Eyebane
CHASER	Chamaesyce	serpyllifolia	Thyme-leaf Spurge
CHEALB	Chenopodium	album	Lambsquarter
CHEDES	Chenopodium	desiccatum	Desert Goosefoot
CHELEP	Chenopodium	leptophyllum	Slimleaf Goosefoot
CHERUB	Chenopodium	rubrum	Red Goosefoot
CHRVIL	Chrysopsis	villosa	Hairy Golden-aster
CIRARV	Cirsium	arvense	Canada Thistle
CIRFLO	Cirsium	flodmanii	Flodman's Thistle
CIRSIU	Cirsium	spp.	Thistle
CIRUND	Cirsium	undulatum	Wavy-leaved Thistle
COLLIN	Collomia	linearis	Narrow-leaf Collomia
COLPAR	Collinsia	parviflora	Small-flowered Blue-eyed Mary
COMUMB	Comandra	umbellata	Bastard Toad-flax
CONCAN	Conyza	canadensis	Horseweed
CONORI	Conringia	orientalis	Mustard Hare's Ear
CORSTR	Corallorhiza	striata	Striped Coral-root
CORVIV	Coryphantha	vivipara	Pincushion Cactus
CREOCC	Crepis	occidentalis	Western Hawksbeard
CREPIS	Crepis	spp.	Hawksbeard
CRYCEL	Cryptantha	celosioides	Northern Cryptantha
CRYMIN	Cryptantha	minima	Annual Cryptantha
DALCAN	Dalea	candida	White Prairie-clover
DALENN	Dalea	enneandra	Nine-anther Prairie-clover
DALPUR	Dalea	purpurea	Purple Prairie-clover
DELBIC	Delphinium	bicolor	Little Larkspur
DELPHI	Delphinium	spp.	Larkspur
DESPIN	Descurainia	pinnata	Pinnate Tansymustard
DESRIC	Descurainia	richardsonii	Richardson's Tansymustard
DESSOP	Descurainia	sophia	Flixweed Tansymustard
DISTRA	Disporum	trachycarpum	Wartberry Fairy-bell
DRAOLI	Draba	oligosperma	Few-seeded Draba
DRAREP	Draba	reptans	Carolina Whitlow-grass
ECHANG	Echinacea	angustifolia	Pale Purple Coneflower
EPIANG	Epilobium	angustifolium	Fireweed
EPIPAN	Epilobium	paniculatum	Autumn Willow-herb
ERIANN	Eriogonum	annuum	Annual Buckwheat
ERICAE	Erigeron	caespitosus	Tufted Fleabane
ERICOM	Erigeron	compositus	Cut-leaved Daisy
ERIFLA	Eriogonum	flavum	Yellow Buckwheat
ERIGER	Erigeron	spp.	Daisy; Fleabane
ERILAN	Eriophyllum	lanatum	Common Eriophyllum
ERIOCH	Erigeron	ochroleucus	Buff Fleabane
ERIOGO	Eriogonum	spp.	Buckwheat; Wild Buckwheat
ERIOVA	Eriogonum	ovalifolium	Cushion Buckwheat
ERIPAU	Eriogonum	pauciflorum	Few-flowered Wild Buckwheat
ERIPUM	Erigeron	pumilus	Shaggy Fleabane

FORBS CONTINUED:

ERISPE	Erigeron	speciosus	Showy Fleabane
ERIUMB	Eriogonum	umbellatum	Sulfur Buckwheat
ERYASP	Erysimum	asperum	Plains Wallflower
ERYCHE	Erysimum	cheiranthoides	Wormseed Wallflower
ERYINC	Erysimum	inconspicuum	Smallflowered Wallflower
EUPESU	Euphorbia	esula	Leafy Spurge
EUPGLY	Euphorbia	glyptosperma	Corrugate-seeded

Spurge			
EUPROB	Euphorbia	robusta	Rocky Mountain Spurge
EUPSPA	Euphorbia	spathulata	Spatulate-leaved Spurge
FILARV	Filago	arvensis	Field Filago
FORB	Forb		Forb
FORBPE	Forb	perennial	Perennial Forb
FORBXX	Forb		Forb
FRAVIR	Fragaria	virginiana	Virginia Strawberry
FRIATR	Fritillaria	atropurpurea	Checker Lily
FRIPUD	Fritillaria	pudica	Yellow Bell
GAIARI	Gaillardia	aristata	Blanket-flower
GALAPA	Galium	aparine	Goose-grass
GALBOR	Galium	boreale	Northern Bedstraw
GALTRI	Galium	triflorum	Sweetscented Bedstraw
GAUCOC	Gaura	coccinea	Scarlet Gaura
GENAMA	Gentianella	amarella	Northern Gentian
GERANI	Geranium	spp.	Geranium; Crane's-bill
GERVIS	Geranium	viscosissimum	Sticky Geranium
GEUTRI	Geum	triflorum	Prairie Smoke
GLYLEP	Glycyrrhiza	lepidota	American Licorice
GRISQU	Grindelia	squarrosa	Curlycup Gumweed
HABVIR	Habenaria	viridis	Frog Orchis
HACFLO	Hackelia	floribunda	Showy Stickseed
HAPACA	Haplopappus	acaulis	Cushion Goldenweed
HAPARM	Haplopappus	armerioides	Thrift Goldenweed
HAPLAN	Haplopappus	lanuginosus	Woolly Goldenweed
HAPSPI	Haplopappus	spinulosus	Spiny Goldenweed
HEDDRU	Hedeoma	drummondii	Drummond False Pennyroyal
HEDHIS	Hedeoma	hispida	Rough Pennyroyal
HEDSUL	Hedysarum	sulphurescens	Yellow Hedysarum
HELANN	Helianthus	annuus	Common Sunflower
HELMAX	Helianthus	maximiliani	Maximilan's Sunflower
HELNUT	Helianthus	nuttallii	Nuttall's Sunflower
HETVIL	Heterotheca	villosa	Hairy Golden-aster
HEURIC	Heuchera	richardsonii	Richardson's Alumroot
HYMACA	Hymenoxys	acaulis	Stemless Hymenoxys
HYMFIL	Hymenopappus	filifolius	Columbia Cut-leaf
HYMPOL	Hymenopappus	polycephalus	Columbia Cut-leaf
HYMRIC	Hymenoxys	richardsonii	Richardson's Hymenoxys
IRIMIS	Iris	missouriensis	Rocky Mountain Iris
IVAAXI	Iva	axillaris	Poverty-weed
KUHEUP	Kuhnia	eupatorioides	False-boneset
LACOBL	Lactuca	oblongifolia	Blue Lettuce
LACPUL	Lactuca	pulchella	Blue Lettuce
LACSER	Lactuca	serriola	Prickly Lettuce
LAPECH	Lappula	echinata	Bristly Stickseed
LAPMYO	Lappula	myosotis	Bristly Stickseed
LAPRED	Lappula	redowskii	Western Stickseed
LAPSQU	Lappula	squarrosa	Bristly Stickseed
LEPDEN	Lepidium	densiflorum	Prairie Pepperweed
LEPIDI	Lepidium	spp.	Pepperweed
LEPPER	Lepidium	perfoliatum	Clasping Pepperweed
LEPRAM	Lepidium	ramosissimum	Branched Pepperweed
LESALP	Lesquerella	alpina	Alpine Bladderpod
LESARE	Lesquerella	arenosa	Sand Bladderpod

LESLUD	Lesquerella	ludoviciana	Silvery Bladderpod
LESQUE	Lesquerella	spp.	Bladderpod
LIAPUN	Liatris	punctata	Dotted Blazing-star
LINAUS	Linum	australe	South-wind Flax
LINLEW	Linum	lewisii	Wild Blue Flax
LINPER	Linum	perenne	Blue Flax
LINRIG	Linum	rigidum	Yellow Flax
LITINC	Lithospermum	incisum	Yellow Gromwell
LITRUD	Lithospermum	ruderale	Western Gromwell
LOMATI	Lomatium	spp.	Biscuit-root; Desert-parsley
LOMCOU	Lomatium	cous	Cous Biscuit-root
LOMFOE	Lomatium	foeniculaceum	Fennel-leaved Desert-parsley
LOMMAC	Lomatium	macrocarpum	Bigseed Desert-parsley
LOMTRI	Lomatium	triternatum	Nine-leaf Lomatium
LOTPUR	Lotus	purshiana	Spanish-clover
LUPARG	Lupinus	argenteus	Silvery Lupine
LUPPUS	Lupinus	pusillus	Rusty Lupine
LUPSER	Lupinus	sericeus	Silky Lupine
LYCDRU	Lychnis	drummondii	Drummond Campion
LYGJUN	Lygodesmia	juncea	Rush-like Skeletonweed
MACCAN	Machaeranthera	canescens	Hoary Aster
MACGRI	Machaeranthera	grindelioides	Nuttall's Goldenweed
MACPIN	Machaeranthera	pinnatifida	Spiny Goldenweed
MACTAN	Machaeranthera	tanacetifolia	Tansy Aster
MELALB	Melilotus	alba	White Sweet-clover
MELOFF	Melilotus	officinalis	Yellow Sweet-clover
MENALB	Mentzelia	albicaulis	White-stemmed Mentzelia
MENDEC	Mentzelia	decapetala	Evening Star
MENLAE	Mentzelia	laevicaulis	Blazing-star Mentzelia
MENPUM	Mentzelia	pumila	Dwarf Mentzelia
MICNUT	Microseris	nutans	Nodding Microseris
MICROS	Microseris	spp.	Microseris

FORBS CONTINUED:

MIRLIN	Mirabilis	linearis	Narrow-leaved Four-o'clock
MONFIS	Monarda	fistulosa	Horsemint
MONNUT	Monolepis	nuttalliana	Poverty Weed
MUSDIV	Musineon	divaricatum	Leafy Musineon
OENCES	Oenothera	cespitosa	Desert Evening-primrose
OENNUT	Oenothera	nuttallii	White Evening-primrose
OENOTH	Oenothera	spp.	Evening-primrose
OPUFRA	Opuntia	fragilis	Brittle Prickly-pear
OPUPOL	Opuntia	polyacantha	Plains Prickly-pear
OROFAS	Orobanche	fasciculata	Clustered Broomrape
OROLUD	Orobanche	ludoviciana	Suksdorf's Broomrape
OROUNI	Orobanche	uniflora	Naked Broomrape
ORTLUT	Orthocarpus	luteus	Yellow Owl-clover
OSMCHI	Osmorhiza	chilensis	Mountain Sweet-cicely

OXYBES	Oxytropis	besseyi	Bessey's Crazyweed
OXYCAM	Oxytropis	campestris	Slender Crazyweed
OXYLAM	Oxytropis	lambertii	Purple Locoweed
OXYMON	Oxytropis	monticola	Slender Crazyweed
OXYSER	Oxytropis	sericea	Silky Crazyweed; White Locowee
OXYSPL	Oxytropis	splendens	Showy Crazyweed
OXYTRO	Oxytropis	spp.	Crazyweed; Locoweed
PARPEN	Parietaria	pensylvanica	Pennsylvania Pellitory
PARSES	Paronychia	sessiliflora	Stemless Whitlow-wort
PENALB	Penstemon	albidus	White-flowered Penstemon
PENERI	Penstemon	eriantherus	Fuzzytongue Penstemon
PENGRA	Penstemon	gracilis	Slender Penstemon
PENNIT	Penstemon	nitidus	Shining Penstemon
PENPRO	Penstemon	procerus	Small-flowered Penstemon
PENSTE	Penstemon	spp.	Penstemon
PETCAN	Petalostemon	candidum	White Prairie-clover
PETPUR	Petalostemon	purpureum	Purple Prairie-clover
PHAHAS	Phacelia	hastata	Silverleaf Phacelia
PHALIN	Phacelia	linearis	Threadleaf Phacelia
PHLALY	Phlox	alyssifolia	Alyssum-leaved Phlox
PHLHOO	Phlox	hoodii	Hood's Phlox
PHLLON	Phlox	longifolia	Long-leaf Phlox
PICOPP	Picradeniopsis	oppositifolia	Plains Bahia
PLAPAT	Plantago	patagonica	Indian-wheat
POLALB	Polygala	alba	White Milkwort
POLAVI	Polygonum	aviculare	Prostrate Knotweed
POLDOU	Polygonum	douglasii	Douglas' Knotweed
POLRAM	Polygonum	ramosissimum	Bushy Knotweed
POTARG	Potentilla	arguta	Tall Cinquefoil
POTGRA	Potentilla	gracilis	Slender Cinquefoil
POTHIP	Potentilla	hippiana	Woolly Cinquefoil
POTPEN	Potentilla	pensylvanica	Prairie Cinquefoil
PSOARG	Psoralea	argophylla	Silver-leaved Scurf-pea
PSOESC	Psoralea	esculenta	Indian Bread-root
PSOLAN	Psoralea	lanceolata	Lemon Scurf-pea
PSOTEN	Psoralea	tenuiflora	Slender-flowered Scurf-pea
PYRASA	Pyrola	asarifolia	Pink Wintergreen
PYRSEC	Pyrola	secunda	One-sided Wintergreen
RATCOL	Ratibida	columnifera	Prairie Coneflower
RUMCRI	Rumex	crispus	Curly Dock
SALAUS	Salsola	australis	Russian Thistle
SALREF	Salvia	reflexa	Lanceleaf Sage
SEDLAN	Sedum	lanceolatum	Lance-leaved Stonecrop
SENCAN	Senecio	canus	Woolly Groundsel
SENPLA	Senecio	plattensis	Prairie Groundsel
SILENE	Silene	spp.	Campion; Catchfly
SILSCO	Silene	scouleri	Scouler's Silene
SISALT	Sisymbrium	altissimum	Tumblemustard
SISANG	Sisyrinchium	angustifolium	Blue-eyed Grass
SISMON	Sisyrinchium	montanum	Mountain Blue-eyed Grass
SMIRAC	Smilacina	racemosa	False Spikenard
SMISTE	Smilacina	stellata	Starry Solomon-plume
SOLIDA	Solidago	spp.	Goldenrod
SOLMIS	Solidago	missouriensis	Missouri Goldenrod
SOLMOL	Solidago	mollis	Velvety Goldenrod
SOLNEM	Solidago	nemoralis	Gray Goldenrod
SOLRIG	Solidago	rigida	Stiff Goldenrod
SOLSPA	Solidago	spathulata	Dune Goldenrod
SOLTRI	Solanum	triflorum	Cut-leaved Nightshade
SONASP	Sonchus	asper	Prickly Sow-thistle
SPHCOC	Sphaeralcea	coccinea	Red Globe-mallow
STAPIN	Stanleya	pinnata	Bushy Princesplume
STELON	Stellaria	longipes	Longstalk Starwort
STEMED	Stellaria	media	Chickweed
STERUN	Stephanomeria	runcinata	Runcinate-leaved Skeltonweed
SUAINT	Suaeda	intermedia	Tall Seablite
SUAMOQ	Suaeda	moquinii	Tall Seablite
TARLAE	Taraxacum	laevigatum	Red-seeded Dandelion
TAROFF	Taraxacum	officinale	Common Dandelion
TETACA	Tetraneuris	acaulis	Stemless Hymenoxys
THAOCC	Thalictrum	occidentale	Western Meadowrue
THERHO	Thermopsis	rhombifolia	Round-leaved Thermopsis
THLARV	Thlaspi	arvense	Field Pennycress
TRADUB	Tragopogon	dubius	Goat's Beard
TRAOCC	Tradescantia	occidentalis	Prairie Spiderwort
TRIFOL	Trifolium	spp.	Clover
TRILEP	Triodanis	leptocarpa	Western Venus'-looking-glass

FORBS CONTINUED:

TRILON	Trifolium	longipes	Long-stalked Clover
VICAME	Vicia	americana	American Vetch
VIOADU	Viola	adunca	Hook Violet
VIOCAN	Viola	canadensis	Canada Violet
VIOLAX	Viola	spp.	Violet
VIONUT	Viola	nuttallii	Yellow Prairie Violet
ZIGELE	Zigadenus	elegans	Glaucous Zigadenus
ZIGVEN	Zigadenus	venenosus	Meadow Death-camas

FERNS & ALLIED TAXA:

CRYCRI	Cryptogramma	crispa	Parsley-fern
CYSFRA	Cystopteris	fragilis	Brittle Bladder-fern
EQULAE	Equisetum	laevigatum	Smooth Scouring-rush
SELDEN	Selaginella	densa	Compact Selaginella
WOOORE	Woodsia	oregana	Oregon Woodsia

APPENDIX B. CONSTANCY, AVERAGE COVER AND RANGE OF COVER VALUES FOR VASCULAR PLANT SPECIES WITH GREATER THAN 3% CANOPY COVER IN ANY GIVEN PLOT.

Constancy is expressed as the percentage (to nearest whole number) of plots (sites) within a given community type or plant association in which a given species occurrs. Average **canopy cover** is computed by summing the midpoints values of the cover classes for a given species and community type and dividing this value by the number of plots in which the species occurs. The **range** of canopy cover is expressed as the minimal value and maximal canopy cover value for a given species within a given community type. The community types/plant associations are ordered by decreasing size of dominant lifeform (forests, shrublands, herb-dominated) and aphabetically within lifeform category.

Appendix B-1.

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	JUNSCO/AGRSPI N = 3	JUNSCO/ORYMIC N = 6	PINCON/JUNCOM N = 2	PINFLE/AGRSPI N = 1	PINPON/ARCUVA N = 2
Trees					
BETPAP	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
FRAPEN	0 (0) [0 - 0]	33 (7) [3 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNSCO	100 (50) [50 - 50]	100 (83) [70 - 98]	0 (0) [0 - 0]	100 (20) [20 - 20]	0 (0) [0 - 0]
PINCON	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (65) [60 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]
PINFLE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
PINPON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (10) [10 - 10]	0 (0) [0 - 0]
POPTRE	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (7) [3 - 10]	0 (0) [0 - 0]	100 (35) [30 - 40]
PSEMEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Shrubs					
AMEALN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (15) [10 - 20]
ARTCAN	0 (0) [0 - 0]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTFRI	100 (2) [1 - 3]	67 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
ARTTRI	67 (15) [10 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BERREP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CORSTO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
JUNCOM	0 (0) [0 - 0]	67 (3) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
JUNHOR	33 (10) [10 - 10]	17 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	50 (1) [1 - 1]
PRUVIR	33 (1) [1 - 1]	50 (2) [1 - 3]	50 (1) [1 - 1]	0 (0) [0 - 0]	50 (1) [1 - 1]
RHUTRI	33 (1) [1 - 1]	100 (4) [1 - 10]	0 (0) [0 - 0]	100 (3) [3 - 3]	100 (1) [1 - 1]
RIBCER	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RIBOXY	0 (0) [0 - 0]	17 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (10) [10 - 10]	0 (0) [0 - 0]	50 (3) [3 - 3]
ROSARK	33 (1) [1 - 1]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSWOO	0 (0) [0 - 0]	17 (1) [1 - 1]	50 (3) [3 - 3]	100 (1) [1 - 1]	50 (1) [1 - 1]
SALSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SHECAN	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]	0 (0) [0 - 0]	50 (3) [3 - 3]
SPIBET	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (10) [10 - 10]	0 (0) [0 - 0]	50 (10) [10 - 10]
SYMALB	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]	100 (3) [3 - 3]
SYMOCC	33 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
YUCGLA	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	JUNSCO/AGRSPI	JUNSCO/ORYMIC	PINCON/JUNCOM	PINFLE/AGRSPI	PINPON/ARCUVA
# Sites	N = 3	N = 6	N = 2	N = 1	N = 2
Graminoids					
AGRDAS	33 (30) [30 - 30]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	33 (1) [1 - 1]	33 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSPI	100 (43) [10 - 60]	50 (7) [1 - 20]	0 (0) [0 - 0]	100 (40) [40 - 40]	100 (20) [20 - 20]
ANDSCO	0 (0) [0 - 0]	17 (1) [1 - 1]	0 (0) [0 - 0]	100 (10) [10 - 10]	100 (3) [3 - 3]
BOUCUR	67 (12) [3 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	67 (2) [1 - 3]	17 (3) [3 - 3]	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]
CALLON	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
CAREXX	0 (0) [0 - 0]	17 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	100 (10) [10 - 10]	33 (3) [3 - 3]	0 (0) [0 - 0]	100 (20) [20 - 20]	0 (0) [0 - 0]
CARPEN	0 (0) [0 - 0]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARROI	0 (0) [0 - 0]	50 (1) [1 - 1]	50 (1) [1 - 1]	100 (1) [1 - 1]	50 (1) [1 - 1]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	100 (5) [1 - 10]	17 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]
MUHCUS	67 (2) [1 - 3]	50 (2) [1 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
ORYMIC	67 (1) [1 - 1]	100 (38) [10 - 70]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
STICOM	33 (1) [1 - 1]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STISPA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Forbs					
ACHMIL	67 (1) [1 - 1]	83 (1) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
ANEPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	50 (1) [1 - 1]
APOAND	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (12) [3 - 20]
AREMAC	0 (0) [0 - 0]	17 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARNCOR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTAGR	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTCON	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]	50 (1) [1 - 1]
BALSAG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (6) [1 - 10]
CAMROT	33 (1) [1 - 1]	67 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CERARV	0 (0) [0 - 0]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
CHRVIL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
COMUMB	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	50 (10) [10 - 10]
DISTRA	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
EPIANG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	JUNSCO/AGRSPI	JUNSCO/ORYMIC	PINCON/JUNCOM	PINFLE/AGRSPI	PINPON/ARCUVA
# Sites	N = 3	N = 6	N = 2	N = 1	N = 2
Forbs Continued					
GALBOR	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (2) [1 - 3]
GEUTRI	33 (1) [1 - 1]	50 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINPER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]
MELOFF	67 (2) [1 - 3]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSOARG	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
PYRASA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SMIRAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
SMISTE	0 (0) [0 - 0]	50 (4) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMIS	67 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
TAROFF	0 (0) [0 - 0]	50 (2) [1 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
THERHO	67 (2) [1 - 3]	0 (0) [0 - 0]	100 (2) [1 - 3]	100 (1) [1 - 1]	100 (7) [3 - 10]
TRADUB	33 (1) [1 - 1]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
VICAME	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
VIOCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Ferns & Allied Taxa					
CYSFRA	0 (0) [0 - 0]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SELDEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	PINPON/AGRSPI N = 9	PINPON/CARPEN N = 5	PINPON/FESIDA N = 1	PINPON/JUNHOR N = 3	PINPON/SYMOCC N = 1
Trees					
BETPAP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FRAPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNSCO	44 (4) [1 - 10]	80 (4) [1 - 10]	0 (0) [0 - 0]	67 (3) [3 - 3]	0 (0) [0 - 0]
PINCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PINFLE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PINPON	100 (41) [20 - 70]	100 (35) [3 - 70]	100 (40) [40 - 40]	100 (53) [40 - 70]	100 (1) [1 - 1]
POPTRE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSEMEN	11 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Shrubs					
AMEALN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTCAN	33 (4) [1 - 10]	40 (6) [1 - 10]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
ARTFRI	67 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]	67 (1) [1 - 1]	100 (3) [3 - 3]
ARTTRI	33 (2) [1 - 3]	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BERREP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRNAU	11 (1) [1 - 1]	40 (6) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CORSTO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	22 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNCOM	67 (3) [1 - 10]	20 (1) [1 - 1]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
JUNHOR	56 (4) [1 - 10]	20 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PRUVIR	22 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	100 (47) [10 - 70]	0 (0) [0 - 0]
RHUTRI	89 (2) [1 - 3]	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
RIBCER	22 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	100 (7) [1 - 20]	0 (0) [0 - 0]
RIBOXY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSARK	11 (1) [1 - 1]	60 (4) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSWOO	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SALSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SHECAN	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPIBET	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMALB	11 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	33 (1) [1 - 1]	40 (6) [1 - 10]	0 (0) [0 - 0]	33 (1) [1 - 1]	100 (20) [20 - 20]
YUCGLA	33 (2) [1 - 3]	20 (1) [1 - 1]	0 (0) [0 - 0]	[illegible] [[illegible] - 0]	100 (3) [3 - 3]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	PINPON/AGRSPI	PINPON/CARPEN	PINPON/FESIDA	PINPON/JUNHOR	PINPON/SYMOCC
# Sites	N = 9	N = 5	N = 1	N = 3	N = 1
Graminoids					
AGRDAS	0 (0) [0 - 0]	40 (3) [3 - 3]	100 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	44 (6) [1 - 10]	80 (3) [1 - 10]	0 (0) [0 - 0]	67 (12) [3 - 20]	0 (0) [0 - 0]
AGRSPI	100 (45) [1 - 90]	40 (10) [10 - 10]	100 (20) [20 - 20]	100 (37) [10 - 60]	100 (30) [30 - 30]
ANDSCO	89 (4) [1 - 20]	20 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUCUR	11 (50) [50 - 50]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
BOUGRA	44 (1) [1 - 1]	60 (4) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
CALLON	22 (6) [1 - 10]	60 (14) [1 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CAREXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	67 (6) [1 - 20]	20 (10) [10 - 10]	0 (0) [0 - 0]	67 (7) [3 - 10]	0 (0) [0 - 0]
CARPEN	33 (2) [1 - 3]	100 (32) [10 - 70]	100 (20) [20 - 20]	0 (0) [0 - 0]	100 (3) [3 - 3]
CARROI	33 (2) [1 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	44 (1) [1 - 1]	60 (2) [1 - 3]	0 (0) [0 - 0]	67 (1) [1 - 1]	100 (3) [3 - 3]
MUHCUS	56 (1) [1 - 1]	40 (6) [1 - 10]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
ORYMIC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	78 (1) [1 - 1]	40 (25) [10 - 40]	0 (0) [0 - 0]	67 (2) [1 - 3]	100 (10) [10 - 10]
STISPA	0 (0) [0 - 0]	20 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Forbs					
ACHMIL	78 (1) [1 - 1]	20 (1) [1 - 1]	100 (1) [1 - 1]	100 (1) [1 - 1]	100 (3) [3 - 3]
ANEPAT	22 (1) [1 - 1]	20 (1) [1 - 1]	100 (3) [3 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]
APOAND	11 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AREMAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARNCOR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
ASTAGR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BALSAG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CAMROT	22 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
CERARV	11 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	33 (1) [1 - 1]	100 (10) [10 - 10]
CHRVIL	22 (1) [1 - 1]	20 (1) [1 - 1]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
COMUMB	0 (0) [0 - 0]	40 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISTRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
EPIANG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GALBOR	22 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]
GEUTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	PINPON/AGRSPI	PINPON/CARPEN	PINPON/FESIDA	PINPON/JUNHOR	PINPON/SYMOCC
# Sites	N = 9	N = 5	N = 1	N = 3	N = 1
Forbs Continued					
LINPER	44 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
MELOFF	22 (1) [1 - 1]	60 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
PSOARG	33 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]	67 (1) [1 - 1]	100 (3) [3 - 3]
PYRASA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SMIRAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SMISTE	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMIS	56 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
TAROFF	44 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	11 (1) [1 - 1]	60 (2) [1 - 3]	100 (3) [3 - 3]	67 (1) [1 - 1]	100 (1) [1 - 1]
TRADUB	33 (1) [1 - 1]	20 (1) [1 - 1]	100 (1) [1 - 1]	33 (1) [1 - 1]	100 (10) [10 - 10]
VICAME	33 (2) [1 - 3]	40 (1) [1 - 1]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
VIOCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Ferns & Allied Taxa					
CYSFRA	11 (10) [10 - 10]	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
SELDEN	11 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	PINPON-JUNSCO	PSEMEN/AMEALN	PSEMEN/SYMOCC	PSEMEN/VIOCAN
# Sites	N = 14	N = 2	N = 3	N = 1
Trees				
BETPAP	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
FRAPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNSCO	100 (33) [3 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PINCON	0 (0) [0 - 0]	50 (10) [10 - 10]	100 (10) [10 - 10]	0 (0) [0 - 0]
PINFLE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PINPON	100 (44) [20 - 70]	50 (60) [60 - 60]	100 (8) [3 - 10]	100 (3) [3 - 3]
POPTRE	0 (0) [0 - 0]	100 (36) [1 - 70]	33 (1) [1 - 1]	100 (80) [80 - 80]
PSEMEN	7 (1) [1 - 1]	100 (11) [1 - 20]	33 (3) [3 - 3]	100 (3) [3 - 3]
Shrubs				
AMEALN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (10) [10 - 10]
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTCAN	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTFRI	50 (3) [1 - 10]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]
ARTTRI	21 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BERREP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (30) [30 - 30]
CHRNAU	21 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CORSTO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
GUTSAR	43 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNCOM	7 (1) [1 - 1]	100 (2) [1 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]
JUNHOR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PRUVIR	0 (0) [0 - 0]	50 (1) [1 - 1]	100 (5) [1 - 10]	100 (3) [3 - 3]
RHUTRI	79 (2) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RIBCER	21 (1) [1 - 1]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]
RIBOXY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (10) [10 - 10]	0 (0) [0 - 0]
ROSARK	14 (1) [1 - 1]	50 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSWOO	7 (1) [1 - 1]	50 (10) [10 - 10]	33 (3) [3 - 3]	100 (30) [30 - 30]
SALSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	100 (3) [3 - 3]
SHECAN	0 (0) [0 - 0]	100 (15) [10 - 20]	100 (2) [1 - 3]	100 (20) [20 - 20]
SPIBET	0 (0) [0 - 0]	100 (25) [20 - 30]	33 (1) [1 - 1]	100 (20) [20 - 20]
SYMALB	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (10) [10 - 10]
SYMOCC	14 (2) [1 - 3]	0 (0) [0 - 0]	100 (5) [3 - 10]	0 (0) [0 - 0]
YUCGLA	29 (6) [1 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	PINPON-JUNSCO	PSEMEN/AMEALN	PSEMEN/SYMOCC	PSEMEN/VIOCAN
# Sites	N = 14	N = 2	N = 3	N = 1
Graminoids				
AGRDAS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	36 (4) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSPI	93 (17) [1 - 50]	0 (0) [0 - 0]	100 (18) [3 - 30]	0 (0) [0 - 0]
ANDSCO	21 (11) [1 - 30]	0 (0) [0 - 0]	100 (17) [10 - 30]	0 (0) [0 - 0]
BOUCUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	43 (7) [1 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	29 (8) [1 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CAREXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	64 (5) [1 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARPEN	50 (14) [1 - 40]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
CARROI	29 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	57 (2) [1 - 3]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]
MUHCUS	21 (12) [3 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ORYMIC	29 (9) [1 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	21 (8) [1 - 20]	0 (0) [0 - 0]	33 (10) [10 - 10]	0 (0) [0 - 0]
STISPA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Forbs				
ACHMIL	57 (1) [1 - 3]	0 (0) [0 - 0]	100 (2) [1 - 3]	100 (1) [1 - 1]
ANEPAT	7 (1) [1 - 1]	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]
APOAND	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (4) [1 - 10]	100 (1) [1 - 1]
AREMAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARNCOR	0 (0) [0 - 0]	50 (30) [30 - 30]	0 (0) [0 - 0]	100 (20) [20 - 20]
ARTLUD	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTAGR	7 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTCON	0 (0) [0 - 0]	100 (7) [3 - 10]	0 (0) [0 - 0]	100 (10) [10 - 10]
BALSAG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CAMROT	29 (1) [1 - 1]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
CERARV	0 (0) [0 - 0]	0 (0) [0 - 0]	67 (2) [1 - 3]	0 (0) [0 - 0]
CHRVIL	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]
COMUMB	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISTRA	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
EPIANG	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
GALBOR	0 (0) [0 - 0]	100 (2) [1 - 3]	100 (8) [3 - 10]	100 (1) [1 - 1]
GEUTRI	7 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-1 (cont.)

Forest/Woodland Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	PINPON-JUNSCO N = 14	PSEMEN/AMEALN N = 2	PSEMEN/SYMOCC N = 3	PSEMEN/VIOCAN N = 1
Forbs Continued				
LINPER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
MELOFF	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSOARG	29 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PYRASA	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
SMIRAC	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
SMISTE	7 (1) [1 - 1]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (3) [3 - 3]
SOLMIS	57 (1) [1 - 3]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
TAROFF	29 (1) [1 - 1]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	7 (1) [1 - 1]	50 (1) [1 - 1]	100 (10) [1 - 20]	0 (0) [0 - 0]
TRADUB	7 (1) [1 - 1]	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]
VICAME	57 (1) [1 - 1]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
VIOCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
Ferns & Allied Taxa				
CYSFRA	7 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SELDEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	ARTCAN/AGRSMI N = 6	ARTCAN/STICOM N = 9	ARTTRI/AGRSMI N = 13	ARTTRI/AGRSPI N = 5	ARTTRI/ATRCON N = 5
Trees					
JUNSCO	33 (1) [1 - 1]	0 (0) [0 - 0]	8 (3) [3 - 3]	40 (1) [1 - 1]	0 (0) [0 - 0]
Shrubs					
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTCAN	100 (32) [10 - 50]	100 (27) [10 - 50]	0 (0) [0 - 0]	20 (10) [10 - 10]	0 (0) [0 - 0]
ARTFRI	100 (4) [1 - 10]	89 (1) [1 - 3]	69 (2) [1 - 3]	100 (1) [1 - 3]	0 (0) [0 - 0]
ARTTRI	17 (1) [1 - 1]	0 (0) [0 - 0]	100 (32) [10 - 50]	100 (38) [10 - 70]	40 (3) [3 - 3]
ATRCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]	100 (23) [3 - 30]
ATRNUT	50 (1) [1 - 1]	0 (0) [0 - 0]	15 (1) [1 - 1]	0 (0) [0 - 0]	100 (18) [10 - 30]
BETOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	40 (1) [1 - 1]
CERLAN	17 (1) [1 - 1]	0 (0) [0 - 0]	15 (2) [1 - 3]	40 (1) [1 - 1]	0 (0) [0 - 0]
CHRNAU	33 (11) [1 - 20]	0 (0) [0 - 0]	23 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]
ELACOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (3) [3 - 3]
EURLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	33 (1) [1 - 1]	11 (1) [1 - 1]	46 (1) [1 - 1]	100 (1) [1 - 3]	0 (0) [0 - 0]
JUNCOM	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]	60 (2) [1 - 3]
JUNHOR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RHUTRI	33 (1) [1 - 1]	33 (1) [1 - 1]	8 (3) [3 - 3]	20 (1) [1 - 1]	0 (0) [0 - 0]
RIBSET	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSARK	0 (0) [0 - 0]	11 (1) [1 - 1]	8 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSWOO	17 (1) [1 - 1]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]	11 (1) [1 - 1]	8 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
SHEARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	33 (1) [1 - 1]	11 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
YUCGLA	17 (1) [1 - 1]	11 (30) [30 - 30]	0 (0) [0 - 0]	60 (1) [1 - 1]	20 (1) [1 - 1]
Graminoids					
AGRDAS	33 (16) [1 - 30]	11 (1) [1 - 1]	15 (17) [3 - 30]	0 (0) [0 - 0]	40 (10) [10 - 10]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGROST	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	100 (18) [3 - 40]	56 (1) [1 - 3]	100 (19) [3 - 40]	60 (4) [1 - 10]	40 (1) [1 - 1]
AGRSPI	33 (11) [1 - 20]	22 (22) [3 - 40]	38 (7) [1 - 20]	100 (43) [3 - 60]	80 (25) [1 - 40]
ANDSCO	0 (0) [0 - 0]	33 (2) [1 - 3]	0 (0) [0 - 0]	20 (1) [1 - 1]	0 (0) [0 - 0]
BOUCUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	83 (21) [3 - 30]	89 (9) [1 - 20]	62 (12) [1 - 30]	100 (5) [1 - 10]	40 (6) [illegible]
BROJAP	17 (1) [1 - 1]	0 (0) [0 - 0]	23 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	ARTCAN/AGRSMI	ARTCAN/STICOM	ARTTRI/AGRSMI	ARTTRI/AGRSPI	ARTTRI/ATRCON
# Sites	N = 6	N = 9	N = 13	N = 5	N = 5
Graminoids Continued					
BROTEC	0 (0) [0 - 0]	22 (1) [1 - 1]	8 (3) [3 - 3]	20 (1) [1 - 1]	20 (1) [1 - 1]
CALLON	17 (3) [3 - 3]	22 (50) [10 - 90]	8 (1) [1 - 1]	20 (20) [20 - 20]	20 (1) [1 - 1]
CALMON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	67 (16) [1 - 30]	67 (12) [1 - 30]	23 (2) [1 - 3]	60 (7) [1 - 20]	20 (1) [1 - 1]
CARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARSTE	50 (7) [1 - 20]	44 (2) [1 - 3]	31 (3) [1 - 10]	60 (2) [1 - 3]	0 (0) [0 - 0]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESSCA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	83 (3) [1 - 10]	89 (4) [1 - 10]	69 (4) [1 - 20]	60 (2) [1 - 3]	40 (1) [1 - 1]
MUHCUS	17 (1) [1 - 1]	11 (20) [20 - 20]	15 (1) [1 - 1]	60 (14) [1 - 20]	0 (0) [0 - 0]
ORYHYM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	60 (5) [3 - 10]
POAPAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POASEC	67 (1) [1 - 1]	67 (3) [1 - 10]	77 (5) [1 - 30]	100 (1) [1 - 3]	40 (6) [1 - 10]
SPOAIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (10) [10 - 10]
SPOASP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (10) [10 - 10]
STICOM	83 (13) [1 - 30]	100 (38) [3 - 70]	38 (7) [1 - 20]	100 (7) [1 - 20]	40 (15) [10 - 20]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STIVIR	50 (30) [1 - 60]	0 (0) [0 - 0]	85 (7) [1 - 20]	20 (10) [10 - 10]	0 (0) [0 - 0]
Forbs					
ACHMIL	67 (1) [1 - 1]	11 (3) [3 - 3]	38 (1) [1 - 1]	60 (1) [1 - 1]	0 (0) [0 - 0]
ANEMUL	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANENUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANEPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTMIC	17 (1) [1 - 1]	33 (1) [1 - 1]	15 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]
ARNFUL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	33 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRDIO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIL	0 (0) [0 - 0]	56 (1) [1 - 3]	8 (1) [1 - 1]	40 (1) [1 - 1]	0 (0) [0 - 0]
COLLIN	17 (1) [1 - 1]	0 (0) [0 - 0]	38 (1) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
COMUMB	50 (1) [1 - 1]	33 (1) [1 - 1]	77 (1) [1 - 3]	60 (1) [1 - 1]	20 (1) [1 - 1]
CREOCC	0 (0) [0 - 0]	[illegible] (0) [0 - 0]	8 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]	0 ([illegible]) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]	60 (5) [1 - 10]
ERIUMB	0 (0) [0 - 0]	[illegible] ([illegible]) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	ARTCAN/AGRSMI	ARTCAN/STICOM	ARTTRI/AGRSMI	ARTTRI/AGRSPI	ARTTRI/ATRCON
# Sites	N = 6	N = 9	N = 13	N = 5	N = 5
Forbs Continued					
GALBOR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GEUTRI	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GRISQU	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (3) [3 - 3]
HELMAX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LAPRED	0 (0) [0 - 0]	11 (1) [1 - 1]	15 (1) [1 - 1]	0 (0) [0 - 0]	20 (3) [3 - 3]
LINPER	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
MELOFF	33 (2) [1 - 3]	22 (1) [1 - 1]	38 (1) [1 - 3]	40 (1) [1 - 1]	0 (0) [0 - 0]
OPUPOL	100 (3) [1 - 10]	89 (4) [1 - 10]	100 (1) [1 - 3]	100 (1) [1 - 1]	80 (2) [1 - 3]
OXYCAM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLALY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLHOO	33 (1) [1 - 1]	11 (1) [1 - 1]	46 (2) [1 - 3]	80 (2) [1 - 3]	20 (1) [1 - 1]
PLAPAT	17 (1) [1 - 1]	56 (5) [1 - 20]	31 (1) [1 - 1]	20 (1) [1 - 1]	20 (1) [1 - 1]
PSOARG	17 (1) [1 - 1]	67 (1) [1 - 1]	31 (3) [1 - 10]	40 (1) [1 - 1]	0 (0) [0 - 0]
SOLMIS	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLNEM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SUAINT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SUAMOQ	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	0 (0) [0 - 0]	11 (1) [1 - 1]	8 (1) [1 - 1]	0 (0) [0 - 0]	20 (3) [3 - 3]
VICAME	67 (1) [1 - 1]	11 (1) [1 - 1]	85 (1) [1 - 1]	80 (1) [1 - 1]	0 (0) [0 - 0]
Ferns & Allied Taxa					
SELDEN	17 (10) [10 - 10]	78 (40) [1 - 80]	31 (30) [1 - 50]	20 (20) [20 - 20]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	ARTTRI/FESSCA N = 2	ATRNUT/AGRSMI N = 2	ATRNUT/AGRSPI N = 1	ATRNUT/ERIPAU N = 4	ATRNUT/SPOAIR N = 1
Trees					
JUNSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Shrubs					
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
ARTFRI	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	25 (1) [1 - 1]	0 (0) [0 - 0]
ARTTRI	100 (17) [3 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	75 (14) [1 - 40]	100 (10) [10 - 10]
ATRCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRNUT	0 (0) [0 - 0]	100 (40) [10 - 70]	100 (10) [10 - 10]	100 (25) [20 - 30]	100 (10) [10 - 10]
BETOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CERLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (4) [1 - 10]	100 (1) [1 - 1]
CHRVIS	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ELACOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
EURLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	0 (0) [0 - 0]	50 (1) [1 - 1]	100 (10) [10 - 10]	50 (1) [1 - 1]	100 (1) [1 - 1]
JUNCOM	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNHOR	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RHUTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RIBSET	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSARK	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSWOO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SHEARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
YUCGLA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Graminoids					
AGRDAS	0 (0) [0 - 0]	50 (1) [1 - 1]	100 (3) [3 - 3]	75 (5) [1 - 10]	0 (0) [0 - 0]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGROST	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	50 (1) [1 - 1]	50 (50) [50 - 50]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
AGRSPI	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (20) [20 - 20]	50 (1) [1 - 1]	0 (0) [0 - 0]
ANDSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUCUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BROJAP	0 (0) [0 - 0]	50 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	ARTTRI/FESSCA N = 2	ATRNUT/AGRSMI N = 2	ATRNUT/AGRSPI N = 1	ATRNUT/ERIPAU N = 4	ATRNUT/SPOAIR N = 1
Graminoids Continued					
BROTEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALMON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARSTE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESIDA	100 (6) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESSCA	100 (65) [50 - 80]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
MUHCUS	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ORYHYM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]
POAPAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POASEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	25 (1) [1 - 1]	0 (0) [0 - 0]
SPOAIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (50) [50 - 50]
SPOASP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STIVIR	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Forbs					
ACHMIL	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANEMUL	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANENUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANEPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTMIC	100 (6) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARNFUL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRDIO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIL	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
COLLIN	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
COMUMB	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]
CREOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	100 (33) [10 - 70]	0 (0) [0 - 0]
ERIUMB	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	ARTTRI/FESSCA	ATRNUT/AGRSMI	ATRNUT/AGRSPI	ATRNUT/ERIPAU	ATRNUT/SPOAIR
# Sites	N = 2	N = 2	N = 1	N = 4	N = 1
Forbs Continued					
GALBOR	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GEUTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GRISQU	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
HELMAX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LAPRED	0 (0) [0 - 0]	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINPER	50 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
MELOFF	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
OPUPOL	0 (0) [0 - 0]	100 (6) [1 - 10]	0 (0) [0 - 0]	75 (1) [1 - 1]	0 (0) [0 - 0]
OXYCAM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLALY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLHOO	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
PLAPAT	0 (0) [0 - 0]	50 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSOARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMIS	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLNEM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SUAINT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SUAMOQ	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
VICAME	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
Ferns & Allied Taxa					
SELDEN	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community # Sites	CERLAN/STICOM N = 5	ELECOM/X N = 1	JUNHOR/AGRDAS N = 7	JUNHOR/ANDSCO N = 11	JUNHOR/CALLON N = 4
Trees					
JUNSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	25 (1) [1 - 1]
Shrubs					
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	18 (25) [10 - 40]	0 (0) [0 - 0]
ARTCAN	20 (1) [1 - 1]	100 (3) [3 - 3]	57 (1) [1 - 1]	27 (2) [1 - 3]	0 (0) [0 - 0]
ARTFRI	100 (3) [1 - 10]	100 (1) [1 - 1]	86 (3) [1 - 3]	73 (1) [1 - 1]	0 (0) [0 - 0]
ARTTRI	60 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
ATRCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRNUT	60 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (1) [1 - 1]	0 (0) [0 - 0]
BETOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (10) [10 - 10]	0 (0) [0 - 0]
CERLAN	100 (24) [10 - 60]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (1) [1 - 1]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]	27 (4) [1 - 10]	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]	0 (0) [0 - 0]	43 (2) [1 - 3]	0 (0) [0 - 0]	25 (1) [1 - 1]
ELACOM	0 (0) [0 - 0]	100 (70) [70 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
EURLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	60 (1) [1 - 1]	100 (1) [1 - 1]	57 (2) [1 - 3]	55 (1) [1 - 1]	25 (1) [1 - 1]
JUNCOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	25 (10) [10 - 10]
JUNHOR	0 (0) [0 - 0]	100 (1) [1 - 1]	100 (37) [10 - 60]	100 (57) [20 - 90]	100 (50) [10 - 80]
RHUTRI	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	36 (2) [1 - 3]	25 (1) [1 - 1]
RIBSET	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (3) [3 - 3]	0 (0) [0 - 0]	50 (3) [3 - 3]
ROSARK	0 (0) [0 - 0]	0 (0) [0 - 0]	43 (2) [1 - 3]	55 (1) [1 - 3]	25 (3) [3 - 3]
ROSWOO	0 (0) [0 - 0]	100 (3) [3 - 3]	14 (3) [3 - 3]	18 (1) [1 - 1]	25 (1) [1 - 1]
SARVER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SHEARG	0 (0) [0 - 0]	100 (1) [1 - 1]	29 (1) [1 - 1]	9 (10) [10 - 10]	25 (1) [1 - 1]
SYMOCC	0 (0) [0 - 0]	100 (1) [1 - 1]	57 (2) [1 - 3]	36 (1) [1 - 1]	25 (1) [1 - 1]
YUCGLA	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	27 (1) [1 - 1]	0 (0) [0 - 0]
Graminoids					
AGRDAS	0 (0) [0 - 0]	100 (20) [20 - 20]	100 (23) [3 - 50]	9 (3) [3 - 3]	50 (1) [1 - 1]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGROST	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	20 (1) [1 - 1]	0 (0) [0 - 0]	29 (31) [1 - 60]	9 (1) [1 - 1]	25 (1) [1 - 1]
AGRSPI	80 (40) [10 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]	64 (24) [10 - 50]	25 (1) [1 - 1]
ANDSCO	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (1) [1 - 1]	91 (11) [1 - 70]	100 (2) [1 - 3]
BOUCUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	25 (3) [3 - 3]
BOUGRA	100 (6) [1 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	18 (1) [1 - 1]	0 (0) [0 - 0]
BROJAP	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community # Sites	CERLAN/STICOM N = 5	ELECOM/X N = 1	JUNHOR/AGRDAS N = 7	JUNHOR/ANDSCO N = 11	JUNHOR/CALLON N = 4
Graminoids Continued					
BROTEC	40 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	20 (1) [1 - 1]	0 (0) [0 - 0]	29 (6) [1 - 10]	64 (10) [1 - 40]	100 (18) [3 - 30]
CALMON	0 (0) [0 - 0]	0 (0) [0 - 0]	57 (6) [1 - 20]	0 (0) [0 - 0]	75 (11) [3 - 20]
CARFIL	100 (15) [1 - 50]	100 (3) [3 - 3]	43 (5) [1 - 10]	73 (9) [1 - 20]	25 (10) [10 - 10]
CARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	43 (8) [3 - 10]	36 (2) [1 - 3]	50 (2) [1 - 3]
CARSTE	20 (1) [1 - 1]	0 (0) [0 - 0]	29 (20) [20 - 20]	9 (20) [20 - 20]	25 (3) [3 - 3]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESSCA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (3) [3 - 3]	25 (1) [1 - 1]
KOECRI	60 (2) [1 - 3]	100 (50) [50 - 50]	100 (6) [1 - 20]	82 (1) [1 - 3]	50 (1) [1 - 1]
MUHCUS	20 (1) [1 - 1]	0 (0) [0 - 0]	29 (1) [1 - 1]	36 (1) [1 - 1]	25 (1) [1 - 1]
ORYHYM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (1) [1 - 1]	0 (0) [0 - 0]
POAPAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POASEC	60 (1) [1 - 1]	100 (1) [1 - 1]	14 (3) [3 - 3]	36 (2) [1 - 3]	0 (0) [0 - 0]
SPOAIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPOASP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	100 (27) [1 - 60]	100 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (7) [3 - 10]	9 (1) [1 - 1]	0 (0) [0 - 0]
STIVIR	40 (11) [1 - 20]	100 (1) [1 - 1]	71 (10) [3 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]
Forbs					
ACHMIL	20 (1) [1 - 1]	100 (1) [1 - 1]	71 (1) [1 - 1]	36 (2) [1 - 3]	25 (1) [1 - 1]
ANEMUL	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (3) [3 - 3]	18 (1) [1 - 1]	0 (0) [0 - 0]
ANENUT	0 (0) [0 - 0]	0 (0) [0 - 0]	43 (2) [1 - 3]	0 (0) [0 - 0]	25 (1) [1 - 1]
ANEPAT	0 (0) [0 - 0]	100 (10) [10 - 10]	0 (0) [0 - 0]	18 (1) [1 - 1]	25 (3) [3 - 3]
ANTMIC	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (2) [1 - 3]	36 (1) [1 - 1]	0 (0) [0 - 0]
ARNFUL	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRDIO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIL	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	9 (1) [1 - 1]	25 (1) [1 - 1]
COLLIN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
COMUMB	20 (1) [1 - 1]	100 (1) [1 - 1]	14 (1) [1 - 1]	73 (1) [1 - 1]	100 (2) [1 - 3]
CREOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	9 (1) [1 - 1]	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (2) [1 - 3]	27 (1) [1 - 1]	25 (3) [3 - 3]
ERIUMB	20 (3) [3 - 3]	0 (0) [0 - 0]	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	CERLAN/STICOM N = 5	ELECOM/X N = 1	JUNHOR/AGRDAS N = 7	JUNHOR/ANDSCO N = 11	JUNHOR/CALLON N = 4
Forbs Continued					
GALBOR	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (1) [1 - 1]	18 (1) [1 - 1]	25 (1) [1 - 1]
GEUTRI	0 (0) [0 - 0]	100 (1) [1 - 1]	29 (6) [1 - 10]	9 (1) [1 - 1]	0 (0) [0 - 0]
GRISQU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
HELMAX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LAPRED	20 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINPER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	36 (1) [1 - 1]	25 (1) [1 - 1]
MELOFF	40 (1) [1 - 1]	0 (0) [0 - 0]	14 (3) [3 - 3]	36 (2) [1 - 3]	0 (0) [0 - 0]
OPUPOL	40 (1) [1 - 1]	0 (0) [0 - 0]	43 (2) [1 - 3]	27 (1) [1 - 1]	0 (0) [0 - 0]
OXYCAM	0 (0) [0 - 0]	100 (1) [1 - 1]	14 (3) [3 - 3]	9 (1) [1 - 1]	0 (0) [0 - 0]
PARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLALY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	27 (2) [1 - 3]	0 (0) [0 - 0]
PHLHOO	60 (1) [1 - 1]	100 (1) [1 - 1]	43 (1) [1 - 1]	27 (1) [1 - 1]	25 (1) [1 - 1]
PLAPAT	60 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSOARG	0 (0) [0 - 0]	100 (1) [1 - 1]	29 (1) [1 - 1]	18 (1) [1 - 1]	0 (0) [0 - 0]
SOLMIS	0 (0) [0 - 0]	100 (1) [1 - 1]	43 (1) [1 - 1]	36 (1) [1 - 1]	25 (1) [1 - 1]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
SOLNEM	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]	27 (2) [1 - 3]	75 (1) [1 - 1]
SUAINT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SUAMOQ	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	0 (0) [0 - 0]	0 (0) [0 - 0]	29 (3) [3 - 3]	73 (3) [1 - 10]	75 (2) [1 - 3]
VICAME	0 (0) [0 - 0]	100 (1) [1 - 1]	71 (2) [1 - 3]	36 (1) [1 - 1]	0 (0) [0 - 0]
Ferns & Allied Taxa					
SELDEN	0 (0) [0 - 0]	100 (70) [70 - 70]	29 (45) [10 - 80]	9 (1) [1 - 1]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	JUNHOR/JUNBAL	RHUTRI/AGRSPI	SARVER/AGRSMI	SARVER/ATRNUT	SHEARG/X
# Sites	N = 4	N = 3	N = 3	N = 10	N = 2
Trees					
JUNSCO	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Shrubs					
ARCUVA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTFRI	0 (0) [0 - 0]	100 (2) [1 - 3]	67 (2) [1 - 3]	10 (1) [1 - 1]	50 (1) [1 - 1]
ARTTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	67 (21) [1 - 40]	50 (6) [1 - 10]	50 (1) [1 - 1]
ATRCON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	60 (16) [1 - 50]	0 (0) [0 - 0]
ATRNUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (4) [1 - 10]	0 (0) [0 - 0]
BETOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CERLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]	0 (0) [0 - 0]	67 (1) [1 - 1]	10 (50) [50 - 50]	0 (0) [0 - 0]
ELACOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
EURLAN	0 (0) [0 - 0]	33 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]	30 (2) [1 - 3]	0 (0) [0 - 0]
JUNCOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNHOR	100 (46) [3 - 80]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RHUTRI	0 (0) [0 - 0]	100 (11) [3 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (25) [20 - 30]
RIBSET	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
ROSACI	75 (11) [3 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (7) [3 - 10]
ROSARK	25 (3) [3 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (10) [10 - 10]
ROSWOO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]
SARVER	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (20) [10 - 40]	100 (26) [3 - 50]	0 (0) [0 - 0]
SHEARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (25) [20 - 30]
SYMOCC	0 (0) [0 - 0]	33 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (25) [10 - 40]
YUCGLA	0 (0) [0 - 0]	33 (10) [10 - 10]	0 (0) [0 - 0]	20 (2) [1 - 3]	0 (0) [0 - 0]
Graminoids					
AGRDAS	25 (3) [3 - 3]	0 (0) [0 - 0]	33 (1) [1 - 1]	20 (1) [1 - 1]	50 (1) [1 - 1]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGROST	50 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (20) [20 - 20]
AGRSMI	75 (5) [1 - 10]	0 (0) [0 - 0]	100 (23) [10 - 30]	20 (2) [1 - 3]	100 (12) [3 - 20]
AGRSPI	0 (0) [0 - 0]	100 (24) [3 - 50]	0 (0) [0 - 0]	60 (3) [1 - 10]	50 (1) [1 - 1]
ANDSCO	75 (20) [1 - 40]	33 (20) [20 - 20]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
BOUCUR	[illegible] (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	[illegible] (0) [0 - 0]	33 (10) [10 - 10]	67 (3) [3 - 3]	30 (1) [1 - 1]	0 (0) [0 - 0]
BROJAP	[illegible] ([illegible]) [0 - 0]	33 (1) [1 - 1]	33 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - [illegible]]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	JUNHOR/JUNBAL N = 4	RHUTRI/AGRSPI N = 3	SARVER/AGRSMI N = 3	SARVER/ATRNUT N = 10	SHEARG/X N = 2
Graminoids Continued					
BROTEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	100 (13) [3 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]	50 (3) [3 - 3]
CALMON	100 (4) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (7) [3 - 10]
CARFIL	0 (0) [0 - 0]	67 (7) [3 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARPEN	25 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (1) [1 - 1]
CARSTE	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	50 (1) [1 - 1]
FESIDA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESSCA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNBAL	100 (23) [20 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	0 (0) [0 - 0]	33 (3) [3 - 3]	67 (2) [1 - 3]	0 (0) [0 - 0]	100 (2) [1 - 3]
MUHCUS	0 (0) [0 - 0]	67 (6) [1 - 10]	33 (3) [3 - 3]	20 (1) [1 - 1]	0 (0) [0 - 0]
ORYHYM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	30 (2) [1 - 3]	0 (0) [0 - 0]
POAPAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (50) [50 - 50]
POASEC	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]	30 (1) [1 - 1]	0 (0) [0 - 0]
SPOAIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (20) [20 - 20]	0 (0) [0 - 0]
SPOASP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	0 (0) [0 - 0]	100 (11) [1 - 30]	67 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STIVIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]
Forbs					
ACHMIL	50 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]
ANEMUL	0 (0) [0 - 0]	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANENUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANEPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTMIC	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARNFUL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRARG	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
ATRDIO	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	40 (20) [1 - 30]	0 (0) [0 - 0]
CHRVIL	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
COLLIN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
COMUMB	25 (1) [1 - 1]	67 (1) [1 - 1]	0 (0) [0 - 0]	20 (1) [1 - 1]	0 (0) [0 - 0]
CREOCC	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]	[illegible] ([illegible]) [1 - 1]	33 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]
ERIUMB	0 (0) [0 - 0]	[illegible] ([illegible]) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GALBOR	0 (0) [0 - [illegible]]	[illegible] ([illegible]) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (7) [3 - 10]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	JUNHOR/JUNBAL	RHUTRI/AGRSPI	SARVER/AGRSMI	SARVER/ATRNUT	SHEARG/X
# Sites	N = 4	N = 3	N = 3	N = 10	N = 2
Forbs Continued					
GEUTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GRISQU	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	10 (1) [1 - 1]	0 (0) [0 - 0]
HELMAX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LAPRED	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	50 (3) [3 - 3]
LINPER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	20 (1) [1 - 1]	0 (0) [0 - 0]
MELOFF	0 (0) [0 - 0]	33 (1) [1 - 1]	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
OPUPOL	0 (0) [0 - 0]	33 (1) [1 - 1]	100 (2) [1 - 3]	30 (1) [1 - 1]	0 (0) [0 - 0]
OXYCAM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
PARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PHLALY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]
PHLHOO	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PLAPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	20 (2) [1 - 3]	0 (0) [0 - 0]
PSOARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
SOLMIS	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (1) [1 - 1]	0 (0) [0 - 0]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (10) [10 - 10]
SOLNEM	25 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (2) [1 - 3]
SUAINT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (3) [3 - 3]
SUAMOQ	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	10 (30) [30 - 30]	0 (0) [0 - 0]
THERHO	100 (6) [1 - 20]	33 (3) [3 - 3]	33 (1) [1 - 1]	70 (3) [1 - 10]	0 (0) [0 - 0]
VICAME	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
			33 (1) [1 - 1]	20 (1) [1 - 1]	0 (0) [0 - 0]
Ferns & Allied Taxa					
SELDEN	0 (0) [0 - 0]	33 (60) [60 - 60]	33 (30) [30 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	YUCGLA/X
# Sites	N = 1
Trees	
JUNSCO	0 (0) [0 - 0]
Shrubs	
ARCUVA	0 (0) [0 - 0]
ARTCAN	100 (1) [1 - 1]
ARTFRI	0 (0) [0 - 0]
ARTTRI	0 (0) [0 - 0]
ATRCON	0 (0) [0 - 0]
ATRNUT	0 (0) [0 - 0]
BETOCC	0 (0) [0 - 0]
CERLAN	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]
ELACOM	0 (0) [0 - 0]
EURLAN	0 (0) [0 - 0]
GUTSAR	0 (0) [0 - 0]
JUNCOM	0 (0) [0 - 0]
JUNHOR	0 (0) [0 - 0]
RHUTRI	100 (3) [3 - 3]
RIBSET	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]
ROSARK	100 (1) [1 - 1]
ROSWOO	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]
SHEARG	0 (0) [0 - 0]
SYMOCC	0 (0) [0 - 0]
YUCGLA	100 (30) [30 - 30]
Grasminoids	
AGRDAS	0 (0) [0 - 0]
AGROPY	0 (0) [0 - 0]
AGROST	0 (0) [0 - 0]
AGRSMI	100 (10) [10 - 10]
AGRSPI	100 (1) [1 - 1]
ANDSCO	100 (1) [1 - 1]
BOUCUR	0 (0) [0 - 0]
BOUGRA	100 (20) [20 - 20]
BROJAP	0 (0) [0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community * YUCGLA/X *

\# Sites * N = 1 *

Species	Constancy	(Average Abund)	[Range, Minimum - Maximum]
Graminoids Continued			
BROTEC	0	(0)	[0 - 0]
CALLON	0	(0)	[0 - 0]
CALMON	0	(0)	[0 - 0]
CARFIL	100	(20)	[20 - 20]
CARPEN	0	(0)	[0 - 0]
CARSTE	0	(0)	[0 - 0]
FESIDA	0	(0)	[0 - 0]
FESSCA	0	(0)	[0 - 0]
JUNBAL	0	(0)	[0 - 0]
KOECRI	100	(1)	[1 - 1]
MUHCUS	0	(0)	[0 - 0]
ORYHYM	0	(0)	[0 - 0]
POAPAL	0	(0)	[0 - 0]
POASEC	0	(0)	[0 - 0]
SPOAIR	0	(0)	[0 - 0]
SPOASP	0	(0)	[0 - 0]
STICOM	100	(70)	[70 - 70]
STICUR	0	(0)	[0 - 0]
STIVIR	0	(0)	[0 - 0]
Forbs			
ACHMIL	0	(0)	[0 - 0]
ANEMUL	0	(0)	[0 - 0]
ANENUT	0	(0)	[0 - 0]
ANEPAT	0	(0)	[0 - 0]
ANTMIC	0	(0)	[0 - 0]
ARNFUL	0	(0)	[0 - 0]
ARTLUD	0	(0)	[0 - 0]
ATRARG	0	(0)	[0 - 0]
ATRDIO	0	(0)	[0 - 0]
CHRVII	0	(0)	[0 - 0]
COLLIN	0	(0)	[0 - 0]
COMUMB	0	(0)	[0 - 0]
[illegible]	0	(0)	[0 - 0]
[illegible]	0	(0)	[0 - 0]
[illegible]	0	(0)	[0 - 0]
[illegible]	0	(0)	[0 - 0]

Appendix B-2 (cont.)

Shrub Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	YUCGLA/X
# Sites	N = 1
Forbs Continued	
GEUTRI	0 (0) [0 - 0]
GRISQU	0 (0) [0 - 0]
HELMAX	0 (0) [0 - 0]
LAPRED	0 (0) [0 - 0]
LINPER	0 (0) [0 - 0]
MELOFF	0 (0) [0 - 0]
OPUPOL	100 (10) [10 - 10]
OXYCAM	0 (0) [0 - 0]
PARPEN	0 (0) [0 - 0]
PHLALY	0 (0) [0 - 0]
PHLHOO	0 (0) [0 - 0]
PLAPAT	0 (0) [0 - 0]
PSOARG	100 (1) [1 - 1]
SOLMIS	0 (0) [0 - 0]
SOLMOL	0 (0) [0 - 0]
SOLNEM	0 (0) [0 - 0]
SUAINT	0 (0) [0 - 0]
SUAMOQ	0 (0) [0 - 0]
THERHO	0 (0) [0 - 0]
VICAME	0 (0) [0 - 0]
Ferns & Allied Taxa	
SELDEN	100 (30) [30 - 30]

Appendix B-3

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	AGRSMI-BOUGRA	AGRSMI-STIVIR	AGRSPI-AGRSMI	AGRSPI-BOUGRA	AGRSPI-CARFIL
# Sites	N = 24	N = 23	N = 3	N = 3	N = 1
Shrubs					
ARTCAN	42 (1) [1 - 3]	52 (1) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTFRI	96 (3) [1 - 20]	83 (4) [1 - 10]	100 (2) [1 - 3]	100 (5) [1 - 10]	100 (3) [3 - 3]
ARTTRI	8 (2) [1 - 3]	22 (4) [1 - 10]	33 (3) [3 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]
CERLAN	25 (1) [1 - 1]	13 (2) [1 - 3]	0 (0) [0 - 0]	33 (20) [20 - 20]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	9 (1) [1 - 1]	100 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIS	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	33 (1) [1 - 1]	52 (1) [1 - 1]	100 (1) [1 - 1]	67 (2) [1 - 3]	100 (1) [1 - 1]
JUNHOR	0 (0) [0 - 0]	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RHUTRI	0 (0) [0 - 0]	4 (1) [1 - 1]	33 (1) [1 - 1]	33 (3) [3 - 3]	0 (0) [0 - 0]
ROSACI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSARK	13 (4) [1 - 10]	17 (2) [1 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSAXX	0 (0) [0 - 0]	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	8 (6) [1 - 10]	13 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
YUCGLA	4 (3) [3 - 3]	0 (0) [0 - 0]	67 (1) [1 - 1]	33 (3) [3 - 3]	100 (20) [20 - 20]
Graminoids					
AGRCRI	8 (1) [1 - 1]	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRDAS	13 (30) [20 - 40]	13 (2) [1 - 3]	33 (20) [20 - 20]	33 (3) [3 - 3]	0 (0) [0 - 0]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSCA	0 (0) [0 - 0]	9 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	88 (32) [3 - 90]	96 (38) [1 - 98]	67 (22) [3 - 40]	67 (1) [1 - 1]	0 (0) [0 - 0]
AGRSPI	17 (2) [1 - 3]	4 (3) [3 - 3]	100 (47) [30 - 70]	100 (53) [20 - 80]	100 (70) [70 - 70]
ANDSCO	8 (2) [1 - 3]	9 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	100 (10) [10 - 10]
ARIPUR	4 (3) [3 - 3]	9 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	92 (19) [1 - 60]	87 (19) [1 - 50]	67 (1) [1 - 1]	100 (20) [10 - 30]	100 (3) [3 - 3]
BROJAP	13 (4) [1 - 10]	22 (19) [1 - 80]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BROTEC	4 (1) [1 - 1]	4 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BUCDAC	4 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	8 (2) [1 - 3]	4 (1) [1 - 1]	33 (1) [1 - 1]	33 (10) [10 - 10]	100 (1) [1 - 1]
CALMON	0 (0) [0 - 0]	4 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARFIL	54 (13) [1 - 60]	70 (8) [1 - 40]	67 (6) [1 - 10]	67 (10) [10 - 10]	100 (30) [30 - 30]
CARPEN	13 (5) [1 - 10]	9 (6) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARROI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARSTE	46 (1) [1 - 3]	22 (14) [1 - [illegible]]	33 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	AGRSMI-BOUGRA N = 24	AGRSMI-STIVIR N = 23	AGRSPI-AGRSMI N = 3	AGRSPI-BOUGRA N = 3	AGRSPI-CARFIL N = 1
Graminoids Continued					
DESCES	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISSPI	0 (0) [0 - 0]	4 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISSTR	4 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESOCT	13 (2) [1 - 3]	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	88 (8) [1 - 20]	70 (5) [1 - 20]	100 (2) [1 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]
MUHCUS	17 (8) [1 - 30]	48 (5) [1 - 30]	33 (1) [1 - 1]	100 (5) [1 - 10]	100 (40) [40 - 40]
PHRCOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
POAARI	0 (0) [0 - 0]	4 (30) [30 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAJUN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAPRA	0 (0) [0 - 0]	9 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POASEC	54 (7) [1 - 20]	48 (4) [1 - 20]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAXXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPAGRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPAPEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	75 (14) [1 - 60]	57 (13) [1 - 40]	33 (1) [1 - 1]	100 (3) [3 - 3]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STIVIR	17 (2) [1 - 3]	100 (18) [1 - 60]	67 (3) [3 - 3]	33 (10) [10 - 10]	0 (0) [0 - 0]
Forbs					
ACHMIL	33 (1) [1 - 1]	43 (1) [1 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANEPAT	4 (1) [1 - 1]	4 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTMIC	29 (1) [1 - 1]	35 (1) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTPAR	25 (3) [1 - 10]	17 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
ARECON	4 (1) [1 - 1]	9 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTDRA	13 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]
ARTLON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	8 (1) [1 - 1]	26 (1) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTADS	0 (0) [0 - 0]	9 (1) [1 - 1]	67 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTFAL	8 (2) [1 - 3]	22 (1) [1 - 1]	67 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]
CERARV	0 (0) [0 - 0]	9 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIL	21 (1) [1 - 3]	35 (1) [1 - 3]	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
COMUMB	8 (1) [1 - 1]	22 (1) [1 - 1]	67 (1) [1 - 1]	33 (1) [1 - 1]	100 (1) [1 - 1]
DALPUR	4 (1) [1 - 1]	13 (2) [1 - 3]	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
ECHANG	0 (0) [0 - 0]	4 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	100 (1) [1 - 1]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	AGRSMI-BOUGRA	AGRSMI-STIVIR	AGRSPI-AGRSMI	AGRSPI-BOUGRA	AGRSPI-CARFIL
# Sites	N = 24	N = 23	N = 3	N = 3	N = 1
Forbs Continued					
HEDHIS	13 (4) [1 - 10]	17 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
HELANN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
HELNUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
IVAAXI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINAUS	21 (1) [1 - 1]	26 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
LITINC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
LYGJUN	8 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
OPUPOL	83 (2) [1 - 3]	48 (2) [1 - 3]	100 (1) [1 - 1]	0 (0) [0 - 0]	100 (1) [1 - 1]
OXYLAM	0 (0) [0 - 0]	4 (3) [3 - 3]	33 (1) [1 - 1]	67 (1) [1 - 1]	100 (1) [1 - 1]
PENALB	25 (1) [1 - 1]	22 (1) [1 - 1]	67 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
PETCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
PHLHOO	71 (3) [1 - 30]	43 (2) [1 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
PLAPAT	46 (1) [1 - 1]	26 (1) [1 - 3]	0 (0) [0 - 0]	67 (2) [1 - 3]	100 (10) [10 - 10]
PSOARG	4 (1) [1 - 1]	57 (1) [1 - 3]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
PSOTEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
RUMCRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMIS	4 (1) [1 - 1]	17 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMOL	13 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPHCOC	71 (2) [1 - 3]	70 (1) [1 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]
STEMED	4 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	67 (1) [1 - 1]	100 (1) [1 - 1]
STERUN	0 (0) [0 - 0]	4 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	0 (0) [0 - 0]	26 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
VICAME	33 (1) [1 - 1]	52 (1) [1 - 3]	100 (2) [1 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]
ZIGVEN	8 (2) [1 - 3]	22 (1) [1 - 3]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
Ferns & Allied Taxa				0 (0) [0 - 0]	0 (0) [0 - 0]
SELDEN	75 (44) [1 - 80]	39 (31) [1 - 90]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
WOOORE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	AGRSPI-POASEC N = 7	ANDSCO-CARFIL N = 9	ARTLON/ORYHYM N = 4	CALLON-CARPEN N = 9	DESCES/X N = 1
Shrubs					
ARTCAN	14 (1) [1 - 1]	22 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
ARTFRI	100 (5) [1 - 20]	67 (4) [1 - 10]	0 (0) [0 - 0]	22 (2) [1 - 3]	0 (0) [0 - 0]
ARTTRI	14 (3) [3 - 3]	11 (10) [10 - 10]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
CERLAN	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
CHRNAU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (2) [1 - 3]	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	29 (1) [1 - 1]	56 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
JUNHOR	0 (0) [0 - 0]	22 (1) [1 - 1]	0 (0) [0 - 0]	11 (3) [3 - 3]	0 (0) [0 - 0]
RHUTRI	0 (0) [0 - 0]	56 (1) [1 - 3]	0 (0) [0 - 0]	22 (2) [1 - 3]	0 (0) [0 - 0]
ROSACI	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSARK	43 (1) [1 - 1]	44 (6) [1 - 10]	25 (1) [1 - 1]	44 (7) [3 - 10]	100 (10) [10 - 10]
ROSAXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
YUCGLA	14 (3) [3 - 3]	56 (7) [1 - 20]	0 (0) [0 - 0]	33 (5) [1 - 10]	0 (0) [0 - 0]
Graminoids					
AGRCRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRDAS	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
AGROPY	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSCA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	14 (1) [1 - 1]	11 (1) [1 - 1]	0 (0) [0 - 0]	33 (11) [1 - 30]	100 (20) [20 - 20]
AGRSPI	100 (47) [10 - 60]	67 (3) [1 - 10]	0 (0) [0 - 0]	22 (1) [1 - 1]	0 (0) [0 - 0]
ANDSCO	0 (0) [0 - 0]	100 (50) [10 - 80]	25 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]
ARIPUR	0 (0) [0 - 0]	11 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BOUGRA	43 (1) [1 - 1]	89 (3) [1 - 10]	0 (0) [0 - 0]	56 (7) [1 - 30]	0 (0) [0 - 0]
BROJAP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	22 (11) [1 - 20]	0 (0) [0 - 0]
BROTEC	43 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
BUCDAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	14 (3) [3 - 3]	78 (6) [1 - 10]	50 (2) [1 - 3]	100 (40) [3 - 90]	0 (0) [0 - 0]
CALMON	0 (0) [0 - 0]	0 (0) [0 - 0]	25 (1) [1 - 1]	22 (16) [1 - 30]	0 (0) [0 - 0]
CARFIL	86 (6) [1 - 20]	89 (19) [3 - 40]	0 (0) [0 - 0]	44 (13) [3 - 20]	0 (0) [0 - 0]
CARPEN	14 (10) [[illegible] - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (23) [10 - 30]	0 (0) [0 - 0]
CARROI	0 (0) [[illegible] - 0]	11 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARSTE	0 (0) [[illegible] - 0]	11 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	AGRSPI-POASEC N = 7	ANDSCO-CARFIL N = 9	ARTLON-ORYHYM N = 4	CALLON-CARPEN N = 9	DESCES/X N = 1
Graminoids Continued					
DESCES	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (30) [30 - 30]
DISSPI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISSTR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESOCT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
KOECRI	100 (12) [1 - 30]	78 (5) [1 - 30]	0 (0) [0 - 0]	67 (5) [1 - 20]	0 (0) [0 - 0]
MUHCUS	14 (1) [1 - 1]	56 (10) [1 - 20]	0 (0) [0 - 0]	22 (6) [1 - 10]	0 (0) [0 - 0]
PHRCOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAARI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAJUN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
POAPRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (10) [10 - 10]
POASEC	71 (4) [1 - 10]	22 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
POAXXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (10) [10 - 10]
SPAGRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPAPEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
STICOM	71 (6) [3 - 20]	78 (3) [1 - 10]	0 (0) [0 - 0]	44 (13) [1 - 20]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STIVIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	22 (2) [1 - 3]	100 (1) [1 - 1]
Forbs					
ACHMIL	57 (1) [1 - 1]	22 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (1) [1 - 1]
ANEPAT	0 (0) [0 - 0]	22 (6) [1 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ANTMIC	43 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
ANTPAR	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARECON	29 (2) [1 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTDRA	29 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
ARTLON	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (14) [3 - 30]	11 (3) [3 - 3]	0 (0) [0 - 0]
ARTLUD	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTADS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ASTFAL	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
CERARV	71 (9) [1 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIL	57 (1) [1 - 1]	33 (1) [1 - 1]	0 (0) [0 - 0]	33 (1) [1 - 1]	0 (0) [0 - 0]
COMUMB	86 (3) [1 - 10]	33 (1) [1 - 1]	0 (0) [0 - 0]	44 (1) [1 - 1]	0 (0) [0 - 0]
DALPUR	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ECHANG	0 (0) [0 - 0]	11 ([illegible]) [3 - 3]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
ERIPAU	14 (1) [1 - 1]	[illegible] ([illegible]) [0 - 0]	50 (2) [1 - 3]	22 (1) [1 - 1]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	AGRSPI-POASEC	ANDSCO-CARFIL	ARTLON/ORYHYM	CALLON-CARPEN	DESCES/X
# Sites	N = 7	N = 9	N = 4	N = 9	N = 1
Forbs Continued					
HEDHIS	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
HELANN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
HELNUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
IVAAXI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINAUS	0 (0) [0 - 0]	44 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LITINC	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LYGJUN	14 (1) [1 - 1]	44 (1) [1 - 1]	0 (0) [0 - 0]	22 (1) [1 - 1]	0 (0) [0 - 0]
OPUPOL	29 (1) [1 - 1]	44 (2) [1 - 3]	0 (0) [0 - 0]	44 (2) [1 - 3]	0 (0) [0 - 0]
OXYLAM	14 (1) [1 - 1]	11 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
PENALB	14 (1) [1 - 1]	44 (2) [1 - 3]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
PETCAN	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
PHLHOO	14 (20) [20 - 20]	67 (6) [1 - 20]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
PLAPAT	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
PSOARG	14 (3) [3 - 3]	33 (1) [1 - 1]	0 (0) [0 - 0]	22 (6) [1 - 10]	0 (0) [0 - 0]
PSOTEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (10) [10 - 10]	0 (0) [0 - 0]
RUMCRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
SOLMIS	14 (1) [1 - 1]	33 (4) [1 - 10]	25 (1) [1 - 1]	11 (1) [1 - 1]	0 (0) [0 - 0]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (3) [3 - 3]
SPHCOC	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	22 (1) [1 - 1]	0 (0) [0 - 0]
STEMED	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STERUN	0 (0) [0 - 0]	0 (0) [0 - 0]	50 (2) [1 - 3]	11 (1) [1 - 1]	0 (0) [0 - 0]
THERHO	86 (3) [1 - 10]	22 (1) [1 - 1]	25 (1) [1 - 1]	56 (5) [1 - 10]	0 (0) [0 - 0]
VICAME	29 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (1) [1 - 1]	0 (0) [0 - 0]
ZIGVEN	14 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Ferns & Allied Taxa					
SELDEN	57 (58) [30 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]	11 (3) [3 - 3]	0 (0) [0 - 0]
WOOORE	14 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	JUNBAL/X N = 2	PHRAUS/X N = 1	SPAPEC-SPAGRA N = 3	STICOM-BOUGRA N = 13	STICOM-CARFIL N = 14
Shrubs					
ARTCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	23 (2) [1 - 3]	29 (2) [1 - 3]
ARTFRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	85 (4) [1 - 10]	100 (4) [1 - 10]
ARTTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	7 (1) [1 - 1]
CERLAN	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (1) [1 - 1]	23 (2) [1 - 3]	36 (2) [1 - 3]
CHRNAU	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
GUTSAR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	23 (1) [1 - 1]	64 (1) [1 - 1]
JUNHOR	100 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	23 (2) [1 - 3]	0 (0) [0 - 0]
RHUTRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ROSACI	50 (10) [10 - 10]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (2) [1 - 3]	0 (0) [0 - 0]
ROSARK	50 (20) [20 - 20]	100 (1) [1 - 1]	33 (3) [3 - 3]	8 (1) [1 - 1]	7 (1) [1 - 1]
ROSAXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SYMOCC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
YUCGLA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]
Graminoids					
AGRCRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (1) [1 - 1]
AGRDAS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	38 (1) [1 - 3]	50 (2) [1 - 3]
AGROPY	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSCA	50 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
AGRSMI	100 (6) [1 - 10]	0 (0) [0 - 0]	33 (3) [3 - 3]	38 (1) [1 - 3]	50 (3) [1 - 10]
AGRSPI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (1) [1 - 1]
ANDSCO	100 (30) [20 - 40]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	14 (1) [1 - 1]
ARIPUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (2) [1 - 3]
BOUGRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (28) [3 - 70]	86 (4) [1 - 20]
BROJAP	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
BROTEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]
BUCDAC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CALLON	50 (10) [10 - 10]	0 (0) [0 - 0]	33 (10) [10 - 10]	8 (3) [3 - 3]	7 (1) [1 - 1]
CALMON	100 (12) [3 - 20]	0 (0) [0 - 0]	33 (1) [1 - 1]	8 (30) [30 - 30]	0 (0) [0 - 0]
CARFIL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	54 (10) [1 - 60]	100 (16) [3 - 60]
CARPEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (3) [3 - 3]	0 (0) [0 - 0]
CARROI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
CARSTE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	54 (4) [1 - 10]	50 (2) [1 - 3]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community / # Sites	JUNBAL/X N = 2	PHRAUS/X N = 1	SPAPEC-SPAGRA N = 3	STICOM-BOUGRA N = 13	STICOM-CARFIL N = 14
Graminoids Continued					
DESCES	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISSPI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
DISSTR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
FESOCT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (3) [3 - 3]
JUNBAL	100 (35) [20 - 50]	100 (30) [30 - 30]	33 (30) [30 - 30]	0 (0) [0 - 0]	0 (0) [0 - 0]
KOECRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
MUHCUS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	85 (7) [1 - 30]	100 (6) [1 - 20]
PHRCOM	0 (0) [0 - 0]	100 (60) [60 - 60]	0 (0) [0 - 0]	8 (1) [1 - 1]	43 (4) [1 - 10]
POAARI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAJUN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POAPRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
POASEC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (1) [1 - 1]
POAXXX	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	38 (1) [1 - 1]	36 (1) [1 - 3]
SPAGRA	50 (1) [1 - 1]	100 (40) [40 - 40]	67 (60) [50 - 70]	0 (0) [0 - 0]	0 (0) [0 - 0]
SPAPEC	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (50) [50 - 50]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICOM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STICUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	100 (30) [1 - 70]	100 (38) [10 - 80]
STIVIR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
				15 (1) [1 - 1]	7 (1) [1 - 1]
Forbs					
ACHMIL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	23 (2) [1 - 3]	14 (1) [1 - 1]
ANEPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	14 (1) [1 - 1]
ANTMIC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	21 (1) [1 - 1]
ANTPAR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	31 (1) [1 - 1]	21 (1) [1 - 1]
ARECON	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTDRA	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]
ARTLON	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ARTLUD	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (1) [1 - 1]
ASTADS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	7 (1) [1 - 1]
ASTFAL	50 (3) [3 - 3]	0 (0) [0 - 0]	100 (1) [1 - 1]	0 (0) [0 - 0]	7 (1) [1 - 1]
CERARV	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	0 (0) [0 - 0]
CHRVIL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	54 (2) [1 - 10]	57 (1) [1 - 3]
COMUMB	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	21 (1) [1 - 1]
DALPUR	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]
ECHANG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
ERI[illegible]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	JUNBAL/X	PHRAUS/X	SPAPEC-SPAGRA	STICOM-BOUGRA	STICOM-CARFIL
# Sites	N = 2	N = 1	N = 3	N = 13	N = 14
Forbs Continued					
HEDHIS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	0 (0) [0 - 0]
HELANN	0 (0) [0 - 0]	100 (3) [3 - 3]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
HELNUT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
IVAAXI	0 (0) [0 - 0]	0 (0) [0 - 0]	33 (20) [20 - 20]	0 (0) [0 - 0]	0 (0) [0 - 0]
LINAUS	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (6) [1 - 10]	29 (1) [1 - 1]
LITINC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
LYGJUN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	21 (1) [1 - 1]
OPUPOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	77 (2) [1 - 10]	57 (3) [1 - 10]
OXYLAM	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]
PENALB	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	23 (1) [1 - 1]	57 (1) [1 - 1]
PETCAN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	14 (1) [1 - 1]
PHLHOO	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	38 (3) [1 - 10]	86 (2) [1 - 3]
PLAPAT	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	62 (2) [1 - 3]	7 (1) [1 - 1]
PSOARG	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	36 (1) [1 - 1]
PSOTEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
RUMCRI	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
SOLMIS	50 (1) [1 - 1]	0 (0) [0 - 0]	0 (0) [0 - 0]	15 (1) [1 - 1]	29 (1) [1 - 1]
SOLMOL	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	8 (1) [1 - 1]	0 (0) [0 - 0]
SPHCOC	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	77 (2) [1 - 3]	79 (1) [1 - 3]
STEMED	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
STERUN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
THERHO	100 (6) [1 - 10]	0 (0) [0 - 0]	100 (2) [1 - 3]	0 (0) [0 - 0]	14 (2) [1 - 3]
VICAME	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	31 (2) [1 - 3]	14 (1) [1 - 1]
ZIGVEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]
Ferns & Allied Taxa					
SELDEN	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	77 (60) [1 - 90]	64 (34) [1 - 90]
WOOORE	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	STICUR-STIVIR
# Sites	N = 9
Shrubs	
ARTCAN	78 (1) [1 - 3]
ARTFRI	89 (3) [1 - 10]
ARTTRI	0 (0) [0 - 0]
CERLAN	11 (10) [10 - 10]
CHRNAU	0 (0) [0 - 0]
CHRVIS	0 (0) [0 - 0]
GUTSAR	22 (1) [1 - 1]
JUNHOR	33 (2) [1 - 3]
RHUTRI	11 (1) [1 - 1]
ROSACI	11 (1) [1 - 1]
ROSARK	33 (9) [3 - 20]
ROSAXX	0 (0) [0 - 0]
SARVER	0 (0) [0 - 0]
SYMOCC	0 (0) [0 - 0]
YUCGLA	22 (2) [1 - 3]
Graminoids	
AGRCRI	0 (0) [0 - 0]
AGRDAS	44 (12) [1 - 40]
AGROPY	11 (3) [3 - 3]
AGRSCA	0 (0) [0 - 0]
AGRSMI	33 (1) [1 - 1]
AGRSPI	0 (0) [0 - 0]
ANDSCO	33 (1) [1 - 1]
ARIPUR	0 (0) [0 - 0]
BOUGRA	78 (7) [1 - 30]
BROJAP	0 (0) [0 - 0]
BROTEC	0 (0) [0 - 0]
BUCDAC	0 (0) [0 - 0]
CALLON	22 (25) [20 - 30]
CALMON	11 (1) [1 - 1]
CARFIL	56 (11) [3 - 20]
CARPEN	44 (2) [1 - 3]
CARROI	0 (0) [0 - 0]
CARSTE	33 (5) [1 - 10]

Appendix B-3 (cont.)

Herbaceous Community Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	STICUR-STIVIR
# Sites	N = 9
Graminoids Continued	
DESCES	0 (0) [0 - 0]
DISSPI	0 (0) [0 - 0]
DISSTR	0 (0) [0 - 0]
FESOCT	0 (0) [0 - 0]
JUNBAL	0 (0) [0 - 0]
KOECRI	89 (3) [1 - 10]
MUHCUS	22 (7) [3 - 10]
PHRCOM	0 (0) [0 - 0]
POAARI	0 (0) [0 - 0]
POAJUN	0 (0) [0 - 0]
POAPRA	0 (0) [0 - 0]
POASEC	33 (2) [1 - 3]
POAXXX	0 (0) [0 - 0]
SPAGRA	0 (0) [0 - 0]
SPAPEC	0 (0) [0 - 0]
STICOM	33 (2) [1 - 3]
STICUR	89 (39) [20 - 60]
STIVIR	67 (18) [1 - 70]
Forbs	
ACHMIL	44 (1) [1 - 1]
ANEPAT	0 (0) [0 - 0]
ANTMIC	22 (1) [1 - 1]
ANTPAR	33 (1) [1 - 1]
ARECON	22 (1) [1 - 1]
ARTDRA	11 (3) [3 - 3]
ARTLON	0 (0) [0 - 0]
ARTLUD	44 (2) [1 - 3]
ASTADS	0 (0) [0 - 0]
ASTFAL	22 (1) [1 - 1]
CERARV	33 (1) [1 - 1]
CHRVIL	33 (1) [1 - 1]
COMUMB	22 (1) [1 - 1]
DALPUR	22 (1) [1 - 1]
ECHANG	0 (0) [0 - 0]
ERIPAU	0 (0) [0 - 0]

Appendix B-3 (cont.)

Herbaceous Types Cover Constancy Table: Constancy (Average Abund) [Range, Minimum - Maximum]

Community	STICUR-STIVIR
# Sites	N = 9
Forbs Continued	
HEDHIS	11 (1) [1 - 1]
HELANN	0 (0) [0 - 0]
HELNUT	0 (0) [0 - 0]
IVAAXI	11 (1) [1 - 1]
LINAUS	11 (1) [1 - 1]
LITINC	11 (3) [3 - 3]
LYGJUN	22 (2) [1 - 3]
OPUPOL	33 (2) [1 - 3]
OXYLAM	11 (1) [1 - 1]
PENALB	0 (0) [0 - 0]
PETCAN	22 (2) [1 - 3]
PHLHOO	11 (1) [1 - 1]
PLAPAT	0 (0) [0 - 0]
PSOARG	67 (2) [1 - 3]
PSOTEN	0 (0) [0 - 0]
RUMCRI	0 (0) [0 - 0]
SOLMIS	11 (1) [1 - 1]
SOLMOL	0 (0) [0 - 0]
SPHCOC	11 (1) [1 - 1]
STEMED	0 (0) [0 - 0]
STERUN	0 (0) [0 - 0]
THERHO	22 (2) [1 - 3]
VICAME	22 (2) [1 - 3]
ZIGVEN	22 (1) [1 - 1]
Ferns & Allied Taxa	
SELDEN	67 (26) [3 - 40]
WOOORE	0 (0) [0 - 0]

APPENDIX C: Assignment of plots (site numbers in ECADS) to community types; arranged alphabetically within lifeform groupings.

Forested Community Types and Their Assigned Site Numbers:

1. JUNSCO/AGRSPI
   1. NHMT320392LR0096 2. NHMT320392LR0094 3. NHMT310593SC0053

2. JUNSCO/ORYMIC
   4. NHMT320392LR0097 5. NHMT320392LR0006 6. NHMT310593SC0015 7. NHMT320392LR0061 8. NHMT320390RD0004
   9. NHMT310593SC0017

3. PINCON/JUNCOM
   10. NHMT310493SC0006 11. NHMT310493SC0010

4. PINFLE/AGRSPI
   12. NHMT320392RD0005

5. PINPON/ARCUVA
   13. NHMT310493SC0004 14. NHMT310493SC0002

6. PINPON/AGRSPI
   15. NHMT310493SC0011 16. NHMT320392LR0069 17. NHMT320392LR0085 18. NHMT320392LR0103 19. NHMT310493SC0012
   20. NHMT320392LR0068 21. NHMT320392LR0083 22. NHMT320392RD0013 23. NHMT310490JL0073

7. PINPON/CARPEN
   24. NHMT320392LR0088 25. NHMT320392LR0089 26. NHMT310490JL0035 27. NHMT310390JL0062 28. NHMT310490JL0072

8. PINPON/FESIDA
   29. NHMT310493SC0005

9. PINPON/JUNHOR
   30. NHMT320392LR0100 31. NHMT320392LR0099 32. NHMT320392LR0101

10. PINPON/SYMOCC
   33. NHMT310490RD0048

11. PINPON-JUNSCO
   34. NHMT310590RD0022 35. NHMT310490JL0030 36. NHMT310490JL0043 37. NHMT310390JL0061 38. NHMT320392LR0102
   39. NHMT320392LR0080 40. NHMT310590RD0023 41. NHMT310390RD0029 42. NHMT310490JL0028 43. NHMT310490JL0037
   44. NHMT310390JL0060 45. NHMT320392RD0012 46. NHMT320392LR0081 47. NHMT320392LR0090

12. PSEMEN/AMEALN
   48. NHMT310493SC0013 49. NHMT310493SC0003

13. PSEMEN/SYMOCC
   50. NHMT310493S[illegible] 51. NHMT310493SC0014 52. NHMT310490RD0047

14. PSEMEN/VIOCAN
   53. NHMT310493SC[illegible]

APPENDIX C (cont.) Shrub Community Types and Their Assigned Site Numbers:

1. ARTCAN/AGRSMI
   1. NHMT310593SC0052   2. NHMT310490JL0044   3. NHMT320392LR0059   4. NHMT310590JL0011   5. NHMT310490JL0069
   6. NHMT320392LR0063

2. ARTCAN/STICOM
   7. NHMT310390RD0039   8. NHMT310490JL0047   9. NHMT310390JL0052   10. NHMT320392LR0086   11. NHMT310390RD0041
   12. NHMT310490JL0023   13. NHMT310390JL0048   14. NHMT320392LR0065   15. NHMT310390RD0045

3. ARTTRI/AGRSMI
   16. NHMT310490RD0002   17. NHMT310590JL0004   18. NHMT310590JL0007   19. NHMT310490JL0026   20. NHMT310490JL0029
   21. NHMT310390JL0058   22. NHMT310390RD0034   23. NHMT310390RD0032   24. NHMT310590JL0005   25. NHMT310490JL0025
   26. NHMT310490JL0042   27. NHMT310590RD0024   28. NHMT310490JL0074

4. ARTTRI/AGRSPI
   29. NHMT310390RD0036   30. NHMT310490JL0036   31. NHMT320392LR0004   32. NHMT310490JL0032   33. NHMT320392RD0003

5. ARTTRI/ATRCON
   34. NHMT310390RD0030   35. NHMT320392LR0005   36. NHMT320392LR0067   37. NHMT320392RD0007   38. NHMT320392LR0010

6. ARTTRI/FESSCA
   39. NHMT310390RD0027   40. NHMT310390RD0028

7. ATRNUT/AGRSMI
   41. NHMT320392LR0048   42. NHMT320390RD0003

8. ATRNUT/AGRSPI
   43. NHMT320392RD0017

9. ATRNUT/ERIPAU
   44. NHMT320392LR0047   45. NHMT320392LR0050   46. NHMT320392LR0052   47. NHMT320392LR0051

10. ATRNUT/SPOAIR
   48. NHMT320392RD0008

11. CERLAN/STICOM
   49. NHMT310590JL0002   50. NHMT320392RD0016   51. NHMT310490JL0038   52. NHMT320392LR0092   53. NHMT310390JL0049

12. ELECOM/X
   54. NHMT310590RD0017

13. JUNHOR/AGRDAS
   55. NHMT310593SC0005   56. NHMT310493SC0033   57. NHMT310593SC0044   58. NHMT310493SC0049   59. NHMT310593SC0024
   60. NHMT310493SC0036   61. NHMT310493SC0045

APPENDIX C (cont.) Shrub Community Types and Their Assigned Site Numbers Continued:

14. JUNHOR/ANDSCO

62. NHMT310590RD0012	63. NHMT310390RD0050	64. NHMT310490JL0068	65. NHMT320392LR0017	66. NHMT320392RD0009
67. NHMT320392LR0064	68. NHMT310590RD0021	69. NHMT310490JL0066	70. NHMT310490JL0070	71. NHMT320392RD0014
72. NHMT320392LR0003				

15. JUNHOR/CALLON

73. NHMT310493SC0039	74. NHMT310593SC0003	75. NHMT320392RD0015	76. NHMT310593SC0008

16. JUNHOR/JUNBAL

77. NHMT310593SC0004	78. NHMT310593SC0012	79. NHMT310493SC0046	80. NHMT310593SC0013

17. RHUTRI/AGRSPI

81. NHMT310390JL0057	82. NHMT320392LR0053	83. NHMT320392LR0098

18. SARVER/AGRSMI

84. NHMT310490JL0031	85. NHMT310493SC0035	86. NHMT310490JL0076

19. SARVER/ATRNUT

87. NHMT320392RD0002	88. NHMT310490JL0039	89. NHMT310390JL0059	90. NHMT320392LR0001	91. NHMT320392LR0066
92. NHMT310590RD0019	93. NHMT310390RD0038	94. NHMT310490JL0041	95. NHMT320392LR0008	96. NHMT320392LR0079

20. SHEARG/X

97. NHMT310593SC0021	98. NHMT310593SC0011

21. YUCGLA/X

99. NHMT320392LR0087

APPENDIX C (cont.) Herbaceous Community Types and Their Assigned Site Numbers:

1. AGRSMI-BOUGRA

1. NHMT310590RD0001	2. NHMT310590RD0020	3. NHMT310590JL0008	4. NHMT310590JL0010	5. NHMT310490JL0045
6. NHMT310593SC0002	7. NHMT310593SC0010	8. NHMT320392RD0004	9. NHMT320392RD0011	10. NHMT320392LR0002
11. NHMT310390JL0055	12. NHMT310590RD0018	13. NHMT310390RD0043	14. NHMT310590JL0009	15. NHMT310490JL0015
16. NHMT310593SC0055	17. NHMT310593SC0043	18. NHMT320392RD0006	19. NHMT320392LR0013	20. NHMT320392LR0016
21. NHMT310490JL0022	22. NHMT310390JL0050	23. NHMT310593SC0014	24. NHMT320390RD0008	

2. AGRSMI-STIVIR

25. NHMT310590RD0015	26. NHMT310590JL0012	27. NHMT310490JL0021	28. NHMT310390JL0053	29. NHMT310390JL0065
30. NHMT310593SC0054	31. NHMT310593SC0023	32. NHMT310590RD0016	33. NHMT320392LR0095	34. NHMT320392LR0055
35. NHMT310590JL0006	36. NHMT310490JL0016	37. NHMT310490JL0024	38. NHMT310390JL0064	39. NHMT310490JL0071
40. NHMT310593SC0016	41. NHMT320390RD0005	42. NHMT320392LR0011	43. NHMT320392LR0106	44. NHMT320392LR0084
45. NHMT310590JL0001	46. NHMT310490JL0027	47. NHMT310593SC0042		

3. AGRSPI-AGRSMI

48. NHMT310490JL0034	49. NHMT310493SC0007	50. NHMT310490JL0075

4. AGRSPI-BOUGRA

51. NHMT310493SC0008	52. NHMT320392LR0056	53. NHMT320392LR0012

5. AGRSPI-CARFIL

54. NHMT320392LR0015

6. AGRSPI-POASEC

55. NHMT310390RD0040	56. NHMT310390RD0049	57. NHMT310390JL0056	58. NHMT310493SC0015	59. NHMT310390RD0044
60. NHMT310390RD0051	61. NHMT320392LR0049			

7. ANDSCO-CARFIL

62. NHMT320390RD0010	63. NHMT320392LR0009	64. NHMT320392LR0014	65. NHMT320392LR0058	66. NHMT320392LR0093
67. NHMT310590RD0013	68. NHMT310590RD0033	69. NHMT320392LR0057	70. NHMT320392LR0082	

8. ARTLON/ORYHYM

71. NHMT310390RD0035	72. NHMT310493SC0040	73. NHMT310390RD0037	74. NHMT310493SC0047

9. CALLON-CARPEN

75. NHMT310590JL0003	76. NHMT310593SC0030	77. NHMT310493SC0037	78. NHMT320392LR0062	79. NHMT320392RD0010
80. NHMT310490JL0033	81. NHMT310593SC0031	82. NHMT320392LR0105	83. NHMT320392LR0054	

10. DESCES/X

84. NHMT310593SC0022

11. JUNBAL/X

85. NHMT310593SC0026	86. NHMT310593SC0012

12. PHRAUS/X

87. NHMT310493SC0038

APPENDIX C (cont.) Herbaceous Community Types and Their Assigned Site Numbers (Cont.)

13. SPAPEC-SPAGRA

88. NHMT310593SC0025	89. NHMT310493SC0050	90. NHMT310593SC0032

14. STICOM-BOUGRA

91. NHMT320392RD0001	92. NHMT320390RD0006	93. NHMT310390RD0042	94. NHMT310390JL0051	95. NHMT310593SC0006
96. NHMT310593SC0051	97. NHMT310590RD0014	98. NHMT310390RD0031	99. NHMT310490JL0046	100. NHMT310593SC0001
101. NHMT310593SC0007	102. NHMT310593SC0018	103. NHMT310493SC0048		

15. STICOM-CARFIL

104. NHMT310590RD0011	105. NHMT310490JL0020	106. NHMT310490JL0014	107. NHMT310490JL0019	108. NHMT320390RD0009
109. NHMT310390RD0046	110. NHMT320392LR0060	111. NHMT310490JL0040	112. NHMT310490JL0017	113. NHMT320390RD0007
114. NHMT310390JL0054	115. NHMT310490JL0067	116. NHMT310593SC0029	117. NHMT310390JL0063	

16. STICUR-STIVIR

118. NHMT310593SC0027	119. NHMT310593SC0041	120. NHMT310593SC0020	121. NHMT310593SC0009	122. NHMT310490JL0013
123. NHMT310493SC0034	124. NHMT310593SC0028	125. NHMT310593SC0019	126. NHMT310490JL0018	

APPENDIX D: Plant associations and community types occurring in Bureau of Land Management Havre, Phillips, Valley and Big Dry Resource Areas; listed by decreasing size of dominant lifeform and alphabetically within lifeform (includes their accompanying G- and S-ranks [S-rank for whole state, not merely study area]).

CONIFER-DOMINATED FOREST & WOODLANDS:	G-rank	S-rank
Abies lasiocarpa Series		
/Juniperus communis	5	3
/Linnaea borealis	5	5
Picea species Series		
/Cornus stolonifera (*C. sericea*)	3	3
/Equisetum arvense	4	4
/Juniperus communis	2	2
/Linnaea borealis	4	4
Juniperus scopulorum Woodland Series		
/Agropyron spicatum (Pseudoroegneria spicata)	4	4
/Oryzopsis micrantha	3	3
Pinus contorta Series		
/Juniperus communis	5	3
/Linnaea borealis	5	5
Pinus flexilis Woodland Series		
/Agropyron spicatum (*Pseudoroegneria spicata*)	4	4
Pinus ponderosa Forest Series		
/Amelanchier alnifolia	2	2
/Andropogon scoparius (Schizachyrium scoparium)	2	2
/Arctostaphylos uva-ursi	5	3
/Berberis repens	3	3
/Carex heliophila	3	3
/Festuca idahoensis	5	4
/Juniperus scopulorum	4	4
/Prunus virginiana	4	4
/Symphoricarpos occidentalis	3	3
Pinus ponderosa Woodland Series		
/Agropyron spicatum (Pseudoroegneria spicata)	4	4
/Andropogon spp.	2	2
/Juniperus horizontalis	3	3

APPENDIX D (cont.)

	G-rank	S-rank
Pseudotsuga menziesii Forest Series		
/Amelanchier alnifolia	2	2
/Arctostaphylos uva-ursi	4	4
/Berberis repens (Mahonia repens)	5	3
/Cornus canadensis	3	3
/Linnaea borealis	4	4
/Symphoricarpos occidentalis	3	3
/Viola canadensis	3	3
Pseudotsuga menziesii Woodland Series		
/Agropyron spicatum (Pseudoroegneria spicata)	5	4
/Andropogon scoparius (Schizachyrium scoparium)	1	1
/Juniperus scopulorum	3	3
/Muhlenbergia cuspidata	2	2
BROAD-LEAVED, MAINLY COLD-DECIDUOUS FORESTS:		
Fraxinus pennsylvanica/Prunus virginiana	3	3
Salix amygdaloides	3	3
Acer negundo/Prunus virginiana	3	3
Fraxinus pennsylvanica-Ulmus americana/Prunus virginiana	1	1
Populus deltoides/Cornus stolonifera (*C. sericea*)	4	4
Populus deltoides/ Herbaceous c.t.	5?	4?
Populus deltoides/ Recent Alluvial Bar	5?	5?
Populus trichocarpa/Cornus stolonifera (C. sericea)	4	4
SHRUBLANDS AND THICKETS:		
Artemisia cana/Agropyron (Pascopyrum) smithii	4	4
A. cana/Stipa comata	3	3
Artemisia tridentata/Agropyron (Pascopyrum) smithii	5	5
A. tridentata/Agropyron spicatum (Pseudoroegneria spicata)	5	5
A. tridentata-Atriplex confertifolia	4	4
A. tridentata-Atriplex nuttallii (A. gardneri)	3	3
A. tridentata/Festuca idahoensis	4	4
A. tridentata/Festuca scabrella	3	3
A. tridentata/Stipa comata	5	4
Atriplex confertifolia	5	3

APPENDIX D (cont.)

SHRUBLANDS AND THICKETS CONTINUED	G-rank	S-rank
Atriplex nuttallii (A.gardneri)/Agropyron (Pascopyrum) smithii	3	3
A. nuttallii (A. gardneri)/Sporobolus airoides	?	?
A. nuttallii (A. gardneri)/Eriogonum pauciflorum	?	?
Ceratoides (Krascheninnikovia) lanata/Stipa comata	3	3
Crataegus succulenta	2	2
Eleagnus angustifolia	SR	SR
Eleagnus commutata	2	2
Eleagnus commutata/Agropyron smithii	2	2
Juniperus horizontalis/Andropogon scoparius	4	4
J. horizontalis/Agropyron dasystachyum (Elymus lanceolatus ssp. *lanceolatus)*	3?	3?
J. horizontalis/Agropyron spicatum (*Pseudoroegneria spicata*)	3?	3?
J. *horizontalis/Calamovilfa longifolia*	3?	3?
J. horizontalis/Carex pensylvanica (C. inops)	4	4
J. horizontalis/Juncus balticus	4?	4?
Prunus virginiana	4	4
Rhus trilobata (R. aromatica)/Agropyron spicatum (Pseudoroegneria spicata)	4	4
R. trilobata (R. aromatica)/Calamovilfa longifolia	5	4
Rosa woodsii	4	4
Shepherdia argentea	4	4
Symphoricarpos occidentalis	4	4
Salix exigua	5	5
Salix lutea/Poa pratensis	4	4
Sarcobatus vermiculatus/Agropyron (Pascopyrum) smithii	4	4
S. vermiculatus-Atriplex nuttallii (A. gardneri)	4	3
Yucca glauca/Calamovilfa longifolia	4	4

APPENDIX D (cont.)

GRASSLANDS and FORB-DOMINATED COMMUNITIES	G-rank	S-rank
Agropyron (Pascopyrum) smithii	4	4
A. smithii-Bouteloua gracilis	5	4
A. smithii-Carex filifolia	4	4
A. smithii-Stipa viridula	4	4
Agropyron spicatum-A. smithii	5	4
A. spicatum-Bouteloua gracilis	5	4
A. spicatum-Calamovilfa longifolia	?	?
A. spicatum-Carex filifolia	4	4
A. spicatum-Muhlenbergia cuspidata	4	3
A. spicatum-Poa sandbergii	4	4
Agrostis stolonifera	5	5
Andropogon gerardii/Calamavilfa longifolia	3	2
Andropogon scoparius-Carex filifolia	4	3
A. scoparius-Muhlenbergia cuspidata	2	2
Artemisia longifolia	3	3
A. longifolia/Oryzopsis hymenoides	1?	1?
Calamovilfa longifolia/Carex heliophila	3	2
Carex aquatilis	5	4
Carex nebrascensis	4	4
Deschampsia cespitosa	4	4
Distichlis spicata	4	4
Eleocharis palustris	4	4
Festuca scabrella-Festuca idahoensis	5	5
Festuca idahoensis-Carex pensylvanica	3	3
Glycyrrhiza lepidota	?	?
Hordeum jubatum	4	4

APPENDIX D (cont.)

GRASSLANDS and FORB-DOMINATED COMMUNITIES (CONT.)	G-rank	S-rank
Juncus balticus	5	5
Phragmites australis	3	2
Poa pratensis	5	5
Scirpus acutus	5	5
Scirpus maritimus	4	4
Scirpus pungens	4	3
Spartina pectinata	3	3
Stipa comata-Bouteloua gracilis	5	5
Stipa comata-Calamovilfa longifolia	2?	2?
Stipa curtiseta-Stipa viridula	?	?
Typha latifolia	5	5