

Michael D. Jennings, Don Faber-Langendoen, Orié L. Loucks, Robert K. Peet, and David Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. *Ecological Monographs* 79:173–199.

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**Appendix A. Glossary of terms.**

**Alliance** — a group of associations with a defined range of species composition, habitat conditions, and physiognomy, and which contains one or more of a set of diagnostic species, typically at least one of which is found in the upper most or dominant stratum of the vegetation. This definition includes both floristic and physiognomic criteria, in keeping with the integrated physiognomic-floristic hierarchy of the NVC.

**Association** — a vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy.

**Associés** — a type of vegetation unit applied in the Western U.S. tradition, to avoid confusion with association as used in the Western U.S. tradition to refer to the latest successional or climax stage; suggested for classification of plant communities in earlier stages of secondary succession (Daubenmire 1968).

**Basal area** — the surface area of a woody stem (or stems) if cut off horizontally at a specific height (“breast height” is here defined as 1.37 meters or 4.5 feet).

**Character species** — a species that shows a distinct maximum concentration (quantitatively and by presence) in a well-definable vegetation types, sometimes recognized at local, regional, and absolute geographic scales (Mueller-Dombois and Ellenberg 1974, p. 178, 208; Bruehlheide 2002), c.f. differential species.

**Class** — see Formation Class.

**Classification** — the grouping of similar types (in this case vegetation types) according to criteria (in this case physiognomic and floristic). The rules for classification must be specified prior to delineation of the types within the classification standard. Classification methods should be clear, precise, and based upon objective criteria so that the outcome is theoretically independent of who applies the classification. (UNEP/FAO 1995, FGDC 2008 ).

**Classification plot record** — a plot record that contains the data necessary to inform the development or revision of the floristic units within the NVC. Such plots typically contain high quality data on floristic composition and structure, and conform to NVC standards (see [Appendix B](#); also see Occurrence Plot Records).

**Climax vegetation** — the final, relatively stable community at the conclusion of ecological succession that is able to reproduce itself indefinitely under existing environmental conditions (Gabriel and Talbot 1984).

**Community** — a group of organisms living together and linked together by their effects on one another and their responses to the environment they share (Whittaker 1975).

**Community constant (species)** — a species that occurs frequently in stands of a type ; synonymous with constant companion.

**Constancy** — the percentage of plots in a given data set that a taxon occurs in.

**Cover estimate** — an estimate of the percentage of the surface of the earth within a specified area, or plot, covered by biomass of plants of a specified group (from one species to all species, from one horizontal layer to all growth). This can be viewed as the percentage of the sky that would be obscured by the biomass. In contrast to leaf area index, total cover cannot exceed 100%.

**Cover type** — a community type defined on the basis of the plant species forming a plurality of composition and abundance (see Eyre 1980 ).

**Diagnostic species** — any species or group of species whose relative constancy or abundance differentiates one vegetation type from another. Similarly, Curtis (1959) defined a diagnostic species as a plant of high fidelity to a particular community and one whose presence serves as a criterion of recognition of that community (Curtis 1959 ). In the Braun-Blanquet system, diagnostic species comprise the character and differential species used to delimit associations (Bruehlheide 2000).

**Differential species** — A plant species that is distinctly more widespread or successful in one of a pair of plant communities than in the other, although it may be still more successful in other communities not under discussion (Curtis 1959 ). This is consistent with Bruehlheide's (2000) definition: a species "that shows a distinct accumulation of occurrences in one or more vegetation units", and clearly distinguishes the concept from that of a character species which should show a distinctive accumulation of occurrences in only one type.

**Dominance** — the extent to which given taxa (or growth forms) predominate in a community because of their size, abundance, or cover. Dominance is interpreted in two different ways for NVC purposes: (1) where vegetation covers more than 25% of the area, the taxon or taxa (or growth forms) within a given stratum having the greatest amount of cover above 25% is considered dominant; and (2) where vegetation covers less than 25% of the area, the taxon or taxa (or growth forms) with the highest percent canopy cover is considered dominant. In the case of a 'tie', the upper canopy will be referred to as the dominant growth form. Other definitions sometimes applied refer to the most common taxon of the upper-most stratum, the taxa with the greatest relative basal area, or the more successful taxon in a competitive interaction.

**Dominance type** — a class of communities defined by the dominance of one or more species, which are usually the most important ones in the uppermost or dominant layer of the community, but sometimes of a lower layer of higher coverage (Gabriel and Talbot 1984).

**Dominant species** — species with the highest percent of cover, usually in the uppermost dominant layer (in other contexts dominant species can be defined in terms of biomass, density, height, coverage, etc., (Kimmins 1997 ).

**Entitation** — the processes by which entities are recognized and defined, usually by dividing a continuously varying phenomenon into a set of discreet entities. In vegetation ecology entitation refers to the act of segmenting an area of vegetation into homogeneous entities, within which samples (plots) can be placed (see Mueller-Dombois and Ellenberg 1974), or the division of community data (usually plot data) into discrete vegetation classes.

**Existing vegetation** — vegetation found at a given location at the time of observation (in contrast to potential vegetation).

**Fidelity** — the degree to which a species is confined in a given vegetation unit. The fidelity of a species determines whether it can be considered a differential or character species, or just a companion or accidental species (Bruehlheide 2000).

**Formation** — a NVC vegetation classification unit of high rank (3rd level) defined by combinations of dominant and diagnostic growth forms that reflect global macroclimatic conditions as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions (see Table 1; FGDC 2008).

**Formation class** — a NVC vegetation classification unit of high rank (1st level) defined by broad combinations of dominant general growth forms adapted to basic moisture, temperature, and/or substrate

or aquatic conditions. As used here for a physiognomic NVC category, the term does not correspond with "class" as used strictly in phytosociological classifications (see Table 1; FGDC 2008).

**Formation subclass:** a NVC vegetation classification unit of high rank (2nd level) defined by combinations of general dominant and diagnostic growth forms that reflect global macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate or aquatic conditions (see Table 1; FGDC 2008).

**Frequency** — percentage of observations within which a taxon occurs.

**Group** — a NVC vegetation classification unit of intermediate rank (6th level) defined by combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect biogeographic differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (see Table 1; FGDC 2008).

**Growth form** — the characteristic structural or functional type of plant. Growth form is usually consistent within a species, but may vary under extremes of environment (Mueller-Dombois 1974). Growth forms determine the visible structure or physiognomy of plant communities (Whittaker 1973). As defined here life forms, constitute a subset of the characteristics that are combined as growth forms.

**Habitat type** — a collective term for all parts of the land surface supporting, or capable of supporting, a particular kind of climax plant association (Daubenmire 1978; Gabriel and Talbot 1984).

**Indicator species** — a species whose presence, abundance, or vigor is considered to indicate certain site conditions (Gabriel and Talbot 1984); synonymous with diagnostic species.

**Layer (vegetation)** — a structural component of a community consisting of plants of approximately the same height stature (e.g., tree, shrub, and field layer), here synonymous with stratum. (Note that elsewhere "strata" are sometimes used to designate vertical layers of foliage with the foliage of a specific plant divided into more than one stratum, whereas as used here an individual plant always belongs exclusively to the one layer or stratum in which the majority of its leaf area occurs.)

**Life form** — a plant type defined by the characteristic structural features and method of perennation, generally as defined by Raunkiaer (1934; see Beard 1973 ).

**Macrogroup** — an NVC vegetation classification unit of intermediate rank (5th level) defined by combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect

biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (Table 1; FGDC 2008).

**Metadata** — information about data. This describes the content, quality, condition, and other characteristics of a given dataset. Its purpose is to provide information about a dataset or some larger data holdings to data catalogues, clearinghouses, and users. Metadata are intended to provide a capability for organizing and maintaining an institution's investment in data as well as to provide information for the application and interpretation of data received through a transfer from an external source (FGDC 2008 ).

Recommended standards for ecological metadata have been proposed by Michener et al. (1997).

**Occurrence plot record** — a plot record that contains data valuable for ecological and geographical characterization of vegetation, but which do not contain sufficient data to be used in quantitative description of an association or alliance (see [Appendix B](#); also see Classification Plot Records).

**Physiognomy** — the visible structure or outward appearance of a plant community as expressed by the dominant growth forms, such as their leaf appearance or deciduousness (Fosberg 1961; also see structure).

**Plant community** — a group of plant species living together and linked together by their effects on one another and their responses to the environment they share (modified from Whittaker 1975). Typically the plant species that co-occur in a plant community show a definite association or affinity with each other (Kent and Coker 1992).

**Plot** — in the context of vegetation classification, an area of defined size and shape that is intended for characterizing a homogenous occurrence of vegetation (also see relevé).

**Potential natural vegetation** — the vegetation that would become established if successional sequences were completed without interference by man or natural disturbance under the present climatic and edaphic conditions (Tüxen 1956; also see existing vegetation).

**Range of variation** — the values of an attribute, such as species composition or environmental parameters, that fall within the upper and lower bounds determined for that attribute. The range of variation in the floristic composition of a vegetation type may, for example, be expressed in terms of its beta diversity (Wilson and Shmida 1984, McCune et al. 2002), either along an environmental gradient or as the amount of compositional change in a multidimensional hyperspace.

**Relevé** — a record of vegetation intended for characterizing a stand of vegetation having uniform habitat and relatively homogeneous plant cover, and which is large enough in area to contain a large proportion of the species typically occurring in the plant community (Mueller-Dombois and Ellenberg 1974; also see plot).

**Sampling method** — the means used to select the locations for plots. (Note that the act of recording a plot or relevé is often referred to as vegetation sampling, but this is really vegetation recording; the sampling component occurs in the selection of the specific plot to be recorded.)

**Seral** — a vegetation type (or component species) that is nonclimax; a species or community demonstrably susceptible to replacement by another species or community (Daubenmire 1978).

**Sere** — a continuous sequence of community types that occur in a successional sequence prior to reaching the climax type.

**Site type** — a qualitative grouping or classification of sites by climate, soil, and habitat attributes, typically determined by the vegetation present at the site.

**Stand** — a spatially continuous unit of vegetation with uniform composition, structure, and environmental conditions. This term is often used to indicate a particular example of a plant community.

**Stratum** — in this document used synonymously with layer. Elsewhere it can indicate a layer of vegetation defined by the foliage between two horizontal planes.

**Structure (vegetation)** — the spatial pattern of growth forms in a plant community, especially with regard to their height, abundance, or coverage within the individual layers (Gabriel and Talbot 1984; also see, physiognomy). Elsewhere this term is used more generally to include all aspects of how communities are assembled.

**Subclimax** — the stage plant succession immediately preceding the climax stage (Gabriel and Talbot 1984).

**Taxon-concept** — When used with respect to taxonomic nomenclature, the combination of a taxon name along with a reference to a circumscribed taxonomic concept (Franz et al. 2008; and as in “potential taxon” of Berendsohn (1995) or “assertion” of Pyle (2004) ).

**Vegetation** — the collective plant cover of an area.

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**Appendix B. Required and optimal attributes for classification and occurrence plot records.**

*Classification plots* provide data needed to develop and define classified vegetation types (associations and alliances). *Occurrence plots* document a less formal observation of a known association or alliance at a location. Required fields are those minimally needed to serve as either classification or occurrence plots. Optimal fields are those fields that, while not required, reflect best practices when recording plots.

Appendix B Section and Table Index

*1. Information that should be included on the form used to record plot data in the field.*

- B1.1. [Field form information about the plot record.](#)
- B1.2. [Field form information about the plot vegetation.](#)
- B1.3. [Field form information about the plot location.](#)
- B1.4. [Field form information about the plot environment.](#)
- B1.5. [Field form information about the plot habitat.](#)

*2. Information that should be included as metadata.*

- B2.1. [Metadata about the original field project for which the plot record was collected.](#)
- B2.2. [Metadata about the plot and the plot observation.](#)
- B2.3. [Metadata about the methods used to collect the field data.](#)
- B2.4. [Metadata about the human sources of the field data.](#)
- B2.5. [Metadata about references for other sources of plot data.](#)
- B2.6. [Metadata about plot record confidentiality and links to publications and sources.](#)

3. Information that should be included about each assignment of a field plot to a vegetation type or types in the NVC.

B3.1 [Assignment of field plots to vegetation types.](#)

Section 1. Information that should be included on the form used to record plot data in the field. The attribute names derive from the attribute names in the VegBank plot archive (with the exception that underscore symbols have been added to improve readability).

TABLE B1.1. Field form information about the plot record.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Author Plot Code	Author's plot number/code, or the original plot number if taken from literature.	Required	Required
Author Observation Code	Code or name that the author uses to identify this plot observation. Where a plot has only one observation, this code may equal Author Plot Code.	Required	Optimal
Placement Method	Description of the method used to determine the placement of a plot.	Optimal	Optimal
Observation Start Date	The date of the observation, or the first day if the observation spanned more than one day.	Required	Required
Observation Stop Date	The last day of the observation if the observation spanned more than one day.	Optimal	Optimal
Date Accuracy	Estimated accuracy of the observation date. Accuracy is often low for legacy data. See Table C3, Appendix C for a constrained vocabulary.	Required	Optimal

TABLE B1.2. Field form information about the plot vegetation.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Dominant Stratum	Identify the dominant stratum (of the six standard strata).	Optimal	Optimal
Growth Form 1	The predominant growth form.	Optimal	Optimal
Growth Form 2	The second-most predominant growth form.	Optimal	Optimal
Growth Form 3	The third-most predominant growth form.	Optimal	Optimal
Growth Form 1 Cover	Total cover of the predominant growth form.	Optimal	Optimal
Growth Form 2 Cover	Total cover of the second-most predominant growth form.	Optimal	Optimal
Growth Form 3 Cover	Total cover of the third-most predominant growth form.	Optimal	Optimal
Basal Area	Total basal area of woody stems in m <sup>2</sup> /ha.	Optimal	Optimal

*The following stratum variables are recorded once for each stratum recognized.*

*While not strictly required, measurements of strata are a best practice. If strata are measured, the first three and last are required*

Stratum Index	Indices used to represent stratum	Required only if strata are recorded	Optimal
Stratum Name	Name of stratum.	Required only if strata are recorded	Optimal
Stratum Description	Description of stratum.	Required only if strata are recorded	Optimal
Stratum Height	Average height to the top of the stratum in meters.	Optimal	Optimal
Stratum Base	Average height of the bottom of the stratum in meters.	Optimal	Optimal
Stratum Cover	Total cover of vegetation within the given stratum in percent.	Required only if strata are recorded	Optimal

*The following apply for recording plant taxa, with at least one record per taxon, and multiple records when taxa are observed in multiple strata.*

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Plant Name	Name of the taxon. For occurrence plots, only dominant taxa are required, whereas for classification plots a comprehensive list of taxa is required.	Required	Required
Plant Reference	Authority followed for taxon (could be entered by taxon, or collectively for the whole plot or as a default where not otherwise specified in the metadata).	Required	Required
Taxon Stratum Cover	Percent cover of taxon in stratum.	Optimal	Optimal
Taxon Cover	Overall cover of the taxon across all strata. For occurrence plots, only dominant taxa are required, whereas for classification plots a comprehensive list of taxa is required.	Required	Required
Taxon Inference Area	This is the area in square meters used to estimate the cover of a given taxon. Generally this should be equal to Taxon Observation Area, but at times this area may be larger or smaller for a specific taxon.	Required	Optimal
Taxon Basal Area	Total basal area of woody stems in m <sup>2</sup> /ha for a given taxon, usually for those with a tree growth form.	Optimal	Optimal
Taxon Stem Count	The number of stems of a given taxon, usually for those with a tree growth form.	Optimal	Optimal

TABLE B1.3. Field form information about the plot location (some can be determined after a return to office, for example, with coordinate conversions).

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
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<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Latitude & Longitude	WGS84 Latitude and Longitude of the plot origin in degrees and decimals following any adjustments, conversions and postprocessing.	Required	Required
Type of Field Coordinates	Coordinates recorded in the field (latitude and longitude with datum, UTM with datum, or alternative geographic projection with units, longitude of center of projection, latitude of center of projection, False easting, False northing, X axis shift, & Y axis shift).	Required	Required
Location Accuracy	Estimated accuracy of the location of the plot. Plot origin has a 95% or greater probability of being within this many meters of the reported location.	Optimal	Required
Location Narrative	Text description that provides information useful for plot relocation.	Optimal	Optimal
Area	Total area of the plot in square meters. If many subplots, this area includes the subplots and the interstitial space.	Required	Optimal
Stand Size	Estimated size of the stand of vegetation in which the plot occurs.	Optimal	Optimal
USGS Quad	U.S. Geological Survey 7.5 minute quadrangle name.	Optimal	Optimal
Ecoregion	Bailey (1995) Ecoregion Section.	Optimal	Optimal
Place name Country	Country of plot location.	Optimal	Optimal
Place Name State/Prov.	State, province, or similar subnational jurisdiction.	Optimal	Optimal
Place Name Canton	County, township, parish, or similar local jurisdiction.	Optimal	Optimal

TABLE B1.4. Field form information about the plot environment.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Elevation	The elevation of the plot origin in meters above sea level.	Optimal	Optimal
Elevation Accuracy	The accuracy of the elevation in percentage of the elevation reported.	Optimal	Optimal
Slope Aspect	Representative azimuth of slope gradient (0–360 degrees; -1 if too flat to determine; -2 if too irregular to determine).	Optimal	Optimal
Slope Gradient	Representative inclination of slope in degrees; if too irregular to determine, = -1.	Optimal	Optimal
Topographic Position	Position of the plot on land surface (e.g., summit, shoulder, upper slope, middle slope, lower slope, toeslope, no slope, channel bed, dune swale, pond). See Table C19, Appendix C for a constrained vocabulary.	Optimal	Optimal
Landform	Landform type. See U.S. Department of Agriculture, Natural Resources Conservation Service, 2002. National Soil Survey Handbook, Part 629 Exhibit 1, Parts I.A & I.B. (Online at <a href="http://soils.usda.gov/technical/handbook/">http://soils.usda.gov/technical/handbook/</a> ) for a list of landform terms.	Optimal	Optimal
Geology	Surface geology type. See Table C18, Appendix C for a constrained vocabulary.	Optimal	Optimal
Hydrologic Regime	Hydrologic regime based on, frequency and duration of flooding) (Cowardin et al. 1979). See Table C8, Appendix C for a constrained vocabulary.	Optimal	Optimal
Soil Moisture Regime	Soil moisture regime, such as xeric, mesic, hygric, hydric. See Table C11, Appendix C for	Optimal	Optimal

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
	a constrained vocabulary.		
Soil Drainage	Drainage of the site (generally consistent with USDA classes). See Table C10, Appendix C for a constrained vocabulary.	Optimal	Optimal
Water Salinity	How saline is the water, if a flooded community. See Table C13, Appendix C for a constrained vocabulary.	Optimal	Optimal
Water Depth	For wetland, aquatic or marine vegetation, the water depth in m.	Optimal	Optimal
Shore Distance	For aquatic or marine vegetation, the closest distance to shore in m.	Optimal	Optimal
Soil Depth	Median depth to bedrock or permafrost in m (usually from averaging multiple probe readings).	Optimal	Optimal
Organic Depth	Depth of the surficial organic layer, where present, in centimeters.	Optimal	Optimal
Soil Cover: Percent Bedrock	Percent of surface that is exposed bedrock.	Optimal	Optimal
Soil Cover: Percent Rock & Gravel	Percent of surface that is exposed rock and gravel.	Optimal	Optimal
Soil Cover: Percent Dead Wood	Percent of surface that is wood.	Optimal	Optimal
Soil Cover: Percent Litter	Percent of surface that is litter.	Optimal	Optimal
Soil Cover: Percent Bare Soil	Percent of surface that is bare mineral soil.	Optimal	Optimal
Soil Cover: Percent Water	Percent of surface that is water.	Optimal	Optimal
Soil Taxon	Name of soil type.	Optimal	Optimal
Soil Taxon Source	Source of soil type.	Optimal	Optimal

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Soil Cover: Percent Live Stems	Percent of surface that is occupied by live plant stems.	Optimal	Optimal
Soil Cover: Percent Nonvascular	Percent of surface that is occupied by nonvascular plants (moss, lichen, liverwort, algae).	Optimal	Optimal

TABLE B1.5. Field form information about the plot habitat.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Observation Narrative	Additional unstructured observations useful for understanding the ecological attributes and significance of the plot observations.	Optimal	Optimal
Landscape Narrative	Unstructured observations on the landscape context of the observed plot.	Optimal	Optimal
Homogeneity	Homogeneity of the community (e.g., homogeneous, compositional trend across plot, conspicuous inclusions, irregular mosaic or pattern)? See Appendix C, Table 7 for a constrained vocabulary.	Optimal	Optimal
Phenological Aspect	Season expression of the community (e.g., typical growing season, vernal, aestival, wet, autumnal, winter, dry, irregular ephemerals present). See Appendix C, Table C9 for a constrained vocabulary.	Optimal	Optimal
Representativeness	Narrative description of how representative the plot is of the stand.	Optimal	Optimal
Stand Maturity	Assess maturity of stand (e.g., young, mature but even-aged, old-growth, etc.) See Appendix	Optimal	Optimal

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
	C, Table C12 for a constrained vocabulary.		
Successional Status	Description of the assumed successional status of the plot.	Optimal	Optimal
<b><i>The following should be repeated once for each type of disturbance reported</i></b>			
Disturbance Type	The type of disturbance being reported. Repeat this field as many times as necessary where there is more than one type of disturbance.	Optimal	Optimal
Disturbance Intensity	Intensity or degree of disturbance. Values are: High, Medium, Low, None.	Optimal	Optimal
Disturbance Age	Estimated time in years since the disturbance event.	Optimal	Optimal
Disturbance Extent	Percent of the plot that experienced the event.	Optimal	Optimal
Disturbance Comment	Text description of details of the disturbance and its impact on the vegetation. Repeat this field as many times as necessary where there is more than one type of disturbance.	Optimal	Optimal

Section 2. Information that should be included as metadata.

TABLE B2.1. Metadata about the original field project for which the plot record was collected.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Project Name	Project name as defined by the principal investigator.	Optimal	Optimal
Project Description	Short description of the project including the original purpose for conducting the project. This can be viewed as the project abstract plus supporting metadata.	Optimal	Optimal

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Start Date	Project start date.	Optimal	Optimal
Stop Date	Project stop date.	Optimal	Optimal

TABLE B2.2. Metadata about the plot and the plot observation.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Layout Narrative	Text description of and the rationale for the layout of the plot.	Optimal	Optimal
Method Narrative	Additional metadata helpful for understanding how the data were collected during the observation event.	Optimal	Optimal
Plot Type	Indicate if information is recorded from the entire plot or from subplots. If from subplots indicate how the subplots were configured: contiguous, regular, random, or haphazard (see Appendix C, Table C2).	Required	Optimal
Taxon Observation Area	The total surface area (in square meters) used for cover estimates and for which a complete species list is provided. If subplots were used, this would be the total area of the subplots without interstitial space.	Required	Optimal
Cover Dispersion	Indication of how cover values for the total taxon list were collected; i.e., from one contiguous area or dispersed subplots (e.g., contiguous, dispersed-regular, dispersed-random).	Required	Optimal
Original Data	Location where the hard data reside and any access instructions.	Optimal	Optimal

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Effort Level	Effort spent making the observations as estimated by the party that submitted the data. Values are: very thorough; accurate; hurried or incomplete.	Optimal	Optimal
Quality of the Floristic Observation	Subjective assessment of the quality of taxonomic resolution made by the party that submitted the plot. For example, what percent of all taxa were identified to species level; how thorough was the search? See Appendix C Table C21 for values and their definitions.	Optimal	Optimal
Quality of the Bryophyte Observation	Subjective estimate of the quality of taxonomic resolution made by the party that submitted the plot. See Appendix C Table C21 for values and their definitions.	Optimal	Optimal
Quality of the Lichen Observation	Subjective estimate of the quality of taxonomic resolution made by the party that submitted the plot. See Appendix C Table C21 for values and their definitions.	Optimal	Optimal
Vouchers Collected	Indicate if voucher specimens were collected and, if so, where they were deposited.	Optimal	Optimal

TABLE B2.3. Metadata about the methods used to collect the field data. If you used a standard stratum method, it should be identified here. Vertical strata used for recording taxon cover must be defined in terms of their upper and lower limits with this information reported in table 1.2. Cover class scales must be defined in terms of their minimum, maximum, and representative cover in percent. You may either use an established, named cover scale which you report in field 3, or you document a new scale through repeated entries in fields 4-8.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
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<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Stratum Method Name	Name of the stratum method. Any appropriate label (e.g., NVC, Braun-Blanquet, NatureServe, North Carolina Vegetation Survey #1, etc.).	Required only if strata are recorded	Optimal
Stratum Method Description	This field describes the general methods used for strata.	Required only if strata are recorded	Optimal
Cover Type	Name of the cover class method (e.g., Braun-Blanquet, Barkman, Domin, Daubenmire, North Carolina Vegetation Survey, etc.).	Required	Optimal
Cover Code	The name or label used in the cover class scale for this specific cover class.	Required	Optimal
Cover Code Upper Limit	Upper limit, in percent, associated with the specific cover code.	Required	Optimal
Cover Code Lower Limit	This is the lower limit, in percent, associated with a specific Cover Code.	Required	Optimal
Cover Percent	A middle value (usually mean or geometric mean) between the Upper Limit and Lower Limit stored by the database for each taxon observation and used for all cover class conversions and interpretations. This is assigned by the author of the cover class schema.	Optimal	Optimal
Index Description	Description of the specific cover class. This is particularly helpful in the case that there is no numeric value that can be applied.	Optimal	Optimal

TABLE B2.4. Metadata about the human sources of the field data.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Given Name	One's first name.	Required	Required
Middle Name	One's middle name or initial, if any.	Optimal	Optimal
Surname	Name shared in common to identify the members of a family, as distinguished from each member's given name.	Required	Required
Organization Name	Name of an organization.	Optimal	Optimal
Current Name	Recursive foreign key to current name of this party.	Optimal	Optimal
Email	email address.	Optimal	Optimal
Address Start Date	The first date on which the address/organization information was applied.	Required	Required
Delivery Point	Address line for the location (street name, box number, suite).	Optimal	Optimal
City	City of the location.	Optimal	Optimal
Administrative Area	State, province of the location.	Optimal	Optimal
Postal Code	Zip code or other postal code.	Optimal	Optimal
Country	Country of the physical address.	Optimal	Optimal
<b><i>The following can be repeated an indefinite number of times per person</i></b>			
Role: Plot submitter	Name of the person submitting the analysis.	Required	Required
Role: Plot Primary Field Observer	Name of the person who made the field observation (e.g., PI, technician, volunteer, etc.).	Required	Required
Role: Plot Author	Name of the author of the plot record.	Required	Required
Role: Project PI	Name of the field plot inventory project's principal investigator.	Optimal	Optimal
Role: Other	Report other roles as appropriate.	Optimal	Optimal

TABLE B2.5 Metadata about references for other sources of plot data. These fields are used when plot observations are taken from published literature sources.

Attribute Name	Attribute Definition	Classification Plots	Occurrence Plots
Authors	Name of authors if plot record is taken from published work.	Required	Required
Title	Title of publication, if plot record is taken from published work.	Required	Required
Publication Date	Date of publication, if plot record is taken from published work.	Required	Required
Edition	Edition of publication if applicable, and if plot record is taken from published work.	Required	Required
Series Name	Name of publication series, if applicable, and if plot record is taken from published work.	Required	Required
Page	Page number of publication, if plot record is taken from published work.	Required	Required
Table Cited	Table number or code, if applicable and if plot record is taken from published work.	Required	Required
Plot Cited	Original plot name, if plot record is taken from published work.	Required	Required
ISBN	International Standard Book Number (ISBN), if applicable, and if plot record is taken from published book.	Optimal	Optimal
ISSN	International Standard Serial Number, if applicable.	Optimal	Optimal
Short Name	Provides a concise or abbreviated name that describes the resource that is being documented.	Optimal	Optimal
Citation Type	Describes the type of reference this generic type is being used to represent. Examples: book, journal article, webpage.	Required	Required

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Title	The formal title given to the work by its author or publisher.	Required	Required
Title Superior	A second, higher order title where appropriate, which in the case of a reference to a chapter is the Book title, and in the case of a Conference Presentation is the Name of the Conference.	Optimal	Optimal
Pub Date	Represents the date that the reference was published.	Required	Required
Access Date	The date the reference being referenced was accessed. This is useful if the reference is could be changed after formal publication, such as websites or databases.	Required	Required
Conference Date	The date the conference was held.	Required	Required
Volume	The volume of the journal in which the article appears.	Required	Required
Issue	The issue of the journal in which the article appears.	Required	Required
Page Range	The beginning and ending pages of the journal article that is being documented.	Required	Required
Total Pages	The total number of pages in the book that is being described.	Required	Required
Publisher	The organization that physically put together the report and publishes it.	Required	Required
Publication Place	The location at which the work was published. This is usually the name of the city in which the publishing house produced the work.	Required	Required
ISBN	The ISBN, or International Standard Book Number assigned to this literature reference.	Required	Required
Edition	The edition of the generic reference type that is	Required	Required

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
	being described.		
Number Of Volumes	Number of volumes in a collection	Required	Required
Chapter Number	The chapter number of the chapter of a book that is being described.	Required	Required
Report Number	The unique identification number that has been issued by the report institution for the report being described.	Required	Required
Communication Type	The type of personal communication. Could be an email, letter, memo, transcript of conversation either hardcopy or online.	Optimal	Optimal
Degree	The name or degree level for which the thesis was completed.	Optimal	Optimal
URL	A URL (Uniform Resource Locator) from which this reference can be downloaded or additional information can be obtained.	Optimal	Optimal
DOI	A Digital Object Identifier - a digital identifier for any object of intellectual property. A DOI provides a means of persistently identifying a piece of intellectual property on a digital network and associating it with related current data.	Optimal	Optimal
Additional Info	Any information that is not characterized by the other reference metadata fields. Example: Copyright 2001, Robert Warner	Optimal	Optimal
Journal	The name of the publication in which the article was published. Example(s): Ecology, New York Times, Harper's, Canadian Journal of Botany/Revue Canadienne de Botanique, The Journal of the American Medical Association	Required	Required

Attribute Name	Attribute Definition	Classification Plots	Occurrence Plots
ISSN	The ISSN, or International Standard Serial Number assigned to this literature reference. Example(s): ISSN 1234-5679.	Required	Required
Abbreviation	Standard abbreviation or shorter name of the journal. Example(s): Can. J. Bot./Rev. Can. Bot., JAMA.	Optimal	Optimal
<i>The following can be repeated an indefinite number of times for each alternate identifier used to describe the reference.</i>			
System	The data management system within which a plot identifier is found. This is typically a URL (Uniform Resource Locator) that indicates a data management system. All identifiers that share a system must be unique. In other words, if the same identifier is used in two locations with identical systems, then by definition the objects at which they point are in fact the same object. Example: <a href="http://metacat.somewhere.org/svc/mc/">http://metacat.somewhere.org/svc/mc/</a> .	Optimal	Optimal
Identifier	An additional, secondary identifier for this reference. The primary identifier belongs in the reference table, but additional identifiers that are used to label this reference, possibly from different data management systems, can be listed here. Example: VCR3465.	Optimal	Optimal
<i>The following can be repeated an indefinite number of times for each contributor to the reference (e.g., author, editor).</i>			
Role Type	The role the party played with respect to the reference contribution. Some potential roles include technician, reviewer, principal investigator, and many others.	Required	Required

Attribute Name	Attribute Definition	Classification Plots	Occurrence Plots
Order	Numerical order in which this contributor's name should be in the order of contributors, if applicable. Examples: 1 [for the first author], 2, [for the second author], etc.	Required	Required
Type	The type of Party that a given record refers to, usually a person or institution.	Required	Required
Position Name	This field is intended to be used to indicate the position occupied by a person within an institution. Position Name is needed for consistency in cases where the associated person that holds the role changes frequently.	Optimal	Optimal
Salutation	The salutation field is used in addressing an individual with a particular title, such as Dr., Ms., Mrs., Mr., etc.	Optimal	Optimal
Given Name	The given name field is used for all names except the surname of the individual. Examples: Jo, Jo R., Jo R.W., John Robert Peter.	Required	Required
Surname	The surname field is used for the last name of the individual.	Required	Required
Suffix	A suffix or suffix abbreviation that follows a name. Examples: Jr., Senior, III, etc.	Optimal	Optimal
Organization Name	The full name of the organization that is associated with the reference contribution. This field is intended to describe which institution or overall organization is associated with the resource being described.	Optimal	Optimal
Current Party	A link to the record of the current name of the party, if different from the name used in this record.	Optimal	Optimal

TABLE B2.6. Metadata about plot record confidentiality and links to publications and sources.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Confidentiality Status	Are the data to be considered confidential? 0 = no, 1 = 1-km radius, 2 = 10-km radius, 3 = 100-km radius, 4 = location embargo, 5 = public embargo on all plot data, 6 = full embargo on all plot data.	Optimal	Optimal
Confidentiality Reason	The reason for confidentiality. This field should not be open to public view. Reasons might include specific rare species, ownership, prepublication embargo, or many other reasons.	Optimal	Optimal
Classification Publication ID	Link to a publication wherein the observation was classified.	Optimal	Optimal
Community Authority ID	Link to the reference from which information on the community concept was obtained during the classification event.	Optimal	Optimal

Section 3. Information that should be included about each assignment of a field plot to a vegetation type in the NVC, or other party-specific classification. Assignment, per se, of a plot to a classification type is not required.

TABLE B3.1. Assignment of field plots to vegetation types.

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Classification Start Date	Start date for the application of a vegetation class to a plot observation by one or more parties.	Required	Required

<b>Attribute Name</b>	<b>Attribute Definition</b>	<b>Classification Plots</b>	<b>Occurrence Plots</b>
Inspection	Was the classification informed by simple inspection of data (Yes/No)?	Optimal	Optimal
Table Analysis	Was the classification informed by inspection of floristic composition tables (Yes/No)?	Optimal	Optimal
Multivariate Analysis	Was the classification informed by use of multivariate numerical tools (Yes/No)?	Optimal	Optimal
Expert System	Was the classification informed by use of automated expert system (Yes/No)?	Optimal	Optimal
Classifier	Name of person who classified the plot – this should link to a person included in the human resources metadata table.	Required	Required
Interpretation Date	The date that the interpretation was made.	Required if known	Required
Interpretation Type	Categories for the interpretation (e.g., author, computer-generated, simplified for comparative analysis, correction, finer resolution).	Required if known	Required
Original Interpretation	Does this interpretation correspond to the original interpretation of the plot author, as best as can be determined. There is no requirement that the authority match the authority of the author; only that the concepts are synonymous.	Required if known	Required
Current Interpretation	This interpretation is the most accurate and precise interpretation currently available.	Required if known	Required
<b><i>The following may be repeated for each community type associated with a plot during a classification event</i></b>			
Community Name	Name of the community.	Required if known	Required
Community Reference	Reference wherein the above name is defined.	Required if	Required

Attribute Name	Attribute Definition	Classification Plots	Occurrence Plots
		known	
Classification Fit	Indicates the degree of fit with the community concept being assigned (e.g., fits concept well, fits but not typical, possible fit, just outside concept). See Table C23 of Appendix C for standard classification fit categories and codes.	Optimal	Optimal
Classification Confidence	Indicates the degree of confidence of the interpreter(s) in the interpretation made. This can reflect the level of familiarity with the classification or the sufficiency of information about the plot (e.g., high, moderate, low).	Optimal	Optimal

#### LITERATURE CITED

Bailey, R.G. 1996. Ecosystem geography. Springer-Verlag, New York, New York, USA. 204 pp

## ***Ecological Archives M079-006-A3***

*Michael D. Jennings, Don Faber-Langendoen, Orié L. Loucks, Robert K. Peet, and David Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. Ecological Monographs 79:173–199.*

### **Appendix C. Constrained Vocabularies**

The following lists are vocabularies that should be used when recording plot information that describes a condition of the following subjects. These standardized vocabularies are used in database “picklists” and greatly facilitate standardized data types and information exchange.

#### Table Index

- C1. [Disturbance Types](#)
- C2. [Plot Observation Types](#)
- C3. [Accuracy of Time of Day](#)
- C4. [Accuracy of Date](#)
- C5. [Vegetation Stratum Types](#)
- C6. [Growth Form Types](#)
- C7. [Homogeneity of Plot](#)
- C8. [Hydrologic Regime of Plot](#)
- C9. [Phenologic Aspect of Plot](#)
- C10. [Soil Drainage of Plot](#)
- C11. [Soil Moisture Regime of Plot](#)
- C12. [Stand Maturity](#)
- C13. [Water Salinity](#)
- C14. [Rock Types](#)

C15. [Placement Method of Plot](#)

C16. [Plot Shape](#)

C17. [Stand Size](#)

C18. [Surficial Geologic Material](#)

C19. [Topographic Position](#)

C20. [Soil Texture](#)

C21. [Quality of the Floristic Observation](#)

C22. [Plot Confidentiality Codes](#)

C23. [Classification Fit](#)

TABLE C1.
<u>Disturbance Types</u>
Avalanche and snow
Cryoturbation
Cultivation
Erosion
Fire suppression
Fire, canopy
Fire, ground
Fire, general
Flood
Grazing, domestic stock
Grazing, native ungulates
Herbicide or chemical
Herbivory, vertebrates
Hydrologic alteration

Ice
Invertebrate caused
Mass land movement (landslides)
Mowing
Other disturbance
Plant disease
Roads and vehicular traffic
Salt spray
Tidal
Timber harvest, general
Timber harvest, clearcut
Timber harvest, selective
Trampling and trails
Wind, chronic
Wind event

TABLE C2.	
Plot Observation Types	Descriptions of Plot Observation Types
Entire	Cover based on observation of an entire plot consisting of a single contiguous area of land.
Subplot-contiguous	Cover based on observation of a single contiguous area of land of less spatial extent than the entire plot.
Subplot-regular	Cover based on observation of multiple subplots arranged in a regular pattern within the overall plot.
Subplot-random	Cover based on observation of multiple randomly dispersed within the overall plot.
Subplot-haphazard	Cover based on observation of multiple subplots haphazardly arranged within the overall plot.

TABLE C3.	
<u>Accuracy of Time of Day</u>	<u>Descriptions of Time of Day Accuracy Categories</u>
One minute	Time of day is accurate to within one minute
One hour	Time of day is accurate to within one hour
Quarter-day	Time of day is accurate to within one quarter-day (e.g., during morning, during afternoon)
Half day	Time of day is accurate to within one half-day (e.g., between 00:00 and 11:59, or between 12:00 and 23:59)

TABLE C4.	
<u>Accuracy of Date</u>	<u>Descriptions of Date Accuracy Categories</u>
One day	Date accurate to within one day
One week	Date accurate to within one week
One month	Date accurate to within one month
Three months	Date accurate to within three months
One year	Date accurate to within one year
Three years	Date accurate to within three years
Ten years	Date accurate to within then years
Greater than ten years	Date accurate to within more than ten years

TABLE C5. NOTE: Vegetation strata are not to be confused with life forms.	
<u>Vegetation Stratum Types</u>	<u>Descriptions of Vegetation Stratum Types</u>
Tree	Includes tall trees (single-stemmed woody plants, generally more than 5 m in height or greater at maturity under optimal growing conditions). Very tall shrubs with tree-like form may also be included here, as may other life forms, such as lianas and epiphytes,

	and their contribution to the stratum can be further specified using the “life form” field.
Shrub	Includes shrubs (multiple-stemmed woody plants, generally less than 5 m in height at maturity under optimal growing conditions) and by shorter trees (saplings). As with the tree stratum, other life forms present in this stratum may also be included (however, herbaceous life forms should be excluded, as their stems often die back annually and do not have as consistent a height as woody life forms). Where dwarf-shrubs (i.e. shrubs < 0.5 m) form a distinct stratum (either as part of a series of strata, as in a forest, or as the top stratum of more open vegetation, such as tundra or xeric shrublands), they should be treated as a low version of the shrub stratum (or short shrub substratum). In many vegetation types, dwarf-shrubs may simply occur as one life form component of the herb stratum (see below).
Herb	Also referred to as field stratum. Includes herbs (plants without woody stems and often dying back annually), often in association with low creeping semi-shrubs, dwarf-shrubs, vines, and non-woody brambles (such as raspberries), as well as tree or shrub seedlings.
Moss	Also referred to as nonvascular, bryoid, or ground stratum. Defined entirely by mosses, lichens, liverworts, and alga. Ground-creeping vines, prostrate shrubs and herbs should be treated in the herb stratum. Where herbs are entirely absent, it is still possible to recognize this stratum if other very low woody or semi-woody life forms are present.
Floating	Includes rooted or drifting plants that float on the water surface (e.g., duckweed, water-lily).
Submerged	Includes rooted or drifting plants that by-and-large remain submerged in the water column or on the aquatic bottom (e.g., pondweed). The focus is on the overall strata arrangement of these aquatic plants. Note that emergent plants life forms in a wetland should be placed in the strata listed above (e.g., cattail or sedges would be placed in the herb stratum, whereas the duckweed would be in the floating aquatic stratum).

TABLE C6.

Growth Form Types

Alga

Aquatic herb

Bamboo
Broad-leaved deciduous shrub
Broad-leaved deciduous tree
Broad-leaved evergreen shrub
Broad-leaved evergreen tree
Bryophyte
Dwarf-shrub
Epiphyte
Evergreen sclerophyllous shrub
Evergreen sclerophyllous tree
Fern or fern allie
Forb
Graminoid
Lichen
Needle-leaved shrub
Needle-leaved tree
Palm shrub
Palm tree
Semi-shrub
Succulent forb
Succulent shrub
Succulent tree
Thorn shrub
Thorn tree
Tree fern
Vine/Liana (woody climbers or vines)

TABLE C7.

Homogeneity of Plot

Homogeneous

Compositional trend across plot

Conspicuous inclusions

Irregular or pattern mosaic

TABLE C8.

Hydrologic Regime of Plot

Semipermanently flooded

Seasonally flooded

Saturated

Seasonally saturated

Temporarily flooded

Intermittently flooded

Permanently flooded

Permanently flooded – tidal

Tidally flooded

Wind-tidally flooded

Irregularly flooded

Irregularly exposed

Upland

Unknown

TABLE C9.

Phenologic Aspect of Plot

Typical growing season
Vernal
Early wet season
Aestival
Wet season
Autumnal
Late wet season
Winter
Dry season
Irregular ephemeral phase

TABLE C10.
<u>Soil Drainage of Plot</u>
Excessively drained
Somewhat excessively drained
Well drained
Moderately well drained
Somewhat poorly drained
Poorly drained
Very poorly drained

TABLE C11.
<u>Soil Moisture Regime of Plot</u>
Very xeric
Xeric
Subxeric

Submesic
Mesic
Subhygric
Hygric
Subhydric
Hydric

TABLE C12.
<u>Stand Maturity</u>
Young, regenerative
Even-age, aggrading
Mature, even-age
Transition, breakup
Old growth or senescent, all-age
Uneven-age

TABLE C13.	
<u>Water Salinity</u>	<u>Description of Water Salinity</u>
Saltwater	greater than 30 ppt
Brackish	0.5 to 30 ppt
Freshwater	less than 0.5 ppt

TABLE C14.		
<u>Rock Types. For definitions of these terms see Jackson 1997, or USDA, NRCS 2002.</u>		
lava	hornfels	quartz-diorite

amphibolite	igneous, unspecified	quartz-monzonite
andesite	ignimbrite	Quartzite
anorthosite	iron-manganese concretions	Rhyolite
arenite	iron-manganese nodules	sandstone, calcareous
argillite	ironstone nodules	sandstone, glauconitic
arkose	lapilli	sandstone, unspecified
basalt	latite	schist, mica
block lava	limestone, arenaceous	schist, unspecified
breccia, non-volcanic	limestone, argillaceous	Scoria
breccia, non-volcanic, acidic	limestone, cherty	sedimentary, unspecified
breccia, non-volcanic, basic	limestone, phosphatic	Serpentinite
calcrete (caliche)	limestone, unspecified	shale, acid
carbonate concretions	marble	shale, calcareous
carbonate nodules	metaconglomerate	shale, clayey
carbonate rock, unspecified	metamorphic, foliated	shale, unspecified
chalk	metamorphic, unspecified	shell fragments
charcoal	metaquartzite	silica concretions
chert	metasedimentary, unspecified	siltstone, calcareous
cinders	metavolcanics	siltstone, unspecified
claystone	migmatite	Slate
coal	mixed	Soapstone
conglomerate, calcareous	monzonite	Syenite
conglomerate, unspecified	mudstone	Syenodiorite
dacite	mylonite	Tachylite
diabase	obsidian	Tonalite
diorite	orthoquartzite	Trachyte
dolomite (dolostone)	ortstein fragments	Travertine
durinodes	pahoehoe lava	Tufa

duripan fragments	peridotite	tuff breccia
gabbro	petrocalcic fragments	tuff, acidic
gibbsite concretions	petroferric fragments	tuff, basic
gibbsite nodules	petrogypsic fragments	tuff, unspecified
gneiss	phyllite	tuff, welded
granite	pillow lava	ultramafic, unspecified
granodiorite	plinthite nodules	volcanic bombs
granofels	porcellanite	volcanic breccia, acidic
granulite	pumice	volcanic breccia, basic
graywacke	pyroclastic (consolidated)	volcanic breccia, unspecified
greenstone	pyroxenite	volcanic, unspecified
gypsum	quartz	Wood

TABLE C15.

Placement Method of Plot

Regular

Random

Stratified random

Transect component

Representative

Capture specific feature

TABLE C16.

Plot Shape

Rectangular

Square

Circle
Transect/Strip
Plotless
Diffuse
Other

TABLE C17.	
<u>Stand Size</u>	<u>Descriptions of Stand Sizes</u>
Very Extensive	Greater than 1000x plot size
Extensive	Greater than 100x plot size
Large	10–100x plot size
Small	3–10x plot size
Very small	1–3x plot size
Inclusion	less than 1x plot size

TABLE C18.	
<u>Surficial Geologic Material</u>	
Residual Material: Bedrock	
Residual Material: Disintegrated Rock	
Residual Material: Deeply Weathered Rock	
Glacial Deposits: Undifferentiated glacial deposit	
Glacial Deposits: Till	
Glacial Deposits: Moraine	
Glacial Deposits: Bedrock and till	
Glacial Deposits: Glacial-fluvial deposits (outwash)	
Glacial Deposits: Deltaic deposits	

Alluvial Deposits: Floodplain
Alluvial Deposits: Alluvial Fan
Alluvial Deposits: Deltas
Marine and Lacustrine Deposits: Unconsolidated Sediments
Marine and Lacustrine Deposits: Coarse sediments
Marine and Lacustrine Deposits: Fine-grained sediments
Organic Deposits: Peat
Organic Deposits: Muck
Slope and Modified Deposits: Talus and scree slopes
Slope and Modified Deposits: Colluvial
Slope and Modified Deposits: Solifluction, landslide
Aeolian Deposits: Dunes
Aeolian Deposits: Aeolian sand flats and cover sands
Aeolian Deposits: Loess deposits
Aeolian Deposits: Volcanic Ash
Chemical Deposits: Evaporites and Precipitates
Other
Variable

TABLE C19.	
<u>Topographic Position</u>	<u>Descriptions of Topographic Positions</u>
Interfluve	crest, summit, ridge
High slope	shoulder slope, upper slope, convex creep slope
High level	mesa, high flat;
Midslope	transportational midslope, middle slope
Backslope	dipslope

Step in slope	ledge, terracette
Lowslope	lower slope, foot slope, colluvial footslope
Toeslope	alluvial toeslope
Low level	terrace, low flat;
Channel wall	bank
Channel bed	narrow valley bottom, gully arroyo;
Basin floor	depression

TABLE C20.

<u>Soil Texture</u>	<u>Descriptors of Soils Texture Terms</u>			
	General Descriptor	Texture Group	Texture Class	Texture Subclass
Sand	coarse-textured	Sandy soils	Sands	Sand
Coarse Sand	coarse-textured	Sandy soils	Sands	Coarse Sand
Fine Sand	coarse-textured	Sandy soils	Sands	Fine Sand
Very Fine Sand	coarse-textured	Sandy soils	Sands	Very Fine Sand
Unspecified Sand	coarse-textured	Sandy soils	Sands	unspecified
Loamy Coarse Sand	coarse-textured	Sandy soils	Loamy Sands	Loamy Coarse Sand
Loamy Sand	coarse-textured	Sandy soils	Loamy Sands	Loamy Sand
Loamy Fine Sand	coarse-textured	Sandy soils	Loamy Sands	Loamy Fine Sand
Loamy Very Fine Sand	coarse-textured	Sandy soils	Loamy Sands	Loamy Very Fine Sand
Unspecified Loamy Sands	coarse-textured	Sandy soils	Loamy Sands	unspecified
Loam	medium-textured	Loamy soils	Loam	Loam
Coarse Sandy Loam	moderately coarse-textured	Loamy soils	Sandy Loams	Coarse Sandy Loam
Sandy Loam	moderately coarse-textured	Loamy soils	Sandy Loams	Sandy Loam
Fine Sandy Loam	moderately coarse-textured	Loamy soils	Sandy Loams	Fine Sandy Loam
Very Fine Sandy Loam	medium-textured	Loamy soils	Sandy Loams	Very Fine Sandy Loam
Unspecified Sandy Loams	moderately coarse-textured to medium-textured	Loamy soils	Sandy Loams	unspecified
Silt Loam	medium-textured	Loamy soils	Silt Loam	Silt Loam
Silt	medium-textured	Loamy soils	Silt	Silt

Sandy Clay Loam	moderately fine-textured	Loamy soils	Sandy Clay Loam	Sandy Clay Loam
Clay Loam	moderately fine-textured	Loamy soils	Clay Loam	Clay Loam
Silty Clay Loam	moderately fine-textured	Loamy soils	Silty Clay Loam	Silty Clay Loam
Sandy Clay	fine-textured	Clayey soils	Sandy Clay	Sandy Clay
Silty Clay	fine-textured	Clayey soils	Silty Clay	;Silty Clay
Clay	fine-textured	Clayey soils	Clay	Clay

TABLE C21.

<u>Quality of the Floristic Observation</u>	<u>Descriptions of Quality of Floristic Observation Values</u>
Highest	At least 95% of all taxa were identified to species level; search was thorough.
High	Between 85% and 95% of all taxa were identified to species level; search was thorough.
High but Incomplete	At least 85% of all taxa were identified to species level; search was not so thorough.
Moderate	Between 70% and 85% of all taxa were identified to species level; search was thorough.
Moderate but Incomplete	Between 70% and 85% of all taxa were identified to species level; search was not so thorough.
Low	Less than 70% of all taxa were identified to species level.

TABLE C22.

<u>Confidentiality Codes</u>	<u>Descriptions of Confidentiality Codes</u>
1	Not confidential
2	Confidential, locality generalized to 1 km radius
3	Confidential, locality generalized to 10 km radius
4	Confidential, locality generalized to 100 km radius
5	Confidential, locality embargoed entirely
6	Confidential, all plot data embargoed

TABLE C23.

<u>Classification Fit Codes</u>	<u>Descriptions of Classification Fit Codes</u>
1	Plot fits concept well
2	Plot fits, but is not typical.
3	Plot possibly fits the type.
4	Plot is just outside the concept of the type.

## ***Ecological Archives M079-006-A4***

*Michael D. Jennings, Don Faber-Langendoen, Orié L. Loucks, Robert K. Peet, and David Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. Ecological Monographs 79:173–199.*

### **Appendix D. An example of the description of a floristic association**

#### **OVERVIEW:**

##### **Names:**

Name: *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Association.

Name, translated: Prairie Dropseed - Little Bluestem - (Scirpus-like Sedge) / (Creeping Juniper) Herbaceous Vegetation

Common Name: Little Bluestem Alvar Grassland

**Identifier:** C EGL005234

**Unit:** ASSOCIATION

##### **Placement in Hierarchy:**

CLASS: V. Herbaceous

FORMATION: V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

ALLIANCE: V.A.5.N.c.41 SPOROBOLUS HETEROLEPIS - (DESCHAMPSIA CAESPITOSA, SCHIZACHYRIUM SCOPARIUM) HERBACEOUS ALLIANCE

**Summary:** The little bluestem alvar grassland type is found primarily in the upper Great Lakes region of the United States and Canada, in northern Michigan and southern Ontario. These grasslands occur on very shallow, patchy soils (usually less than 20 cm deep, averaging about 6 cm deep) on flat alkaline limestone and dolostone outcrops (pavements). This community often has a characteristic soil moisture regime of alternating wet and dry periods. The vegetation is dominated by grasses and sedges, which typically have at least 45% cover. Characteristic species of the grassland are *Sporobolus heterolepis*, *Schizachyrium scoparium*, *Juniperus horizontalis*, *Carex scirpoidea*, *Deschampsia caespitosa*, *Packera paupercula* (= *Senecio pauperculus*), and *Carex crawei*. There is usually less than 10% cover of shrubs over 0.5 m tall; however there may be as much as 50% cover of dwarf-shrubs (under 0.5 m tall) especially *Juniperus horizontalis*. Less than 50% of the ground surface is exposed bedrock (including bedrock covered with nonvascular plants: lichens, mosses, algae).

**Classification Comments:** The most commonly associated alvar communities that occur with this community in a landscape mosaic are *Juniperus horizontalis* - *Dasiphora fruticosa* ssp. *floribunda* / *Schizachyrium scoparium* - *Carex richardsonii* Dwarf-shrubland (Creeping Juniper - Shrubby-cinquefoil Alvar

Pavement Shrubland; C EGL005236), *Deschampsia caespitosa* - (*Sporobolus heterolepis*, *Schizachyrium scoparium*) - *Carex crawei* - *Packera paupercula* Herbaceous Vegetation (Tufted Hairgrass Wet Alvar Grassland; C EGL005110), *Tortella tortuosa* - *Cladonia pocillum* - *Placynthium* spp. Sparse Vegetation (Alvar Nonvascular Pavement; C EGL005192) and, *Thuja occidentalis* - *Pinus banksiana* / *Dasiphora fruticosa* ssp. *floribunda* / *Clinopodium arkansanum* Wooded Herbaceous Vegetation (White-cedar - Jack Pine / Shrubby-cinquefoil Alvar Savanna; C EGL005132) (Reschke et al. 1998).

**Rational for nominal species:** *Sporobolus heterolepis* and *Schizachyrium scoparium* are dominants. *Carex scirpoidea* and *Juniperus horizontalis* are constants (>60% constancy) in the type. *Sporobolus heterolepis*, *Carex scirpoidea* and *Deschampsia caespitosa* are differential species.

## VEGETATION:

**Physiognomy and structure:** The vegetation is dominated by grasses and sedges, which usually have at least 45% cover. There is usually less than 10% cover of shrubs over 0.5 m tall; however there may be as much as 50% cover of dwarf-shrubs (under 0.5 m tall) especially *Juniperus horizontalis*. This dwarf-shrub is shorter than the dominant grasses, and usually is found under the canopy of grasses, so the physiognomic type here is considered a grassland (in spite of relatively high cover of dwarf-shrubs). Less than 50% of the ground surface is exposed bedrock (including bedrock covered with nonvascular plants: lichens, mosses, algae).

Table D1. Physiognomy of the *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Association; Little Bluestem Alvar Grassland, NVC identifier code C EGL005234.

Physiognomy	Average Cover	Range of Cover
Tree Cover (> 5m)	1.0	0 - 15
Tree Height (m)	0.5	0 - 9
Tall Shrub Cover (2-5 m)	0.5	0 - 3
Tall Shrub Height (m)	0.5	0 - 3
Short Shrub Cover (0.5-2 m)	11.0	0 - 33
Short Shrub Height (m)	1.0	0 - 1.8
Vine Cover	0.0	0 - 0
Vine Height	0.0	0 - 0
Herb Cover	46.0	4 - 99
Herb Height	0.3	0-1
Nonvascular Cover	34.0	0 - 90

**Floristics:** Characteristic species of the grassland are *Sporobolus heterolepis*, *Schizachyrium scoparium*, *Juniperus horizontalis*, *Carex scirpoidea*, *Deschampsia caespitosa*, *Packera paupercula* (= *Senecio pauperculus*), and *Carex crawei*. *Juniperus horizontalis* may co-dominate in some stands.

Table D2: Floristic table of the *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Association; Little Bluestem Alvar Grassland, NVC identifier code CEGLO05234. For species in > 10% of stands for a total of 17 field plots. Species nomenclature is according to Gleason and Cronquist (1991).

Species by Layer	Constancy	Avg. Cover	Range of Cover, Where Present *
<b>SHORT SHRUB LAYER (0.5-2 m)</b>			
<i>Juniperus communis</i>	24	0.1	0.3 - 2
<i>Juniperus horizontalis</i>	71	8.0	1 - 33
<i>Prunus pumila</i>	29	0.5	0.3 - 4
<i>Thuja occidentalis</i>	12	0.1	0.3 - 0.3
<b>HERB LAYER</b>			
<i>Achillea millefolium</i>	12	0.1	0.3 - 0.3
<i>Agropyron trachycaulum</i>	24	0.1	0.3 - 0.3
<i>Ambrosia artemisiifolia</i>	18	0.1	0.3 - 0.3
<i>Antennaria</i> spp.	24	0.1	0.3 - 0.3
<i>Aquilegia canadensis</i>	18	0.1	0.3 - 0.3
<i>Arenaria stricta</i>	29	0.1	0.3 - 1
<i>Aster ciliolatus</i>	12	0.1	0.3 - 0.3
<i>Aster laevis</i>	47	0.5	0.3 - 2
<i>Bromus kalmii</i>	18	0.1	0.3 - 2
<i>Calamagrostis canadensis</i>	12	0.1	1 - 2
<i>Calamintha arkansana</i>	59	1.0	0.3 - 5
<i>Campanula rotundifolia</i>	65	0.5	0.3 - 1
<i>Carex aurea</i>	12	0.1	0.3 - 0.3
<i>Carex crawei</i>	24	2.0	0.3 - 18
<i>Carex eburnea</i>	24	0.5	0.3 - 4
<i>Carex granularis</i>	12	0.1	0.3 - 1
<i>Carex richardsonii</i>	12	0.1	1 - 3
<i>Carex scirpoidea</i>	71	4.0	0.3 - 23
<i>Carex viridula</i>	41	0.5	0.3 - 2
<i>Castilleja coccinea</i>	29	0.1	0.3 - 1
<i>Cladium mariscoides</i>	12	0.5	1 - 5
<i>Comandra umbellata</i>	53	0.1	0.3 - 1
<i>Danthonia spicata</i>	53	1.0	0.3 - 5
<i>Deschampsia cespitosa</i>	47	1.0	0.3 - 5
<i>Eleocharis compressa</i>	29	0.5	0.3 - 3
<i>Eleocharis elliptica</i>	12	0.5	0.3 - 5
<i>Fragaria virginiana</i>	29	0.1	0.3 - 1
<i>Geum triflorum</i>	18	0.1	0.3 - 0.3
<i>Hedyotis longifolia</i>	18	0.5	0.3 - 5
<i>Hypericum kalmianum</i>	41	0.1	0.3 - 0.3
<i>Hypericum perforatum</i>	29	0.1	0.3 - 0.3
<i>Muhlenbergia glomerata</i>	12	0.1	1 - 2
<i>Panicum</i> spp.	35	1.0	0.3 - 5
<i>Poa compressa</i>	47	5.0	0.3 - 55
<i>Polygala senega</i>	12	0.1	0.3 - 1
<i>Potentilla fruticosa</i>	71	2.0	0.3 - 8
<i>Prunella vulgaris</i>	24	0.1	0.3 - 0.3
<i>Rhamnus alnifolia</i>	12	0.1	0.3 - 2
<i>Rhus aromatica</i>	18	0.2	0.3 - 3

Table D2: Floristic table of the *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Association; Little Bluestem Alvar Grassland, NVC identifier code CEG005234. For species in > 10% of stands for a total of 17 field plots. Species nomenclature is according to Gleason and Cronquist (1991).

Species by Layer	Constancy	Avg. Cover	Range of Cover, Where Present *
<i>Saxifraga virginiensis</i>	12	0.1	0.3 - 0.3
<i>Schizachyrium scoparium</i>	71	8.0	0.3 - 38
<i>Scirpus cespitosus</i>	12	2.0	1 - 25
<i>Senecio pauperculus</i>	88	2.0	0.3 - 23
<i>Sisyrinchium mucronatum</i>	18	0.1	0.3 - 1
<i>Solidago juncea</i>	12	0.1	0.3 - 0.3
<i>Solidago ohioensis</i>	12	1.0	0.3 - 16
<i>Solidago ptarmicoides</i>	76	0.5	0.3 - 3
<i>Solidago</i> spp.	18	0.1	0.3 - 0.3
<i>Sporobolus heterolepis</i>	53	12.0	0.3 - 76
<i>Sporobolus neglectus/vaginiflorus</i>	24	2.0	0.3 - 25
<i>Zigadenus elegans</i> var. <i>glaucus</i>	29	0.1	0.3 - 2
<b>MOSS LAYER</b>			
<i>Gloeocapsa</i> /rock surface algae	47	12.0	5 - 60
<i>Nostoc commune</i>	41	2.0	0.3 - 18
<i>Trentepohlia</i> spp	29	0.1	0.3 - 0.3
<i>Ditrichum flexicaule</i>	24	0.1	0.3 - 3
<i>Pseudocalliergon turgescens</i>	18	1.0	0.3 - 15
<i>Schistidium rivulare</i>	24	0.5	0.3 - 10
<i>Tortella</i> spp.	41	3.0	0.3 - 29
<i>Tortella tortuosa</i>	12	0.5	0.3 - 10
<i>Cladina rangiferina</i>	18	0.1	0.3 - 0.3
<i>Cladina</i> spp.	12	0.1	0.3 - 0.3
<i>Cladonia pyxidata</i>	29	0.1	0.3 - 1
<i>Cladonia</i> spp.	18	0.1	0.3 - 2
<i>Peltigera</i> spp. ( <i>P. rufescens</i> ?)	12	0.1	0.3 - 0.3
<i>Placynthium nigrum</i>	24	0.2	0.3 - 2
<i>Xanthoparmelia</i> spp.	12	0.1	0.3 - 0.3

\* Each species may not be present in every plot; the range of values is derived only from plots where the species has been found.

**Dynamics:** Not documented.

**Environment:** These grasslands occur on very shallow, patchy soils (usually less than 20 cm deep, averaging about 6 cm deep) on flat limestone and dolostone outcrops (pavements). Soils are loams high in organic matter. This community often has a characteristic soil moisture regime of alternating wet and dry periods; they can have wet, saturated soils in spring and fall, combined with summer drought in most years. In large patches over 20 ha (50 acres) this grassland often occurs as a small-scale matrix, with smaller patches of other alvar communities occurring within the larger patch of little bluestem alvar grassland, forming a landscape mosaic (Reschke et al. 1998).

Table D3. Physical environment of the *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Association; Little Bluestem Alvar Grassland, NVC identifier code C EGL005234.

Continuous Variables	Average	Range
Elevation (m)	186.0	178-209
Slope Gradient (degrees)	0.5	0 - 3
Organic Horizon Depth (cm)	1.0	0 - 8
Average Field pH	7.8	7.3 - 9
Soil Depth (cm)	4.0	1 - 9
Exposed Bedrock (%)	18.0	0 - 75
Large Rock, Surficial (% > 10 cm)	7.0	0 - 35
Small Rock, Surficial (% 0.2 - 2 cm)	10.0	0 - 72
Sand, Surficial (%)	0.0	0 - 0
Bare Soil, Surficial (%)	0.5	0 - 5
Litter (%)	2.0	0 - 12
Down Wood (% > 1 cm dbh)	0.1	0 - 1
Water (%)	0.1	0 - 1
Categorical Variables	Category	Number of Plots (%)
Slope Aspect	Flat	7 (41)
Slope Aspect	South	6 (35)
Slope Aspect	Northeast	2 (12)
Slope Aspect	West	1 (6)
Slope Aspect	North	1 (6)
Topographic Position	High, level	5 (28)
Topographic Position	Low, level	4 (24)
Topographic Position	Midslope	2(12)
Topographic Position	Other	4 (24)
Topographic Position	No Value	2 (12)
Soil Moisture	Periodically Inundated	7 (41)
Soil Moisture	Moist	4 (24)
Soil Moisture	Somewhat Moist	3 (17)
Soil Moisture	Dry	1 (6)
Soil Moisture	Extremely Dry	1 (6)
Soil Moisture	No Value	1 (6)

#### DISTRIBUTION:

**Range:** The little bluestem alvar grassland type is found primarily in the upper Great Lakes region of the United States and Canada, in northern Michigan, and in Ontario on Manitoulin Island and vicinity, on the Bruce Peninsula, and at a few sites further east in the Carden Plain and Burnt Lands.

**Nations:** CA US

**States/Provinces:** Michigan, Ontario

**USFS Ecoregions:** 212H:CC, 212Pc:CCC

## **PLOT SAMPLING AND ANALYSIS:**

**Location of archived plot data:** Spreadsheet files with compiled vegetation data from plots and structural types are available from The Nature Conservancy's Great Lakes Program Office or from the state or provincial Heritage Programs. Original field forms are filed at state/provincial Heritage Programs. Plot data access forthcoming (2004) at [www.vegbank.org](http://www.vegbank.org).

**Factors affecting data consistency:** See "Methods," below.

**The number and size of plots:** Vegetation data were collected using 10 x 10 m relevé plots placed haphazardly within subjectively defined stands.

### **Methods used to analyze field data and identify type:**

From Reschke et al. (1998): Field data collected by collaborators in Michigan, Ontario, and New York were compiled by the Heritage program staff in each jurisdiction, and provided to Carol Reschke (inventory and research coordinator for the Alvar Initiative). With assistance from a contractor (Karen Dietz), field data on vegetation, environment, and evidence of ecological processes from alvar sites were entered into spreadsheets. Spreadsheets were edited to combine a few ambiguous taxa (e.g. *Sporobolus neglectus* and *S. vaginiflorus* look similar and can only be positively distinguished when they are flowering in early fall), incorporate consistent nomenclature (Kartesz 1994), delete duplicates, and delete species that occurred in only one or a few samples. Corresponding data on the environment and evidence of ecological processes were compiled in two additional spreadsheets. The plot data set consisted of data from 85 sample plots; there were 240 taxa of vascular and nonvascular taxa included in the initial data set.

The plot data set included a great deal of structural detail. If a tree species was present in different vegetation strata, then it was recorded as a separate taxon for each layer in which it occurred; for example, *Thuja occidentalis* might be recorded as a tree (over 5 m tall), a tall shrub (2 to 5 m tall), and a short shrub (0.5 to 2 m tall). The full data set of 85 samples by 240 taxa was analyzed using PC-ORD v 3.0 (McCune and Mefford 1995). Vegetation data on percent cover were relativized for each sample and then transformed with an arcsine - square root transformation. This standardization is recommended for percentage data (McCune and Mefford 1995).

Two kinds of classification and two kinds of ordination procedures were applied to the full data set. Classification procedures used were: 1) cluster analysis with group average (or UPGMA) group linkage method and Sørensen's distance measure, and 2) TWINSpan with the default settings. The two ordination procedures used were 1) Bray-Curtis ordination with Sørensen's distance and variance-regression endpoint selection, and 2) non-metric multidimensional scaling (NMS) using Sørensen's distance and the coordinates from the Bray-Curtis ordination as a starting configuration.

Environmental data recorded for each plot and data on evidence of ecological processes were used as overlays in ordination graphs to interpret ordination patterns and relationships among samples.

The classification dendrograms and ordination graphs were presented to a core group of ecologists to discuss the results. Participants in the data analysis discussions were: Wasyl Bakowsky, Don Faber-Langendoen, Judith Jones, Pat Comer, Don Cuddy, Bruce Gilman, Dennis Albert, and Carol Reschke. The two classifications were compared to see how they grouped plots, and ordinations were consulted to check and confirm groupings of plots suggested by the classification program. At the end of the first meeting to discuss the data analysis, collaborating ecologists agreed on eight alvar community types, and suggested another four or five that had been observed in field surveys but were not represented in the plot data set. The group also recommended some refinements to the data analysis.

Following the recommendations of the ecology group, the plot data were modified in two ways. For nonvascular plants, the first data set included data on individual species or genera, as well as taxa representing simple growth forms. Since only a few collaborators could identify nonvascular plants in the field, we had agreed to describe the nonvascular plants in plots by their growth form and collect a specimen if the species had at least 5% cover in the plot. If nonvascular species were identified by the surveyor, or from the collected specimen, the species were included in the data set. This may have biased the results, because the plots sampled by investigators who knew the nonvascular plants had a greater potential diversity than plots in which only a few growth forms were identified. Therefore, all data on nonvascular taxa were lumped into nine growth form categories: foliose algae (e.g. *Nostoc*), rock surface algae, microbial crusts, turf or cushion mosses, weft mosses, thalloid bryophytes, crustose lichens, foliose lichens, and fruticose lichens. The second modification involved lumping the different structural growth forms of woody taxa into a single taxon; for example, trees, tall shrubs and short shrubs forms of *Thuja occidentalis* were lumped into a single taxon.

These modifications reduced the data set to 85 plots and 199 taxa, and even fewer taxa with the woody growth forms lumped. The analyses were run again using the procedures described above with the modified data sets. Lumping the nonvascular plants improved the classification and ordination results (yielding more clearly defined groups), but lumping the growth forms of tree species was actually detrimental to the results. The final classification that we used was produced from an analysis of the data set with nonvascular plants lumped into nine growth forms, and multiple growth forms of tree species kept separate.

#### **CONFIDENCE LEVEL:**

**Confidence Rank:** High.

#### **CITATIONS:**

##### **Synonymy:**

Dry – Fresh Little Bluestem Open Alvar Meadow Type = (Lee et al. 1998).

**References:**

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- Author of Description:** C. Reschke

## ***Ecological Archives M079-006-A5***

*Michael D. Jennings, Don Faber-Langendoen, Orié L. Loucks, Robert K. Peet, and David Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. Ecological Monographs 79:173–199.*

### **Appendix E. Field plot data exchange schema.**

Most of the associations and alliances in North America have not yet been described numerically and little is formally known about their ecological characteristics, either in general or individually. A major reason for the lack of knowledge about associations and alliances is that field plot data for them has not generally been available. To date, the only information compiled systematically about alliances in the United States is the set of alliance descriptions developed by NatureServe (2006). Although this is the best available information, few descriptions are linked with field plot data and fewer are linked with field plot data that can be accessed and reexamined. To describe associations and alliances and to investigate their ecological characteristics, either a massive amount of new field plots must be collected or existing data must somehow be used.

The only way that enough field data can be developed for this purpose is to combine data from multiple sources. To facilitate this, VegBank ([www.vegbank.org](http://www.vegbank.org)) has been established to archive, integrate, and disseminate the field plot data that will be needed to achieve the NVC goal of quantitative field based and peer-reviewed descriptions of associations and alliances.

At the heart of this endeavor is the technical capability to read and integrate digital files containing field plot data. The most appropriate technology for this is XML, and the operable tool for this purpose is a XML schema (see Sperberg-McQueen and Thompson 2003). The NVC XML Schema defines the structure, content, and semantics of plot data that have been originally generated by many different workers. Legacy data formatted to this schema can be queried and combined. The NVC XML Schema is the fundamental means of formatting and transferring vegetation field plot data.

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Sperberg-McQueen, C.M. and H. Thompson. 2003. XML Schema, revision 1.87, W3C, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA.

**Ecological Archives M079-006-A6**

Michael D. Jennings, Don Faber-Langendoen, Orié L. Loucks, Robert K. Peet, and David Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. *Ecological Monographs* 79:173–199.

**Appendix F. Physiognomic and floristic data tables.**

Table Index:

Table F1. [Summary table of vegetation layer, or strata, data from field plots for a given type.](#)

Table F2. [Summary table of vegetation growth forms for a given type. Only growth forms found in the type are shown.](#)

Table F3. [A stand table of floristic composition for each stratum.](#)

TABLE F1. Summary table of vegetation layer, or strata, data from field plots for a given type.

Layer	Height class	Average % cover	Minimum % cover	Maximum % cover
Tree				
Shrub				
Herb				
Moss				
Floating aquatic				
Submerged aquatic				

TABLE F2. Summary table of vegetation growth forms for a given type. Only growth forms found in the type are shown.

Major growth form	Specific Growth form	Size class (not shown)*	Avg % cover	Min% cover	Max% cover
Tree	Needleleaf tree*				
	Broadleaf deciduous tree*				
Shrub	Broadleaf deciduous shrub**				
	Dwarf-shrub				
Herb	Graminoid				
	Forb (including ferns)				
Nonvascular	Moss				

\*If desired, size classes for overstory vs. regeneration, and for tall shrub and medium shrub can be provided.

TABLE F3. A stand table of floristic composition for each stratum.

Species name	Stratum	1, Dominant 2, Characteristic 3. Constant	Constancy	Av. % cover	Min. % cover	Max. % cover
Species 1						
Species 2						
Species 3						
Species <i>n</i>						