



National Spatial Data Infrastructure

Vegetation Classification Standard

Vegetation Subcommittee
Federal Geographic Data Committee

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Federal Geographic Data Committee

*Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
National Aeronautics and Space Administration • National Archives and Records Administration
Tennessee Valley Authority*

Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups are established for issues that transcend data categories.

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NATIONAL VEGETATION CLASSIFICATION STANDARD

1. INTRODUCTION

The United States Federal Geographic Data Committee (hereafter called the FGDC) is tasked to develop geospatial data standards that will enable sharing of spatial data among producers and users and support the growing National Spatial Data Infrastructure (NSDI), acting under the Office of Management Budget (OMB) Circular A-16 and Executive Order #12906. FGDC subcommittees and working groups, in consultation and cooperation with state, local, tribal, private, academic, and international communities, are to develop standards for the content, quality, and transferability of geospatial data. FGDC standards are to be developed through a structured process, integrated with one another to the extent possible, supportable by the current vendor community (but are independent of specific technologies), and are publicly available.

At present there is no Federal standard for vegetation classification and reporting of vegetation statistics. However, there is broad recognition of the need to establish national definitions and classification standards that will facilitate a national synoptic view of the vegetation resources of the United States. This document proposes a standard for terminology, core (or minimum) data and vegetation classification.

There is no single agency responsible for classifying, describing, and/or mapping the vegetation cover of the United States. Many agencies have partial responsibilities for these activities, typically divided by broad vegetation/land use types (e.g., forest, rangelands, wetlands, agricultural lands) or by mission and jurisdiction (e.g., National Forests, Public Lands, National Parks, National Refuges). This has resulted in the current condition of multiple agencies inventorying, mapping, analyzing, and reporting vegetation data in a variety of ways, sometimes in direct conflict with each other due to differing definitions and protocols. The present situation has prevented development of a national synoptic view of the vegetation resources of the United States. Federal agencies are encouraged by a variety of executive orders and Congressional actions to improve cooperation and to reduce duplication. The NVCS responds to this direction.

2. OBJECTIVE

The overall objective of the National Vegetation and Information Standard (NVCS) is to support the use of a consistent national vegetation classification to produce uniform statistics in vegetation resources from vegetation cover data at the national level. It is important that, as agencies map or inventory vegetated Earth cover, they collect enough data accurately and precisely to translate it for national reporting, aggregation, and comparisons. Adoption of the NVCS in subsequent development and application of vegetation mapping schemes will facilitate the compilation of regional and national summaries. In turn, the consistent collection of such information will eventually support the detailed, quantitative, geo-referenced basis for vegetation cover modeling, mapping, and analysis at the field level.

The standard presented represents more the minimum required than the ideal or maximum. The purpose of the national standard is to require all federal vegetation classification efforts to have some core components that are the same across all federal agencies to permit aggregating data from all federal agencies. The NVCS does not prevent local federal efforts from doing whatever they want to meet their specific purposes. NVCS does require that when those local efforts are conducted, they are conducted in ways that, among whatever else they do, they

provide the required core data.

3. MAINTENANCE AUTHORITY

The United States Department of Agriculture - Forest Service was assigned responsibility to coordinate vegetation data-related activities under the policy guidance and oversight of the FGDC. The enclosed draft National Vegetation Classification Standard was developed under the authority of the Office of Management and Budget Circular A-16, revised 1990. The standard is based on earlier work of United Nations Educational Scientific Cultural Organization (UNESCO 1973) and Driscoll et al (1984) that was refined by The Nature Conservancy (TNC Ecology Working Group 1997 (in prep)) for conservation planning. The FGDC Vegetation Subcommittee is coordinating with the United Nations Environment Programme/Food and Agriculture Organization (Young 1994, UNEP/FAO 1995, and Di Gregoiro and Jansen 1995) to have the NVCS as a model for a potential global standard to characterize earth (land) cover.

4. STANDARDS DEVELOPMENT PROCEDURE

Vegetation is comprised of a collection of plants or plant communities with distinguishable characteristics that occupy an area of interest and about which data can be arrayed in a standard format. These vegetation data can provide information about a significant portion of the earth's surface. A Subcommittee on vegetation data (FGDC Vegetation Subcommittee, hereafter called the Subcommittee) was established to promote the use of documented standards in data collection and reporting concerning vegetation that is financed in whole or in part by Federal funds; to exchange information on technological improvements for collecting vegetation data; to encourage the Federal and non-Federal community to identify and adopt standards and specifications for vegetation data; and to collect and process the requirements of Federal and non-Federal organizations for vegetation data.

The Subcommittee consists of representatives designated by the Federal agencies that collect, or finance the collection of, vegetation data as part of their mission or have direct application of these data through legislated mandate. The subcommittee provides interagency policy oversight. FGDC will need to maintain the subcommittee to ensure ongoing interagency coordination, system evolution, and policy interpretation and development. Organizations having national vegetation classification and mapping responsibilities are also represented.

Current membership of the Subcommittee includes representatives from:

- !** U.S. Government
 - Department of Agriculture (USDA)
 - Forest Service (FS) - Chair
 - National Agriculture Statistical Service (NASS)
 - Natural Resources Conservation Service (NRCS)
 - Department of Commerce (DOC)
 - National Oceanic and Atmospheric Administration (NOAA)
 - National Marine Fisheries Service.
 - Department of Defense (DOD)
 - Tri-Service Technology Center
 - U.S. Army Corps of Engineers (USACERL)
 - Department of Interior (USDI)
 - Bureau of Land Management (BLM)

Bureau of Indian Affairs (BIA)
Fish and Wildlife Service (FWS)
National Park Service (NPS)

U.S. Geological Survey (USGS)
Environmental Protection Agency (EPA)
National Aeronautics and Space Administration (NASA)

! Non U.S. Government
The Nature Conservancy (TNC)
Ecological Society of America (ESA)

The Subcommittee identified a need to establish a hierarchical classification standard and associated information standards that will contain an organized list of vegetation types (taxonomic units) with identified relationships among them. Procedures used to identify these standards included users surveys, periodic Subcommittee meetings, a vegetation classification forum held in 1995, and an informal review of the draft standards by the agencies and organizations represented on the Subcommittee. All decisions were made by consensus.

This document proposes a vegetation classification standard and set of information standards to be used by Federal agencies in their activities for inventory, mapping, and reporting on the vegetation resources of the United States. It includes a description of the National Vegetation Classification Standard, general policy regarding federal agencies' use, suggested applications, the principles (basic ideas, requirements) that guided the development of this standard, and a list of definitions used in the standard and its development. This document does not detail the floristically defined units of the classification standard, the field methods, or the data management and analysis standards that will be required to develop and maintain this National Vegetation Classification Standard. This information will be presented in subsequent documents by the Subcommittee.

The National Vegetation Classification Standard (NVCS) is an evolution of what TNC has already developed, which, in turn, is an evolution from other standards, including past federal government and UNESCO (1973) efforts. The NVCS is compatible with TNC because it has evolved from original TNC efforts and TNC now is using NVCS. Once adopted by FGDC, NVCS will be the federal standard. It will guide federal efforts to classify vegetation.

The goal of the NVCS is to provide a standard for meeting the FGDC requirements while at the same time not interfering with the local actions needed to meet local purposes or the bureau actions needed to meet bureau purposes. The NVCS requires federally supported vegetation classification activities to collect data in ways that permit the data to be useful for creating a classification according to NVCS requirements without preventing the activities from also collecting data to meet their local or bureau purposes and requirements.

This standard deals with vegetation cover. It consciously seeks to avoid land use terms. At the same time, it seeks to be useful to efforts to describe and map land use. The NVCS overlaps the Wetlands standard in wetland and emergent aquatic regions. The NVCS classifies primarily according to vegetation and floristic characteristics, not to habitat or related characteristics, whereas the Wetlands standard includes soils and other habitat characteristics in its classification determinations. The two standards have different purposes and so the classifications of the two standards should be viewed as complementary but different systematic approaches or layers in an overall analysis of a geographic area.

5. PURPOSE and SCOPE :

- ! Fosters accuracy, consistency, and clarity in the structure, labeling, definition and application of a systematic vegetation taxonomy for the United States. Accuracy, consistency, and clarity are critical for making effective and efficient decisions about complex assemblages of biotic organisms.
- ! Establishes a national set of standards for classifying existing vegetation cover and its associated information for the United States and its Trust Territories that will be used by Federal agencies to develop and report national statistics. This standard includes guiding principles, definitions of important terminology, and the National Vegetation Classification Standards (NVCS).
- ! Develops federal minimum metadata requirements to ensure consistent reporting on the status of our Nation's vegetation resources. Both the classification standard and the metadata requirements may be used nationally to link local level vegetation inventory and map efforts

5.1. Expectations - The intention of this Federal Geographic Data Committee National Vegetation Classification Standard is to build a common data base of vegetation cover that the various federal agencies will cooperatively populate with consistent and credible data. As state, county, reservation, and private agencies inventory or map lands within the United States, they should collect core data required to meet this standard and populate a national data base on existing vegetation. Agencies must be able to report their vegetation data according to this national standard, although it is understood that agencies will also use other classification approaches according to their respective agency needs and missions. Crosswalks between agency-specific schemes, as well as conventions and protocols for vegetation mapping will be developed through the use of the standards (for examples, see Section I).

5.2. Policy - These standards are intended to be used by federal agencies and as needed by other groups including those engaged in land use planning or management by county and state governments, teaching or research uses, and by the private sector. Widespread use of these standards will facilitate integration of Earth cover data collected by diverse users into a common national data base, enhancing utility beyond single projects and establishing a long-

The adopted standards must be followed by all Federal agencies for data collected directly or indirectly (through grants, partnerships, or contracts). Currently the policy for applying the standard is only through the formation level. Agencies are encouraged to aid in the development of the alliance and association levels through participation in developing the national data base and support for the professional review panel. Non-federal organizations of any and all types might find it useful to use the standard to increase the compatibility of their efforts with those of nearby federal land managers and/or to make their efforts more compatible in any activities that involve them with federal agencies.

5.3. Guiding Principles - The following principles were used to develop the National Vegetation Classification Standard:

- ! The classification is applicable over extensive areas.

- ! The vegetation classification standard is compatible, wherever possible, with other Earth cover/land cover classification standards.
- ! The classification will avoid developing conflicting concepts and methods through cooperative development with the widest possible range of individuals and institutions.
- ! Application of the classification must be repeatable and consistent.
- ! When possible, the classification standard will use common terminology (i.e., terms should be understandable and jargon should be avoided).
- ! For classification and mapping purposes, the classification categories were designed to be mutual exclusive and additive to 100% of an area when mapped within any of the classification's hierarchical levels (Division, Order, Class, Subclass, Subgroup, Formation, Alliance, or Association). Guidelines have been developed for those instances where placement of a floristic unit into a single physiognomic classification category is not clear. Additional guidelines will be developed as other such instances occur.
- ! The classification standard will be dynamic, allowing for refinement as additional information becomes available.
- ! The NVCS is of existing, not potential, vegetation and is based upon vegetation condition at the optimal time during the growing season. The vegetation types are defined on the basis of inherent attributes and characteristics of the vegetation structure, growth form and cover.
- ! The NVCS is hierarchical (i.e., aggregatable) to contain a small number of generalized categories at the higher level and an increasingly large number of more detailed categories at the lower levels. The categories are intended to be useful at a range of scales (UNEP/FAO 1995, Di Gregorio and Jansen 1995).
- ! The upper levels of the NVCS are based primarily on the physiognomy (life form, cover, structure, leaf type) of the vegetation (not individual species). The life forms (e.g., herb, shrub, or tree) in the dominant or uppermost stratum will predominate in the classification of the vegetation type. Climate and other environmental variables are used to help organize the standard, but physiognomy is the driving factor.
- ! The lower levels of the NVCS are based on actual floristic (vegetation) composition. The data used to describe Alliance and Association types must be collected in the field using standard and documented sampling methods. The Alliance and Association units are derived from these field data. These floristically-based classes will be nested under the physiognomic classes of the hierarchy.

6. NATIONAL VEGETATION CLASSIFICATION STANDARD

The NVCS provides a standard framework and classification approach for natural, semi-natural, planted and cultivated vegetation types. All areas having equal to or more than 1% of the surface area with live vegetation cover are classified within the NVCS. The vegetation classification standard is hierarchical and combines floristics at the lowest levels and physiognomy and broad ecological modifiers at the highest levels of the hierarchy. This approach allows the characterization of vegetation patterns at multiple spatial scales. Cultivated and managed vegetation types are included in this classification standard due to their extensive geographical

coverage and the importance of identifying, mapping, and monitoring these types. In addition to vegetation found on strictly upland environments, this classification includes wetland vegetation (rooted emergent and floating).

The NVCS is largely the result of modifications to the vegetation classification standard compiled and refined for conservation planning and resource management at The Nature Conservancy (TNC Ecology Working Group 1994, 1997 (in prep)). The upper five physiognomic levels of the TNC standard (Class, Subclass, Group, Subgroup and Formation) are based on modifications by TNC Ecology Working Group of the UNESCO (1973) and Driscoll *et al.* (1984) vegetation classification. The lower two floristic levels (Alliance and Association) have been developed and are periodically enhanced by the ongoing work of TNC and the network of State Heritage Programs (TNC Ecology Working Group 1997 (in prep)).

The UNESCO system was modified and refined to provide greater consistency at all hierarchical levels and includes additional physiognomic types. A few of the inconsistencies inherent to the UNESCO standard were left intact where modification would have compromised the ecological integrity of the classification standards.

This classification scheme for the upper levels of the hierarchy was chosen because:

- ! It is already the product of an international group of experts. As a result, it is worldwide in coverage and is a more readily acceptable product than local and/or single-authored standards. Variations of the standard are presently being used by different agencies in the United States and internationally.
- ! It is a hierarchical standard that was designed for classification and mapping at multiple scales.
- ! It was well suited to have floristic units nested under its lowest level.
- ! The structure of the standard makes it open-ended; units meeting the standard can be added as needed.

There are seven upper levels in the NVCS. Physiognomic class is a level that is defined by life form and percent cover of the vegetation strata. The level of physiognomic subclass is determined by the predominant leaf phenology of woody plants and the leaf type and periodicity of herbaceous plants. The physiognomic group is defined by a combination of factors relating to climate, leaf morphology and leaf phenology. The subgroup separates the Natural/Semi-natural types from the Planted/Cultivated types. The formation level identifies ecological groupings of vegetation units with broadly defined environmental (e.g., hydrology) and additional physiognomic factors.

The hierarchy for the NVCS is presented below.

NATIONAL VEGETATION CLASSIFICATION STANDARD

DIVISION

ORDER

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

SUBGROUP

physiognomic levels

FORMATION

floristic levels

ALLIANCE

ASSOCIATION

The physiognomic and environmental characteristics used to describe the physiognomic units differ among the major groupings of vegetation. For example, some of the variables used to classify woody formations are different than the variables used to classify herbaceous formations. Adherence to a strictly parallel set of classification variables would cause inappropriate ecological distinctions to be made. Even within a given Physiognomic Group, some variables are better for describing certain vegetation types than others. For example, within the temperate needle-leaved evergreen closed tree canopy group, crown shape is an important variable for distinguishing major floristic types within the upland types, but this distinction is not particularly useful for separating floristic types within wetland types. Different variables are used as necessary to provide the most ecologically meaningful groupings possible and to limit arbitrary splitting of floristic units

There are two floristic levels in the NVCS. Alliances represent an aggregation of Associations and are characterized by one or a group of diagnostic species which, as a rule, occur in the dominant or uppermost stratum of the vegetation. The finest floristic unit of the classification standard is the Association which is characterized by diagnostic species that occur in all strata (overstory and understory) of the vegetation. The diagnostic species used to determine both the Alliance and Association are primarily the dominant species. When data indicate that additional diagnostic species (including differential, indicator, or character species) provide a better characterization of ecological patterns, they are used in addition to the dominant species to classify these floristic units. The current list of Alliances and Associations for the conterminous United States will be published by The Nature Conservancy in the spring of 1997 (TNC Ecology Working Group 1997 (in prep)).

Classification requires that fixed categories be imposed on naturally continuous systems. The cover values, height cutoffs and other physiognomic and environmental distinctions in the classification (taken largely from UNESCO 1973 and Driscoll *et al.* 1984) were chosen to best represent the ecology of vegetation and to provide a consistent framework for describing vegetation across the United States. While not arbitrary, these values may not perfectly describe the variable ecological patterns inherent to some types of vegetation. When the characteristics of a given floristic type span more than one physiognomic unit, the floristic type is placed intact in the physiognomic unit that best describes the majority of occurrences of the floristic type. Floristic units are only split and placed in more than one physiognomic unit if there is evidence that the physiognomic differences also reflect true floristic differences.

The physiognomic attributes in the classification are designed to describe the characteristics of the vegetation as a whole, not the characteristics of individual species. For example, willows and alders exhibit shrub characteristics in many areas and tree characteristics in other areas. Where the overall physiognomy of the vegetation which includes willows and alders is multi-stemmed, the type is classified as shrub dominated. Where the overall physiognomy of the vegetation which includes these species is single-stemmed, the type is classified as tree dominated (provided this reflects additional floristic differences).

The combined physiognomic/floristic approach of this classification standard allows identification of units from both a "top-down" (divisive) and "bottom-up" (agglomerative) approach. The top-down approach allows the use of physiognomic distinctions to help map vegetation, to stratify sampling and, where floristic information is lacking, to delimit vegetation units. A bottom-up approach requires that field inventory and floristic analysis are the primary means for defining associations. Where physiognomy is variable, the bottom-up approach can also be used to help to determine the important physiognomic distinctions.

Sparsely vegetated land cover units are classified within this standard because they cover significant areas across the United States and comprise unique and recognizable vegetation types. The upper hierarchical levels of the sparsely vegetated types are based on physical characteristics of the landscape. Remote sensing approaches can be used to map such areas and provide a functional stratification for inventory of the vegetation types. The lower levels of the classification standard are based on the floristic associations similar to the rest of the classification framework. This Subcommittee will work with the newly formed FGDC Earth Cover Working Group to determine a compatible approach to the upper levels of the sparsely vegetated classes.

Assigning a vegetation 'stand' to a classification type at each level of the classification hierarchy requires a defined set of information. The vegetation types in the NVCS may be developed through the analysis of imagery, thematic spatial data layers, and field survey data. More and more detailed data are required to derive units at consecutively finer levels of the classification hierarchy. Standard inventory methods must be followed and documented to identify the sample points, and uniform data collection protocols must be followed to ensure consistency and comparability of the field data. The standards for vegetation inventory, data management and analysis will be completed as a future stage of work by this Subcommittee.

The upper seven physiognomic levels of the classification standard appear in Appendix I. Appendix II gives examples of vegetation types fully classified within the system. The terminology associated with each level of the hierarchy is included in the "Definitions" section in Appendix III.

6.1. Application - The National Vegetation Classification Standard will enable federal agencies to collect and report vegetation information in a standard format and apply a standard classification standard in the attribution of spatial vegetation data and to use standard vegetation units in reports and on maps. This classification is a critical support tool for inventory, monitoring, research, management, and planning of biological resources and it is currently an aid in strengthening these activities at the national and state levels. The standards do not dictate values for several mapping-related parameters such as minimum mapping unit, polygon minimum width thresholds, etc.. Rather, the NVCS should be employed using the most appropriate level(s) in the hierarchy, in concert with application-specific mapping protocols which provide for the retention of appropriate information. In this manner, as agencies map vegetation at the level(s) and resolution(s) required by their programs, they are generating data which may be shared and assembled into a larger data base of comparable vegetation information.

This standard was designed to be useable in a wide variety of situations and thus its application is not dependent on

any specific data inputs, resolutions or mapping scales. This is one of the inherent values of a hierarchical classification standard. A user must have detailed information about a vegetation stand(s) in order to classify it at the lowest floristic levels but lacking such detailed information, the user can still assign the required more general classification at one of the higher physiognomic classes in the hierarchy. The standard is applicable for many types of data inputs and resolutions and mapping scales. Thus any specific categorization breakout and detail in the hierarchy would obviously depend on the type of data inputs. Data inputs could range from detailed ground observations of very localized vegetation with GPS locations to high, medium, and coarse resolution remote sensing inputs such as 1 meter to 1 kilometer, some with little or no ground observations.

The application of this standard for national, regional and State analyses, reports, and maps will be particularly beneficial by providing a cohesive, consistent, synoptic view of the vegetation resources of such broad geographic areas. Examples of major activities which will benefit directly or indirectly from such a unified classification and information standard include fire fuels mapping and management and general fire fighting, wildlife management, forestry and grazing planning and management, general land use planning and environmental impact assessments, biodiversity and ecosystem management and conservation, and many other natural resources management issues.

This uniform NVCS should also complement local classifications that are designed to meet more specific objectives.

The specific application of this standard to any mapping activities is dependent on the goals and objectives of the mapping activities. Issues of scale, minimum mapping area, appropriate level in the classification standard to use, etc. are all specific to each individual mapping effort. The classification standard merely sets a hierarchical list of classes that should be intelligently employed by the user based on the specifications and limitations of their particular mapping program. The program examples described in Section I, "Current Use of the National Vegetation Classification Standard", all vary with regard to mapping program specifications and limitations and yet all employ the NVCS.

The upper physiognomic levels of the classification hierarchy (see Appendix I) are based on factors that are generally discernible from imagery or ground verification. The types of information needed to categorize vegetation stands from the Physiognomic Class through the Formation levels are referred to in the Requirements Section of this report.

The floristic levels of the classification hierarchy are determined from field data concerning the structure, composition, and cover of the vegetation. Information that is required to categorize vegetation stands into national classification types at the Alliance and Association levels is acquired using standardized inventory methods by characterizing the whole vegetation stand and by plots within the stand. The information needed to classify vegetation into floristic units is listed in the Requirements Section of this report.

It is presently more complicated to assign a vegetation stand to a floristic level of the hierarchy than to a physiognomic level of the hierarchy. While the standard must be considered dynamic and subject to change as new information becomes available, it is anticipated that the higher physiognomic levels of the classification are considerably more stable at this time. A comprehensive list of the nation's floristic level vegetation types is currently a goal to be pursued in the long term application of this standard. The first approximation of a national list of vegetation types across all levels of the classification hierarchy will be published by The Nature Conservancy (TNC Ecology Working Group) in 1997. This publication will serve as the initial basis for assigning vegetation stands to types within the NVCS. This initial national list of vegetation types is the result of several years of work

accomplished at the local level in conjunction with private, State and Federal agencies and organizations. With the collection of standardized data, all users needing to classify a stand will eventually be able to input enter their data into a national data base on existing vegetation (as mentioned in Section D). This national data base will be accessible over the Internet and will be searchable and browsable with photographs, descriptions, successional status and relationships, and data for users to review the development and status of the NVCS. It will also provide a useful tool to aid users in assigning the appropriate classification to their particular vegetation stand data.

A process to help users classify vegetation at the lowest floristic levels will be developed in the future involving Federal, State, and private agencies and professional organizations . When a classification is questionable and a confidence assignment is required, a copy of the vegetation data may need to be sent to the FGDC Vegetation Subcommittee or a professional advisory panel authorized by the Subcommittee for review and assistance. The

Subcommittee or the authorized professional panel will ensure that the vegetation is classified within the NVCS at the appropriate level and type within the classification hierarchy.

! Links with Remote Sensing

The focus of the NVCS is on classifying vegetation, not on the currently available tools for producing the classifications. The use of remote sensing platforms and ground-truthing practices are some of the techniques by which one develops the data to permit the classification.

Size class and structure information to support many remote-sensing based classifications have to come from ground-truthing. The long term goal is to increase the accuracy of the vegetation classification, no matter what scale of remote sensing is used.

Landsat TM can only be reliably used to interpret Alliances when field and aerial observations are also used. Significant advancements have been made in the last two years using multi-seasonal TM (thus gaining better pattern delineation by way of phenotypic distinction) in combination with aerial videography. It is unlikely that many Alliance types could be distinguished by single-date TM and no other ancillary information.

! Links with Scale

The NVCS is a vegetation classification standard. As such, it is scale independent. The scale a classifier chooses to use for presenting the mapped image of the classification will depend on the classifier's needs for detail versus broad coverage and the choice of sensing and ground-truthing systems the classifier makes for obtaining the raw data. The NVCS has no role to play in developing availability of remotely sensed data.

The level of field and other efforts will be determined by the scale of classification chosen. It is not required that all vegetation classification efforts must classify to Association or Alliance.

6.2. Current Use of the National Vegetation Classification Standard - In addition to the broad application of this classification standard for conservation planning and biodiversity management by the Nature Conservancy and network of State Heritage Programs, the NVCS is currently being used and refined through TNC's work with numerous national level Federal programs for resource inventory, management, monitoring and conservation. Examples of these applications are listed below.

The USGS Gap Analysis Program (GAP) uses the NVCS for vegetation classification in mapping the natural and semi-natural vegetation of the U.S. in order to assess the conservation status of species and their habitats. The program's vegetation mapping methods use satellite imagery as a convenient meso-scale base map as well as a source of land cover information. Other sources of land cover information include field observations and aerial video and photography. The progenitors of the NVCS (UNESCO 1973, Driscoll et al 1984, TNC 1994) were the only standards that met the necessary criteria for GAP when the program began working cooperatively with other organizations to develop a unified vegetation classification standard (Jennings 1996).

Since 1990, GAP has funded TNC regional ecologists to collect, evaluate, and classify described Alliances from state Natural Heritage Programs into regionalized classifications. The program first funded this work for the TNC Western Region in 1990 (Bourgeron and Engelking 1993), and then continued to support work in the Northeast (Sneddon and Anderson 1994), Southeast (Weakley et al 1996) and Midwest (Faber-Langendoen and Drake 1996). The Gap Analysis Program currently has active or completed projects in 44 states.

As part of the National Park Service Inventory and Monitoring Program, the USGS/NPS Vegetation Mapping Program is currently involved in a long-term project to map the vegetation of all park units using the standard NVCS. This program requires the mapping of vegetation according to the NVCS using a minimum mapping unit of 0.5 hectare (about 1 acre) mapped to a standard 1:24,000 scale USGS topographic quadrangle. Alliances or Associations must be assigned to each vegetation polygon delineated. All vegetation maps, associated vegetation plot data, and accuracy assessment points are geographically referenced and made available in digital form that is GIS compatible. Inventory and mapping activities are currently taking place in Arizona, California, Maryland, Michigan, Minnesota, Nebraska, South Carolina, South Dakota, and Tennessee.

The U.S. Fish and Wildlife Service is interested in applying the same classification and mapping standards as the USGS/NPS Vegetation Mapping Program for the wildlife refuge system. The Nature Conservancy is presently mapping the vegetation of Chincoteague National Wildlife Refuge as a pilot project. The minimum mapping unit is 0.5 hectare, and the vegetation will be mapped to the Alliance and/or association level. The refuge envisions numerous applications for the vegetation information including improved management of their shorebirds, endangered species, invasive weeds, and ponies. Beyond the Chincoteague National Wildlife Refuge (NWR) pilot, the Service believes that identifying vegetation communities throughout the NWR system will improve the management of the standard fish and wildlife resources.

The Nature Conservancy is presently mapping the Connecticut River for the USGS Ecosystem Initiative to identify critical migration forest bird habitat that should be included in the Conte Wildlife Refuge System. This mapping and analysis is being carried out at the Alliance and Association levels of the NVCS. TNC has performed both full vegetation inventories and targeted analysis of rare communities on numerous Department of Defense installations across the United States. Many of these projects have been associated with the DOD Legacy Program. All of this work has been based on the NVCS.

Perhaps the oldest use and support of the NVCS has been from the U.S. Forest Service. This classification is used to describe the existing and potential vegetation for the ecoregional subsections in the Eastern and Southern Regions. This information is used for determining management and conservation goals. The classification was the basis for the ecological assessment that was carried out in the Pacific Northwest Region Columbia River Basin.

The Southern Region plans to replace the timber typing standard with the NVCS, and use this standard as the lowest level of the ecological classification standard of existing vegetation. In ecosystem management, the USFS

plans to use the classification and ranking standard as a guide for management and conservation action. The California Region is carrying out a LANDSAT change detection program that is cross-walked to the NVCS. In addition, projects in the Ozark Highlands, the Northern Great Plains, the Southern Appalachians, and the Great Lakes States are using this classification as the basis for mapping and analysis.

There are many other agencies using the NVCS. For example, the Bureau of Land Management is cross-walking to this classification standard for an interagency classification project in southwest Colorado. The NVCS provides the framework for vegetation mapping and analysis of numerous riparian projects that The Nature Conservancy is implementing for the Environmental Protection Agency. The Multi-Resolution Land Characterization Consortium has also identified this classification standard as a common basis for vegetation mapping.

7. REQUIREMENTS

The National Vegetation Classification Standard developed by this Subcommittee needs to be compatible with the standards that are being developed, in particular, by the Wetlands Subcommittee, Soils Subcommittee, and the Earth Cover Working Group. The NVCS does not preclude application of the data to other classification standards, but does require that federal applications produce data that support being able to conduct a classification according to the NVCS. Standards developed by this Subcommittee will need to be reflected in the FGDC Content Standards for Digital Spatial Metadata.

NVCS identifies the minimum that must be done. NVCS sets a national minimum standard for federal actions to ensure compatible and appropriate coordination across federal agencies. It does not prevent other actions, as well.

Most existing vegetation inventory/classification data bases may be cross-walked to populate the uniform NVCS. It is not the intent to throw out previous work and redo inventory. Each agency will need to consider the utility of the NVCS for meeting their unique needs and decide to retain existing inventory standards beyond what the NVCS delivers or where the NVCS fits their needs, adopt the NVCS. Regardless of their decision, each agency is to populate the NVCS data base to provide a uniform picture for the vegetation of the United States. Agencies shall use all available tools for accurate classifications.

Applying the National Vegetation Classification Standard requires two separate but interrelated activities:

- ! data collection and management for vegetation classification and reporting at different levels of the hierarchy, and
- ! management and reporting of vegetation information associated with vegetation maps.

7.1 Data Collection - Data Collection to Describe Taxonomic Units of the Classification Standard: Agencies will adhere to common, professionally accepted field inventory and data collection methods that must be documented in associated metadata (data about the data). One should incorporate existing information where possible. However, it is imperative to plan new data collection efforts within the context of the NVCS. This access will likely be through the national data base of existing vegetation described elsewhere in this standard.

- ! Field samples with plot data used for describing or characterizing standard vegetation types must be collected within homogeneous stands of the vegetation types being described.

- ! The sample size and mapping size must be determined by the purpose of the classification effort and the kind of sampling data that are available to the classifier. Sampling procedures and methods must comply with recognized professional standards that will ensure the collection of core physiognomic, biological, locational and environmental information. The amount of data collected may be determined by the level of classification required to meet the objectives of a particular project.

All field work will be expected to obtain the core data listed below. By doing so, others will be able to use the results to develop, without duplication of field work, the higher levels of classification that will be useful to them. Core data that may be required to classify units down through the physiognomic levels of Class, Subclass, Group and Formation include:

Dominant life form (i.e. tree, shrub, dwarf shrub, herb, non-vascular) and general percent cover class of the dominant vegetation stratum.

Physiognomic attributes of the dominant vegetation stratum (e.g., evergreen, deciduous, etc.)

Hydrologic regime of the vegetation site (Cowardin 1979)

The additional core data that will be required to classify units down to the floristic levels of Alliance and Association include:

Height class of vegetation strata (in meters)

Dominant and indicator plant species by stratum and percent cover class estimate. Agencies will use the scientific names (nomenclature) found in the current NRCS PLANTS data base (see <http://plants.usda.gov/plants>) as a national standard or provide accurate translators to those names as a cross-walk. (PLANTS is a component of the Interagency Taxonomic Information System (ITIS) (<http://www.itis.usda.gov/itis>).

7.2. Metadata - Agencies should record and make available the required FGDC metadata during the course of vegetation inventory, whether data has been gathered via remote sensing or field work. This metadata includes but is not limited to:

- ! Metadata for Field (stand and plot) Samples:
- Data Collectors: name and affiliation of investigators
 - Date of field work

 - Field Methods: plot design, date of observation/data collection, date of classification, [other field methods metadata?]

 - Geographic coordinates (UTM or latitude/longitude coordinates) of sample and the datum (NAD27 or NAD83); method of determination; and estimated locational accuracy information, in the form of +/- X m.

 - Sampling design: how, why, and how many sample sites were chosen (subjective, random, stratified, etc.)

Approximate extent of the stand sampled.

Where and how the data are stored.

- ! Metadata for Remotely Sensed Samples:
 - Type of imagery (TM, SPOT, aircraft scanner, radar, CIR, B&W, video, etc.)
 - Source (mono, stereo, vertical, oblique)
 - Scale or resolution of imagery
 - Date of imagery
 - Methods used to classify type
 - Method of imagery classification (visual or computer assisted)
 - Geographic coordinates (UTM or latitude/longitude coordinates) of sample and the datum (NAD27 or NAD83); method of determination; and estimated locational accuracy information, in the form of +/- X m.

7.3. Scale - The scale of data acquisition and presentation affects the resulting classification. When sponsored by a federal program, the classification, itself, must be done according to the NVCS scheme. The metadata that accompany the classification will have to discuss the influence of the chosen scales on the ability of the resulting classification to discriminate the smaller area vegetation types from the matrix of larger area vegetation types within which the smaller types are mixed. Any presentation should include metadata about the influence of scale on the nature or resolution of both the input data and the constructed or displayed product.

7.4. Management and Reporting of Vegetation Information Associated with Vegetation Maps

- ! The following metadata should be developed in conjunction with mapping efforts:
 - a. Location and extent of mapped terrain.
 - b. Map Scale
 - c. Map legend and descriptors of the mapped units
 - d. Criteria for minimum mapping units

- ! General Metadata
 - a. Names and affiliations of people who collected the field data
 - b. Level of vegetation classification that was used for the map
 - c. Information about where the data are stored
 - d. A description of the format in which the data are stored (GIS package, data base structure, etc.)
 - e. A summary of accuracy assessment procedures (class and locational) that were used and the results. It should be noted that some plot data collected with the protection of data confidentiality, by legislation and law, will not be revealed.

8. UPDATING AND TESTING

The National Vegetation Classification Standard will be subject to periodic review and updates. It is necessary that the NVCS continue to improve with new information and knowledge about species assemblages across the landscape in relation to succession, disturbance, extinction, climate change, etc.

Through the Vegetation Subcommittees the USDA Forest Service will oversee maintenance and updating of the NVCS in collaboration with agencies, professional societies, and other organizations. The subcommittee will make arrangements for a data base manager who will effect changes to the master copy of the classification standard as well as conduct any routine maintenance on current versions. The frequency of updating and maintenance that will be necessary is presently unknown, although it is expected that the number and extent of changes to the system will dampen over time.

The purpose of this classification standard is to provide a hierarchical set of categories describing assemblages of plants. This particular standard should not be extended to uniformly include other discrete environmental parameters (such as climate, soils, geology, or physiography). Rather, these other categories of information can be correlated with classified vegetation types through use of common geographic coordinates, for example, by intersecting the desired sets of data using a GIS to yield a separate transformed spatial data showing the combined themes of interest.

An objective of these standards is to create a standard of repeatable classes of vegetation in which the units are both exhaustive and mutually exclusive at each level of the hierarchy. To insure potential for improvements to the standard there will be a period of operational testing and validation, providing an informed basis for any revisions in the future. The goal of this operational testing period is to identify and address any problems in implementing the classification standard. Since adherence to the NVCS will be mandatory for federal activities, the standards need to be applicable to all locations having natural, semi-natural, or cultivated vegetation.

The testing and validation of the physiognomic levels of the standard will consist of three parts: a) develop a dichotomous key for the standard; b) test the standard for being exhaustive and mutually exclusive; and c) "crosswalk" the standard to other existing standards. Each of these parts is explained below.

- ! A simple dichotomous key to the standard will be developed. The key will use the criteria already provided in the system. The objective of this part is to arrange the standard into a "tree" structure that could be followed by a novice, and which will be used in part B, below.

- ! Using existing ground plot data samples, verify that the equivalence classes in each level of the classification's hierarchy are both exhaustive and mutually exclusive. Then, classified samples from the following image sources will be tested for these same qualities (exhaustive and mutually exclusive): a) aerial photographs at a nominal spatial scale of 1:24,000; b) Landsat Thematic Mapper satellite imagery at a nominal spatial scale of 1:100,000; and c) AVHRR satellite imagery at a nominal spatial scale of 1:1,000,000. Results from testing the classification standard with data from these sources will be compared and these results will be used to recommend improvements to the standard. Although the testing and validation activity need not generate large amounts of new data, since many usable data sets exist already, some original field work will be necessary. From this exercise, the subcommittee will determine how well the standard can characterize vegetation types across each level of the hierarchy from

ground plot data, aerial photography, and satellite imagery. From this initial testing, improvements to the standard may be made.

- ! Compare, or "crosswalk," the NVCS with other existing classification standards that have regional or state, or national applications. This "crosswalking" may provide a means to identify possible shortcomings in the NVCS. However, the importance of the "crosswalking" activity will be to facilitate applications of the NVCS to previous work done using other standards. The "crosswalking" will be produced in a database format that includes the map codes for each classification standard in order to facilitate greater automated translation among computerized map products.

The operational testing period will test the classification at a number of sites across the United States to gage the system's functionality among different geographic and ecological regions and gradients. Testing will include, but not be limited to the following range of regions and vegetation types: row crops, cereal crops, tree plantations, tundra, sub tropical scrub forests and marshes, shrub steppe, deserts, mixed graminoid and shrub vegetation, and coniferous forests grading into seasonally deciduous forests.

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10. APPENDICES

10.1. NATIONAL VEGETATION CLASSIFICATION STANDARD (normative)

DIVISION/ORDER	CLASS	SUBCLASS	GROUP	SUBGROUP	FORMATION
DIVISION:	VEGETATED (>1% Vegetation cover)				
TREE	I. CLOSED TREE CANOPY.	A. Evergreen forest.	1. Tropical or subtropical broad-leaved evergreen rainforest.	N. Natural/Semi-natural	a. Lowland tropical or subtropical rainforest b. Submontane tropical or subtropical rainforest c. Montane tropical or subtropical rainforest d. Montane tropical or subtropical cloud forest e. Subalpine tropical or subtropical rainforest f. Temporarily flooded tropical or subtropical rainforest g. Semipermanently flooded tropical or subtropical rainforest h. Saturated tropical or subtropical evergreen rainforest i. Tidal tropical or subtropical rainforest j. Seasonally flooded tropical or subtropical rainforest
DOMINATED	Trees with their crowns overlapping (generally forming 60 - 100% cover)	Evergreen species generally contribute >75% of the total tree cover	(broad-leaved evergreen trees, neither cold- nor drought-resistant)	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			2. Temperate or subpolar broad-leaved evergreen rainforest. (restricted to southern hemisphere)	N. Natural/Semi-natural	a. Temperate evergreen rainforest b. Subpolar evergreen rainforest c. Temporarily flooded temperate evergreen rainforest d. Seasonally flooded temperate evergreen rainforest
			3. Tropical or subtropical broad-leaved seasonal evergreen closed tree canopy. (mainly broad-leaved evergreen trees with some foliage reduction in the dry season)	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
				N. Natural/Semi-natural	a. Lowland tropical or subtropical seasonal evergreen closed tree canopy b. Submontane tropical or subtropical seasonal evergreen closed tree canopy c. Montane tropical or subtropical seasonal evergreen closed tree canopy d. Subalpine tropical or subtropical evergreen closed tree canopy e. Temporarily flooded tropical or subtropical seasonal

		evergreen closed tree canopy
		f. Seasonally flooded tropical or subtropical seasonal evergreen closed tree canopy
		g. Semipermanently flooded tropical or subtropical seasonal evergreen closed tree canopy
	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
		b. Orchards and Groves (fruit and nut trees)
		c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
4. Temperate broad-leaved seasonal evergreen closed tree canopy. (mainly broad-leaved evergreen with some foliage reduction in the dry season)	N. Natural/Semi-natural	a. Lowland temperate seasonal evergreen closed tree canopy
		b. Submontane temperate seasonal evergreen closed tree canopy
		c. Montane temperate seasonal evergreen closed tree canopy
		d. Subalpine temperate evergreen closed tree canopy
		e. Temporarily flooded temperate seasonal evergreen closed tree canopy
		f. Seasonally flooded temperate seasonal evergreen closed tree canopy
		g. Saturated temperate seasonal evergreen closed tree canopy
	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
		b. Orchards and Groves (fruit and nut trees)
		c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
5. Tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy.	N. Natural/Semi-natural	a. Lowland tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy
		b. Temporarily flooded tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy
		c. Seasonally flooded tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy
		d. Semipermanently flooded tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy
		e. Saturated tropical or subtropical broad-leaved evergreen sclerophyllous closed tree canopy
		f. Tidal tropical or subtropical broad-leaved

			evergreen sclerophyllous closed tree canopy (e.g. mangroves)
	C. Planted/Cultivated		a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
6. Winter-rain broad-leaved evergreen	N. Natural/Semi-natural		a. Giant lowland or submontane winter-rain evergreen sclerophyllous closed tree canopy (over 50 m tall, e.g. Eucalyptus in Australia)
sclerophyllous closed tree canopy.			
(stiff leathery-leaved trees)			
			b. Lowland or submontane winter-rain evergreen sclerophyllous closed tree canopy (under 50 m tall, e.g. live oak in California)
	C. Planted/Cultivated		a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
7. Tropical or subtropical needle-leaved evergreen closed tree canopy.	N. Natural/Semi-natural		a. Lowland or submontane tropical or subtropical needle-leaved evergreen closed tree canopy
			b. Montane or subalpine tropical or subtropical needle-leaved evergreen closed tree canopy
			c. Temporarily flooded tropical or subtropical needle-leaved evergreen closed tree canopy
	C. Planted/Cultivated		a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
8. Temperate or subpolar needle-leaved evergreen closed tree canopy.	N. Natural/Semi-natural		a. Giant temperate or subpolar needle-leaved evergreen closed tree canopy (e.g. redwood and Douglas Fir)
(mostly needle-leaved or scale-leaved trees)			b. Rounded-crowned temperate or subpolar needle-leaved evergreen closed tree canopy (e.g. pines, western juniper)
			c. Conical-crowned temperate or subpolar needle-leaved evergreen closed tree canopy (e.g. spruce, eastern juniper, cedar)
			d. Cylindrical-crowned temperate or subpolar needle-leaved evergreen closed tree canopy (e.g. boreal spruce forests in Alaska)
			e. Temporarily flooded temperate or subpolar needle-leaved

			evergreen closed tree canopy
			f. Seasonally flooded temperate or subpolar needle-leaved evergreen closed tree canopy
			g. Saturated temperate or subpolar needle-leaved evergreen closed tree canopy
			h. Tidal temperate or subpolar needle-leaved evergreen closed tree canopy
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	9. Extremely xeromorphic evergreen closed tree canopy.	N. Natural/Semi-natural	a. Sclerophyllous extremely xeromorphic evergreen closed tree canopy
			b. Succulent extremely xeromorphic evergreen closed tree canopy (assumed to be evergreen)
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
B. Deciduous closed tree canopy. Deciduous tree species generally contribute >75% of the total tree cover	1. Drought-deciduous closed tree canopy.	N. Natural/Semi-natural	a. Lowland or submontane drought-deciduous closed tree canopy
			b. Montane or cloud drought-deciduous closed tree canopy
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	2. Cold-deciduous closed tree canopy.	N. Natural/Semi-natural	a. Lowland or submontane cold-deciduous closed tree canopy (e.g. broadleaf forests of the Midwest)
			b. Montane or boreal cold-deciduous closed tree canopy (e.g. broad leaf forests of the mountains)
			c. Subalpine or subpolar cold-deciduous closed tree canopy
			d. Temporarily flooded cold-deciduous closed tree canopy (e.g. alluvial bottomland hardwoods)
			e. Seasonally flooded cold-deciduous closed tree canopy

			(e.g. deciduous larch forests in Alaska, peat forests)
			f. Semipermanently flooded cold-deciduous closed tree canopy (e.g. cypress swamp)
			g. Saturated cold-deciduous closed tree canopy
			h. Tidal cold-deciduous closed tree canopy
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			a. Extremely xeromorphic deciduous thorn closed tree canopy
		N. Natural/Semi-natural	a. Plantations (planted timber stands, Christmas trees)
		C. Planted/Cultivated	b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			a. Lowland tropical or subtropical semi-deciduous closed tree canopy
			b. Cloud or montane tropical or subtropical semi-deciduous closed tree canopy
			c. Seasonally flooded tropical or subtropical semi-deciduous closed tree canopy
			d. Saturated tropical or subtropical semi-deciduous closed tree canopy
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
			b. Orchards and Groves (fruit and nut trees)
			c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			a. Mixed broad-leaved evergreen - cold-deciduous closed tree canopy
			b. Temporarily flooded mixed evergreen - cold-deciduous closed tree canopy
			c. Seasonally flooded mixed broad-leaved evergreen - cold-deciduous closed tree canopy
			d. Saturated mixed broad-leaved evergreen - cold-deciduous closed tree canopy
		C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)
C. Mixed evergreen-deciduous closed tree canopy. Evergreen and deciduous species each generally contribute 25-75% of total tree cover. (Includes semi-deciduous, semi-evergreen, mixed evergreen-deciduous xeromorphic, and mixed needle-leaved evergreen - cold-deciduous woody vegetation)	3. Extremely xeromorphic deciduous closed tree canopy.	N. Natural/Semi-natural	
	1. Tropical or subtropical semi-deciduous closed tree canopy.	N. Natural/Semi-natural	
	2. Mixed broad-leaved evergreen - cold-deciduous closed tree canopy.	N. Natural/Semi-natural	

		<p>3. Mixed needle-leaved evergreen - cold-deciduous closed tree canopy.</p>	<p>N. Natural/Semi-natural</p>	<p>b. Orchards and Groves (fruit and nut trees)</p> <p>c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)</p> <p>a. Mixed needle-leaved evergreen - cold-deciduous closed tree canopy</p> <p>b. Temporarily flooded mixed needle-leaved evergreen - cold-deciduous closed tree canopy</p> <p>c. Seasonally flooded mixed needle-leaved evergreen - cold-deciduous closed tree canopy</p> <p>d. Saturated mixed needle-leaved evergreen - cold-deciduous closed tree canopy</p>
		<p>4. Extremely xeromorphic mixed evergreen-deciduous closed tree canopy.</p>	<p>C. Planted/Cultivated</p>	<p>a. Plantations (planted timber stands, Christmas trees)</p> <p>b. Orchards and Groves (fruit and nut trees)</p> <p>c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)</p>
<p>II. OPEN TREE CANOPY</p> <p>Open stands of trees with crowns not usually touching (generally forming 25 - 60% cover)</p> <p>Canopy tree cover may be less than 25% in cases when the cover of each of the other life forms present (i.e. shrub, dwarf-shrub, herb, nonvascular) is less than 25% and tree cover exceeds the cover of the other life forms</p>	<p>A. Evergreen open tree canopy.</p> <p>Evergreen species generally contribute >75% of the total tree cover</p>	<p>1. Tropical or subtropical broad-leaved evergreen open tree canopy.</p>	<p>N. Natural/Semi-natural</p>	<p>a. Tropical or subtropical broad-leaved evergreen open tree canopy</p> <p>b. Temporarily flooded tropical or subtropical broad-leaved evergreen open tree canopy</p> <p>c. Seasonally flooded tropical or subtropical broad-leaved evergreen open tree canopy</p> <p>d. Semipermanently flooded tropical or subtropical broad-leaved evergreen open tree canopy</p> <p>e. Tidal tropical or subtropical broad-leaved evergreen open tree canopy</p> <p>a. Plantations (planted timber stands, Christmas trees)</p> <p>b. Orchards and Groves (fruit and nut trees)</p> <p>c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)</p>

2. Temperate broad-leaved evergreen open tree canopy.	N. Natural/Semi-natural	a. Temperate broad-leaved evergreen open tree canopy b. Seasonally flooded temperate broad-leaved evergreen
		open tree canopy c. Saturated temperate broad-leaved evergreen open tree canopy
	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
3. Tropical or subtropical needle-leaved evergreen open tree canopy.	N. Natural/Semi-natural	a. Tropical or subtropical needle-leaved evergreen open tree canopy b. Temporarily flooded tropical or subtropical needle-leaved evergreen open tree canopy
		c. Seasonally flooded tropical or subtropical needle-leaved evergreen open tree canopy
		d. Saturated tropical or subtropical needle-leaved evergreen open tree canopy
	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
4. Temperate or subpolar needle-leaved evergreen open tree canopy.	N. Natural/Semi-natural	a. Rounded-crowned temperate or subpolar needle-leaved evergreen open tree canopy (e.g. pine, Western juniper) b. Conical-crowned temperate or subpolar needle-leaved evergreen open tree canopy (e.g. spruce in the west)
		c. Cylindrical-crowned temperate or subpolar needle-leaved evergreen open tree canopy (e.g. some spruce in Alaska)
		d. Temporarily flooded temperate or subpolar needle-leaved evergreen open tree canopy
		e. Seasonally flooded temperate or subpolar needle-leaved evergreen open tree canopy
		f. Saturated temperate or subpolar needle-leaved evergreen open tree canopy (e.g. black spruce bogs)
	C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees)

		5. Extremely xeromorphic evergreen open tree canopy.	N. Natural/Semi-natural	b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Sclerophyllous extremely xeromorphic evergreen open tree canopy b. Succulent extremely xeromorphic evergreen open tree canopy
			C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	B. Deciduous open tree canopy. Deciduous tree species generally contribute to >75% of the total tree cover	1. Tropical or subtropical drought- deciduous open tree canopy.	N. Natural/Semi-natural	a. Lowland or submontane broad-leaved drought-deciduous open tree canopy b. Montane (and cloud) drought-deciduous open tree canopy c. Temporarily flooded tropical or subtropical drought-
deciduous open tree canopy				d. Seasonally flooded tropical or subtropical drought-deciduous open tree canopy a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
		2. Cold-deciduous open tree canopy.	N. Natural/Semi-natural	a. Cold-deciduous open tree canopy b. Temporarily flooded cold-deciduous open tree canopy c. Seasonally flooded cold-deciduous open tree canopy d. Semipermanently flooded cold-deciduous open tree canopy e. Saturated cold-deciduous open tree canopy f. Tidal cold-deciduous open tree canopy
			C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
		3. Extremely xeromorphic deciduous open tree canopy.	N. Natural/Semi-natural	a. Thorn extremely xeromorphic deciduous open tree canopy (may not be represented in the U.S.) b. Orchards and Groves (fruit and nut trees)
			C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees)

		C. Mixed evergreen-deciduous open tree canopy. Evergreen and deciduous species each contribute 25-75% of total tree cover (Includes semi-deciduous, semi-evergreen, mixed evergreen-deciduous xeromorphic, and mixed needle-leaved evergreen - cold-deciduous woody vegetation)	1. Tropical or subtropical semi-deciduous open tree canopy.	N. Natural/Semi-natural C. Planted/Cultivated	c. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Tropical or subtropical semi-deciduous open tree canopy a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards nurseries)
			2. Mixed broad-leaved evergreen - cold-deciduous open tree canopy.	N. Natural/Semi-natural C. Planted/Cultivated	a. Mixed broad-leaved evergreen - cold-deciduous open tree canopy a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			3. Mixed needle-leaved evergreen - cold-deciduous open tree canopy.	N. Natural/Semi-natural	a. Mixed needle-leaved evergreen - cold-deciduous open tree canopy b. Seasonally flooded mixed needle-leaved evergreen - cold-deciduous open tree canopy c. Saturated mixed needle-leaved evergreen - cold-deciduous open tree canopy
			4. Extremely xeromorphic mixed evergreen-deciduous open tree canopy.	N. Natural/Semi-natural C. Planted/Cultivated	a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
SHRUB DOMINATED	III. SHRUBLAND. (SCRUB) Shrubs generally greater than 0.5 m tall with individuals or clumps not touching to overlapping	A. Evergreen shrubland. (scrub) Evergreen species generally contribute >75% of the total shrub cover	1. Tropical or subtropical broad-leaved evergreen shrubland. (with or without scattered tree canopy)	N. Natural/Semi-natural C. Planted/Cultivated	a. Mixed evergreen-deciduous thorn open tree canopy a. Plantations (planted timber stands, Christmas trees) b. Orchards and Groves (fruit and nut trees) c. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Tropical or subtropical broad-leaved evergreen shrubland (includes bamboos and tuft-trees) b. Hemi-sclerophyllous tropical or subtropical broad-leaved evergreen shrubland

(generally forming > 25% canopy
cover - tree cover generally <25%)

Shrub cover may be

less than 25% in cases when the

cover of each of the other

life forms present (i.e. tree,

is less than 25% and shrub cover

exceeds the cover of the other

life forms

c. Sclerophyllous temperate broad-leaved
evergreen shrubland

2. Temperate broad-leaved evergreen
shrubland. (with or without scattered tree canopy)

C. Planted/Cultivated

N. Natural/Semi-natural

c. Sclerophyllous tropical or subtropical broad-leaved
evergreen shrubland

d. Tropical or subtropical broad-leaved evergreen shrubland
with a sparse broad-leaved evergreen tree layer (includes tuft trees)

e. Temporarily flooded tropical or subtropical broad-leaved evergreen
shrubland

f. Seasonally flooded tropical or subtropical broad-leaved
evergreen shrubland

g. Semipermanently flooded tropical or subtropical broad-
leaved evergreen shrubland

h. Saturated tropical or subtropical broad-leaved evergreen shrubland

i. Tidal tropical or subtropical broad-leaved evergreen shrubland

a. Fruit/Nut Shrubs and Vines (vineyards)

b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)

a. Temperate broad-leaved evergreen shrubland (including
bamboos and tuft-trees)

b. Hemi-sclerophyllous temperate broad-leaved evergreen shrubland

d. Suffruticose temperate broad-leaved evergreen shrubland

e. Temperate broad-leaved evergreen shrubland with a sparse
broad-leaved evergreen tree layer (includes tuft trees)

f. Temperate broad-leaved evergreen shrubland with a sparse cold-
deciduous tree layer

g. Temporarily flooded temperate broad-leaved evergreen shrubland

h. Seasonally flooded temperate broad-leaved evergreen shrubland

i. Saturated temperate broad-leaved evergreen shrubland

j. Saturated temperate broad-leaved evergreen shrubland with a
sparse needle-leaved or mixed evergreen tree layer (e.g. pocosins)

k. Saturated temperate broad-leaved evergreen shrubland

with a sparse cold-deciduous tree layer

			C. Planted/Cultivated	I. Tidal broad-leaved evergreen temperate shrubland
				a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
III.	3. Needle-leaved evergreen shrubland.	N. Natural/Semi-natural		a. Needle-leaved evergreen shrubland (e.g. krummholz)
				b. Saturated needle-leaved evergreen shrubland (e.g. shrub bog)
			C. Planted/Cultivated	a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	4. Microphyllous evergreen shrubland. (e.g. sagebrush)	N. Natural/Semi-natural		a. Microphyllous evergreen shrubland
				b. Intermittently flooded microphyllous shrubland
				c. Temporarily flooded microphyllous shrubland
				d. Seasonally flooded microphyllous shrubland
			C. Planted/Cultivated	a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	5. Extremely xeromorphic evergreen shrubland.	N. Natural/Semi-natural		a. Broad-leaved and microphyllous evergreen extremely xeromorphic subdesert shrubland (e.g. creosote bush)
				b. Facultatively deciduous extremely xeromorphic subdesert shrubland (e.g. saltbush)
				c. Succulent extremely xeromorphic evergreen shrubland
				d. Tidal extremely xeromorphic shrubland
				e. Extremely xeromorphic evergreen shrubland with a sparse tree layer
			C. Planted/Cultivated	a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
B. Deciduous shrubland. (scrub) Deciduous species generally contribute >75% of the total shrub cover	1. Drought-deciduous shrubland.	N. Natural/Semi-natural		a. Lowland drought-deciduous shrubland
			C. Planted/Cultivated	a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	2. Cold-deciduous shrubland.	N. Natural/Semi-natural		a. Temperate cold-deciduous shrubland (e.g. serviceberry, some oaks)
				b. Subalpine or subpolar cold-deciduous shrubland (e.g. willow, alder)
				c. Intermittently flooded cold-deciduous shrubland
				d. Temporarily flooded cold-deciduous shrubland

				e. Seasonally flooded cold-deciduous shrubland (e.g. blueberry - azalea thickets)
				f. Semipermanently flooded cold-deciduous shrubland (e.g. buttonbush thickets)
				g. Saturated cold-deciduous shrubland (e.g. on peat)
				h. Tidal cold-deciduous shrubland (e.g. high tide bush)
		C. Planted/Cultivated		a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	3. Extremely xeromorphic deciduous shrubland.	N. Natural/Semi-natural		a. Extremely xeromorphic deciduous subdesert shrubland without succulents
				b. Intermittently flooded extremely xeromorphic deciduous subdesert shrubland
		C. Planted/Cultivated		a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
C. Mixed evergreen-deciduous shrubland. (scrub)	1. Mixed evergreen - drought-deciduous shrubland.	N. Natural/Semi-natural		a. Lowland mixed evergreen - drought-deciduous shrubland
Evergreen and deciduous species each generally contribute 25-75% of total shrub cover (includes facultatively deciduous, extremely xeromorphic mixed evergreen-deciduous woody plants)		C. Planted/Cultivated		a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	2. Mixed evergreen - cold-deciduous shrubland.(with or without scattered tree canopy)	N. Natural/Semi-natural		a. Mixed evergreen - cold-deciduous shrubland
				b. Mixed evergreen - cold-deciduous shrubland with a sparse needle-leaved evergreen tree layer (e.g. pitch pine-scrub oak)
				c. Intermittently flooded mixed evergreen - cold-deciduous shrubland
				d. Seasonally flooded mixed evergreen - cold-deciduous shrubland
				e. Saturated mixed evergreen - cold-deciduous shrubland (e.g. on peat)
				f. Saturated mixed evergreen - cold-deciduous shrubland with a sparse needle-leaved evergreen tree layer (e.g. pocosins)
		C. Planted/Cultivated		a. Fruit/Nut Shrubs and Vines (vineyards)
				b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	3. Extremely xeromorphic mixed evergreen-deciduous shrubland.	N. Natural/Semi-natural		a. Extremely xeromorphic deciduous subdesert shrubland with succulents (e.g. palo verde)

<p>IV. DWARF-SHRUBLAND. (DWARF-SCRUB) Low growing shrubs usually under</p>	<p>A. Evergreen dwarf-shrubland. (dwarf-scrub) Evergreen species generally contribute</p>	<p>1. Needle-leaved or microphyllous evergreen dwarf-shrubland. (with or without scattered tree canopy)</p>	<p>C. Planted/Cultivated</p>	<p>b. Mixed evergreen - deciduous subdesert shrubland a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland (e.g. alpine azalea) b. Creeping or matted needle-leaved or microphyllous</p>
<p>0.5 m tall. Individuals or clumps not touching to overlapping (dwarf-shrubs generally forming >25% cover - trees and shrubs generally <25% cover) dwarf-shrub cover may be less than 25% in cases when the cover of each of the other life forms present (i.e. tree, shrub, herb, nonvascular) is less than 25% and dwarf-shrub cover exceeds the cover of the other life forms.</p>	<p>>75% of the total dwarf-shrub cover</p>	<p>2. Extremely xeromorphic evergreen dwarf-shrubland.</p>	<p>C. Planted/Cultivated</p>	<p>evergreen dwarf-shrubland c. Cushion needle-leaved or microphyllous evergreen dwarf-shrubland d. Needle-leaved or microphyllous evergreen dwarf-shrubland with a sparse needle-leaved evergreen tree layer e. Temporarily flooded needle-leaved and microphyllous f. Seasonally flooded needle-leaved and microphyllous evergreen dwarf-shrubland g. Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (may include sparse dwarf-shrubland, e.g. dwarf-shrub bogs) h. Saturated needle-leaved or microphyllous evergreen dwarf-shrubland with a sparse needle-leaved evergreen tree layer</p>
	<p>B. Deciduous dwarf-shrubland.</p>	<p>1. Drought-deciduous dwarf-shrubland.</p>	<p>C. Planted/Cultivated</p>	<p>a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Extremely xeromorphic evergreen subdesert dwarf-shrubland b. Facultatively deciduous subdesert dwarf-shrubland c. Tidal needle-leaved or microphyllous evergreen dwarf-shrubland a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Caespitose drought-deciduous dwarf-shrubland</p>

		Deciduous species generally contribute >75% of the total dwarf-shrub cover					b. Creeping or matted drought-deciduous dwarf-shrubland c. Cushion drought-deciduous dwarf-shrubland
				C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			2. Cold-deciduous dwarf-shrubland.	N. Natural/Semi-natural			a. Caespitose cold-deciduous dwarf-shrubland b. Creeping or matted cold-deciduous dwarf-shrubland c. Cushion cold-deciduous dwarf-shrubland d. Saturated cold-deciduous dwarf-shrubland
				C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			3. Extremely xeromorphic deciduous dwarf-shrubland.	N. Natural/Semi-natural			a. Extremely xeromorphic deciduous subdesert dwarf-shrubland without succulents
IV.	B.			C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
		C. Mixed evergreen-deciduous dwarf-shrubland. (dwarf-scrub) Evergreen and deciduous species each generally contribute 25-75% of total dwarf-shrub cover (Includes facultatively deciduous shrubs and other mixed xeromorphic evergreen-deciduous shrubs)	1. Mixed evergreen - drought-deciduous dwarf-shrubland.	N. Natural/Semi-natural			a. Mixed evergreen - drought-deciduous dwarf-shrubland
				C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			2. Mixed evergreen- cold-deciduous dwarf-shrubland.	N. Natural/Semi-natural			a. Mixed evergreen - cold-deciduous dwarf-shrubland
				C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
			3. Extremely xeromorphic mixed evergreen - deciduous dwarf-shrubland.	N. Natural/Semi-natural			a. Deciduous subdesert dwarf-shrubland with succulents b. Mixed evergreen - deciduous subdesert dwarf-shrubland
				C. Planted/Cultivated			a. Fruit/Nut Shrubs and Vines (vineyards) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
HERB DOMINATED	V. HERBACEOUS VEGETATION.	A. Perennial graminoid vegetation (grasslands). Perennial graminoids generally contribute to > 50% of total herbaceous canopy cover	1. Tropical or subtropical grassland.	N. Natural/Semi-natural			a. Tall tropical or subtropical grassland b. Medium-tall sod tropical or subtropical grassland c. Medium-tall bunch tropical or subtropical grassland d. Short sod tropical or subtropical grassland e. Short bunch tropical alpine grassland (e.g. Super-paramo)

with less than 25% cover.
Herbaceous canopy cover
may be less than 25% in cases
when the cover of each of the
the other life forms present
(i.e. tree, shrub, dwarf-shrub,
nonvascular) is less than 25%
and herbaceous cover exceeds
the cover of the other life forms.

2. Tropical or subtropical grassland
with a sparse tree layer

C. Planted/Cultivated

N. Natural/Semi-natural

- f. Temporarily flooded tropical or subtropical grassland
- g. Seasonally flooded tropical or subtropical grassland
- h. Semipermanently flooded tropical or subtropical grassland
- i. Tidal tropical or subtropical grassland
- a. Perennial Grass Crops (hayland, pastureland)
- b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)

- a. Tall tropical or subtropical grassland with a sparse mainly
broad-leaved evergreen tree layer (includes tuft plants and
broad-leaved semi-evergreen trees)
- b. Tall tropical or subtropical grassland with a sparse broad-
leaved drought-deciduous tree layer
- c. Medium-tall tropical or subtropical grassland with a sparse
broad-leaved evergreen tree layer (includes tuft plants and
semi-evergreen trees)
- d. Medium-tall tropical or subtropical grassland with a sparse
broad-leaved drought-deciduous tree layer
- e. Medium-tall tropical or subtropical grassland with a sparse
needle-leaved evergreen or mixed tree layer
- f. Medium-tall tropical or subtropical grassland with a sparse
xeromorphic or succulent tree layer
- g. Temporarily flooded tropical grassland with a sparse broad-
leaved evergreen tree layer (includes tuft plants, e.g. Llanos de
Mojos, Bolivia)
- h. Temporarily flooded tropical grassland with a sparse broad-
leaved deciduous tree layer (e.g. in Northeast Bolivia)
- i. Seasonally flooded tropical or subtropical grassland with a
sparse needle-leaved evergreen tree layer
- j. Seasonally flooded tropical or subtropical grassland with a
sparse needle-leaved deciduous tree layer
- a. Perennial Grass Crops (hayland, pastureland)

C. Planted/Cultivated

3. Tropical or subtropical grassland with a sparse shrub layer.	N. Natural/Semi-natural	b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Tall tropical or subtropical grassland with a sparse broad-leaved evergreen or semi-evergreen shrub layer (includes tuft shrubs) b. Tall tropical or subtropical grassland with a sparse broad-leaved drought-deciduous shrub layer c. Medium-tall tropical or subtropical grassland with a sparse broad-leaved evergreen or semi-evergreen shrub layer (includes tuft plants) d. Medium-tall tropical or subtropical grassland with a sparse drought-deciduous shrub layer e. Medium-tall tropical or subtropical grassland with a sparse xeromorphic (often thorny) shrub layer f. Short tropical or subtropical grassland with a sparse broad-leaved evergreen or semi-evergreen shrub layer (includes tuft plants, e.g. Paramo) g. Short tropical or subtropical grassland with a sparse drought-deciduous shrub layer (includes thorny shrubs) h. Short alpine bunch tropical or subtropical grassland with a sparse evergreen shrub layer i. Temporarily flooded tropical or subtropical grassland with a sparse evergreen broad-leaved shrub layer
4. Tropical or subtropical grassland with a sparse dwarf-shrub layer.	C. Planted/Cultivated	a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
4. Tropical or subtropical grassland with a sparse dwarf-shrub layer.	N. Natural/Semi-natural	a. Short bunch tropical or subtropical grassland with a sparse needle-leaved or microphyllous evergreen dwarf-shrub layer (e.g. Puna)
4. Tropical or subtropical grassland with a sparse dwarf-shrub layer.	C. Planted/Cultivated	a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
5. Temperate or subpolar grassland.	N. Natural/Semi-natural	a. Tall sod temperate grassland (includes sod or mixed sod-bunch graminoids) b. Tall bunch temperate grassland c. Medium-tall sod temperate or subpolar grassland (includes sod or mixed sod-bunch graminoids) d. Medium-tall bunch temperate or subpolar grassland

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| <p>6. Temperate or subpolar grassland with a sparse tree layer.</p> | <p>C. Planted/Cultivated</p> <p>N. Natural/Semi-natural</p> | <ul style="list-style-type: none"> e. Short sod temperate or subpolar grassland (includes sod or mixed sod-bunch graminoids, e.g. shortgrass prairie) f. Short bunch temperate or subpolar grassland g. Short alpine or subalpine sod grassland h. Short alpine or subalpine dry bunch grassland i. Intermittently flooded temperate or subpolar grassland (e.g. playa lakes) j. Temporarily flooded temperate or subpolar grassland k. Seasonally flooded temperate or subpolar grassland l. Semipermanently flooded temperate or subpolar grassland m. Saturated temperate or subpolar grassland n. Tidal temperate or subpolar grassland a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) a. Tall temperate grassland with a sparse broad-leaved evergreen tree layer b. Tall temperate grassland with a sparse needle-leaved evergreen tree layer c. Tall temperate grassland with a sparse cold-deciduous tree layer d. Tall temperate grassland with a sparse mixed needle-leaved evergreen or cold-deciduous tree layer e. Medium-tall temperate grassland with a sparse broad-leaved evergreen or semi-evergreen tree layer (includes tuft plants) f. Medium-tall temperate or subpolar grassland with a sparse needle-leaved evergreen or mixed tree layer g. Medium-tall temperate or subpolar grassland with a sparse cold-deciduous tree layer h. Short temperate or subpolar grassland with a sparse broad-leaved evergreen or semi-evergreen tree layer i. Short temperate or subpolar grassland with a sparse cold-deciduous tree layer j. Intermittently flooded temperate or subpolar grassland with a sparse needle-leaved evergreen tree layer |
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			<ul style="list-style-type: none"> k. Temporarily flooded temperate or subpolar grassland with a sparse broad-leaved evergreen tree layer l. Temporarily flooded temperate or subpolar grassland with a sparse cold-deciduous tree layer m. Seasonally flooded temperate or subpolar grassland with a sparse cold-deciduous tree layer n. Semipermanently flooded temperate or subpolar grassland with a sparse cold-deciduous tree layer o. Saturated temperate or subpolar grassland with a sparse needle-leaved evergreen tree layer p. Tidal temperate grassland with a sparse cold-deciduous tree layer
	C. Planted/Cultivated		<ul style="list-style-type: none"> a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
7. Temperate or subpolar grassland with a sparse shrub layer.	N. Natural/Semi-natural		<ul style="list-style-type: none"> a. Tall temperate grassland with a sparse broad-leaved evergreen shrub layer (includes tuft shrubs) b. Tall temperate grassland with a sparse microphyllous evergreen shrub layer c. Tall temperate grassland with a sparse cold-deciduous shrub layer d. Medium-tall temperate or subpolar grassland with a sparse broad-leaved evergreen shrub layer e. Medium-tall temperate or subpolar grassland with a sparse needle-leaved or microphyllous evergreen shrub layer f. Medium-tall temperate or subpolar grassland with a sparse drought-deciduous shrub layer g. Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer h. Medium-tall temperate grassland with a sparse xeromorphic (often thorny) shrub layer i. Short temperate or subpolar grassland with a sparse broad-leaved evergreen or semi-evergreen shrub layer j. Short temperate or subpolar grassland with a sparse microphyllous evergreen shrub layer

			<ul style="list-style-type: none"> k. Short temperate or subpolar grassland with a sparse drought-deciduous shrub layer (includes thorny shrubs) l. Short temperate or subpolar grassland with a sparse cold-deciduous shrub layer m. Short temperate or subpolar grassland with a sparse xeromorphic (evergreen and/or deciduous) shrub layer n. Intermittently flooded temperate or subpolar grassland with a sparse xeromorphic (evergreen and/or deciduous) shrub layer o. Saturated temperate or subpolar grassland with a sparse broad-leaved evergreen shrub layer p. Saturated temperate or subpolar grassland with a sparse cold-deciduous shrub layer q. Saturated temperate or subpolar grassland with a sparse microphyllous evergreen shrub layer
	C. Planted/Cultivated		<ul style="list-style-type: none"> a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
8. Temperate or subpolar grassland with a sparse dwarf-shrub layer.	N. Natural/Semi-natural		<ul style="list-style-type: none"> a. Short temperate or subpolar lowland grassland with a sparse needle-leaved or microphyllous dwarf shrub layer b. Short temperate or subpolar lowland grassland with a sparse cold-deciduous dwarf shrub layer c. Short temperate or subpolar alpine grassland with a sparse needle-leaved or microphyllous evergreen dwarf-shrub layer (e.g. dwarf-shrub meadows) d. Seasonally flooded temperate or subpolar grassland with a sparse needle-leaved or microphyllous dwarf-shrub layer
	C. Planted/Cultivated		<ul style="list-style-type: none"> a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
9. Polar grassland.	N. Natural/Semi-natural		<ul style="list-style-type: none"> a. Short sod polar grassland (including sod or mixed sod-bunch grassland, e.g. sod grass tundra) b. Short bunch polar grassland (e.g. Eriophorum) c. Seasonally flooded polar grassland d. Saturated polar grassland with nonvascular plants admixed
	C. Planted/Cultivated		<ul style="list-style-type: none"> a. Perennial Grass Crops (hayland, pastureland)

	10. Polar grassland with a sparse shrub layer.	N. Natural/Semi-natural C. Planted/Cultivated	b. Landscaped Urban/Suburban/Rural (residential yards, nurseries) [Formations have not yet been defined] a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	11. Polar grassland with a sparse dwarf-shrub layer.	N. Natural/Semi-natural C. Planted/Cultivated	[Formations have not yet been defined] a. Perennial Grass Crops (hayland, pastureland) b. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
B. Perennial forb vegetation. Perennial forbs (including ferns and biennials) generally contributing to >50% of total herbaceous canopy cover	1. Tropical or subtropical perennial forb vegetation.	N. Natural/Semi-natural C. Planted/Cultivated	a. Tall tropical or subtropical perennial forb vegetation b. Low tropical or subtropical perennial forb vegetation c. Semipermanently flooded tropical or subtropical perennial forb vegetation d. Saturated tropical or subtropical perennial forb vegetation e. Tidal tropical or subtropical perennial forb vegetation a. Perennial Forb Row Crops b. Perennial Forb Close-Grown Crops c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
	2. Temperate or subpolar perennial forb vegetation.	N. Natural/Semi-natural C. Planted/Cultivated	a. Tall temperate or subpolar perennial forb vegetation (e.g. tall forb meadows) b. Low temperate or subpolar perennial forb vegetation (e.g. Aleutian forb meadows) c. Intermittently flooded temperate perennial forb vegetation d. Temporarily flooded temperate perennial forb vegetation e. Semipermanently flooded temperate perennial forb vegetation f. Saturated temperate perennial forb vegetation g. Tidal temperate perennial forb vegetation h. Seasonally flooded temperate perennial forb vegetation a. Perennial Forb Row Crops b. Perennial Forb Close-Grown Crops c. Landscaped Urban/Suburban/Rural (residential yards, nurseries)
C. Hydromorphic rooted vegetation. Non-emergent graminoids or forbs structurally supported by water and rooted in substrate (e.g. pond weeds)	1. Tropical or subtropical hydromorphic rooted vegetation. (without seasonal contrasts)	N. Natural/Semi-natural	a. Permanently flooded tropical or subtropical hydromorphic rooted vegetation b. Permanently flooded-tidal tropical or subtropical hydromorphic rooted vegetation (e.g. tropical seagrass beds)

		and water lilies).		C. Planted/Cultivated	[Formations have not yet been defined]
			2. Temperate or subpolar hydromorphic rooted vegetation.	N. Natural/Semi-natural	a. Permanently flooded temperate or subpolar hydromorphic rooted vegetation
					b. Permanently flooded-tidal temperate or subpolar hydromorphic rooted vegetation (e.g. temperate seagrass beds)
				C. Planted/Cultivated	[Formations have not yet been defined]
		D. Annual graminoid or forb vegetation.	1. Tropical or subtropical annual grasslands or forb vegetation.	N. Natural/Semi-natural	a. Tropical or subtropical annual grasslands
					b. Tall tropical or subtropical annual forb vegetation.
					c. Low tropical or subtropical ephemeral annual forb vegetation
					d. Tidal tropical or subtropical annual forb vegetation
				C. Planted/Cultivated	a. Annual Close-Grown Forbs and Grasses
					b. Annual Row-Crop Forbs and Grasses
			2. Temperate or subpolar annual grasslands or forb vegetation.	N. Natural/Semi-natural	a. Tall temperate or subpolar annual grassland (dominated by annual graminoids)
					b. Tall temperate or subpolar annual forb vegetation (dominated by annual forbs)
					c. Low desert or subdesert ephemeral or episodic annual forb vegetation
					d. Short temperate annual grassland
					e. Low temperate intermittently exposed annual forb vegetation
					f. Temporarily flooded temperate annual forb vegetation
					g. Seasonally flooded temperate annual grassland
					h. Seasonally flooded temperate annual forb vegetation
					i. Saturated temperate annual forb vegetation
				C. Planted/Cultivated	a. Annual Close-Grown Forbs and Grasses
					b. Annual Row-Crop Forbs and Grasses
NONVASCULAR DOMINATED	VI. NONVASCULAR VEGETATION. Nonvascular cover (bryophytes, lichens and algae) dominant (generally forming at least 25% cover). Trees, shrubs, dwarf-shrubs and herbs generally with less than	A. Bryophyte vegetation. Bryophytes generally dominate the nonvascular cover.	1. Temperate or subpolar bryophyte vegetation.	N. Natural/Semi-natural	a. Lowland bryophyte vegetation
					b. Seasonally flooded bryophyte vegetation
					c. Saturated bryophyte vegetation
					d. Saturated bryophyte vegetation with a sparse tree layer (e.g. treed bogs)
					e. Saturated bryophyte vegetation with a sparse dwarf-shrub

**Federal Geographic Data Committee--Vegetation Subcommittee
National Vegetation Classification Standard , June 1997**

FGDC-STD-005

DIVISION/ORDER	CLASS	SUBCLASS	GROUP	SUBGROUP	FORMATION
	25% cover. Nonvascular cover may be less than 25% in cases when the cover of each of the other life forms present (tree, shrub, dwarf-shrub, and herb) is less than 25% and non-vascular cover exceeds the cover of the other life forms. Crustose lichen-dominated areas should be placed in the Sparsely Vegetated class.	B. Lichen vegetation. Lichens (foliose or fruticose) generally dominate the nonvascular cover	1. Temperate or subpolar lichen vegetation.	N. Natural/Semi-natural	layer (e.g. dwarf-shrub/moss tundra) [Formations have not yet been defined] a. Lowland lichen vegetation b. Montane/submontane tropical or subtropical lichen vegetation c. Lichen vegetation with a sparse tree layer d. Lichen vegetation with a sparse dwarf-shrub layer [Formations have not yet been defined]
			2. Tropical or subtropical lichen vegetation	C. Planted/Cultivated N. Natural/Semi-natural	[Formations have not yet been defined] a. Montane/submontane tropical or subtropical lichen vegetation
		C. Alga vegetation Algae generally dominate the nonvascular cover	1. Tropical or subtropical alga vegetation	N. Natural/Semi-natural	a. Seasonally flooded alga vegetation
VEGETATION NOT DOMINANT	VII. SPARSE VEGETATION. Vegetation is scattered or nearly absent; total vegetation cover, excluding crustose lichens (which can sometimes have greater than 10% cover) is generally 1% - 10%	A. Consolidated rock sparse vegetation. (cliffs, pavement, incl. pahoehoe lava flows) [Vegetation characterized by herbs, shrubs, trees, and/or nonvascular plants growing in fissures of rocks or walls, or growing adnate on these surfaces]	1. Sparsely vegetated cliffs.	N. Natural/Semi-natural	a. Cliffs with sparse vascular vegetation (e.g. bromeliads in neotropics) (May have sparse to dense crustose lichens, sparse bryoids or foliose or fruticose lichens)
			2. Sparsely vegetated pavement. (level/gently sloping bedrock)	C. Planted/Cultivated N. Natural/Semi-natural	[Formations have not yet been defined] a. Pavement with sparse vascular vegetation (May have sparse to dense crustose lichens, sparse bryoids, or foliose or fruticose lichens) [Formations have not yet been defined]
		B. Boulder, gravel, cobble, or talus sparse vegetation. (incl. a'a lava flows) [Vegetation generally characterized by herbs, and occasionally shrubs and trees on gravel or cobble substrates. Lichens are also common.]	1. Sparsely vegetated talus/scree slopes.	N. Natural/Semi-natural	a. Lowland or submontane talus/scree b. Montane talus/scree c. High mountain talus/scree [Formations have not yet been defined]
			2. Sparsely vegetated rock flats. (boulders, cobble or gravel)	C. Planted/Cultivated N. Natural/Semi-natural	[Formations have not yet been defined] a. Boulder fields b. Cobble/gravel beaches and shores

C. Unconsolidated material sparse vegetation. (soil, sand and ash) [Vegetation generally characterized by isolated herbs or occasionally shrubs]	1. Sparsely vegetated sand dunes.	C. Planted/Cultivated	c. Cobble/gravel flats and ridges [Formations have not yet been defined]
		N. Natural/Semi-natural	a. Dunes with sparse herbaceous vegetation
		C. Planted/Cultivated	b. Dunes with sparse woody vegetation [Formations have not yet been defined]
	2. Sparsely vegetated sand flats.	N. Natural/Semi-natural	a. Sand flats (including storm-washed beaches)
			b. Intermittently flooded sand beaches and shores
			c. Temporarily flooded sand flats
			d. Tidal sand flats (e.g. salt pannes)
		C. Planted/Cultivated	[Formations have not yet been defined]
	3. Sparsely vegetated soil slopes.	N. Natural/Semi-natural	a. Moist slopes
			b. Dry slopes
		C. Planted/Cultivated	a. Agriculture field-bare soil, crop residue.
			b. Non-agriculture disturbed areas
	4. Sparsely vegetated soil flats.	N. Natural/Semi-natural	a. Soil slumps or landslides
			b. Intermittently flooded mud flats (e.g. playa lakes)
			c. Seasonally / temporarily flooded mud flats
			d. Tidal mud flats
		C. Planted/Cultivated	a. Agricultural field - bare soil, crop residue
			b. Non-agriculture disturbed areas
	5. Sparsely vegetated ash deposits.	N. Natural/Semi-natural	[Formations have not yet been defined]
		C. Planted/Cultivated	[Formations have not yet been defined]

DIVISION: NON-VEGETATED (<1% Vegetation cover)

10.2. Examples of Vegetation Types Organized Within The NVCS Hierarchy (informative)

1.		
DIVISION	Vegetated	
ORDER	Tree Dominated	
PHYSIOGNOMIC CLASS	Closed Tree Canopy	
PHYSIOGNOMIC SUBCLASS	Evergreen	
PHYSIOGNOMIC GROUP	Temperate or Subpolar Needle-leaved	
SUBGROUP	Natural/Semi-natural	
FORMATION	Rounded Crowns	
ALLIANCE	<i>Pinus taeda</i> Closed Tree Canopy Alliance	
ASSOCIATION	<i>Pinus taeda/Symplocos tinctoria-Myrica cerifera-Vaccinium elliotii</i>	
2.		
DIVISION	Vegetated	
ORDER	Tree Dominated	
PHYSIOGNOMIC CLASS	Closed Tree Canopy	
PHYSIOGNOMIC SUBCLASS	Evergreen	
PHYSIOGNOMIC GROUP	Temperate or Subpolar Needle-leaved	
SUBGROUP	Planted/Cultivated	
FORMATION	Tree Plantation	
ALLIANCE	Loblolly Pine (<i>Pinus taeda</i>) Plantation	
3.		
DIVISION	Vegetated	
ORDER	Tree Dominated	
PHYSIOGNOMIC CLASS	Open Tree Canopy	
PHYSIOGNOMIC SUBCLASS	Deciduous	
PHYSIOGNOMIC GROUP	Cold-deciduous	
SUBGROUP	Natural/Semi-natural	
FORMATION	Upland	
ALLIANCE	<i>Quercus garryana</i> Alliance	
ASSOCIATION	<i>Quercus garryana-Quercus kelloggii/Rhus diversiloba</i>	
4.		
DIVISION	Vegetated	
ORDER	Shrub Dominated	
PHYSIOGNOMIC CLASS	Shrubland	
PHYSIOGNOMIC SUBCLASS	Deciduous	
PHYSIOGNOMIC GROUP	Cold-deciduous	
SUBGROUP	Natural/Semi-natural	
FORMATION	Seasonally flooded/saturated	
ALLIANCE	<i>Alnus incana</i> Alliance	
ASSOCIATION	<i>Alnus incana/Calamagrostis canadensis</i>	

5.	
DIVISION	Vegetated
ORDER	Shrub Dominated
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen
PHYSIOGNOMIC GROUP	Macrophyllous evergreen shrub
SUBGROUP	Planted/Cultivated
FORMATION	Fruit/leaf/nut shrub crop
ALLIANCE	Cultivated Cranberry (<i>Vaccinium macrocarpon</i>) Bog
6.	
DIVISION	Vegetated
ORDER	Shrub Dominated
PHYSIOGNOMIC CLASS	Dwarf Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen
PHYSIOGNOMIC GROUP	Needle-leaved or Microphyllous
SUBGROUP	Natural/Semi-natural
FORMATION	Cushion
ALLIANCE	<i>Cassiope mertensiana</i> Alliance
ASSOCIATION	<i>Cassiope mertensiana-Phyllodoce empetriformis</i>
7.	
DIVISION	Vegetated
ORDER	Herbaceous/Non-vascular Dominated
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial Graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar
SUBGROUP	Natural/Semi-natural
FORMATION	Temperate tall dense sod grassland
ALLIANCE	<i>Andropogon gerardii-Panicum virgatum</i> Alliance
ASSOCIATION	<i>Andropogon gerardii-Panicum virgatum- (Spartina patens)</i>
8.	
DIVISION	Vegetated
ORDER	Herbaceous/Non-vascular Dominated
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Annual Graminoid
PHYSIOGNOMIC GROUP	Temperate
SUBGROUP	Planted/Cultivated
FORMATION	Row Crop
ALLIANCE	Corn (<i>Zea mays</i>) Crop
9.	
DIVISION	Vegetated
ORDER	Herbaceous/Non-vascular Dominated
PHYSIOGNOMIC CLASS	Non-vascular
PHYSIOGNOMIC SUBCLASS	Bryophyte vegetation

PHYSIOGNOMIC GROUP	Temperate
SUBGROUP	Natural/Semi-natural
FORMATION	Saturated
ALLIANCE	<i>Sphagnum cuspidatum</i> Alliance
ASSOCIATION	<i>Sphagnum cuspidatum</i>
10.	
DIVISION	Vegetated
ORDER	No dominant life form
PHYSIOGNOMIC CLASS	Sparsely vegetated
PHYSIOGNOMIC SUBCLASS	Gravel, cobble rocks
PHYSIOGNOMIC GROUP	Rock flats
SUBGROUP	Natural/Semi-natural
FORMATION	Pavement
ALLIANCE	<i>Sedum nuttallianum</i> Alliance
ASSOCIATION	<i>Sedum nuttallianum-Selaginella peruviana</i>

10.3. Definitions (normative)

The following terms and definitions are used in the National Vegetation Classification Standard:

Agricultural Field - Bare Soil, Crop Residue - Cropland, either tilled or untilled, which has little or no live crop vegetation present. Such areas may or may not have crop residue from previous crops on the surface. This category also includes cropland in a fallow state -- that is, cropland which has been left idle during the whole or greater portion of the growing season.

Alliance - A physiognomically uniform group of Associations sharing one or more diagnostic (dominant, differential, indicator, or character) species which, as a rule, are found in the uppermost stratum of the vegetation.

Alluvial - Characterized by the deposition of sediment by a stream or other running water at any point along its course.

Alpine - The zone on mountain tops between permanent snow and the cold limits of trees.

Annual - Plant species that complete their life-cycle within a single growing season.

Annual Close-Grown Forbs and Grasses - Annual (non-perennial) forbs and grasses which are drill-seeded or broadcast. Examples include wheat, barley, and oats.

Annual Row-Crop Forbs and Grasses - Annual (non-perennial) forbs and grasses planted in rows on a regular and generally consistent row and plant spacing. Examples include corn, soybeans, tomatoes, potatoes, sorghum, and cotton.

Annual Vegetation - Associations that persist for less than one year or are dominated by annual species.

Assemblages - Vegetative communities composed of several to many different species of plants that assemble themselves based on specific site conditions and the presence of seed.

Association - The finest level of the classification standard. The Association is a physiognomically uniform group of vegetation stands that share one or more diagnostic (dominant, differential, indicator, or character) overstory and understorey species. These elements occur as repeatable patterns of assemblages across the landscape, and are generally found under similar habitat conditions. (The Association refers to existing vegetation, not a potential vegetation type).

Biennial - Plant species that complete their life-cycles within two growing seasons.

Boreal - Northern biogeographical region typically referring to subpolar and cold temperate areas.

Brackish - Tidal water with a salinity of 0.5-30 parts per thousand.

Broad-leaved - A plant with leaves that have well-defined leaf blades and are relatively wide in outline (shape) as

opposed to needle-like or linear; leaf area is typically greater than 500 square millimeters or 1 square inch.

Bryophyte - Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts.

Bunch Grass - Multi-stemmed (caespitose) life form of grasses characterized by clumps of erect shoots that slowly spread horizontally by tillers, generally creating distinct individual plants spaced across the ground; often applied to sedges and other graminoids with similar life forms.

Caespitose (cespitose) - Describes a low branching pattern from near the base that forms a multi-stemmed or a bunched appearance.

Canopy Cover - The proportion of ground, usually expressed as a percentage, that is occupied by the perpendicular projection down on to it of the aerial parts of the vegetation or the species under consideration. The additive cover of multiple strata or species may exceed 100%.

Canopy Stratum - Canopy layer.

Classification - The grouping of similar types (in this case - vegetation) according to criteria (in this case - physiognomic and floristic) which are considered significant for this purpose. The rules for classification must be clarified prior to identification of the types within the classification standard. The classification methods should be clear, precise, where possible quantitative, and based upon objective criteria, so that the outcome would be the same whoever performs the definition (or description). Classification necessarily involves definition of class boundaries (UNEP/FAO 1995).

Cliff - Any high, very steep to perpendicular, or overhanging face of a rock outcrop.

Closed Tree Canopy - A class of vegetation that is dominated by trees with interlocking crowns (generally forming 60-100% crown cover).

Cloud Forest - Tropical and subtropical montane forest characterized by a high incidence of low-level cloud cover, usually at the canopy level, promoting development of an abundance of vascular epiphytes.

Cold Deciduous - A class of vegetation where the leaves drop in the unfavorable season of winter frost and freeze. The foliage is dropped every year. Applied to vegetation adapted to cold season influences (temperate).

Conical-crowned - Describes a needle-leaved evergreen tree with a pyramidal or cone-shaped canopy or life form; for example, Douglas fir and silver fir (*Pseudotsuga menziesii* and *Abies amabilis*).

Cover - The area of ground covered by the vertical projection of the aerial parts of plants of one or more species.

Cover Type - A designation based upon the plant species forming a plurality of composition within a given area (e.g., Oak-Hickory).

Creeping - The pattern of stems growing at or just beneath the surface of the ground and usually producing roots at nodes.

Crosswalk - Organizational and definitional property of a classification standard which provides that all its categories either share a common definition with an FGDC vegetation standard category at some level of the hierarchy, or represent a subset of one and only one category at a given level of the FGDC Vegetation Classification Standard. When a standard crosswalks with the FGDC Vegetation Classification, it means that all categories of the standard have one and only one place with the FGDC Standard where they logically exist. It does not mean that all categories of the standard must crosswalk to the same level of the FGDC Standard.

Crustose Lichen - Lichen life form that grows in intimate contact with its substrate, lacks a lower cortex and rhizoids (root-like structures), and is impossible to separate from the substrate without destroying the thallus; lichen with an unlobed, flattened thallus, growing adnate to the substrate.

Cushion Plant - A low, woody, plant life form so densely branched that it forms a compact canopy that is pad- or bolster-like in appearance; usually with microphyllous foliage; characteristic of alpine and tundra plants.

Cylindrical-crowned - A needle-leaved evergreen tree with a narrow, essentially cylinder-shaped canopy or life form; for example, subalpine fir and black spruce (*Abies lasiocarpa* and *Picea mariana*).

Deciduous - A woody plant that seasonally loses all of its leaves and becomes temporarily bare-stemmed.

Deciduous Cover - Vegetation classes where 75% or more of the diagnostic vegetation is made up of tree or shrub species that shed foliage simultaneously in response to an unfavorable season. There is usually one "leaf-off" season every year.

Deciduous Vegetation - Associations in which deciduous woody plants generally contribute 75% or more to total dominant plant cover.

Diagnostic Species - a.k.a. indicator species or phytometers. Used to evaluate [i.e., diagnose] an area, or site, for some characteristic. For example, the presence and relative density of a *Vaccinium stamineum* var. *stamineum* (gooseberry) understory existing beneath a canopy of chestnut oak, black oak, and Virginia pine indicates that the site is xeric (or dry). The oaks and pines can inhabit a wide range of sites, wet to dry. But the gooseberry understory is the indicator of a drier habitat (which is probably due to a combination of factors including: soil type, slope, aspect, elevation, and site history).

Division - This is the first level in the classification standard separating Earth cover into either vegetated or non-vegetated categories (See also Order)

Dominance - The extent to which a given species or life form predominates in a community because of its size, abundance or cover, and affects the fitness of associated species. Dominance is interpreted in two different ways for vegetation classification purposes:



Where one or more vegetation strata (life form) covers greater than 25% (represented by the --- line), the life form greater than 25% which constitutes the uppermost canopy is referred to as the dominant life form.

and never produces leaves.

Evergreen Cover - Vegetation classes where 75% or more of the diagnostic vegetation consists of trees or shrubs having leaves all year. Canopy is never without green foliage. Examples are pine, spruce, juniper, laurel, Cefrela, Ceiba, Guaiacum, Live Oak, Magnolia, Mescal Bean, Texas Ebony, Palms, etc.

Evergreen Vegetation - Associations in which evergreen woody plants generally contribute 75% or more to total dominant plant cover; vegetation canopy is never without photosynthetic tissue.

Extremely Xeromorphic - Associations that are adapted primarily to growing in drought-persistent environments and are only secondarily adapted to other environmental stresses; plants typically have several well-developed xeromorphic characteristics.

Facultatively Deciduous - Evergreen species that shed leaves only under extreme conditions; this strategy is often associated with plants found in semiarid saline/alkaline environments; for example, Atriplex-Kochia saltbush in Australia and North America.

Foliose Lichen - Lichen life form that is leafy in appearance and loosely attached to its substrate; lichen with a lobed, flattened thallus growing loosely attached to the substrate, the lobes flattened or inflated with distinctly differentiated upper and lower surfaces; umbilicate lichens are included.

Forb - A broad-leaved herbaceous plant.

Formation - A level in the classification based on ecological groupings of vegetation units with broadly defined environmental and additional physiognomic factors in common. This level is subject to revision as the vegetation Alliances and Associations are organized under the upper levels of the hierarchy. Different variables are applied to this hierarchical level in the sparsely vegetated class.

Fresh Water - Water with a salinity of less than 0.5 parts per thousand.

Fruit/Nut Shrubs and Vines (vineyards) - Areas dominated by fruit or nut shrubs and vines planted on a regular and generally consistent row and plant spacing. Vegetation is planted for the purpose of producing a fruit or nut crop. Examples include blueberries, cranberries, blackberries, and grapes.

Fruticose Lichen - Lichen life form that is bunched, shrubby or "hairy" in appearance and loosely attached to its substrate; lichen with the thallus branched, the branches solid, or hollow and round, or flattened without distinctly differentiated upper and lower surfaces; squamulose lichens are included.

Giant - Mature forests in which the height of a typical canopy exceeds 50 meters or 165 feet.

Graminoid - Grasses and grass-like plants, including sedges and rushes.

Grassland - Vegetation dominated by perennial graminoid plants.

Growth Form - The shape or appearance of a plant; it primarily reflects the influence of growing conditions.

Hemi-sclerophyllous - A plant with stiff, firm, leathery leaves that partially retain their rigidity during wilting; for example, rhododendron and salal (*Rhododendron* and *Gaultheria*).

Herb - A vascular plant without significant woody tissue above or at the ground; an annual, biennial, or perennial plant lacking significant thickening by secondary woody growth, with perennating buds borne at or below the ground surface (hemicryophytes, geophytes, helophytes, and therophytes of Raunkier).

Herbaceous - A class of vegetation dominated by non-woody plants known as herbs (graminoids, forbs and ferns). Herbs generally form at least 25% cover. Trees, shrub and dwarf shrub generally have less than 25% cover. In rare cases, herbaceous cover exceeds the combined cover of trees, shrubs, dwarf shrubs, and non-vascular plants and is less than 25% cover. Height classes for the graminoids are short (<0.5 m), medium-tall (0.5-1 m) and tall (>1 m). Height classes for the forbs are low (<1 m) and tall (>1 m). For both graminoids and forbs, the height classes are measured when the inflorescences are fully developed.

Herbaceous Vegetation - Vegetation in which herbs (mostly graminoids, forbs, and ferns) form at least 25% cover, and woody vegetation has generally less than 25% cover; herbaceous cover may be less than 25% in cases where the cover of each of the other life forms present is less than 25% and herbaceous cover exceeds the cover of the other life forms.

Herbs - Non-woody vascular plants such as grasses, grass-like plants, and forbs.

Hydrophyte - A plant which has evolved with adaptations to live in aquatic or very wet habitats, e.g., cattail, water lily, water tupelo.

Hydromorphous Herbs - Herbaceous plants structurally adapted for life in water-dominated or aquatic habitats.

Intermittently Flooded - Substrate is usually exposed, but surface water can be present for variable periods without detectable seasonal periodicity. Inundation is not predictable to a given season and is dependent upon highly localized rain storms. This modifier was developed for use in the arid West for water regimes of Playa lakes, intermittent streams, and dry washes but can be used in other parts of the U.S. where appropriate. This modifier can be applied to both wetland and non-wetland situations. Equivalent to Cowardin's Intermittently Flooded modifier.

Krummholz - Growth form assumed by tree species at the upper treeline or in the alpine zone; characterized by a creeping and multi-stemmed growth pattern due to desiccation and physical damage caused by wind and blowing ice crystals near the upper treeline; the same species grows as an erect, single-stemmed tree at lower elevation.

Landscaped Urban/Suburban/Rural - Areas consisting of partially or entirely planted vegetation which is intensively managed for aesthetics, erosion control, horticultural, and/or recreation. Examples include vegetated areas around residential dwellings, industry, golf courses, transportation right-of-ways, and nurseries.

Legend - The list of classification types that are portrayed on a map. The legend will contain a subset of the total classes in the overall classification standard.

Lichen - An organism generally recognized as a single plant that consists of a fungus and an alga or

cyanobacterium living in symbiotic association.

Life Form (growth form) - A classification of plants based upon their size, morphology, habit, life span, and woodiness.

Lignified - A plant with woody tissue developed by secondary cell wall thickening by lignin and cellulose.

Low Forb - A broad-leaved herbaceous plant usually less than 1 meter or 3 feet tall when inflorescences are fully developed.

Lowland - A large land area with vegetation reflecting limits set by regional climate and soil/site conditions; an area where elevation is not the primary gradient affecting vegetation zonation.

Matted - A creeping plant that by reiterative growth has overlapping stems and forms a low, dense ground cover.

Medium-tall Grassland - Graminoid-dominated vegetation usually between 0.5 to 1 meter or 1.5 to 3 feet tall when inflorescences are fully developed in temperate zones and to 2 meters or 6 feet in tropical zones.

Metadata - Data about data. This describes the content, quality, condition, and other characteristics of data. Its purpose is to:

- help organize and maintain a organization's internal investment in spatial data,
- provide information about an organization's data holdings to data catalogues, clearinghouses , and brokerages, and
- provide information to process and interpret data received through a transfer from an external source.

Microphyllous - A plant with small leaves; individual leaf surface areas are less than 500 square millimeters or one square inch.

Mixed Evergreen-deciduous - Vegetation in which evergreen and deciduous species each generally contribute 25-75% to the total canopy cover.

Mixed Evergreen Deciduous Cover - A class of vegetation types where trees (or shrubs) are the dominant life form and neither deciduous nor evergreen species represent more than 75% of cover present.

Montane - The zone in mountainous regions where the influence of altitude (vertical relief) results in local climatic regimes that are sufficiently different from those in the adjacent lowlands as to cause a complex vertical climate-vegetation-soil zonation; includes vegetation at the base of a mountain when it is different from lowland vegetation.

Natural/Semi-natural - Areas dominated by native or established vegetation that has not been cultivated or treated with any annual management or manipulation regime. In cases where it cannot be assessed whether the vegetation was planted or cultivated by humans, the vegetation is considered "Natural/Semi-Natural."

Needle-leaved - A plant with slender, elongated leaves; for example, pine and fir trees (Pinus and Abies).

Non-agricultural Disturbed Areas - Areas with little or no vegetation which have been disturbed by human activity other than for the production of agricultural crops. Examples include areas such as construction sites for urban and residential, mining operations, and landfills.

Non-vascular - Bryoids and lichens dominate with generally at least 25 % canopy cover, while trees, shrubs, dwarf shrubs, and herbs generally make up less than 25% cover. In some regions, non-vascular cover may exceed trees, shrubs, dwarf shrubs, and herbs and be less than 25% of the total cover.

Non-vascular Plant - A plant without specialized water or fluid conductive tissue (xylem and phloem); includes bryophytes, lichens, and algae.

Non-vascular Vegetation - Vegetation that is dominated by bryophytes and lichens, generally forming at least 25% cover, with other vegetation forming less than 25% cover; nonvascular cover may be less than 25% in cases where the cover of each of the other life forms present is less than 25% and nonvascular cover exceeds the cover of other life forms.

Non-vegetated - A class with less than 1 % of the surface area with vegetation cover naturally or from which vegetation is removed and replaced by man (human)-made surfaces or structures.

Open Tree Canopy - A class of vegetation types dominated by trees with crowns not touching, generally forming 25-60% cover. In rare cases, tree cover may exceed the combined cover of shrubs, dwarf shrubs, herbs and non-vascular plants and be less than 25% of the total cover.

Orchards and Groves - Areas dominated by fruit or nut trees planted on a regular and generally consistent row and plant spacing. Stands are planted for the purpose of producing a fruit or nut crop. Examples include areas used for the production of apples, peaches, oranges, pecans, walnuts, cherries, and bananas.

Order - This is a the next level in the hierarchy under Division. The Orders within the Vegetated Division are generally defined by dominant life form (tree, shrub, dwarf shrub, herbaceous, or non-vascular).

Pavement - A relatively flat surface of consolidated material, generally exposed bedrock.

Perennial - Plant species with a life-cycle that characteristically lasts more than two growing seasons and persists for several years.

Perennial Forb Close-Grown Crops - Perennial forbs which are drill-seeded or broadcast. Examples include alfalfa, clover, and lespedeza.

Perennial Forb Row Crops - Perennial forb vegetation planted in rows on a regular and generally consistent row and plant spacing. Examples include strawberries.

Perennial Grass Crops (hayland, pastureland) - Areas of dominantly perennial grasses, either native or non-native species, planted and/or intensively managed as pure or mixed-species stands. Stands often managed for the production of feed or seed, or are grazed. Examples include hayland, pastureland, and native pasture.

Perennial Herbaceous Vegetation - Associations that persist for several years and are dominated by herbaceous

species.

Permanently Flooded - Water that covers the land surface at all times of the year in all years. Equivalent to Cowardin's (1979) "permanently flooded".

Permanently Flooded-tidal - Salt water that covers the land surface at all times of the year in all years. This modifier applies only to permanently flooded areas irregularly flooded by fresh tidal water. Equivalent to Cowardin's (1979) "permanently flooded/tidal".

Physiognomic Class - A level in the classification hierarchy defined by the relative percent canopy cover of the tree, shrub, dwarf shrub, herb, and nonvascular life form in the uppermost strata during the peak of the growing season.

Physiognomic Group - A level in the classification defined by a combination of climate, leaf morphology, and leaf phenology. Different variables are applied to this hierarchical level in the sparsely vegetated class.

Physiognomic Subclass - A level in the classification determined by the predominant leaf phenology of classes defined by tree, shrub, or dwarf shrub stratum (evergreen, deciduous, mixed evergreen-deciduous), and the average vegetation height for the herbaceous stratum (tall, medium, short). Different variables are applied to this hierarchical level in the sparsely vegetated class.

Physiognomy - The structure and life form of a plant community.

Plantations - Areas dominated by trees planted on a regular and generally consistent row and plant spacing. Stands are planted for the purpose of producing a crop of timber, Christmas trees, or other products. Examples include planted hardwood and softwood timber stands.

Planted/Cultivated - Areas dominated with vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation. The majority of vegetation in these areas is planted and/or maintained for the production of food, feed, fiber, or seed. This includes:

- vegetation planted in built-up settings, for recreation, erosion control, or aesthetic purposes,
- all areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, cotton, wheat, and rice,
- grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops,
- orchards, vineyards, and tree plantations planted for the production of fruit, nuts, fiber (wood), or ornamental. In cases where one can not assess whether it was planted by humans (e.g., some mature forests), the vegetation is consider "natural/semi-natural."

Plurality - The plant species that has the most numerous numbers on a site.

Polar - Geographically, the areas within the Arctic and Antarctic circles in which the sun is entirely not visible for six months and is constantly above the horizon for the next six months; climatically, polar regions are characterized by the lack of a period of warmth and by enduring cold; in polar climates the average temperature of

each month is below 10* C (50* F).

Pulvinate Mosses - Mosses growing in cushion-like mats or clumps.

Rainforest - Vegetation in frost-free areas dominated by trees that are always wet from rain.

Repeatable Patterns of Assemblages - see Cover Type

Revolute - Rolled toward the lower surface of a leaf.

Rosulate - A plant with leaves arranged in rosettes (circular clusters).

Rounded-crowned - A needle-leaved evergreen tree with a basically semi-circular canopy or life form; for example, whitebark pine and alligator juniper (*Pinus albicaulis* and *Juniperus deppeana*).

Saltwater - Water with a salinity of greater than 30 parts per thousand.

Saturated - Surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season. Equivalent to Cowardin's (1979) Saturated modifier.

Scale-leaved - A plant with small, overlapping leaves that usually lie flat on the stem; for example, eastern redcedar and western redcedar (*Juniperus virginiana* and *Thuja plicata*).

Sclerophyllous - A plant with usually evergreen leaves that are stiff and firm and retain their stiffness even when wilted; they are common in, but not restricted to, regions with a long summer drought and predictable yet limited winter rain.

Scree - A sheet of coarse rock debris covering a mountain slope without an adjacent cliff.

Scrub - Vegetation dominated by shrubs, including thickets.

Seasonal - Showing periodicity related to the seasons; applied to vegetation exhibiting pronounced seasonal periodicity marked by conspicuous physiognomic changes.

Seasonal Evergreen Vegetation - Associations in which most of the upper canopy plants retain leaves year-round and drop some leaves during unfavorable seasons.

Seasonally Flooded - Surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is very variable, extending from saturated to a water table well below the ground surface. Includes Cowardin's (1979) Seasonal, Seasonal-Saturated, and Seasonal Well Drained modifiers.

Semi-arid - A climatic region having an annual precipitation, usually between 25.4 and 50.8 centimeters or 10 and 20 inches, that is higher than a truly arid climate; typically, vegetation is composed of grasses with or without woody plant layers.

Semi-deciduous Vegetation - Associations (usually tropical and subtropical) in which most of the upper canopy trees are drought-deciduous and many of the understory trees and shrubs are evergreen. The evergreen and deciduous woody plants are not always separated by layers.

Semi-evergreen Vegetation - Associations in which evergreen and deciduous species each generally contribute 25-75% of total tree cover; specifically, this term refers to tropical and subtropical vegetation in which most of the upper canopy trees are evergreen mixed with drought-deciduous trees.

Semi-permanently Flooded - Surface waters persists throughout growing season in most years except during periods of drought. Land surface is normally saturated when water level drops below soil surface. Includes Cowardin's (1979) Intermittently Exposed and Semi-permanently Flooded modifiers.

Short Grassland - Graminoid-dominated vegetation usually less than 0.5 meters or 1.5 feet tall when inflorescences are fully developed.

Shrubland - A class of vegetation defined by areas dominated by shrubs generally greater than 0.5 m tall with individuals or clumps not touching to interlocking. Shrub canopy cover is generally greater than 25% while tree cover is generally less than 25%. In rare cases, shrub cover exceeds the tree, dwarf shrub, herb, non-vascular plant cover and is less than 25% cover.

Shrubs - Woody plants greater than 0.5 m in height that generally exhibit several erect, spreading, or prostrate stems; and have a bushy appearance. In instances where life form cannot be determined, woody plants greater than 0.5 m in height, but less than 5 m in height will be considered shrubs.

Sod Grass - A life form of graminoids that tends to develop a solid mat of grass, sedge, etc. over the ground by vegetative increase of rhizomes or stolons; resulting vegetation generally has few spaces between plants.

Sparsely Vegetated - A class of vegetation types that are defined as having a surface area with 1-10% vegetation cover over the landscape at the peak of the growing season.

Stomata - Pores or openings for gas exchange that are generally concentrated on leaf surfaces.

Subalpine - Upper mountain vegetation immediately below the cold limits of tree and tall shrub growth.

Subdesert - An area of xerophytic shrubby vegetation with a poorly-developed herbaceous layer.

Subgroup - A level of the hierarchy that splits Natural/Semi-Natural vegetation types from the Planted/Cultivated vegetation types.

Submontane - An area where the influence of altitude (vertical relief) does not result in local climate regimes that are sufficiently different from the adjacent lowlands as to cause a complex vegetation-climate-soil zonation; generally includes the foothills of a mountain range; the lowland vegetation at the base of a mountain that displays vegetation zonation.

Subpolar - Geographically, the region immediately equator-ward of the Arctic and Antarctic circles; climatically,

winters are long and extremely cold, and summers are very short; only one month per year has a monthly average warmer than 10* C (50* F); as a rule, the ground is completely covered by snow for at least half a year; the region between the tundra and cold temperate forests or steppes.

Subtropical - Pertains to areas within tropical regions with variable (seasonal) temperature and moisture regimes; climatically, it has seasonal variation marked by dry/wet seasons rather than cold/hot seasons; parts of this region are subject to sub-0* C (32* F) temperatures but rarely have freezing periods of 24 hours or longer; in the United States this term includes southern Florida and the southern tip of Texas.

Succulent - A plant with fleshy stems or leaves with specialized tissue for the conservation of water; a xeromorphic strategy for tolerating long periods of drought.

Suffruticose - A somewhat shrubby plant in which the upper vegetative and flowering shoots die back to leave only the lower parts to survive unfavorable seasons.

Synusia - An association of plant species with a similar life form and similar ecological requirements occurring together in the same habitat; sometimes called a "union"; most habitats are occupied by several synusiae, which may grow above each other in layers, beside each other, or in mixture; for example, an open tree synusia or layer over a grass-dominated synusia or layer.

Tall Forb - Broad-leaved herbaceous plants usually greater than 1 meter or 3 feet tall when inflorescences are fully developed.

Tall Grassland - Graminoid-dominated vegetation usually over 1 meter or 3 feet tall when inflorescences are fully developed in temperate zones and greater than 2 meters or 6 feet in tropical zones.

Talus - A sloping accumulation of coarse rock fragments at the base of a cliff.

Temperate - A geographically, the region between the polar and tropical regions; climatically, the region is moderate with distinct seasons of alternating long, warm summers and short, cold winters.

Temporarily Flooded - Surface water present for brief periods during growing season, but water table usually lies well below soil surface. Often characterizes flood-plain wetlands. Equivalent to Cowardin's (1979) Temporary modifier.

Tidally Flooded - Areas flooded by the alternate rise and fall of the surface of oceans, seas, and the bays, rivers, etc. connected to them, caused by the attraction of the moon and sun [or by the back-up of water caused by unfavorable winds].

Trees - Woody plants that generally have a single main stem and have more or less definite crowns. In instances where life form cannot be determined, woody plants equal to or greater than 5 m in height will be considered trees.

Treeline - A zone where the normal growth of trees is limited; cold temperatures often combined with drought form the upper or arctic treeline, and drought combined with hot temperatures form lower or arid treeline.

Tropical - Geographically, the area between the Tropic of Cancer (23 27' N) and the Tropic of Capricorn (23 27' S), which includes tropical montane and alpine zones; climatically, the tropics are described as either the equatorial limits of freeze or, in temperate marine locations without freezing, the 65* F isotherm for the coldest month of the year; generally, tropical regions are characterized by high mean temperatures, small annual variation in temperature, and abundant rainfall throughout the year, although mountainous areas within the tropics are more variable.

Tuft-tree - Woody plant with large leaf-fronds or rosulate branches at the tips of major trunk(s); for example, palms and tree ferns.

Tundra - The treeless region north of the Arctic Circle (arctic tundra) or above the treeline of high mountains (alpine tundra) and on some sub-Antarctic islands; characterized by very low winter temperatures, short cool summers, permafrost below a surface layer subject to summer melt, short growing season, and low precipitation.

Tussock - Graminoid life form consisting of bunch-like tufts, sometimes more than 1 meter or 3 feet tall, in which the hard, old, withered leaves are intermingled with the fresh, young, green leaves.

Vascular Plant - Plant with water and fluid conductive tissue (xylem and phloem); includes seed plants, ferns, and fern allies.

Vegetated - Areas having equal to or greater than 1% or more of the land or water surface with live vegetation cover at the peak of the growing season.

Vegetation - The collective plant cover over an area.

Vegetation Cover - Vegetation that covers or is visible at or above the land or water surface. It is a sub-category of Earth cover. The percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants.

Vegetation Data - The attributes of the vegetation that are used to classify and characterize the vegetation type and to map a vegetation stand. These data come from the interpretation of remotely sensed imagery, field work, and other thematic data sources.

Vegetation Stands - Contiguous areas that are homogenous with respect to the current condition of vegetation; that is, these are plant communities possessing sufficient uniformity in regard to composition and structure to be clearly different from adjacent areas.

Winter-rain - A climatic regime characterized by precipitation that occurs mostly as rain during cool winters that alternate with dry, hot summers; often associated with sclerophyllous vegetation.

Woody Plant - Plant species life form with woody tissue and buds on that woody tissue near or at the ground surface or above; plants with limited to extensive thickening by secondary woody growth and with perennating buds; includes phanerophytes and chamaephytes of Raunkier.

Woody - Containing lignified plant tissue.

Xeromorphic (Scleromorphic) - Having structural characteristics common among plants adapted to drought, i.e., small thick leaves with sunken stomata or revolute margins, surfaces that are heavily pubescent, waxy or highly reflective and small vein islets.