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The Alaska U.S. National Vegetation Classification: Synopsis of a workshop review of macrogroups, groups, and alliances



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USNVC PROC-XX

PROCEEDINGS OF THE U.S. NATIONAL VEGETATION CLASSIFIATION

Ecological Society of America

The USNVC Partnership and the Federal Geographic Data Committee Vegetation Subcommittee

https://www.fgdc.gov/organization/working-groups-subcommittees/vsc/index_html

The USNVC is a partnership through the Federal Geographic Data Committee Vegetation Subcommittee, chaired by the USFS (Carol Spurrier, Linda Spencer Cochairs). Partners include federal agencies, NatureServe and the Ecological Society of America.

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We thank LANDFIRE and Bureau of Land Management for providing support for the workshop. (L13AC00286, Supplement 0003). We especially thank Henry Bastian for his commitment to the development of the USNVC through workshops like this one. The U.S. Forest Service graciously hosted the workshop in Anchorage, and we thank Beth Schulz and Tina Boucher for their hospitality. We are grateful for the many professional ecologists from federal, state, and academic institutions and organizations who participated in the workshops. A participants list is provided in the report.

When it came to the task of producing a final report that summarized the results of the workshop, we were fortunately to have Erin Lunsford Jones apply her skills to not only copedit the text, but to improve the report's overall structure and coherence. We are grateful for her work.

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EXECUTIVE SUMMARY

As a scientific standard, and as a tool for both federal and nonfederal agencies, organizations, and scientists, the U.S. National Vegetation Classification (USNVC) is becoming an important ecological vegetation classification that helps provide basic and consistent information on the status and trends of the nation's vegetation and ecosystems. It is supported by the Federal Geographic Data Committee (FGDC) Vegetation Subcommittee (comprised of participating federal agencies), NatureServe, and the Ecological Society of America (ESA). Together these partners have used their scientific and applied expertise to put in place a flexible and innovative data standard for vegetation classification, using the EcoVeg approach that forms the scientific basis for the USNVC.

We present the results of a workshop in Anchorage Alaska, Nov. 7-9, 2017, in which the participants were organized into three teams—Arctic & Alpine, Boreal, and Coastal Pacific (hereafter Coastal)—to review existing macrogroups and groups and revise as needed based on expert knowledge, maps, and available publications.

We first outline the criteria that guide the development of the Macrogroup, Group and Alliance levels. Then we explain how an expert-driven process has been used to develop initially the content of the mid levels, using a series of workshops across the country. We describe how the expert-driven process includes an integration of existing literature (thereby building on prior published types), some regional quantitative analyses, extensive vegetation mapping information (particularly in the Arctic and Boreal regions), and collaboration with international classification efforts (including circumpolar Arctic Vegetation Classification and Canadian NVC). All concepts and types were peer reviewed at a three-day workshop, November 7-9, 2017, administered by the ESA USNVC Review Board (hereafter Board). Based on peer review feedback, the Board, working with NatureServe staff, revised as needed (added, deleted or changed) the type concepts. An editorial review process was also completed, where types were reviewed to ensure consistency within and across levels. All types are described using a standard USNVC description template.

In addition to reviewing and revising macrogroup and group concepts, which were available from a 2011 workshop, the workshop participants also drafted alliance concepts, recognizing that lack of definitive association concepts would prevent final resolution. Coastal units already had some accepted association and alliance concepts, and these were revised as needed, along with group revisions.

A tally of types by USNVC hierarchy level is provided in the summary table below. The number is now comprehensive for all levels except association, which remains the one level needing substantial work outside of the Coastal region.

Tally of Alaskan vegetation types by USNVC hierarchy level

Level	No of Types
1. Class	5
2. Subclass	7
3. Formation	16
4. Division	20
5. Macrogroup	31
6. Group	68
7. Alliance	157
8. Association	96*

*The association level was not addressed at the workshop and is very incomplete.

At this time, all 31 macrogroups and 69 Groups in Alaska have been peer reviewed and many have complete descriptions. Many alliance concepts do not have descriptions, nor have association concepts been completed for all of them. This remains an ongoing need for Alaska. A comprehensive report that is attached to this proceedings provides the types and descriptions for all macrogroups, groups, and alliances, where completed. All USNVC types and descriptions, where available, are published on the usnvc.org website.

Development of the USNVC includes international input. NatureServe has worked with partners to promote an International Vegetation Classification (IVC). As U.S. ecologists test and peer review the USNVC, its partners hope that, through coordination with partners of the IVC, and in Canada with the CNVC, we will also contribute to a comprehensive global classification of vegetation. Currently, all USNVC types for Alaska have been integrated into the IVC, whose content is available on NatureServe Explorer (explorer.natureserve.org).

Our vision for the USNVC is that types be based on range-wide vegetation plot data. Existing data are being compiled and new plot data are being collected around the state. Over time, we hope that the partners in Alaska will be able to coordinate efforts and refine the vegetation type concepts provided here.

INTRODUCTION

As a scientific standard, and as a tool for both federal and nonfederal agencies, organizations, and scientists, the U.S. National Vegetation Classification (USNVC) is an important ecological classification that helps provide basic and consistent information on the status and trends of the nation's vegetation and ecosystems. It is supported by the Federal Geographic Data Committee (FGDC) Vegetation Subcommittee (comprised of participating federal agencies), NatureServe, and the Ecological Society of America (ESA). Together these partners have used their scientific and applied expertise to put in place a flexible and innovative data standard for vegetation classification, using a physiognomic-floristic-ecologic approach (Jennings et al. 2009, Faber-Langendoen et al. 2014, ESA Panel 2015, Faber-Langendoen et al. 2016).

Development of the classification in Alaska is preferably based on standardized ground data, including vegetation plot data that are systematically analyzed and classified into types based on vegetation and ecological information. In the past decade, various partners have initiated projects that should lead to a growing accumulation of vegetation plots. Some of these analyses have already helped improve the USNVC (Boucher et al. 2016). The Alaska Geospatial Council, Vegetation Technical Working Group (http://agc.dnr.alaska.gov/vegetation.html) is coordinating efforts across agencies, universities, and other partners, with a special focus on standardized vegetation map producs.

At this time, the development of the classification still relies largely on expert judgement coupled with the available information described above. Input from experts across such a large area is best done using workshops, where the peer review input happens through preparatory materials, face-to-face dialogue, and post meeting review. For that reason, we have been conducting a series of workshops in Alaska that builds on the work of Viereck et al. (1992) and many other local or regionally based vegetation classifications (e.g., Boggs and Sturdy 2005).

This document first briefly describes the Alaska Vegetation Classification (AVC) that was published by Viereck et al. (1992), followed by an introduction to the EcoVeg approach that uses the USNVC classification. It then explains how the mid-level types of the revised hierarchy (especially macrogroup, group, and alliance) were reviewed and revised at a workshop in Anchorage, Alaska on November 7-9, 2017 followed by team-based webinars in the spring of 2018. The process was overseen by the USNVC Review Board, which maintains the USNVC through a dynamic, peer-review-based process directed by ESA, with data management by NatureServe staff, all under the auspices of the FGDC Vegetation Subcommittee.

THE ALASKA VEGETATION CLASSIFICATION

The Alaska Vegetation Classification (AVC) presented by Viereck et al. (1992) is a comprehensive, statewide system that was developed between 1976-1992. The classification was based, as much as possible, on the characteristics of the vegetation itself and is designed to categorize existing vegetation, not potential vegetation. But occasionally, habitat features (such as substrate characteristics) were used to clarify type concepts. A hierarchical, nested system with five levels of resolution was used for classifying Alaska vegetation. The system is agglomerative, starting with 888 known Alaska plant communities, which were listed and referenced. At the broadest level of resolution, the system contains three formations—forest, scrub, and herbaceous vegetation. In addition to the classification, the report contains a key to levels I, II, and III; complete descriptions of all level IV units; and a glossary of terms used.

The specific classification approach used by the Alaska Vegetation Classification is "physiognomic-floristic." The top two levels are strictly physiognomic (e.g. level 1 has 3 units: Forest, Scrub, Herbaceous), the 3rd level is strongly physiognomic but occasionally includes genera reflective of physiognomy (e.g., dryas dwarf scrub, Ericaceous dwarf scrub, Willow dwarf scrub), the fourth level is typically defined by dominant-codominant species in the dominant stratum, and the fifth level is defined by floristic composition across multiple strata. Descriptions are provided for each unit in the top four levels; the fifth level is a list of all published floristic types that fall within level 4.

The Alaska Vegetation Classification has been a foundational classification for cataloguing the wide diversity of Alaskan vegetation types. The classification facilitated mapping many parts of the state through rigorous definitions of the physiognomic and dominant species at each of the four levels. It also provides the basis for ongoing development of fire fuel models (e.g. Alaska Fuel Model Guide Task Group 2018).

Viereck et al. (1992) refer to their classification as a "natural, rather than an artificial classification" because it is designed to serve many needs, rather than a narrowly-defined need. However, by relying strongly on relatively narrowly-defined physiognomic criteria in the top three levels (e.g., level 2 distinguishes between Needleleaf, Broadleaf and Mixed forest, and level 3 separates closed forest, open forest and woodland), it fails to adequately place closely-related types next to each other, while lumping unrelated types together. Thus e.g. White spruce in 1.A.1. Closed needleleaf forest is separated from White spruce mixed forest in 1.C.1. Mixed forest. Further, 1.A.1 contains all closed needeleaf forests, whether temperate rainforests, boreal forests, floodplain forests, or alpine forest. No consideration is given to ecological and biogeographic relationships of the vegetation. These are not external to the vegetation; rather, they are relationships among vegetation types that give consideration to the combination of physiognomic, ecological and biogeographic patterns reflected in the vegetation. It is this wider canvas of criteria (ecological and biogeographic relationships of vegetation) that are provided in the EcoVeg approach of the U.S. National Vegetation Classification (USNVC).

THE U.S. NATIONAL VEGETATION CLASSIFICATION

THE USNVC HIERARCHY

The USNVC Standard provides a standard hierarchy with explicit criteria for each level (Table 1). The details of the criteria have been published elsewhere (Faber-Langendoen et al. 2014, 2016, 2018). An example of the hierarchy as it applies to an already-published vegetation type found in Alaska is provided in Table 2. The upper levels of the classification integrate physiognomy and ecology into large-scale, biome-type concepts called formations and divisions (Fig. 1).

Table 1. Summary of USNVC Hierarchy Levels and Criteria for Natural Vegetation (from FGDC 2008).

Hierarchy Level	Criteria
Upper:	**Physiognomy plays a predominant role**
L1 – Formation Class	Broad combinations of general dominant growth forms that are adapted to basic temperature (energy budget), moisture, and substrate/aquatic conditions.
L2 – Formation Subclass	Combinations of general dominant and diagnostic growth forms that reflect global macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate/aquatic conditions.
L3 – Formation	Combinations of dominant and diagnostic growth forms that reflect global macroclimatic factors as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions.
Mid:	**Floristics and physiognomy play predominant roles**
L4 – Division	Combinations of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
L5 – Macrogroup	Combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and subcontinental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
L6 – Group	Combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology, and disturbance regimes.
Lower:	**Floristics plays a predominant role**
L7 – Alliance	Diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.
L8 – Association	Diagnostic species, usually from multiple growth forms or layers, and more narrowly similar composition that reflect topo-edaphic climate, substrates, hydrology, and disturbance regimes.

Table 2. Example of the USNVC Hierarchy for Natural Vegetation.

Revised Hierarchy for Natural Vegetation	Example
Upper Levels	
1 – Formation Class	**Scientific Name:** Mesomorphic Tree Vegetation Colloquial Name: Forest and Woodland
2 – Formation Subclass	**Scientific Name:** Temperate Forest Vegetation Colloquial Name: Temperate Forest
3 – Formation	**Scientific Name:** Cool Temperate Tree Vegetation Colloquial Name: Cool Temperate Forest
Mid Levels	
4 – Division	**Scientific Name:** *Pseudotsuga menziesii – Tsuga heterophylla – Tsuga mertensiana* Forest & Woodland Division (D192) Colloquial Name: Vancouverian Forest & Woodland
5 – Macrogroup	**Scientific Name:** *Tsuga heterophylla – Picea sitchensis – Sequoia sempervirens* Rainforest Macrogroup (M024) Colloquial Name: Vancouverian Coastal Rainforest
6 – Group	**Scientific Name:** *Tsuga heterophylla – Picea sitchensis* Alaskan Rainforest Group (G750) Colloquial Name: Alaska Maritime Western Hemlock – Sitka Spruce Rainforest
Lower Levels	
7 – Alliance	**Scientific Name:** *Picea sitchensis / Oplopanax horridus* Forest Alliance (A3603) Colloquial Name: Sitka Spruce / Devil's-club Forest
8 – Association	**Scientific Name:** *Picea sitchensis / Oploplanax horridus / Dryopteris campyloptera* Forest (CEGL003259) Colloquial Name: Sitka Spruce / Devil's-club / Mountain Woodfern Forest

Figure 1. Vegetation type map of Alaska (Viereck et al. 1992), showing upland terrestrial biome-scale units that are largely equivalent to the USNVC https://esa.org/vegpanel/usnvc/usnvc-proceedings/types. The macrogroup, group and alliance concepts are placed within these divisions units, providing ecologically-based mid-scale vegetation types for the state.

MID-LEVEL CONCEPTS

The macrogroup (L5), group (L6), and alliance (L7) levels of the USNVC are the main focus of this report. All, preferably, need to be defined by characteristics that can be derived from standard field plots and accepted analytical methods. They are often best developed when lower level units of association are available, but they contain their own criteria sufficient to allow users to develop the concepts somewhat independently of other levels. This approach best brings together the broader ecological tradition of vegetation description and classification, where multiple approaches to classification have been used, and where units comparable in scale to these levels have long been recognized.

Macrogroup (L5): A vegetation type defined by "moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes" (FGDC 2008, cf. Pignatti et al. 1994).

A macrogroup definition should typically contain a moderately large set (dozens) of strongly diagnostic species that share a broadly similar physiognomy and ecology in response to continental, sub-

continental, or regional differences in ecological factors (Table 3). Thus, the macrogroup expresses the floristic, growth form and regional ecological factors that separate vegetation types within a division.

Group (L6): A vegetation type defined by "a relatively narrow set of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology, and disturbance regimes." As with the macrogroup, meeting this definition requires four conditions: characteristic taxa, physiognomy, ecology, and biogeography (Table 3). It is similar to the "order" level of the Braun-Blanquet hierarchy (Pignatti et al. 1994).

A group description should contain several to many diagnostic species that share a similar structure and ecology, responding to regional ecological factors, with many moderately differential species or two or more strongly differential (character) species (see Faber-Langendoen et al. 2014 for definitions). There should be several diagnostic species in the dominant stratum or growth form, but the diagnostic value is typically that of constancy and dominance. Several dominant growth forms are consistent throughout the type. There may be some variation in dominant overstory species where overall floristics and ecology are otherwise quite similar (e.g., a group could include sites with either subalpine larch or Engelmann spruce-subalpine fir as dominants because of their similar floristics, site factors and disturbance regimes).

The criterion of compositional similarity addresses the overall range of composition, rather than specific diagnostic species or dominants. Whereas for the macrogroup, presence/absence may play a strong role in discriminating among types (given the large number of species that are expected for macrogroup discrimination), for the group, the abundance of a set of dominant species along with other diagnostic species together play a stronger role in the characteristic species combination. As with macrogroups, a constant species in a group could occur in as few as 25% of plots or sites (Chytrý and Tichý 2003).

Alliance (L7): A vegetation type defined by "diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes."

The alliance is a more inclusive (or typologically higher-scaled) concept than the association; as such, it should be well separated floristically from other alliances by multiple diagnostic species (either by one or more character species or by many differential species) that have diagnostic value over large geographic areas (Mueller-Dombois and Ellenberg 1974). The alliance aggregates vegetation and habitat factors at somewhat broader biogeographic and ecologic scales than the association. That is, whereas the association contains vegetation characteristics that emphasize more local and narrowly-defined environmental and biotic relationships, the alliance emphasizes somewhat larger environmental gradients and biogeographic regions (Table 3).

Table 3. Interpretive Guidelines for Vegetation and Ecology Criteria for macrogroup, group, and alliance (from Faber-Langendoen et al. 2014, which contains guidelines for all levels). These are "typical" criteria, and the role of factors may differ for some types. The role of ecological factors at each level may also differ depending on the site conditions; e.g., at the macrogroup and group levels, the substrate factors on "atypical" or "azonal" wet or dry sites may more strongly influence vegetation patterns than do mesoclimates, which may more strongly influence vegetation on "typical" or "zonal" or characteristic mesic upland sites.

Level	Definition (FGDC 2008)	Biogeography / Floristics	Diagnostic Species	Growth Forms	Climate	Disturbance regime / Succession	Edaphic/Hydrology
Macrogroup	A vegetation unit that contains moderate sets of diagnostic plant species and diagnostic growth forms that reflect subcontinental to regional biogeographic composition and sub-continental to regional mesoclimate, geology, substrates, hydrology, and disturbance regimes.	Sub-continental to regional ecological gradient segment (often mesoclimatic), reflected by sets of strongly diagnostic species (many species ranges fully contained); overall composition very distinct from other units.	Multiple sets of strong diagnostic species, including many strong differential and character species. Constant species become more important; at least 25% constancy expected.	Broadly uniform sets of growth forms and canopy closure – may be specific growth form variants that support floristic patterns, e.g., herb versus shrub, coastal soft-leaved chaparral versus inland sclerophyll chaparral.	Sub-continental mesoclimate – indicative of primary regional gradients in vegetation, e.g., latitudinal, altitudinal, continentality [major zonal or strong azonal gradients].	Broadly consistent, but variable disturbance regimes indicative of sub-continental climate (e.g., floods, large-scale fires).	Broad range of conditions, sometimes reflective of broad topo-edaphic interactions with climate (e.g., large-scale droughty soils with or without fires), or broad-scale specialized geological substrates.
Group	A vegetation unit that is defined by a relatively small set of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology, and disturbance regimes.	Regional ecological gradient segment (often broadly topo-edaphic) reflected by a set of moderately diagnostic species (at least a few species ranges fully contained); overall composition broadly distinct from other units.	A set of moderately strong diagnostic species, preferably with one or more strong differentials or character species. Constancy of at least 25% expected for some species.	Moderately uniform growth forms and canopy closure, (e.g., varying from evergreen to deciduous and open to closed canopy).	Regional mesoclimate – could indicate secondary regional gradients (depends upon selected primary gradient for macrogroup).	Moderately consistent disturbance regime; may incorporate successional stages that are otherwise floristically similar.	Moderate range of variation in specific topo-edaphic or hydrologic conditions.

Level	Definition (FGDC 2008)	Biogeography / Floristics	Diagnostic Species	Growth Forms	Climate	Disturbance regime / Succession	Edaphic/Hydrology
Alliance	A vegetation classification unit containing one or more associations, and defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation. Alliances reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.	Regional to sub-regional gradient segment (often more narrowly topo-edaphic or biogeographic), reflected by at least several moderate diagnostic species, including from the dominant strata; overall composition moderately distinct from other units.	Several or more moderate diagnostic species, preferably including at least one strong differential (character species may be absent). Constant species more important for defining type, with at least 40% constancy expected.	Moderately uniform growth forms and canopy closure, at least in the dominant layer (e.g., conifer + mixed hardwood, other layers may vary from shrub to herb or moss-dominated ground layers with either open or closed canopy).	Regional to sub-regional topo-edaphic factors, sometimes reflective of biogeography and climate.	Moderately specific disturbance regime – may group successionally related associations.	Moderately specific edaphic or hydrologic conditions, e.g., dry, dry-mesic, mesic, wet-mesic, wet moisture conditions and poor, moderate, moderately rich, rich nutrient conditions.

DYNAMIC PEER REVIEW

The revised USNVC Standard (FGDC 2008) presents a process to be used to create a dynamic content for all vegetation types in the classification. The standard itself does not contain a formal set of USNVC units, but rather describes the process by which such units are to be described, peer reviewed, and maintained through various data management and web tools. This means that the classification is dynamic, subject to change as vegetation scientists revise or newly describe vegetation types in the United States.

The peer-review process approved for the USNVC classification is made within the context of current classification standards, such that the resulting units continue to form a comprehensive and authoritative list(FGDC 2008). That is, at any given time, the types are all consistently matched with each other, and users of the USNVC will be able to access a consistent and current classification. This classification is now managed through peer review as an open process conducted by professional organizations in collaboration with other interested parties. It is administered by a peer-review board under the aegis of an institution capable of providing independent reviewers of appropriate experience in plant community classification. The Ecological Society of America, on behalf of the USNVC partners, plays a key role in guiding the screening and peer review that is needed to maintain the USNVC across all levels. NatureServe staff manage the USNVC classification content and USGS publishes the content on usnvc.org.

USNVC AND RELATED CLASSIFICATIONS

Much previous work has been done to describe vegetation and ecosystem types at scales comparable to the macrogroup, group, and alliance. We drew heavily on this literature wherever possible to help provide the descriptive material for our work, citing previous concepts as the basis for our concepts whenever there was at least 50% correspondence between the original concept and that of the proposed USNVC units.

Braun-Blanquet Approach

We have already noted the similarity of the macrogroup and group concepts to the ‘class’ and ‘order’ of the Braun-Blanquet approach, widely applied throughout Europe and elsewhere. Several researchers have developed units at this scale to the United States and Canada (e.g., Peinado et al. 1997, Rivas-Martínez et al. 1999, Spribile 2002). In British Columbia, where a similar approach to that of Braun-Blanquet has been used, a comprehensive set of classes and orders has been described for most vegetation (Meidinger et al. 2003).

North American Biotic Communities

Brown et al. (1998) published an impressive comprehensive list of 'biotic communities' for all of North America (including Central America), and the scale of these units is at the level of macrogroup and group. However, the publication provides only a list of types and a map of their distribution across North America, but no descriptions.

Ecological Systems

The "Terrestrial Ecological System" classification was completed by NatureServe for the United States (Comer et al. 2003). Terrestrial Ecological Systems are defined as "a group of plant community types that tend to naturally co-occur within similar environmental settings, ecological dynamics, and/or environmental gradients" (Comer and Schulz 2007). Descriptions are available at https://explorer.natureserve.org/. Although developed as a single, non-hierarchical set of types, they have a fairly strong correspondence to the USNVC 'group' and sometimes 'alliance' level, insofar as they describe "existing vegetation" concepts. The two classifications are now tightly linked and interoperable. Starting in the early 2000s, the ecological systems have been adopted and used by US federal agencies, in part as a complement to the USNVC. The USGS Gap Analysis Program and LANDFIRE map products (which form the basis for planning by agencies such as the BLM, Forest Service, and states), incorporate Ecological System information. Ecological systems formed the basis for USGS Gap Analysis models for vertebrates, including habitat relationships to these types and vegetation structural stages for much of the U.S. Ecological Systems also provide the core concept to LANDFIRE for mapping biophysical settings (i.e., the geophysical settings which, along with the effects of natural disturbance, result in recurring mosaics of vegetation successional stages). They are used to characterize natural disturbance (including fire) regimes through state-and-transition models and subsequent maps of fire regime departure (e.g., shifting proportions of successional stages due to human alteration). Linkages between fuel types and ecological systems, as well as to the AVC and the USNVC, are helping to characterize fire dynamics across the Alaska landscape (Alaska Fuel Model Guide Task Group 2018).

METHODS FOR DEVELOPMENY OF MID-LEVEL TYPES

IMPLEMENTATION PHASES FOR DEVELOPING ALASKAN MID-LEVEL TYPES

Phase 1 (2008-2012) and the 2011 Alaska Workshop

The initial work on Alaskan Mid-level types was part of a country-wide project to draft an expert-based set of types for the entire country. In preparation for each workshop, draft lists of macrogroups and groups were developed, based on expert judgment, subsequent review of related concepts, and showing wherever possible their linkage to both NatureServe's Ecological Systems (especially relevant to LANDFIRE's interest) and, where they existed, to USNVC associations (where comprehensive lists for the entire country had already been published in 1998 and continuously updated on NatureServe Explorer).

The first workshop was conducted January 11-13, 2011, in Anchorage, Alaska, at the University of Alaska Anchorage, with attendees and contributors shown in Table 4.

Table 4. Attendees and peer review participants of the 2011 Alaskan USNVC workshop.

First Name	Last Name	Agency/Organization
Keith	Boggs	Uinversity of Alaska - Alaska Natural Heritage Program
Tina	Boucher	University of Alaska - Alaska Natural Heritage Program
Rob	DeVelice	U.S. Forest Service
Don	Faber-Langendoen	NatureServe
Scott	Guyer	Bureau of Land Management
Mark	Hall	NatureServe
Janet	Jorgenson	U.S. Fish and Wildlife Service – Arctic National Wildlife Refuge
Steve	Lennartz	Sanborn, CA GAP mapping, AK LANDFIRE BpS mapping
Del	Meidinger	Private Contractor
Barb	Schrader	U.S. Forest Service
Beth	Schulz	U.S. Forest Service
Jerry	Tande	U.S. Fish and Wildlife Service – National Wetlands Inventory

The workshop provided an early view of how a revised USNVC hierarchy, as specified in the FGDC (2008) Standard, could be developed for Alaska. The major focus of the workshop was on the macrogroup and group levels. The review was coordinated with parallel efforts to develop boreal forest macrogroup concepts in Canada through the Canadian National Vegetation Classification Technical Committee, to ensure a North American-wide perspective. But the work was a first test of the concepts; also, it did not develop alliance concepts.

After achieving a sufficient level of consensus on a working set of types, NatureServe's ecology staff imported the list of the types into Biotics, the USNVC database. Given the early stages of the USNVC development, literature information available on each Group may range from very qualitative to more quantitative.

Phase 2 (2012-2016) and Macrogroup Concept Review

Macrogroup descriptions that were briefly drafted as part of Phase 1 were more fully reviewed across the U.S. and Canada through the USNVC Review Board. This review led to a commitment to "lock down" the macrogroup concepts for a five year+ period in order to focus efforts on group, alliance, and association types. That said, because of the large territory of Alaska and the need for circumarctic input, Alaskan macrogroups were left open to change.

Phase 3 (2017-2020) and the Alaska Workshop 2017

The objective for the workshop was to finalize, through peer review, a comprehensive set of range-wide concepts for USNVC macrogroups and groups for Alaska, and to review the linkage of Ecological Systems to these concepts. The USNVC Review Board hosted a peer-review meeting to include both Alaskan and Canadian ecologists. At the meeting, NatureServe staff (acting in part on behalf of the ESA USNVC Review Board) and Alaskan ecologists would conduct the workshop. A list of all participants is provided in Table 5.

Table 5. Participants at the Alaskan USNVC workshop Nov 7-9, 2017, Anchorage, Alaska.

First Name	Last Name	Email	Agency/Organization
Jennifer	Barnes	Jennifer_Barnes@nps.gov	National Park Service
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A second objective for the workshop was to develop short- and long-term support for USNVC development by engaging Alaskan ecologists in a) facilitating peer review of USNVC products, and b) developing USNVC types (involving field data collection, literature review, data analysis and type description, and serving on the USNVC Review Board).

The process for conducting the workshop was as follows:

i. A series of webinars was held in September 2017 with key participants, in order to scope out key issues for review.
ii. USNVC classification documents were distributed to all workshop participants with the key issues for review (October 2017).
iii. The workshop was held on Nov 7-9, 2017, to review key issues and other identified issues.

a. The Editorial team facilitated review of the macrogroups and groups, recording proposed solutions identified by the workshop participants, and structuring the solutions based on the submissions format for the *USNVC Proceedings*.
b. Participants were divided by region (Arctic & Alpine, Boreal, Coastal).

iv. After the workshop, drafts of macrogroups, groups, and alliances were distributed to all participants for review.
v. A series of webinars was held in March-April 2018 with each regional team (Arctic & Alpine, Boreal, Coastal) to review products.
vi. Proposed revisions were submitted to the USNVC Data Manager for posting on usnvc.org (April-May 2018).
vii. Opportunities were identified to continue development of the USNVC for Alaska at alliance and association levels, based on plot-based data analyses and literature synthesis, with the goal of a future comprehensive publication of the USNVC for Alaska.

RESULTS AND DISCUSSION

A series of tabular lists of USNVC vegetation types and commentary are provided below to document the process that each of three teams (Arctic & Alpine, Boreal, and Coastal) followed in revising Alaskan vegetation types.

ARCTIC & ALPINE TEAM

Participants on the Arctic & Alpine Team are listed in Table 6. A summary of the review comments provided by members of the team is provided in Appendix I.

Table 6. Arctic & Alpine Team Participants, organized by Last Name.

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Tabular lists of USNVC vegetation types and commentary are provided below to document the process of revising Arctic and Alpine vegetation types.

Arctic Uplands Review

The initial list of Arctic upland types provided to the Arctic & Alpine Team for review is shown in Table 7.

Table 7. Initial list of Alaskan USNVC types within Arctic Tundra & Barrens (Division D044). Tundra groups are ordered from dry, dwarf-shrub tundra to mesic-moist tundra.

D044	Arctic Tundra & Barrens		
	M173	North American Arctic & Subarctic Tundra	
		G365	North American Arctic & Subarctic Lichen - Sparse Dwarf-shrub Tundra
		G366	North American Arctic & Subarctic Dryas Dwarf-shrub Tundra
		G367	North American Arctic & Subarctic Ericaceous Dwarf-shrub Tundra
		G614	North American Arctic & Subarctic Dwarf Willow Tundra
		G828	North American Arctic & Subarctic Dwarf Birch Tundra
		G827	North American Arctic & Subarctic Low Willow Tundra
		G615	North American Arctic & Subarctic Mesic Herb Tundra
		G829	North American Arctic & Subarctic Moist Tundra
		G371	North American Arctic & Subarctic Tussock Tundra
	M175	Arctic Cliff, Scree & Rock Vegetation	
		G375	North American Arctic Cliff, Scree & Rock Vegetation
		G616	North American Arctic Gravel Floodplain Vegetation

Arctic Uplands CommentsWe started with a basic macrogroup list of arctic and subarctic tundra, and identified the following issues:

1. At the macrogroup level, it didn't make sense to specify a North American biogeographic region from other regions in the Arctic (e.g. Beringian, Eurasian). Floristic analyses from the Circumarctic plot data do not support this.
2. Floristic analyses from Braun-Blanquet separate acidic from nonacidic/alkaline types at their highest level (Class is approximately equal to USNVC macrogroup). We discussed this approach a lot, but it ignores growth form/structural differences that, along with floristics, are part of the macrogroup concept. In addition, moisture is an important driver. And macrogroups should be relatively meaningful for mapping. It would be difficult to reliably map alkaline versus acidic. We considered a compromise by introducing acidic and nonacidic at the alliance level, and emphasizing broader floristics/growth forms and moisture at the group level. There is enough Arctic literature to bring in the community types under these alliances and see how well the alliances work. Current analyses by Wells (pers. comm. 2020) supports the approach of introducing alkaline versus acidic at the alliance level.
3. This approach also has the benefit of linking the USNVC group level to the CAVM (Circumpolar Arctic Vegetation Map) vegetation types and their mapped expressions (both Circumpolar and Alaskan maps).
4. Arctic open rock type looks ok, but the name may not capture the predominant pattern of open, flat rocky barrens.

Arctic Uplands Recommended Changes

1. Remove North American from macrogroup and group names. No associations had been identified before.
2. Change macrogroup names to **Arctic Dry-Moist Tundra** (from **North American Arctic & Subarctic Tundra - M173**) and **Arctic Scree, Rock & Cliff Barrens** (from **Arctic Cliff, Scree & Rock Vegetation - M175**).
3. For **Arctic Dry-Moist Tundra (M173)**: (see Table 8 for revisions)
    a. Adopt broad floristic/growth form/moisture criteria for Groups. Change group names to closely follow the Circumpolar Arctic Vegetation Map (CAVM) based on growth forms. (See new G896, G897 and G898.)
    b. Take current Groups and move them to the alliance level, introducing the alkaline and acidic distinction as needed.
    c. Bring in the many documented plant community types already catalogued by the Alaskan mapping team (Raynolds) and determine how well the draft alliances hold up.
    d. Alder low tundra type (G357 Western Boreal Mesic Alder - Willow Shrubland) does belong in boreal (where it currently is, Table 27), but that description should note that there are arctic extensions. For example, there are alder communities as far north as the Colville River delta. Perhaps there may need to be a place for an arctic alder group depending on if there are alder plant associations unique to the arctic.
    e. Draft plant community types will be refined into associations by the Alaskan Fairbanks team.
    f. M173/G365 focuses on sites where lichen cover is very high, often foliose. SW Alaska tundra has a lot of this stuff. (M173/G896/A4330, A4331 in revised table.)
    g. M175 has less foliose lichen, though crustose lichen cover may be high. This is the Arctic Lichen Barrens we are proposing (G868).
    h. Inland riverine sand dunes should be placed in the context of tundra. These are important environments with many endemic rare and sensitive plants, and are distinct from coastal dunes. See Arctic Inland Dune (G863), Table 14. [Editorial note: it was decided that for now, Arctic Inland Dune (G863) will reside in D146/M402.]
    i. Tussock Tundra will also include shrub tussock tundra, which has high enough cover of shrubs (typically willows and dwarf birch, but in some cases alder) that there could be confusion with G828 and G827 based on shrub cover alone. If there were a key to the group level, then tussock tundra needs to fall out near the top of the key with the cover of whole tussocks as an important criterion.
    j. At one time, G368 (formerly North American Arctic & Subarctic Tall Willow Riparian Shrubland Tundra) used to be in this macrogroup, but it has been moved to M870 based on Boucher et al. (2016).

4. For **Arctic Scree, Rock & Cliff Barrens (M175):**
    a. Consider splitting G375 into two groups, with carbonate versus noncarbonate alliances

        - **G375a [=G868] Arctic Lichen Barrens? [CAVM B1, B2, B3]**
        - **G375b [=G869] Arctic Open Scree, Rock & Cliff Barrens**

    b. Update **G616 Arctic Gravel Floodplain Vegetation** to note the early versus late seral.

Table 8. Revised Alaskan USNVC types within Arctic Tundra & Barrens (Division D044).

Revised Hierarchy					Formerly
D044	**Arctic Tundra & Barrens**				
	M173	**~~North American~~ Arctic ~~and Subarctic~~ Dry-Moist Tundra**			North American Arctic and Subarctic Tundra
		G896	**Arctic Dwarf-shrub Tundra**		G365, G366, G367, G614
			A4332	**Arctic Acidic Dryas Dwarf-shrub Tundra Alliance**	G366a
			A4333	**Arctic Nonacidic Dryas Dwarf-shrub Tundra Alliance**	G366b
			A4330	**Arctic Acidic Lichen - Sparse Dwarf-shrub Tundra Alliance**	G365a
			A4331	**Arctic Nonacidic Lichen - Sparse Dwarf-shrub Tundra Alliance**	G365b
			A4335	**Arctic Acidic Dwarf Willow Tundra Alliance**	G614a
			A4336	**Arctic Nonacidic Dwarf Willow Tundra Alliance**	G614b
			A4334	**Arctic Ericaceous Dwarf-shrub Tundra Alliance**	G367
		G897	**Arctic Low Shrub Tundra**		G827, G828
			A4339	**Arctic Dwarf Birch Low Shrub Tundra Alliance**	G828
			A4337	**Arctic Acidic Low Willow Tundra Alliance**	G827a
			A4338	**Arctic Nonacidic Low Willow Tundra Alliance**	G827b
		G898	**Arctic Herbaceous Tundra**		G615, G371
			A4341	**Arctic Acidic Nontussock Sedge Tundra Alliance**	G371a
			A4344	**Arctic Rush/Grass, Forb, Cryptogam Tundra Alliance**	G615a
			A4340	**Arctic Herb Tundra Alliance**	G615b
			A4343	**Arctic Tussock Sedge Tundra Alliance**	G371b
			A4342	**Arctic Nonacidic Nontussock Sedge Tundra Alliance**	G371c
		~~G365~~	**~~North American Arctic & Subarctic Lichen - Sparse Dwarf-shrub Tundra~~**		(now A4330, A4331)
		~~G366~~	**~~North American Arctic & Subarctic Dryas Dwarf-shrub Tundra~~**		(now A4333, A4332)
		~~G367~~	**~~North American Arctic & Subarctic Ericaceous Dwarf-shrub Tundra~~**		(now A4334)
		~~G371~~	**~~North American Arctic & Subarctic Tussock Tundra~~**		(now A4341, A4342, A4343)
		~~G614~~	**~~North American Arctic & Subarctic Dwarf Willow Tundra~~**		(now A4335, A4336)

		~~G615~~	~~North American Arctic & Subarctic Mesic Herb Tundra~~		(now A4340, A4344)
		~~G827~~	~~North American Arctic & Subarctic Low Willow Tundra~~		(now A4337, A4338)
		~~G828~~	~~North American Arctic & Subarctic Dwarf Birch Tundra~~		(now A4339)
		~~G829~~	~~North American Arctic & Subarctic Moist Tundra~~		(removed)
	M175	Arctic ~~Cliff,~~ Scree, ~~&~~ Rock ~~Vegetation~~ & Cliff Barrens			Arctic Cliff, Scree & Rock Vegetation
		G616	~~North American~~ Arctic Gravel Floodplain Vegetation		North American Arctic Gravel Floodplain Vegetation
			A4362	Chamerion latifolium - Salix alaxensis Arctic Floodplain Alliance	
		G868	Arctic Lichen Barrens		G375a
			A4327	Noncarbonate Mountain Barrens Alliance	
			A4326	Carbonate Mountain Barrens Alliance	
		G869	Arctic Open Scree, Rock & Cliff Barrens		G375b
			A4329	Arctic Noncarbonate Scree, Rock & Cliff Barrens Alliance	
			A4328	Arctic Carbonate Scree, Rock & Cliff Barrens Alliance	
		~~G375~~	~~North American Arctic Cliff, Scree & Rock Vegetation~~		(now G868, G869)

Arctic Wetlands Review

The initial lists of Arctic wetland types provided to the Arctic & Alpine Team for review are shown in Tables 9, 11, 13, and 15 in the sections below. Here we present overview comments and recommendations across all arctic wetland types. Although initially presented to the Arctic Team, North American Bogs & Fen (Division D029) was ultimately reviewed by the Boreal Team (see Table 31).

Arctic Wetlands Comments

1. Some basic nomenclature changes. In D320, we should remove 'subarctic' from name, as wetlands in subarctic can be expected to be treated with boreal vegetation, as is typical of other subarctic vegetation.
2. M870 should have (wet) "shrubland" added to the name, to account for wet shrublands at group level (Table 10).
3. G368 used to be in arctic uplands, but was moved here based on Boucher et al. (2016). But name wasn't fixed. Tundra should be deleted (Table 10). See details in notes for update to flooding regime.
4. Bogs, fens, wet meadows. It can be hard to distinguish wet meadows from bogs/fens in arctic. Boreal descriptor of bogs and poor fens is pretty good for Arctic part, too, given that flora is depauperate. Still needs some work. Alkaline Fen (rich fen) description needs more work. See also Yukon description for Yukon type "fen water track" (Fw01 in that classification).
5. The macrogroup names for the bog and fen types (M876 and M877) includes "Boreal & Sub-boreal" (Table 31). This name helps separate it from North Pacific Bog & Fen (within the same

Division), and from Southeastern Coastal Bog & Fen (in a different Division). Sub-boreal extends into Rocky Mountain and Laurentian-Acadian regions.

But concept may apply to the Arctic. Is the name ok? Arctic bogs and fens are not really distinct from boreal bogs and fens (i.e., they are essential boreal), so name was not changed.

6. G370 (Table 9). Are there multiple marsh groups? For now, only one major arctic freshwater marsh type, with *Arctophila fulva*, *Carex aquatilis* and *Hippuris vulgaris*.
7. G528 type (Western North American Boreal Wet Meadow & Marsh) (see Table 28 in Boreal section) doesn't seem to be covering the montane-subalpine-boreal marsh. **Review with Boreal Team**.
    a. *Carex aquatilis* - *Salix fuscescens* alpine wet meadow (would this be in Yukon – any elevational differences?)
    b. *Eriophorum angustifolium* - *Carex aquatilis*, *Salix* spp. mostly *S. planifolia* alpine wet meadow (G528 is the right home but this type is describing lowland)
    c. *Salix alaxensis* with a lot of arctic species goes in G357 (see Table 26 in Boreal section) but description is missing it.
8. G617 (North American Arctic & Subarctic Wet Meadow, Table 9). Wet meadow is very similar to bog and fen.
    a. Take out subarctic reference – boreal bog and fen (shrub bog dominates). (Table 10)
    b. Copied what was done for wet meadow and boreal fen and bog – G617 to G360 (Western North American Boreal Bog & Acidic Fen) for comments on what is acidic and nonacidic.
    c. Worked on G360 (Western North American Boreal Bog & Acidic Fen) a lot to modify bog and acid fen to fit both boreal and arctic (may include poor to rich).
    d. Do the same thing but an alkaline version of it (medium rich fen) still keep boreal and arctic together… (G361 Western North American Boreal Alkaline Fen)
9. G769 and M871 (Table 11). Aquatic Vegetation does not exist in Arctic, so remove Arctic from names.

<u>Arctic Wetlands Recommended Changes</u>

1. Changes to the wetlands need further review, especially whether G617 Arctic Wet Meadow is even needed or should just be combined with G360 (acidic fen) or G361 (alkaline fen)
2. Update Nomenclature within M870, as summarized above. (Table 10)
3. G370 should only include one major arctic marsh type that includes *Arctophila fulva*, as well as *Carex aquatilis* and *Hippuris vulgaris*.
4. Other groups in M870 need careful review for clarity as Arctic concepts.
5. Editorial changes to groups in M876 and M877 bog and fen types, but basic concepts otherwise ok. (Table 32)

6. Need to resolve G617 (North American Arctic & Subarctic Wet Meadow) versus G370 (North American Arctic & Subarctic Freshwater Marsh). (Table 10)
7. Remove Arctic from Aquatic Vegetation type. (Table 12)

Arctic Freshwater Marsh & Wet Meadow

The initial list of types for this division are shown in Table 9.

Table 9. Initial list of Alaskan USNVC types within Circumpolar Arctic Freshwater Marsh & Wet Meadow (Division D320).

D320	Circumpolar Arctic & Subarctic Freshwater Marsh & Wet Meadow		
	M870	North American Arctic & Sub-Arctic Freshwater Marsh & Wet Meadow	
		G370	North American Arctic & Subarctic Freshwater Marsh
		G617	North American Arctic & Subarctic Wet Meadow

The team made the following recommendations:

a. At one time, G368 (formerly North American Arctic & Subarctic Tall Willow Riparian Shrubland Tundra) used to be in the tundra macrogroup (D044/M173) but we moved it here to M870 based on Boucher et al (2016).
b. We add G830 to this Macrogroup as well.
c. The term 'Subarctic" was removed because subarctic would fall under Boreal wetlands.
d. The Division D320 was expanded to include boreal marshes, and M894 was moved into it (see Table 30 under Boreal Open Wetlands review).

Table 10. Revised Alaskan USNVC types within Arctic & Boreal Freshwater Marsh, Wet Meadow & Shrubland (Division D320, formerly Circumpolar Arctic Freshwater Marsh & Wet Meadow).

D320	~~Circumpolar~~ Arctic & Boreal~~Subarctic~~ Freshwater Marsh~~, &~~ Wet Meadow & Shrubland		
	M870	~~North American~~ Arctic ~~& Sub-Arctic~~ Freshwater Marsh~~, &~~ Wet Meadow & Shrubland	
		G370	North American Arctic ~~& Subarctic~~ Freshwater Marsh
		G617	North American Arctic ~~& Subarctic~~ Wet Meadow
		G830	North American Arctic Wet Shrubland
		G368	North American Arctic ~~and Subarctic~~ Tall Willow ~~Riparian~~ Wet Shrubland ~~Tundra~~ *[moved from D044/M173]*
	M894	North American Boreal Marsh, Wet Meadow & Shrubland	
		G528	Western ~~North American~~ Boreal Wet Meadow & Marsh
		G768	Eastern North American Boreal Freshwater Marsh, Wet Meadow & Shrubland *[moved from M069]*
		G865	Western Boreal Wet Birch – Willow Low Shrubland
		G866	Western Boreal Wet Alder – Willow Tall Shrub Swamp
		~~G547~~	~~Western Boreal Alkaline Swamp~~

North American Freshwater Aquatic Vegetation

Table 11. Initial list of Alaskan USNVC types within North American Freshwater Aquatic Vegetation (Division D049).

D049	North American Freshwater Aquatic Vegetation		
	M871	Arctic & Northern Boreal Freshwater Aquatic Vegetation	
		G769	North American Arctic & Boreal Freshwater Aquatic Vegetation

The team made the following recommendation:

a. The team recommended removal of "Arctic" from the name, as there is no substantive Arctic freshwater vegetation.

Table 12. Revised Alaskan USNVC types within North American Freshwater Aquatic Vegetation (Division D049).

D049	North American Freshwater Aquatic Vegetation		
	M871	~~Arctic & Northern~~ Boreal Freshwater Aquatic Vegetation	
		G769	North American ~~Arctic &~~ Boreal Freshwater Aquatic Vegetation

Arctic & Boreal Coastal Scrub & Herb Vegetation

Table 13. Initial list of Alaskan USNVC types within Arctic & Boreal Coastal Scrub & Herb Vegetation (Division D146).

D146	Arctic & Boreal Coastal Scrub & Herb Vegetation		
	M402	North American Arctic & Boreal Coastal Shore	
		G612	Arctic & Boreal Coastal Beach & Dune
		G611	Arctic & Boreal Coastal Rocky Shore

The team made the following recommendations:

a. Separate Boreal and Arctic.
   - Arctic Inland Dune (G863) should be separated from Arctic coastal dune (G612) and from Boreal dune which is moved to G374 under D025/M055 (Table 27). [Editorial note: it was decided that for now, Arctic Inland Dune (G863) will reside here in D146/M402.]
   - There is no Western Boreal coastal shoreline, but there is in the eastern Boreal. See G818 under D025/M055 (Table 27), but that group may not fully account for eastern boreal shorelines.

Table 14. Revised Alaskan USNVC types within Arctic Coastal Scrub & Herb Vegetation (Division D146—formerly Arctic & Boreal Coastal Scrub & Herb Vegetation).

D146	Arctic ~~& Boreal~~ Coastal Scrub & Herb Vegetation		
	M402	North American Arctic ~~& Boreal~~ Coastal Shore	
		G612	Arctic ~~& Boreal~~ Coastal Dune & Beach ~~& Dune~~
		G611	Arctic ~~& Boreal~~ Coastal Rocky Shore
		G863	Arctic Inland Dune *[from G612 in part, and M055/G374 in part]*

Arctic Coastal Salt Marsh

Table 15. Initial list of Alaskan USNVC types within Arctic Coastal Salt Marsh (Division D187).

D187	Arctic Coastal Salt Marsh		
	M403	North American Arctic Tidal Salt Marsh	
		G535	North American Low Arctic Coastal Salt Marsh

No substantive changes were made to this macrogroup or group. The G535 North American Low Arctic Coastal Salt Marsh was renamed.

But note that G535 should include one major salt marsh shrub type - *Salix ovalifolia*.

Table 16. Revised Alaskan USNVC types within Arctic Coastal Salt Marsh (Division D187).

D187	Arctic Coastal Salt Marsh		
	M403	~~North American~~ Arctic Tidal Salt Marsh	
		G535	~~North American Low~~ Arctic & Subarctic Coastal Salt Marsh

Alpine Review

The initial list of Alpine types provided to the Arctic & Alpine Team for review is shown in Table 17.

Table 17. Initial list of Alaskan USNVC types within Western North American Alpine Tundra (Division D043).

D043	Western North American Alpine Tundra		
	M101	Vancouverian Alpine Tundra	
		G317	North Pacific Alpine-Subalpine Dwarf-shrubland & Heath
		G319	North Pacific Alpine-Subalpine Bedrock & Scree
		G320	North Pacific Alpine-Subalpine Tundra
		G362	Aleutian Ericaceous Dwarf-shrubland & Heath

	M404	**Western Boreal Alpine Tundra**	
		G613	**Western Boreal Alpine Dwarf-shrub Tundra**
		G747	**Western Boreal Alpine Grassland & Meadow**
		G785	**Western Boreal Alpine Cliff, Scree & Rock Vegetation**

Alpine Comments

1. There are two alpine macrogroups. The groups in these macrogroups have the same kinds of group form/floristic criteria as we have now proposed for Arctic upland groups (see above). That seems satisfying.
2. Aleutians are an odd-ball in the alpine. Torre has Oceanic Boreal in the CircumBoreal Vegetation Map (CBVM). Torre proposed a CBVM: Circumboreal maritime, which in North America would include Aleutians and southern Greenland. But others in CBVM team didn't like it; they wanted Arctic, Boreal, Temperate. Most of the floristics of Aleutians are boreal; so that's the place to put it if you had to pick one.
3. Do we need a new group: Low Birch-Willow Alpine Tundra type (cf G356 Western Boreal Scrub Birch Shrubland / M055 North American Boreal Shrubland & Grassland at lower elevations)? G356 is a low elevation type on permafrost. High elevation is rock. Both acidic, floristics similar.
4. G320: mostly herb name changed.
    a. *Festuca altaica* as a graminoid type that is distinct from herb. Missing the super lush meadows. See also 1997 Fort Richardson – classification. *Veratrum viride* (false hellebore), others.

Alpine Recommended Changes

1. Moved Aleutians G362 out of M101 and put it into Boreal macrogroup M055 (North American Boreal Shrubland & Grassland, see Table 27). Note that there are edits being proposed to that Macrogroup, including a new Aleutian Group. See "Boreal Shrubland & Grassland" for further details.
2. Develop a new Boreal Alpine tundra type, Western Boreal Alpine Mesic Dwarf Birch – Willow Shrubland (G867), analogous to G356. But although G356 is a low elevation type on permafrost and this type is high elevation on rock, both are acidic, floristics similar. So, we need further input on this recommendation.

Table 18. Revised Alaskan USNVC types within Western North American Alpine Tundra (Division D043).

D043	**Western North American Alpine Tundra**		
	M101	**Vancouverian Alpine Tundra**	
		G317	**North Pacific Alpine-Subalpine Dwarf-shrubland & Heath**

		G319	North Pacific Alpine-Subalpine Bedrock & Scree
		G320	North Pacific Alpine-Subalpine Herb Tundra
		~~G362~~	~~Aleutian Ericaceous Dwarf-shrubland & Heath~~ *[moved into D025/M055]*
	M404	Western Boreal Alpine Tundra	
		G613	Western Boreal Alpine Dwarf-shrub Tundra
		G747	Western Boreal Alpine Grassland & Meadow
		G785	Western Boreal Alpine Cliff, Scree & Rock Vegetation
		G867	Western Boreal Alpine Mesic Dwarf Birch – Willow Shrubland *[analogous to G356 in D025/M055]*

BOREAL TEAM

Participants on the Boreal Team are listed in Table 19. A summary of the review comments provided by members of the team is provided in Appendix II.

Table 19. Boreal Team Participants.

First Name	Last Name	Email	Agency/Organization
Jennifer	Barnes	jennifer_barnes@nps.gov	National Park Service
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Aaron	Wells	awells@abrinc.com	ABR Inc. Environmental Research and Services

Tabular lists of USNVC vegetation types and commentary are provided below to document the process of revising Boreal vegetation types.

Boreal Upland Forest Review

The initial list of Boreal upland forest types provided to the Boreal Team for review is shown in Table 20.

Table 20. Initial list of Alaskan USNVC types within North American Boreal Forest & Woodland (Division D014).

D014	North American Boreal Forest & Woodland	
	M156	Alaskan-Yukon North American Boreal Forest

		G349	Alaskan-Yukon Boreal Dry Aspen Forest
		G350	Alaskan-Yukon Boreal Mesic-Moist Black Spruce Forest
		G579	Alaskan-Yukon Boreal Mesic White Spruce - Hardwood Forest
		G627	Alaskan-Yukon Boreal Moist White Spruce - Hardwood Forest
	M179	North American Boreal Subarctic & Subalpine Woodland	
		G633	Western Subarctic Woodland
		G635	Eastern Subarctic Woodland
		G646	Boreal Subalpine Woodland

Boreal Upland Forest Comments

1. Our work was informed by two important sources:
   a. Boucher et al. (2016). Plot-based analyses of various vegetation types, including boreal.
   b. Jorgenson and Meidinger (2015). Circumboreal Vegetation Map (CBVM) for Alaskan-Yukon region.
2. Subarctic Boreal forests. Ongoing review with CNVC team led us to put subalpine in with main boreal rather than subarctic, and keep subarctic on its own.
   a. So M179 would strictly be subarctic. Canadians then have eastern and western subarctic. How would this work in AK? There is a northern boreal type on the CBVM map that is already defined for AK. (Northern Alaska-Yukon Spruce Woodlands and Scrub). That was proposed as the Alaskan subarctic unit (AK subarctic woodland). Black and white spruce, no tamarack.
3. Moving subalpine (G646) to M156 as part of main boreal macrogroup, but splitting G646 into three types: G856, G857, G858. These three groups equate to three CBVM subalpine types, and are all placed in M156.
   a. Yukon-Subalpine spruce woodland and scrub.
   b. Southern AK subalpine spruce woodland and scrub.
   c. Central Alaskan Subalpine.
   d. Liard-Stikine Subalpine spruce fir woodland and scrub (Canada).
4. Main boreal forest types. Currently four groups are listed under M156 Alaskan-Yukon North American Boreal Forest (Table 20).
   In comparing these 4 USNVC groups to the CBVM map, some similarities and some differences emerge. G350 Alaskan-Yukon Boreal Mesic-Moist Black Spruce Forest does not have a CBVM equivalent. The Dry boreal G349 has a direct counterpart on the CBVM map, as do two of the mesic groups (G579 and G627). Even though G579 was called mesic and G627 was called moist, the distinction was intended to largely describe the differences between Central Boreal versus Southern Boreal Alaska. Thus, a series of potential name changes could be made as shown in Table 21). Team added in the Liard-Stikine type, only found in Yukon-BC, for completeness.

Table 21. Comparison of revisions to groups in M156 (Alaskan-Yukon North American Boreal Forest) with equivalent CBVM types from Jorgenson and Meidinger (2015).

Category	USNVC code	USNVC name	Jorgenson and Meidinger 2015
Dry lowland	G349	Alaskan ~~Yukon~~ Boreal Dry Aspen Forest	CBVM= **Yukon Dry Spruce-Aspen Forests**
Mesic Lowland	G579	Central Alaskan-Yukon Boreal Mesic ~~White Spruce - Hardwood~~ Forest	CBVM= **Yukon Mixed Spruce-Birch-Aspen Forests**. A lot of aspen here, not so much in G627
	G627	Southern Alaskan ~~Yukon~~ Boreal Mesic ~~Moist White Spruce - Hardwood~~ Forest	CBVM= **Southern Alaska Spruce-Birch-Herb Forests**. Aspen less common here compared to G579
	G855 (new)	Yukon Boreal Low Montane Forest *[not in AK, shown for completeness]*	CBVM= **Liard-Stikine Spruce-Birch-Aspen Forests**

Given the approach taken for the lowland boreal forest types, above, it appears the Team could tentatively add in the CBVM subalpine types as equivalent Group level distinctions under M156, as shown in Table 22.

Table 22. Subalpine groups to add to M156 (Alaskan-Yukon North American Boreal Forest) based on Jorgenson and Meidinger (2015).

Category	USNVC code	USNVC name	Jorgenson and Meidinger 2015
Sub-alpine	G856 (new)	Central Alaskan Boreal Montane Woodland	CBVM= **Yukon Subalpine Spruce Woodlands and Scrub**
	G857 (new)	Southern Alaskan Boreal Montane Woodland	CBVM= **Southern Alaska Subalpine Spruce Woodlands and Scrub**
	G858 (new)	Yukon Boreal High Montane Woodland *[Not in AK, shown for completeness. See also Yukon Boreal Low Montane Forest (G855) in Table 23.]*	CBVM= **Liard-Stikine Subalpine Spruce-Fir Woodlands and Scrub**

These draft units essentially treat the CBVM types as equivalent to the Group level. The one existing Group that does not have a CBVM equivalent is G350 Alaskan-Yukon Boreal Mesic-Moist Black Spruce Forest. It was not clear how to handle this group. At the workshop itself, Team noted that the CBVM report states that these CBVM map units are potentially equivalent to alliances. But there was concern, on the one hand, that this would push all of the distinctions below these categories to the association level, including black spruce types, hardwood types and white spruce types. That's a lot of diversity to cover at that level. There was also concern that raising these spruce-fir types to alliance level might mean that we are separating types that are successionally related in terms of overstory turnover, but otherwise essentially have the same ground layer. That said, elsewhere in the USNVC (and CNVC), we often separate conifer types from hardwood types at the alliance level, and if there are important moisture/pH/substrate differences within these proposed groups, those differences may also be worthy of alliance level recognition.

Boreal Upland Forest Recommended Changes

To sort out our options, Team considered the following interim solution:

1. Consider adopting the USNVC groups as described above, showing parallel geographic groups for lowland boreal and subalpine boreal.
2. The group preferred to call the boreal subalpine a boreal montane.
3. Remove subalpine scrub from Jorgenson and Meidinger's 2015 subalpine forest-woodland concept (boreal montane) and place scrub in the Boreal Shrubland & Grassland macrogroup M055 (Table 27). However, USNVC criteria do permit scrub to be part of a woodland concept, so this decision could be revisited.
4. Add in provisional alliances reflecting major changes in overstory dominance and physiognomy (conifer vs. deciduous).
5. Produce a draft set of groups and alliances, as listed in Table 23.
6. Review of subalpine groups needs particular input. Are the subalpine geographical categories as distinct as the lowland boreal forest categories, or is the alpine zone more homogeneous across these geographic areas?

Table 23. Revised Alaskan USNVC types within North American Boreal Forest & Woodland (Division D014), showing new groups and alliances.

D014	North American Boreal Forest & Woodland			
	M156	Alaskan-Yukon North American Boreal Forest		
		G349	Alaskan ~~-Yukon~~ Boreal Dry Aspen Forest	
			A4256	White Spruce - Poplar Dry Floodplain Woodland
			A4254	Alaskan Aspen Dry Bluff Woodland
			A4255	Alaskan White Spruce Dune Woodland
		G579	Central Alaskan-Yukon Boreal Mesic ~~White Spruce - Hardwood~~ Forest	
			A4257	Central Alaskan-Yukon Black Spruce Mesic Forest *[old G350 in part]*
			A4258	Central Alaskan-Yukon White Spruce Mesic Forest
			A4259	Central Alaskan-Yukon Aspen – Birch Mesic Forest
		G627	Southern Alaskan ~~-Yukon~~ Boreal ~~Moist White Spruce - Hardwood~~ Mesic Forest	
			A4260	Southern Alaskan-Yukon Black Spruce Mesic Forest *[old G350 in part]*
			A4261	Southern Alaskan-Yukon White Spruce Mesic Forest
			A4262	Southern Alaskan-Yukon Aspen – Birch Mesic Forest
		G855	Yukon Boreal Low Montane Forest *[not in AK, shown for completeness]*	
			Anew	Liard-Stikine Mesic Black Spruce Forest *[not in AK]*
			Anew	Liard-Stikine Mesic White Spruce - Hardwood Forest *[not in AK]*

			Anew	**Liard-Stikine Mesic Aspen-Birch Forest** *[not in AK]*
		~~**G350**~~	~~**Alaskan-Yukon Boreal Mesic-Moist Black Spruce Forest**~~ *[becomes Alliances under G579 and G627]*	
		G856	**Central Alaskan Boreal Montane Woodland**	
			A4288	**Balsam Poplar Montane Woodland**
			A4287	**Central White Spruce Ericaceous Montane Woodland**
		G857	**Southern Alaskan Boreal Montane Woodland**	
			A4290	**Low Birch Montane Woodland**
			A4289	**Southern White Spruce Montane Woodland**
		G858	**Yukon Boreal High Montane Woodland** [*not in AK, shown for completeness*]	
			Anew	**Liard-Stikine Subalpine Spruce Woodland** [*not in AK*]
			Anew	**Liard-Stikine Subalpine Birch Woodland** [*not in AK*]
	M179	**North American Northern Boreal ~~Subarctic & Subalpine~~ Woodland**		
		G859	**Alaskan-Yukon Northern Boreal Mesic Woodland**	
			A4292	**Alaskan Northern Boreal Spruce / Ericaceous Woodland**
			A4291	**Alaskan Northern Boreal Spruce / Dryas Woodland**
		G633	**Western Canadian Subarctic Woodland** [*not in AK, if new Group G859 above is accepted*]	
		G635	**Eastern Canadian Subarctic Woodland** [*not in AK, shown for completeness*]	
		~~**G646**~~	~~**Boreal Subalpine Woodland**~~ *[becomes G856, G857, G858 under M156]*	

Boreal Wet Forest Review

The initial list of Boreal wet forest types provided to the Boreal Team for review is shown in Table 24.

Table 24. Initial list of Alaskan USNVC types within North American Boreal Flooded & Swamp Forest (Division D016).

D016	North American Boreal Flooded & Swamp Forest		
	M299	**North American Boreal Conifer Poor Swamp**	
		G546	**Alaskan-Yukon Boreal Black Spruce - Tamarack Poor Swamp**
	M300	**North American Boreal Flooded & Rich Swamp Forest**	
		G548	**Alaskan-Yukon Boreal Flooded & Rich Swamp**

Boreal Wet Forest Comments

1. Team didn't like the term "swamp," for G546, as they suggested that it typically means moving water through the system. In Alaska, wet forests are underlain by permafrost, and typically are peaty, (but tall and not bog, i.e. > 2 (or 5) m. [Editorial note: As used by USNVC, swamp also includes saturated depressional hydrology, so term is not necessarily inappropriate, but the

permafrost hydrology may be distinctive enough to warrant a different term at the Group level]. Stuntedness, when it occurs, is a function of temperature and flooding. Trees can be stunted because of tussocks, but they can grow tall on peat. There is currently not much tamarack in AK. Remove Rocky Mountain references from type. These wet forests lack the bog indicators, such as *Oxycoccus*, *Sphagnum fuscum*. Break point is a black spruce feathermoss/sphagnum type (belongs on upland side with black spruce/feathermoss?). Wet forest includes black spruce/tussock. Tussock tundra is on upland side, but black spruce/tussock indicates wet.

2. Team also didn't like Group name for G548, as they felt it should strictly be floodplain; there are few rich swamps in AK, and when they occur they would better be combined with poor swamp in G546. Also fairly dry, almost upland-like. There was a suggestion to move G548 to uplands, but most felt it was mostly restricted to floodplain ecology, and so ecologically fits better here. Does this include both high (mostly montane but also lowland) and low gradient (lowland)? Or is high gradient only open shrub-herb type?

Boreal Wet Forest Recommended Changes

1. Change name of Group 546 type to wet forest. And, in line with upland forests, consider need for alliance level units. What's shown in Table 25 is a tentative draft.
2. Change name of G548 to "floodplain" forest. And, in line with upland forests, consider need for alliance level units. What's shown in Table 25 is a tentative draft. Note that G548 includes both high and low gradient floodplains. Maybe alliance distinction needed for high versus low?
3. At this time the Division and Macrogroup names will retain "flooded" and "swamp," as these are wider than Alaska in concept.

Table 25. Revised Alaskan USNVC types within North American Boreal Flooded & Swamp Forest (Division D016). New alliances are shown.

D016	North American Boreal Flooded & Swamp Forest			
	M299	North American Boreal Conifer Poor Swamp		
		G546	Alaskan-Yukon Boreal Black Spruce Wet Forest~~- Tamarack Poor Swamp~~	
			A4264	Central Alaskan Black Spruce Wet Forest
			A4263	Southern Alaskan Black Spruce Wet Forest
		G843	West-Central Boreal Black Spruce - Tamarack Poor Swamp *[not in AK; included for completeness]*	
	M300	North American Boreal Flooded & Rich Swamp Forest		
		G548	Alaskan-Yukon Boreal Flooded & Rich Swamp	
			A4266	Central Alaskan-Yukon Spruce - Birch Floodplain Forest
			A4268	Southwest Alaskan Spruce - Black Cottonwood Floodplain Forest
			A4267	Northern Alaskan-Yukon Spruce - Poplar Floodplain Forest
			A4265	Central Alaskan-Yukon Spruce - Poplar Floodplain Forest

Boreal Shrubland & Grassland Review

The initial list of Boreal shrubland and grassland types provided to the Boreal Team for review is shown in Table 26.

Table 26. Initial list of Alaskan USNVC types within North American Boreal Grassland & Shrubland (Division D025).

D025	North American Boreal Grassland & Shrubland		
	M055	North American Boreal Shrubland & Grassland	
		G359	Western Boreal Dry Shrubland & Grassland
		G356	Western Boreal Scrub Birch Shrubland
		G357	Western Boreal Mesic Alder - Willow Shrubland
		G358	Western Boreal Mesic Grassland & Meadow
		G374	North American Arctic & Boreal Shrub & Herb Inland Dune
		G659	Boreal Alvar
		G818	Eastern Boreal Shrubland & Grassland (not in AK; included for completeness)

Boreal Shrubland & Grassland Comments

1. Team felt that the Aleutian meadow type (G362) fits here (under M055), rather than in alpine (see Table 17 for its former placement under M101).
2. Subalpine scrub also included here. See G848.
3. Team reviewed G356 and G357 concepts, and struggled with montane-subalpine vs lowland. At end of meeting, concepts were left as is, but descriptions needed to be overhauled to reflect range of variation.
4. Made sure that the alpine type G613 Western Boreal Alpine Dwarf-shrub Tundra was distinguishable from G356. i.e. G613 is the alpine dwarf-shrub versus taller boreal subalpine scrub distinction.
5. G357 (Western Boreal Mesic Alder – Willow Shrubland). This includes fairly dryish alder on floodplain (?). This is the boreal counterpart to the Arctic wetter type G368 (North American Arctic Tall Willow Wet Shrubland, see Table 10). It is also the boreal upland counterpart to the boreal open wetlands type G547 (Western Boreal Alkaline Shrub Swamp [includes scrub birch and willow?], see Table 30). Also, does this type include the CBVM type below, as described by Jorgenson and Meidinger (2015), or does their type lump G356 and G357 together?

   Southern Alaska Alder-Willow-Dwarf Birch Scrub comprised of both tall scrub (*Alnus viridis* ssp. *33ilatat, Salix barclayii, S. scouleriana, Sambucus 33ilatate*) and low scrub classes (*Betula nana, Salix pulchra, Vaccinium uliginosum*). The alder tall shrub class has abundant herbs (*Gymnocarpium 33ilatate33s, Dryopteris 33ilatate* ssp. *Americana, Heracleum maximum, Trientalis europaea, Chamerion angustifolium, Aconitum delphiniifolium*) and grasses (*Calamagrostis canadensis*). In the low scrub class, other common species include *Rubus arcticus, R. chamaemorus, Spirea beauverdiana*, lichens in drier areas and Sphagnum mosses in wetter areas. This type has a subcontinental-cold bioclimate, permafrost is

absent, and it occurs on hillside colluvium and glacial till. The alder tall shrub type is abundant at higher elevations along the mountains in the Alaska Peninsula, Aklun mountains, Chugach and Kenai Mountains and has been described by Talbot et al. (2005), Jorgenson et al. (2003), Clark and Duffy (2005), and Wells et al. (2013). Low shrub classes have been described by Wells et al. (2012) and Wibbenmeyer et al. (1982).

6. G368 (North American Arctic Tall Willow Wet Shrubland), which is a wetland type now in M870 (Table 10), is the Arctic equivalent of boreal G357 (Western Boreal Mesic Alder - Willow Shrubland).
   G368 should be dominated by *Salix alaxensis* subsp *alaxensis*. Whereas in boreal (G357) it is *S. alaxensis* subsp. *longistylis*.
7. G374 (N. American Arctic and Boreal Shrub and Herb Inland Dune). Not clear if this is really needed in the Arctic as a distinct type. Clean up description. May be pretty uncommon, even in Boreal.

Boreal Shrubland & Grassland Recommended Changes

1. G356 Western Boreal Mesic Birch-Willow Low Shrubland. Keep concept as is. Includes both subalpine and lowland scrub birch. But modify name slightly.
2. G357 Western Boreal Mesic Alder – Willow Shrubland. Distinguished from both boreal wet alder (G866, Table 10) and arctic wet alder.
3. G359 Western Boreal Dry Shrubland & Grassland. Concept good, description needs to be overhauled.
4. G358 Western Boreal Mesic Grassland & Meadow. Concept pretty good. Clean up description.
5. G374 N. American Arctic & Boreal Shrub & Herb Inland Dune. Remove Arctic for now, and any sandy inland Arctic types probably belong under arctic upland macrogroup M175 (Arctic Scree, Rock & Cliff Barrens). [Editorial note: for now, Arctic Inland Dune (G863) will reside in D146/M402. See Table 14.] Clean up description. May be pretty uncommon in Boreal.
6. Arctic G368 (N. American Arctic Tall Willow Wet Shrubland) should be dominated by *Salix alaxensis* subsp *alaxensis*, distinct from boreal (*S. alaxensis* subsp. *longistylis*).
7. Add Aleutian meadow type (G362).

Table 27. Revised Alaskan USNVC types within North American Boreal Grassland & Shrubland (Division D025).

D025	North American Boreal Grassland & Shrubland			
	M055	North American Boreal Shrubland & Grassland		
		G359	Western Boreal Dry Shrubland & Grassland	
			A4272	Alaskan-Yukon Boreal Montane Dryas Riverine Dwarf-shrubland
			A4273	Alaskan-Yukon Boreal Montane Low Birch Shrubland
			A4271	Alaskan-Yukon Boreal Dry Riverine Grassland

			A4269	Alaskan-Yukon Boreal Sagebrush Steppe Bluff
			A4270	Alaskan-Yukon Boreal Silverberry - Buffaloberry Dry Shrubland
		G374	Western Boreal Dune Shrubland & Grassland ~~North American Arctic & Boreal Shrub & Herb Inland Dune~~	
			A4293	Alaskan-Yukon Boreal Dry Dune Grassland
		G357	Western Boreal Mesic Alder – Willow Shrubland	
			A4279	Southwest Alaskan Boreal Mesic Alder - Willow Shrubland
			A4277	Central Alaskan-Yukon Floodplain Mesic Alder - Willow Shrubland
			A4276	Central Alaskan-Yukon Mesic Alder - Willow Shrubland
			A4278	Southwest Alaskan Boreal Floodplain Mesic Alder - Willow Shrubland
		G358	Western Boreal Mesic Grassland & Meadow	
			A4248	Western Boreal Bluejoint - Mixed Forb-Graminoid Meadow
			A4280	Western Boreal Bluejoint - Fireweed Meadow Alliance
		G659	Western Boreal Alvar	
		G356	Western Boreal Mesic ~~Scrub~~ Birch – Willow Low Shrubland	
			A4275	Alaskan-Yukon Boreal Mesic Low Willow Shrubland
			A4274	Alaskan-Yukon Boreal Mesic Low Birch - Willow Shrubland
		G818	Eastern Boreal Shrubland & Grassland *[Not in AK; included for completeness]*	
		G848	Alaskan-Yukon Boreal Montane Alder - Willow Shrubland	
			A4282	Alaskan-Yukon Southern Boreal Montane Alder - Willow Shrubland
			A4281	Alaskan-Yukon Central Boreal Montane Alder - Willow Shrubland
		G862	Atlantic Boreal Scrub & Grassland *[Not in AK; included for completeness.]*	
		G362 (moved)	Aleutian Ericaceous Dwarf-shrubland & Heath *[moved from alpine tundra macrogroup M101]*	
			A4348	Aleutian Mountain-heath Ericaceous Dwarf-shrubland
			A4347	Aleutian Black Crowberry - Mixed Ericaceous Dwarf-shrubland
		G860	Aleutian Mesic Willow Low Shrubland	
			A4349	Aleutian Barclay's Willow - Ladyfern Low Shrubland
		G861	Aleutian Mesic Forb Meadow	
			A4351	Aleutian Common Ladyfern - Pacific Reedgrass Forb Meadow
			A4350	Common Ladyfern - Kamchatka Aconite Aleutian Forb Meadow
			A4352	Aleutian Subalpine Fleabane - Maidenfern Forb Meadow

Boreal Open Wetlands Review

The initial lists of Boreal open wetland types provided to the Boreal Team for review are shown in tables in each of the sections below. Here we present overview comments across all Boreal open wetland types.

Although originally presented to the Arctic Team, North American Bogs & Fen (Division D029) was reviewed by the Boreal Team.

Boreal Open Wetlands Comments

1. M075 (in D031) seems lumpy. Also description is specific to the lower 48. Elevations do not apply to Alaska. Review whether Vancouverian Group (G520, G521) belong here. Subarctic would be included here and not with D320/M870.
2. G528 (Western North American Boreal Wet Meadow & Marsh, in D031/M075). Possibly includes shrublands too. But compare with G547.
3. Consider adding a new boreal subalpine wet meadow group with *Carex aquatilis, Salix fuscesens, Eriophorum, Salix*.
4. G360 (Western North American Boreal Bog & Acidic Fen, in D029/M876). Pretty good concept. Low scrub bog type. Discussed how it is typically < 2 m. Between 2 and 5 m may be difficult to separate from Black Spruce Wet Forest; rely on floristics to help make call. See Vierek. Stuntedness a function of temperature and flooding. Can get stunted because of tussocks, taller trees with peat.
5. G361 (Western North American Boreal Alkaline Fen, in D029/M877). Good split between acidic (G360) and alkaline. Tamarack is pretty incidental in fens, and not a repeating type. We do have a white spruce rich fen type. *Betula glandulosa/nana* should be in poor fen, not rich fen.
6. G769 (North American Arctic & Boreal Freshwater Aquatic Vegetation, in D049/M871). Does this need discussion? Is a distinct aquatic vegetation type needed in the Arctic? Or should we remove Arctic from name of G769?

Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

Table 28. Initial list of Alaskan USNVC types in Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland (Macrogroup M075) under Division D031.

D031	Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland		
	M075	Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland	
		G520	Vancouverian-Rocky Mountain Subalpine-Alpine Snowbed, Wet Meadow & Dwarf-shrubland
		G521	Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh
		G526	Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland
		G527	Western Montane-Subalpine Riparian & Seep Shrubland
		G528	Western North American Boreal Wet Meadow & Marsh
		G547	Western Boreal Alkaline Swamp

The team made the following recommendations:

a. M075. Major change recommendation is to separate out boreal wetlands from the temperate wetlands at the macrogroup level. This led to sufficiently large changes in concept that M075 was retired and split into M893 and M894.
b. Split M075 into new M893 (Vancouverian and Rocky Mountain wetlands) and new M894 (boreal wetlands).
c. Revise G528 in new M894 to include shrublands, or broaden G547 to not be only alkaline. The latter choice is recommended. Two new groups were added.
   - **G865. Western Boreal Wet Birch – Willow Low Shrubland**
   - **G866. Western Boreal Wet Alder – Willow Tall Shrub Swamp**
d. Move G768 (Eastern North American Boreal Freshwater Marsh, Wet Meadow & Shrubland) from M069 into M894 (Table 10). And move M894 to D320 Arctic & Boreal Freshwater Marsh, Wet Meadow & Shrubland.

Table 29. Alaskan Revisions to the old M075 Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland, following the new montane macrogroup M893 split from it (still under Division D031).

D031	**Western North American Temperate ~~& Boreal~~ Freshwater Marsh, Wet Meadow & Shrubland**			
M893 (old M075, in part)	**Western North American Montane Marsh, Wet Meadow & Shrubland**			
		G526	**Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland**	
			A3799	**Skunkbush Sumac - River Hawthorn - Stretchberry Shrubland**
			A2557	**Silver Sagebrush Wet Shrubland**
			A3800	**Narrowleaf Willow - Dewystem Willow Shrubland**
		G521	**Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh**	
			A1361	**Western Glaucous Bluegrass Wet Meadow**
			A2584	**Bigleaf Sedge - Inland Sedge - Sheldon's Sedge Wet Meadow**
			A3539	**Vancouverian Horsetail Wet Meadow**
			A3805	**Western Lowland Sedge Wet Meadow**
			A3806	**Clustered Field Sedge - Mountain Sedge - Few-flower Spikerush Wet Meadow**
			A3807	**Common Spikerush - Needle Spikerush Marsh**
			A3808	**Western Mannagrass Wet Meadow**
			A3809	**Cow-parsnip - California False Hellebore - Yellowcress Wet Meadow**
			A3810	**Brook Saxifrage - Arrowleaf Ragwort - Mountain Bluebells Wet Meadow**
			A3812	**Monkeyflower - Primrose - Shootingstar Wet Meadow**
			A3813	**Pacific Northwest Dense Sedge Wet Meadow**
			A3814	**Oatgrass - Camas Wet Meadow**

			A3815	Bluejoint - Slimstem Reedgrass - Bluegrass Wet Meadow
			A2642	Silverweed Cinquefoil Wet Meadow
			A2564	Blue Wildrye - Sedge Wet Meadow
			A1374	Western Baltic Rush - Mexico Rush Wet Meadow
			A3804	Water Sedge - Northwest Territory Sedge - Tufted Hairgrass Wet Meadow
		G520	Vancouverian-Rocky Mountain Subalpine-Alpine Snowbed, Wet Meadow & Dwarf-shrubland	
			A3831	Alpine Laurel - Moss-heather - Mountain-avens Wet Dwarf-shrubland
			A3832	Black Alpine Sedge - Sibbaldia - Globeflower Wet Meadow
			A1309	Native Sedge - Icegrass - Sierra False Needlegrass Wet Meadow
			A1424	Western Sedge Wet Meadow
			A1698	White Marsh-marigold - Red-pod Stonecrop Wet Meadow
			A0958	Rocky Mountain Shrubby-cinquefoil Wet Shrubland
		G527	Western Montane-Subalpine Riparian & Seep Shrubland	
			A2563	Sierra Willow Wet Shrubland
			A0977	Arroyo Willow Wet Shrubland
			A0981	Park Willow Wet Shrubland
			A1003	Cascadian Undergreen Willow Wet Shrubland
			A3769	Western Montane Tall Willow Wet Shrubland
			A3770	Rocky Mountain Short Willow Wet Shrubland
			A3771	Western Alder Wet Shrubland
			A3772	Western Water Birch Wet Shrubland
			A3774	Mountain Willow - Lemmon's Willow Wet Shrubland
			A3973	Valley Bottom Netleaf Hackberry / Lewis' Mock Orange Wet Scrub
			A3974	Valley Bottom Black Hawthorn / Common Snowberry Wet Shrubland
			A3773	Western Non-willow Wet Shrubland

Table 30. Alaskan Revisions to the old M075 Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland, following the new arctic and boreal macrogroup M894 split from it (under Division 320).

D320	Arctic & Boreal Freshwater Marsh, Wet Meadow & Shrubland		
M894 (old M075, in part)	North American Boreal Marsh, Wet Meadow & Shrubland		
	G528	Western ~~North American~~ Boreal Wet Meadow & Marsh	
		A2563	Sierra Willow Wet Shrubland
		A0977	Arroyo Willow Wet Shrubland

			A0981	**Park Willow Wet Shrubland**
			A1003	**Cascadian Undergreen Willow Wet Shrubland**
			A3769	**Western Montane Tall Willow Wet Shrubland**
			A3770	**Rocky Mountain Short Willow Wet Shrubland**
		G768 (moved)	**Eastern North American Boreal Freshwater Marsh, Wet Meadow & Shrubland** *[moved from M069]*	
		G865	**Western Boreal Wet Birch – Willow Low Shrubland**	
			A4306	**Alaskan-Yukon Boreal Wet Low Willow Shrubland**
			A4305	**Alaskan-Yukon Boreal Wet Low Birch Shrubland**
		G866	**Western Boreal Wet Alder – Willow Tall Shrub Swamp**	
			A3825	**Western Boreal Alder - Willow Shrub Swamp**
		~~**G547**~~	~~**Western Boreal Alkaline Swamp**~~ *[becomes G865, G866]*	

North American Bog & Fen

Table 31. Initial list of Alaskan USNVC western boreal types within North American Bog & Fen (Division D029).

D029	**North American Bog & Fen**		
	M876	**North American Boreal & Sub-boreal Acidic Bog & Fen**	
		G360	**Western North American Boreal Acidic Bog & Fen**
	M877	**North American Boreal & Sub-boreal Alkaline Fen**	
		G361	**Western North American Boreal Alkaline Fen**

The team was satisfied with these groups. No type concept changes were made, apart from modifying the name of M876 and G360 from “Acidic Bog & Fen” to “Bog & Acidic Fen.”

a. M876/G360 (Western North American Boreal Bog & Acidic Fen). Pretty good concept. Add in low scrub bog and poor graminoid fen. Not much tamarack in AK. Remove Rocky Mountain references from type. Contains bog indicators, such as *Oxycoccus*, *Sphagnum fuscum*. For taller black spruce swamps, see G546 Alaskan-Yukon Boreal Black Spruce Wet Forest. Consider adding in alliances, all very tentative.
b. M877/G361 (Western North American Boreal Alkaline Fen). Improve concept. Consider adding in several alliances, all very tentative.

Table 32. Revised Alaskan USNVC types within North American Bog & Fen (Division D029).

D029	North American Bog & Fen			
	M876	North American Boreal & Subboreal Bog & Acidic ~~Bog &~~ Fen		
		G360	Western North American Boreal Bog & Acidic ~~Bog &~~ Fen	
			A4299	Western Boreal Sedge Poor Fen
			A4300	Western Boreal Dwarf Birch Poor Fen
			A4298	Western Boreal Conifer Scrub Bog
			A3448	Western Boreal Ericaceous Shrub Bog
	M877	North American Boreal & Subboreal Alkaline Fen		
		G361	Western North American Boreal Alkaline Fen	
			A4302	Western Boreal Sweetgale Shrub Fen
			A4304	Southern Alaskan Alkaline Fen
			A4301	Western Boreal Buckbean Fen
			A4303	Western Boreal Sedge Fen
			A3449	Western Boreal Alkaline Shrub Fen

North American Freshwater Aquatic Vegetation

For changes to Alaskan types within the North American Freshwater Aquatic Vegetation (Division D049), see Table 12 in the Arctic Team section.

D049	North American Freshwater Aquatic Vegetation		
	M871	Arctic & Northern Boreal Freshwater Aquatic Vegetation	
		G769	North American Arctic & Boreal Freshwater Aquatic Vegetation

Boreal Open Rock Vegetation Review

The initial list of Boreal open rock vegetation types provided to the Boreal Team for review is shown in Table 33.

Table 33. Initial Alaskan USNVC types within Western North American Temperate & Boreal Cliff, Scree & Rock Vegetation (Division D052).

D052	Western North American Temperate & Boreal Cliff, Scree & Rock Vegetation		
	M887	Western North American Cliff, Scree & Rock Vegetation	
		G822	Western North American Boreal Cliff & Rock Vegetation

Boreal Open Rock Vegetation Comments

1. No review completed of G822. Insofar as it exists, is alkaline versus acidic the most important alliance distinction? We are unsure of this pattern and so do not recommend any changes at this time.

COASTAL TEAM

Participants on the Coastal Team are listed in Table 34. A summary of the review comments provided by members of the team is provided in Appendix III.

Table 34. Coastal Team Participants.

First Name	Last Name	Email	Agency/Organization
Katie	Baer	kbaer@fs.fed.us	U.S. Forest Service
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Karen	Dillman	kdillman@fs.fed.us	U.S. Forest Service
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Don	Long	dlong01@fs.fed.us	U.S. Forest Service, RMRS Missoula Fire Lab
Amy	Miller	amy_e_miller@nps.gov	National Park Service
Kate	Mohatt	kmohatt@fs.fed.us	U.S. Forest Service
Jeane	Osnas	jeosnas@alaska.edu	Alaska Center for Conservation Science
Elizabeth	Powers	elizabeth_powers@fws.gov	U.S. Fish and Wildlife Service
Barb	Schrader	bschrader@fs.fed.us	U.S. Forest Service
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Aaron	Wells	awells@abrinc.com	ABR Inc. Environmental Research and Services

Tabular lists of USNVC vegetation types and commentary are provided below to document the process of revising Coastal vegetation types.

Coastal Lowland Pacific Forest Review

The initial list of Coastal lowland Pacific forest types provided to the Coastal Team for review is shown in Table 35.

Table 35. Initial list of Alaskan USNVC types within macrogroup M024 Vancouverian Lowland & Montane Forest, under Division D192.

D192	Vancouverian Forest & Woodland		
	M024	Vancouverian Lowland & Montane Forest	
		G241	North Pacific Maritime Silver Fir – Western Hemlock Forest

			A3386	Abies amabilis - Tsuga heterophylla / Achlys triphylla Forest Alliance
			A3387	Abies amabilis - Tsuga heterophylla / Vaccinium membranaceum Cold Forest Alliance
		G750	North Pacific Maritime Western Hemlock – Sitka Spruce Rainforest	
			A3601	Tsuga heterophylla - Picea sitchensis / Vaccinium alaskaense Forest Alliance
			A3602	Picea sitchensis / Athyrium filix-femina Forest Alliance
			A3603	Picea sitchensis / Oplopanax horridus Forest Alliance
		G751	North Pacific Western Hemlock – Sitka Spruce – Western Red-cedar Seasonal Rainforest	
			A3604	Tsuga heterophylla - Picea sitchensis / Rhytidiadelphus loreus Forest Alliance
			A3611	Tsuga heterophylla - Thuja plicata / Vaccinium ovalifolium Forest Alliance
			A3608	Picea sitchensis / Rubus spectabilis Mesic Forest alliance

Coastal Lowland Pacific Forest Comments:

1. Distinction between G750 and G751 needs refining. Alaskan rainforests do not fit with seasonal description – potential break in seasonal & non-seasonal types based on precipitation patterns. Distributions need updating and alliances refining.
2. G750: Clarify range – does not occur as far north as Cook Inlet (Prince Wm. Sound, eastern Kenai is probably the most northern extent). 'Matrix type' forests, covering bulk of coastal AK forests. Is there a western hemlock association only? w/o sitka spruce? Transitions to G751 where you pick up red cedar (?).
3. Refine alliances. Some confusion about western red cedar, seasonal rain forest. Need for a non-seasonal type. Should this type be restricted to Alaska only? W. red cedar, questions about distribution. Became apparent that a lot of these descriptions are legacy; descriptions stretched from OR and WA and smeared northward. Build descriptions from these that address variation in vegetation within Alaskan portion of range.
4. G751: Revision of alliances noted as needed. "Seasonal rainforest" does not match precipitation patterns for Alaskan forests. However, some alliances range well into AK.
5. A3608 (Picea sitchensis / Rubus spectabilis Mesic Forest Alliance) should be moved from G751 to G750. Description emphasizes Douglas fir, which does not fit with Alaska.
6. A3611: range is described as "up to the Kenai Peninsula," noted to be incorrect. Range description needs updating.
7. Lowland Mountain Hemlock type: There is a need for a lowland mountain hemlock type. Should this be a new group, or an alliance under G750?

Coastal Lowland Pacific Forest Recommended Changes

1. New lowland mountain hemlock type at Group or Alliance level.
   a) Preferred placement of lowland mountain hemlock to be determined by Coastal Team.

2. Revisit "G751 seasonal rainforest." Can this be addressed by clarifying distinction between G750/G751 and description of G751? or is a new non-seasonal Group needed?
   a) Coastal Team to determine preferred way of addressing non-seasonal rainforests
      i) New AK-only or primarily AK Non-seasonal group, based on precipitation patterns.
      ii) Revisions to G751 and distinction with G750 regarding seasonality to address issue that Alaskan forests are non-seasonal.
3. Move Alliance A3608 from G751 to G750 or create new alliance matching AK type under G750. For now leave A3608 in G751.
4. Revise description of distribution of A3611, to reflect that it does not occur to the Kenai Peninsula.

Table 36. Revised Alaskan USNVC types within macrogroup M024 Vancouverian Coastal Forest (formerly Vancouverian Lowland & Montane Forest), under Division D192.

D192	Vancouverian Forest & Woodland			
	M024	Vancouverian ~~Lowland & Montane~~Coastal Forest		
		G241	North-Central Pacific Maritime Silver Fir – Western Hemlock Rainforest ~~Forest~~	
			A3386	Pacific Silver Fir - Western Hemlock / Sweet After Death Forest
			A3387	Pacific Silver Fir - Western Hemlock / Thinleaf Huckleberry Cold Forest
		G750	~~North Pacific~~ Alaskan Maritime Western Hemlock – Sitka Spruce Rainforest	
			A3601	Western Hemlock - Sitka Spruce / Alaska Blueberry Forest
			A3602	Sitka Spruce / Common Ladyfern Forest
			A3603	Sitka Spruce / Devil's-club Forest
		G751	North-Central Pacific Western Hemlock – Sitka Spruce ~~- Western Red-cedar Seasonal~~ Rainforest	
			A3606	Port Orford-cedar - Sitka Spruce Forest
			A3609	Grand Fir - Sitka Spruce - Western Red-cedar Forest
			A3610	Western Hemlock - Western Red-cedar Rich Mesic Forest
			A3604	North Pacific Western Hemlock - Sitka Spruce Forest
			A3607	Sitka Spruce Stabilized Dune Forest
			A3611	Western Hemlock - Western Red-cedar / Oval-leaf Blueberry Forest
			A3608	Sitka Spruce / Salmonberry Mesic Forest
			A3605	Western Hemlock - Western Red-cedar - Alaska-cedar Forest

Coastal Montane Forest Review

The initial list of Coastal Montane Forest types as provided to the Coastal Team for review is shown in Table 37.

Table 37. Initial list of Alaskan USNVC types within macrogroup M025 Vancouverian Subalpine Forest, under Division D192.

D192	Vancouverian Forest & Woodland			
	M025	Vancouverian Subalpine Forest		
		G245	North Pacific Mountain Hemlock – Silver Fir Forest & Tree Island	
			A3724	Tsuga mertensiana - Tsuga heterophylla - Chamaecyparis nootkatensis Forest & Woodland Alliance
			A3725	Tsuga mertensiana Alaskan Tree Island Alliance

Coasal Montane Forest Comments

1. G245 (now G850): Mountain hemlock. What to do with non-tree island mountain hemlock? Too much emphasis on tree islands? Do we need Sitka spruce type at lower elevation (some of this might be in G256 [= G854]).
2. Move A3724 Tsuga mertensiana - Tsuga heterophylla - Chamaecyparis nootkatensis Forest & Woodland Alliance to G853.

Coastal Montane Forest Recommended Changes

1. Update description of G245 (now G850) pertaining to tree islands. Split G245 into G850 Alaskan Mountain Hemlock Forest and G849 North-Central Pacific Mountain Hemlock - Silver Fir Woodland. (M025/G849 not shown in Table 38, but occurring in BC and southward.)
2. Address non-tree island Mountain Hemlock type.
   i) Update A3725 to Tsuga mertensiana Alaskan Forest &Tree Island Alliance, or
   ii) New Tsuga mertensiana Alaskan Forest Alliance
   (The latter route was chosen - added new A4284 Tsuga mertensiana Maritime Alaskan Forest Alliance.)
3. Move Alliance 3724 Tsuga mertensiana - Tsuga heterophylla - Chamaecyparis nootkatensis Forest & Woodland Alliance to G853 (North-Central Pacific Maritime Swamp Forest) under M035 (Vancouverian Flooded & Swamp Forest). See Table 42.

Table 38. Revised Alaskan USNVC types within macrogroup M025 (formerly Vancouverian Subalpine Forest, now Vancouverian Subalpine-High Montane Forest), under Division D192.

D192	Vancouverian Forest & Woodland			
	M025	Vancouverian Subalpine-High Montane Forest		
	G850 (Alaskan part of old G245)		Alaskan ~~North Pacific~~ Mountain Hemlock ~~– Silver Fir~~ Forest ~~& Tree Island~~	
			~~A3724~~	~~Mountain Hemlock - Western Hemlock - Alaska-cedar Forest & Woodland~~ *[moved under G853 in Vancouverian Flooded & Swamp Forest (M035)]*
			A3725	Montane Alaskan Mountain Hemlock Forest
			A4284	Alaskan Maritime Mountain Hemlock Forest

Coastal Ruderal Forest Review

The initial list of Coastal Ruderal Forest types as provided to the Coastal Team for review is shown in Table 39.

Table 39. Initial list of Alaskan USNVC types within macrogroup M405 Vancouverian Ruderal Forest, under Division D192.

D192	Vancouverian Forest & Woodland		
	M405	Vancouverian Ruderal Forest	
		G801	Vancouverian Ruderal Forest

Coastal Ruderal Forest Comments

1. This group does not occur in Alaska. Description and list of species does not fit. There may be an Alaskan group for post-fire and post-logging vegetation in southeast AK.

Coastal Ruderal Forest Recommended Changes

1. Remove Alaska from the distribution of this type
2. New vegetation type for post-burned and or post-logging for southeast AK may be needed. Possibly a successional type under M024 'Vancouverian Lowland & Montane Forest.' No type was developed at this time.

Table 40. Revised USNVC types within macrogoup M405 Vancouverian Ruderal Forest, under Division D192. Alaska removed from the distribution of this macrogroup.

D192	Vancouverian Forest & Woodland		
	M405	Vancouverian Ruderal Forest *[Remove AK from distribution of this type]*	
		G801	Vancouverian Ruderal Forest *[Remove AK from distribution of this type]*

Coastal Pacific Flooded & Swamp Forest Review

The current list of Coastal Pacific flooded and swamp forest types provided to the Coastal Team for review is shown in Table 41.

Table 41. Initial list of Alaskan USNVC types within Vancouverian Flooded & Swamp Forest (Division D193).

D193	Vancouverian Flooded & Swamp Forest		
	M035	Vancouverian Flooded & Swamp Forest	
		G254	North Pacific Lowland Riparian Forest & Woodland
		G507	North Pacific Montane Riparian Woodland
		G256	North Pacific Maritime Swamp Forest

Coastal Pacific Flooded & Swamp Forest Comments

1. Swamp forests. Had some trouble with swamp definition. Whole place is wet. Matter of drainage, flooding regime, ephemeral. When you have a range issue, can you start moving alliances and associations if you're seeing things that aren't in the range? Shore pine is in G610, (see Coastal Bog & Fen section below). Coastal grassland/shrubland range should expand; not necessarily maritime or SE. Maybe should not be in coastal section. Some of bogs and fens could also be Western North America by group level. Shouldn't everything have same regionality applied? But maybe it doesn't work out that way.
2. G254: Is there a distinct Alaskan group to pull out? Where would the split be? What happens further out to Kodiak? Also noted species and alliances are out of range.
3. G256: Species mix doesn't work for Alaska and needs a lot of work; seems to work for the southern end of the range; could pull alliances and associations out for a new Group; skunk cabbage is somewhat diagnostic and seems to make sense; red alder and sitka spruce; looking for *Pinus contorta* somewhere here but not in A3755 - may be in shrub/grassland. Need for lower elevation Sitka spruce type dependent on review of Alaskan part of G256 (= G854) under M035 Vancouverian Flooded Swamp and Forest.

Coastal Pacific Flooded & Swamp Forest Recommended Changes

1. Working group to review G256 and G254 and associated alliances.
   a) Update group descriptions based on deeper review including alliances.
   b) Working group to determine if a Gulf of Alaska group and alliances should be pulled out.
   c) Determine geographic location for split between Vancouverian and Alaskan types based on tree distribution and rainfall patterns.
   d) G254 now split into G851 (North-Central Pacific) and G852 (Alaskan Pacific). See Table 42.
   e) G256 now split into G853 (North-Central Pacific) and G854 (Alaskan Pacific). See Table 42.

Table 42. Revised Alaskan USNVC types within Vancouverian Flooded & Swamp Forest (Division D193).

D193	Vancouverian Flooded & Swamp Forest			
	M035	Vancouverian Flooded & Swamp Forest		
		G507	North Pacific Montane Riparian Woodland	
			A0306	Cascadian Riparian White Alder Woodland
			A3766	Mountain Hemlock - Pacific Silver Fir Swamp Woodland
			A3767	Cascadian Engelmann Spruce Swamp Woodland
			A3768	Quaking Aspen - Red Alder Swamp Forest
		G851 [=G254a]	North-Central Pacific Lowland Riparian Forest	

			A3777	**White Alder Riparian Forest**
			A3746	**Sitka Spruce - Western Hemlock - Red Alder Riparian Forest**
			A3745	**Bigleaf Maple - Red Alder Riparian Forest**
			A3743	**Oregon Ash - Black Cottonwood - Alder Riparian Forest**
			A3748	**Shining Willow Scrub Swamp**
		G853 [=G256a]	**North-Central Pacific Maritime Swamp Forest**	
			A3755	**Lodgepole Pine Swamp Forest**
			A3753	**Pacific Northwest Alder - Ash Swamp Woodland**
			A4285	**North-Central Pacific Western Hemlock - Sitka Spruce Swamp Forest**
			A3724 (moved)	**Mountain Hemlock - Western Hemlock - Alaska-cedar Forest & Woodland** *[moved from old G245 under M025]*
		G852 [=G254b]	**Alaskan Pacific Riparian Forest & Woodland**	
			A3744	**Black Cottonwood - Sitka Spruce - Western Hemlock Riparian Forest**
			A3747	**Sitka Spruce Riparian Forest**
		G854 [=G256b]	**Alaskan Pacific Swamp Forest**	
			A4286	**Alaskan Pacific Swamp Forest**

Coastal Grassland & Shrubland Review

The initial list of Coastal grassland and shrubland types as provided to the Coastal Team for review is shown in Table 43.

Table 43. Initial list of Alaskan USNVC types within Western North American Grassland & Shrubland (Division D022).

D022	Western North American Grassland & Shrubland		
	M172	**Northern Vancouverian Lowland-Montane Grassland & Shrubland**	
		G354	**Vancouverian Alder - Salmonberry - Willow Shrubland**
		G355	**Northern Vancouverian Grassland & Meadow**

Coastal Grassland & Shrubland Comments

1. G354: Changes needed to *Salix* spp. listed (e.g. no *glauca*; *sitchensis* should be listed), disturbance characterization, and *Alnus* sp. in USNVC description. Aleutian group should be split out. Description includes interior spp. that do not apply to coastal AK. Need an alder-salmon berry alliance; also include copperbush? Add Gulf of Alaska to distribution. Where is break with Aleutian types? Update landslide alliance to be more inclusive, and add a floodplain association.

2. G355: Balds not appropriate for this group. *Empetrum* not common as description implies. Additional alliances needed, update description to reflect full range (south-central AK currently emphasized). Need a new grassland alliance.

Coastal Grassland & Shrubland Recommended Changes

1. Update description of G354 with appropriate species and Alaskan range.
2. Update description of G355 to reflect correct species for Alaskan types.
   a) New corresponding Aleutian grassland and shrubland types in M055 (North American Boreal Shrubland & Grassland). See Table 27.
      - **G860 Aleutian Mesic Willow Low Shrubland**
      - **G362 Aleutian Ericaceous Dwarf-shrubland** *(from M101, Table 18)*
      - **G861 Aleutian Mesic Forb Meadow**

Table 44. Revised Alaskan USNVC types within Western North American Grassland & Shrubland (Division D022)

D022	Western North American Grassland & Shrubland			
	M172	Northern Vancouverian Lowland-Montane Grassland & Shrubland		
		G354	Vancouverian Alder - Salmonberry - Willow Shrubland	
			A3939	Southern Alaskan Salmonberry Shrubland
			A3940	Southern Alaskan Upland Tall Willow Thicket Shrubland
			A3942	Southern Alaskan Russet Buffaloberry Shrubland
			A3941	Southern Alaskan Blueberry Shrubland
			A3938	Southern Alaskan Green Alder - Willow Shrubland
			A3937	Southern Alaskan Sitka Alder Shrubland
		G355	Northern Vancouverian Grassland & Meadow	
			A3946	Common Ladyfern - Fireweed - Bluejoint Meadow
			A3947	Nootka Lupine - Alaska Indian-paintbrush Meadow

Coastal Bog & Fen Review

The initial list of Coastal bog and fen types as provided to the Coastal Team for review is shown in Table 45.

Table 45. Initial list of Alaskan USNVC types within North American Bog & Fen (Division D029).

D029	North American Bog & Fen			
	M063	North Pacific Bog & Fen		
		G285	North Pacific Alkaline Open Fen	
			A3433	North Pacific Sedge Alkaline Fen
			A3432	Sweetgale - Rose Spirea Alkaline Fen

		G284	North Pacific Acidic Open Bog & Fen	
			A3584	Sedge - Sphagnum - Beaksedge Acidic Fen
		G610	North Pacific Maritime Wooded Bog & Poor Fen	
			A3764	Alaskan Lodgepole Pine - Sitka Spruce Wooded Bog

Coastal Bog & Fen Comments

1. M063 Should this be called "Vancouverian" to be consistent with other macrogroups?
2. G285: Group is very broad (Alaska to northern CA); potentially break up.
3. G284: Doesn't seem to match group level, with inclusions of specific California & OR species in description and alliances… split into groups? Determine if a northern split makes sense. Potentially new group. Alternatively, updated description of existing group.
4. G610: Checking on this based on earlier issues with *Pinus contorta* tree groups; description refers to it as a "wetland forested group" so why is it here? Southeast is the core of the distribution.
5. Maybe need an alliance that does not have shore pine and out of the south central zone; this may have mountain hemlock and yellow cedar.

Coastal Bog & Fen Recommended Changes

1. Update G610 description to reflect distribution in AK.
   a) Confirmed that AK is not part of distribution of A3763 Tsuga heterophylla - Thuja plicata / Ledum glandulosum Treed Bog Alliance.
2. Determine if distinct and new Alaskan group(s) broken out from G285 and G284 are appropriate under M063.

Changes above did not lead to any changes in types per se as shown in Table 45.

Coastal Salt Marsh Review

The initial list of Coastal salt marsh types provided to the Coastal Team for review is shown in Table 46.

Table 46. Initial list of Alaskan USNVC types within Temperate & Boreal Pacific Coastal Salt Marsh (Division D035).

D035	Temperate & Boreal Pacific Coastal Salt Marsh			
	M081	North American Pacific Coastal Salt Marsh		
		G499	Temperate Pacific Salt Marsh	
			A2622	Lyngbye's Sedge Brackish Salt Marsh
			A3899	Tufted Hairgrass - Red Fescue Brackish Salt Marsh

Coastal Salt Marsh Comments

1. G499: Group seems rather geographically large, stretching from Alaska to Mexico. Should we split out a northern alliance/group?

2. Broad, but Atlantic-Gulf coast salt marsh has similar broad biogeography at Group level. Based on global review of salt marsh biogeography. Maybe focus at alliance level.

Coastal Salt Marsh Recommended Changes

1. Update description of G499 to provide information on wide ranging nature of some marsh types.
2. If unique Alaskan groups are described, would these fit under broad temperate marsh, or is there a Gulf of Alaska group to be broken out?

Changes above did not lead to any changes in types per se as shown in Table 46.

CONCLUSION

REVISED ALASKAN USNVC HIERARCHY

The current revised USNVC for Alaska now includes a comprehensive, peer-reviewed set of macrogroups, groups, and alliances. A large number of changes to all levels was produced through the workshop review and subsequent webinars. Much work remains to be done for alliance descriptions.

A final tally of the units is provided in Table 47, comparing prior and post workshop numbers. A full hierarchical list of Alaskan types with links to http://www.usnvc.org is presented in Table 48.

Table 47. Summary of the number of types for each level of the USNVC Hierarchy for Alaska prior to the workshiop and after the workshop.

USNVC Level	Alaska 2017 (pre workshop)	Alaska 2018** (post workshop)
1. Class	5	5
2. Subclass	7	7
3. Formation	16	16
4. Division	20	20
5. Macrogroup	35	31
6. Group	76	68
7. Alliance	46*	157
8. Association	114*	96***

* Alliances and associations were incomplete in 2017 and were largely restricted to the Coastal Pacific region.

**Database query from December 31, 2020, but reflective of the 2018 workshop.

*** Associations were not reviewed at the workshop, apart from reviewing distribution. The reduction in numbers reflects removal of AK from the distribution of associations.

Table 48. A synopsis of the Alaska vegetation types based on revisions from the workshop.

The hierarchy is presented in compact form. **Column 1** contains the codes for types of the upper 3 levels of the hierarchy (class, subclass, formation); **column 2** contains, in addition to the description of the types for the upper three levels, the codes for the middle three levels (division, macrogroup and group); **column 3** contains, in addition to the descriptions of the types for the middle levels, the codes for the lower two levels, alliance and association; **column 4** contains the descriptions for the alliance and association types; **column 5** contains the web link to the full description on the explorer.natureserve.org website. A usnvc.org link will be available when that website is refreshed later in 2021.

1	2	3	4	5
1.	**Forest & Woodland**			Explorer
	Tropical, temperate and boreal forests, woodlands and tree savannas characterized by broadly mesomorphic (including scleromorphic) tree growth forms (including *broad-leaved, needle-leaved, sclerophyllous, palm, bamboo trees*, and *tree ferns*), typically with at least 10% cover (but tropical tree savannas up to 40% cover, when trees <8 m tall), irregular horizontal spacing of vegetation structure, and spanning humid to seasonally dry tropical to boreal and subalpine climates and wet to dry substrate conditions. Includes native forests, as well as managed, and some plantation forests where human management is infrequent.			
1.B.	**Temperate & Boreal Forest & Woodland**			Explorer
	Temperate & Boreal Forest & Woodland is typically dominated by broad-leaved deciduous and needle-leaved trees, with some broad-leaved evergreens in warmer regions, and a climate that varies from warm-temperate with only rare frosts to very cold subarctic conditions. It is found across the globe in the mid-latitudes, typically between 25° and 60-70°N and S latitude, and includes boreal, cool-temperate, and warm-temperate/Mediterranean forests.			
1.B.2.	**Cool Temperate Forest & Woodland**			Explorer
	Cool Temperate Forest & Woodland includes temperate deciduous forest and woodland, temperate needle-leaved forest and woodland, and temperate rainforest, dominated by broad-leaved or needle-leaved tree growth forms.			
	D192.	**Vancouverian Forest & Woodland**		Explorer
		This division includes forests and woodlands of the lowland, montane and subalpine zones of cool maritime temperate climates of western North America characterized by the conifers *Abies amabilis, Abies grandis, Abies lowiana, Abies magnifica, Abies procera, Calocedrus decurrens, Callitropsis nootkatensis, Callitropsis lawsoniana, Picea sitchensis, Pinus contorta var. contorta, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Pseudotsuga menziesii var. menziesii, Sequoia sempervirens, Sequoiadendron giganteum, Thuja plicata, Tsuga heterophylla*, and *Tsuga mertensiana*, the broadleaf evergreen trees *Arbutus menziesii, Notholithocarpus densiflorus*, and *Quercus chrysolepis*, and the broadleaf deciduous species *Acer macrophyllum, Alnus rubra*, and *Quercus kelloggii*.		
		M024.	**Vancouverian Coastal Rainforest**	Explorer
			This macrogroup consists of lowland temperate rainforests of the Pacific Northwest, dominated by *Abies amabilis, Acer macrophyllum, Alnus rubra, Arbutus menziesii, Chamaecyparis lawsoniana, Picea sitchensis, Pinus contorta var. contorta, Pseudotsuga menziesii, Sequoia sempervirens, Thuja plicata*, and/or *Tsuga heterophylla*. Forests range from coastal very wet hypermaritime to slightly less wet leeward sites.	
		G241.	**North-Central Pacific Maritime Silver Fir - Western Hemlock Rainforest**	Explorer
			North-Central Pacific Maritime Silver Fir - Western Hemlock Rainforest Pacific Silver Fir - Western Hemlock Rainforest Group	
			This forested group occurs in the lower and montane regions of the central Pacific Northwest rainforest region, primarily west of the Cascade Crest, dominated by *Tsuga heterophylla, Abies amabilis*, and/or *Callitropsis nootkatensis*, in maritime and submaritime climatic zones from northwestern Oregon, coastal British Columbia, and possibly extreme southeastern Alaska. AK, BC, CA?, OR, WA	

A3386. **Pacific Silver Fir - Western Hemlock / Sweet After Death Forest** Explorer

Abies amabilis - Tsuga heterophylla / Achlys triphylla Forest Alliance

Pacific Silver Fir - Western Hemlock / Sweet After Death Forest Alliance

This is an alliance of montane forests of the Pacific Northwest dominated by *Abies amabilis*, and mixed with *Tsuga heterophylla* and/or *Pseudotsuga menziesii*. They occur above lowland forests and below subalpine parklands. These forests have a characteristic elevation (approximately 800-1500 m in the Cascades and 0-1200 m in the Olympic Mountains).

AK, BC, CA?, OR, WA

CEGL005577 **Western Hemlock - Western Red-cedar / Salal / Deer Fern Forest** Explorer

Tsuga heterophylla - Thuja plicata / Gaultheria shallon / Blechnum spicant Forest

Western Hemlock - Western Red-cedar / Salal / Deer Fern Forest

AK, BC, WA

A3387. **Pacific Silver Fir - Western Hemlock / Thinleaf Huckleberry Cold Forest** Explorer

Abies amabilis - Tsuga heterophylla / Vaccinium membranaceum Cold Forest Alliance

Pacific Silver Fir - Western Hemlock / Thinleaf Huckleberry Cold Forest Alliance

These are tall evergreen forests dominated by a mix of *Abies amabilis* and *Tsuga heterophylla* often with *Pseudotsuga menziesii*, but the latter may be absent. These forests occupy a broad elevational band in the Cascades, extending from approximately 1000-1500 m elevation. In the Olympic Mountains and northward through British Columbia, elevations range from approximately 1000-1200 m.

AK, BC, CA?, OR, WA

CEGL002850 **Western Hemlock - Pacific Silver Fir - (Alaska-cedar) / Alaska Blueberry Forest** Explorer

Tsuga heterophylla - Abies amabilis - (Callitropsis nootkatensis) / Vaccinium alaskaense Forest

Western Hemlock - Pacific Silver Fir - (Alaska-cedar) / Alaska Blueberry Forest

AK, BC, WA?

G751. **North-Central Pacific Western Hemlock - Sitka Spruce Rainforest** Explorer

North-Central Pacific Western Hemlock - Sitka Spruce Rainforest

Western Hemlock - Sitka Spruce North-Central Pacific Rainforest Group

These are tall evergreen conifer forests composed of *Tsuga heterophylla*, *Picea sitchensis*, and *Thuja plicata* (either mixed or singly) that occupy the hypermaritime zone of the Pacific Northwest rainforest region on and near the Pacific Coast, along a heavy rain and fog belt from about Prince Rupert, British Columbia, south to Point Arena, California.

AK, BC, CA, OR, WA

A3604. **North Pacific Western Hemlock - Sitka Spruce Forest** Explorer

Tsuga heterophylla - Picea sitchensis / Rhytidiadelphus loreus Forest Alliance

Western Hemlock - Sitka Spruce / Gooseneck Moss Forest Alliance

This alliance covers forests of the Pacific Northwest dominated by *Picea sitchensis* and *Tsuga heterophylla* on well-drained, fresh to moist, nutrient-poor sites with thin soils, usually directly facing the ocean. The understory is variable but species are indicators of nutrient-poor soils, such as *Rhytidiadelphus loreus*.

AK, BC, CA?, OR, WA

CEGL005523 **Sitka Spruce / Pacific Reedgrass Forest** Explorer

Picea sitchensis / Calamagrostis nutkaensis Forest

Sitka Spruce / Pacific Reedgrass Forest

AK, BC, OR, WA

CEGL005525 **Sitka Spruce / False Lily-of-the-Valley Forest** Explorer

Picea sitchensis / Maianthemum dilatatum Forest

Sitka Spruce / False Lily-of-the-Valley Forest

AK, WA

A3610. **Western Hemlock - Western Red-cedar Rich Mesic Forest** Explorer

Tsuga heterophylla - Thuja plicata / Blechnum spicant Rich Mesic Forest Alliance
Western Hemlock - Western Red-cedar / Deer Fern Rich Mesic Forest Alliance
This alliance consists of forests of the Pacific Northwest coastal mountains dominated by *Tsuga heterophylla* and *Thuja plicata*, with heavy to light maritime influence, on moderate to steep slopes, usually facing the ocean, with nutrient-rich and mesic soils.
AK, BC, CA, OR, WA

CEGL003228. **Western Hemlock - Western Red-cedar / (Alaska Blueberry, Oval-leaf Blueberry) / Western Swordfern Forest** Explorer

Tsuga heterophylla - Thuja plicata / Vaccinium (alaskaense, ovalifolium) / Polystichum munitum Forest
Western Hemlock - Western Red-cedar / (Alaska Blueberry, Oval-leaf Blueberry) / Western Swordfern Forest
AK

A3611. Western Hemlock - Western Red-cedar / Oval-leaf Blueberry Forest Explorer

Tsuga heterophylla - Thuja plicata / Vaccinium ovalifolium Forest Alliance
Western Hemlock - Western Red-cedar / Oval-leaf Blueberry Forest Alliance
This alliance consists of forests of the Pacific Northwest dominated by *Tsuga heterophylla* and *Thuja plicata* on well-drained and nutrient-poor sites. Understory species are indicators of nutrient-poor soils.
AK, BC

CEGL003222. **Western Hemlock - Western Red-cedar / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Tsuga heterophylla - Thuja plicata / Vaccinium (alaskaense, ovalifolium) Forest
Western Hemlock - Western Red-cedar / (Alaska Blueberry, Oval-leaf Blueberry) Forest
AK

CEGL003224. **Western Hemlock - Western Red-cedar / Oval-leaf Blueberry / Threeleaf Foamflower Forest** Explorer

Tsuga heterophylla - Thuja plicata / Vaccinium ovalifolium - Tiarella trifoliata Forest
Western Hemlock - Western Red-cedar / Oval-leaf Blueberry / Threeleaf Foamflower Forest
AK

G750. Alaskan Maritime Western Hemlock - Sitka Spruce Rainforest Explorer

Alaskan Maritime Western Hemlock - Sitka Spruce Rainforest
Alaskan Maritime Western Hemlock - Sitka Spruce Rainforest Group
These are tall evergreen conifer rainforests dominated by *Tsuga heterophylla* and/or *Picea sitchensis*, often with other conifers, in the hypermaritime and maritime regions of southern and southeastern Alaska coast, extending to approximately Prince Rupert, British Columbia, along the Alaska-Canadian border.
AK, BC

A3601. Western Hemlock - Sitka Spruce / Alaska Blueberry Forest Explorer

Tsuga heterophylla - Picea sitchensis / Vaccinium alaskaense Forest Alliance
Western Hemlock - Sitka Spruce / Alaska Blueberry Forest Alliance
This alliance consists of tall conifer rainforests dominated by *Tsuga heterophylla* and/or *Picea sitchensis*. The understory can be dominated by *Vaccinium alaskaense*, which is an indicator of hypermaritime - maritime climate and nitrogen-poor soils. This alliance occurs in Alaska and the northernmost coast of British Columbia.
AK, BC

CEGL003205. **Lodgepole Pine - (Alaska-cedar) / Salal Woodland** Explorer

Pinus contorta - (Callitropsis nootkatensis) / Gaultheria shallon Woodland
Lodgepole Pine - (Alaska-cedar) / Salal Woodland
AK

CEGL003229. **Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) Forest
Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest

AK, BC

CEGL003230. **Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Spreading Woodfern Forest** Explorer

Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) / Dryopteris expansa Forest
Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Spreading Woodfern Forest
AK, BC

CEGL003238. **Western Hemlock / Moss Forest** Explorer

Tsuga heterophylla / Moss Forest
Western Hemlock / Moss Forest
AK

CEGL003261. **Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) Forest
Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest
AK, BC?

CEGL003263. **Sitka Spruce / Oval-leaf Blueberry / Common Ladyfern Forest** Explorer

Picea sitchensis / Vaccinium ovalifolium / Athyrium filix-femina Forest
Sitka Spruce / Oval-leaf Blueberry / Common Ladyfern Forest
AK

CEGL003264. **Sitka Spruce / Oval-leaf Blueberry / Spreading Woodfern Forest** Explorer

Picea sitchensis / Vaccinium ovalifolium / Dryopteris expansa Forest
Sitka Spruce / Oval-leaf Blueberry / Spreading Woodfern Forest
AK

CEGL003268. **Sitka Spruce / Bryophyte Forest** Explorer

Picea sitchensis / Bryophyte Forest
Sitka Spruce / Bryophyte Forest
AK

CEGL003269. **Sitka Spruce / Black Crowberry Forest** Explorer

Picea sitchensis / Empetrum nigrum Forest
Sitka Spruce / Black Crowberry Forest
AK

CEGL003272. **Sitka Spruce / Mountain Woodfern Forest** Explorer

Picea sitchensis / Dryopteris campyloptera Forest
Sitka Spruce / Mountain Woodfern Forest
AK

CEGL005547. **Douglas-fir - Western Hemlock / Alaska Blueberry / Common Beargrass Forest** Explorer

Pseudotsuga menziesii - Tsuga heterophylla / Vaccinium alaskaense / Xerophyllum tenax Forest
Douglas-fir - Western Hemlock / Alaska Blueberry / Common Beargrass Forest
AK, OR, WA

CEGL005572. **Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Cordilleran Bunchberry Forest** Explorer

Tsuga heterophylla - (Pseudotsuga menziesii) / Vaccinium alaskaense / Cornus unalaschkensis Forest
Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Cordilleran Bunchberry Forest
AK, OR, WA

CEGL005573. **Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Swordfern Forest** Explorer

Tsuga heterophylla - (Pseudotsuga menziesii) / Vaccinium alaskaense / Polystichum munitum Forest

Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Swordfern Forest
AK, OR, WA

CEGL005574. **Western Hemlock - (Douglas-fir) / Alaska Blueberry - Cascade Barberry - (Salal) Forest** Explorer

Tsuga heterophylla - (Pseudotsuga menziesii) / Vaccinium alaskaense - Mahonia nervosa - (Gaultheria shallon) Forest
Western Hemlock - (Douglas-fir) / Alaska Blueberry - Cascade Barberry - (Salal) Forest
AK, OR, WA

A3602. Sitka Spruce / Common Ladyfern Forest Explorer

Picea sitchensis / Athyrium filix-femina Forest Alliance
Sitka Spruce / Common Ladyfern Forest Alliance
This is an alliance of tall conifer rainforests dominated by *Picea sitchensis* often with *Tsuga heterophylla*. The understory has nutrient-rich soil indicators such as *Athyrium filix-femina*, on sites that are very wet to moist but well-drained. They are found in Alaska and the northernmost coast of British Columbia.
AK, BC

CEGL003273. **Sitka Spruce / Common Ladyfern Forest** Explorer

Picea sitchensis / Athyrium filix-femina Forest
Sitka Spruce / Common Ladyfern Forest
AK

A3603. Sitka Spruce / Devil's-club Forest Explorer

Picea sitchensis / Oplopanax horridus Forest Alliance
Sitka Spruce / Devil's-club Forest Alliance
This alliance consists of forests dominated by *Picea sitchensis* often with *Tsuga heterophylla*. Understory shrubs include species such as *Oplopanax horridus* as an indicator of very wet, subirrigated water-receiving sites on nutrient-rich soils. This alliance occurs in Alaska and the northernmost coast of British Columbia.
AK, BC

CEGL003232. **Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest** Explorer

Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) - Oplopanax horridus Forest
Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest
AK

CEGL003233. **Western Hemlock / Devil's-club - Salmonberry Forest** Explorer

Tsuga heterophylla / Oplopanax horridus - Rubus spectabilis Forest
Western Hemlock / Devil's-club - Salmonberry Forest
AK

CEGL003234. **Western Hemlock / Devil's-club / Western Oakfern Forest** Explorer

Tsuga heterophylla / Oplopanax horridus - Gymnocarpium dryopteris Forest
Western Hemlock / Devil's-club / Western Oakfern Forest
AK

CEGL003236. **Western Hemlock / Oval-leaf Blueberry - Rusty Menziesia Forest** Explorer

Tsuga heterophylla / Vaccinium ovalifolium - Menziesia ferruginea Forest
Western Hemlock / Oval-leaf Blueberry - Rusty Menziesia Forest
AK

CEGL003239. **Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Tsuga heterophylla - Callitropsis nootkatensis / Vaccinium (alaskaense, ovalifolium) Forest
Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) Forest
AK

CEGL003241. **Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest** Explorer

Tsuga heterophylla - Callitropsis nootkatensis / Vaccinium (alaskaense, ovalifolium) - Oplopanax horridus Forest
Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest
AK

CEGL003242 **Western Hemlock - Alaska-cedar / Oval-leaf Blueberry - Rusty Menziesia Forest** Explorer

Tsuga heterophylla - Callitropsis nootkatensis / Vaccinium ovalifolium - Menziesia ferruginea Forest
Western Hemlock - Alaska-cedar / Oval-leaf Blueberry - Rusty Menziesia Forest
AK

CEGL003259 **Sitka Spruce / Devil's-club / Mountain Woodfern Forest** Explorer

Picea sitchensis / Oplopanax horridus / Dryopteris campyloptera Forest
Sitka Spruce / Devil's-club / Mountain Woodfern Forest
AK

CEGL003260 **Sitka Spruce / Devil's-club / Small Enchanter's-nightshade Forest** Explorer

Picea sitchensis / Oplopanax horridus / Circaea alpina Forest
Sitka Spruce / Devil's-club / Small Enchanter's-nightshade Forest
AK

CEGL003267 **Sitka Spruce / Bluejoint Woodland** Explorer

Picea sitchensis / Calamagrostis canadensis Woodland
Sitka Spruce / Bluejoint Woodland
AK

CEGL003275 **Sitka Spruce - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Howell's Marsh-marigold Forest** Explorer

Picea sitchensis - Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) / Caltha leptosepala ssp. howellii Forest
Sitka Spruce - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Howell's Marsh-marigold Forest
AK

CEGL003276 **Sitka Spruce - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest** Explorer

Picea sitchensis - Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) - Oplopanax horridus Forest
Sitka Spruce - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Forest
AK

M025. Vancouverian Subalpine-High Montane Forest Explorer

These are short to tall, dense to open forests, tree islands and large forest patches dominated by *Abies amabilis, Abies lasiocarpa, Abies magnifica var. magnifica, Abies magnifica var. shastensis, Abies procera, Callitropsis nootkatensis, Pinus albicaulis, Pinus balfouriana, Pinus contorta var. murrayana, Pinus monticola*, and/or *Tsuga mertensiana*. These Pacific coastal subalpine forests approach treeline in mountain regions of the Pacific states, extending from low elevations in southeastern Alaska south into high montane regions of Baja California, Mexico, and the Sierra Nevada of California.

G850. Alaskan Mountain Hemlock Forest Explorer

Alaskan Mountain Hemlock Forest
Alaskan Mountain Hemlock Forest Group
AK, BC?

A3725. Montane Alaskan Mountain Hemlock Forest Explorer

Tsuga mertensiana Montane Alaskan Forest Alliance
Mountain Hemlock Montane Alaskan Forest Alliance
This is a forested alliance of open canopy "parklands" dominated by *Tsuga mertensiana* and ericaceous and alpine shrubs and forbs such as *Cassiope mertensiana,*

Elliottia pyroliflora, and *Phyllodoce aleutica*. It occurs from near sea level into the subalpine in Alaska coastal areas, on slope benches or canyon bottoms.
AK

CEGL003248 **Mountain Hemlock / Copperbush / Deer-cabbage Woodland** Explorer

Tsuga mertensiana / Elliottia pyroliflora / Nephrophyllidium crista-galli Woodland
Mountain Hemlock / Copperbush / Deer-cabbage Woodland
AK, BC

CEGL003250 **Mountain Hemlock / Aleutian Mountain-heath / Deer-cabbage Woodland** Explorer

Tsuga mertensiana / Phyllodoce aleutica / Nephrophyllidium crista-galli Woodland
Mountain Hemlock / Aleutian Mountain-heath / Deer-cabbage Woodland
AK

CEGL003251 **Mountain Hemlock / Western Moss-heather Woodland** Explorer

Tsuga mertensiana / Cassiope mertensiana Woodland
Mountain Hemlock / Western Moss-heather Woodland
AK

CEGL003252 **Mountain Hemlock / Western Moss-heather / Deer-cabbage Woodland** Explorer

Tsuga mertensiana / Cassiope mertensiana / Nephrophyllidium crista-galli Woodland
Mountain Hemlock / Western Moss-heather / Deer-cabbage Woodland
AK

A4284. Alaskan Maritime Mountain Hemlock Forest Explorer

Tsuga mertensiana Maritime Alaskan Forest Alliance
Mountain Hemlock Maritime Alaskan Forest Alliance
AK, BC?

1.B.3. Temperate Flooded & Swamp Forest Explorer

Temperate Flooded & Swamp Forest is a tree-dominated wetland influenced by minerotrophic groundwater, either on mineral or organic (peat) soil, found in mid-latitudes of the globe.

D193. Vancouverian Flooded & Swamp Forest Explorer

This division is comprised of forested wetlands of temperate maritime climates from southern Alaska to northern California, including riparian forests, rich swamps, and poor peat swamps (dominated by broad-leaved deciduous and needle-leaved trees.

M035. Vancouverian Flooded & Swamp Forest Explorer

This macrogroup covers forested wetlands and riparian areas of coastal lowlands and mountains from Oregon north into southern Alaska. It includes cottonwood- and conifer-dominated riparian forests, conifer swamps, and treed peatlands (fens and bogs). Dominant species in lowland riparian areas include *Abies grandis, Acer macrophyllum, Alnus rubra, Fraxinus latifolia, Picea sitchensis, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra*, and/or *Thuja plicata*; in montane riparian areas include *Abies amabilis, Abies concolor, Abies magnifica, Pinus contorta var. murrayana, Populus tremuloides*, and/or *Tsuga mertensiana*; and in bogs at a variety of elevations, *Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Tsuga heterophylla*, and *Tsuga mertensiana* are some of the common characteristic tree species.

G853. North-Central Pacific Maritime Swamp Forest Explorer

North-Central Pacific Maritime Swamp Forest
Western Hemlock - Red Alder / Yellow Skunk-cabbage Swamp Forest Group
AK, BC, CA, ID, OR, WA

A3724. Mountain Hemlock - Western Hemlock - Alaska-cedar Forest & Woodland Explorer

Tsuga mertensiana - Tsuga heterophylla - Callitropsis nootkatensis Forest & Woodland Alliance
Mountain Hemlock - Western Hemlock - Alaska-cedar Forest & Woodland Alliance
This alliance covers forests dominated by *Tsuga mertensiana* with *Callitropsis nootkatensis* and/or *Tsuga heterophylla*. Other tree species present include *Picea sitchensis* and/or *Pinus contorta*. Stands have with heavy snowfall in the winter, and occur within the subalpine Wet Hypermaritime Mountain Hemlock Subzone (MHwh)

along the outer coast of British Columbia (elevations of 500-1100 m) and at still snowy but lower elevations in southeastern Alaska.
AK, BC

CEGL003217. **Mountain Hemlock - Western Hemlock / Sitka Alder Forest** Explorer

Tsuga mertensiana - Tsuga heterophylla / Alnus viridis ssp. sinuata Forest
Mountain Hemlock - Western Hemlock / Sitka Alder Forest
AK

CEGL003219. **Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry - Rusty Menziesia Forest** Explorer

Tsuga mertensiana - Tsuga heterophylla / Vaccinium ovalifolium - Menziesia ferruginea Forest
Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry - Rusty Menziesia Forest
AK

CEGL003243. **Mountain Hemlock / Sitka Alder Forest** Explorer

Tsuga mertensiana / Alnus viridis ssp. sinuata Forest
Mountain Hemlock / Sitka Alder Forest
AK

CEGL003245. **Mountain Hemlock / Oval-leaf Blueberry / Deer-cabbage Woodland** Explorer

Tsuga mertensiana / Vaccinium ovalifolium / Nephrophyllidium crista-galli Woodland
Mountain Hemlock / Oval-leaf Blueberry / Deer-cabbage Woodland
AK

CEGL003246. **Mountain Hemlock / Oval-leaf Blueberry - Alaska Bell-heather Woodland** Explorer

Tsuga mertensiana / Vaccinium ovalifolium - Harrimanella stelleriana Woodland
Mountain Hemlock / Oval-leaf Blueberry - Alaska Bell-heather Woodland
AK

CEGL003247. **Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Howell's Marsh-marigold Forest** Explorer

Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) / Caltha leptosepala ssp. howellii Forest
Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Howell's Marsh-marigold Forest
AK

CEGL005584. **Mountain Hemlock - Sitka Spruce / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Tsuga mertensiana - Picea sitchensis / Vaccinium (alaskaense, ovalifolium) Forest
Mountain Hemlock - Sitka Spruce / (Alaska Blueberry, Oval-leaf Blueberry) Forest
AK

CEGL007338. **Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest** Explorer

Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) / Lysichiton americanus Swamp Forest
Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest
AK

CEGL007376. **Western Red-cedar - Alaska-cedar - Western Hemlock / Salal / American Skunk-cabbage Forest** Explorer

Thuja plicata - Callitropsis nootkatensis - Tsuga heterophylla / Gaultheria shallon / Lysichiton americanus Forest
Western Red-cedar - Alaska-cedar - Western Hemlock / Salal / American Skunk-cabbage Forest
AK, BC

CEGL007378. **Mountain Hemlock - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest** Explorer

Tsuga mertensiana - Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) Forest
Mountain Hemlock - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) Forest
AK

G852. Alaskan Pacific Riparian Forest & Woodland Explorer
Alaskan Pacific Riparian Forest & Woodland
Sitka Spruce - Black Cottonwood Alaskan Riparian Woodland Group
AK, BC

A3744. Black Cottonwood - Sitka Spruce - Western Hemlock Riparian Forest Explorer
Populus balsamifera ssp. trichocarpa - Picea sitchensis - Tsuga heterophylla Riparian Forest Alliance
Black Cottonwood - Sitka Spruce - Western Hemlock Riparian Forest Alliance
This alliance comprises streamside riparian forests dominated by *Populus balsamifera ssp. trichocarpa* and may be codominated by coniferous trees such as *Pseudotsuga menziesii, Picea sitchensis, Tsuga heterophylla*, and/or *Pinus ponderosa*. Stands are found in Oregon, Washington, British Columbia and Alaska and occur on active floodplains on well-drained alluvial soils that either experience overbank flooding or high water tables during snowmelt and rainy seasons.
AK, BC?

CEGL003277 **Sitka Spruce - Black Cottonwood / Sitka Alder Riparian Woodland** Explorer
Picea sitchensis - Populus balsamifera ssp. trichocarpa / Alnus viridis ssp. sinuata Riparian Woodland
Sitka Spruce - Black Cottonwood / Sitka Alder Riparian Woodland
AK

CEGL003278 **Sitka Spruce - Black Cottonwood / Devil's-club Riparian Forest** Explorer
Picea sitchensis - Populus balsamifera ssp. trichocarpa / Oplopanax horridus Riparian Forest
Sitka Spruce - Black Cottonwood / Devil's-club Riparian Forest
AK

CEGL003280 **Sitka Spruce - Black Cottonwood / Sidebells Wintergreen Riparian Woodland** Explorer
Picea sitchensis - Populus balsamifera ssp. trichocarpa / Orthilia secunda Riparian Woodland
Sitka Spruce - Black Cottonwood / Sidebells Wintergreen Riparian Woodland
AK

CEGL003281 **Sitka Spruce - Black Cottonwood Riparian Woodland** Explorer
Picea sitchensis - Populus balsamifera ssp. trichocarpa Riparian Woodland
Sitka Spruce - Black Cottonwood Riparian Woodland
AK

CEGL003282 **Black Cottonwood / Willow species Riparian Woodland** Explorer
Populus balsamifera ssp. trichocarpa / Salix spp. Riparian Woodland
Black Cottonwood / Willow species Riparian Woodland
AK

CEGL003283 **Black Cottonwood / Salmonberry Riparian Woodland** Explorer
Populus balsamifera ssp. trichocarpa / Rubus spectabilis Riparian Woodland
Black Cottonwood / Salmonberry Riparian Woodland
AK

CEGL003284 **Black Cottonwood / Devil's-club Riparian Woodland** Explorer
Populus balsamifera ssp. trichocarpa / Oplopanax horridus Riparian Woodland
Black Cottonwood / Devil's-club Riparian Woodland
AK

A3747. **Sitka Spruce Riparian Forest** Explorer

Picea sitchensis Riparian Forest Alliance

Sitka Spruce Riparian Forest Alliance

This alliance consists of lowland coastal and foothill riparian forests dominated by *Picea sitchensis* or other conifer species such as *Tsuga heterophylla* or *Pseudotsuga menziesii*. Understory species are flood-tolerant, such as *Alnus viridis, Oplopanax horridus*, and *Rubus spectabilis*. Forests within this alliance occur in the outer coastal regions from Oregon to southeastern Alaska.

AK, BC

CEGL003253. **Sitka Spruce - Red Alder / Salmonberry - Devil's-club / American Skunk-cabbage Riparian Forest** Explorer

Picea sitchensis - Alnus rubra / Rubus spectabilis - Oplopanax horridus / Lysichiton americanus Riparian Forest

Sitka Spruce - Red Alder / Salmonberry - Devil's-club / American Skunk-cabbage Riparian Forest

AK

CEGL003254. **Sitka Spruce / Devil's-club - Sitka Alder Riparian Woodland** Explorer

Picea sitchensis / Oplopanax horridus - Alnus viridis ssp. sinuata Riparian Woodland

Sitka Spruce / Devil's-club - Sitka Alder Riparian Woodland

AK

CEGL003256. **Sitka Spruce - Western Hemlock / Salmonberry - Devil's-club / Strawberry-leaf Raspberry Riparian Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Rubus spectabilis - Oplopanax horridus / Rubus pedatus Riparian Forest

Sitka Spruce - Western Hemlock / Salmonberry - Devil's-club / Strawberry-leaf Raspberry Riparian Forest

AK

CEGL003258. **Sitka Spruce - Western Hemlock / Devil's-club / Common Ladyfern Riparian Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Oplopanax horridus / Athyrium filix-femina Riparian Forest

Sitka Spruce - Western Hemlock / Devil's-club / Common Ladyfern Riparian Forest

AK, BC

G854. **Alaskan Pacific Swamp Forest** Explorer

Alaskan Pacific Swamp Forest

Western Hemlock - Mountain Hemlock / American Skunk-cabbage Swamp Forest Group

AK, BC

A4286. **Alaskan Pacific Swamp Forest** Explorer

Tsuga heterophylla - Picea sitchensis Alaskan Swamp Forest Alliance

Western Hemlock - Sitka Spruce Alaskan Swamp Forest Alliance

AK, BC

CEGL003209. **Mountain Hemlock - Alaska-cedar / Red Huckleberry / Strawberry-leaf Raspberry - American Skunk-cabbage Swamp Forest** Explorer

Tsuga mertensiana - Callitropsis nootkatensis / Vaccinium parvifolium / Rubus pedatus - Lysichiton americanus Swamp Forest

Mountain Hemlock - Alaska-cedar / Red Huckleberry / Strawberry-leaf Raspberry - American Skunk-cabbage Swamp Forest

AK

CEGL003210. **Alaska-cedar - Western Hemlock - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Deer-cabbage Forest** Explorer

Callitropsis nootkatensis - Tsuga heterophylla - Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) / Nephrophyllidium crista-galli Forest

Alaska-cedar - Western Hemlock - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / Deer-cabbage Forest

AK

CEGL003212. **Alaska-cedar - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Salal / Deer-cabbage Forest** Explorer

Callitropsis nootkatensis - Tsuga mertensiana / Vaccinium (alaskaense, ovalifolium) - Gaultheria shallon / Nephrophyllidium crista-galli Forest
Alaska-cedar - Mountain Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Salal / Deer-cabbage Forest
AK

CEGL003213. **Mountain Hemlock - Alaska-cedar / Salal / American Skunk-cabbage Woodland** Explorer

Tsuga mertensiana - Callitropsis nootkatensis / Gaultheria shallon / Lysichiton americanus Woodland
Mountain Hemlock - Alaska-cedar / Salal / American Skunk-cabbage Woodland
AK

CEGL003215. **Mountain Hemlock - Alaska-cedar / Copperbush / Deer-cabbage Woodland** Explorer

Tsuga mertensiana - Callitropsis nootkatensis / Elliottia pyroliflora / Nephrophyllidium crista-galli Woodland
Mountain Hemlock - Alaska-cedar / Copperbush / Deer-cabbage Woodland
AK

CEGL003216. **Mountain Hemlock - Alaska-cedar / American Skunk-cabbage - Common Ladyfern Swamp Forest** Explorer

Tsuga mertensiana - Callitropsis nootkatensis / Lysichiton americanus - Athyrium filix-femina Swamp Forest
Mountain Hemlock - Alaska-cedar / American Skunk-cabbage - Common Ladyfern Swamp Forest
AK, BC?

CEGL003220. **Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry / American Skunk-cabbage Swamp Forest** Explorer

Tsuga mertensiana - Tsuga heterophylla / Vaccinium ovalifolium / Lysichiton americanus Swamp Forest
Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry / American Skunk-cabbage Swamp Forest
AK, BC?

CEGL003221. **Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry / Deer-cabbage Swamp Forest** Explorer

Tsuga mertensiana - Tsuga heterophylla / Vaccinium ovalifolium / Nephrophyllidium crista-galli Swamp Forest
Mountain Hemlock - Western Hemlock / Oval-leaf Blueberry / Deer-cabbage Swamp Forest
AK, BC?

CEGL003231. **Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Forest** Explorer

Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) / Lysichiton americanus Forest
Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Forest
AK

CEGL003235. **Western Hemlock / Devil's-club / American Skunk-cabbage Swamp Forest** Explorer

Tsuga heterophylla / Oplopanax horridus / Lysichiton americanus Swamp Forest
Western Hemlock / Devil's-club / American Skunk-cabbage Swamp Forest
AK, BC?

CEGL003240. **Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest** Explorer

Tsuga heterophylla - Callitropsis nootkatensis / Vaccinium (alaskaense, ovalifolium) / Lysichiton americanus Swamp Forest
Western Hemlock - Alaska-cedar / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest
AK

CEGL003249. **Mountain Hemlock / Bog Blueberry / Deer-cabbage Woodland** Explorer

Tsuga mertensiana / Vaccinium uliginosum / Nephrophyllidium crista-galli Woodland
Mountain Hemlock / Bog Blueberry / Deer-cabbage Woodland
AK

CEGL003255 **Sitka Spruce - Western Hemlock / Salmonberry / Spreading Woodfern Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Rubus spectabilis / Dryopteris expansa Forest
Sitka Spruce - Western Hemlock / Salmonberry / Spreading Woodfern Forest
AK

CEGL003257 **Sitka Spruce - Western Hemlock / Devil's-club / American Skunk-cabbage Swamp Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Oplopanax horridus / Lysichiton americanus Swamp Forest
Sitka Spruce - Western Hemlock / Devil's-club / American Skunk-cabbage Swamp Forest
AK

CEGL003262 **Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Swamp Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) - Oplopanax horridus Swamp Forest
Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) - Devil's-club Swamp Forest
AK

CEGL003265 **Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest** Explorer

Picea sitchensis - Tsuga heterophylla / Vaccinium (alaskaense, ovalifolium) / Lysichiton americanus Swamp Forest
Sitka Spruce - Western Hemlock / (Alaska Blueberry, Oval-leaf Blueberry) / American Skunk-cabbage Swamp Forest
AK, BC

CEGL003271 **Sitka Spruce / Yellow Skunk-cabbage Swamp Forest** Explorer

Picea sitchensis / Lysichiton americanus Swamp Forest
Sitka Spruce / Yellow Skunk-cabbage Swamp Forest
AK

1.B.4. Boreal Forest & Woodland Explorer

Boreal Forest & Woodland (or taiga) is dominated by needle-leaved (usually evergreen, conical-shaped) conifers, and broad-leaved deciduous hardwoods that cover the northern regions of North America and Eurasia, with extended cold winters and short mild summers.

D014. North American Boreal Forest & Woodland Explorer

This division is composed of upland forests and woodlands of the boreal and subarctic regions of North America, characterized by the needle-leaved evergreen tree species *Abies balsamea, Abies lasiocarpa, Picea glauca, Picea mariana, Pinus banksiana,* and *Pinus contorta var. latifolia*, as well as the broad-leaved cold-deciduous tree species *Betula papyrifera, Betula neoalaskana, Populus tremuloides,* and *Populus balsamifera,* ranging in a broad latitudinal belt from Alaska to Labrador and Newfoundland.

M156. Alaskan-Yukon North American Boreal Forest Explorer

This Alaskan-Yukon North American subboreal and boreal forest ranges from western Alaska to southwestern Yukon Territories, dominated by the conifers *Picea glauca* and *Picea mariana*, and hardwoods *Betula neoalaskana, Betula papyrifera var. kenaica*, and *Populus tremuloides*.

G349. Alaskan Boreal Dry Aspen Forest Explorer

Alaskan Boreal Dry Aspen Forest
Quaking Aspen Alaskan Boreal Dry Forest Group

This group is found in the boreal and boreal transition (low-elevation through alpine) regions of Alaska and probably occurs east in the Yukon Territories of Canada. It is characterized by woodlands and forest dominated by stunted *Populus tremuloides* and associated shrubs at high elevations and steep positions that experience desiccating winds.

AK

A4256. **White Spruce - Poplar Dry Floodplain Woodland** Explorer

Populus balsamifera - Picea glauca / Dryas drummondii Floodplain Woodland Alliance

Balsam Poplar - White Spruce / Drummond's Mountain-avens Floodplain Woodland Alliance

AK

A4379. **Alaskan Aspen Dry Bluff Woodland** Explorer

Populus tremuloides / Shepherdia canadensis - Arctostaphylos uva-ursi Woodland Alliance

Quaking Aspen / Russet Buffaloberry - Kinnikinnick Woodland Alliance

AK

A4380. **Alaskan White Spruce Dune Woodland** Explorer

Picea glauca / Cladonia stellaris Dune Woodland Alliance

White Spruce / Star Reindeer Lichen Dune Woodland Alliance

AK

G579. **Central Alaskan-Yukon Boreal Mesic Forest** Explorer

Central Alaskan-Yukon Boreal Mesic Forest

White Spruce - Resin Birch Forest Group

This group is common throughout interior Alaska and Yukon. Forest canopies may be dominated by *Picea glauca*, *Betula neoalaskana*, and *Populus tremuloides* or a mixture of one or more of these species.

AK, YT?

A4257. **Central Alaskan-Yukon Black Spruce Mesic Forest** Explorer

Picea mariana / Ledum groenlandicum Central Forest Alliance

Black Spruce / Bog Labrador-tea Central Forest Alliance

This alliance is common throughout upland slopes and inactive alluvial deposits in the boreal region of Alaska. Forest canopies are typically open to closed, ranging from 40 to 80% cover, and are dominated by *Picea mariana* or a mix of *Picea glauca* and *Picea mariana*. *Betula neoalaskana* or *Populus tremuloides* may be codominant in post-fire seral stages.

AK, YT?

A4258. **Central Alaskan-Yukon White Spruce Mesic Forest** Explorer

Picea glauca - Betula papyrifera Central Forest Alliance

White Spruce - Paper Birch Central Forest Alliance

AK, YT?

A4259. **Central Alaskan-Yukon Aspen - Birch Mesic Forest** Explorer

Betula papyrifera - Populus tremuloides Central Alliance

Paper Birch - Quaking Aspen Central Alliance

AK, YT?

G627. **Southern Alaskan Boreal Mesic Forest** Explorer

Southern Alaskan Boreal Mesic Forest

White Spruce - Resin Birch - Lutz Spruce Forest Group

This group is common on moist sites throughout the subboreal region of Alaska and Yukon. Forest canopies are typically dominated *Picea glauca* or *Picea x lutzii* (occasionally with *Tsuga mertensiana*) and *Betula papyrifera var. kenaica* or *Betula neoalaskana*.

AK, YT?

A4260. **Southern Alaskan-Yukon Black Spruce Mesic Forest** Explorer

Picea mariana / Ledum groenlandicum Southern Forest Alliance

Black Spruce / Bog Labrador-tea Southern Forest Alliance

This alliance is common throughout upland slopes and inactive alluvial deposits in the boreal region of Alaska. Forest canopies are typically open to closed, ranging from 40 to 80% cover, and are dominated by *Picea mariana* or a mix of *Picea glauca* and *Picea mariana*. *Betula neoalaskana* or *Populus tremuloides* may be codominant in post-fire seral stages.

AK, YT?

A4261. **Southern Alaskan-Yukon White Spruce Mesic Forest** Explorer

Picea glauca - Picea x lutzii - Betula papyrifera Southern Forest Alliance
White Spruce - Lutz Spruce - Paper Birch Southern Forest Alliance

AK, YT?

A4262. **Southern Alaskan-Yukon Aspen - Birch Mesic Forest** Explorer

Betula papyrifera var. kenaica - Populus tremuloides Southern Forest Alliance
Kenai Birch - Quaking Aspen Southern Forest Alliance

AK, YT?

G856. **Central Alaskan Boreal Montane Woodland** Explorer

Central Alaskan Boreal Montane Woodland
White Spruce - Black Spruce Central Montane Woodland Group

AK

A4287. **Central White Spruce Ericaceous Montane Woodland** Explorer

Picea glauca / Loiseleuria procumbens Central Montane Woodland Alliance
White Spruce / Alpine-azalea Central Montane Woodland Alliance

AK

A4288. **Balsam Poplar Montane Woodland** Explorer

Populus balsamifera / Festuca altaica Central Montane Woodland Alliance
Balsam Poplar / Altai Fescue Central Montane Woodland Alliance

AK

G857. **Southern Alaskan Boreal Montane Woodland** Explorer

Southern Alaskan Boreal Montane Woodland
White Spruce - Black Spruce Boreal Montane Woodland Group

AK

A4289. **Southern White Spruce Montane Woodland** Explorer

Picea glauca Southern Montane Woodland Alliance
White Spruce Southern Montane Woodland Alliance

AK

A4290. **Low Birch Montane Woodland** Explorer

Betula papyrifera var. kenaica Southern Montane Woodland Alliance
Kenai Birch Southern Montane Woodland Alliance

AK

M179. **North American Northern Boreal Woodland** Explorer

Open-canopy, short-statured woodlands in subalpine and subarctic North America on cool, dry sites on well-drained to excessively well-drained substrates. Canopies are sparse to open and dominated by *Picea glauca* and *Pinus banksiana*, and codominated by *Picea mariana*. Isolated stands of *Populus tremuloides* or *Populus balsamifera ssp. balsamifera* that occur above conifer treeline are included.

G859. **Alaska-Yukon Northern Boreal Mesic Woodland** Explorer

Alaska-Yukon Northern Boreal Mesic Woodland
White Spruce Northern Boreal Mesic Woodland Group

AK, YT

A4291. **Alaskan Northern Boreal Spruce/ Dryas Woodland** Explorer

Picea glauca / Dryas spp. Northern Boreal Woodland Alliance
White Spruce / Mountain-avens species Northern Boreal Woodland Alliance

AK

A4292. **Alaskan Northern Boreal Spruce / Ericaceous Woodland** Explorer

Picea glauca / Ledum palustre ssp. decumbens Northern Boreal Woodland Alliance
White Spruce / Marsh Labrador-tea Northern Boreal Woodland Alliance

AK

1.B.5. Boreal Flooded & Swamp Forest Explorer

Boreal Flooded & Swamp Forest is a tree-dominated wetland influenced by minerotrophic groundwater (rarely ombrotrophic), either on mineral or organic (peat) soil, found in northern, high latitudes of North America and Eurasia, with extended cold winters and short mild summers.

D016. North American Boreal Flooded & Swamp Forest Explorer

This division includes conifer-treed poor peat swamps and broad-leaved cold-deciduous (hardwood) riparian forests and rich swamps of the boreal region of North America, characterized by *Abies balsamea, Fraxinus nigra, Larix laricina, Picea mariana, Populus balsamifera*, and *Thuja occidentalis*.

M299. North American Boreal Conifer Poor Swamp Explorer

This boreal swamp type is found across the North American boreal region, from Alaska to Newfoundland, including poor to intermediate swamp forests, primarily on peatland soils, dominated by *Picea mariana, Larix laricina, Abies balsamea,* and/or *Betula papyrifera*.

G546. Alaskan-Yukon Boreal Black Spruce Wet Forest Explorer

Alaskan-Yukon Boreal Black Spruce Wet Forest

Black Spruce Alaskan-Yukon Boreal Wet Forest Group

This group includes both forested bogs and acidic swamps of the western North American boreal region, typically with black spruce, but occasionally with tamarack, and an ericaceous heath and sphagnum understory.

AK, YT

A4263. Southern Alaskan Black Spruce Wet Forest Explorer

Picea mariana / Ledum palustre ssp. decumbens / Sphagnum spp. Central Wet Forest Alliance

Black Spruce / Marsh Labrador-tea / Peatmoss species Central Wet Forest Alliance

AK

A4264. Central Alaskan Black Spruce Wet Forest Explorer

Picea mariana / Ledum palustre ssp. decumbens / Sphagnum spp. Southern Wet Forest Alliance

Black Spruce / Marsh Labrador-tea / Peatmoss species Southern Wet Forest Alliance

AK

M300. North American Boreal Flooded & Rich Swamp Forest Explorer

This type is found across the North American boreal region, from Alaska to Newfoundland, including rich floodplain and rich swamp forests.

G548. Alaskan-Yukon Boreal Flooded & Rich Swamp Explorer

Alaskan-Yukon Boreal Flooded & Rich Swamp

Balsam Poplar / Willow species - Green Alder Flooded & Rich Swamp Forest Group

This group represents well-drained, active and inactive floodplains of boreal and sub- boreal areas of Alaska with variable-height vegetation dominated by *Populus balsamifera* and *Picea glauca*.

AK, YT

A4265. Central Alaskan-Yukon Spruce - Poplar Floodplain Forest Explorer

Picea glauca - Populus balsamifera / Alnus viridis ssp. crispa Central Floodplain Forest Alliance

White Spruce - Balsam Poplar / Mountain Alder Central Floodplain Forest Alliance

AK, YT

A4266. Central Alaskan-Yukon Spruce - Birch Floodplain Forest Explorer

Betula papyrifera - Picea spp. Central Floodplain Forest Alliance

Paper Birch - Spruce species Central Floodplain Forest Alliance

AK, YT

A4267. Northern Alaskan-Yukon Spruce - Poplar Floodplain Forest Explorer

Picea glauca - Populus balsamifera / Salix alaxensis Northern Floodplain Forest Alliance

White Spruce - Balsam Poplar / Feltleaf Willow Northern Floodplain Forest Alliance

AK, YT

A4268. Southwest Alaskan Spruce - Black Cottonwood Floodplain Forest Explorer

Picea glauca - Populus balsamifera ssp. trichocarpa / Viburnum edule Southwest Floodplain Forest Alliance

White Spruce - Black Cottonwood / Squashberry Southwest Floodplain Forest Alliance

AK, YT

2. Shrub & Herb Vegetation

Explorer

Grasslands, shrublands, open tree savannas, marshes, bogs and fens dominated by broadly mesomorphic (including scleromorphic) shrub and herb growth forms (including *broad-leaved*, *needle-leaved*, and *sclerophyllous shrubs*, and *forb* and *graminoid herbs*) with an irregular horizontal canopy structure, mesomorphic trees typically <10% cover (but tropical tree savannas typically <40%), tropical to boreal and subalpine climates, and wet to dry substrate conditions.

2.B. Temperate & Boreal Grassland & Shrubland

Explorer

Temperate & Boreal Grassland & Shrubland is dominated by mesomorphic grasses and shrubs, with or without scattered trees (and trees typically <10% cover), ranging from temperate coastal to inland lowland and montane grasslands and shrublands, with a strongly seasonal climate and at least some frost to extended cold seasons.

2.B.2. Temperate Grassland & Shrubland

Explorer

Temperate Grassland, Meadow & Shrubland is dominated by perennial grasses, forbs and shrubs typical of moderately dry to moist habitats and is found in the mid-latitude regions of all continents (23° to 55°N and S), varying from large open grassland landscapes to droughty hillside meadows in forested landscapes.

D022. Western North American Grassland & Shrubland

Explorer

This division contains cool-temperate lowland to subalpine shrubland, grassland, and meadow communities that are dominated by cold-deciduous shrubs or cool-season bunchgrasses or mesic forbs in the mountainous regions of western North America, from Alaska's Aleutian Islands south to the central coast of California, and down through the Intermountain West ranges and Rocky Mountains to Arizona and New Mexico.

M172. Northern Vancouverian Lowland-Montane Grassland & Shrubland

Explorer

This macrogroup consists of low to tall shrublands, meadows, and mosaics of the two in coastal and southeastern Alaska and British Columbia. Shrublands dominate and characteristic species include, but are not limited to, *Alnus viridis*, *Rubus spectabilis*, *Salix alaxensis*, *Salix barclayi*, *Salix glauca*, *Elliottia pyroliflora*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Chamerion angustifolium*, *Heracleum maximum*, and *Veratrum viride*.

G354. Vancouverian Alder - Salmonberry - Willow Shrubland

Explorer

Vancouverian Alder - Salmonberry - Willow Shrubland
Green Alder - Salmonberry - Feltleaf Willow Vancouverian Shrubland Group

This shrubland group ranges from low elevations on the Aleutian Islands to subalpine and low alpine in southeastern Alaska where the dominant and characteristic species include *Alnus viridis*, *Rubus spectabilis*, *Salix alaxensis*, *Salix barclayi*, *Salix glauca*, and *Vaccinium ovalifolium*. Other shrubs may include *Sambucus racemosa*, *Spiraea stevenii*, and *Oplopanax horridus*.

AK, BC

A3937. Southern Alaskan Sitka Alder Shrubland Explorer

Alnus viridis ssp. sinuata Shrubland Alliance
Sitka Alder Shrubland Alliance

This alliance consists of closed to open tall alder thickets of *Alnus viridis* on flat to steep slopes of southwestern Alaska on the Alaska peninsula, Kodiak Island and the Aleutian Islands.

AK

A3938. Southern Alaskan Green Alder - Willow Shrubland Explorer

Alnus viridis - *Salix* spp. Shrubland Alliance
Green Alder - Willow species Shrubland Alliance

These are shrublands and thickets dominated by *Alnus viridis* and various *Salix* species that grow on steep avalanche chutes in southern Alaska.

AK

A3939. Southern Alaskan Salmonberry Shrubland Explorer

Rubus spectabilis Shrubland Alliance
Salmonberry Shrubland Alliance

Shrublands and thickets dominated by *Rubus spectabilis* occurring on steep exposed slopes in southern Alaska.

AK

A3940. Southern Alaskan Upland Tall Willow Thicket Shrubland Explorer

Salix alaxensis - Salix barclayi - Salix bebbiana Upland Willow Thicket Shrubland Alliance
Feltleaf Willow - Barclay's Willow - Bebb's Willow Upland Willow Thicket Shrubland Alliance
This alliance consists of stands dominated by *Salix alaxensis, Salix barclayi, Salix bebbiana*, and other shrubs on upland slopes from low to mid elevations on the Aleutian Islands and maritime regions of mainland Alaska and British Columba.
AK, BC

A3941. **Southern Alaskan Blueberry Shrubland** Explorer

Vaccinium ovalifolium - Vaccinium cespitosum - Vaccinium uliginosum Shrubland Alliance
Oval-leaf Blueberry - Dwarf Bilberry - Bog Blueberry Shrubland Alliance
This shrubland alliance is dominated by *Vaccinium ovalifolium, Vaccinium cespitosum*, and/or *Vaccinium uliginosum* on steep exposed slopes in southwestern Alaska, the Alaska peninsula, Kodiak Island and the Aleutian Islands.
AK

A3942. **Southern Alaskan Russet Buffaloberry Shrubland** Explorer

Shepherdia canadensis Shrubland Alliance
Russet Buffaloberry Shrubland Alliance
Shrublands and thickets dominated by *Shepherdia canadensis* in southern Alaska islands and mainland.
AK

G355. **Northern Vancouverian Grassland & Meadow** Explorer

Northern Vancouverian Grassland & Meadow
Bluejoint - Fireweed - Common Ladyfern Grassland & Meadow Group
This is an herbaceous meadow group that occurs on a variety of habitats with a mesic moisture regime, including balds, windswept exposed ridgetops, coastal headlands, and ravine sideslopes, where the vegetation may be dominated by forbs, graminoids, or ferns; the most common dominant species are *Athyrium filix-femina, Calamagrostis canadensis, Chamerion angustifolium, Heracleum maximum*, and/or *Veratrum viride*.
AK, BC?

A3946. **Common Ladyfern - Fireweed - Bluejoint Meadow** Explorer

Athyrium filix-femina - Chamerion angustifolium - Calamagrostis canadensis Meadow Alliance
Common Ladyfern - Fireweed - Bluejoint Meadow Alliance
This alliance includes mesic herbaceous meadows codominated by a mix of *Athyrium filix-femina, Chamerion angustifolium ssp. angustifolium*, and/or *Calamagrostis canadensis*. It occurs as balds and meadows on slopes with a mesic moisture regime, including windswept coastal headlands, coastal bluffs, old beach ridges, hillside slopes, stabilized talus, alluvial fans, rolling hills, alluvial slopes, below subalpine shrublands, and ravine sideslopes in Alaska and possibly British Columbia.
AK, BC?

A3947. **Nootka Lupine - Alaska Indian-paintbrush Meadow** Explorer

Lupinus nootkatensis - Castilleja unalaschcensis Meadow Alliance
Nootka Lupine - Alaska Indian-paintbrush Meadow Alliance
This is a mesic meadow alliance of mixed forbs dominated by any number of species, most often stands with *Lupinus nootkatensis* and *Castilleja unalaschcensis* but also with *Achillea millefolium, Senecio triangularis, Streptopus amplexifolius*, and other mesic forb species. Grasses and ferns may also be present. It occurs in Alaska and possibly British Columbia as balds and meadows on slopes with a mesic moisture regime, including windswept coastal headlands, coastal bluffs, old beach ridges, hillside slopes, stabilized talus, alluvial fans, rolling hills, alluvial slopes, below subalpine shrublands, and ravine sideslopes.
AK, BC?

2.B.3. Boreal Grassland & Shrubland Explorer

Boreal Grassland & Shrubland is dominated by mesomorphic perennial grasses, forbs and shrubs, and is found in the northern mid-latitude (boreal) regions of North America and Eurasia, between 55° and 70°N, with extended cold winters and short mild summers.

D025. North American Boreal Grassland & Shrubland Explorer

This division encompasses shrublands, herbaceous meadows, scrub and grasslands occurring on well- to imperfectly drained, upland soils, and shrub and herb vegetation of inland dunes of boreal and subarctic regions of North America.

M055. North American Boreal Shrubland & Grassland Explorer

This macrogroup encompasses dry to mesic shrublands, herbaceous meadows, scrub and grasslands occurring on well- to imperfectly drained, upland soils, and inland dunes of boreal, boreal-transition, and subarctic regions of North America.

G359. Western Boreal Dry Shrubland & Grassland Explorer

Western Boreal Dry Shrubland & Grassland

Common Juniper - Creeping Juniper / Sedge species Dry Shrubland & Grassland Group

This group consists of shrub, shrub-steppe and grasslands in boreal and boreal transition Alaska and western Canada on well-drained soil where permafrost is absent and dominated by low-statured *Juniperus* spp. or other shrubs and/or *Carex* spp. or other graminoid species.

AB, AK, BC, SK, YT

A4269. Alaskan-Yukon Boreal Sagebrush Steppe Bluff Explorer

Artemisia frigida - *Calamagrostis purpurascens* Dry Shrub Grassland Alliance

Prairie Sagewort - Purple Reedgrass Dry Shrub Grassland Alliance

AK, YT

A4270. Alaskan-Yukon Boreal Silverberry - Buffaloberry Dry Shrubland Explorer

Elaeagnus commutata - *Shepherdia canadensis* Dry Shrubland Alliance

Silverberry - Russet Buffaloberry Dry Shrubland Alliance

AK, YT

A4271. Alaskan-Yukon Boreal Dry Riverine Grassland Explorer

Elymus trachycaulus ssp. subsecundus - *Festuca brachyphylla* Dry Riverine Grassland Alliance

Slender Wheatgrass - Alpine Fescue Dry Riverine Grassland Alliance

AK, YT

A4272. Alaskan-Yukon Boreal Montane Dryas Riverine Dwarf-shrubland Explorer

Dryas drummondii Dry Montane Riverine Dwarf-shrubland Alliance

Drummond's Mountain-avens Dry Montane Riverine Dwarf-shrubland Alliance

AK, YT

A4273. Alaskan-Yukon Boreal Montane Low Birch Shrubland Explorer

Betula nana Dry Montane Shrubland Alliance

Dwarf Birch Dry Montane Shrubland Alliance

AK, YT

G374. Western Boreal Dune Shrubland & Grassland Explorer

Western Boreal Dune Shrubland & Grassland

Grayleaf Willow - Boreal Wormwood - Northern Groundsel Dune Group

This group is defined by shrub and herbaceous vegetation, often dominated by *Salix glauca* and *Leymus mollis*, developing on active, inland dunes in arctic and boreal Alaska and Canada.

AB, AK, BC?, SK, YT

A4293. Alaskan-Yukon Boreal Dry Dune Grassland Explorer

Calamagrostis purpurascens - *Oxytropis kobukensis* Boreal Dune Grassland Alliance

Purple Reedgrass - Kobuk Locoweed Boreal Dune Grassland Alliance

AK, YT

G357. Western Boreal Mesic Alder - Willow Shrubland Explorer

Western Boreal Mesic Alder - Willow Shrubland

Siberian Alder - Tealeaf Willow Shrubland Group

This group consists of mesic tall alder and willow shrublands found in the boreal region of Alaska at low to mid elevations in broad valleys, on mountain sideslopes, and in avalanche zones throughout the boreal region of Alaska and north into the low arctic region.

AK, YT

A4276. **Central Alaskan-Yukon Mesic Alder - Willow Shrubland** Explorer

Alnus viridis ssp. crispa - Salix bebbiana / Calamagrostis canadensis Central Mesic Shrubland Alliance

Mountain Alder - Bebb's Willow / Bluejoint Central Mesic Shrubland Alliance

AK, YT

A4277. **Central Alaskan-Yukon Floodplain Mesic Alder - Willow Shrubland** Explorer

Alnus viridis ssp. crispa - Alnus incana ssp. tenuifolia / Equisetum arvense Central Mesic Floodplain Shrubland Alliance

Mountain Alder - Thinleaf Alder / Equisetum arvense Central Mesic Floodplain Shrubland Alliance

AK, YT

A4278. **Southwest Alaskan Boreal Floodplain Mesic Alder - Willow Shrubland** Explorer

Alnus viridis ssp. sinuata - Alnus incana ssp. tenuifolia - Salix alaxensis Southwest Mesic Floodplain Shrubland Alliance

Sitka Alder - Thinleaf Alder - Feltleaf Willow Southwest Mesic Floodplain Shrubland Alliance

AK

A4279. **Southwest Alaskan Boreal Mesic Alder - Willow Shrubland** Explorer

Alnus viridis ssp. sinuata - Sambucus racemosa Southwest Mesic Shrubland Alliance

Sitka Alder - Red Elderberry Southwest Mesic Shrubland Alliance

AK

G358. **Western Boreal Mesic Grassland & Meadow** Explorer

Western Boreal Mesic Grassland & Meadow

Bigelow's Sedge - Bluejoint Boreal Mesic Grassland Group

This group consists of herbaceous meadows of boreal and boreal transition of Alaska extending into western Canada on slopes, upper drainages, and flat areas with fine-textured mineral soils ranging from poorly-drained (on flats) to well-drained (on sideslopes) with dominant species such as *Carex bigelowii*, *Carex microchaeta ssp. nesophila*, and *Calamagrostis canadensis*.

AB, AK, BC, MB, NT, SK, YT

A4248. **Western Boreal Bluejoint - Mixed Forb-Graminoid Meadow** Explorer

Calamagrostis canadensis - Mixed Forb-Graminoid Meadow Alliance

Bluejoint - Mixed Forb-Graminoid Meadow Alliance

AB, AK, BC, MB, ON?, QC?, SK, YT

CEGL002558 **Fireweed Tundra** Explorer

Chamerion angustifolium Meadow

Fireweed Meadow

AK, MB, ON?, QC?

CEGL005287 **Boreal Bluejoint Meadow** Explorer

Calamagrostis canadensis Boreal Meadow

Bluejoint Boreal Meadow

AB, AK, BC, SK, YT

CEGL005290 **Boreal Tufted Hairgrass Meadow** Explorer

Deschampsia cespitosa Boreal Meadow

Tufted Hairgrass Boreal Meadow

AB, AK, BC, SK?

A4280. **Western Boreal Bluejoint - Fireweed Meadow Alliance** Explorer

Calamagrostis canadensis - Chamerion angustifolium Boreal Mesic Meadow Alliance

Bluejoint - Fireweed Boreal Mesic Meadow Alliance

AB, AK, BC, MB, NT, SK, YT

G356. **Western Boreal Mesic Birch - Willow Low Shrubland** Explorer

Western Boreal Mesic Birch - Willow Low Shrubland

Dwarf Birch - Tealeaf Willow Mesic Low Shrubland Group

This group is defined by birch shrublands occurring on mesic, mid-to upper slope sites throughout boreal and subboreal Alaska. The primary species is *Betula glandulosa* which often forms extensive thickets with other low ericaceous shrubs and *Salix* species near treeline.
AK, BC, YT

A4274. **Alaskan-Yukon Boreal Mesic Low Birch - Willow Shrubland** Explorer
Betula nana - Salix pulchra - Ledum palustre ssp. decumbens Low Shrubland Alliance
Dwarf Birch - Tealeaf Willow - Marsh Labrador-tea Low Shrubland Alliance
AK, YT

A4275. **Alaskan-Yukon Boreal Mesic Low Willow Shrubland** Explorer
Salix pulchra / Calamagrostis canadensis Low Shrubland Alliance
Tealeaf Willow / Bluejoint Low Shrubland Alliance
AK, YT

G848. **Alaskan-Yukon Boreal Montane Alder - Willow Shrubland** Explorer
Alaskan-Yukon Boreal Montane Alder - Willow Shrubland
Mountain Alder - Feltleaf Willow - Short-fruit Willow Montane Shrubland Group
AK, YT

A4281. **Alaskan-Yukon Central Boreal Montane Alder - Willow Shrubland** Explorer
Alnus viridis ssp. crispa Central Montane Shrubland Alliance
Mountain Alder Central Montane Shrubland Alliance
AK, YT

A4282. **Alaskan-Yukon Southern Boreal Montane Alder - Willow Shrubland** Explorer
Salix alaxensis - Salix brachycarpa Southern Montane Shrubland Alliance
Feltleaf Willow - Short-fruit Willow Southern Montane Shrubland Alliance
AK, YT

G860. **Aleutian Mesic Willow Low Shrubland** Explorer
Aleutian Mesic Willow Low Shrubland
Barclay's Willow Aleutian Low Shrubland Group
AK

A4349. **Aleutian Barclay's Willow - Ladyfern Low Shrubland** Explorer
Salix barclayi - Athyrium filix-femina Aleutian Low Shrubland Alliance
Barclay's Willow - Common Aleutian Low Shrubland Alliance
AK

G362. **Aleutian Ericaceous Dwarf-shrubland** Explorer
Aleutian Ericaceous Dwarf-shrubland
Black Crowberry - Aleutian Mountain-heath Aleutian Dwarf-shrubland Group
This macrogroup consists of dwarf-shrub heathlands on rocky outcrops and other exposed sites of the Alaska Peninsula, Aleutian Islands and Kodiak Island. Various dwarf-shrub species dominate or codominate, including *Arctostaphylos alpina*, *Cassiope lycopodioides*, *Empetrum nigrum*, and others.
AK

A4347. **Aleutian Black Crowberry - Mixed Ericaceous Dwarf-shrubland** Explorer
Empetrum nigrum - Mixed Ericaceous Aleutian Dwarf Shrubland Alliance
Black Crowberry - Mixed Ericaceous Aleutian Dwarf Shrubland Alliance
AK

A4348. **Aleutian Mountain-heath Ericaceous Dwarf-shrubland** Explorer
Phyllodoce aleutica Aleutian Ericaceous Dwarf-shrubland Alliance
Aleutian Mountain-heath Aleutian Ericaceous Dwarf-shrubland Alliance
AK

G861. **Aleutian Mesic Forb Meadow** Explorer
Aleutian Mesic Forb Meadow
Pacific Reedgrass - Common Ladyfern Aleutian Meadow Group
AK

A4350. **Common Ladyfern - Kamchatka Aconite Aleutian Forb Meadow** Explorer
Athyrium filix-femina - Aconitum maximum Aleutian Forb Meadow Alliance

Common Ladyfern - Kamchatka Aconite Aleutian Forb Meadow Alliance
AK

A4351. **Aleutian Common Ladyfern - Pacific Reedgrass Forb Meadow** Explorer
Athyrium filix-femina - Calamagrostis nutkaensis Aleutian Forb Meadow Alliance
Common Ladyfern - Pacific Reedgrass Aleutian Forb Meadow Alliance
AK

A4352. **Aleutian Subalpine Fleabane - Maidenfern Forb Meadow** Explorer
Erigeron peregrinus - Thelypteris quelpaertensis Aleutian Forb Meadow Alliance
Subalpine Fleabane - Queen's-veil Maidenfern Aleutian Forb Meadow Alliance
AK

2.B.4. Temperate to Polar Scrub & Herb Coastal Vegetation Explorer

Temperate to Polar Scrub & Herb Coastal Vegetation is found in temperate to polar coastal habitats, including beaches, bluffs and dunes, where wind and water are major drivers of the vegetation, across the mid to polar latitudes from 23° to 60-70°N and S latitude, dominated by prostrate perennials on the beach and foredune, and graminoids and scrub on backdunes and bluffs.

D027. Pacific North American Coastal Scrub & Herb Vegetation Explorer

This division is comprised of sparsely- to well-vegetated rocky headlands, sea bluffs, beaches and dunes along the Pacific Coast of North America that are dominated by prostrate perennials on the beach and foredune, and by graminoids and scrub on backdunes and bluffs.

M059. Pacific Coastal Beach & Dune Explorer

Coastal beach and active dunes along the temperate Pacific coast of North America.

G498. **North Pacific Maritime Dune & Coastal Beach** Explorer
North Pacific Maritime Dune & Coastal Beach
American Dunegrass - Sand Ryegrass - Coastal Sand-verbena Dune Grassland & Beach Group
This group consists of herbaceous and shrubby vegetation on coastal sandy and cobble-on-sand beaches, beach dunes, and sand spits that occur along the Pacific coast from central California to Alaska and includes salt-tolerant forb communities that occur just above mean high tide dominated or codominated by *Abronia latifolia, Achillea millefolium var. borealis, Cochlearia groenlandica, Equisetum variegatum, Honckenya peploides, Lathyrus japonicus var. maritimus*, or *Mertensia maritima* and grassland communities that occur as dunes become higher and further away from beach and are dominated by *Leymus mollis, Leymus arenarius*, or *Festuca rubra*.
AK, BC, CA, OR, WA

A4283. **Aleutian Coastal Meadow** Explorer
Honckenya peploides - Leymus mollis Aleutian Coastal Meadow Alliance
Seaside Sandplant - American Dunegrass Aleutian Coastal Meadow Alliance
AK

M058. Pacific Coastal Cliff & Bluff Explorer

This macrogroup occurs on sea cliffs, scree slopes and rocky coastlines exposed to salt spray and ocean wave action. It occurs from the coast of the Aleutian Islands, south through California and possibly into Mexico.

G554. **North Pacific Coastal Cliff & Bluff** Explorer
North Pacific Coastal Cliff & Bluff
Eurhynchium Moss species - Saxifrage species - Orange Wall Lichen species Coastal Cliff & Bluff Group
This group consists of sparsely vegetated exposed sea cliffs and rocky coastlines where grasses, lichens and low shrubs can gain hold, forming communities such as *Eurhynchium-Puccinellia-Caloplaca, Potentilla-Draba-Saxifraga, Xanthoria-Ramalina*, and *Leymus-Ligusticum-Anemone* and occurs from the Aleutian Islands, central and southern Alaska, British Columbia, Washington, and Oregon.
AK, BC, OR, WA

A3455. **North Pacific Coastal Herb Cliff & Bluff** Explorer
Eurhynchium sp. - *Saxifraga* sp. - *Xanthoria* sp. Grassland Alliance
Eurhynchium Moss species - Saxifrage species - Orange Wall Lichen species Grassland Alliance

Herbaceous vegetation of the northern Pacific Coast and Alaska characterized by sparse to open herbaceous vegetation composed of variable coastal species.
AK, BC, OR, WA

D146. Arctic Coastal Scrub & Herb Vegetation Explorer

This type is found on North American Arctic coastline beaches, beach dunes, and stabilized vegetated sand or cobble deposits, with *Leymus mollis* grasslands and *Empetrum nigrum* dwarf-shrublands, as well as on sea cliffs, rocky headlands, and cobble beaches of the Arctic coastline, with stunted trees, shrubs and herbaceous species.

M402. North American Arctic Coastal Shore Explorer

This type is found on North American Arctic coastline beaches, beach dunes, stabilized sand or cobble deposits, on sea cliffs, rocky headlands, and cobble beaches. Vegetation consists of mostly grasslands, dwarf-shrublands, stunted trees, and other herbaceous species. Some of the common dominant species include *Leymus mollis*, *Honckenya peploides*, and/or *Lupinus nootkatensis*.

G864. Arctic Coastal Dune & Beach Explorer

Arctic Coastal Dune & Beach
Arctic Coastal Dune & Beach Group

This group represents *Leymus mollis* grasslands developing on sandy upper beaches and coastal dunes along the Arctic Ocean and Bering Sea coastlines.
AK, LB, MB, NT, NU, QC, YT

A4296. Arctic Coastal Dune Explorer

Arctic Coastal Dune Alliance
Arctic Coastal Dune Alliance
AK, LB, MB, NT, NU, QC, YT

A4297. Arctic Coastal Beach Explorer

Arctic Coastal Beach Alliance
Arctic Coastal Beach Alliance
AK, LB, MB, NT, NU, QC, YT

G611. Arctic Coastal Rocky Shore Explorer

Arctic Coastal Rocky Shore
Arctic Coastal Rocky Shore Group

This group is characterized by a mixture of stunted trees, shrubs and herbaceous species that inhabit sea cliffs, rocky headlands, and cobble beaches of the Arctic coastline.
AK, NT, NU, YT

A4353. Arctic Coastal Rocky Shore Explorer

Arctic Coastal Rocky Shore Alliance
Arctic Coastal Rocky Shore Alliance
AK

G863. Arctic Inland Dune Explorer

Arctic Inland Dune
Arctic Inland Dune Group
AK, LB, MB, NT, NU?, QC, YT

A4294. Arctic Inland Forb & Grass Dune Explorer

Arctic Inland Forb & Grass Dune Alliance
Arctic Inland Forb & Grass Dune Alliance
AK, LB, MB, NT, NU, QC, YT

A4295. Arctic Inland Willow Shrub Dune Explorer

Arctic Inland Willow Shrub Dune Alliance
Arctic Inland Willow Shrub Dune Alliance
AK, LB, MB, NT, NU, QC, YT

2.C. Shrub & Herb Wetland Explorer

Shrub & Herb Wetland includes open bogs, fens, fresh and saltwater marshes, wet meadows and wet shrublands. The vegetation occurs from tropical to polar regions.

2.C.2. Temperate to Polar Bog & Fen Explorer

Temperate to Polar Bog & Fen includes temperate bogs and fens dominated by *Sphagnum* or brown mosses with ericaceous shrubs, graminoids, and low scrub tree growth forms, across the mid-latitudes of the Northern Hemisphere from 23° to 70°N, but is much less common in the southern mid-latitudes.

D029. North American Bog & Fen Explorer

This division includes open and treed bogs and fens throughout much of North America from the boreal zone in Canada south to northern California, montane areas in the western United States, the northern Great Plains, and much of the midwestern and northeastern United States and southeastern Canada.

M876. North American Boreal & Subboreal Bog & Acidic Fen Explorer

This boreal acidic bog and fen macrogroup extends across the boreal regions of North America, extending south into subboreal regions of the Pacific Maritimes and Rocky Mountains, the Great Lakes region and northeastern U.S. It is dominated by a continuous layer of *Sphagnum* mosses (sometimes submerged in bog pools), typically to depths exceeding 40 cm, as well as ericaceous dwarf-shrubs and thin-leaved graminoids. Scrub trees may be common, but trees are otherwise sparse.

G360. Western North American Boreal Bog & Acidic Fen Explorer

Western North American Boreal Bog & Acidic Fen
Black Spruce / Bog Labrador-tea / Northland Cottonsedge Boreal Bog & Acidic Fen Group

This group extends across the western boreal regions of North America, extending south into the Pacific Maritime and Rocky Mountain divisions on wet organic soils (bogs) with tree- or shrub-dominated or dwarf-shrub/herbaceous vegetation.

AB, AK, BC, ID, MB, MT, NT, NU, SK, YT

A3448. Western Boreal Ericaceous Shrub Bog Explorer

Vaccinium oxycoccos - Andromeda polifolia / Sphagnum spp. Shrub Bog Alliance
Small Cranberry - Bog-rosemary / Peatmoss species Shrub Bog Alliance

This bog and poor fen acidic peatland alliance occurs in the western North American boreal region from Alaska to central Canada. The vegetation is dominated by low ericaceous shrubs, including *Betula glandulosa, Chamaedaphne calyculata, Empetrum nigrum, Kalmia polifolia, Ledum groenlandicum, Ledum palustre ssp. decumbens, Vaccinium oxycoccos*, and *Vaccinium uliginosum*, with patches of graminoids and bryophyte lawns.

AB, AK, BC, MB, NT, NU, SK, YT

A4298. Western Boreal Conifer Scrub Bog Explorer

Picea mariana / Sphagnum spp. Western Boreal Scrub Bog Alliance
Black Spruce / Peatmoss species Western Boreal Scrub Bog Alliance

AB, AK, BC, MB, NT, NU, SK, YT

A4299. Western Boreal Sedge Poor Fen Explorer

Carex chordorrhiza - Carex aquatilis - Carex limosa Poor Fen Alliance
Creeping Sedge - Water Sedge - Mud Sedge Poor Fen Alliance

AB, AK, BC, MB, NT, NU, SK, YT

A4300. Western Boreal Dwarf Birch Poor Fen Explorer

Betula nana Poor Fen Alliance
Dwarf Birch Poor Fen Alliance

AB, AK, BC, MB, NT, NU, SK, YT

M877. North American Boreal & Subboreal Alkaline Fen Explorer

This alkaline fen macrogroup occurs on peatlands across the boreal regions of North America, extending south into subboreal regions of the Rocky Mountains, Great Lakes, and northeastern and north-central U.S. *Sphagnum* peatmoss and ericaceous shrubs are patchy to absent and brown mosses, broad-leaved non-ericaceous shrubs, and thin-leaved graminoids are common.

G361. Western North American Boreal Alkaline Fen Explorer

Western North American Boreal Alkaline Fen
Shrubby-cinquefoil - Woolly-fruit Sedge Boreal Alkaline Fen Group

This group extends across the western boreal regions of North America and consists of alkaline fens with graminoid-dominated or shrub-dominated vegetation, or a patchwork of both where *Dasiphora fruticosa ssp. floribunda* is a common diagnostic shrub.

AB, AK, BC, MB, NT, NU, SK, YT

A4301. **Western Boreal Buckbean Fen** Explorer

Menyanthes trifoliata / Carex utriculata Alkaline Fen Alliance
Buckbean / Northwest Territory Sedge Alkaline Fen Alliance
AB, AK, BC, MB, NT, NU, SK, YT

A4302. **Western Boreal Sweetgale Shrub Fen** Explorer

Myrica gale Alkaline Fen Alliance
Sweetgale Alkaline Fen Alliance
AB, AK, BC, MB, NT, NU, SK, YT

A4303. **Western Boreal Sedge Fen** Explorer

Carex aquatilis - Mixed Sedge Alkaline Fen Alliance
Water Sedge - Mixed Sedge Alkaline Fen Alliance
AB, AK, BC, MB, NT, NU, SK, YT

A4304. **Southern Alaskan Alkaline Fen** Explorer

Trichophorum cespitosum Southern Alaskan Alkaline Fen Alliance
Tufted Bulrush Southern Alaskan Alkaline Fen Alliance
AK

M063. North Pacific Bog & Fen Explorer

This macrogroup contains alkaline, acidic, and neutral peatlands (fens and bogs) that occur throughout southern Alaska (including the Aleutian Islands), maritime British Columbia, Washington, Oregon, and northern California. The vegetation is low-shrub or graminoid physiognomy, or stunted coastal Pacific tree species, and nearly all examples have a moss-dominated ground layer.

G285. North Pacific Alkaline Open Fen Explorer

North Pacific Alkaline Open Fen
Cusick's Sedge - Water Sedge - Sweetgale Alkaline Fen Group

This group consists of neutral to alkaline fens where brown mosses such as *Campylium*, *Drepanocladus*, *Scorpidium*, *Tomentypnum*, and *Warnstorfia* and sedges (*Carex*) are characteristic, and other indicator species include *Betula nana*, *Carex aquatilis*, *Carex cusickii*, *Carex limosa*, *Carex livida*, *Carex utriculata*, *Comarum palustre*, *Menyanthes trifoliata*, *Myrica gale*, and *Spiraea douglasii*. It is known from the Pacific Coast from Alaska south to northern California, in and west of the coastal mountain summits but including the Puget Sound lowlands.

AK, BC, CA, OR, WA

A3432. **Sweetgale - Rose Spirea Alkaline Fen** Explorer

Myrica gale - Spiraea douglasii Alkaline Fen Alliance
Sweetgale - Rose Spirea Alkaline Fen Alliance
This alliance consists of shrublands dominated by *Myrica gale* and/or *Spiraea douglasii*. These are fens with neutral to alkaline pH (wetlands with at least 30 cm of organic with exposure to groundwater) that occur within the Pacific Northwest, including Alaska.
AK, BC, CA, OR, WA

A3433. **North Pacific Sedge Alkaline Fen** Explorer

Carex aquatilis - Carex livida - Carex cusickii Alkaline Fen Alliance
Water Sedge - Livid Sedge - Cusick's Sedge Alkaline Fen Alliance
This alliance consists of herbaceous wetlands dominated by *Carex* species such as *Carex aquatilis var. dives*, *Carex cusickii*, *Carex livida*, and/or *Carex utriculata*. These wetlands are fens with neutral to alkaline pH (wetlands with at least 30 cm organic soils with an exposure to nutrient-rich groundwater) that occur in the Pacific Northwest, including Alaska.
AK, BC, CA, NT?, NU?, OR, WA, YT?

CEGL001826 **Sitka Sedge Fen** Explorer

Carex aquatilis var. dives Fen
Sitka Sedge Fen
AK, BC, CA?, OR, WA

G284. North Pacific Acidic Open Bog & Fen Explorer

North Pacific Acidic Open Bog & Fen
North Pacific Acidic Open Bog & Fen Group
Bogs and fens occurring along the Pacific coast with saturated acidic (pH <5.5) organic soils >40 cm deep. Vegetation is dominated by stunted trees, dwarf-shrubs, herbaceous species or a mosaic of any of these; characteristic species include *Carex aquatilis var. dives, Carex obnupta, Carex pluriflora, Darlingtonia californica, Gaultheria shallon, Ledum glandulosum,* and *Spiraea douglasii* and tree species, if present, include *Callitropsis nootkatensis, Pinus contorta var. contorta, Picea sitchensis, Thuja plicata,* and/or *Tsuga heterophylla*. *Sphagnum* spp. dominate the ground layer.
AK, BC, CA, OR, WA

A3584. **Sedge - Sphagnum - Beaksedge Acidic Fen** Explorer

Carex aquatilis - Sphagnum spp. - *Rhynchospora* spp. Acidic Fen Alliance
Water Sedge - Peatmoss species - Beaksedge species Acidic Fen Alliance
This alliance consists of herbaceous-dominated acidic fens where the herbaceous canopy is dominated by *Carex aquatilis, Carex utriculata, Eriophorum chamissonis,* and/or *Rhynchospora alba*. *Sphagnum* moss is often more dominant than the vascular plants. Shrubs may be present but these have <25% cover. This alliance occurs in southern Alaska, coastal British Columbia, Washington and Oregon.
AK, BC, OR, WA

G610. **North Pacific Maritime Wooded Bog & Poor Fen** Explorer

North Pacific Maritime Wooded Bog & Poor Fen
Beach Pine / Bog Labrador-tea / Peatmoss species Wooded Bog & Poor Fen Group
These are forested bogs and fens (peat soils or mineral over deep peat) found in the coastal Pacific Northwest dominated by an open canopy of *Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Tsuga heterophylla,* and/or *Tsuga mertensiana*.
AK, BC, OR, WA

A3764. **Alaskan Lodgepole Pine - Sitka Spruce Wooded Bog** Explorer

Pinus contorta - Picea sitchensis Alaskan Wooded Bog Alliance
Lodgepole Pine - Sitka Spruce Alaskan Wooded Bog Alliance
This alliance consists of deep peat, organic, treed fens and bogs dominated in the upper canopy by *Pinus contorta* and/or *Picea sitchensis* on gentle slopes. These are open woodlands with trees that are at least 5 m tall, but the canopy layer can be very open (10-20%). Thick sphagnum moss species cover the ground, and a low-shrub layer may or may not be present. This alliance occurs in south-central and southeastern Alaska.
AK

CEGL003201 **Lodgepole Pine / Peatmoss species Treed Bog** Explorer

Pinus contorta / Sphagnum spp. Treed Bog
Lodgepole Pine / Peatmoss species Treed Bog
AK

CEGL003202 **Lodgepole Pine / Black Crowberry Treed Bog** Explorer

Pinus contorta / Empetrum nigrum Treed Bog
Lodgepole Pine / Black Crowberry Treed Bog
AK

CEGL003203 **Lodgepole Pine / Sitka Sedge Treed Bog** Explorer

Pinus contorta / Carex aquatilis var. dives Treed Bog
Lodgepole Pine / Sitka Sedge Treed Bog
AK

CEGL003204 **Lodgepole Pine / Tufted Bulrush Treed Bog** Explorer

Pinus contorta / Trichophorum cespitosum Treed Bog
Lodgepole Pine / Tufted Bulrush Treed Bog
AK

CEGL003206 **Lodgepole Pine / Oval-leaf Blueberry Treed Bog** Explorer

Pinus contorta / Vaccinium ovalifolium Treed Bog

Lodgepole Pine / Oval-leaf Blueberry Treed Bog
AK

CEGL003270 **Sitka Spruce / Peatmoss species Treed Bog** Explorer
.

Picea sitchensis / Sphagnum spp. Treed Bog
Sitka Spruce / Peatmoss species Treed Bog
AK

2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland Explorer

Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland includes wet riparian and swamp shrublands, wet meadows, wet prairies, and shallow and deep emergent marshes. The vegetation comprises seasonal green emergent, hydrophytic shrubs and herbs with at least 10% cover, on mucky, inundated or saturated soils across the mid-latitudes of the Northern and Southern hemispheres from 23° to 70°.

D031. Western North American Temperate Freshwater Marsh, Wet Meadow & Shrubland Explorer

This division contains marshes, wet meadows and shrublands, singly and in mosaics, along riparian corridors, around vernal pools, depressions, seeps and springs on mineral soils or shallow organic layers over mineral substrates in temperate latitudes of western North America.

M073. Vancouverian Lowland Marsh, Wet Meadow & Shrubland Explorer

This macrogroup includes freshwater shrublands, meadows, marshes and mudflat wetlands, with mostly mineral soils that are that are poorly to well-drained and seasonally wet to saturated, occurring at low elevations from the Pacific coast and inland to interior wetlands of shallow lakebeds, rivershores of the Columbia River and the Rocky Mountains.

G525. Temperate Pacific Freshwater Wet Mudflat Explorer

Temperate Pacific Freshwater Wet Mudflat
Blunt Spikerush - Teal Lovegrass - Marsh Seedbox Temperate Pacific Freshwater Wet Mudflat Group

These herbaceous freshwater mudflats are found scattered throughout the western U.S. and Canada, occurring primarily on seasonally or tidally flooded shallow lakebeds and floodplains. They range from sparsely vegetated to thick mats and are may be dominated by *Crassula aquatica, Eleocharis obtusa, Eragrostis hypnoides, Gnaphalium palustre, Lilaeopsis occidentalis, Limosella aquatica,* and/or *Ludwigia palustris.*

AK, BC, CA, CO, ID, MT, NV, OR, UT, WA, WY

G517. Vancouverian Freshwater Wet Meadow & Marsh Explorer

Vancouverian Freshwater Wet Meadow & Marsh
Bering's Tufted Hairgrass - Pacific Silverweed - Slough Sedge Vancouverian Freshwater Coastal Marsh & Wet Meadow Group

These coastal freshwater herbaceous or shrubby wetlands are dominated by a wide variety of species that are found in dune complexes, behind deltas, in coastal upper marshes, and can be influenced by tides and inland freshwater pulses. They are found from southern California to the northern Aleutian Islands of Alaska.

AK, BC, CA, ID, MT, NV, OR, WA

G322. Vancouverian Wet Shrubland Explorer

Vancouverian Wet Shrubland
Alder species - Willow species - Meadowsweet species Wet Shrubland Group

This group includes alder, willow, and non-willow wet shrub swamps occurring on poorly drained, well-drained seasonally wet or saturated soils that may dry out completely during the growing season, on mineral or shallow (<30 cm) organic soils over mineral substrates. Stands may be dominated by *Alnus viridis ssp. sinuata, Cornus sericea, Malus fusca, Rubus spectabilis, Salix hookeriana, Salix sitchensis, Spiraea douglasii,* and/or *Vaccinium uliginosum* and are found west of the Pacific coastal mountain summits from Alaska to California.

AK, BC, CA, OR, WA

A3833. Pacific Green Alder - Vine Maple Shrub Swamp Explorer

Alnus viridis ssp. sinuata - Alnus viridis ssp. fruticosa - Acer circinatum Shrub Swamp Alliance
Sitka Alder - Siberian Alder - Vine Maple Shrub Swamp Alliance

These communities are located in the moderate- to high-elevation (1200-3000 m) riparian habitats of the Cascade and Coast ranges from British Columbia to northern California. They usually occur in somewhat steep drainages, which flood from spring snowmelt and winter rainstorms. A dense tall-shrub cover of *Alnus viridis ssp. sinuata* or *Alnus viridis ssp. fruticosa* or *Acer circinatum* characterizes this alliance.
AK, BC, CA, ID?, MT, OR, WA

CEGL001154 **Sitka Alder Shrub Swamp** Explorer

Alnus viridis ssp. sinuata Shrub Swamp
Sitka Alder Shrub Swamp
AK, ID?, MT, OR?, WA

M893. Western North American Montane Marsh, Wet Meadow & Shrubland Explorer

G521. Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh Explorer

Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh
Sedge species - Reedgrass species Montane Wet Meadow & Marsh Group
This group consists of wet meadows dominated by graminoids such as *Calamagrostis canadensis*, *Carex aquatilis*, *Carex utriculata*, and *Eleocharis palustris* or forbs such as *Camassia quamash*, *Cardamine cordifolia*, *Dodecatheon jeffreyi*, *Phippsia algida*, *Rorippa alpina*, *Senecio triangularis*, and *Veratrum californicum* found throughout low and high montane altitudes of the western U.S. and Canada.
AB, AK, AZ, BC, CA, CO, ID, MT, ND, NE, NM, NV, OR, SD, UT, WA, WY

A3807. Common Spikerush - Needle Spikerush Marsh Explorer

Eleocharis palustris - Eleocharis acicularis Marsh Alliance
Common Spikerush - Needle Spikerush Marsh Alliance
This alliance consists of seasonally to permanently saturated freshwater herbaceous wetlands (meadows, seeps, swales and shorelines) dominated by *Eleocharis acicularis*, *Eleocharis macrostachya*, *Eleocharis palustris*, or *Eleocharis rostellata*, often surrounding permanent waterbodies or in depressions subject to seasonal flooding, from sea level to 2500 m elevation in the western U.S. and Canada.
AB, AK, AZ, BC, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

CEGL001833 **Common Spikerush Marsh** Explorer

Eleocharis palustris Marsh
Common Spikerush Marsh
AB, AK, AZ, BC, CA?, CO, ID, MT, NM, NV, OR, UT, WA, WY

D320. Arctic & Boreal Freshwater Marsh, Wet Meadow & Shrubland Explorer

This division occurs as small patches throughout arctic and boreal regions of Alaska and Canada, typically on the margins of ponds, lakes and beaded streams.

M870. Arctic Freshwater Marsh, Wet Meadow, & Shrubland Explorer

This macrogroup consists of emergent marshes, wet meadows and wet shrublands that occur as small patches throughout arctic and subarctic Alaska and Canada, typically on the margins of ponds, lakes, beaded streams, wide and narrow floodplains and along water tracks within permafrost landscapes.

G370. North American Arctic Freshwater Marsh Explorer

North American Arctic Freshwater Marsh
Pendantgrass - Water Sedge Arctic Marsh Group
This group occurs as small patches throughout arctic and subarctic Alaska and Canada, typically on the margins of ponds, lakes and beaded streams.
AK, LB, NT, NU, QC, YT

A4354. Pendantgrass - Water Sedge Freshwater Marsh Explorer

Arctophila fulva - Carex aquatilis Arctic Freshwater Marsh Alliance
Pendantgrass - Water Sedge Arctic Freshwater Marsh Alliance
AK

A4355. Arctic Pendantgrass -Water Horsetail - Common Mare's-tail Freshwater Marsh Explorer

Arctophila fulva - Equisetum fluviatile - Hippuris vulgaris Arctic Freshwater Marsh Alliance

Pendantgrass - Water Horsetail - Common Mare's-tail Arctic Freshwater Marsh Alliance

AK

G617. North American Arctic Wet Meadow Explorer

North American Arctic Wet Meadow

Water Sedge - Tall Cottongrass Arctic Wet Meadow Group

This group is found throughout arctic and subarctic Alaska. Its distribution in Canada needs to be determined.

AK, LB, NT, NU, QC, YT

A4356. Arctic Acidic Wet Meadow Explorer

Arctic Acidic Wet Meadow Alliance

Arctic Acidic Wet Meadow Alliance

AK

A4357. Arctic Nonacidic Wet Meadow Explorer

Arctic Nonacidic Wet Meadow Alliance

Arctic Nonacidic Wet Meadow Alliance

AK

G830. North American Arctic Wet Shrubland Explorer

North American Arctic Wet Shrubland

Tealeaf Willow - Tall Cottongrass Arctic Wet Shrubland Group

Low-shrub wetlands dominated by *Salix pulchra* in arctic and subarctic regions that occur along water tracks, which are linear features where groundwater flow forms subsurface channels that are confined by permafrost.

AK, YT?

A4358. Arctic Willow Wet Shrubland Explorer

Arctic Willow Wet Shrubland Alliance

Arctic Willow Wet Shrubland Alliance

AK

A4359. Arctic Dwarf Birch - Ericaceous Wet Shrubland Explorer

Betula nana - Ericaceous Arctic Wet Shrubland Alliance

Dwarf Birch - Ericaceous Arctic Wet Shrubland Alliance

AK

G368. North American Arctic Tall Willow Wet Shrubland Explorer

North American Arctic Tall Willow Wet Shrubland

Feltleaf Willow Arctic Wet Shrubland Group

This group is defined by tall willow shrublands found in riparian corridors throughout the arctic, subarctic, and boreal alpine regions of Alaska.

AK, LB?, NT?, NU?, QC?, YT?

A4360. Arctic Tall Willow Wet Shrub Tundra Explorer

Arctic Tall Willow Wet Shrub Tundra Alliance

Arctic Tall Willow Wet Shrub Tundra Alliance

AK

A4361. Arctic Tall Alder Wet Shrub Tundra Explorer

Arctic Tall Alder Wet Shrub Tundra Alliance

Arctic Tall Alder Wet Shrub Tundra Alliance

AK

M894. North American Boreal Marsh, Wet Meadow & Shrubland Explorer

This sedge wet meadow, marsh and wet shrubland macrogroup is found throughout the boreal regions of North America in low-lying wet areas.

G528. Western Boreal Wet Meadow & Marsh Explorer

Western Boreal Wet Meadow & Marsh

Water Sedge - Northwest Territory Sedge Boreal Wet Meadow & Marsh Group

This wetland group occurs in boreal Alaska and Canada on mineral soils and is characterized by graminoid species such as *Calamagrostis canadensis, Carex aquatilis, Carex lasiocarpa, Carex*

utriculata, *Equisetum palustre*, *Eriophorum angustifolium*, and others. It may include shrub cover (<25%) such as *Myrica gale*, *Alnus incana ssp. tenuifolia*, and *Salix* spp.
AB, AK, BC, MB, NT, NU, SK, YT

A3823. **Western Boreal Sedge Wet Meadow** Explorer

Carex aquatilis - *Carex* spp. - *Eriophorum angustifolium* Sedge Meadow Alliance
Water Sedge - Sedge species - Tall Cottongrass Sedge Meadow Alliance
This herbaceous alliance consists of sedge-dominated, mineral soil wetlands where *Carex aquatilis*, *Carex lacustris*, *Carex rostrata*, *Carex stricta*, *Carex utriculata*, *Carex vesicaria*, and *Equisetum fluviatile* provide the dominant cover (singly or in various combinations); it is found in the boreal and boreal transition climates.
AB, AK, BC, MB, NT, NU, SK, YT

CEGL005288. **Northwest Territory Sedge Boreal Wet Meadow** Explorer

Carex utriculata Boreal Wet Meadow
Northwest Territory Sedge Boreal Wet Meadow
AB, AK, BC, SK?

CEGL005289. **Water Sedge Boreal Wet Meadow** Explorer

Carex aquatilis Boreal Wet Meadow
Water Sedge Boreal Wet Meadow
AB, AK, BC, SK?

A3824. **Western Boreal Cattail - Bulrush Marsh** Explorer

Typha latifolia - *Schoenoplectus* spp. Western Boreal Marsh Alliance
Broadleaf Cattail - Bulrush species Western Boreal Marsh Alliance
Bulrush and cattail marshes within boreal and boreal transition climates whose stands are generally low in species diversity and are typically dominated by species of *Typha* or *Scirpus* and/or *Schoenoplectus*. These marshes are generally flooded with emergent canopies but do experience seasonal fluctuations in water levels, including complete drawdown from time to time.
AB, AK, BC, MB, NT, NU, SK, YT

A4307. **Southwest Alaskan Boreal Sedge Wet Meadow** Explorer

Eriophorum angustifolium - *Carex* spp. Southwest Alaskan Sedge Meadow Alliance
Tall Cottongrass - Sedge species Southwest Alaskan Sedge Meadow Alliance
AK

A4308. **Western Boreal Bluejoint Wet Meadow** Explorer

Calamagrostis canadensis Western Boreal Wet Meadow Alliance
Bluejoint Western Boreal Wet Meadow Alliance
AB, AK, BC, MB, NT, NU, SK, YT

A4309. **Western Boreal Herb Marsh** Explorer

Equisetum fluviatile Western Boreal Marsh Alliance
Water Horsetail Western Boreal Marsh Alliance
AB, AK, BC, MB, NT, NU, SK, YT

CEGL005292. **Water Horsetail Western Boreal Marsh** Explorer

Equisetum fluviatile Western Boreal Marsh
Water Horsetail Western Boreal Marsh
AB, AK, BC, SK?

A4310. **Western Boreal Alpine Wet Meadow** Explorer

Carex aquatilis - *Salix fuscescens* Alpine Wet Meadow Alliance
Water Sedge - Alaska Bog Willow Alpine Wet Meadow Alliance
AB, AK, BC, MB, NT, NU, SK, YT

G865. **Western Boreal Wet Birch - Willow Low Shrubland** Explorer

Western Boreal Wet Birch - Willow Low Shrubland
Dwarf Birch - Tealeaf Willow / Tussock Cottongrass Low Wet Shrubland Group
AB, AK, BC, MB, NT, NU, SK, YT

A4305. **Alaskan-Yukon Boreal Wet Low Birch Shrubland** Explorer

Betula nana - *Salix pulchra* / *Eriophorum vaginatum* Wet Shrubland Alliance

Dwarf Birch - Tealeaf Willow / Tussock Cottongrass Wet Shrubland Alliance
AK, YT

A4306. **Alaskan-Yukon Boreal Wet Low Willow Shrubland** Explorer

Salix pulchra / Calamagrostis canadensis Wet Shrubland Alliance
Tealeaf Willow / Bluejoint Wet Shrubland Alliance
AK, YT

G866. **Western Boreal Wet Alder - Willow Tall Shrub Swamp** Explorer

Western Boreal Wet Alder - Willow Tall Shrub Swamp
Thinleaf Alder - Bebb's Willow / Water Sedge Tall Shrub Swamp Group
AB, AK, BC, ID, MB, MN, MT, ND, NT, NU, SK, YT

A3825. **Western Boreal Alder - Willow Shrub Swamp** Explorer

Alnus incana ssp. tenuifolia - Salix pulchra / Carex aquatilis Shrub Swamp Alliance
Thinleaf Alder - Tealeaf Willow / Water Sedge Shrub Swamp Alliance
This alliance covers herbaceous wetlands with open or patchy shrub cover (up to 25% cover); shrub species include *Myrica gale*, *Alnus incana ssp. tenuifolia*, or *Salix* spp. and is limited to boreal and boreal transition climates.
AB, AK, BC, ID, MB, MN, MT, ND, SK, YT

2.C.5. Salt Marsh Explorer

Salt Marsh is a wetland that has shallow water and levels that usually fluctuate due primarily to tides along the coast or changes in water depth in depressions. Coastal salt marshes are primarily intertidal; that is, they are found in areas at least occasionally inundated by high tide but not flooded during low tide, including estuaries, lagoons, and the lee side of barrier islands. The vegetation comprises emergent shrubs and herbs with at least 10% cover, especially saline or halophytic species. They occur at all latitudes around the globe, but are concentrated in the temperate mid-latitudes (23-70°N and S).

D035. Temperate & Boreal Pacific Coastal Salt Marsh Explorer

Intertidal salt marshes and adjacent brackish marshes dominated by salt-tolerant graminoid and succulent stem vegetation found on the coast of the Pacific Rim in temperate, boreal and arctic latitudes of western North America and eastern Asia.

M081. **North American Pacific Coastal Salt Marsh** Explorer

This macrogroup consists of coastal intertidal salt marshes dominated by *Allenrolfea occidentalis*, *Batis maritima*, *Carex lyngbyei*, *Glaux maritima*, *Jaumea carnosa*, *Suaeda* spp., and/or *Salicornia depressa*, among many other species along the Pacific Coast of North America, spanning boreal salt marshes from Alaska to Baja California in Mexico.

G499. **Temperate Pacific Salt Marsh** Explorer

Temperate Pacific Salt Marsh
Lyngbye's Sedge - Cosmopolitan Bulrush - Sea-milkwort Salt Marsh Group
This group consists of intertidal salt and brackish marshes found throughout the North American Pacific coast, with representative dominant plant species such as *Batis maritima*, *Carex lyngbyei*, *Carex ramenskii*, *Distichlis spicata*, *Eleocharis palustris*, *Glaux maritima*, *Salicornia depressa*, *Suaeda* spp., *Triglochin maritima*, and/or *Triglochin* spp.
AK, BC, CA, MXBCN, MXBCS, MXSON, OR, WA

A2622. **Lyngbye's Sedge Brackish Salt Marsh** Explorer

Carex lyngbyei Brackish Salt Marsh Alliance
Lyngbye's Sedge Brackish Salt Marsh Alliance
This alliance consists of brackish estuarine tidal marshes dominated by *Carex lyngbyei*, along tidal flats and tidal river channel margins of the northern Pacific Coast.
AK, BC, CA, OR, WA

CEGL003285. **Lyngbye's Sedge - (Saltgrass, Seaside Arrow-grass) Salt Marsh** Explorer

Carex lyngbyei - (Distichlis spicata, Triglochin maritima) Salt Marsh
Lyngbye's Sedge - (Saltgrass, Seaside Arrow-grass) Salt Marsh
AK, BC, OR, WA

CEGL003369. **Lyngbye's Sedge Salt Marsh** Explorer

Carex lyngbyei Salt Marsh
Lyngbye's Sedge Salt Marsh

AK, BC, OR, WA

A3899. **Tufted Hairgrass - Red Fescue Brackish Salt Marsh** Explorer

Deschampsia cespitosa - Festuca rubra Brackish Salt Marsh Alliance
Tufted Hairgrass - Red Fescue Brackish Salt Marsh Alliance

This alliance consists of salt marshes dominated by *Deschampsia cespitosa* and/or *Festuca rubra*, that occur on high salt marshes with infrequent (less than daily) tidal flooding. It occur along the coast of Oregon, Washington, British Columbia and southeastern Alaska.

AK, BC?, OR, WA

D187. Arctic Coastal Salt Marsh Explorer

This division includes arctic vegetation that is influenced by prolonged flooding with tidal or non-tidal brackish/salt water and is dominated by a combination of halophytic species, such as *Carex glareosa, Carex mackenziei, Carex maritima, Carex subspathacea, Hippuris lanceolata, Puccinellia phryganodes*, and *Ranunculus cymbalaria*.

M403. Arctic Tidal Salt Marsh Explorer

This macrogroup consists of tidal saltwater herbaceous marshes dominated by *Carex glareosa, Carex ramenskii, Carex subspathacea, Carex ursina, Cochlearia groenlandica, Dupontia fisheri, Puccinellia phryganodes*, and *Stellaria humifusa* found along Alaska's Arctic coastline from the Bering Sea to the Arctic Ocean.

G535. **Arctic & Subarctic Coastal Salt Marsh** Explorer

Arctic & Subarctic Coastal Salt Marsh
Hoppner's Sedge - Fisher's Tundragrass Salt Marsh Group

This group is defined as sparse to closed growth of halophytic, clonal graminoids such as *Puccinellia phryganodes, Carex subspathacea*, and *Dupontia fisheri* and the succulent forbs *Stellaria humifusa* and *Cochlearia groenlandica* occupying the intertidal zone of the Bering Sea and Arctic Ocean coastlines.

AK, LB, MB, NT, NU, QC, YT

A4311. **Subarctic Pacific Low Salt Marsh** Explorer

Bolboschoenus maritimus Low Salt Marsh Alliance
Cosmopolitan Bulrush Low Salt Marsh Alliance

AK

A4312. **Subarctic Pacific Brackish Salt Marsh** Explorer

Salix ovalifolia - Carex mackenziei Salt Marsh Alliance
Oval-leaf Willow - Mackenzie's Sedge Salt Marsh Alliance

AK

A4313. **Subarctic Pacific High Salt Marsh** Explorer

Carex ramenskii - Triglochin maritima High Salt Marsh Alliance
Ramensk's Sedge - Seaside Arrow-grass High Salt Marsh Alliance

AK

4. Polar & High Montane Scrub, Grassland & Barrens Explorer

Tundra, alpine and tropical high montane habitats dominated by cryomorphic growth forms (including *dwarf-shrubs*, krummholz, associated *herbs, lichens* and *mosses*), with low height and open to closed canopy.

4.B. Temperate to Polar Alpine & Tundra Vegetation Explorer

Alpine dwarf-shrublands, krummholz, forb meadows, grasslands, and cryptogam barrens occurring above treeline in temperate and boreal regions around the globe, predominantly in North America and Eurasia, with more isolated occurrences in the Southern Hemisphere. Polar tundra is dominated by dwarf-shrubs, cushion shrubs, sedges and grasses, mosses and lichens, and is found in the high latitudes north of 60°N in the Arctic region and south of 50°S in the Antarctic region, in permafrost soils that range from dry to seasonally saturated.

4.B.1. Temperate & Boreal Alpine Tundra Explorer

Alpine dwarf-shrublands, forb meadows and grasslands occurring above the continuous forest line in temperate and boreal regions around the globe, predominantly in North America and Eurasia, with more isolated occurrences in the Southern Hemisphere.

D043. Western North American Alpine Tundra Explorer

This type consists of low to dwarf-shrublands, tundra and sparse vegetation at and above upper timberline in the western North American Cordillera from the Aleutian Islands of Alaska to northern Mexico.

M101. Vancouverian Alpine Tundra Explorer

This macrogroup consists of well-vegetated to sparsely vegetated tundra areas, from bare, rocky summits and wind-blown dry sites to mesic and wet sites, above the altitudinal and longitudinal limit of trees in the Pacific Northwest coastal region north to maritime Alaska, including the Aleutian Islands, and is dominated by dwarf-shrubs genera such as *Cassiope*, *Empetrum*, *Phyllodoce*, *Salix*, and *Vaccinium* and herbaceous species such as *Anemone narcissiflora*, *Carex breweri*, *Festuca brachyphylla*, *Nephrophyllidium crista-galli*, *Polygonum bistortoides*, *Sanguisorba canadensis*, and *Valeriana sitchensis*.

G317. North Pacific Alpine-Subalpine Dwarf-shrubland & Heath Explorer

North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Black Crowberry - Pink Mountain-heath - Western Moss-heather Alpine-Subalpine Dwarf-shrubland & Heath Group

This alpine dwarf-shrubland group occurs in the coastal mountains of the Pacific Northwest north into southeastern Alaska. The vegetation ranges from a sparse to near continuous cover of dwarf-shrubs (alpine heath) or dwarf-shrub-herbaceous meadows.

AK, BC, CA, ID, OR, WA

A3331. Pacific Northwest Mountain-heath Alpine Dwarf-shrubland Explorer

Phyllodoce empetriformis - *Cassiope mertensiana* - *Vaccinium deliciosum* Alpine Dwarf-shrubland Alliance

Pink Mountain-heath - Western Moss-heather - Cascade Bilberry Alpine Dwarf-shrubland Alliance

Within these communities, dwarf-shrub is often the dominant lifeform, but they also occur with a mosaic of very low subshrub-like perennial- and herbaceous-dominated communities. *Cassiope mertensiana*, *Luetkea pectinata*, *Phyllodoce empetriformis*, *Phyllodoce glanduliflora*, or *Vaccinium deliciosum* may be the dominant. These dwarf-shrublands are typically located in subalpine or low alpine habitats on high mountains of the Pacific Northwest, often in association with subalpine parkland.

AK, BC, CA, ID, OR, WA

A3333. Least Willow - Setchell's Willow Alpine Dwarf-shrubland Explorer

Salix rotundifolia - *Salix setchelliana* Alpine Dwarf-shrubland Alliance

Least Willow - Setchell's Willow Alpine Dwarf-shrubland Alliance

This alliance is characterized dwarf-shrublands dominated by *Salix rotundifolia* and *Salix setchelliana* and is known from Alaska and British Columbia.

AK, BC

A3334. Aleutian Mountain-heath - Alaska Bell-heather Alpine Dwarf-shrubland Explorer

Phyllodoce aleutica - *Harrimanella stelleriana* Alpine Dwarf-shrubland Alliance

Aleutian Mountain-heath - Alaska Bell-heather Alpine Dwarf-shrubland Alliance

This alliance is characterized by dwarf-shrublands dominated by *Phyllodoce aleutica* and/or *Harrimanella stelleriana* and is known from Alaska and British Columbia.

AK, BC

A3335. Mountain-avens Alpine Dwarf-shrubland Explorer

Dryas drummondii - *Dryas integrifolia* Alpine Dwarf-shrubland Alliance

Drummond's Mountain-avens - Entireleaf Mountain-avens Alpine Dwarf-shrubland Alliance

This alliance is characterized by dwarf-shrublands dominated by *Dryas drummondii* and *Dryas integrifolia*.

AK, BC

G320. North Pacific Alpine-Subalpine Tundra Explorer

North Pacific Alpine-Subalpine Tundra

Longawn Sedge - Showy Sedge - Spreading Phlox Alpine-Subalpine Tundra Group

This mesic alpine and subalpine herbaceous meadow group occurs in the mountain regions of the Pacific Northwest coast north to the maritime and boreal transition regions of Alaska where the vegetation is characterized by a moderately dense to dense herbaceous layer, often composed of a mixture of graminoids such as *Calamagrostis canadensis, Carex* spp., *Festuca* spp. and many forbs.
AK, BC, CA, OR, WA

G319. North Pacific Alpine-Subalpine Bedrock & Scree Explorer

North Pacific Alpine-Subalpine Bedrock & Scree
Racomitrium Moss species - Snow Lichen species - Phlox species North Pacific Alpine-Subalpine Bedrock & Scree Group
This group consists of communities dominated by *Artemisia arctica, Astragalus alpinus, Carex microchaeta, Lomatium* spp., *Luina hypoleuca, Minuartia arctica, Paxistima myrsinites, Phlox* spp., *Salix rotundifolia, Saxifraga bronchialis, Saxifraga sibirica, Sibbaldia procumbens*, and/or Silene acaulis, as well as a variety of nonvascular (lichen) species. It is found on barren and sparsely vegetated alpine rocky environments of the North Pacific.
AK, BC, CA, OR, WA

M404. Western Boreal Alpine Tundra Explorer

This macrogroup consists of low to dwarf-shrublands, tundra, meadows, and sparse vegetation on rocky areas of high elevations in continental boreal climates from north-central British Columbia, through Yukon, to south-central Alaska. Alpine tundra characterized by *Artemisia arctica, Carex microchaeta, Dryas integrifolia, Empetrum nigrum, Festuca altaica*, and *Salix reticulata* dominates; *Cassiope tetragona* is the main heath species.

G613. Western Boreal Alpine Dwarf-shrubland Explorer

Western Boreal Alpine Dwarf-shrubland
Black Crowberry - Ledge Stonecrop Alpine Dwarf-shrubland Group
This group is defined as tundra vegetation dominated by the dwarf-shrub *Empetrum nigrum* occurring on mountain and hillslopes, low summits and ridges, and valley bottoms across a range of soil types and hydrologies. This group is found in the Aleutian Islands and boreal regions of Alaska, Canada, and possibly Greenland.
AK, BC, YT

A4316. Western Boreal Alpine Cassiope - Dwarf Willow Tundra Explorer

Cassiope tetragona - Salix rotundifolia Alpine Dwarf-shrubland Alliance
White Arctic Mountain-heather - Least Willow Alpine Dwarf-shrubland Alliance
AK, BC?, YT?

A4317. Western Boreal Alpine Dryas Acidic Tundra Explorer

Dryas octopetala Acidic Alpine Dwarf-shrubland Alliance
Eight-petal Mountain-avens Acidic Alpine Dwarf-shrubland Alliance
AK, BC?, YT?

A4318. Western Boreal Alpine Dryas Alkaline Tundra Explorer

Dryas integrifolia - Oxytropis nigrescens Alkaline Alpine Dwarf-shrubland Alliance
Entireleaf Mountain-avens - Blackish Oxytrope Alkaline Alpine Dwarf-shrubland Alliance
AK, BC?, YT?

A4319. Western Boreal Alpine Ericaceous Acidic Dwarf-shrub Tundra Explorer

Empetrum nigrum - Vaccinium uliginosum - Artemisia arctica Alpine Dwarf-shrubland Alliance
Black Crowberry - Bog Blueberry - Boreal Sagebrush Alpine Dwarf-shrubland Alliance
AK, BC?, YT?

G747. Western Boreal Alpine Acidic Mesic Meadow Explorer

Western Boreal Alpine Acidic Mesic Meadow
Tussock Cottongrass - Meadow Bistort Alpine Meadow Group
This group consists of boreal alpine mesic grasslands and meadows of North America dominated mostly by grasses and sedges, including *Arctagrostis latifolia, Carex aquatilis, Carex bigelowii, Carex macrochaeta, Festuca altaica, Festuca rubra, Anthoxanthum monticola ssp. alpinum*, and/or *Poa arctica*.

AK, BC?, YT?

A4320. **Western Boreal Alpine Acidic Mesic Sedge - Tussock Meadow** Explorer

Eriophorum vaginatum - *Salix pulchra* - *Polygonum bistorta* Alpine Meadow Alliance

Tussock Cottongrass - Tealeaf Willow - Meadow Bistort Alpine Meadow Alliance

AK, BC?, YT?

A4321. **Western Boreal Alpine Alkaline Mesic Sedge - Dryas Meadow** Explorer

Carex bigelowii - *Dryas integrifolia* Alpine Meadow Alliance

Bigelow's Sedge - Entireleaf Mountain-avens Alpine Meadow Alliance

AK, BC?, YT?

A4322. **Western Boreal Alpine Acidic Mesic Sedge - Willow Meadow** Explorer

Carex bigelowii - *Eriophorum angustifolium* - *Salix pulchra* Alpine Meadow Alliance

Bigelow's Sedge - Tall Cottongrass - Tealeaf Willow Alpine Meadow Alliance

AK, BC?, YT?

G785. **Western Boreal Alpine Cliff, Scree & Rock Vegetation** Explorer

Western Boreal Alpine Cliff, Scree & Rock Vegetation

Western Boreal Alpine Cliff, Scree & Rock Vegetation Group

This group consists of sparsely vegetated alpine cliff, scree, talus and bedrock above the dwarf-shrub zone, with forbs and graminoids such as *Draba* spp., *Saxifraga* spp., *Oxyria digyna*, *Festuca brachyphylla*, and others, and where dwarf-shrubs are uncommon. It occurs in Alaska and possibly western Canada.

AK, BC?, YT?

A4323. **Western Boreal Alpine Dryas Rocky Tundra** Explorer

Dryas integrifolia - *Oxytropis nigrescens* - *Arctostaphylos rubra* Alpine Rock Alliance

Entireleaf Mountain-avens - Blackish Oxytrope - Red-fruit Bearberry Alpine Rock Alliance

AK, BC?, YT?

A4324. **Western Boreal Alpine Lichen Rocky Tundra** Explorer

Cladonia spp. - *Umbilicaria* spp. - *Rhizocarpon geographicum* Alpine Rock Alliance

Cup Lichen species - Rocktripe Lichen species - World Map Lichen Alpine Rock Alliance

AK, BC?, YT?

A4325. **Western Boreal Alpine Mixed Forb Rocky Tundra** Explorer

Artemisia arctica - *Festuca altaica* - *Valeriana capitata* Alpine Rock Alliance

Boreal Sagebrush - Altai Fescue - Capitate Valerian Alpine Rock Alliance

AK, BC?, YT?

G867. **Western Boreal Alpine Mesic Dwarf Birch - Willow Shrubland** Explorer

Western Boreal Alpine Mesic Dwarf Birch - Willow Shrubland

Dwarf Birch - Tealeaf Willow Alpine Shrubland Group

AK, BC?, YT?

A4314. **Western Boreal Alpine Dwarf Birch Shrubland** Explorer

Betula nana Alpine Shrubland Alliance

Dwarf Birch Alpine Shrubland Alliance

AK, BC?, YT?

A4315. **Western Boreal Alpine Tealeaf Willow Shrubland** Explorer

Salix pulchra Alpine Shrubland Alliance

Tealeaf Willow Alpine Shrubland Alliance

AK, BC?, YT?

4.B.2. Polar Tundra & Barrens Explorer

Upland or dry polar tundra is dominated by dwarf-shrubs, sedges and grasses, mosses and lichens, and is found in the high latitudes north of 60°N in the Arctic region and south of 50°S in the Antarctic region, in permafrost soils that range from dry to seasonally saturated.

D044. Arctic Tundra & Barrens Explorer

This circumarctic tundra and barrens type contains low shrubs, dwarf-shrubs, cushion shrubs, chamaephyte herbs, hemicryptophyte herbs, lichens, and sparse vegetation generally occurring north of the treeline.

M175. Arctic Scree, Rock & Cliff Barrens Explorer

This macrogroup consists of sparsely vegetated talus, bedrock, cliffs, rock outcrops, and rocky floodplains in the Arctic regions of North America, with <10% vascular cover and variable cover of mosses and lichens. Some forbs and graminoids include *Draba* spp., *Saxifraga* spp., *Oxyria digyna*, *Festuca brachyphylla*, and others.

G616. Arctic Gravel Floodplain Vegetation Explorer

Arctic Gravel Floodplain Vegetation
Arctic Gravel Floodplain Vegetation Group

This group includes sparsely vegetated rocky floodplains, with little soil alluvium. Nonvascular cover may be very low to absent, and vascular cover is low.

AK, LB?, NT, NU, QC?, YT

A4362. Arctic Fireweed - Willow Floodplain Explorer

Chamerion latifolium - *Salix alaxensis* Arctic Floodplain Alliance
Dwarf Fireweed - Feltleaf Willow Arctic Floodplain Alliance

AK

G868. Arctic Lichen Barrens Explorer

Arctic Lichen Barrens
Arctic Lichen Barrens Group

AK, LB?, NT, NU, QC?, YT

A4326. Carbonate Mountain Barrens Explorer

Carbonate Mountain Barrens Alliance
Carbonate Mountain Barrens Alliance

AK, LB?, NT, NU, QC?, YT

A4327. Noncarbonate Mountain Barrens Explorer

Noncarbonate Mountain Barrens Alliance
Noncarbonate Mountain Barrens Alliance

AK, LB?, NT, NU, QC?, YT

G869. Arctic Open Scree, Rock & Cliff Barrens Explorer

Arctic Open Scree, Rock & Cliff Barrens
Arctic Open Scree, Rock & Cliff Barrens Group

AK, LB?, MB, NT, NU, QC?, YT

A4328. Arctic Carbonate Scree, Rock & Cliff Barrens Explorer

Arctic Carbonate Scree, Rock & Cliff Barrens Alliance
Arctic Carbonate Scree, Rock & Cliff Barrens Alliance

AK, LB?, MB, NT, NU, QC?, YT

A4329. Arctic Noncarbonate Scree, Rock & Cliff Barrens Explorer

Arctic Noncarbonate Scree, Rock & Cliff Barrens Alliance
Arctic Noncarbonate Scree, Rock & Cliff Barrens Alliance

AK, LB?, MB, NT, NU, QC?, YT

M173. Arctic Dry-Moist Tundra Explorer

This macrogroup is characterized by graminoid- or shrub-dominated vegetation underlain by continuous permafrost, which occupies the landscape located inland from coastal zones and north of latitudinal treeline in arctic Alaska and Canada as well as the region west of longitudinal treeline in subarctic Alaska.

G897. Arctic Low Shrub Tundra Explorer

Arctic Low Shrub Tundra
Arctic Low Shrub Tundra Group

AK, LB, MB, NT, NU, QC, YT

A4337. Arctic Acidic Low Willow Tundra Explorer

Arctic Acidic Low Willow Tundra Alliance
Arctic Acidic Low Willow Tundra Alliance

This low-shrub tundra group is found on mesic to moist sites throughout arctic and subarctic alpine regions of Alaska. Vegetation is dominated by low willows, including *Salix richardsonii*, *Salix pulchra*, and *Salix glauca*.
AK, LB, MB, NT, NU, QC, YT

A4338. **Arctic Nonacidic Low Willow Tundra** Explorer

Arctic Nonacidic Low Willow Tundra Alliance
Arctic Nonacidic Low Willow Tundra Alliance
This low-shrub tundra alliance is found on mesic to moist sites throughout arctic and subarctic alpine regions of Alaska. Vegetation is dominated by low willows, including *Salix richardsonii*, *Salix pulchra*, and *Salix glauca*.
AK, LB, MB, NT, NU, QC, YT

A4339. **Arctic Dwarf Birch Low Shrub Tundra** Explorer

Arctic Dwarf Birch Low Shrub Tundra Alliance
Arctic Dwarf Birch Low Shrub Tundra Alliance
This shrub tundra alliance is found on mesic to moist sites throughout the low arctic region of Alaska. Vegetation is dominated *Betula nana* and other low ericaceous shrubs, including *Ledum palustre ssp. decumbens* and *Vaccinium uliginosum*.
AK, LB, MB, NT, NU, QC, YT

G896. **Arctic Dwarf-shrub Tundra** Explorer

Arctic Dwarf-shrub Tundra
Arctic Dwarf-shrub Tundra Group
AK, LB?, MB, NT?, NU?, QC?, YT?

A4330. **Arctic Acidic Lichen - Sparse Dwarf-shrub Tundra** Explorer

Arctic Acidic Lichen - Sparse Dwarf-shrub Tundra Alliance
Arctic Acidic Lichen - Sparse Dwarf-shrub Tundra Alliance
This group is characterized by lichen cover >25% or a sparse cover (<25%) of dwarf-shrubs that may or may not include lichens in the lowlands, hills and mountains of arctic and the alpine of subarctic Alaska.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4331. **Arctic Nonacidic Lichen - Sparse Dwarf-shrub Tundra** Explorer

Arctic Nonacidic Lichen - Sparse Dwarf-shrub Tundra Alliance
Arctic Nonacidic Lichen - Sparse Dwarf-shrub Tundra Alliance
This group is characterized by lichen cover >25% or a sparse cover (<25%) of dwarf-shrubs that may or may not include lichens in the lowlands, hills and mountains of arctic and the alpine of subarctic Alaska.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4332. **Arctic Acidic Dryas Dwarf-shrub Tundra** Explorer

Arctic Acidic Dryas Dwarf-shrub Tundra Alliance
Arctic Acidic Dryas Dwarf-shrub Tundra Alliance
This alliance is defined by tundra vegetation dominated by the dwarf, broad-leaved evergreen shrub species, *Dryas octopetala* and/or *Dryas integrifolia* often in combination with dwarf willows or ericaceous shrubs occurring in the arctic and subarctic regions of Alaska and Canada.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4333. **Arctic Nonacidic Dryas Dwarf-shrub Tundra** Explorer

Arctic Nonacidic Dryas Dwarf-shrub Tundra Alliance
Arctic Nonacidic Dryas Dwarf-shrub Tundra Alliance
This group is defined by tundra vegetation dominated by the dwarf, broad-leaved evergreen shrub species, *Dryas octopetala* and/or *Dryas integrifolia* often in combination with dwarf willows or ericaceous shrubs occurring in the arctic and subarctic regions of Alaska and Canada.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4334. **Arctic Ericaceous Dwarf-shrub Tundra** Explorer

Arctic Ericaceous Dwarf-shrub Tundra Alliance
Arctic Ericaceous Dwarf-shrub Tundra Alliance

This alliance is defined by tundra vegetation dominated by dwarf- to low ericaceous shrubs such as *Ledum palustre ssp. decumbens*, *Cassiope tetragona*, and *Vaccinium vitis-idaea* often in combination with abundant bryophytes and lichens in the arctic and subarctic regions of Alaska and Canada.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4335. Arctic Acidic Dwarf Willow Tundra Explorer

Arctic Acidic Dwarf Willow Tundra Alliance
Arctic Acidic Dwarf Willow Tundra Alliance
This tundra alliance is defined as dwarf-shrub vegetation dominated by prostrate willow species found on exposed sites in the arctic and subarctic regions of Alaska and Canada.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4336. Arctic Nonacidic Dwarf Willow Tundra Explorer

Arctic Nonacidic Dwarf Willow Tundra Alliance
Arctic Nonacidic Dwarf Willow Tundra Alliance
This tundra group is defined as dwarf-shrub vegetation dominated by prostrate willow species found on exposed sites in the arctic and subarctic regions of Alaska and Canada.
AK, LB?, MB, NT?, NU?, QC?, YT?

G898. Arctic Herbaceous Tundra Explorer

Arctic Herbaceous Tundra
Arctic Herbaceous Tundra Group
AK, LB, MB, NT, NU, QC, YT

A4340. Arctic Herb Tundra Explorer

Arctic Herb Tundra Alliance
Arctic Herb Tundra Alliance
This group represents mesic herbaceous vegetation dominated by perennial sedges, grasses and/or broad-leaved herbaceous species found throughout the arctic and subarctic regions of Alaska and Canada, possibly extending to Greenland.
AK, LB?, MB, NT?, NU?, QC?, YT?

A4341. Arctic Acidic Nontussock Sedge Tundra Explorer

Arctic Acidic Nontussock Sedge Tundra Alliance
Arctic Acidic Nontussock Sedge Tundra Alliance
AK, LB, MB, NT, NU, QC, YT

A4342. Arctic Nonacidic Nontussock Sedge Tundra Explorer

Arctic Nonacidic Nontussock Sedge Tundra Alliance
Arctic Nonacidic Nontussock Sedge Tundra Alliance
AK, LB, MB, NT, NU, QC, YT

A4343. Arctic Tussock Sedge Tundra Explorer

Arctic Tussock Sedge Tundra Alliance
Arctic Tussock Sedge Tundra Alliance
This tundra alliance is defined by tussock-forming sedges often in combination with dwarf- or low shrubs developing over continuous, ice-rich permafrost throughout arctic and subarctic Alaska and Canada.
AK, LB, MB, NT, NU, QC, YT

A4344. Arctic Rush/Grass, Forb, Cryptogam Tundra Explorer

Arctic Rush/Grass, Forb, Cryptogam Tundra Alliance
Arctic Rush/Grass, Forb, Cryptogam Tundra Alliance
This alliance consists of moist tundra in the high and low Arctic, dominated by sedges with scattered prostrate and dwarf-shrubs. Dominant sedges include *Carex aquatilis var. stans*, *Eriophorum angustifolium*, and *Luzula arctica*; shrub species include *Betula nana*, *Cassiope tetragona*, *Dryas integrifolia*, *Ledum palustre*, *Salix pulchra*, and *Vaccinium vitis-idaea*.
AK, LB, MB, NT, NU, QC, YT

5. Aquatic Vegetation Explorer

Open freshwater and saltwater wetlands dominated by aquatic vegetation, either rooted with leaves rising up to or near the surface, or floating freely on the water surface. Stands typically have surface water,

generally up to 2 m in depth, along ocean, lake, pond, and river margins in non-tidal, tidal and intertidal habitats.

5.A. Saltwater Aquatic Vegetation Explorer

Saltwater Aquatic Vegetation occurs in shallow to deep saline habitats where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe from the equator to the polar regions.

5.A.2. Benthic Macroalgae Saltwater Vegetation Explorer

The vegetation includes subtidal or intertidal bottoms and other areas dominated by attached macroalgae, including kelp, intertidal fucoids, and calcareous algae, which are usually submersed within or extend to the surface of the water column, though they may be exposed during low tides.

D047. Temperate Intertidal Shore Explorer

This vegetation consists of intertidal and shallow subtidal macroalgae communities in shallow brackish or saltwater coastal waters in the world's temperate to subpolar areas.

M106. Temperate Pacific Seaweed Intertidal Vegetation Explorer

This macrogroup is of marine algae living on tidal flats and rocky areas in the near-shore intertidal zone of the temperate North America Pacific coast. Some dominant species include *Enteromorpha* spp., *Fucus distichus*, *Postelsia palmiformis*, and *Vaucheria longicaulis*.

G385. North American Pacific Intertidal Algal Flat Explorer

North American Pacific Intertidal Algal Flat

Vaucheria Marine Alga - Sea-lettuce species North American Intertidal Algal Flat Group

This group consists of algal communities on coastal tidal flats on the north Pacific Coast from Alaska to central California where characteristic species include *Vaucheria longicaulis* and species of *Enteromorpha*.

AK, BC, CA, OR, WA

A4363. North American Pacific Mixed Algal Flat Explorer

North American Pacific Mixed Algal Flat Alliance

North American Pacific Mixed Algal Flat Alliance

AK

5.A.3. Benthic Vascular Saltwater Vegetation Explorer

The vegetation includes subtidal or intertidal bottoms of rooted vascular vegetation beds commonly dominated by any number of seagrass or eelgrass species, including species of *Cymodocea, Halodule, Thalassia, Halophila, Vallisneria, Ruppia, Phyllospadix*, and *Zostera*, and which are usually submersed in the water column or floating on the surface, or exposed during low tides.

D064. Temperate Seagrass Aquatic Vegetation Explorer

This division is comprised of stands (beds) of submerged aquatic vascular plants in temperate to subpolar mesohaline to euhaline estuaries and near-shore areas of oceans of the Northern Hemisphere that are dominated by species of the genera *Zostera*, *Phyllospadix*, and/or *Ruppia* and/or by the species *Cymodocea nodosa* and/or *Posidonia oceanica*.

M184. Temperate Pacific Seagrass Intertidal Vegetation Explorer

This macrogroup contains the sub-tidal and intertidal zones of temperate North America Pacific Coast dominated by seagrass and surfgrass and other vascular species, including *Zostera marina* and *Phyllospadix scouleri*.

G373. Temperate Pacific Seagrass Bed Explorer

Temperate Pacific Seagrass Bed

Eelgrass species - Surf-grass species Temperate Pacific Seagrass Bed Group

This group consists of marine near-shore beds dominated by macrophytic algae and marine aquatic angiosperms such as *Zostera marina* found throughout intertidal zones with clear water in bays, inlets and lagoons in the coastal areas of the North Pacific Coast, from California north through Oregon, Washington, British Columbia and north into the Gulf of Alaska, Cook Inlet, and Bristol Bay coasts.

AK, BC, CA, MXBCN, OR, WA

A4364. Temperate Pacific Seawrack Bed Explorer

Zostera marina Temperate Pacific Eelgrass Bed Alliance

Seawrack Temperate Pacific Eelgrass Bed Alliance

AK

A4365. **Temperate Pacific Surf-grass Bed** Explorer

Phyllospadix scouleri - *Phyllospadix torreyi* Temperate Pacific Seagrass Bed Alliance

Scouler's Surf-grass - Torrey's Surf-grass Temperate Pacific Seagrass Bed Alliance

AK

5.B. Freshwater Aquatic Vegetation Explorer

Freshwater Aquatic Vegetation occurs in shallow to deep freshwater habitats where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe from the equator to the polar regions.

5.B.2. Temperate to Polar Freshwater Aquatic Vegetation Explorer

Temperate to Polar Freshwater Aquatic Vegetation occurs in shallow to deep freshwater habitats (e.g., lakes, ponds, canals, streams, rivers, and freshwater portions of estuaries) where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe in both hemispheres, from the tropics north and south to the polar regions.

D049. North American Freshwater Aquatic Vegetation Explorer

Floating-leaved and submergent aquatic vegetation found in permanently flooded but shallow freshwater sites across North America.

M109. Western North American Freshwater Aquatic Vegetation Explorer

This macrogroup consists of rooted and floating freshwater aquatic herbaceous vegetation dominated by western U.S. aquatic species *Azolla filiculoides, Azolla microphylla, Nuphar polysepala, Nymphaea tetragona, Stuckenia striata,* and several other cosmopolitan species, found throughout the temperate regions of western North America.

G544. Western North American Temperate Freshwater Aquatic Vegetation Explorer

Western North American Temperate Freshwater Aquatic Vegetation

Pond-lily species - Pondweed species - Duckweed species Freshwater Aquatic Vegetation Group

This group consists of freshwater aquatic herbaceous vegetation found throughout the temperate regions of western North America. A variety of rooted or floating aquatic herbaceous species may dominate, including *Azolla* spp., *Nuphar polysepala, Polygonum* spp., *Potamogeton* spp., *Ranunculus* spp., and *Wolffia* spp. Submerged vegetation, such as *Myriophyllum* spp., *Ceratophyllum* spp., and *Elodea* spp., is often present.

AB, AK, AZ, BC, CA, CO, ID, MT, ND, NE, NM, NV, OK, OR, SD, SK?, TX, UT, WA, WY

A3893. **Mare's-tail - Widgeonweed - Bur-reed Aquatic Vegetation** Explorer

Hippuris vulgaris - *Ruppia* spp. - *Sparganium* spp. Aquatic Vegetation Alliance

Common Mare's-tail - Widgeonweed species - Bur-reed species Aquatic Vegetation Alliance

This alliance consists of aquatic plant communities dominated by *Hippuris vulgaris, Ruppia cirrhosa, Ruppia maritima, Sparganium angustifolium, Sparganium eurycarpum,* and/or *Stuckenia filiformis* in any combination. These associations are floating aquatic that are rooted in mud but require a water column for support. Sites are non-tidal, freshwater to slightly brackish, seasonally or permanently flooded marshes, shallow lakes and ponds.

AK, BC, CA, CO, ID, NV?, OR, WA, WY

CEGL003315 **Common Mare's-tail Aquatic Vegetation** Explorer

Hippuris vulgaris Aquatic Vegetation

Common Mare's-tail Aquatic Vegetation

AK, CO, OR, WA

A3925. **Western Buckbean Aquatic Vegetation** Explorer

Menyanthes trifoliata Aquatic Vegetation Alliance

Buckbean Aquatic Vegetation Alliance

This is an herbaceous wetland and aquatic floating alliance dominated by *Menyanthes trifoliata* with occasional other species such as *Carex arcta, Carex limosa, Carex utriculata, Eleocharis palustris, Nuphar polysepala, Potamogeton* spp., and *Utricularia macrorhiza*. Stands grow where they are submerged through much of the year but may

dry to the soil surface during the growing season. This alliance is known throughout the western U.S. and Canada.
AK, BC, CA, CO, OR, WA, WY

CEGL003410 **Buckbean Aquatic Vegetation** Explorer
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Menyanthes trifoliata Aquatic Vegetation
Buckbean Aquatic Vegetation
AK, BC, CA, CO, OR, WA, WY

M871. Boreal Freshwater Aquatic Vegetation Explorer
Aquatic freshwater vegetation found in shallow to deep water within the Arctic and Boreal climate zones of Alaska, Canada and Greenland with dominant species such as *Isoetes tenella, Limosella aquatica, Potamogeton* spp., *Ranunculus* ssp., and *Sparganium angustifolium.*

G769. North American Boreal Freshwater Aquatic Vegetation Explorer
North American Boreal Freshwater Aquatic Vegetation
North American Boreal Freshwater Aquatic Vegetation Group
Aquatic freshwater vegetation found in shallow to deep water within the Arctic and Boreal climatic zones of Alaska, Canada and Greenland with dominant species such as *Isoetes tenella, Limosella aquatica, Potamogeton* spp., *Ranunculus* ssp., and *Sparganium angustifolium.*
AB, AK, BC, LB, MB, NB, NF, NS, NT, NU, ON, QC, SK, YT

A4253. Duckweed - Mixed Boreal Floating Aquatic Vegetation Explorer
Lemna spp. - Mixed Boreal Floating Aquatic Vegetation Alliance
Duckweed species - Mixed Boreal Floating Aquatic Vegetation Alliance
AB, AK, BC, MB, NT, NU, ON, QC, SK, YT

CEGL005452 **North America Boreal Duckweed Pond** Explorer
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Lemna spp. North American Boreal Aquatic Vegetation
Duckweed species North America Boreal Aquatic Vegetation
AB, AK, BC, MB, NT, NU, ON, QC, SK, YT

A4345. Boreal Mare's-tail - Pondweed Explorer
Boreal Mare's-tail - Pondweed Alliance
Boreal Mare's-tail - Pondweed Alliance
AB, AK, BC, LB, MB, NB, NF, NS, NT, NU, ON, QC, SK, YT

A4346. Boreal Pondlily Explorer
Boreal Pondlily Alliance
Boreal Pondlily Alliance
AB, AK, BC, LB, MB, NB, NF, NS, NT, NU, ON, QC, SK, YT

6. Open Rock Vegetation Explorer
Tropical, temperate, and boreal habitats are characterized or dominated by plant growth forms, such as *lichen, bryophyte, alga*, or *fern*, that have structural adaptations for living on stable rock surfaces or on unstable rocky substrates, such as cliffs, talus, scree, pavement, cobble, lava or boulderfields, and with associated mesomorphic grass, shrub and tree growth forms.

6.B. Temperate & Boreal Open Rock Vegetation Explorer
Rocky habitats (such as cliffs, talus, scree, pavement, cobbles, recent lava flows, or large rock outcrops) characterized by temperate, including Mediterranean, and boreal lithomorphic and lithophilic growth forms, including saxicolous *lichens, bryophytes, algae*, and/or *ferns* and other pteridophytes. Tree growth forms typically have <10% cover, are very sparse; woody growth forms, when present, include cold-deciduous broad-leaved and needle-leaved trees and shrubs. Vegetation found on temperate and boreal rocky habitats (such as cliffs, talus, recent lava flows, or rock outcrops) at low to moderate elevations at mid-latitudes from 23°to 70°N or S latitude around the globe that are characterized by nonvascular plant growth forms that have structural adaptations for living on these habitats.

6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation Explorer
Vegetation in temperate and boreal habitats found in rocky or rocklike habitats (such as cliffs, talus, scree, pavement, cobbles, lava, boulderfields, or badlands) at low elevations at mid-latitudes around the globe characterized by nonvascular plant growth forms that have structural adaptations for living on stable rock

surfaces or in unstable rocky substrates. A sparse cover of vascular mesomorphic growth forms, including needle-leaved and cold-deciduous broad-leaved woody plants, may be present.

D052. Western North American Temperate Cliff, Scree & Rock Vegetation Explorer

This division is characterized by the vegetation of rocky or rock-like habitats, including outcrops, cliffs, talus, or scree, in low- to mid-elevation, temperate and boreal climatic areas of western North America. Cryptogam vegetation tends to dominate, with vascular plants species of low cover.

M887. Western North American Cliff, Scree & Rock Vegetation Explorer

This sparsely vegetated rock outcrop and cliff face macrogroup is found in temperate and boreal climates, on the Alaska peninsula and Aleutian Islands, boreal Alaska and Yukon Territory, the Coast Mountains of British Columbia, in Washington and northwestern Oregon. Stands include patchy vegetated fractures in the rock surface and less steep or more stable slopes that are composed of scattered trees and/or shrubs. Mosses or lichens may be very dense, well-developed and display cover well over 10%.

G318. North Vancouverian Montane Bedrock, Cliff & Talus Vegetation Explorer

North Vancouverian Montane Bedrock, Cliff & Talus Vegetation
North Vancouverian Montane Bedrock, Cliff & Talus Vegetation Group

This group consists of sparsely vegetated rock outcrops and cliff faces from Alaska south into northern California. It occurs as small patches of dense vegetation, typically scattered trees and/or shrubs, such as trees *Abies* spp., *Callitropsis nootkatensis*, *Pseudotsuga menziesii* (not in Alaska), *Thuja plicata*, or *Tsuga* spp., and shrubs *Acer circinatum*, *Alnus viridis*, and *Ribes* spp.; mosses or lichens may be very dense.

AK, BC, CA, OR, WA

A3778. Steller's Alpine Speedwell - Coiled Sedge Sparse Rock & Talus Vegetation Explorer

Veronica wormskjoldii var. stelleri - *Carex circinata* Sparse Rock Vegetation Alliance
Steller's Alpine Speedwell - Coiled Sedge Sparse Rock Vegetation Alliance

Sparse vegetation of low to subalpine elevations occurring on rock and talus of the Alaska Peninsula and Aleutian Islands.

AK

A3779. North Pacific Nonvascular Rock Vegetation Explorer

North Pacific Nonvascular Rock Vegetation Alliance
North Pacific Nonvascular Rock Vegetation Alliance

Barren and sparsely vegetated landscapes (generally <10% vascular plant cover) of steep cliff faces, narrow canyons, and larger rock outcrops of northern California to southeastern Alaska.

AK, BC, CA, OR, WA

D329. North American Boreal Cliff, Scree & Rock Vegetation Explorer

M895. North American Boreal Cliff, Scree & Rock Vegetation Explorer

G822. Western Boreal Cliff, Scree & Rock Vegetation Explorer

Western Boreal Cliff, Scree & Rock Vegetation
Western Boreal Cliff, Scree & Rock Vegetation Group

This sparsely vegetated rock outcrop and cliff face macrogroup is found in the boreal regions of Alaska and adjacent Yukon Territory. Stands include patchy vegetated fractures in the rock surface and less steep or more stable slopes that are composed of scattered trees and/or shrubs. Mosses or lichens may be very dense, well-developed and display cover well over 10%.

AK, YT

A4366. Western Boreal Mixed Lichen Rock Vegetation Explorer

Western Boreal Mixed Lichen Rock Vegetation Alliance
Western Boreal Mixed Lichen Rock Vegetation Alliance

AK

A4367. Western Boreal Mixed Forb Rock Vegetation Explorer

Western Boreal Mixed Forb Rock Vegetation Alliance
Western Boreal Mixed Forb Rock Vegetation Alliance

AK

A4368. Western Boreal Dryas - Lichen Rock Vegetation Explorer

Western Boreal Dryas - Lichen Rock Vegetation Alliance
Western Boreal Dryas - Lichen Rock Vegetation Alliance
AK

MACROGROUP AND GROUP DESCRIPTIONS

All type descriptions, where available, are now fully available on http://www.usnvc.org

RELATION OF ECOLOGICAL SYSTEMS TO USNVC

The relationship of Ecological Systems to the USNVC is shown at the group level. Many systems may be more directly equivalent to alliances, and future drafts will clarify that level of relationships. Others form complexes that cross multiple groups and alliances.

ALLIANCE DESCRIPTIONS

Although alliance concepts have been drafted, descriptions are largely lacking and will need investment to be completed.

FURTHER DEVELOPMENTS

Development of the USNVC in Alaska continues through a number of activities:

- Continued advancement of the USNVC in Alaska through vegetation plot data collection and analyses
- Ongoing cooperation with the Alaskan and federal agencies, universities, consultants and other partners
- Review of Torre Jorgenson's Plant Community Type crosswalk spreadsheet, which often guides the Alaskan alliance level concepts.
- The Alaskan Arctic vegetation classification was presented at the International Association of Vegetation Science (IAVS) meeting in Bozeman, Montana in July of 2018. Don Faber-Langendoen collaborated with the Alaskan team from University of Alaska, Fairbanks to present the poster. "**Arctic Vegetation Types and the EcoVeg approach: U.S. and Canadian perspectives** " (Don Faber-Langendoen[1], Martha Raynolds[2], Skip Walker[2], Amy Breen[2], Jozef Sibik[3], and Will Mackenzie[4] [1]NatureServe, [2]University of Alaska Fairbanks, [3] Slovak Academy of Sciences, [4]British Columbia Ministry of Forests, Lands and Natural Resources.)
- Ongoing collaboration with Alaska GeoSpatial Council
- Crosswalk of NatureServe Ecological Systems classification and mapping
- Collaboration with Canadian National Vegetation Classification process.

We look forward to further improvements to the USNVC through these activities.

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APPENDICES

APPENDIX I. ARCTIC AND ALPINE TEAM: SUMMARY NOTES

Notes by Nadele Flynn to help keep track of discussion, details on changes made to MG (macrogroup) and G (Group), Alliance descriptions are tracked in an excel table by Don.

Nov 7, 2017

In red are thoughts or comments that are incomplete or seem out of context of discussion

- Don: showed summary of criteria slide
- Begin at the macrogroup level – good strong diagnostic species. Can be biogeographic focus.
    - Group – drivers could be physiognomic
    - Alliance – diagnostic
    - Matt C: How about low centered polygonal polygon. How then would wetlands fit into this system? For example how would forested wetlands fit. At the Macrogroup Level forested wetlands are split out.
    - Janet: pointed out that arctic types (esp. wetlands) are scattered throughout document – see notes on paper copy
- First topic for discussion "What's in the name?"
    - M173 North American Arctic & Subarctic. Should we drop north American in the name?
    - Braun-Blanquet Class and USNVC MG are closely related
    - Should MG break out at acidic and non-acidic at this level? Discussion about this and consensus that for most groups this would show up at the alliance level (not MG). It would cause a lot of duplication if broken up at a higher level (i.e. MG)
    - Arctic tundra and barrens category, drop north America…don't break by acidic / calcareous at MG level.
- Don put the example on the board of what it would look like to break out acidic-non-acidic at the Alliance level. Are there dominant diagnostics that seem to split the acidic and non-acidic?
    - Torre: What is more important moisture or acidic in terms of breaking down the alliances?
    - Janet: It is more common to split by moisture so that would be less dramatic of a change
- Mesic to Wet changed to Mesic to Moist – Skip and others agree to change
    - Work at the alliance level and designate an acid and non-acidic version.
    - Torre: First principles driven by physiognomy at the highest level, then structure and then acidic at the third level.
    - Upland vs wetland distinction made.
- NVC wants to bring floristics and structure in at the mid-level.
    - MG should be meaningful at a mapping interpretation, very difficult to map this for acidic and non-acidic. Much easier to map across a moisture regime, if there was a desire to do this at a MG level.

- Putting acidic at a level lower than structural is better.
- Could have one alliance in a group or more than one alliance in a group.

10. 2016 Skip Braun-Blanquet to USNVC alliance comparison (is this really a good comparison).
11. G367 & G828 could be alliances
12. Moist tundra and tussock tundra could be together as alliances
13. Should moist tundra be a group? The group would be dry to moist not shrub versus sedge
14. Proposal
    a. MG: arctic and subarctic tundra
    b. Group: dry arctic and mesic-moist
    c. Don: Tried another example in excel to break out groups by structure (see excel) then group broke out into an alder discussion at this point.
15. Alder Low Alder Tundra (keep it as a boreal association that comes into arctic). Could consider chatting with Will to see how common of a type it is in Yukon arctic.
    a. Group (who?) suggest leave the alder for now, but group majority decided it was boreal with arctic extensions.
    b. Add something to the alder description for alder to reflect arctic extensions?
16. G829, non-tussock sedge moist tundra (see how the name changed)
    a. Group and alliance take out all moisture reference
    b. Look at alpine types
    c. Vancouverian Alpine Tundra
17. G362 Aleutian Ericaceous
    a. Northern maritime (Torre would say it is in this one) very oceanic wet climate – 70% boreal and 30% arctic. Has a boreal flora (Steve Talbot). A bunch of other countries want to put it into boreal. Boreal oceanic. Also wanted SE Alaska to be boreal (Europeans), coastal specific.
    b. Iceland, Aleutian etc. all in oceanic boreal with BB folks (globally)
    c. Mountain complex
18. Moving on to alpine (this is central-northern Alaska-Yukon dwarf scrub and meadows- part of western boreal alpine tundra.
    a. Torre: Very similar floristics but didn't want to call it arctic tundra.
    b. Southern Alaska alpine dwarf scrub and meadows – Torre felt it is somewhat similar to Vancouverian alpine tundra
19. M404 western boreal alpine – see notes that Don wrote in excel
20. G362 Aleutian types – not much data higher than 300 m – side of volcanos.
    a. Birch willow low shrub into the alpine
21. Systems; discussion brought back to "systems"
22. Rock system
23. G356: Low birch willow low elevation is on permafrost and high elevation on rock. Both acidic floristics similar.

   a. East side of SE Yukon is mapped as Vancouverian (really wet) boreal arctic type alpine – they are mixed could be one or the other. See notes south of CBVM mapped southern boreal.

24. G320: mostly herb name changed – see excel table (Don made this change)
   a. Torre was talking about *Festuca altaica* as a graminoid type that is distinct from herb. Missing the super lush meadows.
   b. 1997 Fort Richardson – classification: Skip Walker (Torre also did this) *Veratrum viride* (hellebore), Wrangallis Feoria
25. G528 type doesn't seem to be covering the montane-subalpine-boreal
   a. *Carex aquatilis –Salix fuscescens* alpine wet meadow (would this be in Yukon – any elevational differences?
   b. Eriophorum - *Carex aquatilis, Salix* spp. mostly *S. planifolia* alpine wet meadow (G528 is the right home but this type is describing lowland)
   c. *Salix alexaxensis* with a lot of arctic species G357 but description is missing it
26. Tomorrow we will cover: Plot data sources, where to go next …..

Nov 8 2017

- Review of what we did yesterday
- Take out continental biogeography at mg level
- See excel update
- Three CAVM agrees with the three groups dwarf low shrub graminoid
- Revisit alliance concepts based on strong floristic criteria and think about alkaline acidic at this level which of these current concepts need to be broken out
   - Association level or alliance level….acidic and non-acidic (older term) – Torre prefers alkaline. Might not have as much in common at the association level alkaline pH 7 and higher. Calcium binding to phosphorus and reducing nutrients happens at 7.4. pH 8 or 8.2 carbonate saturated communities
- M175
   - What happens when the lichen cover is very high with arctic open rock barrens (lichen is not sparse) when 80% of cover.
   - Janet: Do you count crustose lichen? Group answer - Yes we do…but this is fruticose…SW Alaska tundra that has a lot of this stuff.
- Group: Is this a moisture differentiation?
- G365 would have sites with high cover of lichen. Rich dense tundra with lichen on top.
   - Add a category for arctic lichen – sparse tundra dwarf shrub
   - Looking at CAVM B2. Cryptogam barren complex (bedrock)
   - Lichens on rock is different from shrub communities we've been talking about in G365

  - Mountains and lowland lichen on rock are they different? Yes shield, rock lichen is very different but we are doing just Alaska – no high arctic. So we can just keep arctic open rock barrens
  - Bare ground barren without much lichen cover (where to put this)
- M175 groups
  - Arctic Lichen Barrens – as much crustose as foliose here
  - *Umbillicaria* (at the association level) on cliff faces under non-carbonate
  - Arctic Sparse Vegetated Barrens
  - Get some plot data type 1 to 76 could they be attached to these categories to give people names and associations to think about categories.

- Prostrate, erect and low shrub.
  - In erect (dwarf low tall) and prostrate (modifier of dwarf) – see notes in excel table for height breakdown and explanation of use of terms
  - Sometimes they are the same species but *Betula nana* and *B. glandulosa*
  - Needs to be a floristic decision not just physiognomic one
  - Comment: Remove alder class because it is in boreal
  - Alaska ecologists: collect species and force to a strata (as its potential) rather than the strata it is in and the physiognomy is just described
  - Arctic dwarf-shrub tundra – split dwarf willow tundra into an acidic and nonacidic - see excel notes for examples of splits and species that would differentiate
  - Split *Dryas* dwarf—shrub tundra (acidic and non-acidic) see excel table for species [comment that three species and some varieties of octopetala]
  - Comment: Brooks Range is limestone
  - Split lichen – sparse tundra dwarf-shrub tundra (acidic and nonacidic) see excel notes
    - *Bryocaulon, Cladina, Alectoria, Cladonia* (acidic indicators)
    - *Cetraria* (general) but *Pertusaria* (nonacidic), *Thamnolia*. (all genera), *Cladonia*
  - Low shrub tundra split low willow tundra with acidic and nonacidic (see excel table for species)

- Gravel floodplain
  - Early seral shrub
  - Late seral shrub (lots of willows – there is a paper that describes willow associates)
- Boreal G357 (riparian not under wetland)
- Also in G368 (page 169) rename to riparian (not tundra) is was moved out of arctic because it was too tall
  - Modified the species to take out boreal species.
  - Flooding dynamics – flood 5-year flood (overbank), buried organic horizons, change sediments to include sands and silts.
  - Copses= stands; *Populus balsamifera* – Chandler river (ANWR), associated with springs

  - G769 took out arctic out of aquatic (too cold for floating vegetation mats – other rationale)

- BREAK

- Fresh water fens
  - Added a bunch of *Carex* species to description
  - *C. rariflora*
- G617. Wet meadow is actually bog and fen
  - Take out subarctic reference – boreal bog and fen (shrub bog dominates)
  - Copied what was done for wet meadow and boreal fen and bog – G617 to G360 for comments on what is acidic and nonacidic
  - Worked on G360 a lot to modify bog and acid fen to fit both boreal and arctic [may include poor to rich in one)
  - Do the same thing but an alkaline version of it (medium rich fen) still keep boreal and arctic together…
- G370
  - Nadele emailed Don (for species list) Fw01 fen water track type that can be shrubby
  - Group talked about marshes and there are very few.
- Didn't get to salt water marshes or dunes

Talk to Don about getting some funding through WMAC, Arctic LCC – how to get some funding to include Yukon arctic perspective (as a contractor?) OR better to ask Will to continue to advise CAVM and pan arctic classification and use this to feed Yukon (and Canadian) perspective.

Arctic Recap (Lisa Saperstein)

Summary slide of changes.

Don F: Started with basic macrogroup list of arctic and subarctic tundra. Didn't make sense to specify N. American from elsewhere- removed N. American from name. No associations had been identified before. Changed macrogroup name to Dry-Moist tundra. Changed group names to follow circumarctic map, based on structure first. These became basis for alliances. Talked a lot about acidic vs non-acidic, using that to split things up rather than structure. Compromised by introduce acidic at the alliance level; split into acidic and alkaline alliances. Enough literature to bring in the community types under this split and see how well the grouping works. But for now, have link between groups and circumarctic maps.

DonL: Created alliances where there wasn't. Plant community types will become associations.

Don F: Will put this together over next few years.

Tina: Also waiting on rollout of the Arctic types for the Canadian NVC.

Don F: They have associations, can probably roll things up by next summer. Circumarctic meeting in Bozeman this summer. Looked at sparse veg/barrens, 2 alpine groups. Had same kinds of group criteria for alpine as for arctic. Left alpine mostly as is, except moved Aleutians out of it. Moved Aleutians to M055 (boreal). How much of flora is distinct from other areas of boreal?

Tina: Spatial equivalent of Vancouverian?

DonF: Yes, specific area used by geographers. But need to decide if it works for us in terms of vegetation. If not Vancouverian, it becomes boreal.

Beth: What is included?

DonF: Kodiak

Amy: circumpolar perspective, different divisions. Torre has Oceanic Boreal in Circumboreal veg map (CBVM).

Torre: Circumboreal. N. Maritime east (Aleutians, Greenland, others). But others in group didn't like it. Wanted Arctic, Boreal, Temperate. Most of the floristics of Aleutians are boreal; that's the place to put it if you had to pick one.

DonF: Looked at wetlands. Talked about bogs, fens, wet meadows. Hard to distinguish wet meadows from bogs/fens in arctic. Boreal descriptor is pretty good for arctic, too. Depauperate flora. Still needs some work. Marshes- only one major arctic marsh type.

Arctic Next Steps:

Martha took a list of names of people who participated.

Martha will take list of existing plant community types and link to draft alliances to see how they work (arctic veg map).

Nadele will send Yukon Arctic community classifications to Martha.

Group will then meet via teleconference, make a decision as to whether they're at a point to write up descriptions.

Longer term: Skip Walker and team have 4000+ plots in database.

Amy: Will be included in Beringian analysis, then secure funding for analysis for North America. Each of arctic nations responsible for their section of database.

DonF: how will things be standardized across circumarctic?

Amy: working on this; starting with panarctic flora info. July- IAVS meeting in Bozeman: International Association of Vegetation Science - on arctic mapping. Should have classification done by then. Bozeman meeting is next step. Looking at NASA to get a workshop funded specific to arctic. Don F. will be in Bozeman

DonF-Should know by July if things are converging at lower and mid-levels. Hold off on writing till after that meeting.

Aaron- has set of plots from Arctic. UAF group has that.

Nadele: Will McKenzie is best contact for process, assuming he will be involved.

DonF: he is planning on having things rolled up by July meeting.

Database, flora, analysts lined up for Arctic- good start.

APPENDIX II. BOREAL TEAM SUMMARY NOTES

Nov. 8 2017

One big group- not a breakout group.

*DonL= Don Long, DonF=Don Faber-Langendoen

Boreal Discussion (Lisa Saperstein)

DonF: One of unresolved issues was what to do with subalpine boreal. Temporarily combined with subarctic. In discussions with Canadian NVC, they moved to east to west distinction. Also working on subarctic part. Suggested we think about putting subalpine in with main boreal rather than subarctic and keep subarctic on its own. So, Macrogroup would strictly be subarctic. Canadians then have eastern and western subarctic. How would this work in AK? There is a northern subalpine type that is already defined for AK. That could be the Alaskan subarctic unit (AK subarctic woodland). Black and white spruce, no tamarack. One way of dealing with this outer section, before you hit woodland.

Tina: Northern and southern subalpine. In Canadian version, willow scrub birch. Imagining Yukon subalpine woodlands more like interior/Yukon. Alaskan southern more like BC?

Janet: Is this boreal? Where?

Tina: Both sides of AK range, BC. Birch drops out, just spruce and scrub birch, Ledum, V. uliginosum

DonF: Yukon-Subalpine spruce woodland and scrub, Southern AK subalpine spruce woodland and scrub… In Canada, Liard-Stikine Subalpine spruce fir woodland and scrub. These become grouped in boreal. Northern part would be subarctic

Tina: What are distinguishing features of subarctic?

Torre: At macrogroup, we (Torre and Del) did northern, mid, and southern breakout for boreal. Northern boreal was equivalent to subarctic. Macrogroup at top split into mid and southern (??).

Don F: Yes, northern unit would be a subarctic unit, separate from other 2.

Torre: A lot of aspen in central continental climate. Aspen drops out in southern section; fern/herb component. Similar to central Canada.

Tina: Their moist warm boreal spruce hardwood, fern understory.

Torre: Our solution was not to use mesic and moist- used veg to distinguish. Veg structure rather than moisture.

DonF: Stuff on screen was attempt to bring together CBVM and USNVC. Yukon dry spruce aspen on CAVM. Pretty clear, it's a group, keep as is. The other 3, G579, G350, and G627. Have Mesic/Moist split. Mesic equivqalent to Torre's Central; Moist equivalent to southern. The third is more for Yukon. In addition, there's the 3 subalpine on CBVM. Similar split; Yukon, southern AK, and Liard Stikine subalpine.

Are these really macrogroups, or should they be lower layers?

Torre: They considered these classes to be more on the alliance level, but could organize these at a higher level.

DonF: Dry spruce/aspen forest, probably its own group. Maybe just one alliance under it. Potentially a mesic group that covers Central, Southern, and Yukon as alliances. Third group could be the boreal subalpine and the 3 categories under that as alliances. Groups tend to be moisture gradient level. Splitting out as geographic areas would be different approach; all the distinctions of birch and spruce would have had to become associations within the central zone.

Torre: Would be okay with him

Tina: Would it come back and bite us when we talk about mapping, LANDFIRE? Permafrost, how forests develop?

Torre: Southern- has little permafrost, relatively little fire.

Tina: Will we map at alliance level?

DonF: Could. Some Systems synonymous at alliance

DonL: Alliances generally pull out dominant species. This is more site specific.

DonF: If feasible to pull it out, can do it.

Summary: Dry, Mesic, Subalpine for groups. The geographic aspect bumps down to alliance. Subalpine splits currently not described- this would be new

Torre: prefers “montane,” not subalpine term.

Nadele: used “high boreal”, scrub birch with <10% trees. Rolling hills, low mountains, can get plateaus of this type for large areas. Not sure in AK; may be more narrow bands that are difficult to capture as a map unit. Had a lower boreal, too. At higher latitudes, the high boreal blends into the subarctic. Haven’t yet distinguished high boreal around Dawson from eastern forest communities (AK); break around Beringean glaciated vs nonglaciated area.

DonL: Subalpine…. 3 layer cake, things get compressed.

Don F: Central AK, low boreal very extensive. Montane term is fine.

Tina: Spruce/willow/birch zone called subalpine in some Canadian documentation

Nadele: N. BC, different than what we’ve done in Yukon.

DonF: Here, it’s still combined- Liard-Stikine subalpine spruce fire woodland and scrub

Janet: Woodland and scrub is actually mosaic of woodland and scrub?

Torre: Would have open woodland as one thing, scrub is shrub without tree. Almost montane woodland and subalpine scrub. Maybe take scrub out to avoid mosaics?

Alpine and Boreal Scrub & Grassland

Don F: Okay, take scrub out. Boreal Grassland and Shrubland has scrub birch shrubland group. Showed description on screen. Upper slope sites throughout the boreal and subboreal regions. Fits subalpine description. Added a note to possibly call it subalpine for consistency.

Issue of adding this; 3 geographic subalpine alliances. Is it ok to have 1 group for these 3 alliances? We only have one alliance for scrub birch. Do we need 3 geographic groups to correspond to these alliances?

Torre: need separate alliance for Vaccinium ovalifolium in southern Alaska montane spruce woodland-

Discussion about whether it’s uliginosum or ovalifolium.

Don F: G613: alpine type, W. boreal alpine dwarf shrub tundra

Discussion about borders with Canada, Cordilleran veg.

Don F: Cordilleran is in its own subgroup. Back to W. Boreal alpine description: restricted to prostrate dwarf shrubs. Does not pick up heathy veg. Does mention V. uliginosum. Erect shrubs and trees <10% cover. Description says it's Empetrum nigrum dominated. Maybe indicate that this type excludes the more erect types consisting of low shrubs (blueberry low shrub types)?

Tina: Thinks this may be included in Betula glandulosa plots.

DonF: Currently part of G356, scrub birch group. Vaccinium low shrub type; in same zone as G356.

Torre: Make G613 dwarf shrub group; more general, remove the E. nigrum specification.

Tina: Question is whether boreal Dryas is distinct from arctic.

Don F: Right now, boreal alpine separate from arctic

Tina: That's easy; if separate, then we need… doesn't matter how you do it…. Dwarf shrub…Dryas type found not to be distinct, but if we are having top down splits need to explain that the boreal Dryas type in boreal is similar to arctic.

DonF: Drew a figure. Montaine forests: central, southern, Liane-Stikine- 3 alliances.

Alpine: 1 alliance shared across alpine zone. Could introduce distinct alliances based on central, southern, and L-S zones. Low shrub zone is between alpine and montane zones.

Torre: central boreal alpine zone different than southern alpine zone. Southern closer to L-S/Vancouverian than central (Cordillerian?). Patchy, transition zone. Alpine: Same boreal with strong transitioning to Vancouverian.

DonF: 1 boreal alpine type, but some Vancouverian types showing up within this region? If so, they belong with Vancouverian. From a map perspective, S. boreal alpine has different classification types. Subalpine scrub type…? Scrub birch, occurs in 3 regions between montane and alpine zones. May be variations, more of the blueberry type in one area, straight scrub birch in central…

Torre: central is mostly shrub birch, alder. Salix bebbiana. Southern is more S. barclayii, alder species change.

Tina: Analysis they did showed overlap in boreal plot data, alder/willow, alder, and willow plots. Originally had as separate groups, but data didn't support this, so they grouped

*G356: renamed western boreal montane scrub. Pulled out birch from group name; this will be in the alliance. [but later, the team changed its mind on this, see below]

(didn't write down who was talking, maybe still Tina?)

Central AK scrub zone has Alnus viridis ssp fruticosa, Salix glauca, S. bebbiana, Betula glandulosa.

Southern AK scrub zone: Salix barclayii, Vaccinium uliginosum, B. glandulosa, A. viridis ssp sinuata. Umbels more prevalent in this zone, not in central. Also Veratrum viride.

G357: Western boreal mesic alder willow shrubland. This is the other group they have; the one Tina mentioned that they were unable to split out based on data. This is more interior boreal, with A. viridis ssp fruticosa, S. pulchra. Geographic: common throughout boreal region. Replaced by Vancouverian group to the south.

Tina: okay keeping the geographic separation for the alder types.

Discussion: This is what we described as alder shrub in arctic breakout – decided to keep it in boreal in that breakout.

DonF: CBVM -southern Alaska alder willow dwarf birch scrub. Where does it fit in, in terms of Groups? Note made about this type in G356 section. G356 and G357- similar, not sure how it fits in. Should they be separate alliances under one group? S. barclayii removed from G357 because it's more in the southern. V. uliginosum in central and southern.

G356: Montane added to group name. Should 356 and 357 be collapsed?

Break till 1607 hr.

DonF: Summary of where we are. We worked through subalpine scrub, connected to the beyond treeline scrub; they are related. Plus central vs southern going on in this scrub area. Maybe 1 group, but tracking the geographic difference?

Torre: Parallel to what we talked about for main boreal geographic separation.

DonF: Scrub zone has central and southern alliance…

Question about combining G356 or G357 or not.

Torre: Having the birch stuff at group level, willow stuff at group level, geographic separation at alliance level?

Tina: Birch-ish low shrub, alder low shrub individual groups? Alliance has geographic separations

Janet: Other option is that they are all in one group?

Tina: Doesn't like that idea

DonF: would have to add birch back into name of G356 (formerly removed).

Tina: Montane scrub wasn't supposed to include alder and willows, just other low shrubs. Fire people in past wanted the shrub birch retained.

Lisa: We do have different fuel models for shrub birch vs alder/willow. Figured that could come in under the alliance or association if the montane shrub name was used for G356, especially if B. glandulosa doesn't really occur in southern boreal zone. From an USNVC standpoint, not sure if it matters if it's in Group or Alliance/Assoc., as long as it's in. Lower levels may not get incorporated into LANDFIRE as a map unit, though, if they end up mapping to USNVC in the future. Would want the distinction to show up on LANDFIRE landscape, and it may not if it's in Association and they only go to Alliance.

Torre: suggests keeping both groups 356 and 357 (birch and willow/alder) but make them all lowland. In addition, there's a third group that's montane shrub. Birch/ericaceous- pretty uniform, wouldn't need geographic alliance

Tina: different alders grading in based on geography, but B. glandulosa in both.

*Decided we didn't need the new montane shrub group- would fit under G356, may revise description. Also discussed inclusion of low shrub birch dominated types that were included as tundra in arctic section.

G356: Western Boreal scrub birch shrubland (montane, subalpine, excludes wetland birch types) Possibly update description to include flat areas

G357: Western boreal mesic alder – willow shrubland

May need some wet boreal shrub types.

Nadele: Do you have grasslands?

Tina: G357 Occurs in boreal and arctic. Need a boreal equivalent to what we did with arctic. See G368: Arctic equivalent. (N. American Arctic Tall Willow Wet Shrubland), but it is now in wetlands S. Alaxensis spp alaxensis in arctic, sub species. longistylus is the boreal version. In arctic group, it was under wetlands.

G359: Western boreal dry shrubland and grassland. Pulled up description. May need to clean this up and have AK/Yukon concept distinct from western boreal grassland.

Torre: Make group dry scrubland- juniper, Artemisia. List doesn't currently have Artemisia, and that's what we have here.

DonF: Mostly eastern Yukon, not Alaska?

We have it on bluffs along Yukon, but species list in G359 doesn't match what we tend to have in AK.

Torre: Question is what you have on group level and alliances below that.

Mesic Grassland: G358. Question of whether this would be predominantly Calamagrostis. People don't think so.

Lisa: Viereck has some midgrass shrub, dry fescue types.

Discussion of whether Calamagrostis is mostly post fire, post disturbance.

Lisa: Occurs along rivers and streams, lakes, but not necessarily wet.

Torre: Carex bigelowii comes in other places.

Tina: speices list under G358 includes southern boreal species. Needs to be cleaned up. Can have northern and southern types. Disturbance regime may be on a north-south basis. .

G374: Inland dune. N.Amer. Arctic and Boreal shrub and herb inland dune. Discussion of what is found in these areas vs what's in the description.Shepherdia and Arctostaphilus uva ursa, aspen comes in. Unsure of successional status. Lichens can be part, Cladina spp.

Janet: Original description seems to have been written more for arctic, not boreal. There is an arctic/boreal split- 2 groups rather than having them lumped as is.

Talk about putting some in M175, arctic barrens

Torre: Boreal sand- Calamagrostis purpurescens

Will describe in more detail later

November 9, 2017

Boreal Forest reprise.

Yesterday- started talking about boreal forest, got into scrub montane but didn't talk about forested areas. Will get back to that first.

DonF: Currently 4 macrogroups. 1st is main lowland montane boreal forest, subarctic woodlands, and swamp forest (poor and flooded). This came from Canadian hierarchy. In prep for workshop, especially looked at CBVM map

Potential edits:

M156, AK Yukon North Amer. boreal

G349 Alaskan Yukon dry aspen forest

GNEW Alaskan Yukon spruce hardwood mesic forest

Alliance: Central Alaska Yukon Boreal mesic

Alliance: Southern Alaska Yukon Boreal moist

Alliance: Liard-Stikine spruce birch aspen

Alliance: AK Yukon boreal mesic moist black spruce forest

G646: AK Yukon montane-subalpine woodland

Alliance: Yukon central Alaska subalpine spruce

Alliance: S. AK subalpine spruce woodland

Alliance: Liard-Stikine subalpine spruce fire spruce

Tina: New one, mesic and moist combined. Sort of corresponded to central and southern….

DonF- those become alliances

Torre: Wrapping things into one group won't work so well for mapping. Always have had transitional zone mapped separately. That difference almost bigger than dry aspen. Same with woodland. Making big breaks with these groups.

DonL: Criteria in hand, can have mappable alliances. In group map, nothing to prevent that. LANDFIRE mapping alliances. Not all groups would have a separate mappable alliance- that would be part of the rules.

Torre: dry aspen forest hard to separate out for mapping at that level

DonL: If large group, want ability to break it up. Others, may just map to group.

DonF: Group level captures moisture gradient. Other option would be to move things up to macrogroup. But hard to see how these would make good macrogroup, Alaskan Yukon is current one, covers geographic area.

Tina: Might want to add CBVM equivalents to clarify

DonF: Is black spruce present as an upland species across all three areas, or mostly in one?

Lisa: It's everywhere.

Beth: are there descriptions for these alliances?

DonF: in CBVM not shown in upland

Torre: Alliance, species similar and interchangeable. Uplands usually P. glauca, but can be P. mariana. Understory different, generally. Probably similar to differences you're getting across geographic areas. Mesic upland, mostly in interior. Southern: more P. glauca in uplands

Tina: Occurs in both, but successional models different in interior vs southern. Need equivalent interior and southern. Site differences where you'd get P. mariana more than P. glauca. Site types. Pretty distinct. From a mapping perspective, have units that are mappable identified. For fire, need to keep P. mariana mappable in both central and southern.

DonF: CBVM map: black spruce sites not able to pull out

Tina: Scale, funding, and tech issues.

Beth: What about P. mariana that were in group?

DonF: Should black and white spruce be together at some level?

Tina: black spruce sites on upland should be separate group, if it fits USNVC definition.

DonF: Can you separate on black spruce and co-association based on understory?

Torre: Rule of thumb, black spruce on more nutrient poor sites. But plenty of black spruce/aspen after fire around Tok, with birch. Same combos with black spruce as white spruce.

Tina: black spruce/deciduous component, then a P. mariana ericaceous site?

DonF: can the two spruce co-occur?

Yes.

DonF: Is black vs white at same level of distinction as dry vs montane? If they overlap a lot more, can push it down to a lower level.

Torre: Part of problem is black spruce on higher elevation, can recycle back to black spruce without hardwood component. Black spruce has different pathways under different conditions

Lisa: If distinguished at higher USNVC levels, would it leave more ability for diversity at lower ones?

DonL: If you have criteria, can split at lower level, alliance.

Janet: If you have different successional statuses, shouldn't be at higher level

DonL: is it in CBVM?

Tina: That map is at large scale, shouldn't hold us to it. Black spruce not well covered on it. Agrees with Lisa about elevating to higher scale

DonF: Move black spruce to group level and repeat geographic distinctions? Canadians don't treat it that way

Nadele: Black spruce more of a wet/cold subarctic landscape. But in Dawson area, tend to be on moister than mesic sites, grading to bog/permafrost drainage areas. But there's also a mix of black and white spruce, on mesic sites. If talking about a unique black spruce, unique type on well drained site- there is nothing for that.

Torre: Theresa Hollingsworth identified 3 treeline types, one drier type, 3 wetter types, 1 mesic. With equisetum/rose, more like white spruce.

Beth: Group 350 description-Alaska Yukon Boreal Mesic Moist black spruce forest. Describes the drier types and hardwood mixes

Tina: Does correspond to Hollingsworth treatment, plus other examples. That's the core of it- the mesic black spruce with aspen or birch replacement seral stage.

Torre: Hard to map out at either level

DonF: We all agree it exists, question is what level should it go on?

Tina: Maybe we need something like this, plus a black spruce type that replaces to black spruce without the hardwood component.

DonF: A lot would happen at association, potentially, under one scenario. Not sure if that's too lumpy

Discussion about where to put black spruce relative to the geographic splits

Tina: Site type dependent. Dry black spruce. Black spruce lichen- more in the subarctic.

Beth: Dry aspen description, no mention of black spruce. Thinks of this as super dry, ridge types.

Tina: Original idea, but maybe broaden it. Spruce at alliance. Doesn't see dry black spruce fitting in with dry aspen forest

Torre: Treat at community level. South facing, spruce lichen… Primarily white spruce aspen with some odd occasions of black spruce. Not a central tendency, which is what we need to focus on.

DonF: Where does that leave us?

Beth: Maybe park this here, leave black spruce at alliance level. Look where black spruce is described elsewhere. Found at least 5-6 macrogroups where black spruce is described, at least under older version of USNVC. Continue on, make sure everything else is covered. See what's missing, then return to this.

Tina: trying to stay consistent with how we define groups, alliances. Need to be able to stick with definitions for USNVC. Can't be too fine or too broad.

Torre: wouldn't put it up at group level, but not sure we want to get it at alliance. More of a community level. What are your indicators- black spruce replacing white spruce? Keeping it at alliance would prevent polluting white spruce/hardwood group. Highest he'd want to go is to alliance. Would take some detailed analysis to see if you can justify.

Tina: Need full gradation of black spruce for analysis. In ordination, black spruce popped out from white spruce.

Torre: Wet black spruce definitely different.

DonF: For example, Coastal forests, upland and lowland. Fundamental shift in climate and species between montane and Vancouverian.

Tina: falls apart in SC AK

DonF: Still, big turnover in these macrogroups between range. In boreal, turnover is more subtle in tree species and ground level plants. Stronger shift is subarctic vs main boreal. Lose some species in subarctic. Ecological drivers change. Thinks that's why montane distinction is at group level

Patrick: Sounds like this type of black spruce, because of fire dynamics, is important and different, important to capture- does that get at some of it.

Amy- yes, disturbance regime important

Patrick: Taking this into consideration and including floristics is important. Is if practical to consider this at higher level, not just based on floristics?

Tina: Important to have distinctions that can line out potential changes post disturbance. Would be easier if we had more tree species

Beth: Not just fire, losing permafrost. Disturbance is important factor

Torre: permafrost important in lowlands.

*Parking it for now with black spruce at alliance level, look at other groups

Tina: so subarctic woodland is combination of white and black spruce?

Beth: M179: Subarctic and subalpine woodland.

DonF: Moved G 646 into M156, alliance level had the 3 geographic splits

GNew is the Northern Alaska spruce woodland. Macrogroup is N. Ameriacan Boreal subarctic woodland

Boreal Flooded and Swamp Forest

M299: N. American Boreal Conifer Poor Swamp

Currently: Macrogroup N. American boreal conifer poor swamp, NA boreal flooded and rich swamp forest.

M299 new: N. American boreal conifer poor swamp

G807: Atlantic boreal black spruce-balsam fire poor swamp

G806: Ontario Quebec boreal black spruce poor swamp

Gf843 West central boreal black spruce-tamarack poor swamp

G546: AK Yukon boreal black spruce tamarack poor swamp

Geographic differences, east west.

M 300: N. Amer. boreal flooded and rich swamp forest- similar breakdown. G548: AK Yukon Boreal flooded and rich swamp.

Janet: description is more floodplain. That's dry much of the year, short period of wet.

Looked at description of G548: definitely floodplain description. A lot of populous balsamifera.

Torre: doesn't like swamp description in general. Not technical definition of swamp. Peat rich, precipitation driven. Only similarity to swamp is that it's forested. Not eutrophic, no flowing water- not a swamp.

Others agree

Beth: description on board is for G548. Not a swamp, but also not a black spruce type, either. More P. balsamifera.

Tina: Some of the swamp descriptions may fit SE forests, that have skunk cabbage. Doesn't work for black spruce types.

Some people call to get rid of swamp designation.

Torre: Tamarack can be more minerotropic, more water.

*G548: changed to boreal floodplain, flooded and rich swamp wording removed. Made a note that there may be 2 alliances for floodplain based on CBVM- central vs southern. P. trichocarpa may be a basis for splitting. Discussion of successional status on floodplains, ranges from almost non-vegetated to shrub to forest. Torre- would like to see floodplain pulled out of wetland.

DonF: Floodplains are tricky

DonL: More of a system, shifting mosaic.

DonF: but don't lump them all together; more of an existing vegetation type.

DonL: Somewhere down the road, a gravel bar may be colonized. But probably not in short term.

Marilyn: Where do floodplains go?

DonF: Under boreal. Add a floodplain group. Under forest. Open seral stage would be under open shrubland/grass category. Whether it goes to barren depends on situation. Hard to put in open rock class because they don't have lichens like rock category.

Torre: In other forest category, other macrogroup, at late succession they converge to white spruce. Similar to P. glauca on upland in late succession. Would love to have it on the macrogroup category. But doesn't feel strongly about it, as long as it's represented.

DonF: Group 548, alliances under that. Within this group, can make montane floodplain different from lowland.

Tina: High vs low gradient. But wouldn't restrict it to montane.

Made a note under G548 that there may be the high/low gradient distinction.

Boreal Open Wetlands

DonF: Scrub floodplain. G357- Is mesic alder willow shrubland distinct, do we need another group in there? Are we missing the floodplain component?

Torre: can fit these into dry shrubland/grassland. Would like to see separate floodplain, but would fit in these other classes. Dry/moist framework

DonF: G528: wet meadow marsh. Seasonally saturated, alliance has Myrica gale, Alnus. More of a swamp. Made a note that they proposed two alliances- Myrica dominated and Alnus dominated.

Beth: Myrica more consistently saturated. Alnus can dry out more.

Tina: Substrate differences.

Torre: discusses changes in siltation, swamp

Lisa: General question- why isn't there a separate riparian category at some upper level? Cramming riparian areas into wetland areas, other things that don't seem to fit. If looking for riparian areas in a table of contents, wouldn't think to look for it under these other categories.

DonF: Riparian used in vague ways, ecologically, so avoided it as a high level class.

Nadele: Used for inputs, forest affecting river is a general consideration. 2-way interaction forest-river and river-forest.

Tina: Vancouverian discussion- at group level split out the wet wetlands vs the more high gradient as riparian

DonL: We're classifying floristics, leveraging other things, but ultimately a plant community.

Torre: Could buy suggestion that under wetlands, you can break it out at macrogroup for a riverine system. Right now, we're going all the way down from meadows to swamps.

DonF: Looking at table of contents on screen- Suggestion: M300 NA Boreal flooded and rich swamp forest. G548 Alaska Yukon Boreal floodplain.

*this is what we did earlier, but didn't change in the table of contents, just in the description.

Torre: Wet forest or bog forest instead of "swamp" designation.

Nadele: Doesn't think there'd be swamps here. They have them in Yukon, but not here.

Tina reads off the swamp types found in Canada.

Torre: Permafrost conditions. Very different than a swamp.

Tina: what we have is more of a fen.

Lisa: Use a different term that doesn't specify "swamp?" For example, LANDFIRE used woody wetland. They lumped a bunch of EVTs into it, but as a general description…

Toore: Woody wetlands, wet forest, wet woodland possible substitutions for group. Eg. G546

DonF: Stunted black spruce is included in G360 W. NA Arctic Boreal Bog and acidic fen. Bog/fen open scrub herb.

Janet: Viereck did this, too. She disagrees with it. If it's spruce, it's trees.

DonF: If that scrubby…. Recommends not throwing it out. Physiognomically it's like a shrub. Same height.

Marilyn: Don't occur together. Shrubs lower, spruce above.

DonF: If ground layer is the same as bog, don't want to remove it from this category.

Lisa: We are looking at this as a separate alliance, right? For fire applications, we assign this as a chaparral fuel type when dry. Would be good to have it as something distinct that we can pull out on a map.

Tina: Could have alliances for it based on different geographic areas- northern and southern.

DonF: back to black spruce wet forest. G546. Now AK Yukon Boreal Black spruce-tamarack wet forest. Does not include stunted forest.

Tina: Not much tamarack in AK.

DonF: Can remove it and put it in alliance level.

*tamarack moved out of group name.

Torre: Wet forest- central and southern boreal would be different, permafrost driven. Central stuff may be in bog or not- let's say not for now. Different successional strategies. Tamarack more in central geography. Southern less studied… Trichophorum in southern. At alliance level, can really go to town if you wanted.

Tina: Take rocky mountains references out of description.

Janet: Resolve as to whether stunted is included. Description says stunted, but we just had that in a different group

Tina: depends on how you define stunted. Shorter than mesic spruce, less stunted than bog?

DonF –Will remove stunted. Definition of stunted?

Viereck is 3 m (about 10 feet). Need to define what this will be.

Torre: don't correlate stuntiness to peat presence- it's more temperature and flood related. Can get stunted in tussocks, taller trees with peat.

DonF: Link full floristics with peat and black spruce.

Torre: Real cutpoints of stuntiness can be problematic.

DonF: What distinguishes black spruce forest from bogs?

Torre: Floristically- species of sphagnum. Oxycoccus indicator is pretty strong- not in wet forests, but it is in bogs. Sphagnum fuscum is thick peats. Tie these back to bog description.

DonF: how dry can this get- G546

Torre: feathermosses Hylocomium splendens and Pleurozium schreberi can occur

Tina: would think that's more in the mesic

Torre: On a continuum, least wet has the feathermoss, but still Ledum/Rubus rich. Then you can argue what the transition point is where it moves into moist class.

DonF: black spruce feathermoss- upland. Black spruce/feathermoss/sphagnum at the line, then Black spruce/sphagnum wet.

Torre: can add feathermoss/sphagnum mix as dividing line.

Back to mesic black spruce. G350¨AK Yukon Boreal mesic-moist black spruce forest.

Don F: Is this as distinct as wet black spruce? Or should it be at alliance level? Is there a southern vs central version? Montane?

Lisa: What about black spruce tussock/shrubs/moss understory… Different forest types, if you're looking at mapping at alliance level, should we keep this at group level so these can be alliances under it? If alliance, you end up with a bunch of associations below it.

Discussion about black spruce/tussock, where should it go?

Jen: Keep where it is or put in wet forest.

Torre: Tussocks up north on slopes, but lowland in interior. Tussocks only species that's facultative on permafrost.

Tina: in different place in boreal…

*Decision to put black spruce/tussock to wet forest, G546, black spruce wet forest.

DonF: Let's leave it here for now. Let's document variation, bring descriptions and plot data in, decide how much to split this up and how

Beth: getting a lot of data from Tanana Valley FIA plots.

Torre: Good support for mesic black spruce at group level. Can maybe swap out white and black spruce at group level.

DonF: Group 361- W. N. Amer. boreal alkaline fens. 2nd in the fen group. Are there a lot of richer fens in AK?

Tina: Need to expand this- have a list of alliances. Currently only one. We have Menyanthes.

Torre: Likes the split between poor and rich fen. Thinks Dasiphora and others in description are from the east. Have some cinquefoil rich areas, but unusual. Real classic rich fen include Carex rostrata/utriculata,

C. diandra, Menyanthes trifoliata, Equisetum fluviatile, Potentilla palustre. Rich, floating mat fens. M. trifoliata/C. utriculata I s the classic rich fen.

Distinct alliances? Maybe a couple, more likely one with different communities. Poor fen- Carex chordorrhiza. Shrubby fens, more on rich fen side. Can be a shrubby- Myrica- and herbaceous alliance.

DonF: can also have stunted tree fens?

Torre: Can have tamarack where it gets enough that people may call it Larix fen, but not common and repeated.

Note added that tamarack is incidental here.

Torre: North, C. aquatilis rich and C. utriculata breaks out. Maybe those are communities. May prove to be alliance with more analysis. Probably have a north/south split. Trichophorum caespitarum fens in south.

Lisa: Is there a cutoff to separate fens from wet forest?

DonF- At least 10% tree cover with trees that are 5 meters for forest. Between 2-5 m, gets a little fuzzier, rely more on floristics. Below 2 m, more scrub.

Tina: BC- not distinguishing between rich and poor, but looking at species, we're speaking the same language.

Nadele: Bogs/fens only been worked on well for one area. Don't have much data on sedge species- more based on expert opinion on what sedges occur. We do have a rich white spruce fen.

Torre: alkaline fen- Betula glandulosa/nana; remove them from rich fen description. Should be in poor fen description.

DonF: Descriptions need work, but not trying to do that here.

Boreal Upland Forests Reprise

DonF: back to white spruce. Have essentially defined new sets of alliances, no descriptions.

<u>G579: Now an alliance; the central portion. Boreal Mesic white sprice-hardwood forest</u>

3 alliances:

Central alliance, southern, Laird-stickine.

Torre has descriptions for CBVM

Lisa: southern has lutz spruce

Beth: Some Mountain hemlock, too, and different betulas in central and southern zone

Tina: transition to coastal. In general, southern would have different understory- Menziessia. Central different- CBVM has descriptions.

G579 is more for the central description; G627 more the southern.

Lisa: What about straight white spruce, without a strong hardwood component?

Beth: If these groups become alliances, going to have a bunch of associations

DonF: trading off canopy type for geography. Canopy goes more into association.

DonL: Association level can incorporate time since disturbance.

DonF: how many pure conifer associations are there?

Lisa: Concern about mapping unit, what LANDFIRE eventually uses. Currently saying that things will be crosswalked to Ecological Systems and that the Ecol. Systems are not going away. But, in opening remarks, Don F. indicated that Ecological Systems were intermediary, best classification they had at the time. We use the LANDFIRE landscape for very practical applications- fire spread/behavior modeling during incidents, etc. Have heard different things about what level of USNVC LANDFIRE will crosswalk to in re-map- group, macrogroup, alliance… If they end up going to higher levels, the way things are now these would not be very descriptive, would not be useful for us in a map. Since it sounds like LANDFIRE's needs are what got this process started again, want to make sure that what we come up with will be useable on a practical level within LANDFIRE.

DonL: Have cover and height. He has advocated they map leaf form, use these metrics directly. Can work with that and assign fuels; not sure if that's an association or alliance. So we don't have to map associations per say to get the data.

Lisa: Yes, as long as it gets incorporated into fuel model. We'll have a lot more info, better technology for the LANDFIRE remap, but we don't know what will actually get included/used. Currently don't trust height classifications in the LANDFIRE landscape. They are going to have more size classes in future, which will help.

DonF- NPS_ minimum standard is alliance level. But can map to association if you can see it. With USNVC, can choose among different levels.;

DonL- Not a mapping system directly

Lisa: Differences in what is included in group names; some have species descriptions in groups, some you won't get a picture of what's in the group until you get to alliance.

DonF: will learn how to improve resolution with more data; hopefully now we're only one level off

Tina: Are we losing consistency with CBVM by going to geographic areas for alliances? Do we have to demote everything across the board?

DonF: Doesn't think so, but we do want to check, make sure AK alliances aren't too coarse.

Tina: If we have to account for all the detail at the association level, things get jammed together. Not sure how it will apply across the level

DonL: Don't know what the associations are at this point. Have data, but not the descriptions

Torre: First- moist vs mesic; maybe use more descriptive terms. White spruce

Tina: Mesic- central, moist - southern

Beth: Central and southern- north of AK range is central?

Tina: yes- Alaska range is the split.

DonF: White spruce hardwood- how can we get community type developed so we can see variation?

Tina: Yes, there is lots of info

Beth: Viereck is one, a lot of regional studies. But, need to get out of regional focus. FIA will provide info in coming years.

Don: would like to get a handle on this in the next 6 months- year.

Beth: Is that reasonable?

Examples of regional studies?

Chugach and Tongass have been pulled into classification.

Beth: Keith Bogg's stuff hasn't been. Interior- hard to get around, much of it is regional.

Torre: Will end up proliferating a lot of similar types that have been named differently. Most things understood and described at some regional level.

DonF: We all want exhaustive info, but do the regional studies give us a good overview? Can somebody pull things together for the regions? Is there a need for funding? Where would it come from?

Tina: Henry not opposed to funding, but wanted to see what came out of meeting.

DonF: What's feasible in short term, what do we need to come out of this?

Tina: Comprehensive list of plant communities…

Lisa: Gray literature, things agencies have done. We need to know what you need, what you can use. Viereck level 4 routinely collected. Fire projects, often don't fit Viereck exactly because it's successional. Often write major species in to get to Viereck 5.

What's next?

Who wants to stay involved in looking at groups and potential alliances?

Tina: Do you mean "stay involved" or "do the work?" Can do the former

DonF: He and Patrick will take info from meeting and clean up current version of USNVC

Beth: Need to pass notes around to see if things were captured. First step

Tina: One of the to-do lists was to place alliances under correct group, other things that maybe can't be done yet. Not necessarily have notes about which alliances go under which groups, at least not in Maritime group.

DonF: Revised structure will facilitate that.

Barb: If we get the notes captured, will help them sort it out. Most people were in discussion, didn't take notes. Have a follow up meeting after that. Want to make changes objectively, be able to iterate that. So, a follow-up meeting to get grounded with group before Don and Pat do a lot of work.

DonF: Have Del look at this too

Barb: How far north and west are we extending this- what's coastal, what's boreal transition?

DonF: Who is the "we?"

Barb: Anybody who was in the group. Or anybody else who wants to join in who wasn't in the original group.

Tina: In Vancouverian, not even happy with the groups- need to resolve. Alliances okay in some cases, but groups don't work for AK

DonL- came up with more questions than answers

Barb- but quite productive: issues were in geographic scope of things at the group level; too broad.

Tina: Already have associations and alliances- need to check that they are correctly lined up.

There is a person (Karen?) who is looking at this; are associations identified, are they showing up. Just for Tongass.

DonF: a rollup, easy enough to bring this in. Must make sure things link within the hierarchy. Plot data separate

Barb: USFS working on fitting their data into the format. Who else do we bring in? Pull in other association data from beyond USFS? We stop at forest boundaries.

DonF: Tongass- plant community types linked to associations in USNVC.

Barb: associations based on potential natural associations, linked to USNVC associations.

Don F: Del has pulled existing tables on this into database. Chugach is missing from this. Can bring summaries into database and have a more complete picture of what's in AK. Can help see what's the most useful alliance/association data. Don't know if we have the capability to pull summaries into database. How feasible is it to bring in the rest of this summary data?

Other sources of information for coastal Pacific: NPS has guides, other agency produced classifications. Heritage website.

Short term: Phone call with coastal pacific group before looking at structure of hierarchy more.

Beth: Prince of Wales mapping, FIA is in planning stage. Kenai map is ongoing.

Work out northern and western extent of area.

APPENDIX III. COASTAL TEAM SUMMARY NOTES

Coastal Discussion Recap (from Lisa Saperstein)

*DonL= Don Long

*DonF= Don Faber-Langendoen

DonL: Recaps Coastal Pacific discussion. Process: assessed descriptions, which had species and spatial distribution info. Then got into alliance/association discussion. Looked at whether same species showing up, either in common or on their own. Used silver fir as an example. Matrix type- western hemlock, G750. Where did it occur with and without Sitka spruce? Refine alliances. Some confusion about western red cedar, seasonal rain forest

Barb: Summer dry spells with 0 precip in some areas; does this make sense for AK? Looking at gradients.

DonL: Mountain hemlock. Is there non-tree islands? Do we need Sitka spruce type at lower elevation? Wooded bog and fen, includes some shore pine. Is it forested or not? W. red cedar, questions about distribution. Became apparent that a lot of these descriptions, legacy; descriptions stretched from OR and WA and smeared northward. Build descriptions from these.

Tina: Bio climatic splits to help differentiate seasonal from rainier part of forest

Barb: Are there objective measures we can employ in AK?

Don L: Vancouverian class seemed to work, but is it appropriate to make another region to better represent AK- Gulf of AK? Finer scale species distributions. Swamp forests, had some trouble with swamp definition. Whole place is wet. Matter of drainage, flooding regime, ephemeral. When you have a range issue, can you start moving alliances and associations, if you're seeing things that aren't in the range? Shore pine G610, in grassland/wetland or forested? Coastal grassland/shrubland- range expands, not necessarily maritime or SE. Maybe should not be in coastal section. Some of bogs and fens could also be W. North America by group level. Shouldn't everything have same regionality applied? But maybe it doesn't work out that way. G354: Shrubs (alder, salmonberry, willow). Some species not mentioned in alliances when we know they are there, but no other real issues. Other than question about whether it's Southcentral or coastal maritime.

Finished up with bogs and fens. Group level had issues- California alliances that didn't fit. Rough, cut and paste. Salt marsh kind of the same. Temperate and Aleutian.

Beth: Mt hemlock not confined to subalpine

Don L: Elevation gradient within the overall range.

Barb: Pat edited in USNVC document, highlighted areas to be revised.

Pat: Ruderal group that people felt weren't appropriate for AK- scrapped it. Also questions about swamp forest. N. Pacific Maritime Swamp Forest- southern part well defined, but not the north.

Barb: Drainage drives alliances and associations. We're very wet- maybe this needs to go to another macrogroup. Should some things be in different category- more mesic, not flooded?

DonL: Maritime vs more montane; some things more relevant to OR or WA.

Barb: Clarify what we are including in coastal. What's not in boreal; make sure we're looking at correct portion of the landscape. They assumed Aleutians are not in the group they focused on.

DonF: Mt hemlock showing up in lower coast… Everything bleeds into something else. Can start splitting a whole lot when you get to transition zones.

Tina: Mt. Hemlock, defined well for SE and into BC, but this as dominant sea level forest type didn't fit. Maritime, but not at upper elevation. Kept going back to definition of group, mesoclimate, diagnostics.

DonF: Wooded bogs. Broader discussion of wetland/upland distinction. Also open wetland vs forested wetlands. Treed bogs and treed fens, esp. stunted, come up in a lot of places. 5 m and above, more closed canopy, forested. *(Missed some of this since I couldn't hear him).* Have to read descriptions to get a sense of what things are, don't just look at name.

Don L: Understory may be better classifier.

Notes From Don Long

Coastal Forest Breakout

11/7/17

Archipelago along the coast (map)

Working from Del's work in Canada

Go over 2010's work; descriptions and species comp for group/Macrogroup

CVC work Canada specific

DeMeo's work in the South

Existing vs Potential Veg approaches in previous classifications

Coastal Correlation – used OR,WA,BC plot data; tabular data from the archipelago; constancy/cover data; Tina: done and peer reviewed; associations are in Biotics and USNVC document

Karen – has done some plot analysis on plant associations for the Tongass based on the spreadsheet

Elizabeth: ESD plot data might be useful; use Nowacki's data and find the Coastal Forest data – (Parker); Tina: Maybe use something like MRLA from NRCS

Barb: Example: DF/Blueberry Association; is this included in the alliance in it's entire range?

How do we deal with peri-glacial types; they are very evident on the landscape

Input:

1B2Nd – Coastal Forests

G241 Silver Fir – very restricted to southern AK; not coming up in Tongass plots; look at name

Mountain Hemlock – usually not with Silver Fir; maybe another group

Alliances checked; how about associations with no Silver Fir; maybe drop associations?

G750 Matrix type; this is the bulk of what's out there; is there a western hemlock association only? w/o sitka spruce?

Transitions to 751 where you pick up western red cedar

G751. Hyper-maritime zone but range excludes Alaska? Maybe move some to G750

A3608 – “possibly southern Alaska”; this listed in another group – G256? Confusion about seasonal rain forest; includes western red cedar

A3611 – range is described as “up to the Kenai peninsula” – absolutely not (Beth)

What is meant by seasonal rainforest?

G245 (= G850) Mountain Hemlock: A3725 is the only Alaska specific type?

Need a non-tree island mountain hemlock type? Or one for just mountain hemlock? Make a new group? Too much emphasis tree island

Move A3724 to G750; might need a type w/ sitka spruce at lower elevations; some of this might be in G256

Species comments

Shore Pine? Where is it? In North Pacific Wooded Bog and Poor Fen (G610) but is less than < 10 tree cover? Could have a forested Group for this?

Western Hemlock ubiquitous with a very wide range

Thuja plicata – drops out of the north end at Prince of Wales

1B3Ng – Swamp Forests

Wide ranging description geographically; maybe more appropriate at the Macrogroup level? And then define a different Group? Does it work at this level? Could Gulf of Alaska be a region?

Benches vs terraces – geologic/geomorphic vs alluvial?

G254 – many of these are out of range. G254 now equals G851

G507 – same issue as previous day; no Alliances listed? Association 7338 works for Alaska in the 3766 Alliance

G256 (= G854)– still having trouble with this “swamp” definition in the context of wetland classification; species mix doesn’t work for Alaska and needs a lot of work; seems to work for the southern end of the range; could pull alliances and associations out for a new Group; skunk cabbage is somewhat diagnostic and seems to make sense; red alder and sitka spruce; looking for pinus contorta somewhere here but not in A3755 - may be in shrub/grassland

2c2Na

G610 Checking on this based on earlier issues with pinus contorta tree groups; description refers to it as a “wetland forested group” so why is it here?

SE is the core of the distribution

Maybe need an alliance that does not have shore pine and out of the south central zone; this may have mountain hemlock and yellow cedar

Coastal Grassland and Shrubland Breakout

M172

G354 Southeast Alaska? Add Gulf of Alaska to this; Should this include the Aleutians as well? Oceanic Arctic? Or focus on Gulf of Alaska only?

Why combine grass and shrub? This really only occurs at the Macrogroup level

A3937 – questions about alnus - ssp fruiticosa and it's distribution

Diagnostic willow species: no glauca; sitchensis should be there

Very alder-centric description; is this OK?

Need an alder-salmon berry alliance; also include copperbush?

Landslide Alliance? Make it more inclusive; but add a floodplain association

G355 Looks good – drop references to balds; delete references to Empetrum

Alliance list looks good – align range to range of groups – species in name are just a portion of the range - what about more calamagrostis? No associations so can't tell if they are in there?

2c2Na – Bog and Fen

G284 Includes California alliances making it more of a Macrogroup level type; pull those out?

G285 Again, split out California – Oregon types out from this group

G499 – Salt Marsh Pull out A 2622, A3899? This one needs some work

<u>Notes From Beth Schulz</u>

Coastal AK

M024. Vancouverian Lowland and Montane Forest (with note "no_edits_needed", but we found a number of needed edits)

G750 – clarify range. Not as far north as Cook Inlet – Prince Wm. Sound, eastern Kenai probably northern extension) But bulk of coastal AK described here (or should be)

Should include the TSHE-THPL-PISI types that DO occur in AK

G751 – as described (seasonal rainforest), does not occur in AK, however, several alliance descriptions range far into AK.

- A.3608 – PISI/RUSP the name sounds like associations we have in AK, but longer description sounds more like PSME important. Hard to make the names more meaningful and less confusing.

- A.3611. TSHE-THPL/VAOV type concept says this may be found on the Kenai Peninsula. It does not! Perhaps include a similar alliance in G750. G750 does mention THPL, and GASH. THPL range in AK is limited to the most southern portions of the Tongass

G245 (now G850) – in Subalpine Macrogroup, only place for Mt hemlock (TSME). However, not all TSME is subalpine. Need another group for non-subalpine. Mt Hemlock is not riparian, either. Maybe alliance under G750?

General misgivings about the term “swamp” in Alaska. G256 (= G854) and alliance A3756 seem to be dumping ground for associations that include skunk cabbage. An indicator of water close to the ground surface, but not “swamp”.

G355 alliances and associations defined - A3947 may refer to wrong species of Castilleja?

M063, G610, A3764 – add another alliance for TSME-CUNO? Mixed forests

To learn more about the U.S. National Vegetation Classification:
Web publication of the USNVC: http://usnvc.org/
Proceedings of the USNVC: http://proceedings.usnvc.org/