COMMUNITY CONCEPTS AND APPLICATIONS FOR CONSERVATION

by

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INTRODUCTION

Biological diversity is the variety of life and its processes. Biological diversity encompasses genetic diversity, species diversity, and community and ecosystem diversity. Ecological communities are recurrent groups of species that coexist in similar landscape features. Communities are recognized as both component elements of biological diversity and as representative elements of species populations and habitats and ecological processes. The conceptual objective of the coarse-filter approach to conservation of biological diversity is that conservation areas containing representative examples of all communities (ecosystems) will protect viable populations of most species, biotic interactions, and ecosystem processes. The coarse-filter approach is used to develop conservation strategies for all the components of native ecosystems (Bourgeron and Engelking 1994; Grossman et al. 1994; Hunter 1991; Noss et al. 1995).

For biologists, ecologists, and resource managers to work effectively within the coarse-filter paradigm, appropriate information on plant communities must be consistently applied within a hierarchy of geographic scales. The objectives of this report are (1) to summarize the conceptual bases for alternative approaches to classification and evaluate these approaches in relation to fulfillment of conservation needs at the landscape and subregional scales (*sensu* McNab and Avers 1994) and (2) to summarize the geographic range of applicability, methods, and comparability of community classification work in Idaho.

CONSERVATION AND COMMUNITY CONCEPTS

Potential Natural Vegetation

Plant community classification in the Northwest is predominantly based on the concept of potential natural vegetation. Here it is conventionally held that vegetation is an integrated expression of the physical environment and that the end point of plant succession, the “climax” plant community, reflects the most meaningful integration of environmental potential (Daubenmire 1952; Pfister 1989). The principle objective of western community classification is to describe relationships between pattern and process in natural vegetation and the physical and biotic environment.

Classification work in the Rocky Mountains (Pfister et al. 1977; Daubenmire and Daubenmire 1968; Cooper et al. 1991; Steele et al. 1981 and 1983; Mauk and Henderson 1984) and the Intermountain region (Daubenmire 1970; Tisdale 1986; Hironaka et al. 1983) is strongly influenced by the work of Daubenmire (1952 and 1968; Wellner 1989; Alexander 1985 and 1988). In this work the *habitat type* is recognized as the basic classification unit. The habitat type is defined as all the land areas that support, or have the potential to support, the same climax vegetation. The habitat type is named for the climax vegetation, or plant association. The phase is recognized as a subdivision of a habitat type representing a characteristic variation in climax vegetation and environmental condition.

The concept of the habitat type as a land classification can be misleading because the classification unit, all areas of land which support a specific plant association, is actually derived through the analysis of floristic similarity (Hall 1988). In forested regions of Oregon and Washington the term *plant association* is thought the most appropriate classification unit as it pertains to the classification of plant communities, rather than areas of land (e.g., Johnson and Simon 1987; Williams and Smith 1991). Johnson and Simon (1987) describe the plant association as follows: “If a particular stand is able to persist and develop in its environment, and if interspecific competitive forces remain natural without disturbing influences, then following a long period of time those plants which can reproduce in competition will constitute a long-term stable community or ‘climax’ community. This climax plant community containing a definite plant composition, having similar gross appearance or physiognomy, and growing in uniform habitat conditions, is called a plant association. As a combination of similar environmental factors are repeated across a landscape, a predictable plant association will occupy those sites given time and lack of disturbance.” Phases are not usually recognized. Rather, warranted differences are recognized at the association level.

Habitat type and plant association classifications are based on the concept of “climax” vegetation. The notion of the climax community is derived from the work of Clements (1916; McIntosh 1985; Kingsland 1991). Clements proposed a discrete community model (Gauch 1982). In this context the idea of the climax community as a stable, self-reproducing collection of populations which have attained a steady state with the environment, is embedded in the treatment of communities as “complex organisms” which possess attributes analogous to individual organisms. Perhaps for this reason, community classifications based on the hypothetical climax vegetation are often assumed to support a discrete community model. The two concepts (the discrete community model and the climax) are, however, independent. Traditional discussions entitled “habitat type versus continuum philosophy” (e.g., Steele et al. 1981 and 1983; Cooper et al. 1991; Pfister et al. 1977) should not be needed.

Classification based on a theoretical end-point of succession, or potential natural vegetation, is fully compatible with the continuous (or continuum) community model. This model, proposed by Gleason (1926), is based on the individualistic distribution of species. In this model, communities are associations of species independently ordered along environmental and resource gradients (McIntosh 1985; Kingsland 1991).

Modern departure from the discrete community model has paralleled advancements in computer assisted computation. The continuous community model is a fundamental assumption of modern classification and ordination techniques (e.g., detrended correspondence analysis, canonical correspondence analysis) (Gauch 1982; Hill 1979; ter Braak 1990). Technological advances in the manipulation and analysis of quantitative data on plant species distributions and abundances has contributed to widespread acceptance that the plant community is necessarily a mathematical abstraction of nature. That is, the composition identified in a classification synthesis table does not likely occur in the field. Rather, the idealized stand is a representative summary of all the variability of stands sampled, and classified as the association (Williams and Smith 1991; Pfister 1989; Sawyer and Keeler-Wolf 1995).

In application of the continuous model, communities are viewed more as arbitrary units which embody and characterize variability in species distributions and abundances, rather than units of discrete invariability. The continuous model fosters the perspective that communities must be operationally defined.

One of the greatest difficulties, or least acceptable aspects, of using the climax as a basis for community classification is that, for many plant associations, the climax is not often observed. The seral progression to climax, not having been observed, may never occur, and in cases has little precedence in nature (e.g., some associations within the *Abies grandis* series). The concept of using the late seral, most shade tolerant tree species as an integrated expression of the physical environment is, however, operationally independent of the concept of climax. For example, the operational differentiation between the plant associations *Abies grandis*/*Calamagrostis rubescens* and *Pseudotsuga menziesii*/*Calamagrostis rubescens* - the successful establishment of *Abies grandis* - is independent of the notion of a climax occurrence of *Abies grandis*/*Calamagrostis rubescens*.

Hall et al. (1995) propose the *potential natural community* as an alternative term for concepts encompassing the plant association, habitat type, and range site. The potential natural community is described as: “the biotic community that one presumes would be established and maintained over time under present environmental conditions if all successional sequences were completed” in the absence of human and/or natural disturbance. Implicit in the concept of potential natural community are (1) a relaxed interpretation of the certainty of seral progression and (2) wider acceptance of dynamic processes of change. These characteristics of potential natural community may reduce the need to recognize certain *community types*: communities which possess low classification certainty (e.g., due to low sampling effort) and seral communities which show no clear trend to a specific plant association or habitat type.

Classification units based on potential natural vegetation are stable in time. Regardless of seral or structural changes (in response to disturbance events), the plant association will remain unchanged. That is, as long as disturbance events do not change the site potential. Since classifications of potential natural vegetation are temporally stable, the vegetation classification units encompass the entire dynamic range of variation in seral status and structural condition (Neiman and Hironaka 1989). As the potential natural vegetation is necessarily defined in relation to physical environmental parameters, it is a fundamental basis for describing and understanding ecosystem structure and function and the natural range of variability (Haufler 1994; Haufler and Irwin 1993; Morgan et al. 1994; *and see* Crane and Fischer 1986; Agee 1981).

Recognition of the dynamic nature of ecosystems is crucial for successful application of the coarse-filter approach to conservation. The natural, or historic, range of variation characterizes fluctuation in ecosystem conditions and processes over time (Morgan et al. 1994). Hall et al. (1995) and Steele and Geier-Hayes (1987, 1989, 1992) provide a systematic approach to characterization of seral and structural condition. The operational value of these units of natural seral and structural variability is in their relation to potential natural vegetation.

Dynamic Riparian Systems

Riparian ecosystems represent a broad range of biological and environmental relationships. Though some riparian systems may be relatively stable, others are dynamic and characterized by frequent and intense environmental change. Most riparian systems are subject to fluctuating water tables; rearrangement of the substrate due to stream meandering and down cutting; and the activities of fire, wildlife, and man (Padgett et al. 1989; Manning and Padgett 1995). The frequency and intensity of disturbance events fundamentally distinguishes riparian from adjacent upland systems.

With this great difference, conventions developed for upland vegetation may not apply to riparian systems. Winward and Padgett (1989; Manning and Padgett 1995) developed the concept of the *riparian complex* as a unit of land that supports, or may potentially support, a similar grouping of riparian community types. Riparian complexes are distinguished on the basis of geomorphology, substrate, stream channel characteristics, and general vegetation pattern. The riparian complex is analogous to the habitat type concept and provides an approach to classification of riparian site potential. The riparian complex is particularly useful in mapping intricate mosaics of riparian vegetation.

Riparian communities are often classified as community types, defined as an abstract grouping of stands based on floristic and structural similarities (e.g. Manning and Padgett 1995; Padgett et al. 1989; Crowe and Clausnitzer 1995; Youngblood et al. 1985). However, Hansen et al. (1995) argue for the application of the habitat type system. They contend that changes in site conditions such as the filling and drying of potholes or the deposition of alluvium on flood plains (giving rise to drier site conditions) result in the replacement of one site potential for another. Cyclical changes, in comparison, that do not effect geomorphology, substrate, and stream channel characteristics do not effect the site potential. In riparian systems the frequency and intensity of change in site potential is high compared to upland systems. Kovalchik (1987 and 1993; Hansen et al. 1995) proposed the term *riparian association* as the plant community representing the latest successional stage attainable on a specific hydrologically-influenced surface (or the vegetative potential of a fluvial surface). In this sense, the riparian association is analogous to the plant association as it reflects the most meaningful integration of environmental potential.

The concept of the potential natural community (Hall et al. 1995) is of useful integrative value in this context. As it pertains to the "biotic community that one *presumes* would be established and maintained over time under *present environmental conditions*," the potential natural community concept, compared to traditional view of the plant association or habitat type, allows for (1) a greater level of uncertainty concerning the seral status of riparian communities and (2) a wider acceptance of dynamic processes of change inherent to riparian systems.

The Regional and Continental Scale

The habitat type, plant association, and community type approaches to community classification are developed through observation of stand-scale patterns in species distribution and abundance. These observations are summarized and applied at the landscape or subregional scales. In order to summarize information on the regional, continental, or global scales, it is necessary to establish applicable definitions and classification standards. Recent efforts to develop regional and continental vegetation classifications include Driscoll et al. (1984), Bourgeron and Engelking (1994) (subsequently referred to as the Western Regional Vegetation Classification [WRVC]), and Federal Geographic Data Committee (1996) (subsequently referred to as the National Vegetation Classification [NVC]) (*and see* Cowardin et al. 1979).

These regional and continental vegetation classification systems each involve (in principle) a similar six-tiered hierarchical scheme of four physiognomic classes (class, subclass, group [subgroup], and formation) and two floristic classes (alliance [or series] and plant association [or community association]). The classifications differ in that the floristic elements (series and plant association) identified by Driscoll et al. (1984) describe potential natural vegetation (after Daubenmire 1952; Mueggler and Stewart 1980).

In contrast, the floristic levels of the WRVC and NVC are defined as units of existing vegetation. In this context plant association (usage of the term *community association* is basically equivalent) is defined as: "a plant community of definite floristic composition, presenting a uniform physiognomy, and growing in uniform habitat conditions" (Third International Botanical Congress 1910, as cited by Bourgeron and Engelking 1994). The alliance is defined as a physiognomically uniform group of plant associations which share one or more diagnostic species found, as a rule, in the uppermost stratum of the existing vegetation (Bourgeron and Engelking 1994; Federal Geographic Data Committee 1996).

Bourgeron and Engelking (1994) provide operational guidelines for inclusion of a community within the WRVC: published or gray literature references must provide (1) location information, (2) a description of methods, and (3) species lists with quantitative measures of species abundances (i.e., a synthesis table). Federal Geographic Data Committee (1996) refine these general standards with more specific requirements concerning methods and location data.

Synthesis

Sawyer and Keeler-Wolf (1995) liken a community classification to a language developed to meet the need of a set of commonly held objectives. The numerous vegetation classification systems that have been developed reflect a variety of descriptive scales, philosophies, and objectives. Reasons for developing a vegetation classification include: resource inventory, conservation planning, or building a framework for understanding vegetation dynamics. A basic objective common to all community classification is to enable consistent communication regarding vegetation (Gauch 1982; Sawyer and Keeler-Wolf 1995). What are the classification needs for objectives of plant community conservation at the landscape and subregional scales?

Objectives for plant community conservation may be summarized as: (1) maintain viable representative occurrences of all native communities as integral elements of biological diversity; (2) ensure long-term viability of the constituent populations and habitats of plant and animal species, biotic interactions, and ecological processes; and (3) maintain an ecological reference against which the effects of intensive management activities may be assessed (The Nature Conservancy 1996; USDI Bureau of Land Management 1992; USDA Forest Service 1994; Grossman et al. 1994; Noss et al. 1995). In the Northwest, upland forest, shrubland, and grassland landscape- and subregional-scaled community classifications are predominantly classifications of potential natural vegetation. Riparian and wetland classifications in the region are intermediate. Some authors argue for an integrative approach and adapt potential natural vegetation concepts to riparian and wetland systems. Others classify riparian and wetland vegetation as units of existing vegetation. Current regional- and continental-scaled vegetation classifications are of existing vegetation. Given these two approaches, which approach will most effectively fulfill needs for meeting the objectives of community conservation in the Northwest?

The first objective, to maintain viable representative occurrences of all native communities, may be met with either a classification of existing vegetation or a classification of potential natural vegetation. The basic requirement for this objective is consistant application of non-overlapping units.

The second objective, to ensure long-term viability of all the constituent populations and habitats of plant and animal species, biotic interactions, and ecological processes, is that of the coarse-filter strategy. This is the conceptual paradigm in which ecological classification units are used to predict the distributions and abundances of populations and habitats of all (common and rare) plant and animal species. Implementation of this coarse-filter approach to conservation requires a classification which provides a meaningful integration of the environmental factors and ecosystem processes affecting the distribution and abundance of plant and animal species. Here *ecosystem processes* are, for example, succession; plant establishment, growth, and senescence; animal reproduction and predation; disturbance; photosynthesis; respiration; and decomposition.

Classifications of existing vegetation and potential natural vegetation both provide an integration of these environmental factors, though with differing capacity and meaning. In principle, units of potential natural vegetation possess a one-to-one relationship to the integrated environmental factors affecting the distribution and abundance of plant and animal species. While all the potential seral and structural stages of a site are implicit in the classification of potential natural vegetation, the specific dynamic state of a particular occurrence is not. Taken independently, units of potential natural vegetation do not express the dynamic state of the ecosystem (i.e., the current status of ecosystem processing as expressed, for example, by stand seral status and structural condition).

In contrast to the unit of potential natural vegetation, the unit of existing vegetation is an expression of dynamic state. The uniform floristic and structural unit of existing vegetation may be derived, however, through a range of different successional pathways and on a range of different site potentials. In this sense, the units of existing vegetation (taken alone) possess a one-to-many relationship to environmental factors and ecosystem processes. In the context of implementing the coarse-filter strategy at landscape and subregional scales, the unit of existing vegetation is *meaningful* only in relation to the respective potential natural vegetation.

To effectively attain the second objective for plant community conservation (long-term viability of all the constituent populations and habitats of plant and animal species, biotic interactions, and ecological processes) a classification of both potential natural vegetation and existing vegetation are needed. Due to the one-to-one relationship of units of potential natural vegetation to integrated environmental factors (affecting the distribution and abundance of plant and animal species and ecosystem processes), this is best accomplished on the primary basis of potential natural vegetation, with secondary units of existing vegetation.

The unit of existing vegetation encompasses a single combination of seral status and structural condition. Existing vegetation is a relatively transient, dynamic expression of a given site. In contrast, the unit of potential natural vegetation encompasses all potential seral stages and structural conditions of a given site. Thus, only the unit of potential natural vegetation is sufficiently stable in time to fulfill the third objective for community conservation, maintenance of an ecological reference against which the effects of human activities may be assessed.

Implementation of conservation action (e.g., ecological inventory and conservation site selection) typically occurs at the land unit or landscape scale (using terminology cited by McNab and Evers 1994). Conservation planning may occur at the landscape, subregional, or region scale. Range-wide issues in community conservation occur, primarily, at the subregional and regional scales. Thus, the community classification system must allow for integration into a hierarchical classification of successively larger geographical (regional, continental, and global) scales.

To effectively meet the objectives for community conservation (as stated above) for the landscape and subregional scales, community classification must: (1) provide a meaningful integration of the environmental factors and ecosystem processes affecting the distribution and abundance of plant and animal species; (2) provide temporal stability; (3) be widely accepted; and (4) allow for integration at successively higher geographical (regional, continental, and global) scales. A classification of potential natural vegetation, coupled with a classification of seral status and structural condition, is best suited to fill these criteria. Confidence in the capability of each unit within this system to fulfill conservation objectives may be evaluated on the basis of (1) the availability and quality of location information, (2) the methods employed, and (3) the availability of species lists with quantitative measures of species abundances.

APPLICATIONS

Plant communities are abstract units that embody and characterize variability among similar stands of vegetation, represent an integration of environmental factors, and, to an extent, are based on intuitive interpretation of quantitative data. The ecological boundaries of a community may vary depending on the individual perceptions, the diversity of the study area, and the number of samples analyzed. The rate of change within a particular community in the composition and structure of representative stands is variable both between different communities and between different scales of the landscape. Given these conditions, knowledge of the confidence in, or the nature of, each classification unit is essential to effectively attain the objectives for community conservation. The range in geographical scales and objectives related to plant community classification points to the need for crosswalking between classification schemes. In this section a number of crosswalks pertinent to community classification in Idaho are presented.

Regional- and Subregional-Scale Crosswalks

Hall and Martinez (1995) propose a systematic approach to determining the similarities or differences between proposed and currently accepted plant associations. In this approach, objective criteria (based on analysis of floristic similarity, productivity, and response to disturbance) are identified. Approaches taken here are less formal. Crosswalks are presented at two geographic scales: (1) regional and subregional, and (2) subregional and landscape.

I present a list of plant communities known or expected to occur in Idaho (Rust 1996). Plant associations and stable community types described on the landscape and subregional scales are crosswalked to the formation level of the NVC (which was developed for application on the continental scale). Information necessary for this crosswalk was based on the consensus of the TNC/Natural Heritage Ecology Working Group and (for community elements not recognized on the regional scale) NVC standards and conventions.

In Table 1[1] plant associations and stable community types known or expected to occur in Idaho are listed by NVC subclass. This (working) comprehensive community classification for Idaho provides a less detailed crosswalk to the NVC. Table 1 provides a summary of the subregional- and landscape-scale crosswalks which follow. Principle authorship for each community is identified as a basis for comparing composition and structure and resolving issues of synonymy. Notes on the level of confidence in the community classification units are provided.

Table 2 provides a crosswalk of plant associations identified in two subregional classifications of plant

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[1] Nomenclature follows Hitchcock and Cronquist (1973), with the following exceptions: *Salix* follows Brunsfeld and Johnson (1985), with the exception of *Salix amygdaloides*, *Salix lasiolepis*, and *Salix scouleriana* which follow Hitchcock and Cronquist 1973; *Carex utriculata* as treated by Reznicek (1987); *Leucopoa kingii*, *Poa cusickii*, and *Poa epilis* as treated by Cronquist et al. (1977); *Artemisia* follows Cronquist et al. (1994), except that *Artemisia arbuscula arbuscula*, *Artemisia arbuscula thermopola*, and *Artemisia longiloba* are recognized as treated by Winward and Tisdale (1977) and *Artemisia tridentata xericensis* by Rosentreter and Kelsey (1991); *Poa secunda* as treated by Arnow (1981).

association groupings, or working-groups (*sensu* Steele et al. 1981). The working-group classifications, the Biophysical Classification (USDA Forest Service 1996) and the Ecosystem Diversity Matrix (Haufler 1994), were developed primarily for the implementation of ecosystem management. The crosswalk is a summary of information provided in the two documents. The intent of the crosswalk is to facilitate cross-referencing between the individual association and the larger working-group unit.

Landscape-Scale Crosswalks

Classification crosswalks at the landscape and subregion scales occur between individual community classification studies. The objective is to display the work of various investigators in relation to the standard selected for application in Idaho. The crosswalk is developed on the basis of comparison of similarity in species composition and relation to environmental factors. The rigorous, objective criteria proposed by Hall and Martinez (1995), though desirable, are not applied here. Rather, the correlations presented here are based on the information provided (in print) by the respective authors. These crosswalk tables should be considered a “first approximation.” An attempt is made to arrange the landscape and subregional crosswalks by NVC group. However, in cases it is convenient to include geographically and/or environmentally associated communities (which are assigned to a different NVC group) as well.

The primary areas of focus (Tables 3 - 5) are (1) alpine and subalpine grassland, (2) medium-tall bunch grassland, and (3) forest and shrubland communities of the Blue Mountains Section (McNab and Evers 1994; ecoregional section boundaries referred to here are those identified through the sub-section delineation conducted by the Interior Columbia Basin Ecosystem Management [ICBEM] Project). With the exception of wetland and riparian vegetation, these are the classifications most in need of crosswalk attention. Classifications of forested vegetation of Idaho and adjacent portions of Montana, Wyoming, and Utah (Cooper et al. 1991; Mauk and Henderson 1984; Steele et al. 1981 and 1983; Pfister et al. 1977; Daubenmire and Daubenmire 1968) are well coordinated. As there is interest within the TNC/Natural Heritage Ecology Working Group for conducting a regional crosswalk of wetland and riparian classifications, these classifications are not addressed here.

Table 3 provides a crosswalk of short alpine or subalpine sod and dry bunch grassland and related low temperate or subpolar forb communities (referencing NVC terminology). The principle authors of work in the alpine and subalpine grassland vegetation of Idaho and immediately adjacent areas of Montana include Cooper and Lesica (1992), Caicco (1983), Moseley (1985), and Urbanczyk (1993). Cooper and Lesica (1992) conducted their work in the Beaverhead Mountains of Montana, adjacent to Idaho. Many of the communities described also occur within the Idaho portions of the Bitterroot Mountains Section and the Challis Volcanics Section. The work of Caicco (1983), Moseley (1985), and Urbanczyk (1993) was conducted within portions of the Bitterroot Mountains and Challis Volcanics Sections.

Classification of the alpine and subalpine vegetation is particularly fraught with variability due to differences in the focus and interpretation of the investigator, the size of the area studied, the analytical methods employed, the number of samples analyzed, and the great biological and physical diversity of these habitats within Idaho and adjacent areas. Caicco (1983), Moseley (1985), and Urbanczyk (1993) use similar field and analytical methods (Table 6). The quantitative analysis in these studies is heavily influenced by classification techniques; ordination is applied secondarily. This approach appears to have been less successful in Urbanczyk’s (1993) study.

Table 4 provides a crosswalk of medium-tall bunch temperate or subpolar grassland and related communities. Classification of grassland and associated shrubland communities in the Blue Mountains Section is strongly influenced by differences in the area studied and the number of stands sampled by different investigators. The primary investigators are Daubenmire (1970), Tisdale (1986), and Johnson and Simon (1987).

Most of Daubenmire’s (1970) sampling is peripheral to the Blue Mountains Section. Three of the communities he describes are endemic to the Palouse Prairie Section (Table 4) (Lichthardt and Moseley

1997). Unfortunately, his types are easily confused with those of Tisdale (1986) and Johnson and Simon (1987). Moseley and Lichthardt (1997) provide a detailed discussion of the classification of selected Palouse Prairie communities and their relation to similar Canyon Grassland communities: *Agropyron spicatum-Festuca idahoensis*, *Festuca idahoensis*/*Symphoricarpos albus*, *Festuca idahoensis*/*Rosa nutkana*, and *Symphoricarpos albus*/*Rosa* sp.

Tisdale (1986) and Johnson and Simon (1987) both worked in the Hells Canyon region of the Blue Mountains Section. Tisdale (1986) also sampled in more eastern locations, upstream on the Clearwater and Salmon Rivers. Johnson and Simon (1987) sampled in more western locations, in the Wallowa Mountains. Johnson and Simon (1987) sampled an order of magnitude more sites than Tisdale (1986). They were able to resolve finer ecological differences and described approximately three times as many grassland communities. Unfortunately, the level of recognition given to the classification of Tisdale (1986), compared to Johnson and Simon (1987), in conservation-related inventory has varied (e.g., Bourgeron and Engelking 1994; Mancuso and Moseley 1994; Hill 1995a and b). Due to the extent and history of this inconsistency, for the purpose of summary (e.g., of current conservation status), it is necessary to merge the elements recognized by Johnson and Simon (1987) into those described by Tisdale (1986), even though the former work provides greater resolution of the biological diversity of the Blue Mountains Section. For this reason, a number of the communities described by Johnson and Simon (1987) are recognized here as variants of the larger units described by Tisdale (1986) (Table 4).

A crosswalk of selected forest and shrubland associations of the Blue Mountains Section is displayed in Table 5. This is a comparison of the work of Steele et al. (1981), Johnson and Simon (1987), and Cooper et al. (1991). Differences in these classifications arise in plant species nomenclature (e.g., *Vaccinium globulare* as compared to *V. membranaceum*) and convention concerning the recognition of phases.

<u>Assessment of Applicability and Confidence</u>

The confidence in a classification unit may be assessed on the basis of (1) the availability and quality of location information, (2) the methods employed, and (3) the availability of species lists with quantitative measures of species abundances (Bourgeron and Engelking 1994; Grossman et al. 1994; *and see* Hall and Martinez 1995). Plant community ecology plot data is to community classification as a voucher specimen is to plant systematics. Plant community classification is based on quantitative data for species distribution and abundance (Gauch 1982). The criteria listed above describe the information needed for the comparison of work by different investigators. These criteria allow evaluation of the capability of a classification unit to serve within the coarse-filter conservation strategy and to contribute to applications of range of natural variability concepts and the development of conservation occurrence ranks and/or element specifications.

Community classification and inventory publications that provide sufficient information to determine plot location and number (by association) to the subregional scale (i.e., the ecoregional section) are summarized in Table 6. Table 7 provides a compilation of (1) the distribution data provided in these publications, (2) expert opinion community distribution information gathered for the ICBEM Project (Reid et al. 1995), and (3) plant community element occurrence data (Idaho Conservation Data Center 1996).

Seventy-five principle authors are identified (Table 1; *and see* Rust 1995) for plant associations and community types known or expected to occur in Idaho. Of these, less than one-third provide sufficient information to determine plot location and number (by association) to the subregional scale (Table 6). Of the 1566 combinations of community within ecoregional section (Table 7), approximately 55 percent are not represented by plot data. This reflects (1) the need for crosswalk attention in riparian and wetland communities (e.g., Tuhy 1981; Mutz and Graham 1982; Mutz and Queiroz 1983), (2) the need to acquire and summarize original data (e.g., Hironaka et al. 1983; Miller 1976), and (3) the need to produce quantitative data for communities known only from observational information. Additional information on the distribution of community ecology plots is surely available but has not been published.

CONCLUSION

Community classification is a language derived to fill the needs of specified objectives. Classification in the Northwest has grown from a conceptual tradition of potential national vegetation. Though founded in the discrete community model and the concept of climax vegetation, classification of potential natural vegetation is independent of these views and is entirely consistent with continuous community models. Recent modification of concepts concerning the classification of potential natural vegetation allows for the inclusion of greater uncertainty with regard to seral status and provides for the wider acceptance of dynamic systems.

Three objectives are identified for plant community conservation: (1) maintain viable representative occurrences of all native communities as integral elements of biological diversity; (2) ensure long-term viability of all the constituent populations and habitats of plant and animal species, biotic interactions, and ecological processes; and (3) maintain an ecological reference against which the effects of human activities may be assessed. In order to effectively meet these objectives at the landscape and subregional scales, community classification must: (1) provide a meaningful integration of the environmental factors and ecosystem processes effecting the distribution and abundance of plant and animal species; (2) provide temporal stability; (3) be widely accepted; and (4) allow for integration at successively higher geographical (regional, continental, and global) scales. A classification of potential natural vegetation, coupled with a classification of seral status and structural condition, is best suited to fill these criteria. Confidence in the capability of each unit within this system to fulfill conservation classification objectives should be evaluated on the basis of (1) the availability and quality of location information, (2) the methods employed, and (3) the availability of species lists with quantitative measures of species abundances.

Current regional- and continental-scale classifications are based on existing vegetation. To work effectively in a cooperative environment of differing classification objectives and geographic scales, it is necessary to identify methods to crosswalk between alternative classification systems.

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LIST OF TABLES

Table 1. Plant communities known or expected to occur in Idaho are listed by NVC subclass, with reference to principle descriptive works and with notes regarding the level of confidence in the occurrence of the plant community element in Idaho (§, anecdotal type not supported by quantitative data; ‡, description of type is not supported by quantitative data collected within Idaho; ¶, quantitative data is only representative of a small portion of the potential range of the community; also see notes listed at the end of the table).

Evergreen Forest

- Abies grandis/Acer glabrum (62)
  - Acer glabrum phase (62)
  - Physocarpus malvaceus phase (62)
- Abies grandis/Adiantum pedatum (71§)
- Abies grandis/Asarum caudatum (14)
  - Asarum caudatum phase (14)
  - Menziesia ferruginea phase (14)
- Abies grandis/Clintonia uniflora (62)
  - Clintonia uniflora phase (14)
  - Menziesia ferruginea phase (14)
  - Physocarpus malvaceus phase (14)
  - Xerophyllum tenax phase (14)
- Abies grandis/Coptis occidentalis (62)
- Abies grandis/Linnaea borealis (62)
  - Linnaea borealis phase (62)
  - Vaccinium globulare phase (62)
  - Xerophyllum tenax phase (62)
- Abies grandis/Physocarpus malvaceus (14)
  - Coptis occidentalis phase (14)
  - Physocarpus malvaceus phase (14)
- Abies grandis/Senecio triangularis (14)
- Abies grandis/Spiraea betulifolia (62)
- Abies grandis/Taxus brevifolia/Asarum caudatum (16)
- Abies grandis/Taxus brevifolia/Clintonia uniflora (16)
- Abies grandis/Vaccinium caespitosum (62)
- Abies grandis/Vaccinium globulare (62)
- Abies grandis/Xerophyllum tenax (62)
  - Coptis occidentalis phase (14)
  - Vaccinium globulare phase (14)
- Abies lasiocarpa/Acer glabrum (62)
  - Pachistima myrsinites phase (63)
- Abies lasiocarpa/Actaea rubra (63)
- Abies lasiocarpa/Alnus sinuata (62)
- Abies lasiocarpa/Arnica cordifolia (62)
  - Arnica cordifolia phase (63)
  - Astragalus miser phase (63)
  - Picea engelmannii phase (63)
  - Shepherdia canadensis phase (63)
- Abies lasiocarpa/Arnica latifolia (63)
- Abies lasiocarpa/Berberis repens (63)
  - Berberis repens phase (63)
  - Carex geyeri phase (63)
  - Pinus flexilis phase (44)
  - Pseudotsuga menziesii phase (44)
  - Ribes montigenum phase (44)
- Abies lasiocarpa/Calamagrostis canadensis (62)
  - Calamagrostis canadensis phase (62)
  - Ligusticum canbyi phase (62)
  - Vaccinium caespitosum phase (62)
- Abies lasiocarpa/Calamagrostis rubescens (62)
  - Calamagrostis rubescens phase (63)
  - Pachistima myrsinites phase (63)
- Abies lasiocarpa/Caltha biflora (62)
- Abies lasiocarpa/Carex geyeri (62)
  - Artemisia tridentata vaseyana phase (62)
  - Carex geyeri phase (62)
- Abies lasiocarpa/Carex rossii (63)
- Abies lasiocarpa/Clintonia uniflora (62)
  - Clintonia uniflora phase (62)
  - Menziesia ferruginea phase (62)
  - Xerophyllum tenax phase (14)
- Abies lasiocarpa/Coptis occidentalis (62)
- Abies lasiocarpa/Ledum glandulosum (62)
- Abies lasiocarpa/Linnaea borealis (62)
  - Linnaea borealis phase (62)
  - Vaccinium scoparium phase (62)
  - Xerophyllum tenax phase (62)
- Abies lasiocarpa/Luzula hitchcockii (62)
  - Luzula hitchcockii phase (62)
  - Vaccinium scoparium phase (62)
- Abies lasiocarpa/Menziesia ferruginea (62)
  - Coptis occidentalis phase (14)
  - Luzula hitchcockii phase (14)
  - Menziesia ferruginea phase (63)
  - Vaccinium scoparium phase (14)
  - Xerophyllum tenax phase (14)
- Abies lasiocarpa/Oplopanax horridum (59)
- Abies lasiocarpa/Osmorhiza chilensis (63)
  - Osmorhiza chilensis phase (63)
  - Pachistima myrsinites phase (63)
- Abies lasiocarpa/Pedicularis racemosa (63)
  - Pedicularis racemosa phase (44)
  - Pseudotsuga menziesii phase (44)
- Abies lasiocarpa/Physocarpus malvaceus (63)
- Abies lasiocarpa/Polemonium pulcherrimum (34)
- Abies lasiocarpa/Rhododendron albiflorum (73§)
- Abies lasiocarpa/Ribes montigenum (62)
  - Pinus albicaulis phase (63)
  - Ribes montigenum phase (63)
  - Thalictrum fendleri phase (44)
- Abies lasiocarpa/Spiraea betulifolia (62)
- Abies lasiocarpa/Streptopus amplexifolius (62)
  - Ligusticum canbyi phase (63)
  - Menziesia ferruginea phase (14)
  - Streptopus amplexifolius phase (63)
- Abies lasiocarpa/Symphoricarpos albus (63)
- Abies lasiocarpa/Thalictrum occidentale (63)
- Abies lasiocarpa/Vaccinium caespitosum (62)
- Abies lasiocarpa/Vaccinium globulare (62)
  - Pachistima myrsinites phase (63)
  - Vaccinium globulare phase (62)
  - Vaccinium scoparium phase (62)
- Abies lasiocarpa/Vaccinium scoparium (62)
  - Arnica latifolia phase (44)
  - Calamagrostis rubescens phase (62)
  - Pinus albicaulis phase (62)
  - Vaccinium scoparium phase (62)
- Abies lasiocarpa/Xerophyllum tenax (62)
  - Coptis occidentalis phase (14)
  - Luzula hitchcockii phase (62)
  - Vaccinium globulare phase (62)
  - Vaccinium scoparium phase (62)

Picea engelmannii/Arnica cordifolia (63)
Picea engelmannii/Calamagrostis canadensis (75)
Picea engelmannii/Caltha leptosepala (63)
Picea engelmannii/Carex disperma (62)
Picea engelmannii/Equisetum arvense (62)
Picea engelmannii/Galium trifolium (62)
Picea engelmannii/Hypnum revolutum (62)
Picea engelmannii/Juniperus communis (63)
Picea engelmannii/Ribes montigenum (63)
Picea glauca/Carex disperma (66)
Picea glauca/Carex utriculata (31)
Picea glauca/Equisetum arvense (31)
Pinus albicaulis/Carex rossii (63)
    Pinus contorta phase (63)
Pinus albicaulis/Vaccinium scoparium (63)
Pinus contorta/Arnica cordifolia (63)
Pinus contorta/Calamagrostis rubescens (63)
Pinus contorta/Spiraea betulifolia (63)
Pinus contorta/Vaccinium caespitosum (62)
Pinus contorta/Vaccinium globulare (63)
Pinus contorta/Vaccinium occidentale (66)
Pinus contorta/Vaccinium scoparium (62)
Pinus contorta/Xerophyllum tenax (14)
Pinus ponderosa/Calamagrostis rubescens (72§)
Pinus ponderosa/Physocarpus malvaceus (62)
Pinus ponderosa/Symphoricarpos albus (62)
Pinus ponderosa/Symphoricarpos oreophilus (62)
Pseudotsuga menziesii/Acer glabrum (62)
    Acer glabrum phase (62)
    Symphoricarpos oreophilus phase (62)
Pseudotsuga menziesii/Arnica cordifolia (62)
    Arnica cordifolia phase (62)
    Astragalus miser phase (62)
Pseudotsuga menziesii/Berberis repens (62)
    Berberis repens phase (62)
    Carex geyeri phase (62)
    Symphoricarpos oreophilus phase (62)
Pseudotsuga menziesii/Calamagrostis rubescens (62)
    Arctostaphylos uva-ursi phase (14)
    Calamagrostis rubescens phase (62)
    Festuca idahoensis phase (62)
    Pachistima myrsinites phase (63)
    Pinus ponderosa phase (62)
Pseudotsuga menziesii/Carex geyeri (62)
    Carex geyeri phase (62)
    Pinus ponderosa phase (62)
    Symphoricarpos oreophilus phase (62)
Pseudotsuga menziesii/Juniperus communis (62)
Pseudotsuga menziesii/Linnaea borealis (62)
Pseudotsuga menziesii/Osmorhiza chilensis (62)
Pseudotsuga menziesii/Physocarpus malvaceus (62)
    Calamagrostis rubescens phase (62)
    Pachistima myrsinites phase (63)
    Physocarpus malvaceus phase (14)
    Pinus ponderosa phase (62)
    Pseudotsuga menziesii phase (62)
    Smilacina stellata phase (14)
Pseudotsuga menziesii/Spiraea betulifolia (62)
    Calamagrostis rubescens phase (62)
    Pinus ponderosa phase (62)
    Spiraea betulifolia phase (62)
Pseudotsuga menziesii/Symphoricarpos albus (62)
    Pinus ponderosa phase (62)
    Symphoricarpos albus phase (62)
Pseudotsuga menziesii/Symphoricarpos oreophilus (62)
Pseudotsuga menziesii/Vaccinium caespitosum (62)
Pseudotsuga menziesii/Vaccinium globulare (62)
Thuja plicata/Adiantum pedatum (14)
Thuja plicata/Asarum caudatum (14)
    Asarum caudatum phase (14)
    Menziesia ferruginea phase (14)
    Taxus brevifolia phase (14)
Thuja plicata/Athyrium filix-femina (14)
    Adiantum pedatum phase (14)
    Athyrium filix-femina phase (14)
Thuja plicata/Clintonia uniflora (14)
    Clintonia uniflora phase (14)
    Menziesia ferruginea phase (14)
    Taxus brevifolia phase (14)
    Xerophyllum tenax phase (14)
Thuja Plicata/Dryopteris spp (61)
Thuja plicata/Gymnocarpium dryopteris (14)
Thuja plicata/Lysichitum americanum (25‡)
Thuja plicata/Oplopanax horridum (14)
Tsuga heterophylla/Asarum caudatum (14)
    Aralia nudicaulis phase (14)
    Asarum caudatum phase (14)
    Menziesia ferruginea phase (14)
Tsuga heterophylla/Clintonia uniflora (14)
    Aralia nudicaulis phase (14)
    Clintonia uniflora phase (14)
    Menziesia ferruginea phase (14)
    Xerophyllum tenax phase (14)
Tsuga heterophylla/Gymnocarpium dryopteris (14)
Tsuga heterophylla/Menziesia ferruginea (14)
Tsuga mertensiana/Clintonia uniflora (14)
    Menziesia ferruginea phase (14)
    Xerophyllum tenax phase (14)
Tsuga mertensiana/Luzula hitchcockii (14)
Tsuga mertensiana/Menziesia ferruginea (14)
    Luzula hitchcockii phase (14)
    Xerophyllum tenax phase (14)
Tsuga mertensiana/Phyllodoce empetriformis (71§)
Tsuga mertensiana/Streptopus amplexifolius (14)
    Luzula hitchcockii phase (14)
    Menziesia ferruginea phase (14)
Tsuga mertensiana/Xerophyllum tenax (14)
    Luzula hitchcockii phase (14)
    Vaccinium globulare phase (14)
    Vaccinium scoparium phase (14)
    Xerophyllum tenax phase (14)

<u>Deciduous Forest</u>

Acer grandidentatum/Berberis repens (33§)
Acer grandidentatum/Calamagrostis rubescens (9§)
Acer grandidentatum/Juniperus scopulorum (73§)
Acer grandidentatum/Osmorhiza chilensis (73§)
Acer negundo/Cornus stolonifera (58)
Acer negundo/Equisetum arvense (58)
Alnus rhombifolia/Amelanchier alnifolia (47)
Alnus rhombifolia/Betula occidentalis (47)
Alnus rhombifolia/Celtis reticulata (47)
Alnus rhombifolia/Philadelphus lewisii (47)
Alnus rhombifolia/Prunus virginiana (47)
Alnus rhombifolia/Rhus glabra (47)

Alnus rhombifolia/Rosa woodsii (47)
Alnus rhombifolia/Sambucus cerulea (47)
Alnus rubra/Adiantum pedatum (61)
Populus angustifolia/Acer grandidentatum (58)
Populus angustifolia/Betula occidentalis (58)
Populus angustifolia/Chrysopsis villosa (46)
Populus angustifolia/Elaeagnus commutata (46)
Populus angustifolia/Rhus trilobata (58)
Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Bromus carinatus (53)
Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Calamagrostis rubescens (53)
Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Tall Forb (53)
Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Thalictrum fendleri (53)
Populus tremuloides/Amelanchier alnifolia/Tall Forb (53)
Populus tremuloides/Amelanchier alnifolia/Thalictrum fendleri (53)
Populus tremuloides/Artemisia tridentata (53)
Populus tremuloides/Bromus carinatus (53)
Populus tremuloides/Calamagrostis canadensis (28‡)
Populus tremuloides/Calamagrostis rubescens (53)
Populus tremuloides/Crataegus douglasii-Symphoricarpos albus (17)
Populus tremuloides/Juniperus communis/Carex geyeri (53)
Populus tremuloides/Rubus parviflorus (53)
Populus tremuloides/Salix scouleriana (53)
Populus tremuloides/Shepherdia canadensis (53)
Populus tremuloides/Stipa comata (53)
Populus tremuloides/Symphoricarpos oreophilus/Bromus carinatus (53)
Populus tremuloides/Symphoricarpos oreophilus/Calamagrostis rubescens (53)
Populus tremuloides/Symphoricarpos oreophilus/Carex rossii (53)
Populus tremuloides/Symphoricarpos oreophilus/Tall Forb (53)
Populus tremuloides/Symphoricarpos oreophilus/Thalictrum fendleri (53)
Populus tremuloides/Tall Forb (53)
Populus tremuloides/Thalictrum fendleri (53)
Populus tremuloides/Veratrum californicum (53)
Populus tremuloides/Wyethia amplexicaulis (53)
Populus trichocarpa/Alnus incana (39‡)
Populus trichocarpa/Cicuta douglasii (17)
Populus trichocarpa/Cornus stolonifera (66)
Populus trichocarpa/Crataegus douglasii (36¶)
Populus trichocarpa/Festuca idahoensis (41¶)
Populus Trichocarpa/Recent Alluvial Bar (28‡)
Populus trichocarpa/Rhamnus alnifolia (51§)
Populus trichocarpa/Rosa woodsii (11‡)
Populus trichocarpa/Salix lutea (42‡)
Populus trichocarpa/Symphoricarpos albus (51§)

<u>Mixed Evergreen-Deciduous Forest</u>

Alnus rhombifolia-Abies grandis (47)
Larix lyallii-Abies lasiocarpa (14)

<u>Evergreen Woodland</u>

Abies grandis/Calamagrostis rubescens (62)
Abies lasiocarpa-Pinus albicaulis/Vaccinium scoparium (59)
Abies lasiocarpa/Juniperus communis (62)
Juniperus occidentalis/Artemisia tridentata vaseyana (27)
Juniperus occidentalis/Cercocarpus ledifolius/Symphoricarpos oreophilus (20)
Juniperus osteosperma-Pinus monophylla/Artemisia tridentata vaseyana/Agropyron spicatum (9§)
Juniperus osteosperma-Pinus monophylla/Cercocarpus ledifolius/Agropyron spicatum (9§)
Juniperus osteosperma-Pinus monophylla/Prunus virginiana (9§)
Juniperus osteosperma/Agropyron spicatum (35‡)
Juniperus osteosperma/Artemisia nova/Agropyron spicatum (4‡)
Juniperus osteosperma/Artemisia nova/Poa secunda (9§)
Juniperus osteosperma/Artemisia tridentata (4‡)
Juniperus osteosperma/Artemisia tridentata tridentata/Agropyron spicatum (9§)
Juniperus osteosperma/Artemisia tridentata vaseyana/Agropyron spicatum (9§)
Juniperus osteosperma/Purshia tridentata-Symphoricarpos oreophilus/Agropyron spicatum (33§)
Juniperus osteosperma/Purshia tridentata/Poa secunda (9§)
Picea engelmannii/Cornus stolonifera (75)
Pinus albicaulis (Timberline) (73§)
Pinus albicaulis-Abies lasiocarpa (62)
Pinus albicaulis/Carex geyeri (63)
Pinus albicaulis/Festuca idahoensis (63)
Pinus albicaulis/Juniperus communis (63)
Pinus albicaulis/Poa nervosa (71§)
Pinus contorta/Festuca idahoensis (62)
Pinus flexilis (Timberline) (73§)
Pinus flexilis/Cercocarpus ledifolius (62)
Pinus flexilis/Festuca idahoensis (62)
Pinus flexilis/Juniperus communis (62)
Pinus flexilis/Leucopoa kingii (62)
Pinus flexilis/Potentilla fruticosa/Distichlis spicata stricta (49§)
Pinus flexilis/Purshia tridentata (19¶)
Pinus ponderosa/Agropyron spicatum (62)
Pinus ponderosa/Crataegus douglasii (36¶)
Pinus ponderosa/Festuca idahoensis (62)
Pinus ponderosa/Festuca scabrella (45‡)
Pinus ponderosa/Purshia tridentata (62)
  - Agropyron spicatum phase (62)
  - Festuca idahoensis phase (62)

Pinus ponderosa/Stipa comata (18)
Pinus ponderosa/Stipa occidentalis spp (62)
Pseudotsuga menziesii/Agropyron spicatum (62)
Pseudotsuga menziesii/Cercocarpus ledifolius (62)
Pseudotsuga menziesii/Festuca idahoensis (62)

Festuca idahoensis phase (62)
Pinus ponderosa phase (62)
Pseudotsuga menziesii/Juniperus scopulorum (68§)
Pseudotsuga menziesii/Leucopoa kingii (68§)

Deciduous Woodland

Celtis reticulata/Agropyron spicatum (64)
Populus angustifolia/Cornus stolonifera (75)

Evergreen Shrubland

Artemisia cana viscidula/Deschampsia cespitosa (58)
Artemisia cana viscidula/Festuca idahoensis (29)
Artemisia tridentata spiciformis/Bromus carinatus (29)
Artemisia tridentata spiciformis/Carex geyeri (29)
Artemisia tridentata tridentata/Elymus cinereus (29)
Artemisia tridentata tridentata/Festuca idahoensis (29)
Artemisia tridentata tridentata/Poa secunda (9§)
Artemisia tridentata tridentata/Stipa comata (17)
Artemisia tridentata vaseyana-Symphoricarpos oreophilus/Agropyron spicatum (29)
Artemisia tridentata vaseyana-Symphoricarpos oreophilus/Bromus carinatus (57)
Artemisia tridentata vaseyana-Symphoricarpos oreophilus/Carex geyeri (29)
Artemisia tridentata vaseyana-Symphoricarpos oreophilus/Festuca idahoensis (29)
Artemisia tridentata vaseyana/Agropyron spicatum (29)
Artemisia tridentata spiciformis/Bromus carinatus (29)
Artemisia tridentata spiciformis/Carex geyeri (29)
Artemisia tridentata vaseyana/Elymus cinereus (29)
Artemisia tridentata vaseyana/Leucopoa kingii (35‡)
Artemisia tridentata vaseyana/Poa secunda (19¶)
Artemisia tridentata vaseyana/Stipa comata (29)
Artemisia tridentata wyomingensis/Carex filifolia (9§)
Artemisia tridentata wyomingensis/Elymus ambiguus salmonis (50§)
Artemisia tridentata wyomingensis/Festuca idahoensis (50§)
Artemisia tridentata wyomingensis/Poa secunda (29)
Artemisia tridentata wyomingensis/Sitanion hystrix (29)
Artemisia tridentata wyomingensis/Stipa comata (29)
Artemisia tridentata wyomingensis/Stipa thurberiana (29)
Artemisia tridentata xericensis/Agropyron spicatum (29)
Artemisia tridentata xericensis/Festuca idahoensis (29)
Cercocarpus ledifolius/Agropyron spicatum (64)
Cercocarpus ledifolius/Artemisia tridentata (20)
Cercocarpus ledifolius/Artemisia tridentata vaseyana (3‡)
Cercocarpus ledifolius/Artemisia tridentata/Festuca idahoensis (20)
Cercocarpus ledifolius/Calamagrostis rubescens (20)
Cercocarpus ledifolius/Elymus ambiguus salmonis (50§)
Cercocarpus ledifolius/Elymus cinereus (20)
Cercocarpus ledifolius/Festuca idahoensis (20)
Cercocarpus ledifolius/Holodiscus dumosus (50§)
Cercocarpus ledifolius/Leucopoa kingii (73§)
Cercocarpus ledifolius/Symphoricarpos albus/Festuca idahoensis (20)
Cercocarpus ledifolius/Symphoricarpos oreophilus (20)
Chrysothamnus nauseosus/Elymus flavescens/Psoralea lanceolata (12¶)
Purshia tridentata-Artemisia tridentata tridentata (12¶)
Purshia tridentata-Chrysothamnus nauseosus (12¶)
Purshia tridentata-Prunus virginiana (40¶)
Purshia tridentata/Poa nevadensis (50§)
Atriplex confertifolia/Agropyron spicatum (73§)
Atriplex confertifolia/Elymus ambiguus salmonis (50§)
Atriplex confertifolia/Oryzopsis hymenoides (50§)
Atriplex confertifolia/Sitanion hystrix (73§)

Deciduous Shrubland

Alnus incana-Betula occidentalis/Salix exigua (47)
Alnus incana/Athyrium filix-femina (39‡)
Alnus incana/Carex utriculata (39‡)
Alnus incana/Cornus stolonifera (66)
Alnus incana/Equisetum arvense (39‡)
Alnus incana/Lysichitum americanum (39‡)
Alnus incana/Mesic Forb (58)
Alnus incana/Mesic Graminoid (58)
Alnus incana/Ribes hudsonianum (75)
Alnus incana/Spiraea douglasii (38‡)
Alnus sinuata (18)
Alnus sinuata/Athyrium filix-femina (39‡)
Alnus sinuata/Mesic Forb (39‡)
Alnus sinuata/Montia cordifolia (14)
Betula glandulosa/Carex lasiocarpa (7§)
Betula glandulosa/Carex simulata (52)
Betula glandulosa/Carex utriculata (28‡)
Betula glandulosa/Lonicera caerulea/Senecio pseudaureus (65)
Betula occidentalis (28‡)
Betula occidentalis/Celtis reticulata (47)
Betula occidentalis/Cornus stolonifera (58)
Betula occidentalis/Crataegus douglasii (49§)
Betula occidentalis/Mesic Forb (58)
Betula occidentalis/Philadelphus lewisii (50§)
Betula occidentalis/Prunus virginiana (30)
Betula occidentalis/Purshia tridentata/Stipa comata (50§)
Betula papyrifera/Aralia nudicaulis (39‡)
Cornus stolonifera (28‡)
Cornus stolonifera/Galium trifolium (75)
Cornus stolonifera/Heracleum lanatum (75)
Crataegus douglasii/Heracleum lanatum (17)
Crataegus douglasii/Montia perfoliata (1¶)
Crataegus douglasii/Symphoricarpos albus (17)
Glossopetalon nevadensis/Agropyron spicatum (34)
Philadelphus lewisii (50§)
Physocarpus malvaceus-Symphoricarpos albus (34)
Potentilla fruticosa/Deschampsia cespitosa (75)

Prunus virginiana/Artemisia tridentata
    vaseyana-Symphoricarpos oreophilus (70§)
Rhamnus alnifolia (75)
Rosa woodsii (28‡)
Salix bebbiana (28‡)
Salix bebbiana/Mesic Graminoid (58)
Salix boothii/Calamagrostis canadensis (75)
Salix boothii/Carex aquatilis (75)
Salix boothii/Carex nebraskensis (75)
Salix boothii/Carex utriculata (56)
Salix boothii/Equisetum arvense (75)
Salix boothii/Mesic Forb (58)
Salix boothii/Mesic Graminoid (58)
Salix boothii/Poa palustris (75)
Salix boothii/Smilacina stellata (75)
Salix candida/Carex utriculata (28‡)
Salix commutata/Carex scopulorum (66)
Salix drummondiana (28‡)
Salix drummondiana/Calamagrostis canadensis (66)
Salix drummondiana/Carex utriculata (39‡)
Salix eastwoodiae/Carex aquatilis (56)
Salix eastwoodiae/Carex utriculata (56)
Salix exigua/Barren (58)
Salix exigua/Equisetum arvense (75)
Salix exigua/Mesic Forb (58)
Salix exigua/Mesic Graminoid (58)
Salix exigua/Rosa woodsii (42‡)
Salix geyeriana/Calamagrostis canadensis (66)
Salix geyeriana/Carex aquatilis (58)
Salix geyeriana/Carex utriculata (75)
Salix geyeriana/Deschampsia cespitosa (58)
Salix geyeriana/Geum macrophyllum (65)
Salix geyeriana/Mesic Forb (75)
Salix geyeriana/Mesic Graminoid (58)
Salix geyeriana/Poa palustris (75)
Salix lasiandra/Bench (42‡)
Salix lasiandra/Mesic Forb (42‡)
Salix lasiandra/Rosa woodsii (24‡)
Salix lasiolepis/Barren (58)
Salix lutea (75)
Salix lutea/Bench (42‡)
Salix lutea/Mesic Forb (42‡)
Salix lutea/Rosa woodsii (42‡)
Salix planifolia (75)
Salix planifolia monica/Carex aquatilis-Carex utriculata
    (58)
Salix planifolia monica/Carex scopulorum (37‡)
Salix planifolia/Carex aquatilis (58)
Salix wolfii/Calamagrostis canadensis (75)
Salix wolfii/Carex aquatilis (75)
Salix wolfii/Carex microptera (66)
Salix wolfii/Carex nebraskensis (75)
Salix wolfii/Carex utriculata (75)
Salix wolfii/Deschampsia cespitosa (75)
Salix wolfii/Mesic Forb (56)
Salix wolfii/Poa palustris (75)
Salix wolfii/Swertia perennis-Pedicularis groenlandica (66)
Sarcobatus vermiculatus/Distichlis spicata stricta (17)
Sarcobatus vermiculatus/Elymus cinereus (54‡)
Spiraea douglasii (28‡)
Symphoricarpos albus-Rosa spp (34)

Evergreen Dwarf-Shrubland

Artemisia nova/Agropyron spicatum (29)
Artemisia nova/Oryzopsis hymenoides (32‡)
Artemisia nova/Poa secunda (9§)
Cassiope mertensiana-Phyllodoce empetriformis (21‡)
Cassiope mertensiana/Carex paysonis (13‡)
Cassiope mertensiana/Luetkea pectinata (23‡)
Eriogonum ovalifolium depressum Cinder Gardens (19¶)
Eriogonum spp-Physaria oregana (34)
Eurotia lanata/Poa secunda (17)
Kalmia microphylla/Carex scopulorum (28‡)
Phyllodoce empetriformis-Ledum glandulosum (60)
Phyllodoce empetriformis/Antennaria lanata (13‡)

Deciduous Dwarf-Shrubland

Salix nivalis (67¶)

Perennial Graminoid Vegetation

Agropyron scribneri (8¶)
Agropyron smithii (26)
Agropyron spicatum/Eriogonum heracleoides (34)
Agropyron spicatum-Festuca idahoensis (17)
Agropyron spicatum-Melica bulbosa (54‡)
Agropyron spicatum/Opuntia polycantha (34)
Agropyron spicatum-Poa secunda (34)
    Erigeron pumilis variant (34)
    Phlox columbrina variant (34)
    Scutellaria angustifolia variant (34)
    granite variant (34)
Agropyron spicatum-Poa secunda, Scabland (34)
Agropyron spicatum-Poa secunda/Balsamorhiza sagittata
    (34)
    Astagalus cusickii variant (34)
    basalt variant (34)
Agrostis exarata-Agrostis scabra (65)
Aristida longiseta/Poa secunda (17)
Artemisia arbuscula arbuscula/Agropyron spicatum (29)
Artemisia arbuscula arbuscula/Elymus ambiguus
    salmonis (9§)
Artemisia arbuscula arbuscula/Festuca idahoensis (29)
Artemisia arbuscula arbuscula/Poa secunda (29)
Artemisia arbuscula thermopola/Festuca idahoensis (29)
Artemisai cana bolanderi/Muhlenbergia richardsonis (29)
Artemisia longiloba/Festuca idahoensis (29)
Artemisia nova/Elymus ambiguus salmonis (9§)
Artemisia nova/Festuca idahoensis (29)
Artemisia rigida/Poa secunda (34)
Artemisia tridentata tridentata/Agropyron spicatum (29)
Artemisia tridentata vaseyana/Carex geyeri (34)
Artemisia tridentata vaseyana/Festuca idahoensis (29)
Artemisia tridentata wyomingensis/Agropyron spicatum
    (29)

Artemisia tripartita/Agropyron spicatum (17)
Artemisia tripartita/Elymus cinereus (50§)
Artemisia tripartita/Festuca idahoensis (17)
Artemisia tripartita/Stipa comata (17)
Bromus spp/Stipa occidentalis (65)
Calamagrostis canadensis (58)
Calamagrostis purpurescens (48)
Carex albonigra (68§)
Carex aperta (5‡)
Carex aquatilis (75)
Carex buxbaumii Community Type (58)
Carex cusickii (7§)
Carex elynoides/Lupinus agenteus (8¶)
Carex elynoides/Oxytropis sericea (8¶)
Carex lanuginosa (58)
Carex lasiocarpa (58)
Carex limosa (58)
Carex livida (7§)
Carex microptera (75)
Carex nebraskensis (75)
Carex nigricans (13‡)
Carex nigricans-Agrostis humilis (40¶)
Carex paysonis (40¶)
Carex praegracilis-Carex aquatilis (52)
Carex rupestris (8¶)
Carex scirpoidea/Geum rossii (13‡)
Carex scirpoidea/Potentilla diversifolia (13‡)
Carex scopulorum (39‡)
Carex simulata (75)
Carex stenophylla-Poa secunda (9§)
Carex utriculata (66)
Carex vesicaria (28‡)
Deschampsia cespitosa (66)
Deschampsia cespitosa/Caltha leptosepala (13‡)
Deschampsia cespitosa/Potentilla diversifolia (8¶)
Distichlis spicata stricta (17)
Distichlis spicata stricta-Scirpus nevadensis (15‡)
Dryas octopetala (67¶)
Dryas octopetala-Polygonum viviparum (13‡)
Dryas octopetala/Carex rupestris (13‡)
Dulichium arundinaceum (7§)
Eleocharis acicularis (40¶)
Eleocharis palustris (Wetland/Riparian) (66)
Eleocharis pauciflora-Carex aquatili, Carex livida phase (43)
Eleocharis pauciflorus (58)
Eleocharis rostellata Herbaceous Vegetation (28‡)
Elymus ambiguus salmonis/Enceliopsis nudicaulis (9§)
Elymus ambiguus salmonis/Lupinus argenteus (9§)
Elymus cinereus (34)
Elymus cinereus-Distichlis spicata stricta (17)
Eriogonum strictum/Poa secunda (34)
Eriogonum douglassii/Poa secunda (34)
Eriophorum polystachion (39‡)
Festuca idahoensis (Alpine) (60)
Festuca idahoensis-Agropyron spicatum (34)
- Balsamorhiza sagittata variant (34)
- Lupinus sericeus variant (34)
- Phlox columbrina variant (34)
- ridgetop variant (34)

Festuca idahoensis-Carex geyeri (34)
Festuca idahoensis-Carex hoodii (34)
Festuca idahoensis-Danthonia californica (50§)
Festuca idahoensis-Danthonia intermedia-Carex (34)
Festuca idahoensis-Deschampsia cespitosa (54‡)
Festuca idahoensis/Eriogonum caespitosum (8¶)
Festuca idahoensis-Koeleria cristata (34)
- high elevation variant (34)
- low elevation variant (34)
- mounds variant (34)
- ridgetop variant (34)

Festuca idahoensis/Potentilla diversifolia (8¶)
Festuca idahoensis/Rosa nutkana (17)
Festuca idahoensis/Symphoricarpos albus (17)
Festuca scabrella-Festuca idahoensis (73§)
Festuca viridula (73§)
Glyceria borealis (28‡)
Hordeum jubatum (28‡)
Juncus balticus (66)
Juncus Drummondii-Carex spp (40¶)
Juncus parryi (10§)
Juniperus occidentalis/Agropyron spicatum (20)
Juniperus occidentalis/Artemisia arbuscula/Festuca idahoensis (27)
Juniperus occidentalis/Festuca idahoensis (20)
Juniperus osteosperma-Pinus monophylla/Elymus cinereus (9§)
Juniperus osteosperma/Elymus ambiguus salmonis (9§)
Juniperus osteosperma/Stipa comata (9§)
Leucopoa kingii-Carex elynoides (48)
Leucopoa kingii-Poa cusickii (48)
Leucopoa kingii/Achillea millefolium (48)
Leucopoa kingii/Oxytropis compestris (13‡)
Leucopoa kingii/Phlox pulvinata (48)
Phalaris arundinacea (28‡)
Phragmites australis (28‡)
Phragmites communis/Rhus radicans (30)
Poa epilis (8¶)
Potentilla fruticosa/Danthonia intermedia (66)
Potentilla fruticosa/Festuca idahoensis (75)
Purshia tridentata/Agropyron spicatum (34)
Purshia tridentata/Agropyron spicatum-Elymus cinereus (19¶)
Purshia tridentata/Festuca idahoensis (34)
Purshia tridentata/Stipa comata (17)
Rhus glabra/Agropyron spicatum (17)
Scirpus acutus (28‡)
Scirpus americanus (28‡)
Scirpus cespitosus-Carex livida (65)
Scirpus maritimus (28‡)
Scirpus validus (39‡)
Spartina gracilis (28‡)
Sporobolus cryptandra (34)
Sporobolus cryptandra-Poa secunda (64)
Typha latifolia (58)

Perennial Forb Vegetation

- Artemisia ludoviciana (41¶)
- Caltha leptosepala (58)
- Camassia cusickii (34)
- Camassia quamash (17)
- Chrysopsis villosa (41¶)
- Chrysopsis villosa/Sporobolos cryptandrus (30)
- Equisetum fluviatile (28‡)
- Geum rossii (6§)
- Geum rossii/Arenaria obtusiloba (13‡)
- Ivesia gordonii-Arenaria obtusiloba (8¶)
- Ivesia gordonii-Eriogonum caespitosum (8¶)
- Lepidium davisii Vernal Pool (22)
- Mertensia ciliata (58)
- Phlox pulvinata/Poa epilis (8¶)
- Potentilla diversifolia-Arenaria obtusiloba (68§)
- Potentilla ovina/Agropyron scribneri (48)
- Saxifraga oppositifolia (6§)
- Veratrum californicum (75)
- Xerophyllum tenax (73§)

1. Asherin and Orme 1978
2. Bernatus 1990
3. Blackburn et al. 1969
4. Blackburn et al. 1971
5. Boggs et al. 1990
6. Brunsfeld 1981
7. Bursik and Moseley 1995
8. Caicco 1983
9. Caicco and Wellner 1983
10. Chadde 1993
11. Chadde et al. 1988
12. Chadwick and Dalke 1965
13. Cooper and Lesica 1992
14. Cooper et al. 1991
15. Copeland 1979
16. Crawford and Johnson 1985
17. Daubenmire 1970
18. Daubenmire and Daubenmire 1968
19. Day and Wright 1985
20. Dealy 1975
21. Del Moral 1979
22. Doremus and Debolt 1987
23. Douglas and Bliss 1977
24. Evenden 1989
25. Franklin 1966
26. French and Mitchell 1983
27. Hall 1973
28. Hansen et al. 1995
29. Hironaka et al. 1983
30. Huschle 1975
31. Jensen 1990
32. Jensen et al. 1988
33. Johnson and Pfister 1981
34. Johnson and Simon 1987
35. Johnston 1987
36. Kauffman et al. 1985
37. Komarkova 1986
38. Kovalchik 1987
39. Kovalchik 1993
40. Lewis and Riegelhuth 1964
41. Lichthardt 1992
42. Manning and Padgett 1992
43. Mattson 1984
44. Mauk and Henderson 1984
45. Mclean 1970
46. Merigliano 1996
47. Miller 1976
48. Moseley 1985
49. Moseley 1986
50. Moseley 1987
51. Moseley and Bursik 1994
52. Moseley et al. 1991
53. Mueggler 1988
54. Mueggler and Stewart 1980
55. Mutz and Graham 1982
56. Mutz and Queiroz 1983
57. Nelson and Jensen 1987
58. Padgett et al. 1989
59. Pfister et al. 1977
60. Schlatterer 1972
61. Steele 1971
62. Steele et al. 1981
63. Steele et al. 1983
64. Tisdale 1986
65. Tuhy 1981
66. Tuhy and Jensen 1982
67. Urbanczyk 1993
68. Wellner 1991
69. Wellner and Bernatus 1990
70. Wellner and Bernatus 1991
71. Wellner and Moseley 1988
72. Wellner 1985
73. Wellner and Tisdale 1985
74. Wellner et al. 1989
75. Youngblood et al. 1985

§ Formal data collection and analysis have not contributed to the recognition of this plant community element.

‡ Formal data collection contributing to the recognition of this plant community element occurred outside our area. The occurrence of the plant community element in our area is supported by observational data only.

¶ Formal data collection contributing to the recognition of this plant community element occurred over a small area relative to the expected range of the element. The relevance of the classification work to expected range not been formally tested.

Table 2. Subregional crosswalk.

This table is not included here. Please request the original document for this information.

Table 3. Crosswalk showing the relationship between alpine or subalpine sod and bunch grassland and related communities identified by authors working in Idaho and adjacent areas (or within the region). The name of the most similar community applied by the author to the community listed on the left appears below the author. BOLD indicates the principle author as recognized in Table 1 (abbreviations for taxa are the combined first 2 characters of the genus and species epithet). Lower-case italics is used to list communities elements which may occur in Idaho and/or are not well known or documented.

COMMUNITY	C & L 1992[2]	CAICCO[3]	MOSELEY[4]	URBANCZYK[5]	OTHER
AGROPYRON SCRIBNERI	dry slopes	**AGSC**	unstable, talus&defl		
CALAMAGROSTIS PURPURESCENS			**CAPU**	CAPU-CAEL	
CAREX ALBONIGRA					WELLNER 1991
CAREX ELYNOIDES/LUPINUS ARGENTEUS	CAEL	**CAEL/LUAR**	CAEL fellfield	CAEL CAEL/TRHA	
CAREX ELYNOIDES/OXYTROPIS SERICEA	CAEL	**CAEL/OXSE**	CAEL fellfield	CAEL	
CAREX ELYNOIDES-OREOXIS SPP.					
CAREX NIGRICANS	**CANI**				
CAREX NIGRICANS-AGROSTIS HUMILIS					LEWIS AND RIEGELHUTH 1964
CAREX PAYSONIS					LEWIS AND RIEGELHUTH 1964
CAREX RUPESTRIS	CARU/POOV	**CARU**		CARU	
CAREX SCIRPOIDEA/GEUM ROSSII	**CASC/GERO**				
Carex scirpoidea pseudoscirpoidea					DOUGLAS AND BLISS 1977
CAREX SCIRPOIDEA/POTENTILLA DIVERSIFOLIA	**CASC/PODI**				
CASSIOPE MERTENSIANA/CAREX PAYSONIS	**CAME/CAPA**				
DESCHAMPSIA CESPITOSA/POTENTILLA DIVERSIFOLIA		**DECE/PODI**			
DESCHAMPSIA CESPITOSA/CALTHA LEPTOSEPALA	**DECE/CALE**				
DRYAS OCTOPETALA/CAREX RUPESTRIS	**DROC/CARU**			DROC	
DRYAS OCTOPETALA-POLYGONUM VIVIPARUM	**DROC-POVI**			DROC	
FESTUCA IDAHOENSIS (ALPINE)					SCHLATTERER 1972
FESTUCA IDAHOENSIS-DESCHAMPSIA CESPITOSA					MUEGGLER AND STEWART 1980
FESTUCA IDAHOENSIS/ERIOGONUM CAESPITOSUM		**FEID/ERCA**	FEID grassland		
Festuca idahoensis-Leucopoa kingii					
FESTUCA IDAHOENSIS/POTENTILLA DIVERSIFOLIA	FEID/PODI	**FEID/PODI**	FEID grassland		
Festuca ovina					SCHLATTERER 1972
GEUM ROSSII/ARENARIA OBTUSILOBA	**GERO/AROB**				

[2] COOPER AND LESICA 1992

[3] CAICCO 1983

[4] MOSELEY 1985

[5] URBANCZYK 1993

Table 3 (continued)

COMMUNITY	C & L 1992	CAICCO	MOSELEY	URBANCZYK	OTHER
IVESIA GORDONII-ERIOGONUM CAESPITOSUM		**IVGO-ERCA**			
IVESIA GORDONII-ARENARIA OBTUSILOBA		**IVGO-AROB**			
JUNCUS DRUMMONDII-CAREX SPP.					LEWIS AND RIEGELHUTH 1964
JUNCUS PARRYI					CHADDE 1993
LEUCOPOA KINGII-POA CUSICKII			**LEKI/POCU**		
LEUCOPOA KINGII/PHLOX PULVINATA		PHPU fellfield	**LEKI/PHPU**	LEKI	
LEUCOPOA KINGII/ACHILLEA MILLEFOLIUM			**LEKI/ACMI**		
LEUCOPOA KINGII-CAREX ELYNOIDES			**LEKI/CAEL**		
LEUCOPOA KINGII/OXYTROPIS CAMPESTRIS	**LEKI/OXCA**				
PHLOX PULVINATA/POA EPILIS		**PHPU/POEP**	PHPU fellfield		
PHYLLODOCE EMPETRIFORMIS/ANTENNARIA LANATA	**PHEM/ANLA**				
POA EPILIS		**POEP**			
POTENTILLA DIVERSIFOLIA-ARENARIA OBTUSILOBA					WELLNER 1991
POTENTILLA OVINA/AGROPYRON SCRIBNERI	dry slopes	AGSC	**POOV/AGSC**		
Potentilla brevifolia					WELLNER 1991
SALIX NIVALIS				**SANI**	
SAXIFRAGA OPPOSITIFOLIA					BRUNSFELD 1981
Solicago multiradiata-Trifolium haydenii				*Somu-Trha*	
Unstable communities, snowbed			Unstable communities, snowbed		

<u>Table 4</u>. Crosswalk showing the relationship between medium-tall bunch grassland and related communities described by authors working in Idaho and adjacent areas. The name of the most similar community applied by the author to the community listed on the left appears below the author. BOLD indicates the principle author as recognized in Table 1 (abbreviations for taxa are the combined first 2 characters of the genus and species epithet). Lower-case italics is used to list communities elements which may occur in Idaho and/or are not well known or documented.

COMMUNITY	DAUB 1970[6]	TIS 1986 [7]	J & S 1987[8]	OTHER
AGROPYRON SPICATUM/ERIOGONUM HERACLEOIDES			**AGSP/ERHE**	MUEGGLER AND HARRIS 1969
AGROPYRON SPICATUM-FESTUCA IDAHOENSIS* [9]	**AGSP-FEID**			
AGROPYRON SPICATUM-OPUNTIA POLYACANTHA			**AGSP/OPPU**	
AGROPYRON SPICATUM-POA SECUNDA	AGSP-POSE		**AGSP-POSE**	
GRANITE VARIANT			**AGSP-POSE, GRANITE**	
ERIGERON PUMILIS VARIANT			**AGSP-POSE/ERPU**	
PHLOX COLUMBRINA VARIANT			**AGSP-POSE/PHCO**	
SCUTELLARIA ANGUSTIFOLIA VARIANT			**AGSP-POSE/SCAN**	
AGROPYRON SPICATUM-POA SECUNDA, SCABLAND	AGSP-POSE, LITH		**AGSP-POSE, SCAB**	
AGROPYRON SPICATUM-MELICA BULBOSA				MUEGGLER AND HARRIS 1969
AGROPYRON SPICATUM-POA SECUNDA/BALSAMORHIZA SAGITTATA		**AGSP-POSE/BASA**		MUEGGLER AND HARRIS 1969
BASALT VARIANT			**AGSP-POSE, BASALT**	
ASTRAGALUS CUSICKII VARIANT			**AGSP-POSE/ASCU**	
BROMUS SPP.-STIPA OCCIDENTALIS				TUHY 1981
ELYMUS AMBIGUUS SALMONIS/ENCELIOPSIS NUDICAULIS				CAICCO AND WELLNER 1983
ELYMUS AMBIGUUS SALMONIS/LUPINUS ARGENTEUS				CAICCO AND WELLNER 1983
FESTUCA IDAHOENSIS-AGROPYRON SPICATUM		FEID-AGSP	**FEID-AGSP**	MUEGGLER AND HARRIS 1969
BALSAMORHIZA SAGITTATA VARIANT			**FEID-AGSP/BASA**	
LUPINUS SERICEUS VARIANT			**FEID-AGSP/LUSE**	
PHLOX COLUMBRINA VARIANT			**FEID-AGSP/PHCO**	
RIDGETOP VARIANT			**FEID-AGSP, RIDGETOP**	
Antenaria microphylla variant				MUEGGLER AND HARRIS 1969
FESTUCA IDAHOENSIS-CAREX HOODII			**FEID-CAHO**	
FESTUCA IDAHOENSIS-CAREX GEYERI			**FEID-CAGE**	MUEGGLER AND HARRIS 1969
FESTUCA IDAHOENSIS-DANTHONIA CALIFORNICA				MOSELEY 1987
FESTUCA IDAHOENSIS-DANTHONIA INTERMEDIA-CAREX		CAHO-FEID	**FEID-DAIN-CAREX**	
FESTUCA IDAHOENSIS/ERIOGONUM CAESPITOSUM				CAICCO 1983

6 DAUBENMIRE 1970

7 TISDALE 1986

8 JOHNSON AND SIMON 1987

9 Endemic to the Palouse Prairie Section (Lichthardt and Moseley 1997)

Table 4. (continued)

COMMUNITY	DAUB 1970	TIS 1986	J & S 1987	OTHER
FESTUCA IDAHOENSIS-KOELERIA CRISTATA		FEID-KOCR	**FEID-KOCR**	MUEGGLER AND HARRIS 1969
HIGH ELEVATION VARIANT			**FEID-KOCR, HIGH**	
LOW ELEVATION VARIANT			**FEID-KOCR, LOW**	
MOUNDS VARIANT			**FEID-KOCR, MOUNDS**	
RIDGETOP VARIANT			**FEID-KOCR, RIDGETOP**	
FESTUCA IDAHOENSIS/POTENTILLA DIVERSIFOLIA				CAICCO 1983
FESTUCA IDAHOENSIS/ROSA NUTKANA*	**FEID/RONU**			
FESTUCA IDAHOENSIS/SYMPHORICARPOS ALBUS*	**FEID/SYAL** (in part)			
FESTUCA SCABRELLA-FESTUCA IDAHOENSIS	FEID/SYAL (in part)			TISDALE 1983
FESTUCA VIRIDULA				WELLNER AND TISDALE 1985
SPOROBOLUS CRYPTANDRA	SPCR		**SPCR**	
SPOROBOLUS CRYPTANDRA-POA SECUNDA		**SPCR-POSE**		
SYMPHORICARPOS ALBUS-ROSA SP.	FEID/SYAL, SYAL FEID/RONU, RONU	SYAL	**SYAL/ROSA SP.**	FEID/SYAL (TISDALE 1979)

Table 5. Crosswalk showing the relationship between selected plant associations described for the Blue Mountains Section. See Table 4 for grassland associations. The name of the most similar community applied by the author to the community listed on the left appears below the author. BOLD indicates the principle author as recognized in Table 1 (abbreviations for taxa are the combined first 2 characters of the genus and species epithet).

COMMUNITY	S ET AL.1981[10]	C ET AL. 1991[11]	J & S 1987[12]	OTHER
Abies grandis/Acer glabrum, Acer glabrum phase	**ABGR/ACGL, ACGL**		ABGR/ACGL	
Abies grandis/Acer glabrum, Physocarpus malvaceus phase	**ABGR/ACGL, PHMA**		ABGR/ACGL-PHMA	
Abies grandis/Calamagrostis rubescens	**ABGR/CARU**		ABGR/CARU	
Abies grandis/Clintonia uniflora, Clintonia uniflora		**ABGR/CLUN, CLUN**	ABGR/CLUN	
Abies grandis/Coptis occidentalis	**ABGR/COOC**		ABGR/COOC	
Abies grandis/Linnaea borealis	**ABGR/LIBO**	ABGR/LIBO	ABGR/LIBO PICO/LIBO	
Abies grandis/Spiraea betulifolia	**ABGR/SPBE**	ABGR/SPBE	ABGR/SPBE	
Abies grandis/Taxus brevifolia/Clintonia uniflora		ABGR/CLUN, TABE	ABGR/TABE/CLUN	CRAWFORD AND JOHNSON 1985
Abies grandis/Vaccinium globulare	**ABGR/VAGL**	ABGR/VAGL	ABGR/VAME	
Abies lasiocarpa/Calamagrostis rubescens	**ABLA/CARU**	ABLA/CARU	ABLA/CARU	
Abies lasiocarpa/Clintonia uniflora	**ABLA/CLUN**	ABLA/CLUN	ABLA/CLUN	
Abies lasiocarpa/Linnaea borealis	**ABLA/LIBO**		ABLA/LIBO	
Abies lasiocarpa/Menziesia ferruginea	**ABLA/MEFE**	ABLA/MEFE	ABLA/MEFE	
Abies lasiocarpa/Polemonium pulcherrimum			**ABLA/POPU**	
Abies lasiocarpa/Streptopus amplexifolius	**ABLA/STAM**	ABLA/STAM	ABLA/STAM	
Abies lasiocarpa/Vaccinium globulare	**ABLA/VAGL**		ABLA/VAME PICO/VAME	
Abies lasiocarpa/Vaccinium scoparium	**ABLA/VASC**		ABLA/VASC/POPU PICO/VASC	
Artemisia rigida/Poa secunda			**ARRI/POSE**	DAUBENMIRE 1970
Artemisia tridentata vaseyana/Carex geyeri			**ARTRV/CAGE**	
Artemisia tridentata vaseyana-Symphoricarpos oreophilus/Bromus carinatus			ARTRV-SYOR/BRCA	NELSON AND JENSEN 1987
Artemisia tridentata vaseyana/Festuca idahoensis			ARTRV-PUTR/FEID	HIRONAKA ET AL. 1983
Camassia cusickii			**CACU**	
Elymus cinereus			**ELCI**	DAY AND WRIGHT 1985
Eriogonum douglasii/Poa secunda			**ERDO/POSE**	DAUBENMIRE 1970
Eriogonum strictum/Poa secunda			**ERST/POSE**	DAUBENMIRE 1970
Glossopetalon nevadensis/Agropyron spicatum			**GLNE/AGSP**	
Physocarpus malvaceus-Symphoricarpos albus			**PHMA-SYAL**	

[10] STEELE ET AL. 1981

[11] COOPER ET AL. 1991

[12] JOHNSON AND SIMON 1987

Table 5 (continued)

COMMUNITY	S ET AL.1981	C ET AL. 1991	J & S 1987	OTHER
Pinus ponderosa/Agropyron spicatum	**PIPO/AGSP**	PIPO/AGSP	PIPO/AGSP	
Pinus ponderosa/Festuca idahoensis	**PIPO/FEID**	PIPO/FEID	PIPO/FEID	
Pinus ponderosa/Purshia tridentata, Agropyron spicatum phase	**PIPO/PUTR, AGSP**		PIPO/PUTR/AGSP	
Pinus ponderosa/Symphoricarpos albus	**PIPO/SYAL**		PIPO/SYAL	
Pseudotsuga menziesii/Calamagrostis rubescens, Pinus ponderosa phase	**PSME/CARU, PIPO**		PSME/CARU	
Pseudotsuga menziesii/Physocarpus malvaceus	**PSME/PHMA**	PSME/PHMA	PSME/ACGL-PHMA PSME/PHMA	
Pseudotsuga menziesii/Spiraea betulifolia, Pinus ponderosa phase	**PSME/SPBE, PIPO**		PSME/SPBE	
Pseudotsuga menziesii/Symphoricarpos albus, Pinus ponderosa phase	**PSME/SYAL, PIPO**		PSME/SYAL	
Pseudotsuga menziesii/Symphoricarpos oreophilus	**PSME/SYOR**		PSME/SYOR	
Pseudotsuga menziesii/Vaccinium globulare	**PSME/VAGL**		PSME/VAME	
Purshia tridentata/Agropyron spicatum			**PUTR/AGSP**	DAUBENMIRE 1970
Purshia tridentata/Festuca idahoensis			**PUTR/FEID-AGSP**	DAUBENMIRE 1970
Sporobolus cryptandra			**SPCR**	DAUBENMIRE 1970
Symphoricarpos albus-Rosa spp			**SYAL-ROSA**	

Table 6. Community classification and inventory publications that provide sufficient information to determine plot location and number (by association) to the subregional scale (i.e., the ecoregional section) in Idaho and adjacent areas are summarized by author with the number of plots recorded, the field method, analytical method, founding community concept (habitat type, HT; community type, CT; or not applicable, na), and major vegetation group (forest, shrubland, or grassland).

Author	Plots	Field Method[13]	Analytical Method[14]	Community Concept	Major Vegetation Group
Bowerman et al. 1996	834	A	unknown	HT	forest, grassland, shrubland
Caicco 1983	67	B	classification/ordination	na	grassland
Cooper and Lesica 1992	94	F	classification/ordination	na	grassland
Cooper et al. 1991	1,126	A	synthesis table/ordination	HT	forest
Crowe and Clausnitzer 1995	343	A/D	ordination/classification	CT	forest, grassland, shrubland
Dealy 1975	65	E	unknown	HT	forest
Johnson and Simons 1987	1,159	A	ordination/classification	HT	forest, grassland, shrubland
Lauer and Peek 1976	34	C	unknown	na	forest, shrubland
Manning and Padgett 1995	106	D	ordination	CT	forest, grassland, shrubland
Mauk and Henderson 1984	164	A	synthesis table/ordination	HT	forest
Moseley 1985	79	B	classification/ordination	na	grassland
Mueggler 1988	323	A	synthesis table	HT	forest
Mueggler and Harris 1969	19	C	synthesis table	na	grassland
Nelson and Jensen 1987	194	C	classification	HT	shrubland
Padgett et al. 1989	423	D	classification/ordination	CT	forest, grassland, shrubland
Steele et al. 1981	772	A	synthesis table/ordination	HT	forest
Steele et al. 1983	887	A	synthesis table/ordination	HT	forest
Tisdale 1986	88	C	classification	HT	grassland, shrubland
Tuhy and Jensen 1982	148	D	classification	CT	forest, grassland, shrubland
Urbanczyk 1993	75	B	classification/ordination	na	grassland
Winward 1970	39	C	classification	HT	shrubland
Youngblood et al. 1985	382	D	ordination/classification	CT	forest, grassland, shrubland

13 Field method
A. ocular estimation of canopy cover on 0.10 acre plot
B. ocular estimation of canopy cover as per Bliss (1963)
C. Poulton and Tisdale 1961
D. ocular estimates of canopy cover, 50 m^2 plot
E. dominance class, 0.3 ha plot
F. ocular estimation of canopy cover, 0.09 ha plot

14 Analytical methods employed are characterized by the use of (1) synthesis tables (Mueller-Dombois and Ellenberg 1974), (2) classification (e.g., through the use of cluster analysis), or (3) ordination (e.g., through the use of detrended correspondence analysis). In the case that multiple techniques were used, order and/or prevailance of techniques is inferred by a "/" (e.g., classification/ordination means that ordination techniques were subordinate to classification techniques).

Table 7. Summary of the number of sample plots reported by authors listed in Table 6 for communities known or expected to occur in forested ecoregional sections of Idaho. 342B-E, Northwestern Basin & Range Section, Eastern Portion; M331A, Yellowstone Highlands Section; M331D, Overthrust Mountains Section; M332A, Idaho Batholith Section; M332E, Beaverhead Mountains Section; M332F, Challis Volcanics Section; M332G, Blue Mountains Section; M333A, Okanogan Highlands Section; M333B, Flathead Valley Section; M333D, Bitterroot Mountains Section.

This table is not included here. Please request the original document for this information.