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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 monitoring. 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 to complete the classification over the full range of ecological conditions and to conduct 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 environment were studied using 125 vegetation plots sampled in a 12.5 million acre (50,000 km^2) area of predominantly mixed-grass prairie in 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 for each community type sampled (and 54 additional types documented in the literature) are provided.

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.

ACKNOWLEDGEMENTS

All financial and personnel support for this study were provided by the Montana Natural Heritage Program and the Montana State Library. Many resource managers, particularly USDI Bureau of Land Management, USDA Soil Conservation Service, and USDI Bureau of Indian Affairs personnel, provided assistance in locating field sites.

The authors would particularly like to thank Peter Achuff, Lisa Schassberger, David Genter, Margaret Beer, and Cedron Jones for their reviews and feedback during the development of this classification. Robert Ament provided conscientious assistance during field work. Appreciation is also extended to Dorinda Monson and Brooke Wineteer who helped prepare and clean the immense amount of data generated by this study.

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

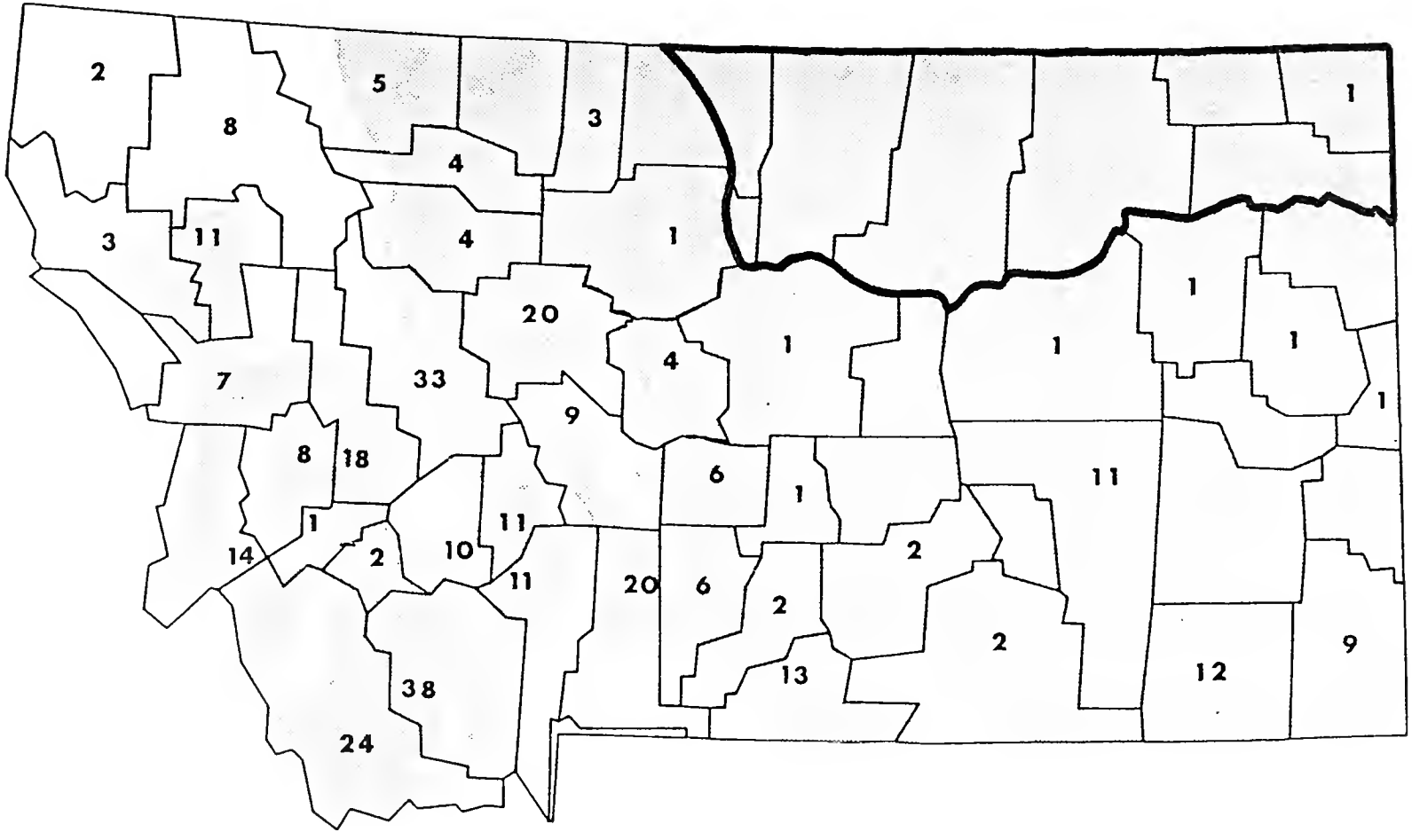


Figure 1.--Number of grassland plant community Element Occurrence Records (EOR's) in the Montana Natural Heritage Program database (as of 11/21/89), by county. The shaded area represents grassland ecoregions of Montana as defined by Omernik (1987). The northeastern Montana study area is delimited by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

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 dissertation describing grassland communities of south-central Montana has recently been completed by Steve Harvey, Montana State University, Bozeman.

Grassland and shrubland classifications that are available for the northeastern Montana study area include Branson et al. (1970), Mackie (1970), and Dusek (1971) but all of these studies cover relatively small geographic areas.

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 (1989).

In contrast to grasslands and shrublands, the classification of the forest types of Montana is largely complete. The upland forest classification provided by Pfister et al. (1977) has been refined and completed by the work of Cooper and Pfister (1981; 1985), Roberts et al. (1979), Roberts (1980), Hoffman and Hansen (1981), and Hansen and Hoffman (1985). Classifications of Montana riparian sites (including forested, shrub dominated, and herb dominated communities) are nearing completion (personal communication, Paul Hansen, Montana Riparian Association, School of Forestry, University of Montana, Missoula).

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. (1990). 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.

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 1900 feet on the Missouri

River at the North Dakota border to 6900 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 Physiographic 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. 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 sharply dissected badlands topography do occur, particularly along the Missouri River.

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 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 by Austin and Heyligers (1989). The method, as applied in the present study, involved selecting a set of USGS 7.5' 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 likely 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 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 indicator of nutrient regime.

e) Radiation regime was not considered in this process since it varies greatly at relatively fine geographic scales for different slopes and aspects, particularly in complex terrain. Plot selection in the field attempted to include a wide range of slope/aspect combinations in each sampling area.

A total of 175 plots were targeted for sampling based on the time available for this study (note: only 125 plots were ultimately sampled). 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 occurrence, areas severely 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. Within an area, one to five plots were chosen from different topographic positions 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 sample remnants of presettlement vegetation.

The data were recorded on a Natural Heritage Program Community Survey Form for each plot. These forms are basically the same as the general plot data and ocular plant species data forms used by the USDA Forest Service (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.

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. Classification was accomplished using two-way indicator species analysis (TWINSPAN; Hill 1979a) in the CEP MS-DOS computer package (Mohler 1987). 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 variables recorded in each plot and, in the case of DCCA,

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	

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 125 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).

Finally, species richness and diversity measures (Hill 1973) were calculated for each plot using the AID computer program (Overton et al. 1987). For those communities represented by more than one plot, means and standard errors of means for each measure were also calculated.

Taxonomic Considerations

Nomenclature follows Kartesz and Kartesz (1985). Scientific names of all species in this study, their code names, and their synonyms (from GPFA 1986) are listed in Appendix A.

Stipa spartea was observed on two of the study's 125 plots and was a dominant element at both of these sites. However, close examination of initial TWINSPAN and DCA patterns suggested close ecological similarity between S. spartea and S. comata within the study area. Because of this similarity, the two species were grouped under S. comata for all analyses reported here.

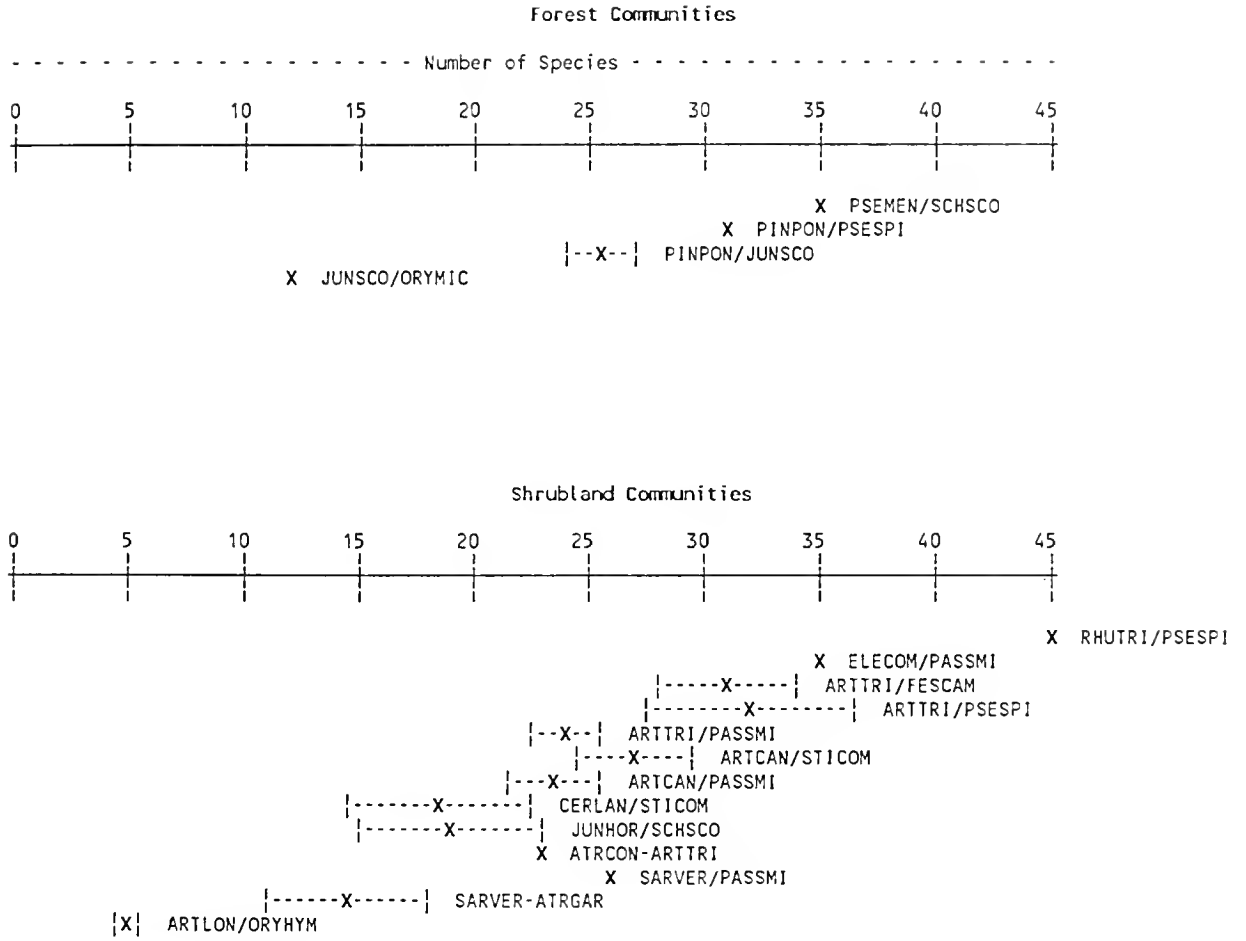


Figure 2.--Species richness (means and standard errors of means) of northeastern Montana plant communities.

Figure 3.--Plot scores (•) for DCA ordinations. The first axis is the horizontal axis and the second or third axis is the vertical axis. Numbers in diagrams indicate the number of multiple plots at that ordination position. X, Y, and Z denote situations with more than 9 plots at that ordination position.

3a - First and second axes; all 125 plots. X, Y, and Z represent 12, 54, and 14 plots at the respective ordination position.

3b - First and third axes; all 125 plots. X, Y, and Z represent 20, 27, and 21 plots at the respective ordination position.

3c - First and second axes; all 16 forest plots.

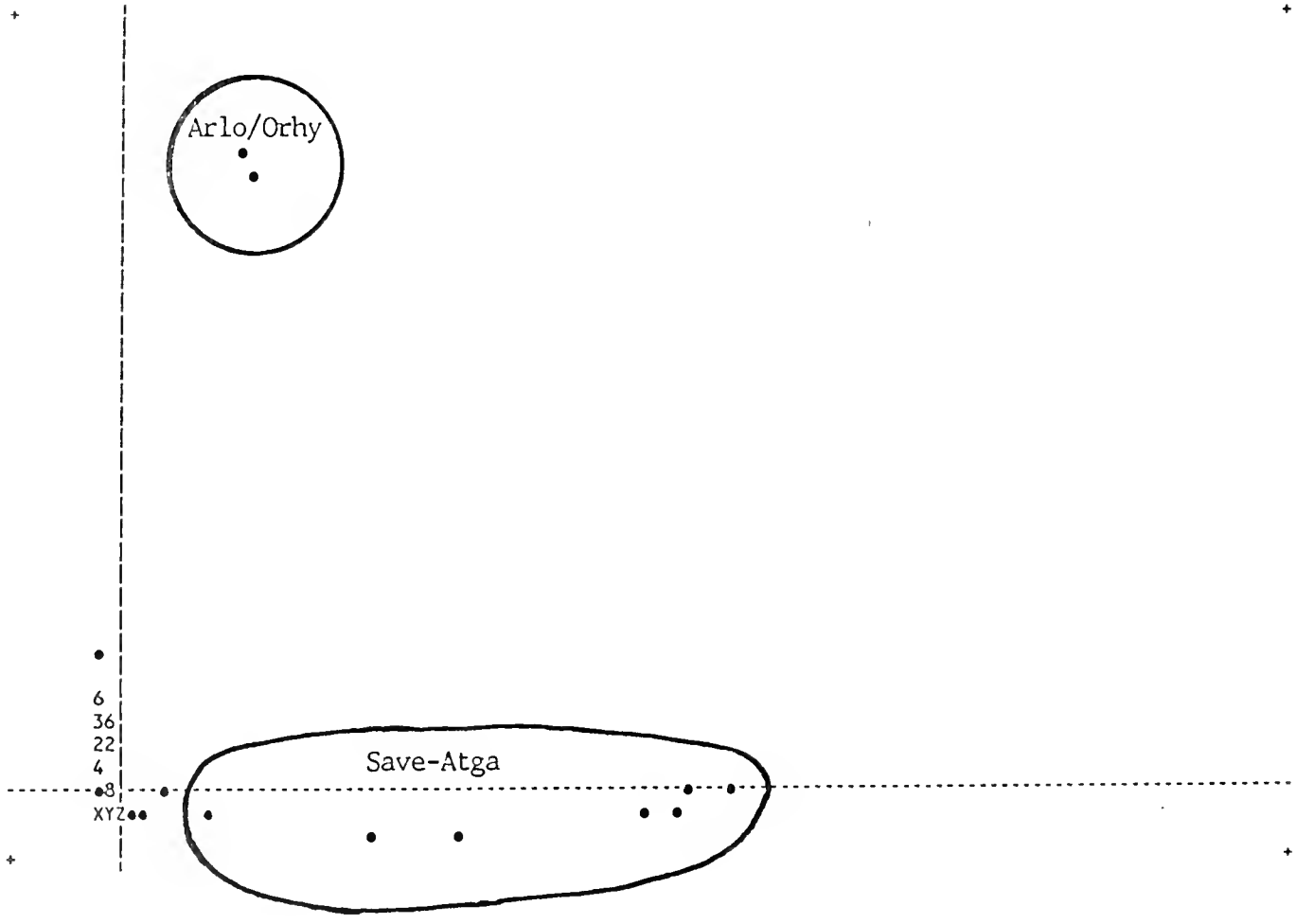
3d - First and second axes; all 53 shrubland plots. X represents 33 plots at that ordination position.

3e - First and third axes; all 53 shrubland plots. X, Y, and Z represent 20, 10, and 16 plots at the respective ordination position.

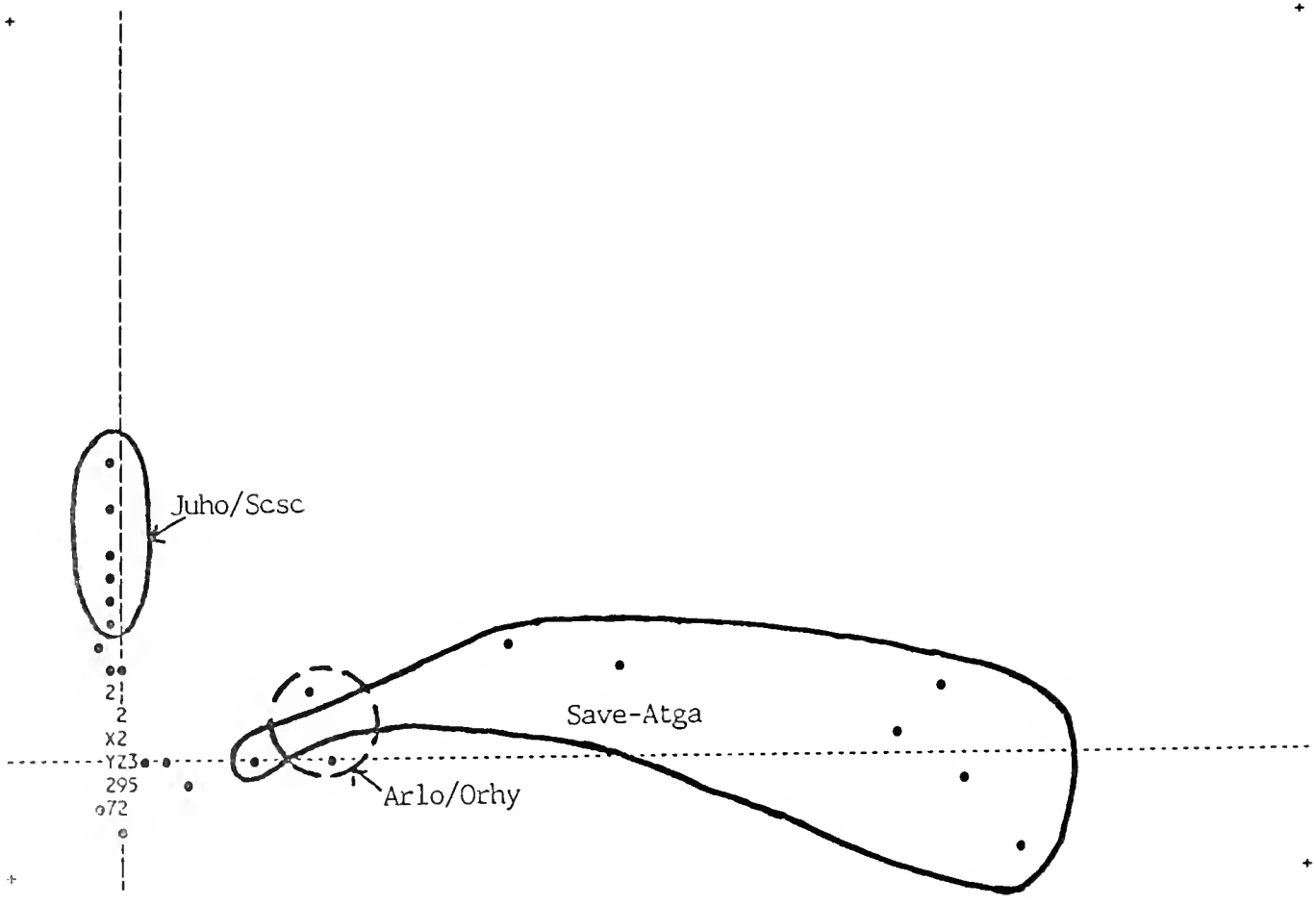
3f - First and second axes; 34 shrubland plots with ARTLON/ORYHYM, ARTTRI/FESCAM, SARVER/ATRGAR, SARVER/PASSMI, ATRCON-ARTTRI, and JUNHOR/SCHSCO plots removed.

3g - First and second axes; all 56 grassland plots. X represents 10 plots at that ordination position.

3h - First and second axes; 51 grassland plots with CALLON-CARINO and SCHSCO-MUHCUS plots removed.



(3a)



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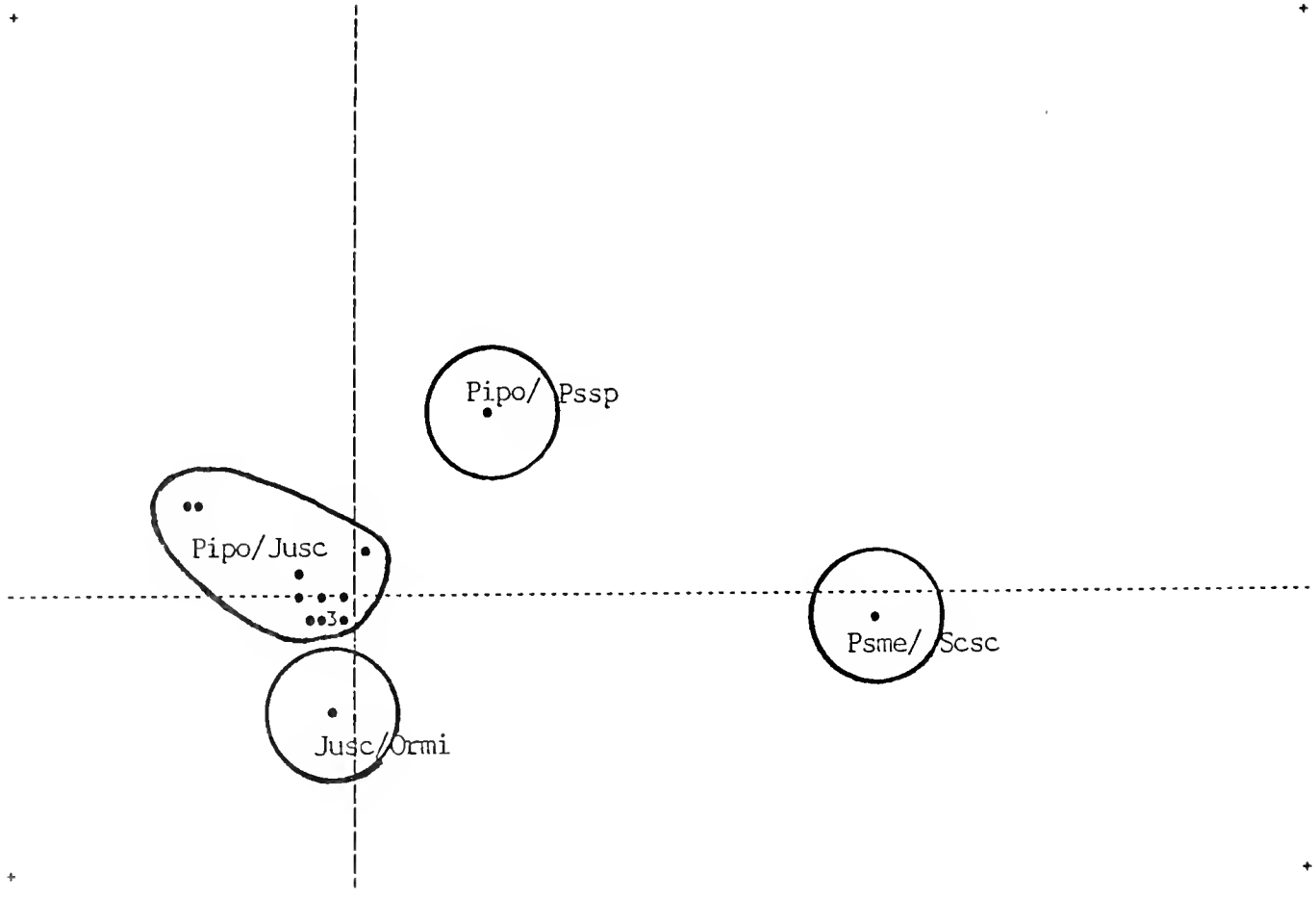

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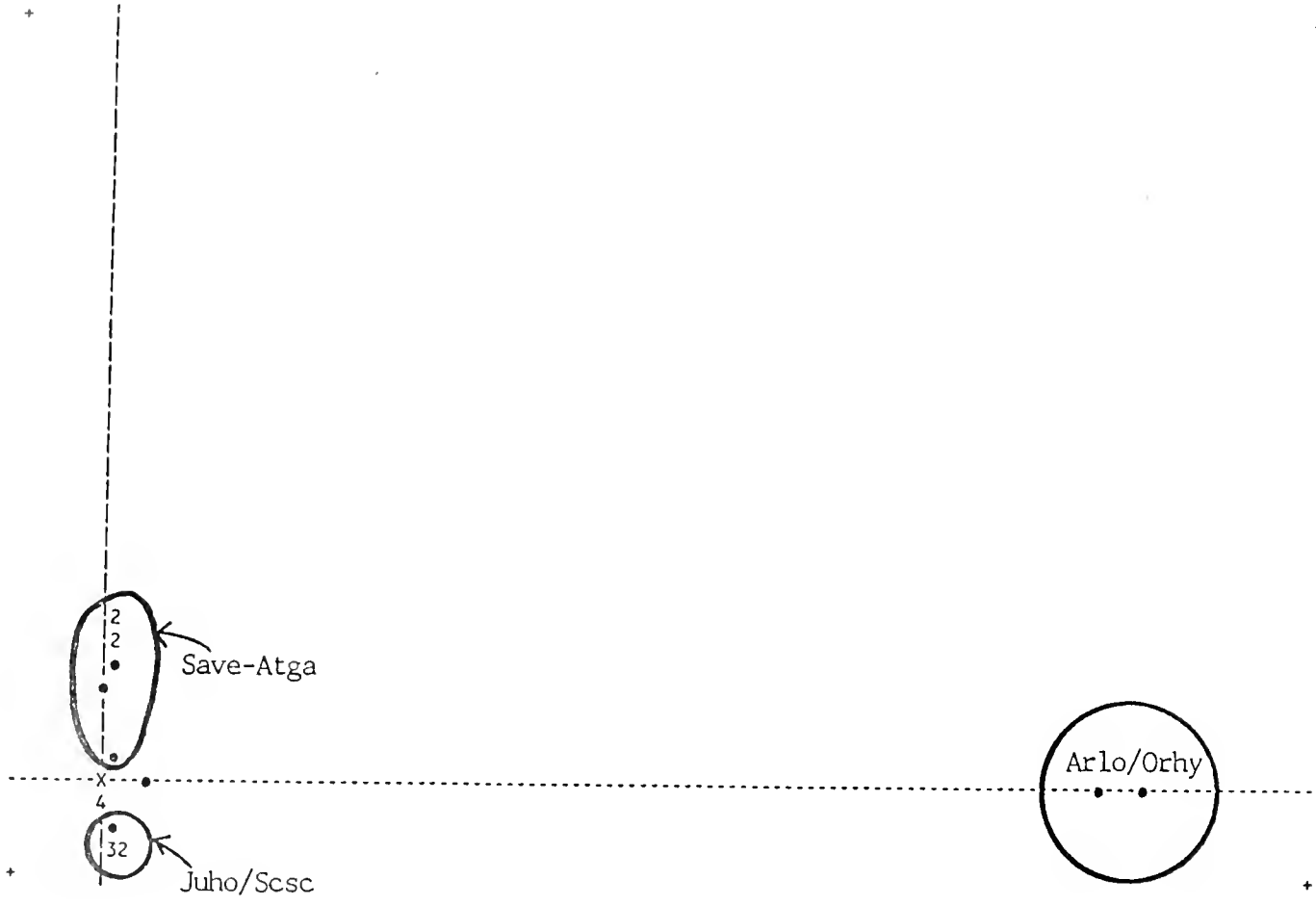

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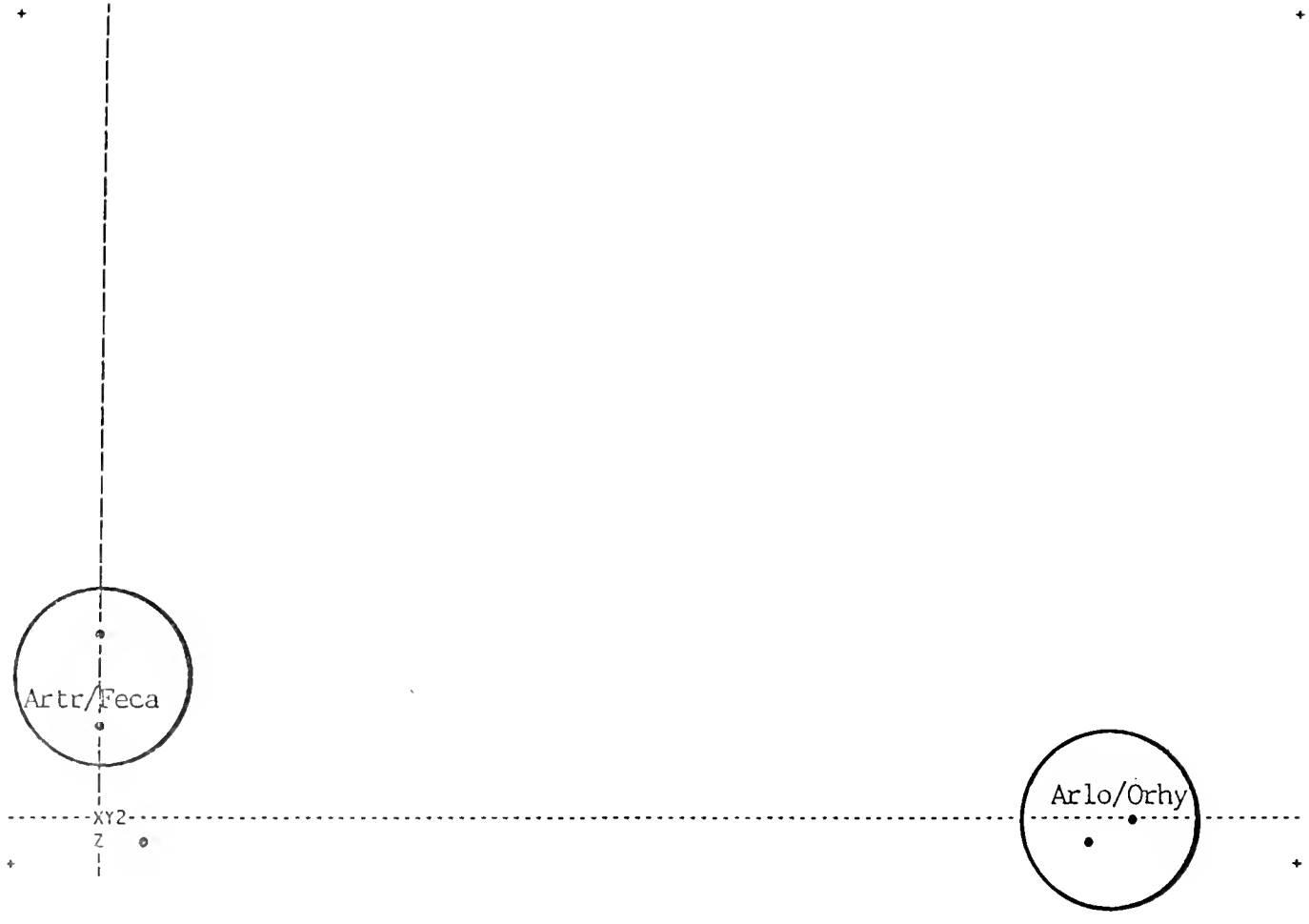

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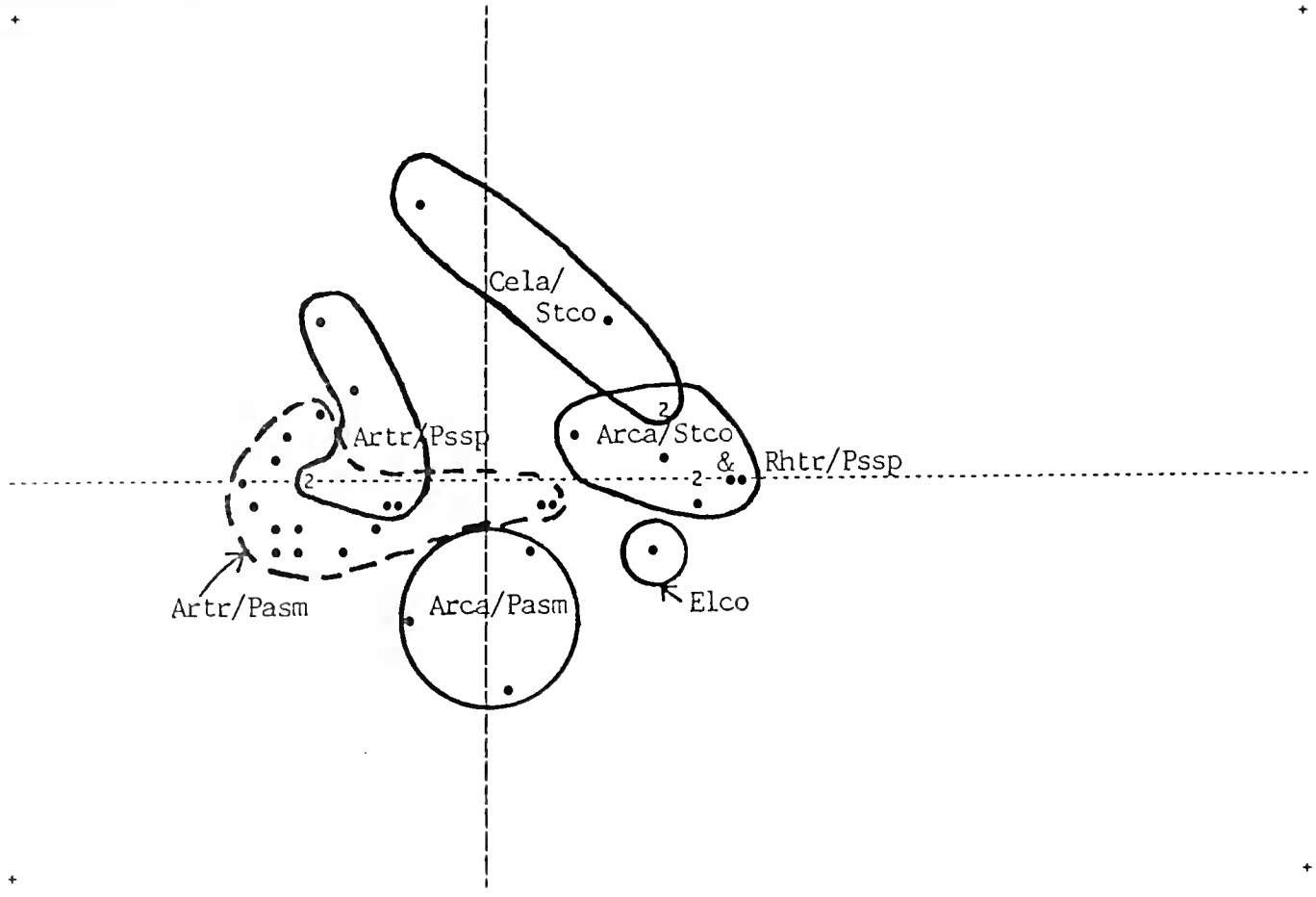
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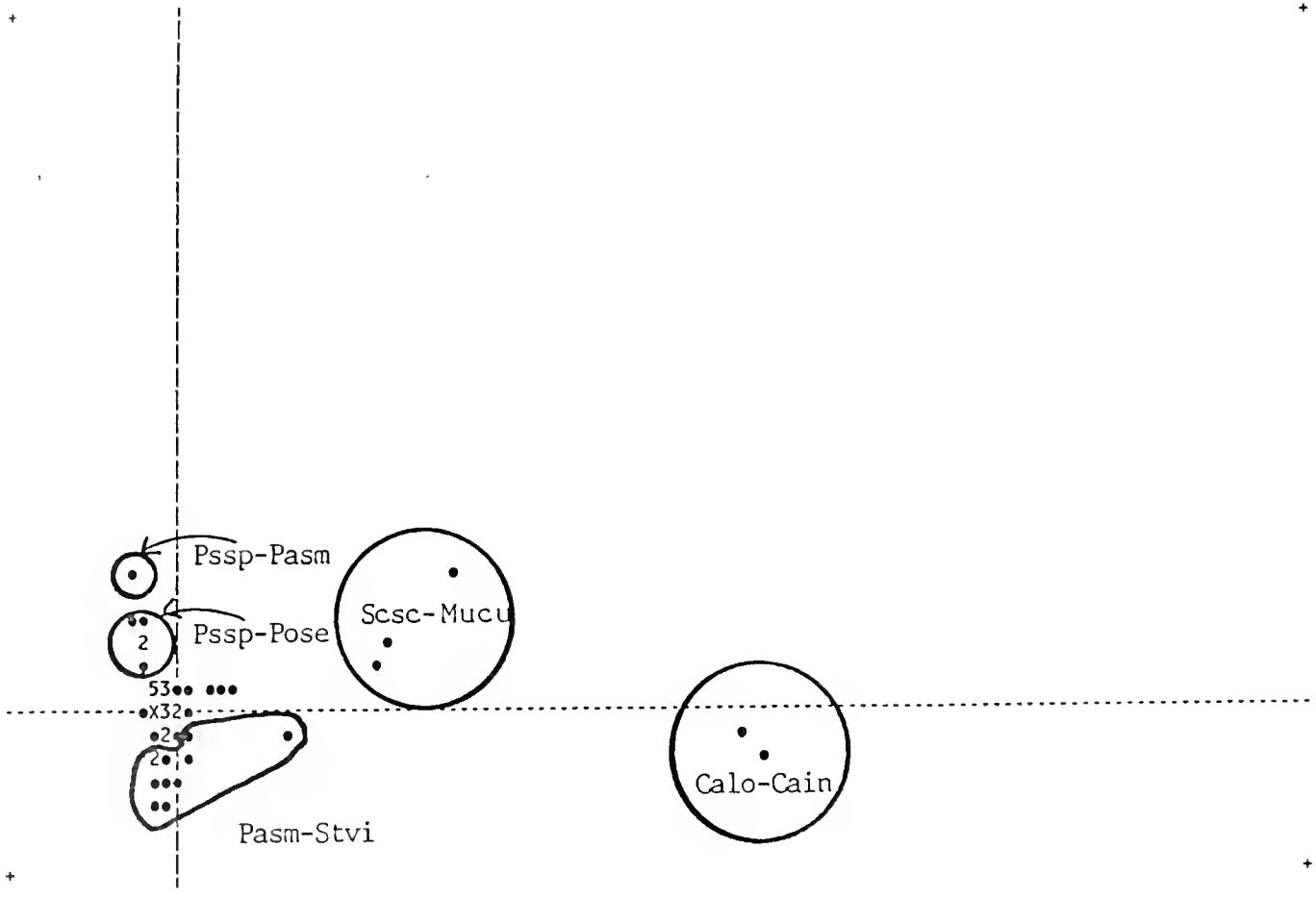
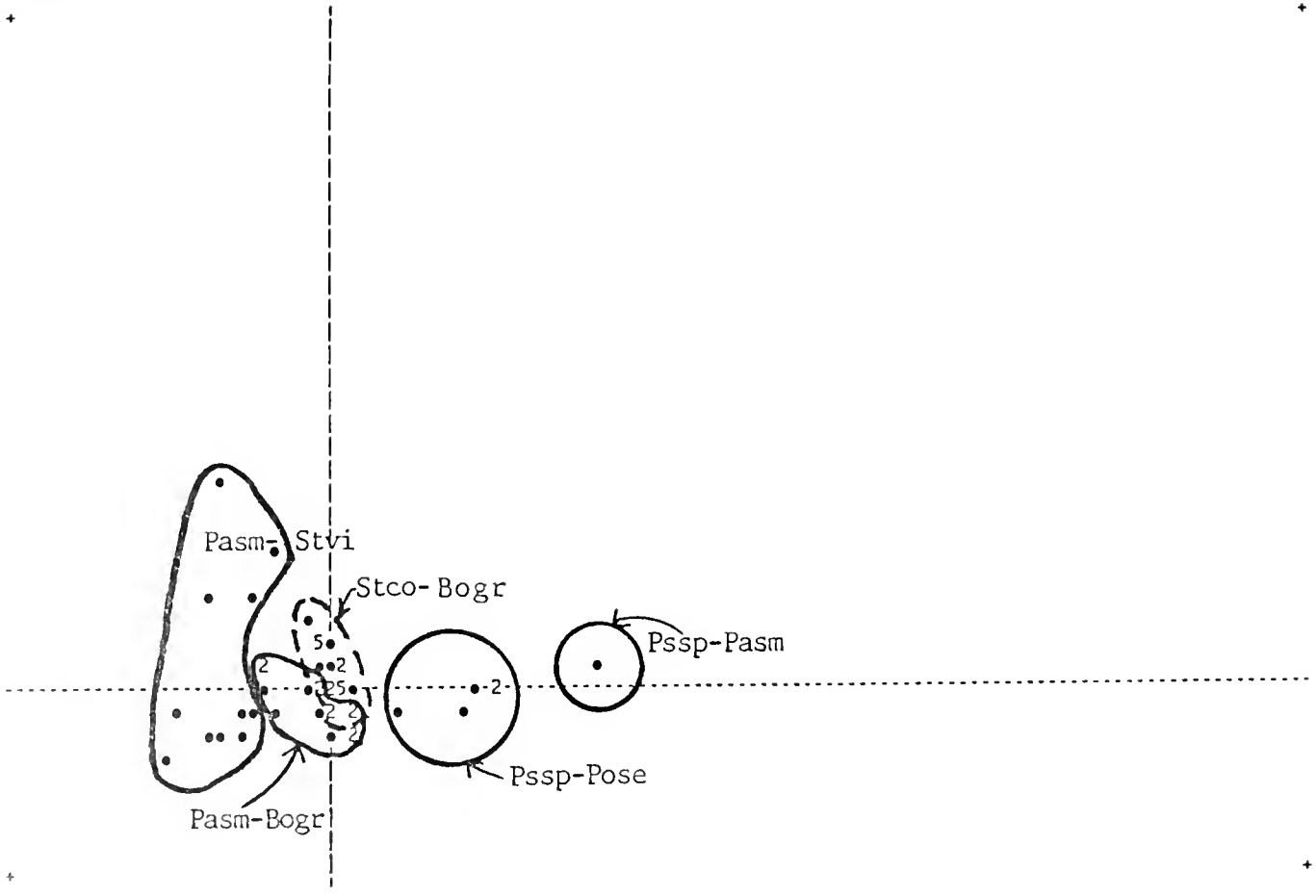


(3g)



(3h)

these patterns using DCCA (Appendix Figure H1) demonstrates that conditions relating to soil disturbance and slope instability (e.g., "badlands" and "blowout" sites) are primary gradients affecting compositional patterns among all plots.

Forest Plots

The four forest communities segregate distinctly within the DCA ordination (Figure 3c). The first two axes appear to reflect complex moisture/landform gradients (Appendix Figure H2). PINPON/JUNSCO occurs on relatively xeric sites on sedimentary soils (mostly in breaks) and PINPON/PSESPI and PSEMEN/SCHSCO occupy more mesic sites at higher elevations in mountains. JUNSCO/ORYMIC was found in a moderately mesic draw within sedimentary breaks.

Shrubland Plots

DCA ordination of all 53 shrubland plots indicates that 38 of the plots lie near the origin of axes 1 and 2 and that the ARTLON/ORYHYM and SARVER/ATRGAR "badlands" types and the JUNHOR/SCHSCO "blowout" type are outliers (Figure 3d). This is the same situation as described above for the first three axes of the DCA ordination of all 125 study plots. When axes 1 and 3 are shown (Figure 3e) the ARTTRI/FESCAM type characteristic of the highest elevations of shrubland occurrence in the study area appears as an outlier (on the third axis).

Removing all "badlands" and related communities (i.e., JUNHOR/SCHSCO, ATRCON-ARTTRI, SARVER/PASSMI, SARVER-ATRGAR, and ARTLON/ORYHYM) and the ARTTRI/FESCAM high elevation type produces the DCA ordination shown in Figure 3f. Plots within the remaining seven communities group together, for the most part, within the ordination space defined by axes 1 and 2.

DCCA interpretation of the overall patterns of vegetation and environment within the shrublands is presented in Appendix Figure H3. Axis 1 is strongly correlated to soil disturbance and slope instability with "badlands" communities having positive scores and communities typically on relatively stable surfaces with little erosion having negative scores. Axis 2 is characterized by a complex radiation/moisture/disturbance gradient with communities on sunny, xeric sites having higher scores than relatively shady, mesic sites. Also, the JUNHOR/SCHSCO "blowout" type has a low score on DCCA axis 2.

Grassland Plots

DCA ordination of all 56 grassland plots is presented in Figure 3g (axis 1 vs. axis 2). Most of the plots cluster near the origin. The SCHSCO-MUHCUS and CALLON-CARINO community types are outliers along the first axis. Both of these types are

characteristic of unstable "badlands" or "blowout" sites with much bare soil exposed. Removing these two communities results in the DCA ordination shown in Figure 3h (axis 1 vs. axis 2). The remaining five communities segregate within this ordination space. Most of the separation occurs along the first axis.

DCCA ordination of all 56 plots is presented in Appendix Figure H4. The first axis represents a complex disturbance/radiation/moisture gradient. Communities characterized by unstable soils, often high radiation indices, and xeric conditions have negative scores. In contrast, communities on relatively stable soils, on low radiation index and relatively mesic sites have positive scores.

Much less separation occurs along the second DCCA axis. This axis is interpretable as a moisture gradient with more mesic sites having higher scores than xeric sites (e.g., PASSMI-STIVIR > PASSMI-BOUGRA > STICOM-BOUGRA).

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).

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APPENDIX A

Plant List and Importance Values of All Species Identified in Study

The coded nomenclature is based on Kartesz and Kartesz (1985) while the synonyms in parentheses are based on GPFA (1986).

The importance values (IV) presented equal the species percentage presence (number plots of occurrence as percentage of all plots) times the species cover index (% cover of species summed over all plots of occurrence).

#OCCUR = number of plots of occurrence

Summary statistics:

Total number of species = 230
Total number of plots = 125
Total number of species occurrances = 2990

SPECIES	CODE	#OCCUR	IV
TREES			
FRAXINUS PENNSYLVANICA	FRAPEN	1	8
JUNIPERUS SCOPULORUM	JUNSCO	14	3808
PINUS CONTORTA	PINCON	1	8
PINUS PONDEROSA	PINPON	17	6045
PSEUDOTSUGA MENZIESII	PSEMEN	2	6
SHRUBS			
ARCTOSTAPHYLOS UVA-URSI	ARCUVA	1	8
ARTEMISIA CANA	ARTCAN	38	8390
ARTEMISIA (FILIFOLIA?)	ARTFIL	1	0
ARTEMISIA FRIGIDA	ARTFRI	95	18164
ARTEMISIA LONGIFOLIA	ARTLON	9	403
ARTEMISIA TRIDENTATA	ARTTRI	38	20049
ATRIPLEX CONFERTIFOLIA	ATRCON	2	17
ATRIPLEX GARDNERI (A. NUTTALLII)	ATRGAR	16	320
CERATOIDES LANATA	CERLAN	18	828
CHRYSOTHAMNUS NAUSEOSUS	CHRNAU	20	744
CHRYSOTHAMNUS VISCIDIFLORUS	CHRVIS	2	2
CORYPHANTHA VIVIPARA	CORVIV	11	48
ELEAGNUS COMMUTATA	ELECOM	1	56
GUTIERREZIA SAROTHRAE	GUTSAR	51	1040

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
JUNIPERUS COMMUNIS	JUNCOM	4	37
JUNIPERUS HORIZONTALIS	JUNHOR	8	1926
OPUNTIA POLYACANTHA	OPUPOL	79	4677
PRUNUS VIRGINIANA	PRUVIR	4	53
RHUS TRILOBATA (R. AROMATICA)	RHUTRI	17	218
RIBES CEREUM	RIBCER	2	2
ROSA ARKANSANA	ROSARK	29	1960
ROSA WOODSII	ROSWOO	6	38
SARCOBATUS VERMICULATUS	SARVER	11	1738
SHEPHERDIA ARGENTEA	SHEARG	1	0
SHEPHERDIA CANADENSIS	SHECAN	1	2
SUAEDA MOQUINII	SUAMOQ	5	20
SYMPHORICARPOS OCCIDENTALIS	SYMOCC	13	421
SYMPHORICARPOS OREOPHILUS	SYMORE	1	0
YUCCA GLAUCA	YUCGLA	13	421
FORBS			
ACHILLEA MILLEFOLIUM	ACHMIL	50	1400
AGOSERIS GLAUCA	AGOGLA	7	20
ALLIUM CERNUUM	ALLCER	6	14
ALLIUM TEXTILE	ALLTEX	43	740
ALYSSUM DESERTORUM	ALYDES	2	2
ANDROSACE SEPTENTRIONALIS	ANDSEP	8	26
ANEMONE MULTIFIDA	ANEMUL	9	32
ANTENNARIA MICROPHYLLA	ANTMIC	42	1109
ANTENNARIA PARVIFOLIA	ANTPAR	14	78
APOCYNUM ANDROSAEMIFOLIUM	APOAND	1	8
APOCYNUM CANNABINUM	APOCAN	2	2
ARABIS HOLBOELLII	ARAHOL	28	314
ARENARIA CONGESTA	ARECON	9	50
ARTEMISIA CAMPESTRIS	ARTCAM	11	48
ARTEMISIA DRACUNCULUS	ARTDRA	7	20
ARTEMISIA LUDOVICIANA	ARTLUD	16	230
ASTER FALCATUS	ASTFAL	32	474
ASTER FOLIACEUS	ASTFOL	1	0
ASTER LAEVIS	ASTLAE	1	0
ASTER SIBIRICUS	ASTSIB	1	0
ASTRAGALUS ADSURGENS	ASTADS	11	70
ASTRAGALUS AGRESTIS	ASTAGR	5	20
ASTRAGALUS BISULCATUS	ASTBIS	2	2
ASTRAGALUS DRUMMONDII	ASTDRU	4	6
ASTRAGALUS GILVIFLORUS	ASTGIL	12	58
ASTRAGALUS LOTIFLORUS	ASTLOT	4	6
ASTRAGALUS MISSOURIENSIS	ASTMIS	9	32

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
ASTRAGALUS PECTINATUS	ASTPEC	10	40
ASTRAGALUS PURSHII	ASTPUR	3	4
ATRIPLEX SUCKLEYI (A. DIOICA)	ATRSUC	5	324
BESSEYA WYOMINGENSIS	BESWYO	8	26
CALOCHORTUS NUTTALLII	CALNUT	6	14
CAMELINA MICROCARPA	CAMMIC	4	6
CAMPANULA ROTUNDIFOLIA	CAMROT	6	14
CERASTIUM ARVENSE	CERARV	15	672
CERASTIUM NUTANS	CERNUT	1	0
CHAMAESYCE SERPENS (EUPHORBIA SERPENS)	CHASER	1	0
CHENOPODIUM ALBUM	CHEALB	12	58
CHENOPODIUM DESICCATUM	CHEDES	1	0
CIRSIUM ARVENSE	CIRARV	2	2
CIRSIUM UNDULATUM	CIRUND	16	102
COLLOMIA LINEARIS	COLLIN	22	238
COMANDRA UMBELLATA	COMUMB	46	938
CONRINGIA ORIENTALIS	CONORI	1	0
CREPIS OCCIDENTALIS	CREOCC	7	20
CRYPTANTHA CELOSIOIDES	CRYCEL	3	4
DALEA CANDIDA	DALCAN	12	58
DALEA PURPUREA	DALPUR	18	166
DESCURAINIA PINNATA	DESPIN	2	2
DESCURAINIA RICHARDSONII	DESRIC	1	0
DESCURAINIA SOPHIA	DESSOP	4	6
EPILOBIUM PANICULATUM	EPIPAN	2	2
ERIGERON CAESPITOSUS	ERICAE	2	2
ERIGERON COMPOSITUS	ERICOM	1	0
ERIGERON OCHROLEUCUS	ERIOCH	11	48
ERIGERON PUMILUS	ERIPUM	22	238
ERIGERON SPECIOSUS	ERISPE	1	0
ERIOGONUM FLAVUM	ERIFLA	15	90
ERIOGONUM OVALIFOLIUM	ERIOVA	3	4
ERIOGONUM PAUCIFLORUM	ERIPAU	7	20
ERYSIMUM ASPERUM	ERYASP	1	0
ERYSIMUM INCONSPICUUM	ERYINC	27	292
EUPHORBIA SPATHULATA	EUPSPA	3	4
GAILLARDIA ARISTATA	GAIARI	17	116
GALIUM BOREALE	GALBOR	6	26
GAURA COCCINEA	GAUCOC	22	194
GEUM TRIFLORUM	GEUTRI	4	6
GLYCYRRHIZA LEPIDOTA	GLYLEP	4	6
GRINDELIA SQUARROSA	GRISQU	19	182
HEDEOMA HISPIDUM	HEDHIS	9	32
HELIANTHUS ANNUUS	HELANN	10	40

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
HETEROTHECA VILLOSA (CHRYSOPSIS VILLOSA)	HETVIL	47	1711
HEUCHERA RICHARDSONII	HEURIC	1	0
HYMENOPAPPUS FILIFOLIUS	HYMFIL	2	2
HYMENOXYS RICHARDSONII	HYMRIC	15	90
IVA AXILLARIS	IVAAXI	4	6
LACTUCA SERRIOLA	LACSER	10	40
LACTUCA TATARICA (L. OBLONGIFOLIA)	LACTAT	3	4
LAPPULA REDOWSKII	LAPRED	11	70
LAPPULA SQUARROSA (L. ECHINATA)	LAPSQU	1	0
LEPIDIUM DENSIFLORUM	LEPDEN	16	102
LEPIDIUM PERFOLIATUM	LEPPER	1	0
LESQUERELLA ALPINA	LESALP	5	10
LESQUERELLA LUDOVICIANA	LESLUD	3	4
LIATRIS PUNCTATA	LIAPUN	32	410
LINUM AUSTRALE	LINAUS	19	289
LINUM PERENNE	LINPER	8	42
LINUM RIGIDUM	LINRIG	2	2
LITHOSPERMUM INCISUM	LITINC	1	0
LOGFIA ARVENSIS	LOGARV	2	2
LOMATIUM FOENICULACEUM	LOMFOE	8	26
LOMATIUM MACROCARPUM	LOMMAC	7	20
LUPINUS ARGENTEUS	LUPARG	2	2
LUPINUS PUSILLUS	LUPPUS	3	4
LYGODESMIA JUNCEA	LYGJUN	4	6
MACHAERANTHERA CANESCENS	MACCAN	5	10
MACHAERANTHERA GRINDELIOIDES	MACGRI	3	4
MACHAERANTHERA PINNATIFIDA (HAPLOPAPPUS SPINULOSUS)	MACPIN	17	116
MELILOTUS ALBA	MELALB	3	4
MELILOTUS OFFICINALIS	MELOFF	41	918
MENTZELIA ALBICAULIS	MENALB	2	2
MINUARTIA PUNGENS	MINPUN	2	2
MIRABILIS LINEARIS	MIRLIN	1	0
MOEHRINGIA LATERIFLORA (ARENARIA LATERIFLORA)	MOELAT	1	0
MONARDA FISTULOSA	MONFIS	1	0
MUSINEON DIVARICATUM	MUSDIV	9	32
OENOTHERA NUTTALLII	OENNUT	1	0
OROBANCHE FASCICULATA	OROFAS	8	26
ORTHOCARPUS LUTEUS	ORTLUT	7	20
OXYTROPIS CAMPESTRIS	OXYCAM	8	26
OXYTROPIS LAMBERTII	OXYLAM	8	42
OXYTROPIS SERICEA	OXYSER	8	26

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
OXYTROPIS SPLENDENS	OXYSPL	1	0
PENSTEMON ALBIDUS	PENALB	36	590
PENSTEMON NITIDUS	PENNIT	17	116
PICRADENIOPSIS OPPOSITIFOLIA	PICOPP	3	4
PHACELIA LINEARIS	PHALIN	17	116
PHLOX ALYSSIFOLIA	PHLALY	1	0
PHLOX HOODII	PHLHOO	57	2440
PLANTAGO PATAGONICA	PLAPAT	33	1214
POLYGALA ALBA	POLALB	1	0
POLYGONUM MONSPELIENSIS (P. AVICULARE)	POLMON	1	0
POLYGONUM DOUGLASII	POLDOU	2	2
POLYGONUM RAMOSISSIMUM	POLRAM	4	6
POTENTILLA GRACILIS	POTGRA	2	2
POTENTILLA PENSYLVANICA	POTPEN	19	144
PSORALEA ARGOPHYLLA	PSOARG	35	826
PSORALEA ESCULENTA	PSOESC	2	2
PSORALEA LANCEOLATA	PSOLAN	1	0
PULSATILLA PATENS (ANEMONE PATENS)	PULPAT	8	147
RATIBIDA COLUMNIFERA	RATCOL	16	102
SALSOLA AUSTRALIS (S. IBERICA)	SALAUS	1	0
SEDUM LANCEOLATUM	SEDLAN	2	2
SENECIO CANUS	SENCAN	9	32
SILENE DRUMMONDII	SILDRU	1	0
SILENE SCOULERI	SILSCO	2	2
SISYMBRIUM ALTISSIMUM	SISALT	3	4
SISYRINCHIUM MONTANUM	SISMON	1	0
SMILACINA STELLATA	SMISTE	1	0
SOLANUM TRIFLORUM	SOLTRI	1	0
SOLIDAGO MISSOURIENSIS	SOLMIS	27	346
SOLIDAGO MOLLIS	SOLMOL	4	6
SPHAERALCEA COCCINEA	SPHCOC	65	2080
STELLARIA MEDIA	STEMED	1	2
STEPHANOMERIA RUNCINATA	STERUN	12	58
TARAXACUM OFFICINALE	TAROFF	31	384
TETRANEURIS ACAULIS (HYMENOXYS ACAULIS)	TETACA	5	10
THERMOPSIS RHOMBIFOLIA	THERHO	30	720
THLASPI ARVENSE	THLARV	1	0
TRADESCANTIA OCCIDENTALIS	TRAOCC	1	0
TRAGOPOGON DUBIUS	TRADUB	41	672
TRIODANIS LEPTOCARPA	TRILEP	2	2
VICIA AMERICANA	VICAME	50	1100
ZIGADENUS VENENOSUS	ZIGVEN	14	106

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
GRAMINOIDS			
AGROPYRON CRISTATUM	AGRCRI	6	14
AGROSTIS SCABRA	AGRSCA	3	4
ARISTIDA PURPUREA	ARIPUR	9	50
BOUTELOUA GRACILIS	BOUGRA	78	40466
BROMUS HORDEACEUS (B. MOLLIS)	BROHOR	1	0
BROMUS JAPONICUS	BROJAP	15	90
BROMUS TECTORUM	BROTEC	8	58
CALAMOVILFA LONGIFOLIA	CALLON	20	2464
CAREX ELEOCHARIS	CARELE	42	5292
CAREX FILIFOLIA	CARFIL	65	24466
CAREX FOENEA	CARFOE	1	0
CAREX INOPS (C. HELIOPHILA)	CARINO	24	4272
CAREX ROSSII	CARROS	1	0
DISTICHLIS SPICATA	DISSPI	3	32
ELYMUS ELYMOIDES (SITANION HYSTRIX)	ELYELY	10	40
ELYMUS GLAUCUS	ELYGLA	1	0
ELYMUS LANCEOLATUS (AGROPYRON DASYSTACHYUM)	ELYLAN	29	4559
ELYMUS TRACHYCAULIS (AGROPYRON CANINUM)	ELYTRA	1	0
FESTUCA CAMPESTRIS (F. SCABRELLA)	FESCAM	2	208
FESTUCA IDAHOENSIS	FESIDA	2	17
JUNCUS BALTICUS	JUNBAL	1	2
KOELERIA MACRANTHA (K. PYRAMIDATA)	KOEMAC	96	36672
MUHLENBERGIA CUSPIDATA	MUHCUS	27	1966
ORYZOPSIS HYMENOIDES	ORYHYM	5	20
ORYZOPSIS MICRANTHA	ORYMIC	3	50
PASCOPYRUM SMITHII (AGROPYRON SMITHII)	PASSMI	74	66363
POA ARIDA	POAARI	2	49
POA CUSICKII	POACUS	2	2
POA GLAUCIFOLIA	POAGLA	1	0
POA NEVADENSIS (P. JUNCIFOLIA)	POANEV	2	2
POA PRATENSIS	POAPRA	3	4
POA SECUNDA (P. SANDBERGII)	POASEC	67	9862
PSEUDOROEGNERIA SPICATA (AGROPYRON SPICATUM)	PSESPI	38	24837

APPENDIX A (continued)

SPECIES	CODE	#OCCUR	IV
SCHIZACHYRIUM SCOPARIUM (ANDROPOGON SCOPARIUS)	SCHSCO	17	1979
SPOROBOLUS CRYPTANDRUS	SPOCRY	3	4
STIPA COMATA	STICOM	70	80164
STIPA SPARTEA	STISPA	2	160
STIPA VIRIDULA	STIVIR	37	9516
VULPIA OCTOFLORA (FESTUCA OCTOFLORA)	VULOCT	4	6
FERNS/ALLIES			
CRYPTOGRAMMA CRISPA	CRYCRI	1	0
SELAGINELLA DENSA	SELDEN	56	106758
WOODSIA OREGANA	WOOORE	4	37

APPENDIX B

LIST AND KEYS TO PLANT COMMUNITIES OF NORTHEASTERN MONTANA

In addition to the 24 community types sampled in this study, all 78 community types that have been documented in northeastern Montana are included in this list and key.

Table B1.--List of northeastern Montana plant communities. Highlighted types were sampled in this study. An asterisk indicates a newly described type.

UPLANDS

Forests and Woodlands (largely based on Roberts 1980 and Roberts et al. 1979)

Abies lasiocarpa/Juniperus communis
Abies lasiocarpa/Linnaea borealis
Juniperus scopulorum/Oryzopsis micrantha
Juniperus scopulorum/Pseudoroegneria spicata
Picea spp./Juniperus communis
Picea spp./Linnaea borealis
Pinus contorta/Juniperus communis
Pinus contorta/Linnaea borealis
Pinus ponderosa/Amelanchier alnifolia
Pinus ponderosa/Arctostaphylos uva-ursi
Pinus ponderosa/Carex inops
Pinus ponderosa/Festuca idahoensis
Pinus ponderosa/Juniperus horizontalis
Pinus ponderosa/Juniperus scopulorum
Pinus ponderosa/Mahonia repens
Pinus ponderosa/Pseudoroegneria spicata
Pinus ponderosa/Symphoricapos occidentalis
Pseudotsuga menziesii/Amelanchier alnifolia
Pseudotsuga menziesii/Arctostaphylos uva-ursi
Pseudotsuga menziesii/Cornus canadensis
Pseudotsuga menziesii/Juniperus scopulorum
Pseudotsuga menziesii/Linnaea borealis
Pseudotsuga menziesii/Mahonia repens
Pseudotsuga menziesii/Muhlenbergia cuspidata
Pseudotsuga menziesii/Pseudoroegneria spicata
* Pseudotsuga menziesii/Schizachyrium scoparium
Pseudotsuga menziesii/Symporicarpos occidentalis
Pseudotsuga menziesii/Viola canadensis

Shrublands

Artemisia cana/Pascopyrum smithii
Artemisia cana/Stipa comata
Artemisia longifolia/Oryzopsis hymenoides
Artemisia tridentata/Festuca campestris
Artemisia tridentata/Pascopyrum smithii
Artemisia tridentata/Pseudoroegneria spicata
Atriplex confertifolia - Artemisia tridentata
Ceratoides lanata/Stipa comata
* Eleagnus commutata/Pascopyrum smithii
Juniperus horizontalis/Schizachyrium scoparium
Rhus trilobata/Pseudoroegneria spicata
Sarcobatus vermiculatus - Atriplex gardneri
Sarcobatus vermiculatus/Pascopyrum smithii

Table B1.--(continued)

Grasslands

Calamovilfa longifolia/Carex inops
Pascopyrum smithii/Bouteloua gracilis
Pascopyrum smithii/Stipa viridula
Pseudoroegneria spicata/Bouteloua gracilis
Pseudoroegneria spicata/Muhlenbergia cuspidata
Pseudoroegneria spicata/Pascopyrum smithii
Pseudoroegneria spicata/Poa secunda
Schizachyrium scoparium/Muhlenbergia cuspidata
Stipa comata/Bouteloua gracilis

RIPARIAN (based on Hansen et al. 1990)

Forests and Woodlands

Acer negundo/Prunus virginiana
Fraxinus pennsylvanica/Prunus virginiana
Pinus ponderosa/Prunus virginiana
Populus angustifolia/Cornus sericea
Populus deltoides/Cornus sericea
Salix amygdaloides

Shrublands

Crataegus succulenta
Prunus virginiana
Rosa woodsii
Salix exigua
Shepherdia argentea
Symphoricarpos occidentalis

Graminoidlands and Forblands

Carex aquatilis
Carex nebrascensis
Carex rostrata
Distichlis spicata
Eleocharis palustris
Hordeum jubatum
Juncus balticus
Phalaris arundinacea
Phragmites australis
Polygonum amphibium
Salicornia rubra
Scirpus acutus
Scirpus maritimus
Scirpus pungens
Spartina pectinata
Typha latifolia

Table B2.--Key to northeastern Montana plant communities.

The following canopy coverage terms are used in the keys:

(1) "scarce" = less than 1% cover, versus "common" = greater than 1% cover;
(2) "poorly represented" = less than 5% cover, versus "well represented" = greater than 5% cover; and
(3) "abundant" = greater than 25% cover.

When applying the key in the field the above definitions may need to be adjusted to the next lower coverage class in cases where species cover is thought to be unusually low (e.g., due to dense shading, heavy litter accumulation, heavy grazing).

UPLAND FORESTS AND WOODLANDS KEY
(largely based on Roberts 1980 and Roberts et al. 1979)

Series Key

1. Abies lasiocarpa present and reproducing successfully
   ABILAS SERIES
1. Abies lasiocarpa not the indicated climax -- 2

2. Picea spp. present and reproducing successfully
   PICEA SPP. SERIES
2. Picea spp. not the indicated climax -- 3

3. Pseudotsuga menziesii present and reproducing successfully
   PSEMEN SERIES
3. Pseudotsuga menziesii not the indicated climax -- 4

4. Pinus contorta present and reproducing more successfully than Pinus ponderosa, or Pinus contorta the only tree species present
   PINCON SERIES
4. Pinus ponderosa reproducing more successfully than Pinus contorta, or Pinus ponderosa or Juniperus scopulorum the only tree species present -- 5

5. Pinus ponderosa present
   PINPON SERIES
5. Pinus ponderosa absent; Juniperus scopulorum the indicated climax
   JUNSCO SERIES

Table B2.--(continued)

Key to the Abies lasiocarpa Communities

1. Linnaea borealis common
   ABILAS/LINBOR
1. Linnaea borealis scarce or absent; Juniperus communis or Festuca idahoensis the dominant undergrowth
   ABILAS/JUNCOM

Key to the Picea spp. Communities

1. Linnaea borealis common
   PICEA SPP./LINBOR
1. Linnaea borealis scarce or absent; Juniperus communis the dominant undergrowth
   PICEA SPP./JUNCOM

Key to the Pseudotsuga menziesii Communities

1. Cornus canadensis common
   PSEMEN/CORCAN
1. Cornus canadesis scarce or absent -- 2

2. Linnaea borealis common
   PSEMEN/LINBOR
2. Linnaea borealis scarce or absent -- 3

3. At least two of the following three forbs present: Viola canadensis, Thalictrum occidentale, or Osmorhiza chilensis
   PSEMEN/VIOCAN
3. Not as above -- 4

4. Amelanchier alnifolia or Spiraea betulifolia well represented
   PSEMEN/AMEALN
4. Amelanchier alnifolia or Spiraea betulifolia poorly represented or absent -- 5

5. Mahonia repens common
   PSEMEN/MAHREP
5. Mahonia repens scarce or absent -- 6

6. Arctostaphylos uva-ursi well represented
   PSEMEN/ARCUVA
6. Arctostaphylos uva-ursi poorly represented or absent -- 7

7. Schizachyrium scoparium well represented
   PSEMEN/SCHSCO
7. Schizachyrium scoparium poorly represented or absent -- 8

Table B2.--(continued)

8. Muhlenbergia cuspidata well represented
   PSEMEN/MUHCUS
8. Muhlenbergia cuspidata poorly represented or absent -- 9

9. Juniperus scopulorum well represented
   PSEMEN/JUNSCO
9. Juniperus scopulorum poorly represented or absent -- 10

10. Symphoricarpos occidentalis well represented
    PSEMEN/SYMOCC
10. Symphoricarpos occidentalis poorly represented or absent; Pseudoroegneria spicata the dominant undergrowth
    PSEMEN/PSESPI

Key to the Pinus contorta Communities

1. Linnaea borealis common
   PINCON/LINBOR
1. Linnaea borealis scarce or absent; Juniperus communis or Arctostaphylos uva-ursi the dominant undergrowth
   PINCON/JUNCOM

Key to the Pinus ponderosa Communities

1. Amelanchier alnifolia well represented
   PINPON/AMEALN
1. Amelanchier alnifolia poorly represented or absent -- 2

2. Arctostaphylos uva-ursi well represented
   PINPON/ARCUVA
2. Arctostaphylos uva-ursi poorly represented or absent -- 3

3. Mahonia repens well represented
   PINPON/MAHREP
3. Mahonia repens poorly represented or absent -- 4

4. Juniperus scopulorum well represented
   PINPON/JUNSCO
4. Juniperus scopulorum poorly represented or absent -- 5

5. Symphoricarpos occidentalis well represented
   PINPON/SYMOCC
5. Symphoricarpos occidentalis poorly represented or absent -- 6

6. Graminoids well represented -- 7
6. Graminoids poorly represented or absent; Juniperus horizontalis or Rhus trilobata common
   PINPON/JUNHOR

Table B2.--(continued)

7. Festuca campestris common
   PINPON/FESIDA
7. Festuca campestris scarce or absent -- 8

8. Pseudoroegneria spicata well represented
   PINPON/PSESPI
8. Pseudoroegneria spicata poorly represented or absent
   PINPON/CARINO

Key to the Juniperus scopulorum Communities

1. Oryzopsis micrantha common
   JUNSCO/ORYMIC
1. Oryzopsis micrantha scarce or absent
   JUNSCO/PSESPI

UPLAND SHRUBLANDS/GRASSLANDS KEY

1. Herbaceous vegetation dominant; shrubs, if present, are widely scattered or are half-shrubs such as Artemisia frigida and Gutierrezia sarothrae -- 2
1. Woody plants well represented -- 10

2. Pascopyrum smithii well represented -- 3
2. Pascopyrum smithii poorly represented or absent -- 5

3. Pseudoroegneria spicata well represented
   PSESPI-PASSMI
3. Pseudoroegneria spicata poorly represented or absent -- 4

4. Stipa viridula well represented
   PASSMI-STIVIR (including PASSMI clay flat type)
4. Stipa viridula poorly represented or absent
   PASSMI-BOUGRA (including PASSMI-CARFIL)

5. Pseudoroegneria spicata well represented -- 6
5. Pseudoroegneria spicata poorly represented or absent; Schizachyrium scoparium, Calamovilfa longifolia, Stipa comata, or Bouteloua gracilis dominant grasses -- 8

6. Muhlenbergia cuspidata well represented
   PSESPI-MUHCUS
6. Muhlenbergia cuspidata poorly represented or absent -- 7

7. Bouteloua gracilis well represented
   PSESPI-BOUGRA
7. Bouteloua gracilis poorly represented or absent; Poa secunda present
   PSESPI-POASEC (including PSESPI-CARFIL)

Table B2.--(continued)

8. Schizachyrium scoparium well represented
   SCHSCO-MUHCUS (including SCHSCO-CARFIL and CALLON-CARFIL)
8. Schizachyrium scoparium poorly represented or absent -- 9

9. Calamovilfa longifolia well represented
   CALLON-CARINO
9. Calamovilfa longifolia poorly represented or absent
   STICOM-BOUGRA (including STICOM-CARFIL)

10. Sarcobatus vermiculatus, Atriplex gardneri, or A. confertifolia well represented -- 11
10. Sarcobatus vermiculatus, Atriplex gardneri, or A. confertifolia poorly represented or absent -- 13

11. Atriplex confertifolia well represented
    ATRCON-ARTTRI
11. Atriplex confertifolia poorly represented or absent -- 12

12. Atriplex gardneri well represented
    SARVER-ATRGAR (including the ATRGAR and SARVER-ARTTRI types)
12. Atriplex gardneri poorly represented or absent
    SARVER/PASSMI

13. Artemisia cana, A. longifolia, or A. tridentata well represented -- 14
13. The above Artemisia species poorly represented or absent -- 19

14. Artemisia cana is the dominant Artemisia shrub species -- 15
14. Artemisia cana minor relative to A. longifolia or A. tridentata, or absent -- 16

15. Pascopyrum smithii well represented
    ARTCAN/PASSMI
15. Pascopyrum smithii poorly represented or absent
    ARTCAN/STICOM

16. Artemisia longifolia dominant
    ARTLON/ORYHYM
16. Artemisia longifolia minor or absent relative to Artemisia tridentata -- 17

17. Festuca campestris well represented
    ARTTRI/FESCAM
17. Festuca campestris poorly represented or absent -- 18

Table B2.--(continued)

18. Pseudoroegneria spicata well represented
ARTTRI/PSESPI
18. Pseudoroegneria spicata poorly represented or absent; Pascopyrum smithii well represented
ARTTRI/PASSMI

19. Rhus trilobata and Pseudoroegneria spicata well represented
RHUTRI/PSESPI
19. Rhus trilobata and Pseudoroegneria spicata poorly represented or absent -- **20**

20. Juniperus horizontalis well represented
JUNHOR/SCHSCO (including JUNHOR/CARINO)
20. Juniperus horizontalis poorly represented or absent -- **21**

21. Ceratoides lanata well represented
CERLAN/STICOM
21. Ceratoides lanata poorly represented or absent; Eleagnus commutata well represented
ELECOM/PASSMI

RIPARIAN KEY
(based on Hansen et al. 1989)

Key to Lifeforms

1. Trees common
Riparian Forest/Woodland Communities
1. Trees scarce or absent -- 2

2. Willow species common or nonwillow shrub species well represented
Riparian Shrubland Communities
2. Willow species scarce or absent and nonwillow shrub species poorly represented or absent -- 3

3. Graminoids abundant
Riparian Graminoid Communities
3. Graminoids not abundant; forbs well represented
Riparian Forbland Communities

Key to Riparian Forest/Woodland Communities

1. Pinus ponderosa present and reproducing successfully
PINPON/PRUVIR
1. Pinus ponderosa absent -- 2

Table B2.--(continued)

2. Fraxinus pennsylvanica common
   FRAPEN/PRUVIR
2. Fraxinus pennsylvanica scarce or absent -- 3

3. Acer negundo common
   ACENEG/PRUVIR
3. Acer negundo scarce or absent -- 4

4. Populus angustifolia with a greater canopy cover than either P. deltoides or Salix amygdaloides
   POPANG/CORSER
4. Populus angustifolia with less canopy cover than either P. angustifolia or Salix amygdaloides -- 5

5. Populus deltoides with a greater canopy cover than Salix amygdaloides
   POPDEL/CORSER
5. Populus deltoides with less canopy cover than Salix amygdaloides
   SALAMY

Key to Riparian Shrubland Communities

1. Shepherdia argentea well represented
   SHEARG
1. Shepherdia argentea poorly represented or absent -- 2

2. Salix exigua common
   SALEXI
2. Salix exigua scarce or absent -- 3

3. Artemisia cana well represented
   ARTCAN/PASSMI
3. Artemisia cana poorly represented or absent -- 4

4. Sarcobatus vermiculatus well represented
   SARVER/PASSMI
4. Sarcobatus vermiculatus poorly represented or absent -- 5

5. Crataegus succulenta or C. douglasii, individually or in combination, well represented
   CRASUC
5. Crataegus succulenta or C. douglasii, individually or in combination, poorly represented or absent -- 6

6. Prunus virginiana well represented
   PRUVIR
6. Prunus virginiana poorly represented or absent -- 7

Table B2.--(continued)

7. Rosa woodsii well represented
   ROSWOO
7. Rosa woodsii poorly represented or absent; Symphoricarpos occidentalis well represented
   SYMOCC

Key to Riparian Graminoid Communities

1. Scirpus spp. well represented -- 2
1. Scirpus spp. poorly represented or absent -- 4

2. Scirpus acutus or S. validus, individually or in combination, well represented
   SCIACU
2. Scirpus acutus or S. validus, individually or in combination, poorly represented or absent -- 3

3. Scirpus maritimus well represented
   SCIMAR
3. Scirpus maritimus poorly represented or absent; S. pungens well represented
   SCIPUN

4. Phragmites australis well represented
   PHRAUS
4. Phragmites australis poorly represented or absent -- 5

5. Spartina pectinata or S. gracilis, individually or in combination, well represented
   SPAPEC
5. Spartina pectinata or S. gracilis, individually or in combination, poorly represented or absent -- 6

6. Eleocharis palustris or E. acicularis, individually or in combination, well represented
   ELEPAL
6. Eleocharis palustris or E. acicularis, individually or in combination, poorly represented or absent -- 7

7. Carex spp. well represented -- 8
7. Carex spp. poorly represented or absent -- 10

8. Carex rostrata, C. vesicaria, or C. atherodes, individually or in combination, well represented
   CARROS
8. Carex rostrata, C. vesicaria, or C. atherodes, individually or in combination, poorly represented or absent -- 9

Table B2.--(continued)

9. Carex aquatilis or C. lenticularis, individually or in combination, well represented
CARAQU
9. Carex aquatilis or C. lenticularis, individually or in combination, poorly represented or absent; Carex nebrascensis well represented
CARNEB

10. Juncus balticus well represented
JUNBAL
10. Juncus balticus poorly represented or absent -- **11**

11. Phalaris arundinacea well represented
PHAARU
11. Phalaris arundinacea poorly represented or absent -- **12**

12. Distichlis spicata well represented
DISSPI
12. Distichlis spicata poorly represented or absent -- **13**

13. Pascopyrum smithii well represented
PASSMI
13. Pascopyrum smithii poorly represented or absent; Hordeum jubatum well represented
HORJUB

Key to Riparian Forbland Communities

1. Typha latifolia or T. angustifolia well represented
TYPLAT
1. Typha latifolia or T. angustifolia poorly represented or absent -- **2**

2. Polygonum amphibium well represented
POLAMP
2. Polygonum amphibium poorly represented or absent; Salicornia rubra well represented
SALRUB

APPENDIX C

Average Cover and Constancy for Community Types

Occurrences of each species in each community type are indicated by two values. The first value indicates the mean cover (in percent) for plots in which the species was present. The second value is the percentage of the total number of plots (in the community type) in which the species was found.

In these tables, type number codes are defined as follows:

Forest Communities (Table C1)

TYPE NO. 1 = PSEUDOTSUGA MENZIESII/SCHIZACHYRIUM SCOPARIUM
TYPE NO. 2 = PINUS PONDEROSA/PSEUDOROEGNERIA SPICATA
TYPE NO. 3 = PINUS PONDEROSA/JUNIPERUS SCOPULORUM
TYPE NO. 4 = JUNIPERUS SCOPULORUM/ORYZOPSIS MICRANTHA

Shrubland Communities (Table C2)

TYPE NO. 5 = RHUS TRILOBATA/PSEUDOROEGNERIA SPICATA
TYPE NO. 6 = ELEAGNUS COMMUTATA/PASCOPYRUM SMITHII
TYPE NO. 7 = ARTEMISIA TRIDENTATA/FESTUCA CAMPESTRIS
TYPE NO. 8 = ARTEMISIA TRIDENTATA/PSEUDOROEGNERIA SPICATA
TYPE NO. 9 = ARTEMISIA TRIDENTATA/PASCOPYRUM SMITHII
TYPE NO. 10 = ARTEMISIA CANA/STIPA COMATA
TYPE NO. 11 = ARTEMISIA CANA/PASCOPYRUM SMITHII
TYPE NO. 12 = CERATOIDES LANATA/STIPA COMATA
TYPE NO. 13 = JUNIPERUS HORIZONTALIS/SCHIZACHYRIUM SCOPARIUM
TYPE NO. 14 = ATRIPLEX CONFERTIFOLIA-ARTEMISIA TRIDENTATA
TYPE NO. 15 = SARCOBATUS VERMICULATUS/PASCOPYRUM SMITHII
TYPE NO. 16 = SARCOBATUS VERMICULATUS-ATRIPLEX GARDNERI
TYPE NO. 17 = ARTEMISIA LONGIFOLIA/ORYZOPSIS HYMENOIDES

Grassland Communities (Table C3)

TYPE NO. 18 = PSEUDOROEGNERIA SPICATA-POA SECUNDA
TYPE NO. 19 = PSEUDOROEGNERIA SPICATA-PASCOPYRUM SMITHII
TYPE NO. 20 = PASCOPYRUM SMITHII-STIPA VIRIDULA
TYPE NO. 21 = PASCOPYRUM SMITHII-BOUTELOUA GRACILIS
TYPE NO. 22 = STIPA COMATA-BOUTELOUA GRACILIS
TYPE NO. 23 = SCHIZACHYRIUM SCOPARIUM-MUHLENBERGIA CUSPIDATA
TYPE NO. 24 = CALAMOVILFA LONGIFOLIA-CAREX INOPS

Table C1.--Forest communities.

SPECIES	TYPE NO:	1 (N = 1)		2 (N = 1)		3 (N =13)		4 (N = 1)	
		COV	CON	COV	CON	COV	CON	COV	CON
TREES									
FRAXINUS PENNSYLVANICA								10	100
JUNIPERUS SCOPULORUM						21	92	80	100
PINUS CONTORTA		10	100						
PINUS PONDEROSA		10	100	<1	100	33	100		
PSEUDOTSUGA MENZIESII		3	100			<1	8		
SHRUBS									
ARCTOSTAPHYLOS UVA-URSI									
ARTEMISIA CANA						4	23		
ARTEMISIA (FILIFOLIA?)						<1	8		
ARTEMISIA FRIGIDA		<1	100	3	100	2	54		
ARTEMISIA LONGIFOLIA						<1	15		
ARTEMISIA TRIDENTATA						<1	38		
ATRIPLEX CONFERTIFOLIA									
ATRIPLEX GARDNERI									
CERATOIDES LANATA									
CHRYSOTHAMNUS NAUSEOSUS						2	46		
CHRYSOTHAMNUS VISCIDIFLORUS									
CORYPHANTHA VIVIPARA									
ELEAGNUS COMMUTATA									
GUTIERREZIA SAROTHRAE						<1	38		
JUNIPERUS COMMUNIS								10	100
JUNIPERUS HORIZONTALIS									
OPUNTIA POLYACANTHA				<1	100	<1	69	<1	100
PRUNUS VIRGINIANA		10	100	3	100			3	100
RHUS TRILOBATA						<1	54	3	100
RIBES CEREUM		<1	100			<1	8		
ROSA ARKANSANA						3	31		
ROSA WOODSII		3	100						
SARCOBATUS VERMICULATUS									
SHEPHERDIA ARGENTEA									
SHEPHERDIA CANADENSIS		3	100						
SUAEDA MOQUINII									
SYMPHORICARPOS OCCIDENTALIS		3	100	20	100	<1	15		
SYMPHORICARPOS OREOPHILUS						<1	8		
YUCCA GLAUCA				3	100	<1	31		
FORBS									
ACHILLEA MILLEFOLIUM		<1	100	3	100	<1	54	<1	100
AGOSERIS GLAUCA									
ALLIUM CERNUUM						<1	15		
ALLIUM TEXTILE				<1	100	<1	69		
ALYSSUM DESERTORUM						<1	8		
ANDROSACE SEPTENTRIONALIS						<1	8		
ANEMONE MULTIFIDA						<1	8		
ANTENNARIA MICROPHYLLA						<1	54		
ANTENNARIA PARVIFOLIA						<1	15		
APOCYNUM ANDROSAEMIFOLIUM		10	100						
APOCYNUM CANNABINUM									
ARABIS HOLBOELLII						<1	23		
ARENARIA CONGESTA				<1	100				
ARTEMISIA CAMPESTRIS		<1	100			<1	8		
ARTEMISIA DRACUNCULUS		<1	100						
ARTEMISIA LUDOVICIANA				3	100	<1	15		
ASTER FALCATUS		<1	100	<1	100	<1	31		
ASTER FOLIACEUS									

Table C1.--(continued)

SPECIES	TYPE NO:	1		2		3		4	
		COV	CON	COV	CON	COV	CON	COV	CON
ASTER LAEVIS		<1	100						
ASTER SIBIRICUS		<1	100						
ASTRAGALUS ADSURGENS						<1	23		
ASTRAGALUS AGRESTIS						3	8		
ASTRAGALUS BISULCATUS									
ASTRAGALUS DRUMMONDII									
ASTRAGALUS GILVIFLORUS						<1	15		
ASTRAGALUS LOTIFLORUS									
ASTRAGALUS MISSOURIENSIS						<1	8		
ASTRAGALUS PECTINATUS									
ASTRAGALUS PURSHII									
ATRIPLEX SUCKLEYI									
BESSEYA WYOMINGENSIS						<1	15		
CALOCHORTUS NUTTALLII						<1	15		
CAMELINA MICROCARPA									
CAMPANULA ROTUNDIFOLIA		<1	100			<1	8		
CERASTIUM ARVENSE				10	100				
CERASTIUM NUTANS									
CHAMAESYCE SERPENS									
CHENOPODIUM ALBUM						<1	31		
CHENOPODIUM DESICCATUM									
CIRSIUM ARVENSE		<1	100						
CIRSIUM UNDULATUM		<1	100	<1	100				
COLLOMIA LINEARIS						<1	46		
COMANDRA UMBELLATA						<1	23		
CONRINGIA ORIENTALIS									
CREPIS OCCIDENTALIS						<1	15		
CRYPTANTHA CELOSIOIDES									
DALEA CANDIDA						<1	15		
DALEA PURPUREA						<1	8		
DESCURAINIA PINNATA						<1	8		
DESCURAINIA RICHARDSONII									
DESCURAINIA SOPHIA									
EPILOBIUM PANICULATUM		<1	100			<1	8		
ERIGERON CAESPITOSUS									
ERIGERON COMPOSITUS									
ERIGERON OCHROLEUCUS						<1	15		
ERIGERON PUMILUS						<1	15		
ERIGERON SPECIOSUS									
ERIOGONUM FLAVUM						<1	15		
ERIOGONUM OVALIFOLIUM						<1	8		
ERIOGONUM PAUCIFLORUM						<1	23		
ERYSIMUM ASPERUM									
ERYSIMUM INCONSPICUUM						<1	8		
EUPHORBIA SPATHULATA									
GAILLARDIA ARISTATA				<1	100	<1	8		
GALIUM BOREALE		3	100	<1	100				
GAURA COCCINEA									
GEUM TRIFLORUM									
GLYCYRRHIZA LEPIDOTA						<1	8		
GRINDELIA SQUARROSA						<1	8		
HEDEOMA HISPIDUM									
HELIANTHUS ANNUUS						<1	15		
HETEROTHECA VILLOSA		<1	100	3	100	<1	15		
HEUCHERA RICHARDSONII									
HYMENOPAPPUS FILIFOLIUS						<1	15		
HYMENOXYS RICHARDSONII						<1	8		
IVA AXILLARIS						<1	8		
LACTUCA SERRIOLA						<1	31		
LACTUCA TATARICA						<1	8		
LAPPULA REDOWSKII									
LAPPULA SQUARROSA									

Table C1.--(continued)

SPECIES	TYPE NO:	1		2		3		4	
		COV	CON	COV	CON	COV	CON	COV	CON
LEPIDIUM DENSIFLORUM						<1	23		
LEPIDIUM PERFOLIATUM									
LESQUERELLA ALPINA						<1	8		
LESQUERELLA LUDOVICIANA									
LIATRIS PUNCTATA		<1	100	<1	100	<1	31		
LINUM AUSTRALE									
LINUM PERENNE						<1	8		
LINUM RIGIDUM									
LITHOSPERMUM INCISUM									
LOGFIA ARVENSIS									
LOMATIUM FOENICULACEUM						<1	8		
LOMATIUM MACROCARPUM									
LUPINUS ARGENTEUS									
LUPINUS PUSILLUS									
LYGODESMIA JUNCEA									
MACHAERANTHERA CANESCENS									
MACHAERANTHERA GRINDELIOIDES						<1	8		
MACHAERANTHERA PINNATIFIDA									
MELILOTUS ALBA									
MELILOTUS OFFICINALIS						<1	77		
MENTZELIA ALBICAULIS									
MINUARTIA PUNGENS						<1	15		
MIRABILIS LINEARIS									
MOEHRINGIA LATERIFLORA								<1	100
MONARDA FISTULOSA		<1	100						
MUSINEON DIVARICATUM						<1	15		
OENOTHERA NUTTALLII									
OROBANCHE FASCICULATA				<1	100				
ORTHOCARPUS LUTEUS									
OXYTROPIS CAMPESTRIS									
OXYTROPIS LAMBERTII						<1	8		
OXYTROPIS SERICEA						<1	8		
OXYTROPIS SPLENDENS									
PENSTEMON ALBIDUS						<1	8		
PENSTEMON NITIDUS						<1	15		
PICRADENIOPSIS OPPOSITIFOLIA									
PHACELIA LINEARIS				<1	100	<1	31		
PHLOX ALYSSIFOLIA									
PHLOX HOODII						<1	15		
PLANTAGO PATAGONICA									
POLYGALA ALBA									
POLYGONUM MONSPELIENSIS									
POLYGONUM DOUGLASII									
POLYGONUM RAMOSISSIMUM						<1	8		
POTENTILLA GRACILIS									
POTENTILLA PENSYLVANICA						<1	8		
PSORALEA ARGOPHYLLA				3	100	<1	31		
PSORALEA ESCULENTA									
PSORALEA LANCEOLATA									
PULSATILLA PATENS						<1	8		
RATIBIDA COLUMNIFERA									
SALSOLA AUSTRALIS									
SEDUM LANCEOLATUM									
SENECIO CANUS									
SILENE DRUMMONDII									
SILENE SCOULERI						<1	8		
SISYMBRIUM ALTISSIMUM									
SISYRINCHIUM MONTANUM									
SMILACINA STELLATA								<1	100
SOLANUM TRIFLORUM									
SOLIDAGO MISSOURIENSIS		<1	100			<1	54		
SOLIDAGO MOLLIS									

Table C1.--(continued)

SPECIES	TYPE NO:	1		2		3		4	
		COV	CON	COV	CON	COV	CON	COV	CON
SPHAERALCEA COCCINEA						<1	8		
STELLARIA MEDIA									
STEPHANOMERIA RUNCINATA						<1	54		
TARAXACUM OFFICINALE						<1	15	<1	100
TETRANEURIS ACAULIS						<1	15		
THERMOPSIS RHOMBIFOLIA		<1	100	<1	100	2	23		
THLASPI ARVENSE									
TRADESCANTIA OCCIDENTALIS									
TRAGOPOGON DUBIUS		<1	100	<1	100				
TRIODANIS LEPTOCARPA						<1	8		
VICIA AMERICANA						<1	62		
ZIGADENUS VENENOSUS				<1	100				
GRAMINOIDS									
AGROPYRON CRISTATUM									
AGROSTIS SCABRA		<1	100						
ARISTIDA PURPUREA						<1	15		
BOUTELOUA GRACILIS				<1	100	1	54		
BROMUS HORDEACEUS									
BROMUS JAPONICUS						<1	8		
BROMUS TECTORUM		<1	100						
CALAMOVILFA LONGIFOLIA						10	31		
CAREX ELEOCHARIS									
CAREX FILIFOLIA						2	54		
CAREX FOENEA									
CAREX INOPS		<1	100	3	100	18	69		
CAREX ROSSII						<1	8		
DISTICHLIS SPICATA									
ELYMUS ELYMOIDES									
ELYMUS GLAUCUS		<1	100						
ELYMUS LANCEOLATUS						3	15		
ELYMUS TRACHYCAULIS									
FESTUCA CAMPESTRIS									
FESTUCA IDAHOENSIS									
JUNCUS BALTICUS									
KOELERIA MACRANTHA		<1	100	3	100	1	62		
MUHLENBERGIA CUSPIDATA						1	23		
ORYZOPSIS HYMENOIDES									
ORYZOPSIS MICRANTHA						<1	15	20	100
PASCOPYRUM SMITHII						4	54		
POA ARIDA									
POA CUSICKII		<1	100			<1	8		
POA GLAUCIFOLIA									
POA NEVADENSIS								<1	100
POA PRATENSIS									
POA SECUNDA				<1	100	<1	46		
PSEUDOROEGNERIA SPICATA		3	100	30	100	14	77		
SCHIZACHRYIUM SCOPARIUM		30	100			<1	15		
SPOROBOLUS CRYPTANDRUS									
STIPA COMATA				10	100	<1	8		
STIPA SPARTEA									
STIPA VIRIDULA						<1	8		
VULPIA OCTOFLORA									
FERNS/ALLIES									
CRYPTOGRAMMA CRISPA									
SELAGINELLA DENSA				<1	100				
WOODSIA OREGANA				<1	100	<1	8		

Table C2.--Shrubland communities.

SPECIES	TYPE NO:	5 (N = 1)		6 (N = 1)		7 (N = 2)		8 (N = 4)		9 (N =15)	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
TREES											
FRAXINUS PENNSYLVANICA											
JUNIPERUS SCOPULORUM										3	7
PINUS CONTORTA											
PINUS PONDEROSA								<1	25		
PSEUDOTSUGA MENZIESII											
SHRUBS											
ARCTOSTAPHYLOS UVA-URSI											
ARTEMISIA CANA				3	100						
ARTEMISIA (FILIFOLIA?)											
ARTEMISIA FRIGIDA		<1	100	<1	100	<1	100	1	100	2	73
ARTEMISIA LONGIFOLIA											
ARTEMISIA TRIDENTATA						17	100	45	100	25	100
ATRIPLEX CONFERTIFOLIA											
ATRIPLEX GARDNERI										<1	20
CERATOIDES LANATA								<1	25	2	13
CHRYSOTHAMNUS NAUSEOSUS										1	33
CHRYSOTHAMNUS VISCIDIFLORUS											
CORYPHANTHA VIVIPARA								<1	25	<1	13
ELEAGNUS COMMUTATA				70	100						
GUTIERREZIA SAROTHRAE		<1	100	<1	100			<1	100	<1	47
JUNIPERUS COMMUNIS						<1	100	<1	25		
JUNIPERUS HORIZONTALIS				<1	100	<1	50				
OPUNTIA POLYACANTHA		<1	100					<1	100	1	100
PRUNUS VIRGINIANA											
RHUS TRILOBATA		3	100							1	20
RIBES CEREUM											
ROSA ARKANSANA		<1	100							<1	13
ROSA WOODSII				3	100						
SARCOBATUS VERMICULATUS										<1	7
SHEPHERDIA ARGENTEA				<1	100						
SHEPHERDIA CANADENSIS											
SUAEDA MOQUINII											
SYMPHORICARPOS OCCIDENTALIS		3	100	<1	100						
SYMPHORICARPOS OREOPHILUS											
YUCCA GLAUCA								<1	25		
FORBS											
ACHILLEA MILLEFOLIUM		<1	100	<1	100	<1	100	<1	75	<1	33
AGOSERIS GLAUCA						<1	100			<1	7
ALLIUM CERNUUM		<1	100								
ALLIUM TEXTILE		<1	100			<1	100	<1	25	<1	67
ALYSSUM DESERTORUM								<1	25		
ANDROSACE SEPTENTRIONALIS		<1	100	<1	100					<1	7
ANEMONE MULTIFIDA		<1	100			<1	50				
ANTENNARIA MICROPHYLLA						5	100	<1	50	<1	7
ANTENNARIA PARVIFOLIA				<1	100					<1	7
APOCYNUM ANDROSAEMIFOLIUM											
APOCYNUM CANNABINUM											
ARABIS HOLBOELLII				<1	100			<1	50	<1	20
ARENARIA CONGESTA						<1	50				
ARTEMISIA CAMPESTRIS		<1	100								
ARTEMISIA DRACUNCULUS											
ARTEMISIA LUDOVICIANA											
ASTER FALCATUS		<1	100					<1	50	<1	20
ASTER FOLIACEUS											

Table C2.--(continued)

SPECIES	TYPE NO:	5		6		7		8		9	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
ASTER LAEVIS											
ASTER SIBIRICUS											
ASTRAGALUS ADSURGENS								<1	25	<1	7
ASTRAGALUS AGRESTIS										<1	7
ASTRAGALUS BISULCATUS											
ASTRAGALUS DRUMMONDII								<1	25		
ASTRAGALUS GILVIFLORUS								<1	50		
ASTRAGALUS LOTIFLORUS											
ASTRAGALUS MISSOURIENSIS								<1	25	<1	7
ASTRAGALUS PECTINATUS				<1	100						
ASTRAGALUS PURSHII								<1	75		
ATRIPLEX SUCKLEYI											
BESSEYA WYOMINGENSIS		<1	100			<1	100				
CALOCHORTUS NUTTALLII								<1	25	<1	13
CAMELINA MICROCARPA								<1	25	<1	7
CAMPANULA ROTUNDIFOLIA		<1	100			<1	100				
CERASTIUM ARVENSE		<1	100			<1	100				
CERASTIUM NUTANS											
CHAMAESYCE SERPENS											
CHENOPODIUM ALBUM										<1	7
CHENOPODIUM DESICCATUM											
CIRSIUM ARVENSE											
CIRSIUM UNDULATUM		<1	100							<1	7
COLLOMIA LINEARIS						<1	50	<1	25	<1	40
COMANDRA UMBELLATA		<1	100	<1	100			<1	75	<1	73
CONRINGIA ORIENTALIS											
CREPIS OCCIDENTALIS		<1	100							<1	13
CRYPTANTHA CELOSIOIDES											
DALEA CANDIDA		<1	100					<1	25		
DALEA PURPUREA		<1	100					<1	75	<1	20
DESCURAINIA PINNATA											
DESCURAINIA RICHARDSONII											
DESCURAINIA SOPHIA										<1	7
EPILOBIUM PANICULATUM											
ERIGERON CAESPITOSUS				<1	100						
ERIGERON COMPOSITUS											
ERIGERON OCHROLEUCUS						<1	100				
ERIGERON PUMILUS		<1	100					<1	25	<1	33
ERIGERON SPECIOSUS						<1	50				
ERIOGONUM FLAVUM		<1	100			<1	50				
ERIOGONUM OVALIFOLIUM		<1	100								
ERIOGONUM PAUCIFLORUM											
ERYSIMUM ASPERUM											
ERYSIMUM INCONSPICUUM				<1	100			<1	25	<1	27
EUPHORBIA SPATHULATA										<1	20
GAILLARDIA ARISTATA		<1	100			<1	50				
GALIUM BOREALE						<1	100				
GAURA COCCINEA		<1	100					<1	25	<1	20
GEUM TRIFLORUM				<1	100						
GLYCYRRHIZA LEPIDOTA											
GRINDELIA SQUARROSA										<1	7
HEDEOMA HISPIDUM										<1	7
HELIANTHUS ANNUUS										<1	13
HETEROTHECA VILLOSA		<1	100	<1	100	<1	100	<1	50	<1	7
HEUCHERA RICHARDSONII											
HYMENOPAPPUS FILIFOLIUS											
HYMENOXYS RICHARDSONII										<1	33
IVA AXILLARIS											
LACTUCA SERRIOLA										<1	13
LACTUCA TATARICA										<1	13
LAPPULA REDOWSKII										<1	13
LAPPULA SQUARROSA											

Table C2.--(continued)

SPECIES	TYPE NO:	5		6		7		8		9	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
LEPIDIUM DENSIFLORUM								<1	25	<1	7
LEPIDIUM PERFOLIATUM											
LESQUERELLA ALPINA								<1	25	<1	7
LESQUERELLA LUDOVICIANA											
LIATRIS PUNCTATA		<1	100					<1	25	<1	13
LINUM AUSTRALE		<1	100					<1	75	<1	27
LINUM PERENNE						<1	50	<1	25	3	7
LINUM RIGIDUM								<1	25		
LITHOSPERMUM INCISUM											
LOGFIA ARVENSIS											
LOMATIUM FOENICULACEUM										<1	7
LOMATIUM MACROCARPUM		<1	100			<1	50			<1	7
LUPINUS ARGENTEUS						<1	100				
LUPINUS PUSILLUS								<1	25		
LYGODESMIA JUNCEA											
MACHAERANTHERA CANESCENS										<1	7
MACHAERANTHERA GRINDELIOIDES											
MACHAERANTHERA PINNATIFIDA											
MELILOTUS ALBA											
MELILOTUS OFFICINALIS		<1	100					<1	75	<1	47
MENTZELIA ALBICAULIS										<1	7
MINUARTIA PUNGENS											
MIRABILIS LINEARIS											
MOEHRINGIA LATERIFLORA											
MONARDA FISTULOSA											
MUSINEON DIVARICATUM								<1	25	<1	27
OENOTHERA NUTTALLII											
OROBANCHE FASCICULATA										<1	20
ORTHOCARPUS LUTEUS						<1	100				
OXYTROPIS CAMPESTRIS				<1	100					<1	7
OXYTROPIS LAMBERTII								<1	25		
OXYTROPIS SERICEA											
OXYTROPIS SPLENDENS						<1	50				
PENSTEMON ALBIDUS		<1	100	<1	100			<1	25	<1	27
PENSTEMON NITIDUS		<1	100					<1	25	<1	20
PICRADENIOPSIS OPPOSITIFOLIA										<1	13
PHACELIA LINEARIS										<1	47
PHLOX ALYSSIFOLIA											
PHLOX HOODII		<1	100	<1	100			<1	75	1	53
PLANTAGO PATAGONICA								<1	50	<1	27
POLYGALA ALBA											
POLYGONUM MONSPELIENSIS											
POLYGONUM DOUGLASII											
POLYGONUM RAMOSISSIMUM											
POTENTILLA GRACILIS				<1	100						
POTENTILLA PENSYLVANICA		<1	100			<1	50	<1	25	<1	7
PSORALEA ARGOPHYLLA				<1	100			<1	75	2	33
PSORALEA ESCULENTA		<1	100								
PSORALEA LANCEOLATA											
PULSATILLA PATENS				10	100						
RATIBIDA COLUMNIFERA								<1	50	<1	7
SALSOLA AUSTRALIS											
SEDUM LANCEOLATUM											
SENECIO CANUS				<1	100	<1	50				
SILENE DRUMMONDII		<1	100								
SILENE SCOULERI											
SISYMBRIUM ALTISSIMUM											
SISYRINCHIUM MONTANUM											
SMILACINA STELLATA											
SOLANUM TRIFLORUM										<1	7
SOLIDAGO MISSOURIENSIS				<1	100	<1	50				
SOLIDAGO MOLLIS											

Table C2.--(continued)

SPECIES	TYPE NO:	5		6		7		8		9	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
SPHAERALCEA COCCINEA								<1	75	<1	80
STELLARIA MEDIA											
STEPHANOMERIA RUNCINATA											
TARAXACUM OFFICINALE								<1	25	<1	53
TETRANEURIS ACAULIS											
THERMOPSIS RHOMBIFOLIA		3	100							<1	7
THLASPI ARVENSE											
TRADESCANTIA OCCIDENTALIS											
TRAGOPOGON DUBIUS		<1	100	<1	100			<1	50	<1	40
TRIODANIS LEPTOCARPA											
VICIA AMERICANA				<1	100	<1	50	<1	100	<1	87
ZIGADENUS VENENOSUS						<1	50			<1	7
GRAMINOIDS											
AGROPYRON CRISTATUM											
AGROSTIS SCABRA											
ARISTIDA PURPUREA											
BOUTELOUA GRACILIS								10	100	11	67
BROMUS HORDEACEUS											
BROMUS JAPONICUS		<1	100					<1	50	<1	20
BROMUS TECTORUM										3	7
CALAMOVILFA LONGIFOLIA										<1	13
CAREX ELEOCHARIS								2	50	3	27
CAREX FILIFOLIA				3	100	<1	50	<1	50	2	33
CAREX FOENEA						<1	50				
CAREX INOPS						<1	100			2	13
CAREX ROSSII											
DISTICHLIS SPICATA											
ELYMUS ELYMOIDES										<1	7
ELYMUS GLAUCUS											
ELYMUS LANCEOLATUS				20	100					15	13
ELYMUS TRACHYCAULIS						<1	50				
FESTUCA CAMPESTRIS						65	100				
FESTUCA IDAHOENSIS						5	100				
JUNCUS BALTICUS											
KOELERIA MACRANTHA		3	100	50	100	<1	100	2	100	4	73
MUHLENBERGIA CUSPIDATA								10	50	<1	27
ORYZOPSIS HYMENOIDES											
ORYZOPSIS MICRANTHA											
PASCOPYRUM SMITHII						<1	50	4	100	24	100
POA ARIDA						<1	50				
POA CUSICKII											
POA GLAUCIFOLIA								<1	25		
POA NEVADENSIS											
POA PRATENSIS						<1	50				
POA SECUNDA				<1	100			<1	100	6	80
PSEUDOROEGNERIA SPICATA		3	100			<1	100	29	100	11	40
SCHIZACHYRIUM SCOPARIUM											
SPOROBOLUS CRYPTANDRUS											
STIPA COMATA		30	100	10	100			<1	100	6	33
STIPA SPARTEA											
STIPA VIRIDULA				<1	100			15	50	6	87
VULPIA OCTOFLORA											
FERNS/ALLIES											
CRYPTOGRAMMA CRISPA		<1	100								
SELAGINELLA DENSA		60	100	70	100	<1	50	20	50	34	20
WOODSIA OREGANA											

Table C2.--(continued)

SPECIES	TYPE NO:	10 (N = 7)		11 (N = 3)		12 (N = 3)		13 (N = 6)		14 (N = 1)	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
TREES											
FRAXINUS PENNSYLVANICA											
JUNIPERUS SCOPULORUM											
PINUS CONTORTA											
PINUS PONDEROSA											
PSEUDOTSUGA MENZIESII											
SHRUBS											
ARCTOSTAPHYLOS UVA-URSI								10	17		
ARTEMISIA CANA		21	100	30	100			3	33		
ARTEMISIA (FILIFOLIA?)											
ARTEMISIA FRIGIDA		<1	100	2	100	4	100	<1	50		
ARTEMISIA LONGIFOLIA								<1	50		
ARTEMISIA TRIDENTATA						2	67			3	100
ATRIPLEX CONFERTIFOLIA										10	100
ATRIPLEX GARDNERI				<1	67	<1	67			<1	100
CERATOIDES LANATA						13	100				
CHRYSOTHAMNUS NAUSEOSUS				10	67			<1	17	<1	100
CHRYSOTHAMNUS VISCIDIFLORUS											
CORYPHANTHA VIVIPARA		<1	14					<1	17		
ELEAGNUS COMMUTATA											
GUTIERREZIA SAROTHRAE		<1	14	<1	33	<1	67	<1	17	<1	100
JUNIPERUS COMMUNIS											
JUNIPERUS HORIZONTALIS								50	100		
OPUNTIA POLYACANTHA		<1	86	<1	100	<1	67	<1	33	<1	100
PRUNUS VIRGINIANA											
RHUS TRILOBATA		<1	14					<1	17	<1	100
RIBES CEREUM											
ROSA ARKANSANA		<1	14					<1	100		
ROSA WOODSII		<1	14	<1	33						
SARCOBATUS VERMICULATUS		<1	14								
SHEPHERDIA ARGENTEA											
SHEPHERDIA CANADENSIS											
SUAEDA MOQUINII											
SYMPHORICARPOS OCCIDENTALIS		10	14	<1	67			<1	17		
SYMPHORICARPOS OREOPHILUS											
YUCCA GLAUCA								<1	17	<1	100
FORBS											
ACHILLEA MILLEFOLIUM		3	14	<1	100			<1	33		
AGOSERIS GLAUCA											
ALLIUM CERNUUM								<1	17		
ALLIUM TEXTILE		<1	29			<1	33				
ALYSSUM DESERTORUM											
ANDROSACE SEPTENTRIONALIS											
ANEMONE MULTIFIDA		<1	14								
ANTENNARIA MICROPHYLLA		<1	43	<1	33			<1	33		
ANTENNARIA PARVIFOLIA								<1	17		
APOCYNUM ANDROSAEMIFOLIUM											
APOCYNUM CANNABINUM											
ARABIS HOLBOELLII		<1	14					<1	33		
ARENARIA CONGESTA											
ARTEMISIA CAMPESTRIS		<1	14					<1	17	<1	100
ARTEMISIA DRACUNCULUS		<1	14								
ARTEMISIA LUDOVICIANA		2	43								
ASTER FALCATUS		<1	43	<1	33			<1	33		
ASTER FOLIACEUS								<1	17		

Table C2.--(continued)

SPECIES	TYPE NO:	10		11		12		13		14	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
ASTER LAEVIS											
ASTER SIBIRICUS											
ASTRAGALUS ADSURGENS								<1	17		
ASTRAGALUS AGRESTIS											
ASTRAGALUS BISULCATUS				<1	33						
ASTRAGALUS DRUMMONDII											
ASTRAGALUS GILVIFLORUS								<1	33		
ASTRAGALUS LOTIFLORUS		<1	29								
ASTRAGALUS MISSOURIENSIS		<1	29			<1	33				
ASTRAGALUS PECTINATUS		<1	14								
ASTRAGALUS PURSHII											
ATRIPLEX SUCKLEYI											
BESSEYA WYOMINGENSIS		<1	14								
CALOCHORTUS NUTTALLII						<1	33				
CAMELINA MICROCARPA				<1	33	<1	33				
CAMPANULA ROTUNDIFOLIA											
CERASTIUM ARVENSE		<1	14	<1	33			<1	17		
CERASTIUM NUTANS											
CHAMAESYCE SERPENS										<1	100
CHENOPODIUM ALBUM		<1	14	<1	33						
CHENOPODIUM DESICCATUM											
CIRSIUM ARVENSE											
CIRSIUM UNDULATUM		<1	43								
COLLOMIA LINEARIS				<1	33						
COMANDRA UMBELLATA		<1	43	<1	67	<1	33	<1	83		
CONRINGIA ORIENTALIS											
CREPIS OCCIDENTALIS								<1	17		
CRYPTANTHA CELOSIOIDES											
DALEA CANDIDA								<1	17		
DALEA PURPUREA		<1	14					<1	33		
DESCURAINIA PINNATA											
DESCURAINIA RICHARDSONII											
DESCURAINIA SOPHIA		<1	14								
EPILOBIUM PANICULATUM											
ERIGERON CAESPITOSUS								<1	17		
ERIGERON COMPOSITUS											
ERIGERON OCHROLEUCUS		<1	14								
ERIGERON PUMILUS		<1	29			3	33				
ERIGERON SPECIOSUS											
ERIOGONUM FLAVUM								<1	33		
ERIOGONUM OVALIFOLIUM											
ERIOGONUM PAUCIFLORUM								<1	17		
ERYSIMUM ASPERUM											
ERYSIMUM INCONSPICUUM		<1	43	<1	33						
EUPHORBIA SPATHULATA											
GAILLARDIA ARISTATA		<1	14								
GALIUM BOREALE											
GAURA COCCINEA		<1	71					<1	17	<1	100
GEUM TRIFLORUM		<1	14								
GLYCYRRHIZA LEPIDOTA		<1	14					<1	17		
GRINDELIA SQUARROSA		<1	14							3	100
HEDEOMA HISPIDUM		<1	29								
HELIANTHUS ANNUUS				<1	33						
HETEROTHECA VILLOSA		<1	86								
HEUCHERA RICHARDSONII											
HYMENOPAPPUS FILIFOLIUS											
HYMENOXYS RICHARDSONII				<1	33						
IVA AXILLARIS											
LACTUCA SERRIOLA											
LACTUCA TATARICA											
LAPPULA REDOWSKII		<1	14							3	100
LAPPULA SQUARROSA											

Table C2.--(continued)

SPECIES	TYPE NO:	10		11		12		13		14	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
LEPIDIUM DENSIFLORUM											
LEPIDIUM PERFOLIATUM											
LESQUERELLA ALPINA											
LESQUERELLA LUDOVICIANA											
LIATRIS PUNCTATA		<1	29					<1	17	<1	100
LINUM AUSTRALE						<1	33				
LINUM PERENNE								<1	17		
LINUM RIGIDUM											
LITHOSPERMUM INCISUM											
LOGFIA ARVENSIS											
LOMATIUM FOENICULACEUM		<1	14								
LOMATIUM MACROCARPUM											
LUPINUS ARGENTEUS											
LUPINUS PUSILLUS											
LYGODESMIA JUNCEA											
MACHAERANTHERA CANESCENS										<1	100
MACHAERANTHERA GRINDELIOIDES											
MACHAERANTHERA PINNATIFIDA		<1	29								
MELILOTUS ALBA		<1	14								
MELILOTUS OFFICINALIS		<1	29	2	67	<1	67	1	50		
MENTZELIA ALBICAULIS											
MINUARTIA PUNGENS											
MIRABILIS LINEARIS											
MOEHRINGIA LATERIFLORA											
MONARDA FISTULOSA											
MUSINEON DIVARICATUM						<1	33				
OENOTHERA NUTTALLII											
OROBANCHE FASCICULATA		<1	29								
ORTHOCARPUS LUTEUS		<1	14								
OXYTROPIS CAMPESTRIS						<1	33	<1	17		
OXYTROPIS LAMBERTII						<1	33				
OXYTROPIS SERICEA		<1	14					<1	17		
OXYTROPIS SPLENDENS											
PENSTEMON ALBIDUS		<1	57			<1	33	<1	33		
PENSTEMON NITIDUS		<1	14					<1	50		
PICRADENIOPSIS OPPOSITIFOLIA											
PHACELIA LINEARIS		<1	14	<1	33						
PHLOX ALYSSIFOLIA											
PHLOX HOODII		<1	29	<1	67	<1	67	<1	33		
PLANTAGO PATAGONICA		4	71	<1	33	<1	67				
POLYGALA ALBA											
POLYGONUM MONSPELIENSIS											
POLYGONUM DOUGLASII											
POLYGONUM RAMOSISSIMUM											
POTENTILLA GRACILIS											
POTENTILLA PENSYLVANICA				<1	33						
PSORALEA ARGOPHYLLA		<1	71								
PSORALEA ESCULENTA											
PSORALEA LANCEOLATA											
PULSATILLA PATENS											
RATIBIDA COLUMNIFERA		<1	14	<1	33						
SALSOLA AUSTRALIS										<1	100
SEDUM LANCEOLATUM		<1	14								
SENECIO CANUS								<1	33		
SILENE DRUMMONDII											
SILENE SCOULERI											
SISYMBRIUM ALTISSIMUM											
SISYRINCHIUM MONTANUM											
SMILACINA STELLATA											
SOLANUM TRIFLORUM											
SOLIDAGO MISSOURIENSIS		<1	14					<1	50		
SOLIDAGO MOLLIS											

Table C2.--(continued)

SPECIES	TYPE NO:	10		11		12		13		14	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
SPHAERALCEA COCCINEA		<1	86	<1	67	<1	67			<1	100
STELLARIA MEDIA											
STEPHANOMERIA RUNCINATA								<1	17	<1	100
TARAXACUM OFFICINALE		<1	29	<1	67	<1	33				
TETRANEURIS ACAULIS											
THERMOPSIS RHOMBIFOLIA		<1	14					1	83		
THLASPI ARVENSE											
TRADESCANTIA OCCIDENTALIS											
TRAGOPOGON DUBIUS		<1	71	<1	33	<1	33			<1	100
TRIODANIS LEPTOCARPA											
VICIA AMERICANA				<1	100			<1	17		
ZIGADENUS VENENOSUS		<1	14								
GRAMINOIDS											
AGROPYRON CRISTATUM		<1	29	<1	33						
AGROSTIS SCABRA											
ARISTIDA PURPUREA		<1	14								
BOUTELOUA GRACILIS		9	86	12	67	5	100				
BROMUS HORDEACEUS											
BROMUS JAPONICUS				<1	33	<1	33				
BROMUS TECTORUM		<1	14			<1	33				
CALAMOVILFA LONGIFOLIA		10	14			<1	33	13	83	<1	100
CAREX ELEOCHARIS		1	71	10	67	<1	33	20	17		
CAREX FILIFOLIA		8	57	<1	33	20	100	10	50		
CAREX FOENEA											
CAREX INOPS								1	50		
CAREX ROSSII											
DISTICHLIS SPICATA				<1	33						
ELYMUS ELYMOIDES										<1	100
ELYMUS GLAUCUS											
ELYMUS LANCEOLATUS		<1	14	15	67			3	17		
ELYMUS TRACHYCAULIS											
FESTUCA CAMPESTRIS											
FESTUCA IDAHOENSIS											
JUNCUS BALTICUS								3	17		
KOELERIA MACRANTHA		3	86	4	100	2	67	<1	83		
MUHLENBERGIA CUSPIDATA		20	14					<1	17		
ORYZOPSIS HYMENOIDES										3	100
ORYZOPSIS MICRANTHA											
PASCOPYRUM SMITHII		1	71	12	100	<1	33			<1	100
POA ARIDA											
POA CUSICKII											
POA GLAUCIFOLIA											
POA NEVADENSIS											
POA PRATENSIS											
POA SECUNDA		2	86	<1	67	<1	100				
PSEUDOROEGNERIA SPICATA		40	14			40	67	20	33		
SCHIZACHYRIUM SCOPARIUM		3	14					5	100		
SPOROBOLUS CRYPTANDRUS											
STIPA COMATA		39	100	<1	67	24	100				
STIPA SPARTEA											
STIPA VIRIDULA				30	67						
VULPIA OCTOFLORA		<1	29								
FERNS/ALLIES											
CRYPTOGRAMMA CRISPA											
SELAGINELLA DENSA		42	86	10	33						
WOODSIA OREGANA		<1	14								

Table C2.--(continued)

SPECIES	TYPE NO:	15 (N = 1)		16 (N = 7)		17 (N = 2)	
		COV	CON	COV	CON	COV	CON
TREES							
FRAXINUS PENNSYLVANICA							
JUNIPERUS SCOPULORUM							
PINUS CONTORTA							
PINUS PONDEROSA							
PSEUDOTSUGA MENZIESII							
SHRUBS							
ARCTOSTAPHYLOS UVA-URSI							
ARTEMISIA CANA							
ARTEMISIA (FILIFOLIA?)							
ARTEMISIA FRIGIDA		<1	100				
ARTEMISIA LONGIFOLIA				<1	14	.25	100
ARTEMISIA TRIDENTATA		40	100	5	29		
ATRIPLEX CONFERTIFOLIA				<1	14		
ATRIPLEX GARDNERI				4	71		
CERATOIDES LANATA		<1	100				
CHRYSOTHAMNUS NAUSEOSUS				<1	14		
CHRYSOTHAMNUS VISCIDIFLORUS				<1	29		
CORYPHANTHA VIVIPARA		<1	100				
ELEAGNUS COMMUTATA							
GUTIERREZIA SAROTHRAE				<1	29		
JUNIPERUS COMMUNIS							
JUNIPERUS HORIZONTALIS							
OPUNTIA POLYACANTHA		3	100	<1	43		
PRUNUS VIRGINIANA							
RHUS TRILOBATA							
RIBES CEREUM							
ROSA ARKANSANA							
ROSA WOODSII							
SARCOBATUS VERMICULATUS		10	100	26	100		
SHEPHERDIA ARGENTEA							
SHEPHERDIA CANADENSIS							
SUAEDA MOQUINII				1	71		
SYMPHORICARPOS OCCIDENTALIS							
SYMPHORICARPOS OREOPHILUS							
YUCCA GLAUCA				<1	14		
FORBS							
ACHILLEA MILLEFOLIUM							
AGOSERIS GLAUCA							
ALLIUM CERNUUM							
ALLIUM TEXTILE				<1	43		
ALYSSUM DESERTORUM							
ANDROSACE SEPTENTRIONALIS							
ANEMONE MULTIFIDA							
ANTENNARIA MICROPHYLLA		<1	100				
ANTENNARIA PARVIFOLIA							
APOCYNUM ANDROSAEMIFOLIUM							
APOCYNUM CANNABINUM							
ARABIS HOLBOELLII							
ARENARIA CONGESTA							
ARTEMISIA CAMPESTRIS							
ARTEMISIA DRACUNCULUS							
ARTEMISIA LUDOVICIANA							
ASTER FALCATUS				<1	14		
ASTER FOLIACEUS							

Table C2.--(continued)

SPECIES	TYPE NO:	15		16		17	
		COV	CON	COV	CON	COV	CON
ASTER LAEVIS							
ASTER SIBIRICUS							
ASTRAGALUS ADSURGENS							
ASTRAGALUS AGRESTIS							
ASTRAGALUS BISULCATUS							
ASTRAGALUS DRUMMONDII							
ASTRAGALUS GILVIFLORUS							
ASTRAGALUS LOTIFLORUS							
ASTRAGALUS MISSOURIENSIS		<1	100				
ASTRAGALUS PECTINATUS							
ASTRAGALUS PURSHII							
ATRIPLEX SUCKLEYI				16	71		
BESSEYA WYOMINGENSIS							
CALOCHORTUS NUTTALLII							
CAMELINA MICROCARPA							
CAMPANULA ROTUNDIFOLIA							
CERASTIUM ARVENSE							
CERASTIUM NUTANS							
CHAMAESYCE SERPENS							
CHENOPODIUM ALBUM						<1	100
CHENOPODIUM DESICCATUM							
CIRSIUM ARVENSE							
CIRSIUM UNDULATUM							
COLLOMIA LINEARIS							
COMANDRA UMBELLATA				<1	14		
CONRINGIA ORIENTALIS				<1	14		
CREPIS OCCIDENTALIS							
CRYPTANTHA CELOSIOIDES							
DALEA CANDIDA				<1	14		
DALEA PURPUREA							
DESCURAINIA PINNATA				<1	14		
DESCURAINIA RICHARDSONII							
DESCURAINIA SOPHIA							
EPILOBIUM PANICULATUM							
ERIGERON CAESPITOSUS							
ERIGERON COMPOSITUS							
ERIGERON OCHROLEUCUS							
ERIGERON PUMILUS		<1	100				
ERIGERON SPECIOSUS							
ERIOGONUM FLAVUM							
ERIOGONUM OVALIFOLIUM							
ERIOGONUM PAUCIFLORUM						<1	50
ERYSIMUM ASPERUM							
ERYSIMUM INCONSPICUUM							
EUPHORBIA SPATHULATA							
GAILLARDIA ARISTATA							
GALIUM BOREALE							
GAURA COCCINEA							
GEUM TRIFLORUM							
GLYCYRRHIZA LEPIDOTA							
GRINDELIA SQUARROSA				<1	14		
HEDEOMA HISPIDUM							
HELIANTHUS ANNUUS				<1	57		
HETEROTHECA VILLOSA							
HEUCHERA RICHARDSONII							
HYMENOPAPPUS FILIFOLIUS							
HYMENOXYS RICHARDSONII							
IVA AXILLARIS				<1	43		
LACTUCA SERRIOLA				<1	43		
LACTUCA TATARICA							
LAPPULA REDOWSKII				<1	43		
LAPPULA SQUARROSA				<1	14		

Table C2.--(continued)

SPECIES	TYPE NO:	15		16		17	
		COV	CON	COV	CON	COV	CON
LEPIDIUM DENSIFLORUM				<1	86		
LEPIDIUM PERFOLIATUM							
LESQUERELLA ALPINA							
LESQUERELLA LUDOVICIANA							
LIATRIS PUNCTATA		<1	100				
LINUM AUSTRALE							
LINUM PERENNE							
LINUM RIGIDUM							
LITHOSPERMUM INCISUM							
LOGFIA ARVENSIS							
LOMATIUM FOENICULACEUM							
LOMATIUM MACROCARPUM							
LUPINUS ARGENTEUS							
LUPINUS PUSILLUS							
LYGODESMIA JUNCEA							
MACHAERANTHERA CANESCENS				<1	43		
MACHAERANTHERA GRINDELIOIDES							
MACHAERANTHERA PINNATIFIDA							
MELILOTUS ALBA							
MELILOTUS OFFICINALIS				<1	43		
MENTZELIA ALBICAULIS							
MINUARTIA PUNGENS							
MIRABILIS LINEARIS							
MOEHRINGIA LATERIFLORA							
MONARDA FISTULOSA							
MUSINEON DIVARICATUM				<1	14		
OENOTHERA NUTTALLII							
OROBANCHE FASCICULATA		<1	100				
ORTHOCARPUS LUTEUS							
OXYTROPIS CAMPESTRIS							
OXYTROPIS LAMBERTII							
OXYTROPIS SERICEA							
OXYTROPIS SPLENDENS							
PENSTEMON ALBIDUS							
PENSTEMON NITIDUS				<1	14		
PICRADENIOPSIS OPPOSITIFOLIA							
PHACELIA LINEARIS							
PHLOX ALYSSIFOLIA							
PHLOX HOODII				<1	14		
PLANTAGO PATAGONICA		<1	100	<1	14		
POLYGALA ALBA							
POLYGONUM MONSPELIENSIS							
POLYGONUM DOUGLASII							
POLYGONUM RAMOSISSIMUM				<1	29	<1	50
POTENTILLA GRACILIS							
POTENTILLA PENSYLVANICA							
PSORALEA ARGOPHYLLA							
PSORALEA ESCULENTA							
PSORALEA LANCEOLATA							
PULSATILLA PATENS							
RATIBIDA COLUMNIFERA							
SALSOLA AUSTRALIS							
SEDUM LANCEOLATUM							
SENECIO CANUS							
SILENE DRUMMONDII							
SILENE SCOULERI							
SISYMBRIUM ALTISSIMUM							
SISYRINCHIUM MONTANUM							
SMILACINA STELLATA							
SOLANUM TRIFLORUM							
SOLIDAGO MISSOURIENSIS							
SOLIDAGO MOLLIS							

Table C2.--(continued)

SPECIES	TYPE NO:	15		16		17	
		COV	CON	COV	CON	COV	CON
SPHAERALCEA COCCINEA		<1	100	<1	14		
STELLARIA MEDIA							
STEPHANOMERIA RUNCINATA						<1	50
TARAXACUM OFFICINALE		<1	100				
TETRANEURIS ACAULIS							
THERMOPSIS RHOMBIFOLIA							
THLASPI ARVENSE							
TRADESCANTIA OCCIDENTALIS							
TRAGOPOGON DUBIUS		<1	100	<1	14		
TRIODANIS LEPTOCARPA							
VICIA AMERICANA		<1	100	<1	14		
ZIGADENUS VENENOSUS							
GRAMINOIDS							
AGROPYRON CRISTATUM				<1	14		
AGROSTIS SCABRA							
ARISTIDA PURPUREA		<1	100				
BOUTELOUA GRACILIS		3	100	<1	14		
BROMUS HORDEACEUS							
BROMUS JAPONICUS				<1	43		
BROMUS TECTORUM							
CALAMOVILFA LONGIFOLIA				<1	14	<1	50
CAREX ELEOCHARIS		<1	100				
CAREX FILIFOLIA							
CAREX FOENEA							
CAREX INOPS							
CAREX ROSSII							
DISTICHLIS SPICATA							
ELYMUS ELYMOIDES		<1	100	<1	71		
ELYMUS GLAUCUS							
ELYMUS LANCEOLATUS				<1	43		
ELYMUS TRACHYCAULIS							
FESTUCA CAMPESTRIS							
FESTUCA IDAHOENSIS							
JUNCUS BALTICUS							
KOELERIA MACRANTHA		<1	100				
MUHLENBERGIA CUSPIDATA				<1	14		
ORYZOPSIS HYMENOIDES				<1	14	<1	100
ORYZOPSIS MICRANTHA							
PASCOPYRUM SMITHII		30	100	5	43		
POA ARIDA							
POA CUSICKII							
POA GLAUCIFOLIA							
POA NEVADENSIS							
POA PRATENSIS							
POA SECUNDA		<1	100	1	43		
PSEUDOROEGNERIA SPICATA				<1	29		
SCHIZACHYRIUM SCOPARIUM							
SPOROBOLUS CRYPTANDRUS							
STIPA COMATA		3	100				
STIPA SPARTEA							
STIPA VIRIDULA							
VULPIA OCTOFLORA		<1	100				
FERNS/ALLIES							
CRYPTOGRAMMA CRISPA							
SELAGINELLA DENSA		30	100				
WOODSIA OREGANA							

Table C3.--Grassland communities.

SPECIES	TYPE NO:	18 (N = 5)		19 (N = 1)		20 (N =11)		21 (N =12)		22 (N =22)	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
TREES											
FRAXINUS PENNSYLVANICA											
JUNIPERUS SCOPULORUM											
PINUS CONTORTA											
PINUS PONDEROSA											
PSEUDOTSUGA MENZIESII											
SHRUBS											
ARCTOSTAPHYLOS UVA-URSI											
ARTEMISIA CANA		<1	20			<1	64	<1	42	<1	36
ARTEMISIA (FILIFOLIA?)											
ARTEMISIA FRIGIDA		6	100	<1	100	2	100	3	100	4	91
ARTEMISIA LONGIFOLIA											
ARTEMISIA TRIDENTATA						2	18	3	8	<1	9
ATRIPLEX CONFERTIFOLIA											
ATRIPLEX GARDNERI								<1	17	<1	5
CERATOIDES LANATA						<1	9	<1	17	1	36
CHRYSOTHAMNUS NAUSEOSUS				<1	100	<1	9				
CHRYSOTHAMNUS VISCIDIFLORUS											
CORYPHANTHA VIVIPARA										<1	23
ELEAGNUS COMMUTATA											
GUTIERREZIA SAROTHRAE		<1	20	<1	100	<1	55	<1	42	<1	50
JUNIPERUS COMMUNIS											
JUNIPERUS HORIZONTALIS											
OPUNTIA POLYACANTHA		<1	20	<1	100	3	36	1	75	<1	55
PRUNUS VIRGINIANA		<1	20								
RHUS TRILOBATA											
RIBES CEREUM											
ROSA ARKANSANA		<1	60			1	27	<1	8	8	18
ROSA WOODSII						<1	9			<1	5
SARCOBATUS VERMICULATUS						3	9				
SHEPHERDIA ARGENTEA											
SHEPHERDIA CANADENSIS											
SUAEDA MOQUINII											
SYMPHORICARPOS OCCIDENTALIS		<1	20			<1	9			<1	5
SYMPHORICARPOS OREOPHILUS											
YUCCA GLAUCA				<1	100			3	8		
FORBS											
ACHILLEA MILLEFOLIUM		<1	60	<1	100	<1	73	1	33	<1	27
AGOSERIS GLAUCA		<1	20			<1	18	<1	8		
ALLIUM CERNUUM		<1	40								
ALLIUM TEXTILE		<1	40			<1	27	<1	25	<1	23
ALYSSUM DESERTORUM											
ANDROSACE SEPTENTRIONALIS										<1	18
ANEMONE MULTIFIDA		<1	40					<1	8	<1	9
ANTENNARIA MICROPHYLLA		<1	60			<1	73	<1	50	<1	27
ANTENNARIA PARVIFOLIA								<1	25	<1	23
APOCYNUM ANDROSAEMIFOLIUM											
APOCYNUM CANNABINUM											
ARABIS HOLBOELLII				<1	100	<1	27	<1	42	<1	32
ARENARIA CONGESTA		2	40			<1	18	<1	8	<1	9
ARTEMISIA CAMPESTRIS		<1	40							<1	9
ARTEMISIA DRACUNCULUS		<1	40					<1	17	<1	5
ARTEMISIA LUDOVICIANA		<1	20			<1	36	<1	17	1	14
ASTER FALCATUS		<1	20	<1	100	1	45	<1	8	<1	18
ASTER FOLIACEUS											

Table C3.--(continued)

SPECIES	TYPE NO:	18		19		20		21		22	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
ASTER LAEVIS											
ASTER SIBIRICUS											
ASTRAGALUS ADSURGENS		<1	20	3	100	<1	18			<1	5
ASTRAGALUS AGRESTIS						<1	9			<1	9
ASTRAGALUS BISULCATUS								<1	8		
ASTRAGALUS DRUMMONDII		<1	20							<1	9
ASTRAGALUS GILVIFLORUS						<1	9	<1	8	<1	14
ASTRAGALUS LOTIFLORUS										<1	5
ASTRAGALUS MISSOURIENSIS										<1	5
ASTRAGALUS PECTINATUS						<1	18	<1	8	<1	23
ASTRAGALUS PURSHII											
ATRIPLEX SUCKLEYI											
BESSEYA WYOMINGENSIS		<1	40								
CALOCHORTUS NUTTALLII											
CAMELINA MICROCARPA											
CAMPANULA ROTUNDIFOLIA		<1	20								
CERASTIUM ARVENSE		10	80			<1	9	<1	8	<1	9
CERASTIUM NUTANS						<1	9				
CHAMAESYCE SERPENS											
CHENOPODIUM ALBUM						<1	18	<1	8		
CHENOPODIUM DESICCATUM										<1	5
CIRSIUM ARVENSE		<1	20								
CIRSIUM UNDULATUM		<1	40			<1	18	<1	17	<1	9
COLLOMIA LINEARIS						<1	45	<1	8		
COMANDRA UMBELLATA		<1	100	<1	100	<1	27	<1	8	<1	18
CONRINGIA ORIENTALIS											
CREPIS OCCIDENTALIS		<1	20								
CRYPTANTHA CELOSIOIDES								<1	8	<1	9
DALEA CANDIDA						<1	9	<1	8	<1	14
DALEA PURPUREA				<1	100	1	27			<1	14
DESCURAINIA PINNATA											
DESCURAINIA RICHARDSONII		<1	20								
DESCURAINIA SOPHIA						<1	9				
EPILOBIUM PANICULATUM											
ERIGERON CAESPITOSUS											
ERIGERON COMPOSITUS										<1	5
ERIGERON OCHROLEUCUS		<1	100					<1	8		
ERIGERON PUMILUS								<1	33	<1	23
ERIGERON SPECIOSUS											
ERIOGONUM FLAVUM		<1	60					<1	8	<1	18
ERIOGONUM OVALIFOLIUM		<1	20								
ERIOGONUM PAUCIFLORUM											
ERYSIMUM ASPERUM											
ERYSIMUM INCONSPICUUM		<1	20			<1	36	<1	50	<1	23
EUPHORBIA SPATHULATA											
GAILLARDIA ARISTATA		<1	100			<1	9	<1	17	<1	18
GALIUM BOREALE		<1	20								
GAURA COCCINEA		<1	20			<1	45			<1	18
GEUM TRIFLORUM								<1	8	<1	5
GLYCYRRHIZA LEPIDOTA						<1	9				
GRINDELIA SQUARROSA				<1	100	<1	27	<1	42	<1	23
HEDEOMA HISPIDUM				<1	100	<1	18	<1	17	<1	5
HELIANTHUS ANNUUS											
HETEROTHECA VILLOSA		<1	80	<1	100	<1	55	1	25	1	68
HEUCHERA RICHARDSONII										<1	5
HYMENOPAPPUS FILIFOLIUS											
HYMENOXYS RICHARDSONII						<1	18	<1	17	<1	18
IVA AXILLARIS											
LACTUCA SERRIOLA				<1	100						
LACTUCA TATARICA											
LAPPULA REDOWSKII						<1	9	<1	8	<1	9
LAPPULA SQUARROSA											

Table C3.--(continued)

SPECIES	TYPE NO:	18		19		20		21		22	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
LEPIDIUM DENSIFLORUM		<1	20			<1	18	<1	8	<1	5
LEPIDIUM PERFOLIATUM								<1	8		
LESQUERELLA ALPINA				<1	100					<1	5
LESQUERELLA LUDOVICIANA										<1	14
LIATRIS PUNCTATA		<1	80	<1	100			<1	25	<1	27
LINUM AUSTRALE						<1	27	<1	8	2	27
LINUM PERENNE										<1	9
LINUM RIGIDUM											
LITHOSPERMUM INCISUM											
LOGFIA ARVENSIS						<1	18				
LOMATIUM FOENICULACEUM		<1	20					<1	17	<1	9
LOMATIUM MACROCARPUM						<1	18	<1	8	<1	5
LUPINUS ARGENTEUS											
LUPINUS PUSILLUS		<1	20								
LYGODESMIA JUNCEA		<1	20							<1	9
MACHAERANTHERA CANESCENS											
MACHAERANTHERA GRINDELIOIDES										<1	9
MACHAERANTHERA PINNATIFIDA						<1	18	<1	25	<1	45
MELILOTUS ALBA								<1	17		
MELILOTUS OFFICINALIS				<1	100	<1	36	<1	17	<1	5
MENTZELIA ALBICAULIS						<1	9				
MINUARTIA PUNGENS											
MIRABILIS LINEARIS						<1	9				
MOEHRINGIA LATERIFLORA											
MONARDA FISTULOSA											
MUSINEON DIVARICATUM											
OENOTHERA NUTTALLII		<1	20								
OROBANCHE FASCICULATA		<1	20								
ORTHOCARPUS LUTEUS						<1	27			<1	5
OXYTROPIS CAMPESTRIS										<1	14
OXYTROPIS LAMBERTII		<1	20	<1	100	3	9			<1	9
OXYTROPIS SERICEA		<1	60							<1	9
OXYTROPIS SPLENDENS											
PENSTEMON ALBIDUS		<1	20	<1	100	<1	27	<1	8	<1	55
PENSTEMON NITIDUS						<1	9	<1	8	<1	9
PICRADENIOPSIS OPPOSITIFOLIA						<1	9				
PHACELIA LINEARIS		<1	20			<1	18				
PHLOX ALYSSIFOLIA											
PHLOX HOODII		<1	20	<1	100	<1	55	1	75	1	73
PLANTAGO PATAGONICA		<1	20			1	36	<1	50	2	27
POLYGALA ALBA											
POLYGONUM MONSPELIENSIS						<1	9				
POLYGONUM DOUGLASII								<1	8		
POLYGONUM RAMOSISSIMUM											
POTENTILLA GRACILIS										<1	5
POTENTILLA PENSYLVANICA		<1	60			<1	9	<1	33	<1	23
PSORALEA ARGOPHYLLA				<1	100	<1	64	<1	8	<1	32
PSORALEA ESCULENTA										<1	5
PSORALEA LANCEOLATA										<1	5
PULSATILLA PATENS										<1	23
RATIBIDA COLUMNIFERA				<1	100	<1	45	<1	17	<1	14
SALSOLA AUSTRALIS											
SEDUM LANCEOLATUM		<1	20								
SENECIO CANUS						<1	18			<1	14
SILENE DRUMMONDII											
SILENE SCOULERI								<1	8		
SISYMBRIUM ALTISSIMUM		<1	20			<1	18				
SISYRINCHIUM MONTANUM										<1	5
SMILACINA STELLATA											
SOLANUM TRIFLORUM											
SOLIDAGO MISSOURIENSIS		<1	20			1	36	<1	8	<1	23
SOLIDAGO MOLLIS						<1	9	<1	17	<1	5

Table C3.--(continued)

SPECIES	TYPE NO:	18		19		20		21		22	
		COV	CON	COV	CON	COV	CON	COV	CON	COV	CON
SPHAERALCEA COCCINEA		<1	20			<1	64	<1	92	<1	77
STELLARIA MEDIA										3	5
STEPHANOMERIA RUNCINATA						<1	9				
TARAXACUM OFFICINALE		<1	40	<1	100	<1	55	<1	17	<1	9
TETRANEURIS ACAULIS		<1	20							<1	9
THERMOPSIS RHOMBIFOLIA		<1	100			<1	45			2	18
THLASPI ARVENSE										<1	5
TRADESCANTIA OCCIDENTALIS										<1	5
TRAGOPOGON DUBIUS		<1	80	<1	100	<1	45	<1	42	<1	18
TRIODANIS LEPTOCARPA				<1	100						
VICIA AMERICANA		<1	40	3	100	<1	64	<1	33	<1	14
ZIGADENUS VENENOSUS		<1	20			<1	36	1	25	<1	9
GRAMINOIDS											
AGROPYRON CRISTATUM								<1	8	<1	5
AGROSTIS SCABRA						<1	18				
ARISTIDA PURPUREA				<1	100	<1	9	3	8	<1	9
BOUTELOUA GRACILIS		<1	40	<1	100	4	55	14	100	10	86
BROMUS HORDEACEUS								<1	8		
BROMUS JAPONICUS						<1	27				
BROMUS TECTORUM		1	80								
CALAMOVILFA LONGIFOLIA										<1	5
CAREX ELEOCHARIS		<1	40			13	36	2	75	2	45
CAREX FILIFOLIA		6	100			8	55	6	50	9	86
CAREX FOENEA											
CAREX INOPS						5	18			<1	9
CAREX ROSSII											
DISTICHLIS SPICATA						10	9			3	5
ELYMUS ELYMOIDES						<1	9			<1	5
ELYMUS GLAUCUS											
ELYMUS LANCEOLATUS						<1	18	30	17	4	55
ELYMUS TRACHYCAULIS											
FESTUCA CAMPESTRIS											
FESTUCA IDAHOENSIS											
JUNCUS BALTICUS											
KOELERIA MACRANTHA		10	100	<1	100	4	82	10	100	6	95
MUHLENBERGIA CUSPIDATA						2	45	<1	17	3	27
ORYZOPSIS HYMENOIDES											
ORYZOPSIS MICRANTHA											
PASCOPYRUM SMITHII		<1	20	3	100	45	91	18	83	1	45
POA ARIDA						30	9				
POA CUSICKII											
POA GLAUCIFOLIA											
POA NEVADENSIS						<1	9				
POA PRATENSIS						<1	9			<1	5
POA SECUNDA		4	100	<1	100	<1	36	7	75	<1	36
PSEUDOROEGNERIA SPICATA		46	100	70	100						
SCHIZACHYRIUM SCOPARIUM						<1	9	<1	8	<1	5
SPOROBOLUS CRYPTANDRUS										<1	14
STIPA COMATA		7	80	<1	100	6	64	22	75	36	91
STIPA SPARTEA										50	9
STIPA VIRIDULA				3	100	13	82	5	25	4	18
VULPIA OCTOFLORA								<1	8		
FERNS/ALLIES											
CRYPTOGRAMMA CRISPA											
SELAGINELLA DENSA		52	100			15	73	66	83	49	73
WOODSIA OREGANA		10	20								

Table C3.--(continued)

SPECIES	TYPE NO:	23 (N = 3)		24 (N = 2)	
		COV	CON	COV	CON
TREES					
FRAXINUS PENNSYLVANICA					
JUNIPERUS SCOPULORUM					
PINUS CONTORTA					
PINUS PONDEROSA		<1	33		
PSEUDOTSUGA MENZIESII					
SHRUBS					
ARCTOSTAPHYLOS UVA-URSI					
ARTEMISIA CANA		<1	33		
ARTEMISIA (FILIFOLIA?)					
ARTEMISIA FRIGIDA		<1	33		
ARTEMISIA LONGIFOLIA				3	50
ARTEMISIA TRIDENTATA				<1	50
ATRIPLEX CONFERTIFOLIA					
ATRIPLEX GARDNERI					
CERATOIDES LANATA					
CHRYSOTHAMNUS NAUSEOSUS				3	100
CHRYSOTHAMNUS VISCIDIFLORUS					
CORYPHANTHA VIVIPARA					
ELEAGNUS COMMUTATA					
GUTIERREZIA SAROTHRAE		<1	33		
JUNIPERUS COMMUNIS					
JUNIPERUS HORIZONTALIS					
OPUNTIA POLYACANTHA		2	67	<1	50
PRUNUS VIRGINIANA					
RHUS TRILOBATA		<1	67		
RIBES CEREUM					
ROSA ARKANSANA		7	67	7	100
ROSA WOODSII					
SARCOBATUS VERMICULATUS					
SHEPHERDIA ARGENTEA					
SHEPHERDIA CANADENSIS					
SUAEDA MOQUINII					
SYMPHORICARPOS OCCIDENTALIS					
SYMPHORICARPOS OREOPHILUS					
YUCCA GLAUCA		15	67		
FORBS					
ACHILLEA MILLEFOLIUM					
AGOSERIS GLAUCA					
ALLIUM CERNUUM					
ALLIUM TEXTILE					
ALYSSUM DESERTORUM					
ANDROSACE SEPTENTRIONALIS					
ANEMONE MULTIFIDA					
ANTENNARIA MICROPHYLLA					
ANTENNARIA PARVIFOLIA		<1	33		
APOCYNUM ANDROSAEMIFOLIUM					
APOCYNUM CANNABINUM		<1	33	<1	50
ARABIS HOLBOELLII					
ARENARIA CONGESTA					
ARTEMISIA CAMPESTRIS		<1	33		
ARTEMISIA DRACUNCULUS					
ARTEMISIA LUDOVICIANA					
ASTER FALCATUS				<1	50
ASTER FOLIACEUS					

Table C3.--(continued)

SPECIES	TYPE NO:	23		24	
		COV	CON	COV	CON
ASTER LAEVIS					
ASTER SIBIRICUS					
ASTRAGALUS ADSURGENS					
ASTRAGALUS AGRESTIS					
ASTRAGALUS BISULCATUS					
ASTRAGALUS DRUMMONDII					
ASTRAGALUS GILVIFLORUS		<1	33		
ASTRAGALUS LOTIFLORUS		<1	33		
ASTRAGALUS MISSOURIENSIS		<1	33		
ASTRAGALUS PECTINATUS					
ASTRAGALUS PURSHII					
ATRIPLEX SUCKLEYI					
BESSEYA WYOMINGENSIS					
CALOCHORTUS NUTTALLII					
CAMELINA MICROCARPA					
CAMPANULA ROTUNDIFOLIA					
CERASTIUM ARVENSE					
CERASTIUM NUTANS					
CHAMAESYCE SERPENS					
CHENOPODIUM ALBUM					
CHENOPODIUM DESICCATUM					
CIRSIUM ARVENSE					
CIRSIUM UNDULATUM		<1	33		
COLLOMIA LINEARIS				<1	50
COMANDRA UMBELLATA				<1	50
CONRINGIA ORIENTALIS					
CREPIS OCCIDENTALIS					
CRYPTANTHA CELOSIOIDES					
DALEA CANDIDA		<1	33		
DALEA PURPUREA					
DESCURAINIA PINNATA					
DESCURAINIA RICHARDSONII					
DESCURAINIA SOPHIA				<1	50
EPILOBIUM PANICULATUM					
ERIGERON CAESPITOSUS					
ERIGERON COMPOSITUS					
ERIGERON OCHROLEUCUS					
ERIGERON PUMILUS					
ERIGERON SPECIOSUS					
ERIOGONUM FLAVUM		<1	33		
ERIOGONUM OVALIFOLIUM					
ERIOGONUM PAUCIFLORUM				<1	100
ERYSIMUM ASPERUM		<1	33		
ERYSIMUM INCONSPICUUM					
EUPHORBIA SPATHULATA					
GAILLARDIA ARISTATA					
GALIUM BOREALE		<1	33		
GAURA COCCINEA					
GEUM TRIFLORUM					
GLYCYRRHIZA LEPIDOTA					
GRINDELIA SQUARROSA					
HEDEOMA HISPIDUM					
HELIANTHUS ANNUUS				<1	50
HETEROTHECA VILLOSA		<1	33		
HEUCHERA RICHARDSONII					
HYMENOPAPPUS FILIFOLIUS					
HYMENOXYS RICHARDSONII					
IVA AXILLARIS					
LACTUCA SERRIOLA					
LACTUCA TATARICA					
LAPPULA REDOWSKII					
LAPPULA SQUARROSA					

Table C3.--(continued)

SPECIES	TYPE NO:	23		24	
		COV	CON	COV	CON
LEPIDIUM DENSIFLORUM					
LEPIDIUM PERFOLIATUM					
LESQUERELLA ALPINA					
LESQUERELLA LUDOVICIANA					
LIATRIS PUNCTATA		<1	67	<1	50
LINUM AUSTRALE					
LINUM PERENNE		<1	33		
LINUM RIGIDUM		<1	33		
LITHOSPERMUM INCISUM		<1	33		
LOGFIA ARVENSIS					
LOMATIUM FOENICULACEUM					
LOMATIUM MACROCARPUM					
LUPINUS ARGENTEUS					
LUPINUS PUSILLUS		<1	33		
LYGODESMIA JUNCEA		<1	33		
MACHAERANTHERA CANESCENS					
MACHAERANTHERA GRINDELIOIDES					
MACHAERANTHERA PINNATIFIDA					
MELILOTUS ALBA					
MELILOTUS OFFICINALIS					
MENTZELIA ALBICAULIS					
MINUARTIA PUNGENS					
MIRABILIS LINEARIS					
MOEHRINGIA LATERIFLORA					
MONARDA FISTULOSA					
MUSINEON DIVARICATUM					
OENOTHERA NUTTALLII					
OROBANCHE FASCICULATA					
ORTHOCARPUS LUTEUS					
OXYTROPIS CAMPESTRIS		<1	33		
OXYTROPIS LAMBERTII					
OXYTROPIS SERICEA					
OXYTROPIS SPLENDENS					
PENSTEMON ALBIDUS		1	100		
PENSTEMON NITIDUS				<1	50
PICRADENIOPSIS OPPOSITIFOLIA					
PHACELIA LINEARIS					
PHLOX ALYSSIFOLIA		<1	33		
PHLOX HOODII					
PLANTAGO PATAGONICA					
POLYGALA ALBA		<1	33		
POLYGONUM MONSPELIENSIS					
POLYGONUM DOUGLASII				<1	50
POLYGONUM RAMOSISSIMUM					
POTENTILLA GRACILIS					
POTENTILLA PENSYLVANICA					
PSORALEA ARGOPHYLLA					
PSORALEA ESCULENTA					
PSORALEA LANCEOLATA					
PULSATILLA PATENS		10	33		
RATIBIDA COLUMNIFERA					
SALSOLA AUSTRALIS					
SEDUM LANCEOLATUM					
SENECIO CANUS					
SILENE DRUMMONDII					
SILENE SCOULERI					
SISYMBRIUM ALTISSIMUM					
SISYRINCHIUM MONTANUM					
SMILACINA STELLATA					
SOLANUM TRIFLORUM					
SOLIDAGO MISSOURIENSIS		<1	33	<1	50
SOLIDAGO MOLLIS					

Table C3.--(continued)

SPECIES	TYPE NO:	23		24	
		COV	CON	COV	CON
SPHAERALCEA COCCINEA					
STELLARIA MEDIA					
STEPHANOMERIA RUNCINATA				<1	50
TARAXACUM OFFICINALE					
TETRANEURIS ACAULIS					
THERMOPSIS RHOMBIFOLIA		<1	33	<1	100
THLASPI ARVENSE					
TRADESCANTIA OCCIDENTALIS					
TRAGOPOGON DUBIUS					
TRIODANIS LEPTOCARPA					
VICIA AMERICANA					
ZIGADENUS VENENOSUS					
GRAMINOIDS					
AGROPYRON CRISTATUM					
AGROSTIS SCABRA					
ARISTIDA PURPUREA					
BOUTELOUA GRACILIS		2	100		
BROMUS HORDEACEUS					
BROMUS JAPONICUS					
BROMUS TECTORUM					
CALAMOVILFA LONGIFOLIA		10	33	12	100
CAREX ELEOCHARIS		3	33		
CAREX FILIFOLIA		15	67		
CAREX FOENEA					
CAREX INOPS				20	100
CAREX ROSSII					
DISTICHLIS SPICATA					
ELYMUS ELYMOIDES					
ELYMUS GLAUCUS					
ELYMUS LANCEOLATUS		<1	33		
ELYMUS TRACHYCAULIS					
FESTUCA CAMPESTRIS					
FESTUCA IDAHOENSIS					
JUNCUS BALTICUS					
KOELERIA MACRANTHA		<1	33	3	50
MUHLENBERGIA CUSPIDATA		5	67		
ORYZOPSIS HYMENOIDES		<1	33		
ORYZOPSIS MICRANTHA					
PASCOPYRUM SMITHII				<1	50
POA ARIDA					
POA CUSICKII					
POA GLAUCIFOLIA					
POA NEVADENSIS					
POA PRATENSIS					
POA SECUNDA				<1	50
PSEUDOROEGNERIA SPICATA					
SCHIZACHYRIUM SCOPARIUM		27	100	<1	50
SPOROBOLUS CRYPTANDRUS					
STIPA COMATA		1	100		
STIPA SPARTEA					
STIPA VIRIDULA				<1	50
VULPIA OCTOFLORA					
FERNS/ALLIES					
CRYPTOGRAMMA CRISPA					
SELAGINELLA DENSA					
WOODSIA OREGANA					

APPENDIX D

VEGETATION CHARACTERISTICS FOR EACH PLOT

Percent cover values have been converted into 1-column scalars as follows:

% COVER CONVERSION

. = (absent)
+ = < 1 %
1 = 1- 4.9 %
2 = 5-24.9 %
3 = 25-49.9 %
4 = 50-74.9 %
5 = 75-100 %

In these tables, type number codes are defined as follows:

Forest Communities (Table D1)

TYPE NO. 1 = PSEUDOTSUGA MENZIESII/SCHIZACHYRIUM SCOPARIUM
TYPE NO. 2 = PINUS PONDEROSA/PSEUDOROEGNERIA SPICATA
TYPE NO. 3 = PINUS PONDEROSA/JUNIPERUS SCOPULORUM
TYPE NO. 4 = JUNIPERUS SCOPULORUM/ORYZOPSIS MICRANTHA

Shrubland Communities (Table D2)

TYPE NO. 5 = RHUS TRILOBATA/PSEUDOROEGNERIA SPICATA
TYPE NO. 6 = ELEAGNUS COMMUTATA/PASCOPYRUM SMITHII
TYPE NO. 7 = ARTEMISIA TRIDENTATA/FESTUCA CAMPESTRIS
TYPE NO. 8 = ARTEMISIA TRIDENTATA/PSEUDOROEGNERIA SPICATA
TYPE NO. 9 = ARTEMISIA TRIDENTATA/PASCOPYRUM SMITHII
TYPE NO. 10 = ARTEMISIA CANA/STIPA COMATA
TYPE NO. 11 = ARTEMISIA CANA/PASCOPYRUM SMITHII
TYPE NO. 12 = CERATOIDES LANATA/STIPA COMATA
TYPE NO. 13 = JUNIPERUS HORIZONTALIS/SCHIZACHYRIUM SCOPARIUM
TYPE NO. 14 = ATRIPLEX CONFERTIFOLIA-ARTEMISIA TRIDENTATA
TYPE NO. 15 = SARCOBATUS VERMICULATUS/PASCOPYRUM SMITHII
TYPE NO. 16 = SARCOBATUS VERMICULATUS-ATRIPLEX GARDNERI
TYPE NO. 17 = ARTEMISIA LONGIFOLIA/ORYZOPSIS HYMENOIDES

Grassland Communities (Table D3)

TYPE NO. 18 = PSEUDOROEGNERIA SPICATA-POA SECUNDA
TYPE NO. 19 = PSEUDOROEGNERIA SPICATA-PASCOPYRUM SMITHII
TYPE NO. 20 = PASCOPYRUM SMITHII-STIPA VIRIDULA
TYPE NO. 21 = PASCOPYRUM SMITHII-BOUTELOUA GRACILIS
TYPE NO. 22 = STIPA COMATA-BOUTELOUA GRACILIS
TYPE NO. 23 = SCHIZACHYRIUM SCOPARIUM-MUHLENBERGIA CUSPIDATA
TYPE NO. 24 = CALAMOVILFA LONGIFOLIA-CAREX INOPS

Table D1.--Forest plots.

SPECIES	TYPE NO:0000000000000000 1233333333333334 PI:DDDDDLLLLLLLLLD PLOT NO:0000000000000000 4422223334666770 7823980573012234
TREES	
FRAXINUS PENNSYLVANICA	2
JUNIPERUS SCOPULORUM	..33223+3213.1+5
PINUS CONTORTA	2..............
PINUS PONDEROSA	2+4443432223212.
PSEUDOTSUGA MENZIESII	1.....+.........
SHRUBS	
ARCTOSTAPHYLOS UVA-URSI	.....
ARTEMISIA CANA	....+...+.....2.
ARTEMISIA (FILIFOLIA?)	.........+.....
ARTEMISIA FRIGIDA	+1.+2.+.++.+..+.
ARTEMISIA LONGIFOLIA	...........++..
ARTEMISIA TRIDENTATA	...+.....+.+.++.
ATRIPLEX CONFERTIFOLIA	.....
ATRIPLEX GARDNERI	.....
CERATOIDES LANATA	.....
CHRYSOTHAMNUS NAUSEOSUS	....++..+.+.+2..
CHRYSOTHAMNUS VISCIDIFLORUS	.....
CORYPHANTHA VIVIPARA	.....
ELEAGNUS COMMUTATA	.....
GUTIERREZIA SAROTHRAE	..+.+....+.+..+.
JUNIPERUS COMMUNIS	2
JUNIPERUS HORIZONTALIS	.....
OPUNTIA POLYACANTHA	.+++.+...+++++++
PRUNUS VIRGINIANA	21.....1
RHUS TRILOBATA	...+.++.++.+..+1
RIBES CEREUM	+.....+....
ROSA ARKANSANA	.....+..+.+2..
ROSA WOODSII	1.....
SARCOBATUS VERMICULATUS	.....
SHEPHERDIA ARGENTEA	.....
SHEPHERDIA CANADENSIS	1.....
SUAEDA MOQUINII	.....
SYMPHORICARPOS OCCIDENTALIS	12....+.+.....
SYMPHORICARPOS OREOPHILUS	...+.....
YUCCA GLAUCA	.1...+.+.+....+.
FORBS	
ACHILLEA MILLEFOLIUM	+1++.+++.+.+...+
AGOSERIS GLAUCA	.....
ALLIUM CERNUUM	.....++.
ALLIUM TEXTILE	.+++++++.+++....
ALYSSUM DESERTORUM	....+.....
ANDROSACE SEPTENTRIONALIS	.....+....
ANEMONE MULTIFIDA	.....+....
ANTENNARIA MICROPHYLLA	....++++++.+....
ANTENNARIA PARVIFOLIA	..++.....
APOCYNUM ANDROSAEMIFOLIUM	2.....
APOCYNUM CANNABINUM	.....
ARABIS HOLBOELLII	....+...+..+....
ARENARIA CONGESTA	.+.....
ARTEMISIA CAMPESTRIS	+.....+.

Table D1.--(continued)

SPECIES	TYPE NO:0000000000000000 1233333333333334 PI:DDDDDLLLLLLLLLD PLOT NO:0000000000000000 4422223334666770 7823980573012234
ARTEMISIA DRACUNCULUS	+.....
ARTEMISIA LUDOVICIANA	.1....+..+.....
ASTER FALCATUS	++...+++.+.....
ASTER FOLIACEUS	.....
ASTER LAEVIS	+.....
ASTER SIBIRICUS	+.....
ASTRAGALUS ADSURGENS	....+...+.....+.
ASTRAGALUS AGRESTIS	......1.....
ASTRAGALUS BISULCATUS	.....
ASTRAGALUS DRUMMONDII	.....
ASTRAGALUS GILVIFLORUS	..........+..+.
ASTRAGALUS LOTIFLORUS	.....
ASTRAGALUS MISSOURIENSIS	.....+.
ASTRAGALUS PECTINATUS	.....
ASTRAGALUS PURSHII	.....
ATRIPLEX SUCKLEYI	.....
BESSEYA WYOMINGENSIS	........+..+....
CALOCHORTUS NUTTALLII	......++.....
CAMELINA MICROCARPA	.....
CAMPANULA ROTUNDIFOLIA	+.......+.....
CERASTIUM ARVENSE	.2.....
CERASTIUM NUTANS	.....
CHAMAESYCE SERPENS	.....
CHENOPODIUM ALBUM	.....+.+...++...
CHENOPODIUM DESICCATUM	.....
CIRSIUM ARVENSE	+.....
CIRSIUM UNDULATUM	++.....
COLLOMIA LINEARIS	.....+++...+++..
COMANDRA UMBELLATA	......++....+...
CONRINGIA ORIENTALIS	.....
CREPIS OCCIDENTALIS	.........+.+....
CRYPTANTHA CELOSIOIDES	.....
DALEA CANDIDA	.....+.+.
DALEA PURPUREA	.....+..
DESCURAINIA PINNATA	...+.....
DESCURAINIA RICHARDSONII	.....
DESCURAINIA SOPHIA	.....
EPILOBIUM PANICULATUM	+......+.....
ERIGERON CAESPITOSUS	.....
ERIGERON COMPOSITUS	.....
ERIGERON OCHROLEUCUS	........+.....+.
ERIGERON PUMILUS	....+......+....
ERIGERON SPECIOSUS	.....
ERIOGONUM FLAVUM	..........+..+.
ERIOGONUM OVALIFOLIUM	.....+...
ERIOGONUM PAUCIFLORUM	..........+..++.
ERYSIMUM ASPERUM	.....
ERYSIMUM INCONSPICUUM	.......+.....
EUPHORBIA SPATHULATA	.....
GAILLARDIA ARISTATA	.+..+.....
GALIUM BOREALE	1+.....
GAURA COCCINEA	.....
GEUM TRIFLORUM	.....
GLYCYRRHIZA LEPIDOTA	..........+.....
GRINDELIA SQUARROSA	..........+.....
HEDEOMA HISPIDUM	.....
HELIANTHUS ANNUUS	.......+.....+..

Table 01.--(continued)

SPECIES	TYPE NO:0000000000000000 1233333333333334 PI:DDDDDLLLLLLLLLD PLOT NO:0000000000000000 4422223334666770 7823980573012234
HETEROTHECA VILLOSA	+1.....+.....+.
HEUCHERA RICHARDSONII	.....
HYMENOPAPPUS FILIFOLIUS	....+.....+.
HYMENOXYS RICHARDSONII	.....+.....
IVA AXILLARIS	.....+.....
LACTUCA SERRIOLA	.....+++...+....
LACTUCA TATARICA	.....+.....
LAPPULA REDOWSKII	.....
LAPPULA SQUARROSA	.....
LEPIDIUM DENSIFLORUM	.....+....++..
LEPIDIUM PERFOLIATUM	.....
LESQUERELLA ALPINA	.....+.
LESQUERELLA LUDOVICIANA	.....
LIATRIS PUNCTATA	++...+...+++....
LINUM AUSTRALE	.....
LINUM PERENNE	.....+....
LINUM RIGIDUM	.....
LITHOSPERMUM INCISUM	.....
LOGFIA ARVENSIS	.....
LOMATIUM FOENICULACEUM	...+.....
LOMATIUM MACROCARPUM	.....
LUPINUS ARGENTEUS	.....
LUPINUS PUSILLUS	.....
LYGODESMIA JUNCEA	.....
MACHAERANTHERA CANESCENS	.....
MACHAERANTHERA GRINDELIOIDES	.....+.
MACHAERANTHERA PINNATIFIDA	.....
MELILOTUS ALBA	.....
MELILOTUS OFFICINALIS	..++..+++++.++.
MENTZELIA ALBICAULIS	.....
MINUARTIA PUNGENS	.....+.+.....
MIRABILIS LINEARIS	.....
MOEHRINGIA LATERIFLORA	.....+
MONARDA FISTULOSA	+.....
MUSINEON DIVARICATUM	.....+.....+..
OENOTHERA NUTTALLII	.....
OROBANCHE FASCICULATA	.+.....
ORTHOCARPUS LUTEUS	.....
OXYTROPIS CAMPESTRIS	.....
OXYTROPIS LAMBERTII	.....+.....
OXYTROPIS SERICEA	....+.....
OXYTROPIS SPLENDENS	.....
PENSTEMON ALBIDUS	.....+.
PENSTEMON NITIDUS	.....+..+..
PICRADENIOPSIS OPPOSITIFOLIA	.....
PHACELIA LINEARIS	.+++.+.+.....
PHLOX ALYSSIFOLIA	.....
PHLOX HOODII	.....+....+.
PLANTAGO PATAGONICA	.....
POLYGALA ALBA	.....
POLYGONUM MONSPELIENSIS	.....
POLYGONUM DOUGLASII	.....
POLYGONUM RAMOSISSIMUM	.....+...
POTENTILLA GRACILIS	.....
POTENTILLA PENSYLVANICA	.....+.....
PSORALEA ARGOPHYLLA	.^--..-.....-.
PSORALEA ESCULENTA	.....

Table D1.--(continued)

SPECIES	TYPE NO:0000000000000000 1233333333333334 PI:DDDDDLLLLLLLLLD PLOT NO:0000000000000000 4422223334666770 7823980573012234
PSORALEA LANCEOLATA	.....
PULSATILLA PATENS	....+.....
RATIBIDA COLUMNIFERA	.....
SALSOLA AUSTRALIS	.....
SEDUM LANCEOLATUM	.....
SENECIO CANUS	.....
SILENE DRUMMONDII	.....
SILENE SCOULERI	..+.....
SISYMBRIUM ALTISSIMUM	.....
SISYRINCHIUM MONTANUM	.....
SMILACINA STELLATA	.....+
SOLANUM TRIFLORUM	.....
SOLIDAGO MISSOURIENSIS	+...+++.++.+.+..
SOLIDAGO MOLLIS	.....
SPHAERALCEA COCCINEA	.....+.....
STELLARIA MEDIA	.....
STEPHANOMERIA RUNCINATA	.....+++..+.+++.
TARAXACUM OFFICINALE	.....+..+....+
TETRANEURIS ACAULIS	....+.....+.
THERMOPSIS RHOMBIFOLIA	++.....+....11..
THLASPI ARVENSE	.....
TRADESCANTIA OCCIDENTALIS	.....
TRAGOPOGON DUBIUS	++.....
TRIODANIS LEPTOCARPA	.....+.....
VICIA AMERICANA	..++.+++.+.+.+..
ZIGADENUS VENENOSUS	.+.....
GRAMINOIDS	
AGROPYRON CRISTATUM	.....
AGROSTIS SCABRA	+.....
ARISTIDA PURPUREA	..+....+.....
BOUTELOUA GRACILIS	.+11+..+.+...++.
BROMUS HORDEACEUS	.....
BROMUS JAPONICUS	.....+.....
BROMUS TECTORUM	+.....
CALAMOVILFA LONGIFOLIA	.....+..+.22..
CAREX ELEOCHARIS	.....
CAREX FILIFOLIA	..+11...++.+..1.
CAREX FOENEA	.....
CAREX INOPS	+132.313.1.122..
CAREX ROSSII	....+.....
DISTICHLIS SPICATA	.....
ELYMUS ELYMOIDES	.....
ELYMUS GLAUCUS	+.....
ELYMUS LANCEOLATUS	.....11..
ELYMUS TRACHYCAULIS	.....
FESTUCA CAMPESTRIS	.....
FESTUCA IDAHOENSIS	.....
JUNCUS BALTICUS	.....
KOELERIA MACRANTHA	+11+1...++.++.+.
MUHLENBERGIA CUSPIDATA	....1.....++.
ORYZOPSIS HYMENOIDES	.....
ORYZOPSIS MICRANTHA	.....+..+...2
PASCOPYRUM SMITHII	..21.+.2.11..+..
POA ARIDA	.....
POA CUSICKII	+.....+....

Table D1.--(continued)

SPECIES	TYPE NO:0000000000000000 1233333333333334 PI:DDDDDLLLLLLLLLD PLOT NO:0000000000000000 4422223334666770 7823980573012234
POA GLAUCIFOLIA	.....
POA NEVADENSIS	.....+
POA PRATENSIS	.....
POA SECUNDA	.++++++.....+..
PSEUDOROEGNERIA SPICATA	13.221223112..2.
SCHIZACHYRIUM SCOPARIUM	3..+.....+.
SPOROBOLUS CRYPTANDRUS	.....
STIPA COMATA	.2.....+.
STIPA SPARTEA	.....
STIPA VIRIDULA	.....+...
VULPIA OCTOFLORA	.....
FERNS/ALLIES	
CRYPTOGRAMMA CRISPA	.....
SELAGINELLA DENSA	.+.....
WOODSIA OREGANA	.+.....+.....

Table D2.--Shrubland plots.

SPECIES	TYPE NO: 0000000000000000000000011111111111111111111111111 5677838899999999999999900000001112223333334566666 PI: LDDDDLLLDDDDLLLLLLLLLLLDDDLLLLLLLLLLDDDLLLDLDDDLLL PLOT NO: 0000000000000000000000000000000000000000000000000000000 5122333702330000222245734424451460341256673301334 7778626424241457567928591537821492892106800139891
TREES	
FRAXINUS PENNSYLVANICA	.....
JUNIPERUS SCOPULORUM	.....1.....
PINUS CONTORTA	.....
PINUS PONDEROSA	.....+.....
PSEUDOTSUGA MENZIESII	.....
SHRUBS	
ARCTOSTAPHYLOS UVA-URSI	.....2.....
ARTEMISIA CANA	.1.....2233222332...11.....
ARTEMISIA (FILIFOLIA?)	.....
ARTEMISIA FRIGIDA	++++1+++1+..2.+11+1.++++++1+++1+1++2.++..+.+.....
ARTEMISIA LONGIFOLIA	.....+++.....+
ARTEMISIA TRIDENTATA	..134333323313422312431.....1+.....13.....2
ATRIPLEX CONFERTIFOLIA	.....2.....+
ATRIPLEX GARDNERI	.....+..++.....+.+++.....+.1+2.11
CERATOIDES LANATA	....+.....+...1.....222.....+.....
CHRYSOTHAMNUS NAUSEOSUS	.....++.....++..1.....+.2.....+..+.....+
CHRYSOTHAMNUS VISCIDIFLORUS	.....+.....
CORYPHANTHA VIVIPARA	.....+..+..+.....+.....+....+.....
ELEAGNUS COMMUTATA	.4.....
GUTIERREZIA SAROTHRAE	++..++++.....++++.+.+..+.....++.+..+...+.+....+
JUNIPERUS COMMUNIS	..++...+.....
JUNIPERUS HORIZONTALIS	.++.....244434.....
OPUNTIA POLYACANTHA	+...+++++1+11++++++++++.++++1++++.++.++...+1+....+
PRUNUS VIRGINIANA	.....
RHUS TRILOBATA	1.....1.....+...++.....+....+.....
RIBES CEREUM	.....
ROSA ARKANSANA	+.....+..+.+.....1+++++.....
ROSA WOODSII	.1.....+.....+.....
SARCOBATUS VERMICULATUS	.....+.....+.....2+23431
SHEPHERDIA ARGENTEA	.+.....
SHEPHERDIA CANADENSIS	.....
SUAEDA MOQUINII	.....++1+
SYMPHORICARPOS OCCIDENTALIS	1+.....2.....++.....+.....
SYMPHORICARPOS OREOPHILUS	.....
YUCCA GLAUCA	.....+.....+...+.....+
FORBS	
ACHILLEA MILLEFOLIUM	+++++.++++..+....+...+.1.....+++....+...+.....
AGOSERIS GLAUCA	..++.....+.....
ALLIUM CERNUUM	+.....+.....
ALLIUM TEXTILE	+.++...+.+++++.+..+.+++...++.....+.....++.
ALYSSUM DESERTORUM	....+.....
ANDROSACE SEPTENTRIONALIS	++.....+.....
ANEMONE MULTIFIDA	+..+.....+.....
ANTENNARIA MICROPHYLLA	..+2+..+.....+.....+.+.+..+.....+.+.+.....
ANTENNARIA PARVIFOLIA	.+.....+.....+.....
APOCYNUM ANDROSAEMIFOLIUM	.....
APOCYNUM CANNABINUM	.....
ARABIS HOLBOELLII	.+...++.....++..+.....+.....+..+.....
ARENARIA CONGESTA	...+.....
ARTEMISIA CAMPESTRIS	+.....+.....+...+.....

Table D2.--(continued)

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                                TYPE NO:00000000000000000000000011111111111111111111111111
                                        56778888999999999999999900000001112223333334566666666

                                     PI:LDDDDLLLLDDDDLLLLLLLLLLLLDDDLLLLLLLLLLLDDDLLLLDLDDDLLL
                                PLOT NO:00000000000000000000000000000000000000000000000000000000
                                        51223337023300002222457344244514603412566733013345
SPECIES                                 77786264242414575679285915378214928921068001398919
-------------------------------------------------------------------------------------------------
ARTEMISIA DRACUNCULUS                   .....................+.....................................
ARTEMISIA LUDOVICIANA                   .....................+1.1...................................
ASTER FALCATUS                          +.....++...+......+...+++.+....+........++.....++.....
ASTER FOLIACEUS                         ....................................+.....+..............
ASTER LAEVIS                            .....................................................
ASTER SIBIRICUS                         .....................................................
ASTRAGALUS ADSURGENS                    ......+.........+.....................+...............
ASTRAGALUS AGRESTIS                     ...................+.....................................
ASTRAGALUS BISULCATUS                   ..............................+......................
ASTRAGALUS DRUMMONDII                   .......+.............................................
ASTRAGALUS GILVIFLORUS                  ......++.............................++...............
ASTRAGALUS LOTIFLORUS                   ......................++.............................
ASTRAGALUS MISSOURIENSIS                .....+..........+.......+..+.....+.........+.......
ASTRAGALUS PECTINATUS                   .+.....................+.....................................
ASTRAGALUS PURSHII                      .....+++.............................................
ATRIPLEX SUCKLEYI                       .....................................3+32.
BESSEYA WYOMINGENSIS                    +.++.....................+.....................
CALOCHORTUS NUTTALLII                   .....+...+.........+.............+.....................
CAMELINA MICROCARPA                     .......+....+..................+.+.....................
CAMPANULA ROTUNDIFOLIA                  +.++.....................................................
CERASTIUM ARVENSE                       +.++.....................+......+.......+...............
CERASTIUM NUTANS                        .....................................................
CHAMAESYCE SERPENS                      ..............................................+......
CHENOPODIUM ALBUM                       ............+............+....+.....................
CHENOPODIUM DESICCATUM                  .....................................................
CIRSIUM ARVENSE                         .....................................................
CIRSIUM UNDULATUM                       +.........+............++..+.....................
COLLOMIA LINEARIS                       ...+...+..++++.....1..+........+.....................
COMANDRA UMBELLATA                      ++...+++.++1.+++..++++++....++.++.+..+++++.......+
CONRINGIA ORIENTALIS                    .....................................................
CREPIS OCCIDENTALIS                     +........+............+.............+...............
CRYPTANTHA CELOSIOIDES                  .....................................................
DALEA CANDIDA                           +......+................................+.........+
DALEA PURPUREA                          +....+++..........+.+.+....+............++........
DESCURAINIA PINNATA                     .....................................................
DESCURAINIA RICHARDSONII                .....................................................
DESCURAINIA SOPHIA                      ............+............+.........................
EPILOBIUM PANICULATUM                   .....................................................
ERIGERON CAESPITOSUS                    .+.....................................+...........
ERIGERON COMPOSITUS                     .....................................................
ERIGERON OCHROLEUCUS                    ..++...................+.............................
ERIGERON PUMILUS                        +...+...+...+...++..+....+.+.....1.........+.......
ERIGERON SPECIOSUS                      ..+..................................................
ERIOGONUM FLAVUM                        +..+.....................................+.+.........
ERIOGONUM OVALIFOLIUM                   +.....................................................
ERIOGONUM PAUCIFLORUM                   ..........................................+..........
ERYSIMUM ASPERUM                        .....................................................
ERYSIMUM INCONSPICUUM                   .+...+..+.+.+.+.......+....+..+++....................
EUPHORBIA SPATHULATA                    ..........++..........+..............................
GAILLARDIA ARISTATA                     +.+.....................+.............................
GALIUM BOREALE                          ..++.................................................
GAURA COCCINEA                          +....+..............+.++++++..+.......+....+.........
GEUM TRIFLORUM                          .+.....................+.............................
GLYCYRRHIZA LEPIDOTA                    ........................+...............+.............
GRINDELIA SQUARROSA                     ...................+......+...............1.....+.
HEDEOMA HISPIDUM                        .....................+....+.+.....................
HELIANTHUS ANNUUS                       ..............+.....+...........+..............+++
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Table D2.--(continued)

SPECIES	
	TYPE NO:00000000000000000000000011111111111111111111111111
	56778888999999999999999900000001112223333334566666
	PI:LDDDDLLLDDDDLLLLLLLLLLLLDDDLLLLLLLLLLDDDLLLDLDDDLLL
	PLOT NO:00000000000000000000000000000000000000000000000000
	51223337023300002222457344244514603412566733013345
	77786264242414575679285915378214928921068001398919
HETEROTHECA VILLOSA	++++..++.....+....1+++++.....
HEUCHERA RICHARDSONII	.....
HYMENOPAPPUS FILIFOLIUS	.....
HYMENOXYS RICHARDSONII	.....+..++.+...+.....+.....
IVA AXILLARIS	.....++.
LACTUCA SERRIOLA	.....+.....+.....++.
LACTUCA TATARICA	.....++.....
LAPPULA REDOWSKII	.....+....+.....+.....1.....++
LAPPULA SQUARROSA	.....+.....
LEPIDIUM DENSIFLORUM	.....+...+.....+++++
LEPIDIUM PERFOLIATUM	.....
LESQUERELLA ALPINA	.....+.....+.....
LESQUERELLA LUDOVICIANA	.....
LIATRIS PUNCTATA	+.....+.....+.+..+..+.....+...++.....
LINUM AUSTRALE	+...+.++.....+.+..++.....+.....
LINUM PERENNE	...+...+..1.....+.....
LINUM RIGIDUM	....+.....
LITHOSPERMUM INCISUM	.....
LOGFIA ARVENSIS	.....
LOMATIUM FOENICULACEUM	.....+.....+.....
LOMATIUM MACROCARPUM	+.+.....+.....
LUPINUS ARGENTEUS	..++.....
LUPINUS PUSILLUS	......+.....
LYGODESMIA JUNCEA	.....
MACHAERANTHERA CANESCENS	.....+.....+..+.+.+
MACHAERANTHERA GRINDELIOIDES	.....
MACHAERANTHERA PINNATIFIDA	.....+..+.....
MELILOTUS ALBA	.....+.....
MELILOTUS OFFICINALIS	+....+++..+.+...+.+1.++..+..+..1+++..+..+1.....++.
MENTZELIA ALBICAULIS	.....+.....
MINUARTIA PUNGENS	.....
MIRABILIS LINEARIS	.....
MOEHRINGIA LATERIFLORA	.....
MONARDA FISTULOSA	.....
MUSINEON DIVARICATUM	......+......+.+..+...+.....+.....+.
OENOTHERA NUTTALLII	.....
OROBANCHE FASCICULATA	.....+..+...+.....+.+.....+.....
ORTHOCARPUS LUTEUS	..++.....+.....
OXYTROPIS CAMPESTRIS	.+.....+.....+...+.....
OXYTROPIS LAMBERTII	......+.....+.....
OXYTROPIS SERICEA	.....+.....+.....
OXYTROPIS SPLENDENS	...+.....
PENSTEMON ALBIDUS	++...+...+.....+++.....++..++...+...++.....
PENSTEMON NITIOUS	+.....+...+...+.....+.....+.....+++.....+
PICRADENIOPSIS OPPOSITIFOLIA	.....++.....
PHACELIA LINEARIS	.....++++++....+...+.....+.....
PHLOX ALYSSIFOLIA	.....
PHLOX HOODII	++...+++..1.+.+++.+.1.+....+.++.++.+.++.....+
PLANTAGO PATAGONICA	....+..++...+....+...+.+.+.+2++..++.....+.....+
POLYGALA ALBA	.....
POLYGONUM MONSPELIENSIS	.....
POLYGONUM DOUGLASII	.....
POLYGONUM RAMOSISSIMUM	.....+.+..
POTENTILLA GRACILIS	.+.....
POTENTILLA PENSYLVANICA	+..++.....+.....+.....
PSORALEA ARGOPHYLLA	.+...+++.+.....+.+2..+.++.+.+.....
PSORALEA ESCULENTA	+.....

Table D2.--(continued)

SPECIES	
	TYPE NO:00000000000000000000000011111111111111111111111111
	56778888999999999999999900000001112223333334566666
	PI:LDDDDLLLDDDDLLLLLLLLLLLDDDLLLLLLLLLLDDDLLLDLDDDLLL
	PLOT NO:00000000000000000000000000000000000000000000000000
	51223337023300002222457344244514603412566733013345
	77786264242414575679285915378214928921068001398919
PSORALEA LANCEOLATA	.....
PULSATILLA PATENS	.2.....
RATIBIDA COLUMNIFERA	......++.....+.....+.....+.....
SALSOLA AUSTRALIS	.....+.....
SEDUM LANCEOLATUM	.....+.....
SENECIO CANUS	.+.+.....++.....
SILENE DRUMMONDII	+.....
SILENE SCOULERI	.....
SISYMBRIUM ALTISSIMUM	.....
SISYRINCHIUM MONTANUM	.....
SMILACINA STELLATA	.....
SOLANUM TRIFLORUM	.....+.....
SOLIDAGO MISSOURIENSIS	.++.....+.....+++.....
SOLIDAGO MOLLIS	.....
SPHAERALCEA COCCINEA	....++.++++++..+++.++++.+++++++.++.+.....++.....+
STELLARIA MEDIA	.....
STEPHANOMERIA RUNCINATA	.....+..+.....
TARAXACUM OFFICINALE	.....+++..+...++++..+..+.+..++.+.....+.....
TETRANEURIS ACAULIS	.....
THERMOPSIS RHOMBIFOLIA	1.....+.....+.....++++1.....
THLASPI ARVENSE	.....
TRADESCANTIA OCCIDENTALIS	.....
TRAGOPOGON DUBIUS	++....++..++.....+.+.++++++.+..+..+.....++...+..
TRIODANIS LEPTOCARPA	.....
VICIA AMERICANA	.+.+++++++++++..+++++.....+++.....+.+.....+
ZIGADENUS VENENOSUS	...+.....+.....+.....
GRAMINOIDS	
AGROPYRON CRISTATUM	.....++...+.....+....
AGROSTIS SCABRA	.....
ARISTIDA PURPUREA	.....+.....+.....
BOUTELOUA GRACILIS	....2++313..3...+21++2++22.22121.2+1.....1.....+
BROMUS HORDEACEUS	.....
BROMUS JAPONICUS	+.....++..+.+.....+.....+..+.....++.
BROMUS TECTORUM	.....1.....+.....+.....
CALAMOVILFA LONGIFOLIA	.....+.....+.2.....+.2.1+31+.....+
CAREX ELEOCHARIS	....+1..2.....++..+..1.+.+++.+2..+2.....+.....
CAREX FILIFOLIA	.1+...++.1..+.....+..1++21..2.+..42+.22..+.....
CAREX FOENEA	...+.....
CAREX INOPS	..++.....1.....+.....++.1.....
CAREX ROSSII	.....
DISTICHLIS SPICATA	.....+.....
ELYMUS ELYMOIDES	.....+.....++.+.+++
ELYMUS GLAUCUS	.....
ELYMUS LANCEOLATUS	.2.....3+.....+.+.3.....1..+...+.
ELYMUS TRACHYCAULIS	...+.....
FESTUCA CAMPESTRIS	..54.....
FESTUCA IDAHOENSIS	..+2.....
JUNCUS BALTICUS	.....1.....
KOELERIA MACRANTHA	14++11+++2..+..+122++++2+1.+++2++1.+++++.+.+.....
MUHLENBERGIA CUSPIDATA	.....2+..+.....+..++.2.....+.....+
ORYZOPSIS HYMENOIDES	.....1.....+
ORYZOPSIS MICRANTHA	.....
PASCOPYRUM SMITHII	...+2++1233233132233223.1++.++311.+.....+3...+.1
POA ARIDA	..+.....
POA CUSICKII	.....

Table D2.--(continued)

	TYPE NO:00000000000000000000000011111111111111111111111111
	56778888999999999999999900000001112223333345666666
	PI:LDDDDLLLDDDDLLLLLLLLLLLDDDLLLLLLLLLLDDDLLLDLDDDLLL
	PLOT NO:00000000000000000000000000000000000000000000000000
	51223337023300002222457344244514603412566733013345
SPECIES	77786264242414575679285915378214928921068001398919
POA GLAUCIFOLIA	.......+.....
POA NEVADENSIS	.....
POA PRATENSIS	...+.....
POA SECUNDA	.+..++++32.+2++1+++.+.+2.+++++.+++++.....+.++...
PSEUDOROEGNERIA SPICATA	1.++4141.2+2.....1+..33.....24..32.....++
SCHIZACHYRIUM SCOPARIUM	.....1.....2+1112.....
SPOROBOLUS CRYPTANDRUS	.....
STIPA COMATA	32..++++...++...22..+..1334334++.313.....1.....
STIPA SPARTEA	.....
STIPA VIRIDULA	.+...2.21+11++22.122.11.....4+.....
VULPIA OCTOFLORA	.....++.....+.....
FERNS/ALLIES	
CRYPTOGRAMMA CRISPA	+.....
SELAGINELLA DENSA	44+.2..2.....+.44.....4.4+5+42.....3.....
WOODOSIA OREGANA	.....+.....

Table D2.--(continued)

SPECIES	TYPE NO:111 677 PI:LDD PLOT NO:000 733 657
TREES	
FRAXINUS PENNSYLVANICA	...
JUNIPERUS SCOPULORUM	...
PINUS CONTORTA	...
PINUS PONDEROSA	...
PSEUDOTSUGA MENZIESII	...
SHRUBS	
ARCTOSTAPHYLOS UVA-URSI	...
ARTEMISIA CANA	...
ARTEMISIA (FILIFOLIA?)	...
ARTEMISIA FRIGIDA	...
ARTEMISIA LONGIFOLIA	.23
ARTEMISIA TRIDENTATA	+..
ATRIPLEX CONFERTIFOLIA	...
ATRIPLEX GARDNERI	...
CERATOIDES LANATA	...
CHRYSOTHAMNUS NAUSEOSUS	...
CHRYSOTHAMNUS VISCIDIFLORUS	+..
CORYPHANTHA VIVIPARA	...
ELEAGNUS COMMUTATA	...
GUTIERREZIA SAROTHRAE	...
JUNIPERUS COMMUNIS	...
JUNIPERUS HORIZONTALIS	...
OPUNTIA POLYACANTHA	+..
PRUNUS VIRGINIANA	...
RHUS TRILOBATA	...
RIBES CEREUM	...
ROSA ARKANSANA	...
ROSA WOODSII	...
SARCOBATUS VERMICULATUS	3..
SHEPHERDIA ARGENTEA	...
SHEPHERDIA CANADENSIS	...
SUAEDA MOQUINII	+..
SYMPHORICARPOS OCCIDENTALIS	...
SYMPHORICARPOS OREOPHILUS	...
YUCCA GLAUCA	...
FORBS	
ACHILLEA MILLEFOLIUM	...
AGOSERIS GLAUCA	...
ALLIUM CERNUUM	...
ALLIUM TEXTILE	+..
ALYSSUM DESERTORUM	...
ANDROSACE SEPTENTRIONALIS	...
ANEMONE MULTIFIDA	...
ANTENNARIA MICROPHYLLA	...
ANTENNARIA PARVIFOLIA	...
APOCYNUM ANDROSAEMIFOLIUM	...
APOCYNUM CANNABINUM	...
ARABIS HOLBOELLII	...
ARENARIA CONGESTA	...
ARTEMISIA CAMPESTRIS	...

Table D2.--(continued)

SPECIES	TYPE NO:111 677 PI:LDD PLOT NO:000 733 657
ARTEMISIA DRACUNCULUS	...
ARTEMISIA LUDOVICIANA	...
ASTER FALCATUS	+..
ASTER FOLIACEUS	...
ASTER LAEVIS	...
ASTER SIBIRICUS	...
ASTRAGALUS ADSURGENS	...
ASTRAGALUS AGRESTIS	...
ASTRAGALUS BISULCATUS	...
ASTRAGALUS DRUMMONDII	...
ASTRAGALUS GILVIFLORUS	...
ASTRAGALUS LOTIFLORUS	...
ASTRAGALUS MISSOURIENSIS	...
ASTRAGALUS PECTINATUS	...
ASTRAGALUS PURSHII	...
ATRIPLEX SUCKLEYI	+..
BESSEYA WYOMINGENSIS	...
CALOCHORTUS NUTTALLII	...
CAMELINA MICROCARPA	...
CAMPANULA ROTUNDIFOLIA	...
CERASTIUM ARVENSE	...
CERASTIUM NUTANS	...
CHAMAESYCE SERPENS	...
CHENOPODIUM ALBUM	.++
CHENOPODIUM DESICCATUM	...
CIRSIUM ARVENSE	...
CIRSIUM UNDULATUM	...
COLLOMIA LINEARIS	...
COMANDRA UMBELLATA	...
CONRINGIA ORIENTALIS	+..
CREPIS OCCIDENTALIS	...
CRYPTANTHA CELOSIOIDES	...
DALEA CANDIDA	...
DALEA PURPUREA	...
DESCURAINIA PINNATA	+..
DESCURAINIA RICHARDSONII	...
DESCURAINIA SOPHIA	...
EPILOBIUM PANICULATUM	...
ERIGERON CAESPITOSUS	...
ERIGERON COMPOSITUS	...
ERIGERON OCHROLEUCUS	...
ERIGERON PUMILUS	...
ERIGERON SPECIOSUS	...
ERIOGONUM FLAVUM	...
ERIOGONUM OVALIFOLIUM	...
ERIOGONUM PAUCIFLORUM	..+
ERYSIMUM ASPERUM	...
ERYSIMUM INCONSPICUUM	...
EUPHORBIA SPATHULATA	...
GAILLARDIA ARISTATA	...
GALIUM BOREALE	...
GAURA COCCINEA	...
GEUM TRIFLORUM	...
GLYCYRRHIZA LEPIDOTA	...
GRINDELIA SQUARROSA	...
HEDEOMA HISPIDUM	...
HELIANTHUS ANNUUS	+..

Table D2.--(continued)

SPECIES	TYPE NO:111 677 PI:LDD PLOT NO:000 733 657
HETEROTHECA VILLOSA	...
HEUCHERA RICHARDSONII	...
HYMENOPAPPUS FILIFOLIUS	...
HYMENOXYS RICHARDSONII	...
IVA AXILLARIS	+..
LACTUCA SERRIOLA	+..
LACTUCA TATARICA	...
LAPPULA REDOWSKII	+..
LAPPULA SQUARROSA	...
LEPIDIUM DENSIFLORUM	+..
LEPIDIUM PERFOLIATUM	...
LESQUERELLA ALPINA	...
LESQUERELLA LUDOVICIANA	...
LIATRIS PUNCTATA	...
LINUM AUSTRALE	...
LINUM PERENNE	...
LINUM RIGIDUM	...
LITHOSPERMUM INCISUM	...
LOGFIA ARVENSIS	...
LOMATIUM FOENICULACEUM	...
LOMATIUM MACROCARPUM	...
LUPINUS ARGENTEUS	...
LUPINUS PUSILLUS	...
LYGODESMIA JUNCEA	...
MACHAERANTHERA CANESCENS	...
MACHAERANTHERA GRINDELIOIDES	...
MACHAERANTHERA PINNATIFIDA	...
MELILOTUS ALBA	...
MELILOTUS OFFICINALIS	+..
MENTZELIA ALBICAULIS	...
MINUARTIA PUNGENS	...
MIRABILIS LINEARIS	...
MOEHRINGIA LATERIFLORA	...
MONARDA FISTULOSA	...
MUSINEON DIVARICATUM	...
OENOTHERA NUTTALLII	...
OROBANCHE FASCICULATA	...
ORTHOCARPUS LUTEUS	...
OXYTROPIS CAMPESTRIS	...
OXYTROPIS LAMBERTII	...
OXYTROPIS SERICEA	...
OXYTROPIS SPLENDENS	...
PENSTEMON ALBIDUS	...
PENSTEMON NITIDUS	...
PICRADENIOPSIS OPPOSITIFOLIA	...
PHACELIA LINEARIS	...
PHLOX ALYSSIFOLIA	...
PHLOX HOODII	...
PLANTAGO PATAGONICA	...
POLYGALA ALBA	...
POLYGONUM MONSPELIENSIS	...
POLYGONUM DOUGLASII	...
POLYGONUM RAMOSISSIMUM	.+.
POTENTILLA GRACILIS	...
POTENTILLA PENSYLVANICA	...
PSORALEA ARGOPHYLLA	...
PSORALEA ESCULENTA	...

Table D2.--(continued)

SPECIES	TYPE NO:111 677 PI:LDD PLOT NO:000 733 657
PSORALEA LANCEOLATA	...
PULSATILLA PATENS	...
RATIBIDA COLUMNIFERA	...
SALSOLA AUSTRALIS	...
SEDUM LANCEOLATUM	...
SENECIO CANUS	...
SILENE DRUMMONDII	...
SILENE SCOULERI	...
SISYMBRIUM ALTISSIMUM	...
SISYRINCHIUM MONTANUM	...
SMILACINA STELLATA	...
SOLANUM TRIFLORUM	...
SOLIDAGO MISSOURIENSIS	...
SOLIDAGO MOLLIS	...
SPHAERALCEA COCCINEA	...
STELLARIA MEDIA	...
STEPHANOMERIA RUNCINATA	..+
TARAXACUM OFFICINALE	...
TETRANEURIS ACAULIS	...
THERMOPSIS RHOMBIFOLIA	...
THLASPI ARVENSE	...
TRADESCANTIA OCCIDENTALIS	...
TRAGOPOGON DUBIUS	...
TRIODANIS LEPTOCARPA	...
VICIA AMERICANA	...
ZIGADENUS VENENOSUS	...
GRAMINOIDS	
AGROPYRON CRISTATUM	...
AGROSTIS SCABRA	...
ARISTIDA PURPUREA	...
BOUTELOUA GRACILIS	...
BROMUS HORDEACEUS	...
BROMUS JAPONICUS	+..
BROMUS TECTORUM	...
CALAMOVILFA LONGIFOLIA	.+.
CAREX ELEOCHARIS	...
CAREX FILIFOLIA	...
CAREX FOENEA	...
CAREX INOPS	...
CAREX ROSSII	...
DISTICHLIS SPICATA	...
ELYMUS ELYMOIDES	+..
ELYMUS GLAUCUS	...
ELYMUS LANCEOLATUS	+..
ELYMUS TRACHYCAULIS	...
FESTUCA CAMPESTRIS	...
FESTUCA IDAHOENSIS	...
JUNCUS BALTICUS	...
KOELERIA MACRANTHA	...
MUHLENBERGIA CUSPIDATA	...
ORYZOPSIS HYMENOIDES	.++
ORYZOPSIS MICRANTHA	...
PASCOPYRUM SMITHII	2..
POA ARIDA	...
POA CUSICKII	...

Table D2.--(continued)

SPECIES	TYPE NO:111 677 PI:LDD PLOT NO:000 733 657
POA GLAUCIFOLIA	...
POA NEVADENSIS	...
POA PRATENSIS	...
POA SECUNDA	1..
PSEUDOROEGNERIA SPICATA	...
SCHIZACHYRIUM SCOPARIUM	...
SPOROBOLUS CRYPTANDRUS	...
STIPA COMATA	...
STIPA SPARTEA	...
STIPA VIRIDULA	...
VULPIA OCTOFLORA	...
FERNS/ALLIES	
CRYPTOGRAMMA CRISPA	...
SELAGINELLA DENSA	...
WOODSIA OREGANA	...

Table D3.--Grassland plots.

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                                TYPE NO:1111112222222222222222222222222222222222222222222222
                                        8888890000000000011111111111122222222222222222222
                                
                                     PI:DDDDLLLLLLLLLLLLLDDDDDDLLLLLLDDDDDDDDDLLLLLLLLLLL
                                PLOT NO:00000000000000000000000000000000000000000000000000
                                        4445530112225566700112400114500001113441111124455 6
SPECIES                                 0491646261243545115680389055067891451263478900614 3
-------------------------------------------------------------------------------------------

     TREES

FRAXINUS PENNSYLVANICA          ..............................................
JUNIPERUS SCOPULORUM            ..............................................
PINUS CONTORTA                  ..............................................
PINUS PONDEROSA                 ..............................................
PSEUDOTSUGA MENZIESII           ..............................................

     SHRUBS

ARCTOSTAPHYLOS UVA-URSI         ..............................................
ARTEMISIA CANA                  +.....+...1.+++++...++.+.++.....++.+.1++..+....+..
ARTEMISIA (FILIFOLIA?)          ..............................................
ARTEMISIA FRIGIDA               ++22+++1+2++1+++111211+1+1+++2+11221.11.22++11++1+
ARTEMISIA LONGIFOLIA            ..............................................
ARTEMISIA TRIDENTATA            ......+....1.....1.................+........+....
ATRIPLEX CONFERTIFOLIA          ..............................................
ATRIPLEX GARDNERI               ..................+.......+.....................
CERATOIDES LANATA               ............+........+.....+.......1.+.++..11++..
CHRYSOTHAMNUS NAUSEOSUS         .....++.......................................
CHRYSOTHAMNUS VISCIDIFLORUS     ..............................................
CORYPHANTHA VIVIPARA            ..............................+..+.+.....+.....+..
ELEAGNUS COMMUTATA              ..............................................
GUTIERREZIA SAROTHRAE           ....++++.+.+...++.....++++.+....++.+..+.+.++.+..++
JUNIPERUS COMMUNIS              ..............................................
JUNIPERUS HORIZONTALIS          ..............................................
OPUNTIA POLYACANTHA             +....+...2+.++...++.+1++.+.+1+...1..+++.+...1++++.
PRUNUS VIRGINIANA               ...+..........................................
RHUS TRILOBATA                  ..............................................
RIBES CEREUM                    ..............................................
ROSA ARKANSANA                  .+.++.1+...+.........+.........2.......2..1.....+.
ROSA WOODSII                    ................+............+.................
SARCOBATUS VERMICULATUS         .........1....................................
SHEPHERDIA ARGENTEA             ..............................................
SHEPHERDIA CANADENSIS           ..............................................
SUAEDA MOQUINII                 ..............................................
SYMPHORICARPOS OCCIDENTALIS     ...+.......+..................+...............
SYMPHORICARPOS OREOPHILUS       ..............................................
YUCCA GLAUCA                    .....+.............1..........................

     FORBS

ACHILLEA MILLEFOLIUM            +..++++++++..+++...1..+.+.+....+++1..+....+.......
AGOSERIS GLAUCA                 ...+.........++...........+...................
ALLIUM CERNUUM                  ...++.........................................
ALLIUM TEXTILE                  ++.....+.+.....+..+.+......+.++..........+..++...
ALYSSUM DESERTORUM              ..............................................
ANDROSACE SEPTENTRIONALIS       ............................++.....+..........+
ANEMONE MULTIFIDA               .+..+.....................+..............++......
ANTENNARIA MICROPHYLLA          ..+++.1+++.+.+++......++++++.........++.+.+...+..+
ANTENNARIA PARVIFOLIA           ................+.++.........+++++.............
APOCYNUM ANDROSAEMIFOLIUM       ..............................................
APOCYNUM CANNABINUM             ..............................................
ARABIS HOLBOELLII               .....+.++......+.+..++.+...+.+...+...++...++.+.+.....
ARENARIA CONGESTA               ..+1.........++......+..............+..+.....
ARTEMISIA CAMPESTRIS            ++.....................................+...+.....
```

Table D3.--(continued)

SPECIES	TYPE NO: PI: PLOT NO:
ARTEMISIA DRACUNCULUS	+.+.....+..+..+....+.....
ARTEMISIA LUDOVICIANA	...+.....+....++++...+.....1...+.....+.
ASTER FALCATUS	....++...+.+.1++.....+.....+++..+.....
ASTER FOLIACEUS	.....
ASTER LAEVIS	.....
ASTER SIBIRICUS	.....
ASTRAGALUS ADSURGENS	.+...1.+.+.....+.....
ASTRAGALUS AGRESTIS	.....+.....++.
ASTRAGALUS BISULCATUS	.....+.....
ASTRAGALUS DRUMMONDII	..+.....++.....
ASTRAGALUS GILVIFLORUS	.....+.....+.....+.....+...+
ASTRAGALUS LOTIFLORUS	.....+.....
ASTRAGALUS MISSOURIENSIS	.....+.....
ASTRAGALUS PECTINATUS	.....+.+.....+.....+.....+....+....++
ASTRAGALUS PURSHII	.....
ATRIPLEX SUCKLEYI	.....
BESSEYA WYOMINGENSIS	.+.+.....
CALOCHORTUS NUTTALLII	.....
CAMELINA MICROCARPA	.....
CAMPANULA ROTUNDIFOLIA	...+.....
CERASTIUM ARVENSE	+2.+2.....+.....+.....+.+.....
CERASTIUM NUTANS	.....+.....
CHAMAESYCE SERPENS	.....
CHENOPODIUM ALBUM	.....+....+.....+.....
CHENOPODIUM DESICCATUM	.....+.....
CIRSIUM ARVENSE	..+.....
CIRSIUM UNDULATUM	+..+.....++.....++.....+....+.....
COLLOMIA LINEARIS	.....++.+....++.....+.....
COMANDRA UMBELLATA	+++++++....+..+.....+.....+.++.....+
CONRINGIA ORIENTALIS	.....
CREPIS OCCIDENTALIS	+.....
CRYPTANTHA CELOSIOIDES	.....+....+.....+.....
DALEA CANDIDA	.....+.....+.....+.....+..+.
DALEA PURPUREA	.....+.1...+.+.....+.+.....+
DESCURAINIA PINNATA	.....
DESCURAINIA RICHARDSONII	.+.....
DESCURAINIA SOPHIA	.....+.....
EPILOBIUM PANICULATUM	.....
ERIGERON CAESPITOSUS	.....
ERIGERON COMPOSITUS	.....
ERIGERON OCHROLEUCUS	+++++.....+.....
ERIGERON PUMILUS	.....+.....++.+.....+...+...+..+.+...
ERIGERON SPECIOSUS	.....
ERIOGONUM FLAVUM	.+.++.....+.....+.....+.+....+
ERIOGONUM OVALIFOLIUM	...+.....
ERIOGONUM PAUCIFLORUM	.....
ERYSIMUM ASPERUM	.....
ERYSIMUM INCONSPICUUM	...+...++....++....++++.++...++.....+...+.....+
EUPHORBIA SPATHULATA	.....
GAILLARDIA ARISTATA	+++++.....+.....+..+.....++..+.....+.
GALIUM BOREALE	...+.....
GAURA COCCINEA	+.....++..+.+..+.....+.+..+.....+.
GEUM TRIFLORUM	.....+.....+.....
GLYCYRRHIZA LEPIDOTA	.....+.....
GRINDELIA SQUARROSA	.....++.+.....+.....+++.++.....+.+.+.....+..+
HEDEOMA HISPIDUM	.....+.....++..+...+.....+.....
HELIANTHUS ANNUUS	.....

Table D3.--(continued)

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                    TYPE NO:1111112222222222222222222222222222222222222222222222
                            8888890000000000011111111111122222222222222222222
                                
                         PI:DDDDLLLLLLLLLLLLDDDDDDLLLLLLDDDDDDDDDDLLLLLLLLLL
                       PLOT NO:0000000000000000000000000000000000000000000000000000
                            4445530112225566700112400114500001113441111124456
SPECIES                     0491646261243545115680389055067891451263478900 6143
-------------------------------------------------------------------------------
HETEROTHECA VILLOSA         +.++++.+...+.++++..1....++...2.11.++.++.+.++.+++++
HEUCHERA RICHARDSONII       ..............................+.....................
HYMENOPAPPUS FILIFOLIUS     ..................................................
HYMENOXYS RICHARDSONII      ......+....+...........++...........+.+........+
IVA AXILLARIS               ..................................................
LACTUCA SERRIOLA            .....+............................................
LACTUCA TATARICA            ..................................................
LAPPULA REDOWSKII           ..............+..+...........+.....................+
LAPPULA SQUARROSA           ..................................................
LEPIDIUM DENSIFLORUM        +..........+.+.....+..........................+..
LEPIDIUM PERFOLIATUM        ............................+.....................
LESQUERELLA ALPINA          .....+.......................................+....
LESQUERELLA LUDOVICIANA     ............................+++...................
LIATRIS PUNCTATA            +++.++..............+..+..+.........+.++.+.......++
LINUM AUSTRALE              ...........+++........+.............2++...+..+..+.
LINUM PERENNE               ..............................++..................
LINUM RIGIDUM               ..................................................
LITHOSPERMUM INCISUM        ..................................................
LOGFIA ARVENSIS             ..............++..................................
LOMATIUM FOENICULACEUM      +..................+......+.......++..............
LOMATIUM MACROCARPUM        ..............++........+..............+...........
LUPINUS ARGENTEUS           ..................................................
LUPINUS PUSILLUS            ..+...............................................
LYGODESMIA JUNCEA           +.....................................++..........
MACHAERANTHERA CANESCENS    ..................................................
MACHAERANTHERA GRINDELIOIDES ................................................+
MACHAERANTHERA PINNATIFIDA ..............+.+......+..+.+..++.....++.+++++...+.
MELILOTUS ALBA              ..............................++..................
MELILOTUS OFFICINALIS       .....++....+++..............++.....................+.
MENTZELIA ALBICAULIS        ........+.........................................
MINUARTIA PUNGENS           ..................................................
MIRABILIS LINEARIS          ..............+...................................
MOEHRINGIA LATERIFLORA      ..................................................
MONARDA FISTULOSA           ..................................................
MUSINEON DIVARICATUM        ..................................................
OENOTHERA NUTTALLII         ...+..............................................
OROBANCHE FASCICULATA       ....+.............................................
ORTHOCARPUS LUTEUS          .......+......++.........................+.........
OXYTROPIS CAMPESTRIS        ....................................++...+.........
OXYTROPIS LAMBERTII         ....++.....1.................+.........+.........
OXYTROPIS SERICEA           .+++.....................................+...+.....
OXYTROPIS SPLENOENS         ..................................................
PENSTEMON ALBIDUS           +....+.+...+.+.....+.........+++++++.++.+.......++
PENSTEMON NITIDUS           ......+.................+.............+.....+.....
PICRADENIOPSIS OPPOSITIFOLIA ................+....................+.............
PHACELIA LINEARIS           +.....++.........................................
PHLOX ALYSSIFOLIA           ..................................................
PHLOX HOODII                ..+..+++..++.+..++.1.++++1.++.1+1111..+.++.++++.+1
PLANTAGO PATAGONICA         +.......+...+.1.++..+.++..+.+.....+11.......++1..
POLYGALA ALBA               ..................................................
POLYGONUM MONSPELIENSIS     ..............+...................................
POLYGONUM DOUGLASII         ........................+.........................
POLYGONUM RAMOSISSIMUM      ..................................................
POTENTILLA GRACILIS         ..............................+...................
POTENTILLA PENSYLVANICA     .+.++......+.....++...+.+....+.+..+..+....+.......
PSORALEA ARGOPHYLLA         .....+.+.+.++.+++..+.................+.++++.......++
PSORALEA ESCULENTA          ..............................+...................
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Table D3.--(continued)

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                    TYPE NO:1111112222222222222222222222222222222222222222222222
                            88888900000000000111111111111222222222222222222222
                             PI:DDDDLLLLLLLLLLLLLDDDDDDLLLLLLDDDDDDDDDDLLLLLLLLLLL
                          PLOT NO:00000000000000000000000000000000000000000000000000
                            4445530112225566700112400114500001113411111244556
SPECIES                     0491646261243545115680389055067891451263478900 6143
-------------------------------------------------------------------------------
PSORALEA LANCEOLATA         ............................+.....................
PULSATILLA PATENS           ..............................+++.++.............
RATIBIDA COLUMNIFERA        .....+.+.+.+.+.+.........+.+.............+.+...+.
SALSOLA AUSTRALIS           ..................................................
SEDUM LANCEOLATUM           ...+..............................................
SENECIO CANUS               ............++.................+......+..........+
SILENE DRUMMONDII           ..................................................
SILENE SCOULERI             ..................+...............................
SISYMBRIUM ALTISSIMUM       .+...........++...................................
SISYRINCHIUM MONTANUM       ........................................+.........
SMILACINA STELLATA          ..................................................
SOLANUM TRIFLORUM           ..................................................
SOLIDAGO MISSOURIENSIS      .+....1.......+++.......+....+..++.....+........+.
SOLIDAGO MOLLIS             ............+........+..+...........+.............
SPHAERALCEA COCCINEA        ..+.....+.+.++++++1+++1.+++++.+.++++++..++.+1+++++
STELLARIA MEDIA              ..............................1...................
STEPHANOMERIA RUNCINATA     ......+...........................................
TARAXACUM OFFICINALE        ..+.++.++++..+.+.+.+.........+.................+..+..
TETRANEURIS ACAULIS         .+.....................................+.........+.
THERMOPSIS RHOMBIFOLIA      +++++.++.+.+....+.................1......1..+......+
THLASPI ARVENSE             ..............................+...................
TRADESCANTIA OCCIDENTALIS   ..............................+...................
TRAGOPOGON DUBIUS           ++++.+...++..+++..+..++....++.......+++.....+.....
TRIODANIS LEPTOCARPA        .....+............................................
VICIA AMERICANA             ..++.1+.+..+.+++++....+.++........+.....+.........
ZIGADENUS VENENOSUS         ...+...++.....++...+....+.1............+..+.......

      GRAMINOIDS

AGROPYRON CRISTATUM         ....................+.........................+....
AGROSTIS SCABRA             ..............++.....................................
ARISTIDA PURPUREA           .....+.........+.......1..............+.........+.
BOUTELOUA GRACILIS          +.+..+.+....+++22331231+++4+1222112241+.++..++13++
BROMUS HORDEACEUS           ..................+..............................
BROMUS JAPONICUS            ............++..+.................................
BROMUS TECTORUM             +++1.............................................
CALAMOVILFA LONGIFOLIA      ..............................+...................
CAREX ELEOCHARIS            +.+.......++.+4..+.2+.+1+++.+..+..22.+...+.++++...
CAREX FILIFOLIA             +2+2+..13..++..21+1..2..+2+..12.22.++111122223.+22
CAREX FOENEA                ..................................................
CAREX INOPS                 ......2....+.....................................+..+.......
CAREX ROSSII                ..................................................
DISTICHLIS SPICATA          .........2.............................1...........
ELYMUS ELYMOIDES            .........+.....................................+.....
ELYMUS GLAUCUS              ..................................................
ELYMUS LANCEOLATUS          ..............++....3.......2.13+1+.++.+.+.+.....+
ELYMUS TRACHYCAULIS         ..................................................
FESTUCA CAMPESTRIS          ..................................................
FESTUCA IDAHOENSIS          ..................................................
JUNCUS BALTICUS             ..................................................
KOELERIA MACRANTHA          22+22+2122+1.+++.2122+2222++-212223.+12+1+1+++++++
MUHLENBERGIA CUSPIDATA      ......2+...+...++....+...+.......1.+..1.........1+
ORYZOPSIS HYMENOIDES        ..................................................
ORYZOPSIS MICRANTHA         ..................................................
PASCOPYRUM SMITHII          ..+..122435.4434+123.3321232.++....1..1..++.+++.+.
POA ARIDA                   .........3........................................
POA CUSICKII                ..................................................
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Table D3.--(continued)

	TYPE NO:1111112222222222222222222222222222222222222222222222
	8888890000000000011111111111122222222222222222222
	PI:DDDDLLLLLLLLLLLLLDDDDDDLLLLLLDDDDDDDDDDLLLLLLLLLLL
	PLOT NO:00000000000000000000000000000000000000000000000000
	4445530112225566700112400114500001113441111124455 6
SPECIES	0491646261243545115680389055067891451263478900 6143
POA GLAUCIFOLIA	.....
POA NEVADENSIS	.....+.....
POA PRATENSIS	.....+.....+.
POA SECUNDA	111+2+...+.+..+.+22+2.2+1.+.+...+...++.....+.+.++.
PSEUDOROEGNERIA SPICATA	444424.....
SCHIZACHYRIUM SCOPARIUM	.....+.....+.....+.....
SPOROBOLUS CRYPTANDRUS	.....+.....+.+....
STIPA COMATA	121.1+...11221++.223.32++2.4.4412343243.23.3423342
STIPA SPARTEA	.....3..4.....
STIPA VIRIDULA	.....122+1.32.113.12.....+.....+.2...+..1.....
VULPIA OCTOFLORA	.....+.....
FERNS/ALLIES	
CRYPTOGRAMMA CRISPA	.....
SELAGINELLA DENSA	44334.+.2++2.324.5.54.4443455.++5454.4433+.24.54.3
WOODSIA OREGANA	...2.....

Table D3.--(continued)

SPECIES	TYPE NO:222222 233344 PI:LDDDLL PLOT NO:000000 611303 703333
TREES	
FRAXINUS PENNSYLVANICA	.....
JUNIPERUS SCOPULORUM	.....
PINUS CONTORTA	.....
PINUS PONDEROSA	...+..
PSEUDOTSUGA MENZIESII	.....
SHRUBS	
ARCTOSTAPHYLOS UVA-URSI	.....
ARTEMISIA CANA	..+...
ARTEMISIA (FILIFOLIA?)	.....
ARTEMISIA FRIGIDA	1+....
ARTEMISIA LONGIFOLIA	1
ARTEMISIA TRIDENTATA	....+.
ATRIPLEX CONFERTIFOLIA	.....
ATRIPLEX GARDNERI	+.....
CERATOIDES LANATA	.....
CHRYSOTHAMNUS NAUSEOSUS	11
CHRYSOTHAMNUS VISCIDIFLORUS	.....
CORYPHANTHA VIVIPARA	.....
ELEAGNUS COMMUTATA	.....
GUTIERREZIA SAROTHRAE	++....
JUNIPERUS COMMUNIS	.....
JUNIPERUS HORIZONTALIS	.....
OPUNTIA POLYACANTHA	+.+1.+
PRUNUS VIRGINIANA	.....
RHUS TRILOBATA	..++..
RIBES CEREUM	.....
ROSA ARKANSANA	.12.12
ROSA WOODSII	.....
SARCOBATUS VERMICULATUS	.....
SHEPHERDIA ARGENTEA	.....
SHEPHERDIA CANADENSIS	.....
SUAEDA MOQUINII	.....
SYMPHORICARPOS OCCIDENTALIS	.....
SYMPHORICARPOS OREOPHILUS	.....
YUCCA GLAUCA	..22..
FORBS	
ACHILLEA MILLEFOLIUM	.....
AGOSERIS GLAUCA	.....
ALLIUM CERNUUM	.....
ALLIUM TEXTILE	.....
ALYSSUM DESERTORUM	.....
ANDROSACE SEPTENTRIONALIS	.....
ANEMONE MULTIFIDA	.....
ANTENNARIA MICROPHYLLA	.....
ANTENNARIA PARVIFOLIA	.+....
APOCYNUM ANDROSAEMIFOLIUM	.....
APOCYNUM CANNABINUM	.+...+
ARABIS HOLBOELLII	.....
ARENARIA CONGESTA	.....
ARTEMISIA CAMPESTRIS	.+....

Table D3.--(continued)

SPECIES	TYPE NO:222222 233344 PI:LDDDLL PLOT NO:0D0000 611303 703333
ARTEMISIA DRACUNCULUS	.....
ARTEMISIA LUDOVICIANA	.....
ASTER FALCATUS	.....+
ASTER FOLIACEUS	.....
ASTER LAEVIS	.....
ASTER SIBIRICUS	.....
ASTRAGALUS ADSURGENS	.....
ASTRAGALUS AGRESTIS	.....
ASTRAGALUS BISULCATUS	.....
ASTRAGALUS DRUMMONDII	.....
ASTRAGALUS GILVIFLORUS	.+....
ASTRAGALUS LOTIFLORUS	...+..
ASTRAGALUS MISSOURIENSIS	...+..
ASTRAGALUS PECTINATUS	.....
ASTRAGALUS PURSHII	.....
ATRIPLEX SUCKLEYI	.....
BESSEYA WYOMINGENSIS	.....
CALOCHORTUS NUTTALLII	.....
CAMELINA MICROCARPA	.....
CAMPANULA ROTUNDIFOLIA	.....
CERASTIUM ARVENSE	.....
CERASTIUM NUTANS	.....
CHAMAESYCE SERPENS	.....
CHENOPODIUM ALBUM	.....
CHENOPODIUM DESICCATUM	.....
CIRSIUM ARVENSE	.....
CIRSIUM UNDULATUM	...+..
COLLOMIA LINEARIS	.....+
COMANDRA UMBELLATA	....+.
CONRINGIA ORIENTALIS	.....
CREPIS OCCIDENTALIS	.....
CRYPTANTHA CELOSIOIDES	.....
DALEA CANDIDA	...+..
DALEA PURPUREA	.....
DESCURAINIA PINNATA	.....
DESCURAINIA RICHARDSONII	.....
DESCURAINIA SOPHIA	....+.
EPILOBIUM PANICULATUM	.....
ERIGERON CAESPITOSUS	.....
ERIGERON COMPOSITUS	+.....
ERIGERON OCHROLEUCUS	.....
ERIGERON PUMILUS	.....
ERIGERON SPECIOSUS	.....
ERIOGONUM FLAVUM	.+....
ERIOGONUM OVALIFOLIUM	.....
ERIOGONUM PAUCIFLORUM	....++
ERYSIMUM ASPERUM	..+...
ERYSIMUM INCONSPICUUM	.....
EUPHORBIA SPATHULATA	.....
GAILLARDIA ARISTATA	.....
GALIUM BOREALE	.+....
GAURA COCCINEA	.....
GEUM TRIFLORUM	.....
GLYCYRRHIZA LEPIDOTA	.....
GRINDELIA SQUARROSA	.....
HEDEOMA HISPIDUM	.....
HELIANTHUS ANNUUS	.....+

Table D3.--(continued)

SPECIES	TYPE NO:222222 233344 PI:LDDDLL PLOT NO:000000 611303 703333
HETEROTHECA VILLOSA	..+...
HEUCHERA RICHARDSONII	.....
HYMENOPAPPUS FILIFOLIUS	.....
HYMENOXYS RICHARDSONII	+.....
IVA AXILLARIS	.....
LACTUCA SERRIOLA	.....
LACTUCA TATARICA	.....
LAPPULA REDOWSKII	.....
LAPPULA SQUARROSA	.....
LEPIDIUM DENSIFLORUM	.....
LEPIDIUM PERFOLIATUM	.....
LESQUERELLA ALPINA	.....
LESQUERELLA LUDOVICIANA	.....
LIATRIS PUNCTATA	..++.+
LINUM AUSTRALE	.....
LINUM PERENNE	.+....
LINUM RIGIDUM	...+..
LITHOSPERMUM INCISUM	...+..
LOGFIA ARVENSIS	.....
LOMATIUM FOENICULACEUM	.....
LOMATIUM MACROCARPUM	.....
LUPINUS ARGENTEUS	.....
LUPINUS PUSILLUS	...+..
LYGODESMIA JUNCEA	...+..
MACHAERANTHERA CANESCENS	.....
MACHAERANTHERA GRINDELIOIDES	+.....
MACHAERANTHERA PINNATIFIDA	.....
MELILOTUS ALBA	.....
MELILOTUS OFFICINALIS	.....
MENTZELIA ALBICAULIS	.....
MINUARTIA PUNGENS	.....
MIRABILIS LINEARIS	.....
MOEHRINGIA LATERIFLORA	.....
MONARDA FISTULOSA	.....
MUSINEON DIVARICATUM	.....
OENOTHERA NUTTALLII	.....
OROBANCHE FASCICULATA	.....
ORTHOCARPUS LUTEUS	.....
OXYTROPIS CAMPESTRIS	.+....
OXYTROPIS LAMBERTII	.....
OXYTROPIS SERICEA	.....
OXYTROPIS SPLENDENS	.....
PENSTEMON ALBIDUS	.+1+..
PENSTEMON NITIDUS	+...+.
PICRADENIOPSIS OPPOSITIFOLIA	.....
PHACELIA LINEARIS	.....
PHLOX ALYSSIFOLIA	.+....
PHLOX HOODII	+.....
PLANTAGO PATAGONICA	.....
POLYGALA ALBA	.+....
POLYGONUM MONSPELIENSIS	.....
POLYGONUM DOUGLASII	....+.
POLYGONUM RAMOSISSIMUM	.....
POTENTILLA GRACILIS	.....
POTENTILLA PENSYLVANICA	.....
PSORALEA ARGOPHYLLA	.....
PSORALEA ESCULENTA	.....

Table D3.--(continued)

SPECIES	TYPE NO:222222 233344 PI:LDDDLL PLOT NO:000000 611303 703333
PSORALEA LANCEOLATA	.....
PULSATILLA PATENS	.2....
RATIBIDA COLUMNIFERA	.....
SALSOLA AUSTRALIS	.....
SEDUM LANCEOLATUM	.....
SENECIO CANUS	.....
SILENE DRUMMONDII	.....
SILENE SCOULERI	.....
SISYMBRIUM ALTISSIMUM	.....
SISYRINCHIUM MONTANUM	.....
SMILACINA STELLATA	.....
SOLANUM TRIFLORUM	.....
SOLIDAGO MISSOURIENSIS	..+.+.
SOLIDAGO MOLLIS	.....
SPHAERALCEA COCCINEA	+.....
STELLARIA MEDIA	.....
STEPHANOMERIA RUNCINATA	....+.
TARAXACUM OFFICINALE	.....
TETRANEURIS ACAULIS	.....
THERMOPSIS RHOMBIFOLIA	.+..++
THLASPI ARVENSE	.....
TRADESCANTIA OCCIDENTALIS	.....
TRAGOPOGON DUBIUS	.....
TRIODANIS LEPTOCARPA	.....
VICIA AMERICANA	+.....
ZIGADENUS VENENOSUS	.....
GRAMINOIDS	
AGROPYRON CRISTATUM	.....
AGROSTIS SCABRA	.....
ARISTIDA PURPUREA	.....
BOUTELOUA GRACILIS	++11..
BROMUS HORDEACEUS	.....
BROMUS JAPONICUS	.....
BROMUS TECTORUM	.....
CALAMOVILFA LONGIFOLIA	...212
CAREX ELEOCHARIS	+.1...
CAREX FILIFOLIA	12.2..
CAREX FOENEA	.....
CAREX INOPS	32
CAREX ROSSII	.....
DISTICHLIS SPICATA	.....
ELYMUS ELYMOIDES	.....
ELYMUS GLAUCUS	.....
ELYMUS LANCEOLATUS	1+....
ELYMUS TRACHYCAULIS	.....
FESTUCA CAMPESTRIS	.....
FESTUCA IDAHOENSIS	.....
JUNCUS BALTICUS	.....
KOELERIA MACRANTHA	++..1.
MUHLENBERGIA CUSPIDATA	2.2+..
ORYZOPSIS HYMENOIDES	...+..
ORYZOPSIS MICRANTHA	.....
PASCOPYRUM SMITHII	....+.
POA ARIDA	.....
POA CUSICKII	.....

Table D3.--(continued)

SPECIES	TYPE NO:222222 233344 PI:LDDDLL PLOT NO:000000 611303 703333
POA GLAUCIFOLIA	.....
POA NEVADENSIS	.....
POA PRATENSIS	.....
POA SECUNDA	+...+.
PSEUDOROEGNERIA SPICATA	.....
SCHIZACHYRIUM SCOPARIUM	.422.+
SPOROBOLUS CRYPTANDRUS	.....
STIPA COMATA	2+1+..
STIPA SPARTEA	.....
STIPA VIRIDULA	.....+
VULPIA OCTOFLORA	.....
FERNS/ALLIES	
CRYPTOGRAMMA CRISPA	.....
SELAGINELLA DENSA	.....
WOODSIA OREGANA	.....

APPENDIX E

SITE CHARACTERISTICS FOR EACH PLOT

Both quantitative and categorical site characteristics are presented. "RI" values are solar radiation indices at each plot as determined using Frank and Lee (1966). These indices equal the ratio of the total annual potential isolation to the maximum potential at the site. RI=.43 for all flat surfaces in the study area. The code letters under "% Cover" are defined as follows:

S = bare soil	G = gravel	R = rock
L = litter	W = wood	M = moss
BV = basal vegetation		

Classes of categorical site characteristics are defined as follows:

Parent Material

- alluvium
- eolian
- glacial till
- sedimentary
- igneous

Landforms

- mountains
- rolling uplands
- breaklands
- plateaus
- kames and kettles
- alluvial forms

Plot Position

- valley bottom
- draw
- short slope
- lower slope
- mid slope
- ridge

Slope Shape

- even
- convex
- concave
- undulating

Soil Surface

- stable with adequate ground cover (= stable)
- stable but trend towards increased erosion (= stable-)
- unstable with inadequate ground cover (= unstable)
- unstable but trend towards stability (= unstable+)

Erosion Type

- none
- sheet
- rill
- sheet and rill
- sheet and gully
- sheet, rill, and gully
- wind

Ground Disturbance

- undisturbed
- low
- moderate
- high

Table E1.--Forest plots.

PSEUDOTSUGA MENZIESII/SCHIZACHYRIUM SCOPARIUM

TYPE NO: 1

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 47	5040.	40.	SE	.52	3.0	20.0	30.0	10.0	3.0	.0	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 47	igneous	mountain	ridge	convex	stable	sheet	low

Table E1.--(continued)

PINUS PONDEROSA/PSEUDOROEGNERIA SPICATA

TYPE NO: 2

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 48	4880.	40.	E	.43	.5	20.0	30.0	10.0	.5	.0	40.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 48	igneous	mountain	mid	even	stable	sheet	undistur

Table E1.--(continued)

PINUS PONDEROSA/JUNIPERUS SCOPULORUM

TYPE NO: 3

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 22	2300.	10.	S	.47	.5	.0	.0	80.0	3.0	.0	10.0
D 23	2320.	10.	N	.39	3.0	.5	.0	80.0	3.0	.5	10.0
D 29	3540.	20.	NW	.38	20.0	3.0	10.0	50.0	3.0	.0	10.0
L 28	2740.	20.	E	.43	.5	.0	.0	80.0	.5	.0	20.0
L 30	2800.	10.	NW	.40	.5	.0	.5	80.0	.5	.0	20.0
L 35	2580.	20.	NE	.38	30.0	.0	3.0	50.0	.5	.5	20.0
L 37	2840.	50.	N	.24	10.0	.0	.0	70.0	3.0	.0	20.0
L 43	2560.	5.	F	.43	3.0	3.0	.5	90.0	.5	.5	10.0
L 60	3200.	20.	S	.50	50.0	.5	.0	50.0	3.0	.0	3.0
L 61	3200.	20.	N	.35	3.0	.5	.5	70.0	.5	.0	20.0
L 62	3100.	5.	N	.43	40.0	.0	.0	40.0	.5	.0	20.0
L 72	3360.	10.	SE	.46	70.0	.5	.5	10.0	.5	.0	20.0
L 73	3500.	30.	SW	.50	20.0	20.0	3.0	30.0	.5	.0	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 22	sedim.	breaks	mid	undulate	stable	none	undistur
D 23	sedim.	breaks	mid	undulate	stable	none	undistur
D 29	sedim.	mountain	ridge	convex	unstabl+	sheet	undistur
L 28	sedim.	breaks	ridge	convex	stable-	sheet	low
L 30	till	breaks	ridge	convex	stable	none	undistur
L 35	till	breaks	mid	even	unstabl+	sheet	low
L 37	sedim.	breaks	ridge	even	stable	sheet	undistur
L 43	sedim.	breaks	ridge	undulate	stable	none	undistur
L 60	sedim.	breaks	mid	undulate	unstable	sh+ri+gu	low
L 61	sedim.	breaks	ridge	undulate	stable	none	undistur
L 62	sedim.	breaks	ridge	even	unstabl+	sh+ri	low
L 72	sedim.	rolling	lower	undulate	unstable	sh+ri	low
L 73	sedim.	mountain	ridge	even	unstabl+	sh+ri	undistur

Table E1.--(continued)

JUNIPERUS SCOPULORUM/ORYZOPSIS MICRANTHA

TYPE NO: 4

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 4	2320.	50.	NW	.30	3.0	.0	.0	70.0	.5	10.0	10.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 4	sedim.	breaks	draw	concave	unstable	sheet	low

Table E2.--Shrubland plots.

RHUS TRILOBATA/PSEUDOROEGNERIA SPICATA

TYPE NO: 5

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover						
					S	G	R	L	W	M	BV
L 57	3640.	50.	NW	.30	.5	.5	3.0	10.0	.0	.5	80.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 57	igneous	mountain	mid	even	stable	none	undistur

Table E2.--(continued)

ELEAGNUS COMMUTATA/PASCOPYRUM SMITHII

TYPE NO: 6

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover						
					S	G	R	L	W	M	BV
D 17	3000.	30.	NE	.35	3.0	.5	.5	3.0	.5	.0	90.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 17	sedim.	rolling	mid	convex	stable	sheet	low

Table E2.--(continued)

ARTEMISIA TRIDENTATA/FESTUCA CAMPESTRIS

TYPE NO: 7

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 27	5720.	40.	W	.43	3.0	3.0	.5	50.0	.0	.0	40.0
D 28	5600.	30.	W	.43	10.0	20.0	.0	40.0	.5	.5	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 27	igneous	mountain	ridge	convex	stable	none	undistur
D 28	igneous	mountain	ridge	convex	stable	sheet	undistur

Table E2.--(continued)

ARTEMISIA TRIDENTATA/PSEUDOROEGNERIA SPICATA

TYPE NO: 8

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 36	3290.	5.	S	.43	20.0	.5	.0	30.0	3.0	.0	50.0
L 32	2400.	10.	W	.43	30.0	30.0	.5	20.0	.5	.5	20.0
L 36	2640.	5.	NW	.43	20.0	10.0	3.0	40.0	.5	.5	30.0
L 74	3481.	10.	E	.43	.5	.5	.5	50.0	3.0	.0	50.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 36	alluvium	rolling	valley	even	stable	sheet	low
L 32	till	rolling	sh slope	even	unstabl+	sheet	low
L 36	till	rolling	ridge	even	stable	sheet	undistur
L 74	sedim.	mountain	mid	concave	stable	sheet	undistur

Table E2.--(continued)

ARTEMISIA TRIDENTATA/PASCOPYRUM SMITHII

TYPE NO: 9

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 2	2370.	5.	E	.43	70.0	.5	.0	10.0	.5	.0	10.0
D 24	2260.	5.	N	.43	20.0	.0	.0	10.0	.5	30.0	40.0
D 32	3420.	10.	S	.47	50.0	10.0	.5	20.0	.5	.0	20.0
D 34	3240.	10.	N	.39	60.0	.5	.5	30.0	.5	.5	10.0
L 1	2720.	5.	N	.43	40.0	.5	.0	10.0	.5	10.0	40.0
L 4	2330.	5.	N	.43	70.0	.5	.5	3.0	.5	.5	20.0
L 5	2320.	10.	N	.39	80.0	.5	.0	3.0	.5	.5	20.0
L 7	2570.	5.	S	.43	70.0	3.0	.5	10.0	.5	.0	20.0
L 25	2500.	5.	SW	.43	3.0	3.0	.5	30.0	.5	.5	60.0
L 26	2440.	5.	W	.43	10.0	.5	.5	50.0	.5	.5	40.0
L 27	2820.	10.	N	.39	10.0	20.0	10.0	40.0	.5	3.0	20.0
L 29	2780.	20.	SE	.48	40.0	.5	.5	40.0	.5	.0	20.0
L 42	2640.	10.	W	.43	50.0	.5	.5	30.0	.5	.0	20.0
L 58	3220.	10.	SE	.46	40.0	20.0	.5	20.0	.5	.5	20.0
L 75	2920.	10.	N	.39	30.0	3.0	3.0	30.0	.0	3.0	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 2	till	rolling	draw	undulate	stable-	sh+gu	mod
D 24	sedim.	breaks	ridge	convex	stable	none	undistur
D 32	sedim.	rolling	ridge	convex	stable-	sheet	low
D 34	sedim.	breaks	ridge	convex	stable-	sheet	undistur
L 1	sedim.	rolling	valley	even	stable	sheet	low
L 4	sedim.	rolling	mid	even	stable-	sheet	mod
L 5	sedim.	rolling	mid	even	stable-	sheet	undistur
L 7	till	rolling	mid	even	unstable	sheet	low
L 25	till	rolling	ridge	even	stable	sheet	mod
L 26	till	rolling	mid	even	stable-	sheet	low
L 27	till	rolling	mid	even	stable	sheet	undistur
L 29	till	breaks	mid	even	unstabl+	sheet	undistur
L 42	sedim.	rolling	mid	even	unstabl+	sheet	low
L 58	sedim.	breaks	sh slope	even	unstable	sh+ri	low
L 75	till	rolling	ridge	even	unstabl+	sh+ri	undistur

Table E2.--(continued)

ARTEMISIA CANA/STIPA COMATA

TYPE NO: 10

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 39	3070.	10.	NE	.40	.5	.0	3.0	10.0	.5	.0	90.0
D 41	2535.	30.	SW	.50	20.0	3.0	.5	20.0	.5	.0	50.0
D 45	2370.	5.	N	.43	3.0	.0	.0	30.0	.5	.0	70.0
L 23	2260.	5.	F	.43	.5	.0	.0	60.0	.5	.0	30.0
L 47	2200.	5.	F	.43	.5	.5	.5	3.0	.5	3.0	90.0
L 48	2740.	5.	F	.43	.5	.0	.0	70.0	.5	.5	20.0
L 52	2700.	10.	W	.43	3.0	.0	.5	20.0	.5	.5	80.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 39	igneous	plateau	ridge	concave	stable	none	undistur
D 41	till	rolling	sh slope	concave	stable	sheet	low
D 45	till	rolling	valley	even	stable	none	low
L 23	till	rolling	valley	even	stable	none	undistur
L 47	till	alluvial	valley	even	stable	none	undistur
L 48	alluvium	alluvial	valley	even	stable	none	undistur
L 52	till	rolling	ridge	convex	unstabl+	sh+gu	undistur

Table E2.--(continued)

ARTEMISIA CANA/PASCOPYRUM SMITHII

TYPE NO: 11

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 11	2600.	5.	F	.43	40.0	.0	.0	20.0	.5	.5	40.0
L 44	2360.	5.	F	.43	10.0	.0	.0	60.0	.5	.0	30.0
L 69	2650.	5.	F	.43	40.0	.0	.0	30.0	.5	.5	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 11	alluvium	alluvial	valley	even	stable	none	low
L 44	alluvium	alluvial	valley	even	stable	none	undistur
L 69	sedim.	alluvial	valley	even	stable-	sheet	undistur

Table E2.--(continued)

CERATOIDES LANATA/STIPA COMATA

TYPE NO: 12

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 2	2920.	10.	NE	.40	40.0	3.0	.0	10.0	.0	3.0	50.0
L 38	2900.	5.	F	.43	20.0	.5	.5	50.0	.0	.0	30.0
L 49	2760.	5.	S	.43	60.0	.5	.5	20.0	.0	3.0	20.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 2	sedim.	rolling	ridge	even	stable	sheet	low
L 38	sedim.	plateau	ridge	even	stable	none	undistur
L 49	till	rolling	lower	convex	stable-	sh+ri	undistur

Table E2.--(continued)

JUNIPERUS HORIZONTALIS/SCHIZACHYRIUM SCOPARIUM

TYPE NO: 13

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 12	2115.	5.	W	.43	80.0	.5	.5	3.0	.5	.0	10.0
D 21	2300.	40.	N	.27	10.0	10.0	.5	20.0	.5	.0	60.0
D 50	3720.	40.	E	.43	20.0	.5	.5	50.0	.0	.5	30.0
L 66	2820.	20.	NW	.38	30.0	.0	.5	40.0	.0	.0	30.0
L 68	2600.	10.	N	.39	80.0	.0	.0	3.0	.0	.0	20.0
L 70	2880.	5.	E	.43	50.0	.0	.0	20.0	.0	.0	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 12	sedim.	breaks	lower	convex	unstable	sh+gu	high
D 21	till	rolling	ridge	convex	stable	sheet	undistur
D 50	sedim.	rolling	ridge	convex	stable-	sheet	low
L 66	sedim.	rolling	mid	undulate	unstabl+	sh+ri+gu	low
L 68	sedim.	alluvial	draw	even	unstable	sh+ri	undistur
L 70	sedim.	rolling	draw	undulate	unstabl+	sh+ri	low

Table E2.--(continued)

ATRIPLEX CONFERTIFOLIA-ARTEMISIA TRIDENTATA

TYPE NO: 14

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 30	3500.	70.	NW	.27	80.0	.5	3.0	.5	10.0	.0	10.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 30	sedim.	mountain	sh slope	undulate	unstable	sh+ri+gu	undistur

Table E2.--(continued)

SARCOBATUS VERMICULATUS/PASCOPYRUM SMITHII

TYPE NO: 15

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 31	2380.	5.	W	.43	20.0	10.0	.5	20.0	.5	.5	50.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 31	till	rolling	mid	even	unstabl+	sheet	low

Table E2.--(continued)

SARCOBATUS VERMICULATUS-ATRIPLEX GARDNERI

TYPE NO: 16

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 3	2300.	70.	SE	.54	97.5	10.0	.5	.5	.0	.0	.5
D 19	2720.	10.	N	.39	80.0	10.0	.5	.5	.5	.0	3.0
D 38	3220.	70.	E	.43	90.0	.5	.0	.5	.5	.0	3.0
L 39	2740.	20.	NE	.38	80.0	3.0	.0	3.0	.5	.0	10.0
L 41	2640.	50.	SW	.53	80.0	.5	.5	10.0	.5	.0	10.0
L 59	3260.	60.	SW	.54	40.0	40.0	3.0	3.0	.5	.0	10.0
L 76	2320.	40.	SE	.52	90.0	.5	.5	10.0	.5	.0	3.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 3	sedim.	breaks	mid	convex	unstable	sh+ri+gu	high
D 19	sedim.	breaks	sh slope	convex	unstable	sh+gu	high
D 38	sedim.	breaks	sh slope	concave	unstable	sh+ri+gu	high
L 39	sedim.	rolling	mid	convex	unstable	sheet	undistur
L 41	sedim.	breaks	ridge	undulate	unstable	sh+ri+gu	undistur
L 59	sedim.	breaks	ridge	undulate	unstable	sh+ri+gu	undistur
L 76	sedim.	breaks	ridge	convex	unstable	sh+ri+gu	low

Table E2.--(continued)

ARTEMISIA LONGIFOLIA/ORYZOPSIS HYMENOIDES

TYPE NO: 17

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 35	3040.	60.	S	.58	90.0	.5	.5	.0	.5	10.0	.5
D 37	3160.	60.	S	.58	90.0	.5	.5	.5	.5	.0	3.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 35	sedim.	breaks	mid	convex	stable-	sh+ri	high
D 37	sedim.	breaks	mid	concave	unstable	sh+ri+gu	high

Table E3.--Grassland plots.

PSEUDOROEGNERIA SPICATA-POA SECUNDA

TYPE NO: 18

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 40	3030.	10.	NE	.40	.5	.0	3.0	.5	.0	.0	90.0
D 44	3200.	50.	N	.24	.5	.5	10.0	10.0	.0	10.0	70.0
D 49	3560.	5.	NE	.43	.0	.5	.0	30.0	.0	.0	70.0
D 51	3300.	40.	N	.27	10.0	.0	3.0	10.0	.0	.5	80.0
L 56	3700.	10.	NW	.40	.5	.5	.0	10.0	.0	.0	90.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 40	igneous	plateau	mid	even	stable	none	undistur
D 44	igneous	plateau	ridge	even	stable	rill	undistur
D 49	till	rolling	valley	even	stable	none	low
D 51	igneous	mountain	mid	convex	stable	rill	undistur
L 56	igneous	mountain	ridge	convex	stable	none	undistur

Table E3.--(continued)

PSEUDOROEGNERIA SPICATA-PASCOPYRUM SMITHII

TYPE NO: 19

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 34	2600.	20.	N	.35	30.0	20.0	.5	20.0	3.0	.5	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 34	till	rolling	ridge	convex	stable	sheet	undistur

Table E3.--(continued)

PASCOPYRUM SMITHII-STIPA VIRIDULA

TYPE NO: 20

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 6	2560.	5.	S	.43	80.0	.5	.5	.5	.0	.0	20.0
L 12	2700.	30.	S	.53	70.0	10.0	3.0	3.0	.0	.0	20.0
L 16	2630.	5.	N	.43	40.0	.0	.0	20.0	.0	10.0	30.0
L 21	2220.	5.	F	.43	.5	.5	.5	70.0	.5	.5	30.0
L 22	2230.	5.	E	.43	.5	.0	.0	70.0	.0	.0	30.0
L 24	2470.	30.	N	.31	20.0	3.0	3.0	40.0	.0	.5	30.0
L 53	3020.	20.	S	.50	.5	.5	.5	80.0	.0	.0	20.0
L 55	3040.	5.	W	.43	.5	.0	.5	30.0	.0	.5	70.0
L 64	2970.	5.	F	.43	30.0	.0	3.0	30.0	.0	.0	40.0
L 65	3000.	10.	S	.47	3.0	.5	10.0	20.0	.0	.0	70.0
L 71	3000.	30.	E	.43	30.0	30.0	.5	20.0	.0	.0	20.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 6	sedim.	rolling	mid	concave	unstabl+	sheet	low
L 12	till	rolling	ridge	concave	unstable	sh+ri	low
L 16	till	rolling	valley	even	stable	none	low
L 21	till	alluvial	valley	even	stable	sheet	undistur
L 22	till	rolling	valley	concave	stable	none	undistur
L 24	till	breaks	mid	even	unstable	sheet	low
L 53	till	rolling	mid	even	stable	none	undistur
L 55	till	rolling	ridge	even	stable	none	low
L 64	till	kettles	draw	concave	stable	none	low
L 65	till	kettles	mid	concave	stable	none	undistur
L 71	till	rolling	ridge	concave	unstabl+	sh+ri	undistur

Table E3.--(continued)

PASCOPYRUM SMITHII-BOUTELOUA GRACILIS

TYPE NO: 21

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 1	2380.	5.	SE	.43	3.0	.5	.0	10.0	.5	.5	80.0
D 5	2330.	5.	W	.43	10.0	.5	.0	60.0	.0	.0	20.0
D 16	2680.	5.	E	.43	.5	.5	.0	3.0	.0	.0	90.0
D 18	2680.	5.	N	.43	10.0	.0	.0	10.0	.0	.0	80.0
D 20	2330.	30.	SW	.50	30.0	30.0	.5	10.0	.0	.0	30.0
D 43	2970.	5.	S	.43	10.0	.5	.5	10.0	.0	.0	80.0
L 8	2610.	5.	F	.43	3.0	.5	.5	10.0	.0	.5	80.0
L 9	2880.	10.	S	.47	.5	.0	.0	50.0	.0	.5	50.0
L 10	2630.	5.	SW	.43	20.0	.5	3.0	30.0	.0	.5	40.0
L 15	2640.	5.	NE	.43	20.0	.0	.5	10.0	.0	.0	70.0
L 45	2250.	5.	S	.43	.5	.5	.5	3.0	.0	.5	90.0
L 50	2780.	5.	N	.43	3.0	.0	.0	10.0	.0	.5	90.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 1	till	rolling	valley	even	stable	sheet	low
D 5	alluvium	rolling	valley	concave	stable	sheet	undistur
D 16	till	rolling	valley	even	stable	none	undistur
D 18	till	alluvial	draw	concave	stable	sheet	low
D 20	till	rolling	mid	convex	stable	sheet	undistur
D 43	till	alluvial	lower	concave	stable	none	undistur
L 8	till	rolling	mid	even	stable	none	low
L 9	sedim.	rolling	ridge	even	stable	none	low
L 10	till	rolling	ridge	even	stable-	sheet	low
L 15	till	rolling	valley	concave	stable	none	low
L 45	till	rolling	valley	even	stable	none	undistur
L 50	till	rolling	ridge	even	unstable	sh+ri	undistur

Table E3.--(continued)

STIPA COMATA-BOUTELOUA GRACILIS

TYPE NO: 22

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 6	2035.	10.	NE	.40	10.0	.5	.0	50.0	.0	.5	30.0
D 7	2220.	5.	W	.43	20.0	.5	.5	30.0	.0	.0	40.0
D 8	2200.	30.	E	.43	30.0	.5	.5	30.0	.0	.0	30.0
D 9	2695.	5.	S	.43	.5	.0	.0	.5	.0	.5	97.5
D 11	2570.	20.	S	.50	.5	3.0	.5	10.0	.0	.5	80.0
D 14	2790.	5.	W	.43	.5	.0	.5	.5	.0	.0	90.0
D 15	2705.	10.	SW	.46	.5	3.0	.5	10.0	.0	.0	80.0
D 31	3440.	10.	SW	.46	40.0	.5	.0	30.0	.0	.0	30.0
D 42	2560.	5.	N	.43	.5	.0	.0	10.0	.5	.0	90.0
D 46	2375.	5.	N	.43	.5	3.0	3.0	10.0	.0	.0	80.0
L 13	2610.	10.	E	.43	20.0	3.0	3.0	10.0	.0	.0	60.0
L 14	2610.	5.	S	.43	.5	3.0	10.0	50.0	.0	.5	40.0
L 17	2620.	5.	SE	.43	60.0	.5	.5	20.0	.0	.0	20.0
L 18	2720.	20.	N	.35	60.0	.0	.0	20.0	.0	.0	20.0
L 19	2700.	5.	F	.43	40.0	3.0	3.0	10.0	.0	.0	40.0
L 20	2260.	5.	SW	.43	3.0	.0	.5	20.0	.0	.0	80.0
L 40	2820.	10.	NW	.40	60.0	.5	.5	20.0	.0	.0	20.0
L 46	2220.	5.	NE	.43	3.0	.5	.5	.5	.0	.0	90.0
L 51	2700.	5.	F	.43	3.0	.5	.0	3.0	.0	.5	90.0
L 54	3040.	20.	S	.50	40.0	10.0	.5	20.0	.0	.5	30.0
L 63	3000.	5.	F	.43	10.0	20.0	10.0	3.0	.0	3.0	50.0
L 67	3040.	5.	F	.43	70.0	3.0	3.0	10.0	.0	.5	10.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 6	eolian	rolling	mid	convex	stable	wind	undistur
D 7	till	kettles	sh slope	convex	stable	sheet	undistur
D 8	till	kettles	sh slope	convex	stable	sheet	undistur
D 9	till	rolling	valley	even	stable	none	undistur
D 11	till	rolling	sh slope	concave	stable	sheet	low
D 14	till	rolling	valley	even	stable	none	undistur
D 15	till	rolling	sh slope	convex	stable	sheet	undistur
D 31	sedim.	rolling	draw	even	stable-	sh+ri	low
D 42	till	rolling	valley	even	stable	none	undistur
D 46	till	rolling	ridge	convex	stable	sheet	low
L 13	till	rolling	sh slope	even	stable	none	low
L 14	till	rolling	ridge	convex	stable	none	low
L 17	till	rolling	mid	convex	unstable	sheet	low
L 18	till	rolling	mid	concave	stable	sheet	low
L 19	till	rolling	ridge	convex	stable-	sheet	low
L 20	till	rolling	ridge	even	stable	none	undistur
L 40	sedim.	rolling	mid	even	unstabl+	sheet	undistur
L 46	till	alluvial	mid	even	stable	none	low
L 51	alluvium	rolling	ridge	even	stable	none	undistur
L 54	till	rolling	mid	even	unstabl+	sh+ri	undistur
L 63	till	kettles	ridge	convex	stable-	sheet	undistur
L 67	till	plateau	ridge	even	unstable	wind	undistur

Table E3.--(continued)

SCHIZACHYRIUM SCOPARIUM-MUHLENBERGIA CUSPIDATA

TYPE NO: 23

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
D 10	2635.	20.	W	.43	20.0	10.0	.5	30.0	.0	.0	40.0
D 13	2175.	40.	SW	.52	20.0	70.0	3.0	3.0	.0	.0	10.0
D 33	2480.	20.	SW	.48	60.0	.5	.5	10.0	.5	.0	30.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
D 10	till	rolling	sh slope	convex	unstabl+	sheet	low
D 13	sedim.	breaks	mid	even	unstable	sheet	low
D 33	sedim.	breaks	mid	even	unstable	sh+ri	mod

Table E3.--(continued)

CALAMOVILFA LONGIFOLIA-CAREX INOPS

TYPE NO: 24

QUANTITATIVE SITE CHARACTERISTICS

Plot No.	Elev. (ft)	Slope (%)	Aspect	RI	% Cover S	G	R	L	W	M	BV
L 3	2360.	5.	W	.43	50.0	.0	.0	10.0	.0	10.0	30.0
L 33	2440.	10.	S	.47	50.0	.0	.0	30.0	.0	.5	20.0

CATEGORICAL SITE CHARACTERISTICS

Plot No.	Parent mater.	Land-form	Plot posi.	Slope shape	Soil surf.	Erosion types	Ground disturb.
L 3	sedim.	rolling	ridge	even	stable-	sheet	undistur
L 33	sedim.	rolling	ridge	even	unstabl+	sheet	low

APPENDIX F

SPECIES RICHNESS AND DIVERSITY MEASURES FOR EACH PLOT

The measures presented here are as described in Hill (1973) and are all in units of number of species:

N(0) = the number of all species on the plot (e.g., = species richness)

N(1) = the number of abundant species on the plot (e.g., = base of the natural logarithms to the power of the Shannon Index)

N(2) = the number of very abundant species on the plot (e.g., = reciprocal of the Simpson Index)

For those communities represented by more than one plot, means and standard errors (SE) of means for each measure are also provided.

Table F1.--Forest plots.

PSEUDOTSUGA MENZIESII/SCHIZACHYRIUM SCOPARIUM

TYPE NO: 1

Plot No.	N(0)	N(1)	N(2)
D 47	35.00	12.80	7.35

PINUS PONDEROSA/PSEUDOROEGNERIA SPICATA

TYPE NO: 2

Plot No.	N(0)	N(1)	N(2)
D 48	31.00	11.94	7.09

PINUS PONDEROSA/JUNIPERUS SCOPULORUM

TYPE NO: 3

Plot No.	N(0)	N(1)	N(2)
D 22	19.00	5.37	3.97
D 23	24.00	5.91	4.11
D 29	25.00	6.50	4.06
L 28	23.00	4.94	3.50
L 30	25.00	4.37	2.79
L 35	32.00	7.28	4.40
L 37	25.00	5.08	3.51
L 43	27.00	7.84	4.32
L 60	18.00	5.93	3.01
L 61	33.00	6.06	3.82
L 62	19.00	6.95	4.52
L 72	27.00	9.82	6.38
L 73	35.00	9.49	5.12
mean =	25.54	6.58	4.12
SE =	1.48	.46	.26

Table F1.--(continued)

JUNIPERUS SCOPULORUM/ORYZOPSIS MICRANTHA

TYPE NO: 4

Plot No.	N(0)	N(1)	N(2)
D 4	12.00	3.62	2.37

Table F2.--Shrubland plots.

RHUS TRILOBATA/PSEUDOROEGNERIA SPICATA

TYPE NO: 5

Plot No.	N(0)	N(1)	N(2)
L 57	45.00	7.31	3.38

ELEAGNUS COMMUTATA/PASCOPYRUM SMITHII

TYPE NO: 6

Plot No.	N(0)	N(1)	N(2)
D 17	35.00	7.16	4.91

ARTEMISIA TRIDENTATA/FESTUCA CAMPESTRIS

TYPE NO: 7

Plot No.	N(0)	N(1)	N(2)
D 27	28.00	2.64	1.44
D 28	34.00	6.34	3.67
mean =	31.00	4.49	2.56
SE =	3.00	1.85	1.12

Table F2.--(continued)

ARTEMISIA TRIDENTATA/PSEUDOROEGNERIA SPICATA

TYPE NO: 8

Plot No.	N(0)	N(1)	N(2)
D 36	23.00	5.38	3.71
L 32	27.00	6.62	3.76
L 36	36.00	5.09	2.76
L 74	43.00	9.04	5.44
mean =	32.25	6.53	3.92
SE =	4.50	.90	.56

ARTEMISIA TRIDENTATA/PASCOPYRUM SMITHII

TYPE NO: 9

Plot No.	N(0)	N(1)	N(2)
D 2	18.00	5.82	4.00
D 24	28.00	9.16	6.14
D 32	24.00	6.14	4.27
D 34	22.00	6.25	4.06
L 1	31.00	6.89	4.43
L 4	15.00	3.11	2.34
L 5	13.00	2.95	2.09
L 7	17.00	5.33	3.65
L 25	29.00	6.59	3.70
L 26	21.00	6.90	5.10
L 27	33.00	9.18	5.01
L 29	30.00	9.38	5.26
L 42	21.00	3.92	2.12
L 58	22.00	6.16	3.90
L 75	34.00	6.49	3.45
mean =	23.87	6.28	3.97
SE =	1.72	.51	.30

Table F2.--(continued)

ARTEMISIA CANA/STIPA COMATA

TYPE NO: 10

Plot No.	N(0)	N(1)	N(2)
D 39	38.00	8.88	5.21
D 41	30.00	9.44	6.14
D 45	28.00	6.12	4.22
L 23	22.00	3.55	2.40
L 47	25.00	4.25	2.63
L 48	26.00	7.34	5.19
L 52	19.00	4.02	3.03
mean =	26.86	6.23	4.12
SE =	2.31	.91	.55

ARTEMISIA CANA/PASCOPYRUM SMITHII

TYPE NO: 11

Plot No.	N(0)	N(1)	N(2)
L 11	23.00	6.65	4.74
L 44	27.00	4.57	2.67
L 69	21.00	6.71	5.05
mean =	23.67	5.98	4.15
SE =	1.76	.70	.75

Table F2.--(continued)

CERATOIDES LANATA/STIPA COMATA

TYPE NO: 12

Plot No.	N(0)	N(1)	N(2)
L 2	26.00	6.94	4.63
L 38	17.00	3.71	2.41
L 49	13.00	4.36	2.98
mean =	18.67	5.00	3.34
SE =	3.84	.99	.67

JUNIPERUS HORIZONTALIS/SCHIZACHYRIUM SCOPARIUM

TYPE NO: 13

Plot No.	N(0)	N(1)	N(2)
D 12	7.00	4.98	4.44
D 21	21.00	4.08	2.78
D 50	33.00	5.70	2.73
L 66	14.00	2.17	1.39
L 68	15.00	3.26	2.47
L 70	24.00	5.74	2.78
mean =	19.00	4.32	2.77
SE =	3.70	.58	.40

ATRIPLEX CONFERTIFOLIA-ARTEMISIA TRIDENTATA

TYPE NO: 14

Plot No.	N(0)	N(1)	N(2)
D 30	23.00	11.79	6.84

Table F2.--(continued)

SARCOBATUS VERMICULATUS/PASCOPYRUM SMITHII

TYPE NO: 15

Plot No.	N(0)	N(1)	N(2)
L 31	26.00	6.78	4.68

SARCOBATUS VERMICULATUS-ATRIPLEX GARDNERI

TYPE NO: 16

Plot No.	N(0)	N(1)	N(2)
D 3	7.00	4.90	3.43
D 19	9.00	2.71	2.20
D 38	6.00	2.01	1.59
L 39	15.00	2.92	2.20
L 41	17.00	4.53	2.96
L 59	28.00	14.02	7.23
L 76	21.00	4.15	2.24
mean =	14.71	5.03	3.12
SE =	3.05	1.55	.72

Table F2.--(continued)

ARTEMISIA LONGIFOLIA/ORYZOPSIS HYMENOIDES

TYPE NO: 17

Plot No.	N(0)	N(1)	N(2)
D 35	5.00	1.54	1.21
D 37	5.00	1.38	1.14
mean =	5.00	1.46	1.17
SE =	.00	.08	.04

Table F3.--Grassland plots.

PSEUDOROEGNERIA SPICATA-POA SECUNDA

TYPE NO: 18

Plot No.	N(0)	N(1)	N(2)
D 40	33.00	5.15	3.27
D 44	28.00	6.62	4.56
D 49	29.00	5.78	3.64
D 51	37.00	8.41	4.93
L 56	26.00	5.54	3.15
mean =	30.60	6.30	3.91
SE =	1.96	.58	.36

PSEUDOROEGNERIA SPICATA-PASCOPYRUM SMITHII

TYPE NO: 19

Plot No.	N(0)	N(1)	N(2)
L 34	35.00	4.39	1.90

Table F3.--(continued)

PASCOPYRUM SMITHII-STIPA VIRIDULA

TYPE NO: 20

Plot No.	N(0)	N(1)	N(2)
L 6	28.00	12.46	8.95
L 12	29.00	8.86	4.79
L 16	18.00	4.51	3.18
L 21	24.00	8.18	5.46
L 22	16.00	1.86	1.27
L 24	33.00	8.71	4.75
L 53	17.00	3.19	1.94
L 55	34.00	4.84	2.80
L 64	41.00	6.78	3.64
L 65	41.00	6.37	3.61
L 71	22.00	4.69	2.45
mean =	27.55	6.40	3.89
SE =	2.72	.91	.63

PASCOPYRUM SMITHII-BOUTELOUA GRACILIS

TYPE NO: 21

Plot No.	N(0)	N(1)	N(2)
D 1	24.00	5.74	3.52
D 5	14.00	6.80	5.15
D 16	24.00	7.17	4.49
D 18	18.00	5.74	4.43
D 20	21.00	6.16	4.70
D 43	32.00	7.75	5.10
L 8	18.00	3.52	2.05
L 9	26.00	3.83	2.15
L 10	29.00	9.45	5.72
L 15	21.00	4.41	3.39
L 45	21.00	3.37	2.50
L 50	17.00	2.87	1.86
mean =	22.08	5.57	3.76
SE =	1.50	.58	.39

Table F3.--(continued)

STIPA COMATA-BOUTELOUA GRACILIS
TYPE NO: 22

Plot No.	N(0)	N(1)	N(2)
D 6	23.00	5.24	3.08
D 7	24.00	5.50	3.17
D 8	25.00	8.78	5.22
D 9	22.00	5.04	2.88
D 11	21.00	6.36	4.00
D 14	19.00	5.27	3.63
D 15	24.00	6.27	4.02
D 31	15.00	3.27	1.99
D 42	32.00	5.00	2.99
D 46	40.00	7.42	3.69
L 13	25.00	5.45	3.71
L 14	23.00	6.62	3.76
L 17	16.00	3.99	2.78
L 18	34.00	5.29	2.34
L 19	17.00	4.26	3.15
L 20	19.00	4.15	2.89
L 40	23.00	5.53	3.24
L 46	17.00	2.85	2.11
L 51	17.00	4.05	3.28
L 54	31.00	4.59	2.15
L 63	29.00	6.80	4.26
L 67	19.00	6.79	3.99
mean =	23.41	5.39	3.29
SE =	1.37	.30	.17

Table F3.--(continued)

SCHIZACHYRIUM SCOPARIUM-MUHLENBERGIA CUSPIDATA
TYPE NO: 23

Plot No.	N(0)	N(1)	N(2)
D 10	22.00	4.46	2.48
D 13	15.00	8.70	7.04
D 33	21.00	7.24	5.28
mean =	19.33	6.80	4.93
SE =	2.19	1.24	1.33

CALAMOVILFA LONGIFOLIA-CAREX INOPS

TYPE NO: 24

Plot No.	N(0)	N(1)	N(2)
L 3	16.00	4.55	2.40
L 33	15.00	6.01	4.19
mean =	15.50	5.28	3.30
SE =	.50	.73	.89

APPENDIX G

EXAMPLE COMMUNITY TYPE DESCRIPTION

Descriptions of the format presented in the following example are currently being completed by the Montana Natural Heritage Program for all community types (approx. 300) of Montana.

Stipa comata-Bouteloua gracilis (STICOM-BOUGRA)

This community is very widespread in Montana and has been recorded in all portions of the state except in the northwest.

Vegetation.--Stipa comata or S. spartea dominate this community. Cover of these species is generally abundant. Other characteristic graminoids include Bouteloua gracilis (well represented), Carex filifolia and/or C. eleocharis (common to well represented), and Koeleria macrantha (well represented). If Pascopyrum smithii is present its cover does not exceed 1% (except in the Pascopyrum smithii phase described by Mueggler and Stewart (1980)). Selaginella densa is often abundant in northcentral and northeastern Montana and generally suggests heavy grazing disturbance in such situations. Artemisia frigida, Heterotheca villosa, Phlox hoodii, and Sphaeralcea coccinea are typically present.

Physical Setting.--This community type is characteristically found on gentle to moderate slopes of any aspect on rolling uplands, broad alluvial benches and fans, and valley floors. Elevations range from 2000 to 6000 feet and annual precipitation varies from 8 to 14 inches. The soil surface is often covered by a dense mat of Selaginella densa (northeastern/northcentral Montana) or in some cases may feature abundant bare soil exposures. Typical soil subgroups include Typic Ustorthents, Ustic Torriorthents, Borollic Calciorthids, Aridic Argiborolls, and Typic Argiborolls.

Adjacent Community Types.--This community generally occupies the driest grassland sites in Montana. The Pseudoroegneria spicata-Bouteloua gracilis or Pascopyrum smithii-Bouteloua gracilis (or Stipa viridula) types occur on more mesic sites. The Pascopyrum types are often found in clay-rich depressions within a matrix of STICOM-BOUGRA. More mesic adjacent shrublands include Artemisia cana-Stipa comata on generally even or convex slopes and Symphoricarpos occidentalis or Prunus virginiana communities in convavities.

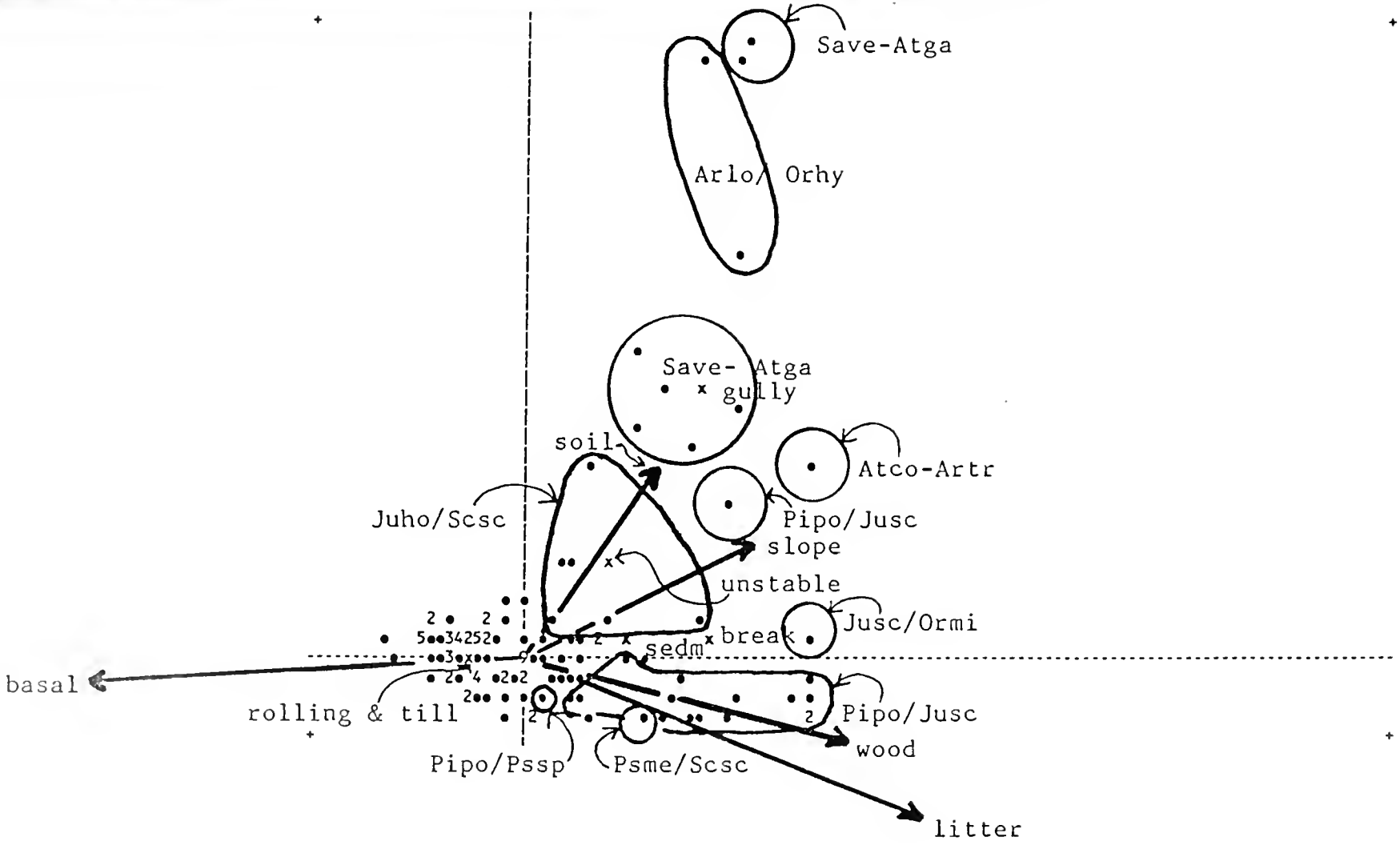
Comments.--This community type has previously been described in Montana by Mueggler and Stewart (1980) and in Wyoming by Terwilliger et al. (1979). Additionally, Coupland (1961) describes a Stipa-Bouteloua type in southern Saskatchewan and Alberta that appears similar in composition to STICOM-BOUGRA. The type also appears to be closely-related (perhaps ecologically equivalent) to the Stipa comata-Carex filifolia type of Hansen (1985).

Bouteloua gracilis is considered an increaser with heavy grazing in this community type while Stipa comata generally decreases (Mueggler and Stewart 1980).

APPENDIX H

DETRENDED CANONOCAL CORRESPONDENCE ANALYSIS DIAGRAMS

Plot scores (•) for first and second axes of DCCA ordinations of all 125 plots, 16 forest plots, 53 shrubland plots, and 56 grassland plots. The first axis is the horizontal axis and the second axis is the vertical axis. Numbers in diagrams indicate multiple plots at that ordination position. Centroids of categorical environmental variables are indicated by "x'. Vectors indicate the direction of maximum change for a quantitative environmental variable and the length indicates the strength of their correlation with the ordination axes. Only the ten environmental variables (of the 46 available) having the strongest correlation with the axes are shown. See Table 1 for a list and abbreviations of the environmental variables.


Save-Atga
Arlo/ Orhy
Save- Atga
gully
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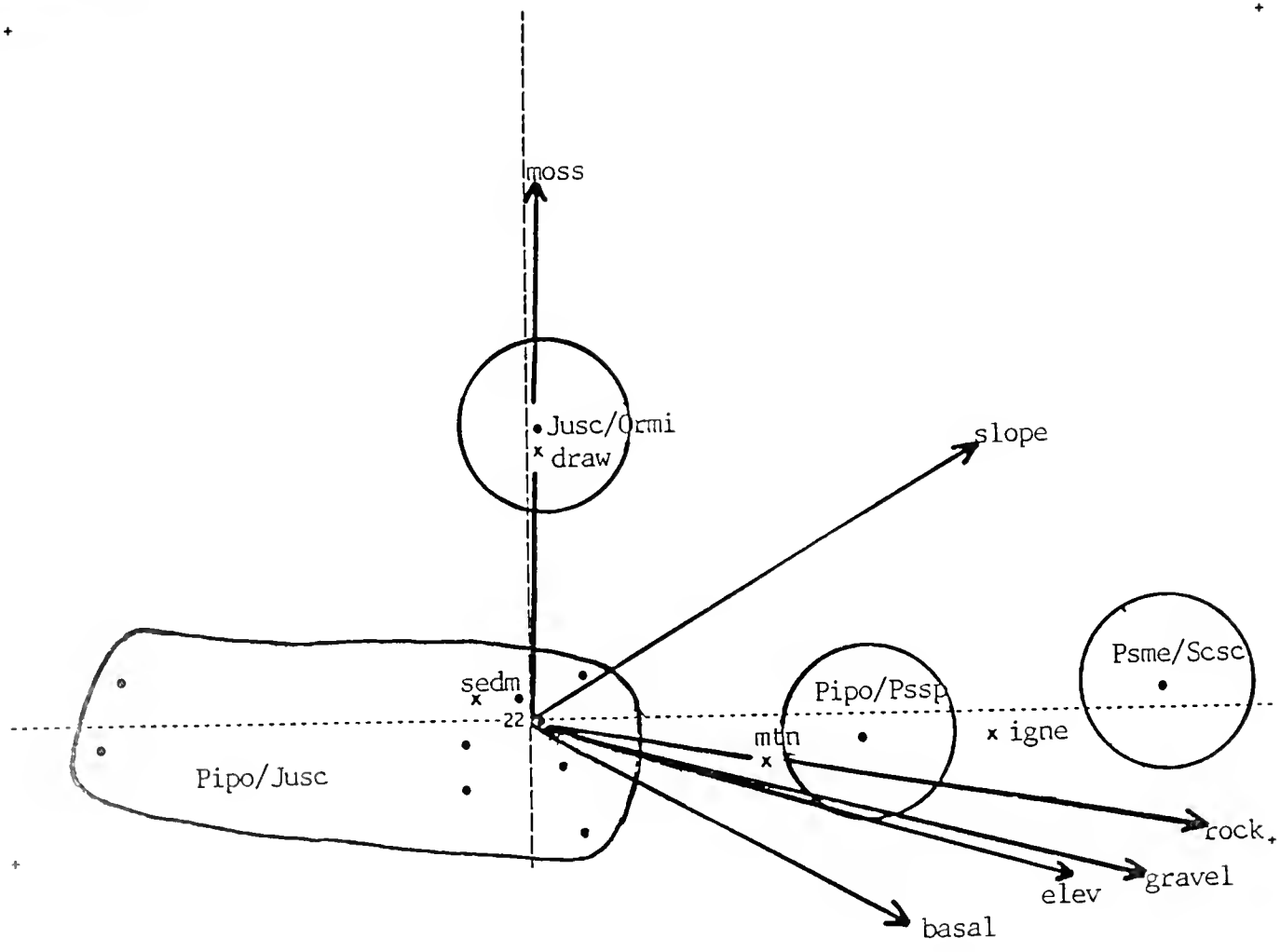
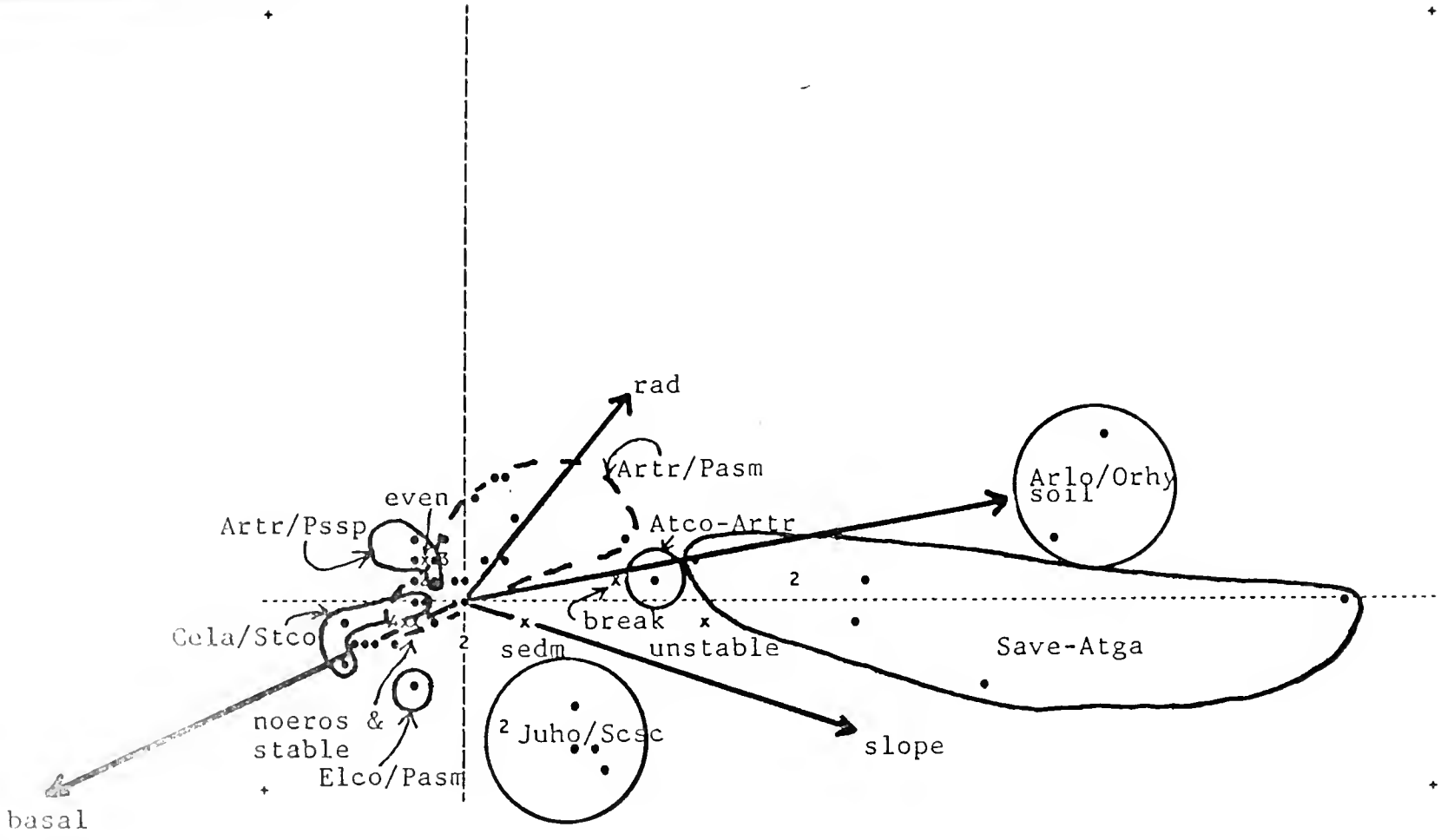
Atco-Artr
Juho/Scsc
Pipo/Jusc
slope
unstable
Jusc/Ormi
break
sedm
basal
rolling & till
Pipo/Jusc
wood
Pipo/Pssp
Psme/Scsc
litter

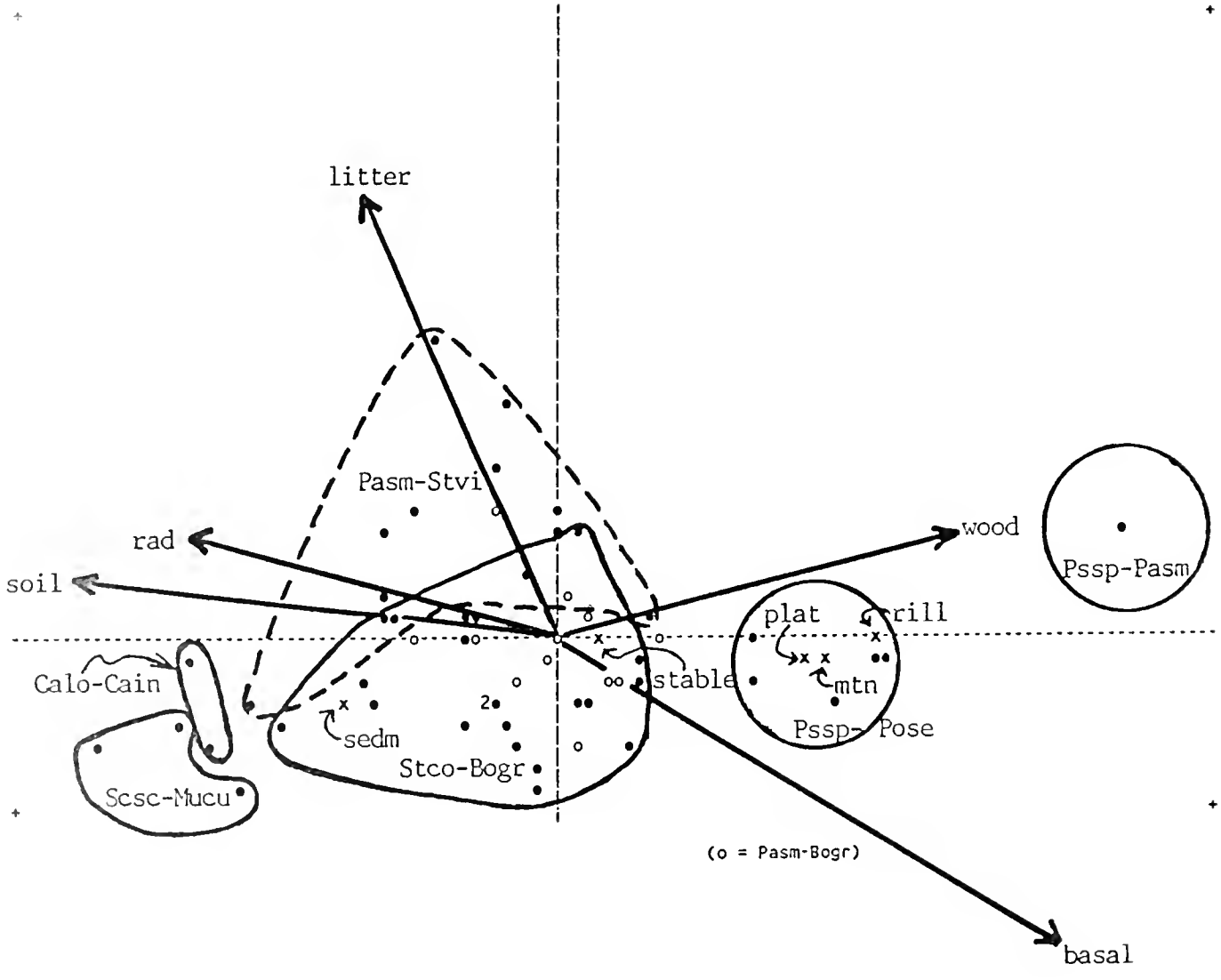
(H1).--All Plots



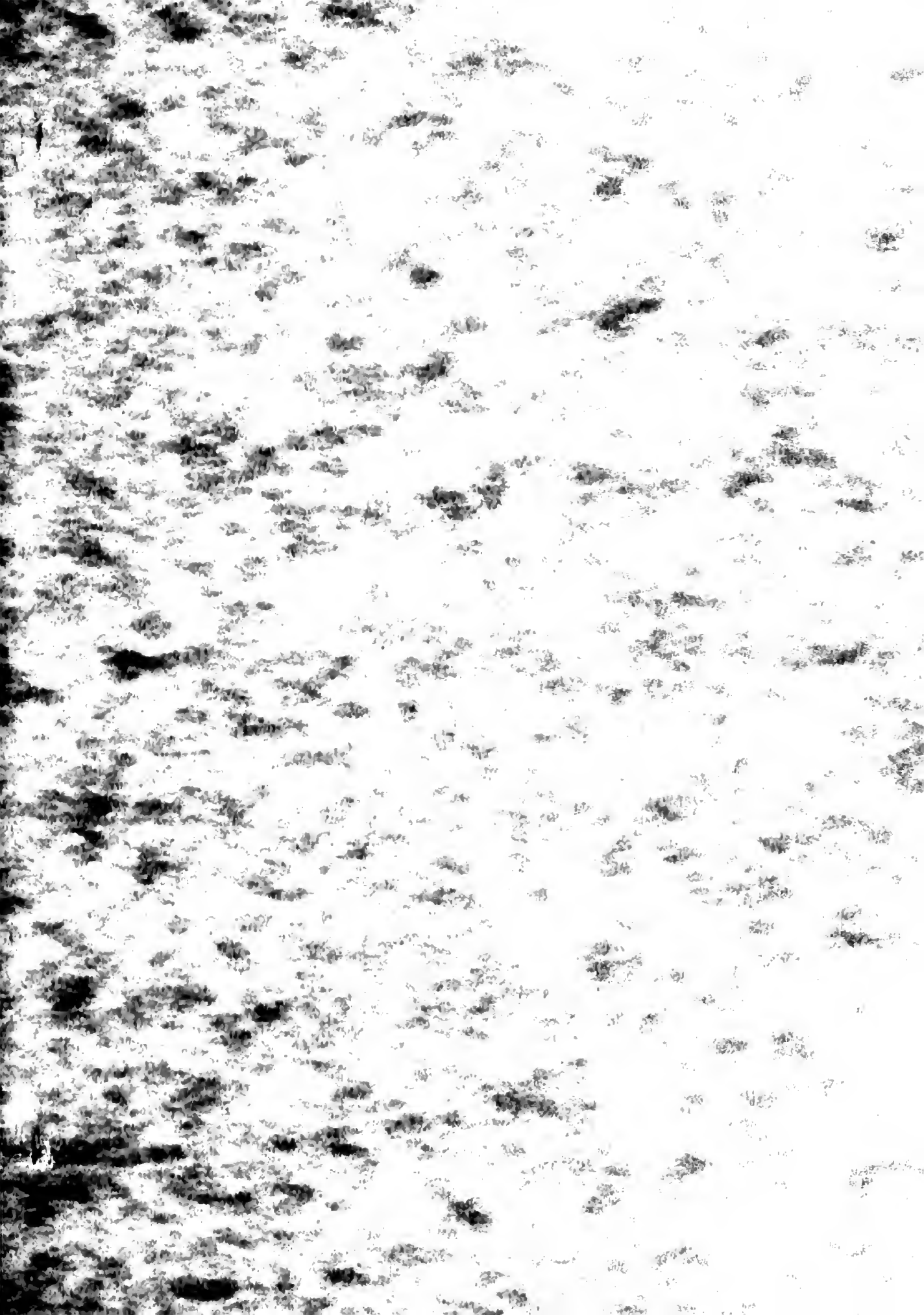
(H2).--Forest Plots



(H3).--Shrubland Plots



(H4).--Grassland Plots

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