Vegetation Associations for Mapping Pacific Northwest National Parks

Eric Mors Nielsen*, Matthew T. Lee, Rachel L. Brunner & Tynan Ramm-Granberg

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* Corresponding author; contact at earthlingsupportsystems@gmail.com

Acknowledgments

The classification presented here evolved from that of Crawford et al. (2009). Many of our classes are brought over verbatim from that document, and most of the others were created by making only slight changes or recombinations of its elements—adjustments that were possible only with the context provided by many thousands of vegetation plots collected in the years since its publication. The lead author of this report has learned a lot about Pacific Northwest vegetation by studying it. So first thanks go to that publication's authors: Rex Crawford, Chris Chappell, Catharine Copass, and Joe Rocchio.

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Introduction

Background

This vegetation classification applies to the three most prominent parks in the U.S. National Park Service North Coast and Cascades (NCCN) region: Mount Rainier, North Cascades, and Olympic National Parks. The classification builds on a previous classification project described by Crawford et al. (2009). One of that classification's stated major purposes was to "provide a platform for future National Park Service vegetation mapping at all three parks." The vegetation mapping effort for the three parks, which was completed in 2021 (see Nielsen et al. 2021a-c), relied on training field data which was collected using Crawford et al. (2009) as the primary reference for assigning field calls to plots. Early drafts of those maps indicated that significant map accuracy problems were resulting from the difficulty of confidently and consistently assigning plots to the approximately 390 vegetation associations described in the classification. Heterogeneity within the set of training plots assigned to each individual association also contributed mapping errors of comparable magnitude. Earlier in the project, we had assumed that the process of aggregating associations into map classes would mitigate these sources of error, but we found that was not the case. The uncertainty in field association calls and the heterogeneity within associations penetrated through to the map class level, making the production of maps meeting accuracy standards using any reasonable map class definitions impossible.

We addressed these challenges—retrospectively, after field training data had been collected—in two related ways. First, we developed floristic analysis tools that took advantage of full plot floristics[1] to assess the fit between a given plot and the multivariate floristic characteristics of all associations for which data had been collected. This allowed us to move away from reliance on the dichotomous keys in Crawford et al. (2009) and replace them with a more robust means for determining an appropriate call.[2] Second, we made modifications to the classification itself as needed to produce reasonably homogeneous groupings that could be rolled up into mappable classes. The main vegetation mapping reports (Nielsen et al. 2021a-c), referred to henceforth as *mapping reports*, contain much more detailed information about these processes.

For the remainder of this report and in the association descriptions themselves, the resulting homogeneous groups, or *mapping associations*, will be simply referred to as *associations*, while the original Crawford et al. (2009) associations will be referred to as *C09 types*. The strategy we used of empirically defining the mapping association cores with reference to the floristic characteristics of the plots that had been assigned to the original C09 types allowed us to evolve the classification in a gentle manner, preserving as much as possible of its original essence.

It should go without saying that the fact that we needed to make significant changes to the classification in order to achieve map accuracy targets in no way reflects poorly on the original classification. First and foremost, that work did not have creation of a mappable classification as its primary goal; rather, it focused on completeness and applicability at any spatial scale. But we also had several major advantages in constructing this variant. We had nearly five times as many full floristic plots as were available at the time of the previous work, all of which were acquired with a stable field sampling strategy and highly experienced crew members, most of whom returned for multiple seasons. We had samples representing all parts of the three parks (the east side of NOCA, in particular, was poorly sampled prior to the collection of map training data). We had access to the accumulated knowledge of several long-time field staff who had visited many of those plots and had shared many field, trail, and camp hours reflecting on the challenges presented by Pacific Northwest vegetation. Finally, we had spatial data layers and modeling techniques available to assess the mapping affinities of plots in order to provide guidance in resolving ambiguous floristic situations.

Although they share many common attributes, this work differs fundamentally from Crawford et al. (2009) and its recent revision, Ramm-Granberg et al. (2021). Those variants of the classification focus on fully representing the diverse ecosystems present and on making that information compatible with the U.S. National Vegetation Classification (2023). The variant represented here focuses instead on creating a representation of that classification which, rather than complete, is mappable at high accuracy. Two important requirements for this work flow from that goal. The first is that all elements of the classification be statistically well-defined and coherent. In order to achieve that requirement, we took the liberty of aggregating some rare vegetation types that are undoubtedly ecologically distinct at fine spatial scales but were clearly linked for our practical purposes. The second requirement is that types be distinguishable on the ground by map users, who may not always be regional vegetation ecologists. We found that consistent recognizability of the mapping types on the ground poses by far the biggest challenge to creating a successful map of reasonably detailed ecological units in a region with strong yet continuously varying environ-

[1] We modified field data collection protocols in late 2008—still early in the map training data collection process—to begin collecting reasonably complete floristic information. This allowed us to revisit and refine plot level calls later, and provided a wealth of data for adaptation of the classification itself.

[2] Although the key cautioned that "the key is not the classification," the information provided in the association descriptions was often simply too general and ambiguous to allow reliable and repeatable assessment of the degree of fit between a plot and the described association.

mental gradients such as the Pacific Northwest. Therefore, we have used a strictly statistics-driven approach emphasizing community floristics and (secondarily) structure, and attempted to provide tools to work with the classification in the field. Anyone with a reasonable background in Pacific Northwest botany should be able to successfully use this document (at least, that is the goal). Again, in constructing the classification with this goal, we have necessarily glossed over some of the fine details, and with them, perhaps much of the unique characteristics that makes special places special. Such are the sacrifices we make for a pixel-based map. Interestingly, we found that a strongly floristically-driven process, provided it follows the full community floristics rather than putting too much emphasis on a few key species, appears also to be a very good route to achieving high map accuracies.

Purposes of this document

The primary purpose of this document is to support the mapping reports and to assist in the interpretation, use and maintenance of the maps. It describes the changes that were made to the association-level classification in order to accomplish the mapping project. It also describes the associations themselves, providing a much more detailed look at the specific vegetation components that together make up each of the classes that were mapped. One stated purpose of the vegetation maps was to provide a reference baseline to which the vegetation of the future might be compared. As far as future changes involve structural modifications to the character of vegetation occupying a site, they may not be difficult to observe. More subtle changes involving shifts in floristics (e.g., due to changing species distributions) are likely to be more challenging to assess; this document may be useful in those cases as a guide to the patterns observed in these parks in the early twenty-first century.

A secondary purpose is to synthesize the knowledge gained from the many thousands of plots collected during the project, describing not only the floristics and physiognomies of the associations, but also the spatial patterns and environmental covariates of floristic variation, making use of spatial data we assembled from topographic, hydrologic, and first-return lidar data. Hopefully this synthesis provides some meaningful extension to the information conveyed by Crawford et al. (2009). The field plot dataset that was developed during the course of this project is truly impressive, and holds great value for addressing any number of ecological and conservation questions going forward. Hopefully this document can serve as a sort of an advertisement for that dataset.

A final purpose of the document is to provide a resource for future fieldwork and vegetation mapping efforts in the Pacific Northwest. The focus in the presentation of the association descriptions has been kept on maximizing their utility, reliability, and clarity for field use. The circumstances of such field use might involve use by NPS personnel in engaging in assessments, updates, or extensions to the 2021 maps, or they might involve use by other researchers developing mapping or classification projects in other parts of the region. Please feel free to contact the lead author to discuss if you are inclined!

Study area

The following brief descriptions of Mount Rainier, North Cascades, and Olympic National Parks are excerpted from the mapping reports. Those reports contain more detailed information about the vegetation, and Crawford et al. (2009) contains extensive descriptions of the setting, geology, climate, soils, hydrology, history, and vegetation of the parks.

Mount Rainier National Park (MORA) encompasses the active stratovolcano Mount Rainier, the highest mountain in the Cascade Range (4,392 meters; 14,410 feet). The mountain hosts some 90 km^2 of glaciers, including both the largest and the lowest terminal altitude glaciers in the contiguous United States (Riedel and Larrabee 2011). The park also includes extensive montane old growth conifer forests, luxuriant meadows and subalpine parklands and austere alpine plant communities developed on pumice deposits. Several major rivers originate from glaciers and emerge from the park: the Carbon River from the northwest, the White from the northeast, the Ohanapecosh and Cowlitz from the southeast, the Nisqually from the southwest, and the Puyallup from the west. The valley of the lower Carbon supports an inland temperate rainforest similar to forests on the Olympic Peninsula. The east side of the park, and especially the northeastern quadrant, lies in a rain shadow cast by the mountain itself. Reduced precipitation and geologically recent pumice deposits there (see Crandell 1969) result in distinct vegetation communities, especially in the alpine and subalpine zones. Elevations in the park range from 460 meters (1,500 feet) to the mountain's summit.

North Cascades National Park Complex (NOCA) is comprised of three units: North Cascades National Park, Ross Lake National Recreation Area (RLNRA) and Lake Chelan National Recreation Area (LCNRA). RLNRA mostly hosts lowland conifer and broadleaf forests, while LCNRA also includes dry montane and subalpine habitats. The National Park itself is mostly characterized by montane and subalpine coniferous forests and woodlands, subalpine and alpine meadows and shrublands, steep rocky peaks, glaciers and other permanent snow and ice. The entire landscape has been extensively shaped by both alpine and continental glaciation, as well as by major rivers, including the Skagit, Nooksack, Baker, Cascade and Stehekin. The upper Skagit River was drowned beneath Diablo Lake and Ross Lake reservoirs, but Lake Chelan, fed by the Stehekin, is a naturally occurring lake whose great depth was increased only slightly by damming. The east side of the complex lies in an intense rain shadow cast by the

mountains to its west; this results in quite distinct vegetation communities, especially in LCNRA where elevations are quite low. Elevations range from 110 meters (350 feet) to well over 2,750 meters (9,000 feet).

Olympic National Park (OLYM) combines a narrow coastal strip of wilderness along the Pacific Ocean, lush lowland river valleys with temperate rainforest, and a mountainous interior with extensive subalpine and alpine habitats. Ten major rivers radiate from the central core of the park, anchored by Mount Olympus (2,428 meters; 7,966 feet). The Elwha River flows north through the park interior for 58 kilometers (36 miles), collecting water from many of the highest peaks. The Bogachiel, Hoh, Queets and Quinault drain the west side, where a cool and moist maritime climate extends far up the valleys, supporting temperate rainforest and marked by frequent coastal fog. The Dungeness, Dosewallips, Duckabush and Skokomish flow east, and the Wynoochee runs south. The northeast section of the park, east of the Elwha, lies in an intense rain shadow cast by the mountains in the central core. Conditions are much drier and vegetation communities are quite distinct from the rest of the park, bearing some resemblance to those of the eastern Cascades. Elevations in the park range from sea level to the summit of Mount Olympus.

Methods

Data collection & plot quality control

A total of 4,110 plots which included reasonably complete species observation data (*full-ocular plots*) were collected between 2005 and 2015. The sampling effort at NOCA and OLYM were approximately similar, but less than half as many full-ocular plots came from MORA as from either of the other parks. This was due to the fact that the primary MORA field effort occurred before the emphasis placed on documenting species observations was increased in late 2008. The full-ocular dataset provided floristics statistics for the C09 types and for the mapping associations as they developed. The association-level calls for all 5,799 plots used as training data for vegetation mapping were evaluated on the basis of their fit to the full-ocular floristics information, as well as their modeling affinities. The evaluation metrics were used to prioritize plot quality control efforts. The mapping reports contain detailed information about the field sample designs, field protocols, floristics evaluation tools, and plot quality control methods used.

Taxonomic treatment for floristic analyses

The following paragraphs are taken in whole from the mapping reports. Refer to those reports for related details and to the taxonomic tables provided with the reports (INR 2021) for lists of all sub-genus groups (*SCM taxa*, in the following) and for a complete review of the taxonomic name changes made to update our treatment to Hitchcock and Cronquist (2018).

> Plot-level species lists were used in all phases of this project. They were the primary source of data we used to assign plots to associations, to rework the mapping associations and form the map classes, and to describe the associations and map classes for users. However, the level of floristic detail captured varied by observer, collection effort, time of year and weather conditions, especially for uncommon, cryptic and ephemeral taxa. Additionally, the number of observations of many less common species fell short of the sample sizes needed to generate reliable statistics. To address these issues, we aggregated rarer species into groups to increase statistical strength and took other steps to reduce variability in floristic detail across plots. We defined a set of analysis taxa in which common and readily identifiable species were treated at species level, while less common or troublesome (cryptic or otherwise difficult) taxa were treated at genus level or as intermediate sub-genus groups defined by lumping species with similar habitats. Some infrequently observed taxa were dropped entirely from analyses involving plot-level comparison.
>
> Troublesome species found in the field were often identified at the genus level. Because our floristic analysis presupposed that the same taxonomic units were used across all plots, leaving these records at genus level would have required lumping the genus and sacrificing the species-level data collected across all other plots. To avoid this, we worked to link genus-level observations to a more specific taxon, particularly for common genera associated with diverse habitats. We accomplished this by creating sub-genus species groups with similar overall morphology, habitat requirements, distributional data and community affinities. We then assigned genus-level field records to the sub-genus groups based on the weight of evidence at plots (e.g., elevation, topographic position, species co-occurrence matrices). Other less common species and genera were lumped to either the sub-genus or genus level, in order to gain necessary sample sizes for analysis.
>
> Species of *Carex* and *Salix*, which are key indicators of several vegetation types, required the most attention. In these widespread yet difficult genera, the group formation process focused primarily on morphology and habitat requirements. As an example, unknown dwarfed alpine willows were coded as *Salix nivalis+*, which was defined to include *S. nivalis* as well as *S. petrophila* and *S. cascadensis*. This entailed losing the distinction between the three alpine species, but we deemed that far preferable to combining all of them with unlike lower elevation species such as *S. commutata* and *S. sitchensis*. Other genera, in which species were less clearly sortable by morphology and life zone, were treated primarily based on species affinity data, using the full plot database to develop co-occurrence relationships and sub-generic groupings.[3] Finally, some species that were often confused by field crews were also lumped (e.g., *Juncus parryi* and *J. drummondii* were lumped as *J. parryi+*).
>
> Across 49 genera, 73 distinct sub-genus taxa were created in this manner, with genus-level occurrences assigned downwards to them and species-level occurrences lumped upwards into them. 65 other genera were treated at the genus level, lumping species-level occurrences up. These taxa, in addition to the species treated at species level, are cumulatively referred to as *SCM taxa*. **Table 2** in INR (2021) identifies the SCM taxon used for each field-identified

[3] For example, we treated the genus *Arnica* as three taxa for analysis: a sub-genus group *A. latifolia+*, containing *A. latifolia*, *A. longifolia*, and a taxon identified in the field as *A. alpina*; another sub-genus group *A. mollis+*, containing *A. mollis*, *A. parryi* and a taxon identified as *A. amplexicaulis*; and a distinct species *A. cordifolia*. Genus-level records were assigned to one of the three based on species co-occurrence data.

taxon.[4] Prior to publication, plant nomenclature was updated to match Hitchcock and Cronquist (2018); the resulting name changes are documented in **Table 1** of INR (2021).

Species cover match tool

The following paragraphs are taken in whole, with minor redactions for clarity, from the mapping reports.

> Associations, and the map classes we developed from them, are defined [primarily] by their floristics [and] their physiognomic structure. We developed a tool called *species cover match* (SCM) to provide a quantitative representation of the degree of fit of a plot to the floristic and (to a lesser extent) structural aspects of a class, and to flag plots that were outliers within the class to which they were assigned. Generally, these resulted from field crews having encountered vegetation communities that had not been treated in Crawford et al. (2009), from mixed species lists due to heterogeneous plots combining multiple vegetation patches, from artifacts relating to hard breaks in the keys, or from differing crew interpretations of how significantly to weight different components of the association descriptions.[5]
>
> SCM used the R **vegclust** package (De Cáceres et al. 2010) to compute the multivariate floristic distance of each of the... full-ocular plots from the centroid of each class, as defined by the plot labels.[6] In order to more closely align the analysis with the emphasis on vertical stratification in the NVC, we weighted the cover values of each SCM taxon by a lifeform-specific[7] multiplier, applied to the transformed and standardized cover values.[8] To approximate the emphasis on vegetation structure in the NVC, we calculated total cover for each lifeform and for all vascular vegetation,[9] and incorporated those in the analysis as if they were additional taxa.

Classification revision approach

The following paragraphs are taken in whole, with minor redactions for clarity, from the mapping reports. The reports also provide examples of the application of these methods. Few of the changes made to the classification were direct or intentional; rather, they mostly evolved organically through reassignments made at the plot level. For this reason the resulting associations are best seen as refinements of the C09 types rather than as constituting an independent classification. The mapping reports contain additional details for how assessments of environmental and imagery-based modeling fit were combined with floristic analyses to refine plot calls, and indirectly the classification itself.

> Early drafts of the vegetation maps were based, with minor adjustments, on the vegetation alliances defined by NatureServe (2012), which in turn were based on the C09 types. Model error rates and preliminary comparison of draft maps from MORA (in 2011) and OLYM (in 2013) to independent accuracy assessment data indicated that the maps were falling well short of accuracy goals. It became evident through working with the training plots that making field calls based on dichotomous keys had resulted in a noisy dataset that may not always have correctly responded to the intentions of Crawford et al. (2009). In some portions of the classification, the associations—as defined by the groups

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[4] Henceforth in this report, both actual taxonomic species and the sub-genus groups defined here may be referred to simply as species, for simplicity.

[5] For example, the description for the *Alnus rubra/Polystichum munitum* association stated that "the herb layer is always dominated by *Polystichum munitum*," and also that it "occurs on upland slopes" and "is [a] result of succession after [disturbance]." On encountering a plot on an upland slope initiated by disturbance that lacked *Polystichum munitum* dominance but otherwise matched the description, some crews would emphasize the setting and decide it was a good enough match, while others would put more emphasis on the insufficient *Polystichum munitum* and choose another alternative. Since the key required 5% or more cover of *Polystichum munitum*, that might often have been used to resolve the question. Using the full species list to make these decisions results in many fewer such ambiguities.

[6] For this analysis, we transformed percent cover via a modified exponential equation (resulting in rapid changes of the transformed value in the indicative 2–10% cover range) to mimic breaks in the original association keys and allow the multivariate data-driven results to maintain as much compatibility with the keys as possible. We then standardized with respect to the mean and standard deviation of each species across all plots.

[7] We assigned all taxa to the following lifeform categories: broadleaf tree, conifer, tall shrub, standard shrub, dwarf shrub, forb, grass, sedge, rush, fern, fern ally, bryophyte and lichen (see INR 2021).

[8] We used a multiplier of 2.0 for conifer and broadleaf tree species, and 1.5 for tall and standard shrubs. All other lifeforms had a multiplier of 1.0. In order to give more weight to taxa that were instrumental in defining the C09 types, the multiplier for each SCM taxon was increased from its lifeform default proportionally to its maximum constancy in any mapping association, up to a maximum of 0.5 for taxa that were always present in an association.

[9] For purposes of lifeform totals, broadleaf trees and conifers were split into two vertical categories, GT5 (height over five meters) and LT5 (height less than five meters, or regen). Lifeform and total vascular cover were transformed using a sigmoidal curve to emphasize change in the region of 10% cover, in keeping with treatment of these thresholds in the original association keys.

of plots assigned to them—lacked the needed floristic cohesion to support repeatable field identification and accurate mapping.

We used the cumulative dataset to enhance the classification for floristic consistency and mapping purposes, creating a set of mapping associations. Despite their differences, the NCCN parks share many dominant plants and plant communities. We took advantage of this commonality, so each park benefitted from plots collected across the network.

We began by reviewing full-ocular plots with SCM. Plots that were significantly more similar to a different C09 type than that to which they were assigned were examined to determine why their floristics differed from expectations. We checked field photos, plot descriptions, imagery and environmental setting, and changed the call to the type suggested by SCM if the balance of evidence supported that. For classes that were strongly defined by their vegetation structure (e.g., krummholz), we were more lenient in allowing floristic outliers to persist.

The process was applied iteratively: as plot QC continued, the analysis was occasionally updated, tightening the floristic groupings as the number of outliers was reduced in each cluster. In this manner, we refined the associations while minimizing changes to their essential character. SCM was also used to suggest a best call at plots for which no confident call had been previously made.

General summary of classification changes

Elimination of C09 types

The classes represented in the NCCN vegetation maps were constructed by aggregating association calls into mappable and meaningful groups, so reasonable homogeneity at the association-level was of great importance. We examined the lumping of plots into all heterogeneous C09 types, especially those with constituent plots showing affinities with different map classes. Very often, a core group of plots could be identified and the heterogeneity was addressed by simply reassigning outlier plots to alternate types with which they exhibited a better multivariate fit, relying on the SCM tool. However, no core group could be identified in some heterogeneous C09 types. These types were eliminated and dissolved into existing types, or split into two new associations with very different characteristics,[10] or occasionally returned to a plot bucket were they were reclustered *en masse*. The eliminated types fell into several main categories:

- Types named and defined based on the presence of a single species, regardless of other vegetation found in the near surroundings.[11] These types typically attracted a heterogeneous mix of plots with little in common other than the presence of the species in question. Perhaps this could have been avoided had additional identification guidance been given. Plots assigned to these types were reassigned to other associations, making use of the full species composition information. In a few cases, several more homogeneous single-species C09 types with overlapping affinities were merged.
- Types distinguished from others based solely on total vegetative cover, either cumulative or in a single layer.[12] Here, as elsewhere in the key, we found that breaks based on observer assessments of whether cover thresholds were exceeded were unreliable. We found that a multivariate approach to classification gave more consistent results and served as a much more reliable foundation for mapping.
- Types that were excessively heterogeneous in species composition, occurring in a variety of settings.[13] Because of their tendency to overlap multiple map classes, it was necessary to eliminate these associations or both map class identifiability and accuracy would have suffered greatly.
- Types which had grown across the course of field sampling to encompass two or more clearly distinct groups of plots, due to previously undiscovered regional variation, idiosyncrasies in the key, lack of viable alternatives, or other causes.

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[10] The best-fit association for individual plots and the assignment of plots to associations split from an existing type were conducted using a cluster assessment process based on the same algorithm and parameters that were used in the reclustering process described below.

[11] Most plots assigned to these calls were small and represented a localized patch of the species in question. Generally these patches did not correspond to any meaningful landscape pattern, but simply reflected the stochastic dispersal and establishment processes of the single species, superimposed on a variety of background vegetation types.

[12] Examples from Crawford et al. (2009) are the C09 types labeled as "bryophyte and lithomorphic sparse vegetation," keyed under a break based on the total vascular cover, and the three depauperate understory forest associations, keyed on overstory species and low understory vascular plant cover.

[13] These agglomerations of disparate plots—termed *catch-alls* by field crews—typically appeared to result from key artifacts. They were recognized by their tendency to model with a variety of map classes, depending on the other vegetation present in addition to the species on which the key had focused.

- Finally, types with fewer than two full-ocular plots.[14] In general, we aimed to produce empirically-driven clusters of plots to which the similarity of other plots could be assessed. An estimate of the internal floristic variability of each association was needed in order to assess its distinctness from neighboring clusters. Several associations with no good plots found during the duration of fieldwork were eliminated from our analysis and are not discussed here. The map training fieldwork was fairly comprehensive; associations occurring in substantial amounts in the NCCN—outside of extremely inhospitable and rarely visited habitats, at any rate—should have been found.

Evolution and renaming

At the conclusion of field sampling, before plot quality control was undertaken, floristics analyses revealed that the species composition across the plots assigned to many of the C09 types no longer closely resembled that described in Crawford et al. (2009). In most cases this was likely a consequence of those descriptions having been based on small sample sizes. In other cases it may have resulted from failures in the association key. The fact that substantial mismatch between our plot dataset and the C09 type descriptions was present from the beginning was the primary motivator for the empirical outlier analysis process we used to coax the dataset into a more stable state. Rather than trying to evaluate the assignment of plots against the Crawford et al. (2009) descriptions, we chose to use the greatly enhanced sample sizes and geographic representativeness present in the mapping plot dataset to our advantage.

As problematic types were dissolved and their plots were reassigned to their best-fit associations, it is possible that these associations evolved in character, even beyond their initial distinctiveness from the C09 types. For whichever reason, it is likely that many of the resulting associations reflect a somewhat different floristic concept than described in Crawford et al. (2009). We renamed any associations for which a stable core had not carried over from the C09 types, in order to avoid confusion with the previous classification.

A few more stable C09 types whose names were deceptive enough to result in frequent confusion during the QC process were also renamed to better reflect their NCCN composition. In addition, the words “sparse” and “lithomorphic” were eliminated from all associations, to make clear that association calls are not determined based on total cover. Despite this, total vascular vegetative cover is still used as a piece of evidence as to the correct call.

Creation of new associations

Several groups of C09 types had become badly tangled in the field plot dataset, with multiple types lacking a core group of plots substantive enough to empirically guide other similar plots toward them. In this situation we fell back on reclustering the constituent full-ocular plots. Groups of C09 types that were addressed in this way included non-forested wetlands, shrublands of talus slopes, avalanche chutes and riparian areas, seral post-fire shrublands and dwarf shrublands, dry shrublands (mostly at NOCA), dry subalpine and alpine meadows (especially at MORA), and conifer *krummholz*.

We clustered all plots assigned to the selected types using the R **vegclust** package (De Cáceres et al. 2010).[15] Before clustering,[16] we applied a logarithmic transformation to the species cover data: ln(cover% + 1). This transformation strongly emphasizes the distinction between absence and presence at low cover values, as well as responding strongly in the critical cover values where a species becomes prominent, well-developed and codominant—all distinctions that were important in describing the C09 types—while de-emphasizing the differences between cover estimates at the higher end, where crews often produced widely varying estimates.

We normalized the log-transformed cover data by site using the chord transformation (Legendre and Gallagher 2001), as recommended by De Cáceres and Wiser (2017). We felt that normalization by site was appropriate because we believe that the observer estimates of relative species abundance were much more consistent than those of absolute abundance. In addition, in many PNW settings (particularly non-forests), the total vascular plant cover even within a consistent ecological community appears to vary considerably over fine spatial scales.

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[14] Most of these had been included in Crawford et al. (2009) based on literature from areas adjacent to the NCCN parks. We retained one association with only one plot, *Populus tremuloides/Cornus nuttallii*, because of its distinctiveness and the apparent species range limitation that prevents it from being more widespread in the parks.

[15] We log-transformed raw percent cover data for each SCM taxon and normalized across sites using the **decostand** function in the R **vegan** package (Oksanen et al. 2019) before using k-means clustering in **vegclust**. We experimented with the number of output clusters until the results captured a similar level of detail to that used elsewhere in the classification.

[16] Rare species had already been treated by aggregating them into SCM taxa or to the genus level; see the mapping reports and INR (2021) for more information. One species with just three observations entered the clustering analysis; three species and one genus had only four observations. All other taxa in the site-by-species matrix had five or more occurrences.

We used k-means clustering to break the group of plots into a target number of clusters. We experimented with fuzzy c-means and noise clustering methods, but observed insufficient improvements in results to justify the expense of the additional complication.[17] In general, we selected the same number of clusters to be output as the number of C09 types that we put into the process. We did this because our intention was not to alter or fix the classification, but simply to restore ecological order to a confused set of plots. If some of the input types seemed like catch-alls, we decreased the number of output clusters corresponding. In other cases, input types were clearly composed of multiple distinct variants; in these cases we increased the number of output clusters.

The output clusters were examined carefully before accepting the results. We reviewed the structure of output clusters with reference to outlier plots, and checked the plots nearest to the centroid of each cluster to verify their structure and ecological setting matched the expectations established by the floristics of the cluster as a whole. We reviewed the species with the highest cover and highest constancy in each cluster, and the most effective discriminating indicator species for discriminating between clusters, to make sure they matched our intuitive understanding of the compositional gradients within the group. We also reviewed the dispersal of the input C09 types into the output clusters to make sure the solution addressed the confusion we had observed, while preserving many or most of the overall association concepts from Crawford et al. (2009). Only if all these checks indicated the results were reasonable did we accept the results.

Often, the clustering procedure resulted in vegetation associations similar to the C09 types, essentially rediscovering the underlying concepts beneath the statistical noise accreted on to them during years of field sampling. In these cases, we kept or only slightly modified the C09 type names. This process could be regarded as a simple extension of that used in the plot-level reassignments discussed above, and in fact the same statistical distance metrics and **vegclust** parameters were used to conduct those assessments.

For some groups, the clustering procedure produced conceptually new associations. In these cases, we chose association names based on vegetation structure and species constancy and cover, and hand-assigned classes to floristically borderline plots based on their structure and setting. The groups of C09 types that were significantly altered by reclustering are shown below. They are shown in the chronological order in which we did the work. In a few cases temporary types resulted which were then fed into a later reclustering procedure before finally being resolved; these are noted. When inspecting the input C09 types for the treatments below, recall that reclustering of types was done only as a last resort. Some related types that might otherwise have been included were resolved prior to this step in other ways.

Sorbus–Spiraea–Vaccinium–Xerophyllum complex

- Input types: SORSIT/PHYEMP-VACDEL, SPISPL, VACDEL, VACDEL-FESVIR, VACMEM, VACMEM/VACDEL, VACMEM/XERTEN, VACSCO, VACSCO/FESVIR, XERTEN
- Output associations: [170] SORSIT/VACDEL-PHYEMP, [171] SORSIT-VACMEM/VALSIT, [172] SPISPL/CARSPE, [209] VACDEL-FESVIR, [211] VACMEM/PAXMYR-VACSCO-CARGEY, [212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, [213] VACMEM/XERTEN, [214] VACSCO-FESVIR-ARECAP

Dry shrub complex (mostly NOCA)

- Input types: ACECIR, ACECIR-(HOLDIS), ACEMAC/ACECIR (a field call used at NOCA), ACEMAC/PAXMYR, ACEMAC/SYMALB, CEAVEL, SALIX-ACEGLA (a field call used at NOCA), some former ALNVIR-ACECIR plots
- Output associations: [035] ACECIR/GALIUM-(POLMUN), [038] (ACEMAC)/ACECIR-PAXMYR, [043] ACEMAC-PSEMEN/SYMALB/OSMBER, [078] CEAVEL-(SPIBET)/CALRUB, [130] PRUEMA-AMEALN-CEAVEL/MAIRAC, [165] SALSCO-SORSCO-AMEALN/PAXMYR, ACEMAC/RUBPAR-(CORSER)/(MAIRAC) (temporary type)

Rare or ambiguous non-tree wetlands

- Input types: CALCAN, CAREXS, CARUTR, CARAQD, CARNIG, KALMIC-CARNIG, CALLEP, CARAQU-(CARNIG)-CALLEP, CAROBN, DANIN, ERIANG/SPHAGN, LEDGRO-KALMIC/SPHAGN, LEPPYR, MALFUS, MENTRI, MIMLEW, MYRGAL/CAR(AQUD,UTR), NUPLUT, PETFRI, SAL(HOO,SIT)-SPIDOU, SALCOM, SALSIT, SCIMIC, SPIDOU, SPIDOU/CARAQUD, SPISPL/CARLEN, TRICAE
- Output clusters: [070] CARAQU-(MENTRI-EQUISETUM), [071] CARNIG-CARLEN-(CALCAN), [072] CAREX-CALLEP-(LEPPYR), [073] CARNIG-KALMIC-(VACDEL), [074] CARNIG-LUEPEC, [163] SALCOM/CAREX-(LEPPYR), [164] SALCOM/VALSIT, [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), [169] SAXTOL-LUZPIP-(CARNIG), [174] THUPLI/LEDGRO/CAROBN/SPHAGN, [179] TRICAE-DODJEF, CORSER-SALSIT (temporary type), SALSIT-ALNVIR/CHAANG-HERMAX (temporary type).

[17] Another technique, hierarchical clustering, was not appropriate in this case because we had carefully selected the plot subsets for clustering and neither expected nor desired any hierarchical structure in the results.

Acer–Salix sitchensis complex

- Input types: ACECIR/ATHFIL-TOLMEN, ACEMAC/MAISTE, ACEMAC/RUBPAR-(CORSER)/(MAIRAC) (temporary type), CORSER-SALSIT (temporary type), SALSIT-ALNVIR/CHAANG-HERMAX (temporary type).
- Output associations: [166] SALSIT-(CORSER)/URTDIO, [134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, [037] ACECIR-OPLHOR/ATHFIL, [034] ACER-CORSER/(PTEAQU), [039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM

Callitropsis in avalanche tracks

- Input types: CUPNOO/OPLHOR-(ALNVIR), CUPNOO/STRLAN
- Output associations: [082] CUPNOO-(VACMEM)/PAXMYR, [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON

Antennaria lanata plots (northeast MORA, especially Grand Park)

- Input types: ANTLAN, DANIN
- Output associations: [091] FESVIR-LUPARC-(ANTLAN-POTFLA), [059] ANTLAN-(OREALP-VACDEL)

Krummholz

- Input types: KRUMM ABILAS, KRUMM CUPNOO, KRUMM TSUMER, PINALB
- Output clusters: [020] ABILAS-(PINALB)/JUNCOM_KRUMM, [205] TSUMER-ABILAS/PHYEMP_KRUMM.

Results

Resulting associations

A total of 218 mapping associations present in the three parks resulted from the plot quality control and classification revision process. The full-ocular plot dataset describes most of these associations very well (**Table 1**).

Table 1. Number of vegetation associations by number of full-ocular plots sampled.

# PLOTS DOCUMENTED	# ASSNS
1	1
2–3	8
4–6	29
7–10	49
11–20	67
21+	64
ANY	218

Table 2 shows the number of associations in each of six lifeform categories which were documented as present in each of the parks. Over half of the described associations are dominated by tree-form conifers. Herbaceous-dominated vegetation types are the second most diverse lifeform category, judging by number of associations. Each park lays claim to a lifeform specialty: OLYM has the widest range of conifer forest associations, while NOCA has more tall shrub and herbaceous types than the other parks, and MORA has the widest variety of dwarf shrublands. MORA is notably less diverse in conifer and especially in broadleaf tree-dominated groups.

Table 2. Number of vegetation associations by park and dominant lifeform.

	DOMINANT LIFEFORM						
PARK	**conifer tree**	broadleaf tree	tall shrub	shrub	dwarf shrub	herbaceous	ALL
MORA	62	9	11	9	9	27	127
NOCA	71	16	18	8	7	32	152
OLYM	84	15	12	9	5	25	150
ALL	112	24	20	11	10	41	

Table 3 shows the number of associations associated primarily with each of the six elevation-based life zones which were documented as well-established in each of the park geographic regions (see the descriptions of these regions below, and the lists of associations known from each of the fifteen park regions in the Guide to use section).

Table 3. Number of vegetation associations by park region and life zone.

	PRIMARY LIFE ZONE						
PARK REGION	coastal	lowland	lower montane	upper montane	subalpine	alpine	ALL
MORA-nw	0	12	10	8	8	5	43
MORA-ne	0	3	7	8	21	8	47
MORA-sw	0	16	12	9	12	3	52
MORA-se	0	11	8	10	16	4	49
NOCA-nw	0	17	11	6	7	5	46
NOCA-ne	0	26	9	6	9	3	53
NOCA-cw	0	9	7	2	5	4	27
NOCA-ce	0	6	7	4	3	2	22
NOCA-s	0	15	10	12	23	2	62
OLYM-nw	7	2	0	0	0	0	9
OLYM-nc	0	24	10	7	14	3	58
OLYM-ne	0	13	8	3	22	9	55
OLYM-sw	13	8	0	0	0	0	21
OLYM-sc	0	15	6	4	8	4	37
OLYM-se	0	16	13	6	11	3	49
ALL	14	84	29	26	49	16	

Modifications to C09 types[18]

- ABIAMA/MENFER was eliminated due to heterogeneity. Plots wound up in [001] ABIAMA-CUPNOO-TSUHET/VACALA, [186] TSUHET-ABIAMA/VACALA/RUBPED, [008] ABIAMA-TSUHET-(PSEMEN)/VACALA and other associations.
- ABIAMA-(PSEMEN)/ACHTRI-TIATRI was eliminated due to heterogeneity. Plots wound up in [003] ABIAMA-PSEMEN/ACHTRI, [187] TSUHET-ABIAMA/VACALA/TIATRI, [009] ABIAMA-TSUHET/RUBPED-TIATRI and other associations.
- ABIAMA/RUBSPE-VACALA evolved into [010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL.
- ABIAMA-TSUHET/dep was renamed [007] ABIAMA-TSUHET/ORTSEC to provide some floristic guidance. A fair number of plots assigned to this wound up in [008] ABIAMA-TSUHET-(PSEMEN)/VACALA.
- ABIAMA-(TSUHET)/VACMEM evolved into [004] ABIAMA-PSEMEN/VACMEM.
- ABIAMA-(TSUHET)/VACMEM-VACALA evolved into [001] ABIAMA-CUPNOO-TSUHET/VACALA.
- ABIAMA-TSUMER/STRLAN evolved into [013] ABIAMA-TSUMER/VACMEM/ERYMON.
- ABIAMA-TSUMER/VACMEM/RUBLAS evolved into [012] ABIAMA-TSUMER/VACMEM.
- ABILAS-(ABIAMA)/MENFER was eliminated due to heterogeneity. Many plots assigned to it remain ambiguous.
- ABILAS-(ABIAMA)/VACMEM/VALSIT evolved into [015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT.
- ABILAS/ERYMON evolved into [029] ABILAS/VACMEM/ERYMON; name changed to reflect prominence of shrub layer.
- ABILAS-PICENG/VACSCO evolved into [018] ABILAS-PICENG/VACMEM/VACSCO-ARNLAT.
- ABILAS-PSEMEN/CALRUB was eliminated; the single plot was a good match to [026] ABILAS-(PSEMEN)/VACMEM/CALRUB.
- ABILAS/RHOALB abbreviation did not agree with its name; changed to [017] ABILAS-PICENG/RHOALB/ARNLAT to fix that and describe the significant herbaceous layer.
- ABILAS/RUBSPE was eliminated; the single good plot appeared to be a variant of [175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL.
- ABILAS-(TSUMER)/EUCLED-LUPARC was eliminated due to heterogeneity. The only good plots were better matches for [019] ABILAS-(PINALB)/FESVIR-LUPARC or other types.
- ABILAS-(TSUMER)/FESVIR was renamed [019] ABILAS-(PINALB)/FESVIR-LUPARC because the secondary tree species is *Pinus albicaulis* rather than *Tsuga mertensiana*, and to distinguish from [117] PINALB/FESVIR-ARECAP.
- ABILAS/VACDEL evolved into [028] ABILAS/VACDEL-VALSIT.
- ABILAS/VACSCO/VALSIT was renamed [031] ABILAS/VACSCO-VALSIT to follow naming conventions.
- ACECIR was heterogeneous and was split into [035] ACECIR/GALIUM-(POLMUN) and [038] (ACEMAC)/ACECIR-PAXMYR, with some plots going to other similar types.
- ACECIR/ATHFIL-TOLMEN was renamed [037] ACECIR-OPLHOR/ATHFIL, some plots were recoded to [035] ACECIR/GALIUM-(POLMUN).
- ACECIR-(HOLDIS) SPARSE was renamed [036] ACECIR-(HOLDIS), incorporating some plots from ACECIR.
- ACEMAC/ACECIR was eliminated due to heterogeneity. Plots wound up in [038] (ACEMAC)/ACECIR-PAXMYR, [039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, and other associations.
- ACEMAC/MAISTE evolved into [039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, incorporating some plots from upland ACEMAC/ACECIR, ACEMAC/SYMALB and ACEMAC/PAXMYR.
- ACEMAC/OXAORE was renamed [040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN to clarify importance of *Picea sitchensis*.
- ACEMAC/PAXMYR was eliminated; it was mostly absorbed into the new [038] (ACEMAC)/ACECIR-PAXMYR, along with many ACECIR plots and some upland ACEMAC/ACECIR plots.
- ACEMAC/RUBSPE was renamed [044] ACEMAC/RUBSPE/TOLMEN to clarify significance of the forb layer.
- ACEMAC/SYMALB was renamed [043] ACEMAC-PSEMEN/SYMALB/OSMBER for clarification, with plots recoded to [134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC and [039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM.
- ALNRUB/ACECIR/CLASIB was eliminated due to heterogeneity. It also no longer appeared to represent the Crawford (2009) concept. Riparian plots joined [053] ALNRUB/RUBSPE/TOLMEN-ATHFIL; upland plots joined [052] ALNRUB/RUBSPE/POLMUN-CLASIB.
- ALNRUB/ALNVIR was eliminated due to heterogeneity. The plots had little in common; most remain ambiguous.
- ALNRUB/OXAORE was eliminated due to heterogeneity. Most plots went to [050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN but some fit better with other associations.
- ALNRUB/POLMUN was heterogeneous and was split into a coastal bluff variant, [049] ALNRUB-PICSIT/POLMUN-(HERMAX), and a more widespread type, [052] ALNRUB/RUBSPE/POLMUN-CLASIB.
- ALNRUB/RUBSPE was renamed [053] ALNRUB/RUBSPE/TOLMEN-ATHFIL to distinguish it from [051] ALNRUB/RUBSPE/CAROBN-LYSAME.
- ALNVIR was renamed [058] ALNVIR-(SAMRAC)/THAOCC for clarification.
- ALNVIR-ACECIR was eliminated due to heterogeneity. Plots were recoded to [035] ACECIR/GALIUM-(POLMUN) and [058] ALNVIR-(SAMRAC)/THAOCC.

[18] The abbreviated names of associations as defined in Crawford et al. (2009) are shown in SMALL-CAPS, without identifying numbers or hyperlinks. Crawford et al. (2009) alternates between the terms “lithomorphic” and “sparse” in the names of a number of rock-associated sparse vegetation types. SPARSE is used in this document, to save space.

- ALNVIR-RUBSPE/ATHFIL was heterogeneous and was split into [057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA) and [056] ALNVIR/PTEAQU-ATHFIL.
- AMEALN/CALRUB was eliminated; no plots were found that matched the description.
- ANTLAN was dissolved into [059] ANTLAN-(OREALP-VACDEL).
- ARCCOL was renamed [060] ARCCOL/RACOMITRIUM for clarity and to match format of similar associations.
- ARC(NEV,UVA)-JUNCOM was eliminated due to heterogeneity. Plots were reassigned to [065] ARCUVA-JUNCOM, [063] ARCUVA-(DASFLO), and other associations.
- ARC(NEV,UVA)-PAXMYR was renamed [061] ARCNEV-PAXMYR/CALRUB to clarify the importance of the graminoid layer, with half the plots recoded to [062] ARCNEV/PSESPI.
- ARC(NEV,UVA)/PSESPI was renamed [062] ARCNEV/PSESPI for clarity, with the addition of many plots assigned to ARC(NEV,UVA)-PAXMYR.
- ARCUVA-FRAVIR-(FESROE) was renamed [064] ARCUVA-FRAVIR/RACOMITRIUM to clarify that the association was found only at NOCA and that *Festuca roemeri* is therefore absent.
- ARNXDIV SPARSE was eliminated; the single plot was a better match for [085] ELMRAC-EPIANA.
- BETPAP-(THUPLI)/ACECIR/MAHNER was heterogeneous and was split. The more eastside group was called [068] BETPAP-PSEMEN/ACECIR/PAXMYR; the westside group kept the name [069] BETPAP-(THUPLI)/ACECIR/MAHNER.
- CALCAN was eliminated due to heterogeneity. Some plots were recoded to [070] CARAQU-(MENTRI-EQUISETUM), others to [071] CARNIG-CARLEN-(CALCAN).
- CARAQD was eliminated due to heterogeneity. Most plots were recoded to [070] CARAQU-(MENTRI-EQUISETUM).
- CAR(AQD,NIG)-CALLEP was heterogeneous and was split. Lower elevation plots with *Carex aquatilis* are mostly included in [070] CARAQU-(MENTRI-EQUISETUM). Plots with *Carex nigricans* (or sometimes *C. spectabilis*) and *Caltha leptosepala* were combined with LEPPYR to form the new [072] CAREX-CALLEP-(LEPPYR).
- CARLEN was merged into [071] CARNIG-CARLEN-(CALCAN).
- CARNIG was dissolved into [074] CARNIG-LUEPEC and [169] SAXTOL-LUZPIP-(CARNIG).
- CAROBN was eliminated due to heterogeneity. Most plots were recoded to [174] THUPLI/LEDGRO/CAROBN/SPHAGN.
- CARSPE SPARSE was eliminated due to heterogeneity. Many plots were recoded to [100] LUEPEC-(CARSPE).
- CARSPE-(PHYGLA-LUPSEL) was eliminated; no plots were found that matched the description.
- CEAVEL was heterogeneous and was split into [078] CEAVEL-(SPIBET)/CALRUB and [130] PRUEMA-AMEALN-CEAVEL/MAIRAC.
- CHALAT was merged with some OXYDIG and VALSIT-ATHAME plots to create [079] CHALAT-(OXYDIG-VALSIT).
- CORSER was eliminated due to heterogeneity. The core occurs in riparian areas and avalanche runouts and was named [166] SALSIT-(CORSER)/URTDIO. Some swamp plots were assigned to [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), other plots were assigned to [035] ACECIR/GALIUM-(POLMUN) and [034] ACER-CORSER/(PTEAQU).
- CUPNOO/OPLHOR-(ALNVIR) evolved into [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON, shedding plots to [080] CUPNOO-(ABILAS)/CLIUNI, [082] CUPNOO-(VACMEM)/PAXMYR, etc., and incorporating some plots from CUPNOO, CUPNOO/STRLAN, and CUPNOO/VALSIT.
- CUPNOO-PSEMEN/ACECIR was eliminated; the only good plot fit well with [082] CUPNOO-(VACMEM)/PAXMYR.
- CUPNOO/RIBLAC was eliminated due to heterogeneity. Several plots were a better fit to [080] CUPNOO-(ABILAS)/CLIUNI.
- CUPNOO/STRLAN was eliminated due to heterogeneity. Several plots were a better fit to [080] CUPNOO-(ABILAS)/CLIUNI.
- CUPNOO/VALSIT evolved into [080] CUPNOO-(ABILAS)/CLIUNI, shedding plots to [082] CUPNOO-(VACMEM)/PAXMYR and [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON.
- DANIN had only one good plot; it was merged into [091] FESVIR-LUPARC-(ANTLAN-POTFLA) along with similar FESVIR-LUPARC plots.
- DANINT abbreviation did not agree with its name. It was changed to [083] DANINT/RACOMITRIUM, shedding one plot to [103] PENDAV/RACOMITRIUM.
- DASFLO SPARSE was merged into [084] DASFLO-(PHLDIF).
- DASFLO-(PHLDIF) was expanded to include DASFLO SPARSE; the name was transferred to [084] DASFLO-(PHLDIF).
- ELMRAC-(SENNEO) SPARSE evolved into [085] ELMRAC-EPIANA.
- ERIANG/SPHAGN was merged into the new [071] CARNIG-CARLEN-(CALCAN).
- ERIPYR SPARSE was merged into [087] ERIPYR-POLDAV, shedding one plot that was a better fit for [108] PHYGLA-(CASMER).
- EUCPAU evolved into [088] EUCPAU-(PHAHAS-CASMIN), incorporating some plots from [104] PHLDIF-(LOMMAR-CARPHA) and several other associations.
- FESROE-CERARV-KOEMAC evolved into [218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, shedding one plot that was a better fit for [064] ARCUVA-FRAVIR/RACOMITRIUM and incorporating some plots from KOEMAC-(AGRPAL) and LOMMAR SPARSE.
- FESVIR-LUPARC was heterogeneous and was dissolved; most plots were recoded to [092] FESVIR-PHLDIF-ARECAP, [090] FESVIR-EUC(LED,ENG), and [091] FESVIR-LUPARC-(ANTLAN-POTFLA). Smaller numbers of plots were recoded to six other associations.
- HERMAX was merged into [093] HERMAX-(THAOCC-SAUAME).
- JUNCOM SPARSE was eliminated due to heterogeneity. Many plots were good fits to [095] JUNCOM-(PHLDIF).

- KALMIC-CARNIG was merged into [073] CARNIG-KALMIC-(VACDEL), shedding one plot that was a better fit for [075] CARSPE-CARNIG-(POTFLA).
- KRUMM ABILAS was eliminated due to heterogeneity. Plots were merged into [020] ABILAS-(PINALB)/JUNCOM_KRUMM or into [205] TSUMER-ABILAS/PHYEMP_KRUMM.
- KRUMM TSUMER evolved into [205] TSUMER-ABILAS/PHYEMP_KRUMM, gaining many plots from KRUMM ABILAS.
- LEDGRO-KALMIC/SPHAGN was eliminated due to problems of spatial scale; plots were merged into [174] THUPLI/LEDGRO/CAROBN/SPHAGN.
- LUEPEC was merged into [100] LUEPEC-(CARSPE), along with some CARSPE SPARSE plots, losing plots that were a better fit to [074] CARNIG-LUEPEC.
- LUIHYP was heterogeneous and was split into [101] LUIHYP-(LOMMAR-CASPAR) and [168] SAXBRO-(DOULAE-SEDUM).
- LUPARC was eliminated due to extreme heterogeneity. Plots were recoded to [076] CARSPE-(LUPARC-POLBIS) and ten other associations.
- LUPSEL-(ERIAUR-MINOBT) was eliminated due to ambiguity. It was unclear how to distinguish it from [105] PHLDIF-LUPSEL-(PEDCON). One plot was a better fit for [086] EMPNIG-LUPSEL.
- LUZGLA-(LUPARC) was eliminated due to ambiguity. The single plausible plot was a good fit with [076] CARSPE-(LUPARC-POLBIS).
- MALFUS was eliminated due to rarity and spatial scale issues. Plots were recoded to [176] THUPLI-TSUHET/LYSAME/SPHAGN and [199] TSUHET-THUPLI/GAUSHA/LYSAME.
- MENTRI was eliminated due to rarity and spatial scale issues. Plots were recoded to [070] CARAQU-(MENTRI-EQUISETUM).
- MIMLEW was eliminated due to rarity and ambiguity. One plot was recoded to [079] CHALAT-(OXYDIG-VALSIT).
- MYRGAL/CAR(AQD,UTR) was eliminated due to rarity and spatial scale issues. The single plot was recoded to [070] CARAQU-(MENTRI-EQUISETUM).
- NUPLUT was eliminated due to rarity and spatial scale issues. Plots were recoded to [070] CARAQU-(MENTRI-EQUISETUM).
- OPLHOR was eliminated due to rarity and spatial scale issues. Plots were recoded to [055] ALNVIR-OPLHOR and [057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA).
- OXYDIG was eliminated due to rarity and spatial scale issues. Two plots were good fits to [079] CHALAT-(OXYDIG-VALSIT).
- PAXMYR/PHLDIF was expanded to include some plots from ARC(NEV,UVA)-PAXMYR, [094] JUNPAR-(POLBIS) and several other associations. The name was transferred to [102] PAXMYR/PHLDIF.
- PETFRI had no good plots and was eliminated.
- PICSIT/GAUSHA evolved into [114] PICSIT-TSUHET/GAUSHA/POLMUN, shedding plots to [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI and others, gaining plots from [115] PICSIT-TSUHET/POLMUN and others.
- PICSIT/MAIDIL was renamed [111] PICSIT-THUPLI/MAIDIL to clarify its affinity with other *Thuja plicata*-containing coastal associations.
- PICSIT-TSUHET/POLMUN-OXAORE evolved into [113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, shedding plots to [189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, [191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, etc. and gaining plots from [109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, TSUHET-PSEMEN/VACALA/OXAORE, etc.
- PICSIT/VACOVA was renamed [112] PICSIT-THUPLI/VACOVAT to eliminate confusion with stands with *Vaccinium ovalifolium* and clarify its affinity with other *Thuja plicata*-containing coastal associations. The new association also incorporated a similar number of plots from [178] THUPLI-TSUHET/VACOVAT that it provided a better fit for.
- PINALB was eliminated due to rarity and spatial scale issues. The single plot was a good match to [020] ABILAS-(PINALB)/JUNCOM_KRUMM.
- PINALB/CALRUB was eliminated due to rarity and heterogeneity. Most plots went to [021] ABILAS-PINALB/PAXMYR-(CALRUB), along with plots from [026] ABILAS-(PSEMEN)/VACMEM/CALRUB, [116] PINALB-(ABILAS)/VACSCO/LUZGLA, etc. Most of the small number of PINALB/CALRUB plots collected had *Abies lasiocarpa* codominant with *Pinus albicaulis*.
- PINALB/FESVIR evolved into [117] PINALB/FESVIR-ARECAP, name changed to distinguish it from [019] ABILAS-(PINALB)/FESVIR-LUPARC. Plots were shed to [019] ABILAS-(PINALB)/FESVIR-LUPARC, etc., and gained from [030] ABILAS/VACMEM/LUPARC, etc.
- PINPON/PSESPI was eliminated due to rarity and ambiguity. The single good plot was a good match to [146] PSEMEN-PINPON/CALRUB.
- POLDAV was eliminated due to rarity and ambiguity. It was merged into [087] ERIPYR-POLDAV.
- POLMIN-RACELO was eliminated due to rarity and ambiguity. One plot tentatively assigned to it worked well with [103] PENDAV/RACOMITRIUM.
- POPBAL-ALNRUB/RUBURS-EQUARV was eliminated; the single plot was a good match to [124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM.
- POPBAL/GAUSHA/POLMUN was eliminated; the single plot was a good match to [124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM.
- POPTRE SHRUB was renamed [129] POPTRE-PAXMYR_SHRUB for clarification. One plot was shed to [093] HERMAX-(THAOCC-SAUAME).

- PSEMEN-(ABIGRA)/ACECIR-PAXMYR kept the same name, but the concept may be changed. It was very heterogeneous and plots were split out to [043] ACEMAC-PSEMEN/SYMALB/OSMBER, [161] PSEMEN/VACMEM, [134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC and several other associations. [132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR is composed of more plots called to PSEMEN-(TSUHET)/ACECIR-PAXMYR.
- PSEMEN-(ALNRUB-TSUHET)/RUBSPE was eliminated due to heterogeneity. Some plots were broadleaf-dominated, some had codominant *Picea sitchensis*, and others were in the OLYM interior. About half the plots were recoded to [189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN. Others went to [050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, [190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, and other associations.
- PSEMEN/GAUSHA-HOLDIS was renamed [135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS to clarify that *Acer macrophyllum* is very significant in the NCCN plots.
- PSEMEN/GAUSHA-MAHNER/POLMUN evolved into a distinct association, [136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, exchanging plots with [137] PSEMEN/GAUSHA-MAHNER, [042] ACEMAC-(PSEMEN)/POLMUN, and several other associations.
- PSEMEN/GAUSHA-VACPAR evolved into [137] PSEMEN/GAUSHA-MAHNER, exchanging plots with [154] PSEMEN-TSUHET/GAUSHA-VACPAR, [153] PSEMEN-TSUHET/GAUSHA-MAHNER, [069] BETPAP-(THUPLI)/ACECIR/MAHNER, [120] PINCON-PSEMEN/GAUSHA, [144] PSEMEN-(PINCON)/ARCUVA/RACCAN, etc.
- PSEMEN-PINPON-POPBAL/ACECIR was eliminated due to rarity and ambiguity. The plots found were better fits for [043] ACEMAC-PSEMEN/SYMALB/OSMBER or [122] POPBAL-ACEMAC/ACECIR/POLMUN.
- PSEMEN-(PINPON)/SYMALB kept the same name, but the concept may be changed. It was very heterogeneous and plots were split out to [043] ACEMAC-PSEMEN/SYMALB/OSMBER and [141] PSEMEN/MAHNER/CALRUB, and were picked up from PSEMEN-(ABIGRA)/ACECIR-PAXMYR and PSEMEN/HOLDIS/CALRUB.
- PSEMEN-(THUPLI-ABIGRA)/VACMEM was eliminated due to heterogeneity. Half the plots were recoded to [157] PSEMEN-TSUHET/PAXMYR/LINBOR, the rest to a variety of other associations.
- PSEMEN-(TSUHET)/dep was eliminated due to heterogeneity. It was a grab bag of sparse understory forest plots, which fit better in [192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), [007] ABIAMA-TSUHET/ORTSEC, [154] PSEMEN-TSUHET/GAUSHA-VACPAR, [194] TSUHET-PSEMEN/POLMUN-BLESPI, and about ten other associations.
- PSEMEN-(TSUHET)/ACECIR-PAXMYR kept the same name, but the concept may be changed. It was very heterogeneous and plots were split out to [155] PSEMEN-TSUHET/MAHNER, [132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, [157] PSEMEN-TSUHET/PAXMYR/LINBOR and other associations.
- PSEMEN-TSUHET/GAUSHA/POLMUN was renamed [159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN to reduce confusion in labeling plots.
- PSEMEN-TSUHET/POLMUN-OXAORE evolved into [148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, shedding plots to three other associations.
- PSEMEN/VACCAE was eliminated; the single plot was a good match to [143] PSEMEN-PINCON/ARCNEV.
- PSESPI abbreviation did not agree with its name; renamed to [131] PSESPI/SELWAL.
- PTEAQU was eliminated due to heterogeneity. Plots were recoded to [162] RUBPAR/PTEAQU-CHAANG, [093] HERMAX-(THAOCC-SAUAME), [056] ALNVIR/PTEAQU-ATHFIL, and [213] VACMEM/XERTEN (mainly at MORA).
- RACCAN-(PENDAV) was renamed [103] PENDAV/RACOMITRIUM to allow for uncertain *Racomitrium* species ID and match format of similar associations.
- RUBPAR/CHAANG was renamed [162] RUBPAR/PTEAQU-CHAANG, gaining several plots from RUBPAR-RUBSPE and PTEAQU.
- RUBPAR-RUBSPE was eliminated due to heterogeneity. Plots were recoded to [162] RUBPAR/PTEAQU-CHAANG and [057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA).
- RUBSPE-RIBBRA was eliminated due to rarity and ambiguity. Plots were recoded to [037] ACECIR-OPLHOR/ATHFIL, [058] ALNVIR-(SAMRAC)/THAOCC and [057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA).
- SALCOM was heterogeneous and ambiguous; it was split into [163] SALCOM/CAREX-(LEPPYR) and [164] SALCOM/VALSIT.
- SAL(HOO,SIT)-SPIDOU was merged into [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), which also incorporated plots from SPIDOU/CARAQD, SALSIT, SPIDOU and other ambiguous single-species associations.
- SALSIT was eliminated due to heterogeneity. Plots were recoded to [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), [166] SALSIT-(CORSER)/URTDIO and other associations.
- SALSIT/EQUARV-PETFRI was heterogeneous and was dissolved into six associations. Many plots went into [166] SALSIT-(CORSER)/URTDIO. The majority of the others went to [125] POPBAL-(ALNRUB)/SALSIT and [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME).
- SAUAME-(HERMAX) was merged into [093] HERMAX-(THAOCC-SAUAME).
- SAXBRO SPARSE was renamed [168] SAXBRO-(DOULAE-SEDUM) to provide context.
- SAXTOL-(LUZPIP) SPARSE evolved into [169] SAXTOL-LUZPIP-(CARNIG) with the incorporation of sparse plots from [067] ATHAME-CRYACR and [077] CASMER-PHYEMP.
- SCIMIC was merged into [070] CARAQU-(MENTRI-EQUISETUM).
- SELWAL-(FESROE,FESBRA) was eliminated; the single plot was a good match to [103] PENDAV/RACOMITRIUM.
- SORSIT/PHYEMP-VACDEL was eliminated due to heterogeneity. Most plots were recoded to [171] SORSIT-VACMEM/VALSIT, [170] SORSIT/VACDEL-PHYEMP or [172] SPISPL/CARSPE.

- SPIDOU was eliminated due to heterogeneity. Most plots were recoded to [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME).
- SPIDOU/CARAQD was eliminated due to heterogeneity. Most plots were recoded to [167] SALSIT-(SPIDOU)/CARAQU-(LYSAME).
- SPISPL was eliminated due to heterogeneity. Plots were recoded to [172] SPISPL/CARSPE and five other associations, but many remained ambiguous.
- SPISPL/CARLEN was eliminated due to rarity and ambiguity. Plots were recoded to [071] CARNIG-CARLEN-(CALCAN) and [164] SALCOM/VALSIT.
- TAXBRE/PAXMYR was eliminated; the single plot was a good match to [165] SALSCO-SORSCO-AMEALN/PAXMYR.
- THUPLI-TSUHET/VACOVA was renamed [178] THUPLI-TSUHET/VACOVAT to eliminate confusion between *Vaccinium ovatum* and *V. ovalifolium*. A fair number of plots were recoded to [112] PICSIT-THUPLI/VACOVAT, [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, [199] TSUHET-THUPLI/GAUSHA/LYSAME, and other associations.
- TRICAE was renamed [179] TRICAE-DODJEF, which also incorporates some plots called to CARUTR and at the alliance level.
- TSUHET-(ABIAMA)/GAUSHA/BLESPI evolved into [200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, shedding plots to [181] TSUHET-ABIAMA-PSEMEN/GAUSHA and [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI.
- TSUHET-ABIAMA/OXAORE-BLESPI evolved into [185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, shedding a plot to [010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL.
- TSUHET-ABIAMA-(PSEMEN)/VACALA evolved into [008] ABIAMA-TSUHET-(PSEMEN)/VACALA, shedding plots along the way to [007] ABIAMA-TSUHET/ORTSEC, [182] TSUHET-ABIAMA-PSEMEN/MAHNER, [186] TSUHET-ABIAMA/VACALA/RUBPED, [009] ABIAMA-TSUHET/RUBPED-TIATRI, [183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, and other associations.
- TSUHET-ABIAMA/VACALA/LYSAME was eliminated due to rarity and heterogeneity. Plots were recoded to [002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN and [187] TSUHET-ABIAMA/VACALA/TIATRI.
- TSUHET/GAUSHA/POLMUN-BLESPI evolved into [189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, incorporating many plots from PSEMEN-(ALNRUB-TSUHET)/RUBSPE.
- TSUHET/POLMUN-BLESPI was eliminated due to heterogeneity. Plots were recoded to [114] PICSIT-TSUHET/GAUSHA/POLMUN, [194] TSUHET-PSEMEN/POLMUN-BLESPI, [188] TSUHET-PICSIT/POLMUN-BLESPI and other associations.
- TSUHET/POLMUN-OXAORE evolved into [190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, shedding plots to [191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI.
- TSUHET-PSEMEN/MAHNER-CHIMEN evolved into [192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN) , shedding plots to [007] ABIAMA-TSUHET/ORTSEC, [155] PSEMEN-TSUHET/MAHNER, etc. and gaining many plots from PSEMEN-(TSUHET)/dep.
- TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN was eliminated due to heterogeneity. Plots were recoded to [177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), [196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, [006] ABIAMA-TSUHET/OPLHOR, [175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, and other associations.
- TSUHET-(PSEMEN)/VACALA/CORUNA evolved into [183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, shedding plots to [198] TSUHET-(PSEMEN)/VACALA/POLMUN, [197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA) and other associations.
- TSUHET-PSEMEN/VACALA/OXAORE evolved into [193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE, shedding plots to [113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN.
- TSUHET-THUPLI-(ABIAMA)/GAUSHA/BLESPI was eliminated due to heterogeneity. Most plots were recoded to [178] THUPLI-TSUHET/VACOVAT, others to [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI and [181] TSUHET-ABIAMA-PSEMEN/GAUSHA.
- TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL evolved into [201] TSUHET-THUPLI/LYSAME-ATHFIL, shedding plots to [110] PICSIT/RUBSPE/CAROBN-LYSAME and three other associations.
- TSUHET-(THUPLI)/LEDGRO/SPHAGN was combined with CAROBN and LEDGRO-KALMIC/SPHAGN and other oddball plots to form [174] THUPLI/LEDGRO/CAROBN/SPHAGN.
- TSUHET/VACALA/OXAORE evolved into [191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, shedding plots to [190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN and other associations.
- TSUMER-ABIAMA/dep was eliminated due to heterogeneity. Plots were recoded to [204] TSUMER-ABIAMA/RHOALB, [002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, [203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON) and [007] ABIAMA-TSUHET/ORTSEC.
- TSUMER-ABIAMA/VACALA/RUBPED evolved into [203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), exchanging plots with many associations.
- TSUMER-ABIAMA/VACMEM/VALSIT was eliminated due to heterogeneity. Plots were recoded to [013] ABIAMA-TSUMER/VACMEM/ERYMON, [012] ABIAMA-TSUMER/VACMEM and other associations.
- TSUMER-ABIAMA/VACMEM/XERTEN evolved into [207] TSUMER-ABILAS/VACMEM/XERTEN, shedding plots to [012] ABIAMA-TSUMER/VACMEM and other associations.
- TSUMER-ABILAS/ALNVIR was eliminated due to rarity and spatial scale issues. Plots were recoded to [058] ALNVIR-(SAMRAC)/THAOCC.
- VACCAE/FESVIR was eliminated; the single good plot was a good match to [092] FESVIR-PHLDIF-ARECAP.
- VACDEL was eliminated; it had become a catch-all of plots with *Vaccinium deliciosum* scattered on a variety of different background vegetation types. Plots were recoded to the best-fitting alternative: [107] PHYEMP-(VACDEL)/LUPARC, [059] ANTLAN-(OREALP-VACDEL), [106] PHYEMP-VACDEL-(CASMER), [215] VALSIT-CARSPE, and many others.

- VACMEM was eliminated due to heterogeneity. Many plots were recoded to [212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, and most of the rest to [171] SORSIT-VACMEM/VALSIT, [211] VACMEM/PAXMYR-VACSCO-CARGEY and [213] VACMEM/XERTEN.
- VACMEM/CALRUB was eliminated due to heterogeneity. Most plots were recoded to [210] VACMEM/PAXMYR-ARECAP-(CALRUB) where they joined similar plots from VACMEM/PHLDIF.
- VACMEM/PHLDIF was eliminated. During mapping plot collection, the type was only found in NOCA, and the plots had little in common with the original concept, which apparently was described from OLYM. Plots were recoded to [210] VACMEM/PAXMYR-ARECAP-(CALRUB), but several remained ambiguous.
- VACMEM/VACDEL was eliminated due to heterogeneity. Plots were recoded to [172] SPISPL/CARSPE and [171] SORSIT-VACMEM/VALSIT.
- VACSCO was eliminated due to heterogeneity. Most plots went to [214] VACSCO-FESVIR-ARECAP, others to [031] ABILAS/VACSCO-VALSIT and [102] PAXMYR/PHLDIF.
- VALSIT-ATHAME was eliminated due to heterogeneity. Plots were recoded, mostly to [079] CHALAT-(OXYDIG-VALSIT), some to [067] ATHAME-CRYACR.
- XERTEN was eliminated due to ambiguity. Plots were recoded to [213] VACMEM/XERTEN and [209] VACDEL-FESVIR, but several remained ambiguous.

Vegetation association descriptions

Guide to included information

Association name

The association names and abbreviations given here follow the following standards:

- ***Scientific names*** are composed of species names only, without lifeform suffix. Plant species included in the name reflect dominance (high average canopy cover), constancy, and/or diagnostic utility.
- Full species names are given using the taxonomy used in Hitchcock and Cronquist (2018), applied at the full species level. If a given field-identified species was split and it was not possible to determine which of the multiple new names our samples represented, both species epithets are given, separated by a forward slash. Very occasionally, the genus level is used in names when confusion is unlikely to result from doing so.
- ***Common names*** attempt to follow those given by the Burke Herbarium (2020) at the University of Washington.
- ***Abbreviations*** have not been updated to follow Hitchcock and Cronquist (2018). The abbreviations are used as database keys for indexing plot and floristic information and also serve to maintain interoperability with prior versions of the classification. Modifying the abbreviations and resolving potential resulting confusion from doing so fell well outside the scope of this work.
- Each association is coded with a 3-digit number, which is given before the full name at the top of each association description,[19] and used as a prefix on the abbreviation in references to the association elsewhere in the document.[20] The table of bookmarks, organized by first-named species, that is given just before the association descriptions also uses these numeric IDs.

Associations from Crawford et al. (2009) that were not intentionally altered were maintained with the same name and abbreviation, with four kinds of exceptions. First, if mismatch between the name and the floristic components of the association in NCCN parks was strong enough that errors in plot assignment were occurring as a result, we updated the name to better reflect the NCCN floristics. Second, if the species included in the name conveyed particularly inaccurate information regarding the vertical strata present, the name was altered to better represent vegetation structure. Third, if the given abbreviation and name did not agree, we updated the abbreviation to agree with the name. In two or three cases, we also updated the punctuation of the name to agree with the consistent practices used in Crawford et al. (2009). Fourth, if the taxonomy of species included in the name was altered in Hitchcock and Cronquist (2018), we updated the name to agree with the revisions.

For the association names we created, we used the following standards regarding vertical strata and inconsistent member species,[21] in an attempt to emulate the conventions used by Crawford et al. (2009):

- Separate vertical strata[22] are acknowledged for: (1) tree species, whether or not tree-sized; (2) shrubs typically taller than 0.5 meters when full-grown; (3) dwarf shrubs,[23] forbs and graminoids (the "field stratum"); and (4) non-vascular and floating vegetation.
- When a stratum is usually well-developed (say, 10% cover or more, with a constancy of 80% or higher), at least one species from it is included in the name, treated as a consistent member.
- If additional species are given for the stratum, they are treated as inconsistent members unless they occur with at least 80% constancy.
- If an entire stratum occurs at less than about 80% constancy, species from the stratum may be included in the name—especially if the stratum occurs in high abundance when it does occur—but will be treated as inconsistent members to indicate that the stratum itself is inconsistent.

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[19] At the top of the page, the association numeric ID serves as a page number reference for field use. It is given there in curly brackets for easy searching in electronic copies of this report.

[20] In the field, the numeric ID here serves as a page number to quickly turn to for comparison. References to other associations in the text include hyperlinks in electronic copies of this report.

[21] "Consistent" members are given without parentheses or asterisks. "Inconsistent" members are indicated by an asterisk in the scientific and common names, and by parentheses in the abbreviation.

[22] Following Crawford et al. (2009), in association abbreviations, species occurring in distinct vertical strata are separated by forward slashes, while species occurring in the same stratum are separated by hyphens. Not following Crawford et al. (2009), association scientific and common names do not attempt to represent strata.

[23] The treatment of dwarf shrubs regarding punctuation in the Crawford type names varied. Most often they were included in herbaceous layer, but occasionally with the she shrub layer. Following this, we have tried to lump them with herbaceous plants in the association names we created, but some inconsistency remains. For example, we have often treated *Paxistima myrsinites* as a shrub and separated it by a slash from the herbaceous layer.

Field photo

The photo represents a typical and hopefully illustrative occurrence of the class, usually from the park in which the class is most prominent. In general, the photo was selected from a plot that was most archetypal (in statistical terms) of the floristic and structural characteristics of the association. If possible, it was chosen from the NCCN park where the association appears to be most abundant. However, photo quality and the desire to illustrate understory, overstory, and general setting sometimes took precedence over those considerations. High quality photos were in shorter supply at MORA, so that park is somewhat under-represented here. Photos from Crawford et al. (2009) were kept if they continued to provide a good illustration of the type under our revised classification, but in many cases we returned to the source image and did some contrast adjustment and color-balancing to increase photo interpretability.[24]

Range (section Range)

The areas within which each association is likely to be found are described in several ways. The *life zone* gives a general idea of the general character of the surrounding vegetation as influenced by elevation, and is applicable across all parks. The *geographic region* is described by providing the number of plots sampled in each park[25] and by identifying the geographic subsets of each park within which the association was found during field sampling.[26] Finally, the *elevation range* within which the most "typical" half of each association lies is given.[27] This is provided on a park-specific basis because broad scale climatic differences result in many associations occurring at lower elevations in NOCA and OLYM than they do in MORA. Finally, associations occurring within specific easily-described habitats (e.g., in wetlands, on valley bottoms, on balds, on exposed colluvial rocks) are identified.

More information on the designated life zones and geographic regions follows, but first, an example of the interpretation of the provided range information.

Range: Subalpine zone, in wetlands. **MORA**-19: **ne*-sw-se*** (nw) 1570-1740m. **NOCA**-3: (nw-ce) 1540-1610m. **OLYM**-6: **se** (nc-ne-sc) 1310-1460m.

Interpretation: This association is found in the subalpine life zone, but is generally restricted to wetlands. 19 plots were collected at MORA, 3 at NOCA, and 6 at OLYM. The association is most typically found between 1570 and 1740 meters elevation at MORA, between 1540 and 1610 meters at OLYM, and between 1310 and 1460 meters at NOCA. It is present in the northeast, southwest, and southeast regions of MORA and in the southeast region of OLYM. It may also occasionally be found in the northwest region of MORA, in the northwest and central east regions of NOCA, and in the north central, northeast, and south central regions of OLYM. Across the NCCN, it is most strongly tied to the northeast and southeast regions of MORA.

[24] Appendix A provides the park and plot ID where each photo was obtained.

[25] The number of plots sampled is given immediately after the park name abbreviation. Absence of plots in any park does not imply the association cannot be found there, but only that it was not identified during the mapping project and likely occurs in limited amounts at most.

[26] The regions of each park where the association was documented are given following the number of plots sampled per park. For associations that are particularly regionalized, stars designate the regions where they will overwhelmingly be found. Regions given in parentheses indicate that the association is likely scattered there at most, and possibly found only along one the region's boundaries.

[27] The 25th and 75th percentile elevations for all plots of the association sampled in that park. See Environmental metrics for more information on the interquartile range.

Life zones

Pacific Northwest vegetation exhibits strong general patterns of structure and species composition variability in response to elevation, regardless of geography. The life zones defined here represent areas with broad climatic affinities delineated mainly on the basis of elevation. Note that although the zone definitions are based on tree species and structure, most vegetation dominated by shrubs and herbaceous plants can be placed into this system as well. In the descriptions, the most characteristic zone for each association is listed first.

- *Coastal zone*: Closed forests influenced by marine cloud layers, or at least floristically related to such environments and characterized by the presence of *Picea sitchensis*. The zone consists of two subzones. The *outer coastal subzone* occurs only within a few kilometers of the Pacific Ocean and so is present only at OLYM; it ranges up to about 80 meters (250 feet) elevation. The *inland fog subzone* is characterized by closed forests away from the coast, but still influenced by marine fog and cloud layers. At OLYM, it includes significant portions of the Sol Duc, Bogachiel, Hoh, Queets, and Quinault valleys, and ranges from about 80 to 300 meters (250 to 1000 feet), and higher in some major valley bottoms. It is also present in MORA, although it is only known from the lower Carbon River valley where *Picea sitchensis* occurs, where it ranges up to about 610 meters (2000 feet).
- *Lowland zone*: Closed low elevation forests outside the *Picea sitchensis* zone, generally lacking prominent *Abies amabilis* except in very cool and moist microsites in valley bottoms. Upland broadleaf forest types are found exclusively in the lowland zone, but valley bottom broadleaf stands can range into the lower montane. At MORA, the zone ranges up to about 910 meters (3000 feet). At NOCA, it extends up to about 750 meters (2450 feet), though this varies on the east side. On the west side of OLYM it ranges up to about 600 meters (1950 feet); elsewhere at OLYM it reaches up to 750 meters (2450 feet) and beyond.
- *Lower montane zone*: Closed forests at middle elevations, typically with prominent to dominant *Abies amabilis* but lacking substantial amounts of higher elevation species (*Tsuga mertensiana, Abies lasiocarpa, Callitropsis nootkatensis*). At MORA, the zone generally ranges up to 1250 meters (4100 feet) elevation. On the west side of NOCA, it extends on average up to 1150 meters (3750 feet), while on the east side it may often only reach 900 meters (2950 feet). At OLYM, the zone generally ranges up to 1100 meters (3600 feet), but it is increasingly constricted on the east side and is virtually eliminated in the northeast, where drier lowland forests extend higher and essentially contact the upper montane zone.
- *Upper montane zone*: Closed forest structure persists in this zone, but species composition shifts toward high elevation tree species (*Tsuga mertensiana, Abies lasiocarpa, Callitropsis nootkatensis*) and associated shrubs (e.g., *Vaccinium membranaceum*, *Rhododendron albiflorum*). Franklin and Dyrness (1988) refer to this as the "lower subalpine subzone." The zone occupies a large area at MORA, ranging on average up to 1580 meters (5200 feet) elevation. On the west side of NOCA, the zone ranges up to 1500 meters (4900 feet). It has a much wider elevation range on the east side of NOCA, beginning lower and extending higher, up to about 1600 meters (5250 feet). At OLYM, it ranges on average up to only 1350 meters (2300 to 4450 feet) elevation.
- *Subalpine zone*: Here, closed forest patches diminish in size and increasingly mosaic with meadow and dwarf-shrubland openings, forming subalpine parkland. At MORA, the zone generally ranges up to 1880 meters (6200 feet) elevation, and up to 2060 meters (6800 feet) in dry habitats in the northeast park quadrant. On the west side of NOCA, the zone typically ranges up to 1700 meters (5600 feet), while on the east side it often reaches 1900 meters (6250 feet). At OLYM, the zone generally ranges up to only 1600 meters (5250 feet) elevation.
- *Alpine zone*: High elevations characterized by the lack of extensive full-stature conifers; trees are either confined to small microsites or reduced to *krummholz* (shrub) form. At MORA, the zone generally ranges from about 1880 meters (6200 feet) elevation up, though the lower limit varies substantially with exposure to other environmental stress and may be substantially higher in the northeast quadrant. On the west side of NOCA the zone begins at around 1700 meters (5600 feet), and on the east side 1900 meters (6250 feet). At OLYM, the zone generally ranges from about 1600 meters (5250 feet) elevation up. In all parks, the lower limit of the alpine zone varies substantially with exposure to other environmental stress.

Geographic regions

The elevational zonation above is superimposed on broader geographic patterns of climate and geology, producing a wide range of distinct combinations to which the associations described here respond. We broke each park into geographic regions in order to provide additional guidance on the known spatial distribution and geographically varying abundance of each association.[28] The regions are defined below.

Within Mount Rainier National Park (MORA)

The four MORA regions are shown in Figure 1. The four regions meet at the summit. The Winthrop Glacier and West Fork White River separate the northwest and northeast regions, the White River/Ohanapecosh divide separates the northeast and southeast, the Cowlitz/Nisqually divide separates the southeast and southwest, and the Puyallup/Mowich divide separates the southwest and northwest.

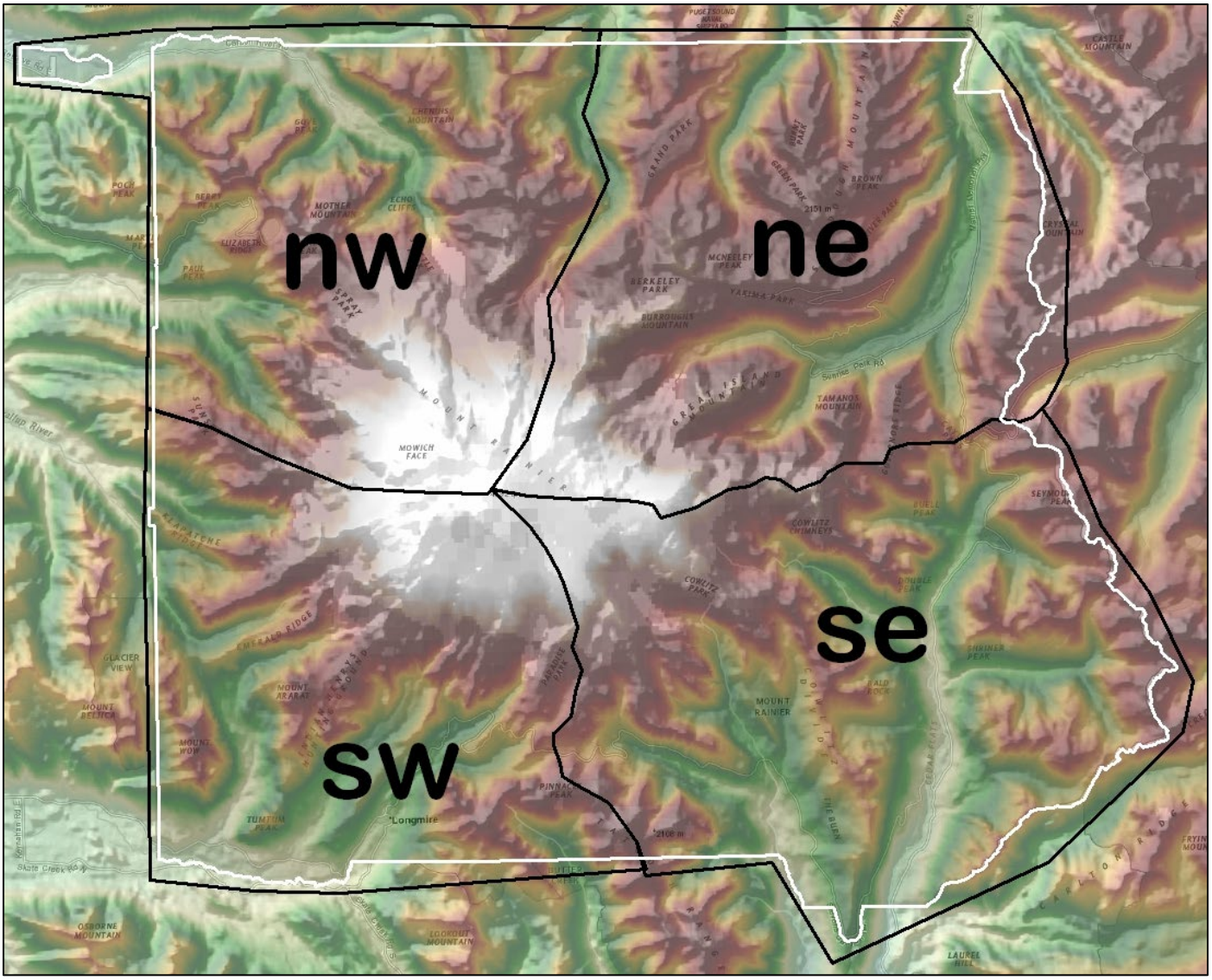


Figure 1. Geographic regions at Mount Rainier National Park, park boundary shown in white.

[28] Lists of associations known from each of the fifteen park regions are provided beginning with Association list for MORA northwest region.

Within North Cascades National Park Service Complex (NOCA)

The five NOCA regions are shown in Figure 2. The Skagit River and Ruby Creek separate the northern from the central regions. The northwest and northeast regions are separated by the crest of the Pickett Range and the remainder of the divide between the upper Skagit (including Ross Lake) and the lower Skagit, Baker, and Chilliwack Rivers. Thunder Creek separates the central west and central east regions. The southern region is delineated by the Stehekin/Skagit divide.

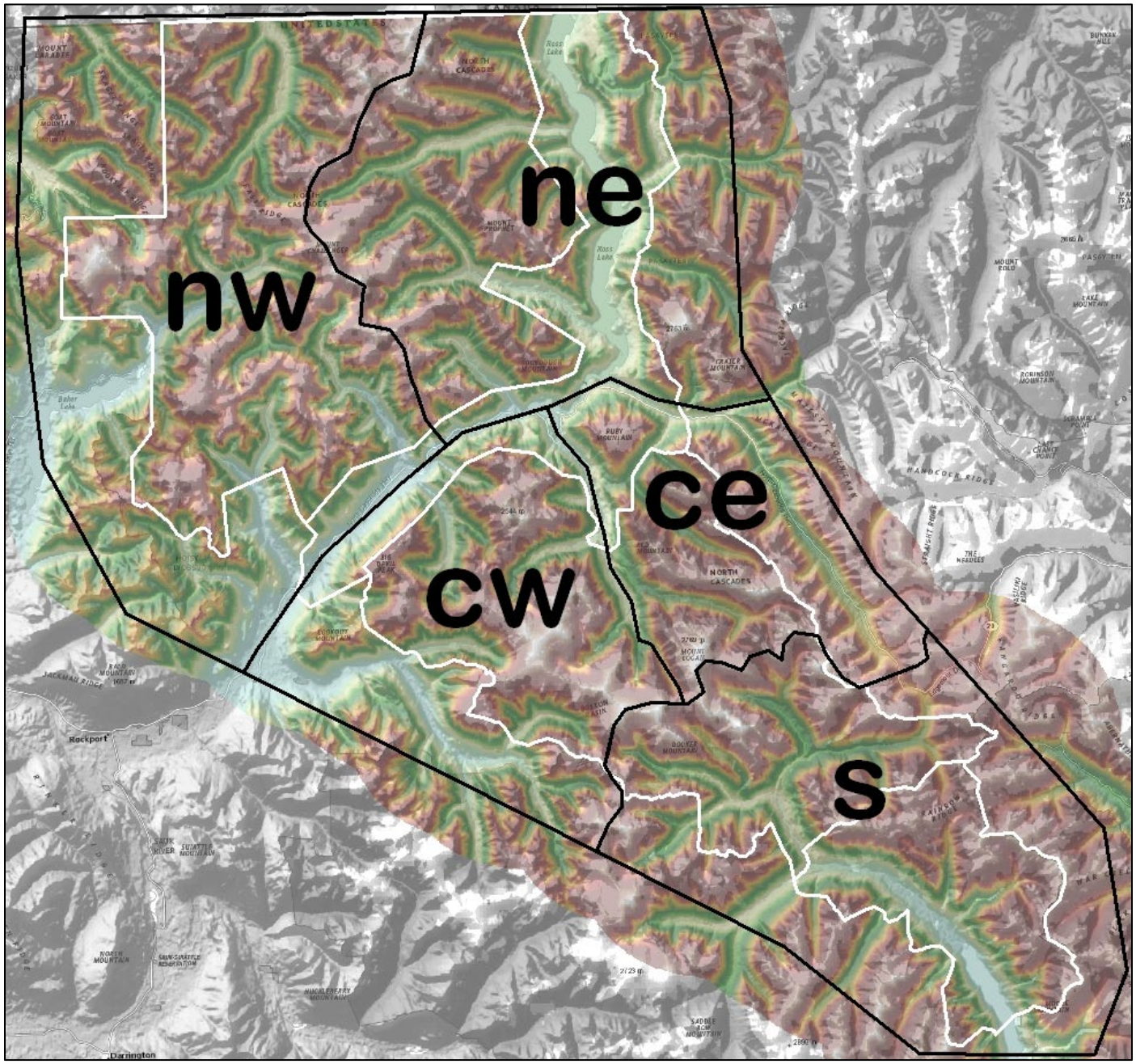


Figure 2. Geographic regions at North Cascades National Park Service Complex, park boundaries shown in white.

Within Olympic National Park (OLYM)

The six OLYM regions are shown in Figure 3. The northwest region represents the park coastal strip north of the Quillayute and Bogachiel Rivers. The southwest region represents the coastal strip south of this, but also includes the lower portion of the Queets valley in the main park section, west of the Queets Campground. The south central and north central regions are separated by the divide between the Hoh and the Bogachiel and Elwha Rivers, and then (east from the Bailey Range) following the height of land across Mt. Scott and down to the Elwha. The north central and northeast regions are separated by the Elwha River. The northeast and southeast regions are separated by the Lost/Hayes divide and then by the Dosewallips River. The southeast and south central regions are separated by the Elwha River, and then (south of Low Divide) by the North Fork Quinault.

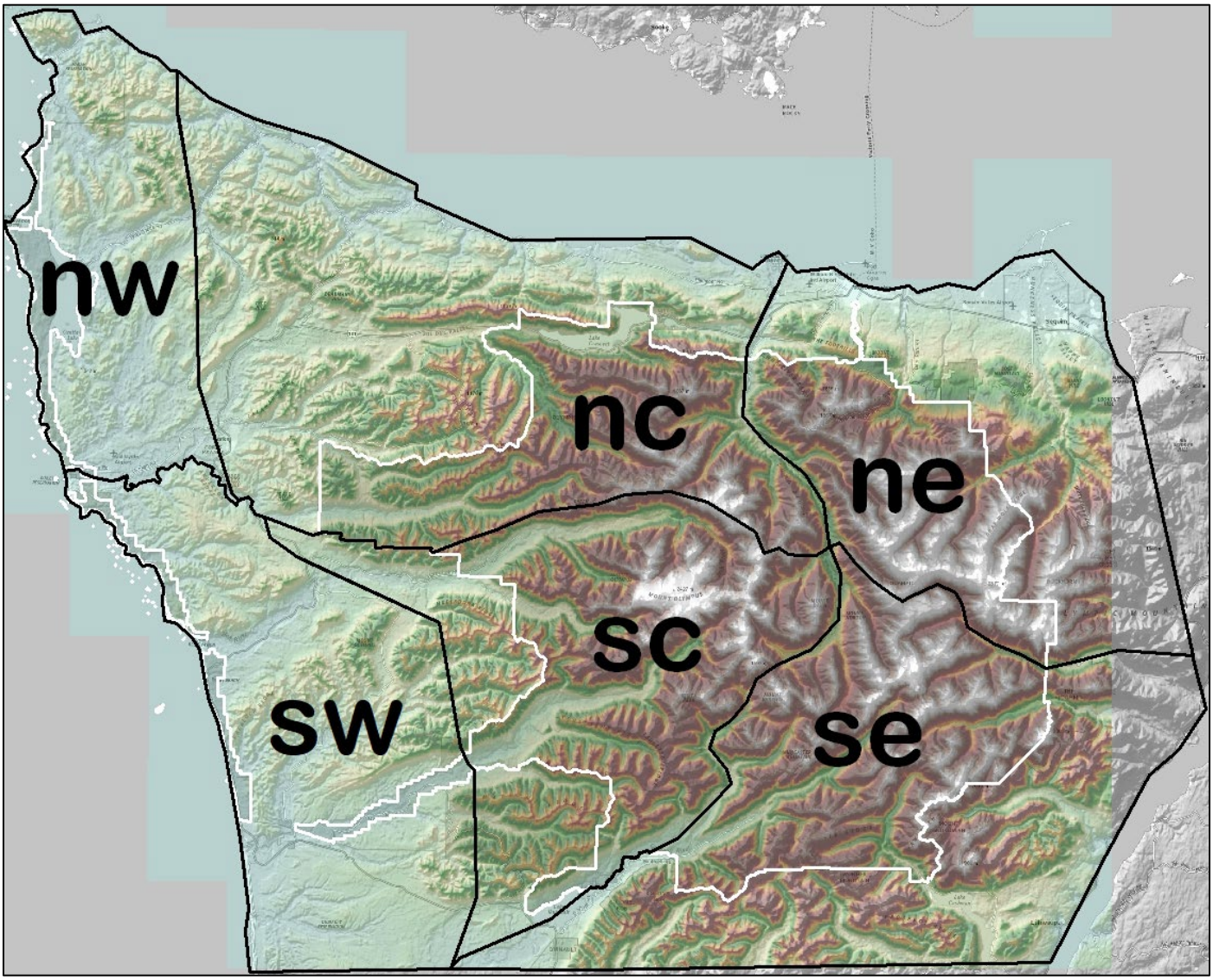


Figure 3. Geographic regions at Olympic National Park, park boundary shown in white.

Structure (section Struct)

The information here describes the typical vegetation structural components found in the association. The structural data provided is based on field visual estimates of crown cover[29] summed within the following structural groups.

Structural groups

- *GT5*: Trees over five meters tall. Also referred to as *overstory* or occasionally simply "tree." Our quantitative data did not distinguish between vertical layers; GT5 trees include emergent, canopy, sub-canopy, and understory trees over five meters high.
- *LT5*: Trees less than five meters tall, either regeneration or environmentally limited (e.g., *krummholz*); sometimes mistakenly called "understory."
- *Tall shrub*: Shrubs over head height. In indicator tables, abbreviated *TSHRB*.
- *Shrub*: Shrubs less than head height but greater than 50 centimeters tall. In indicator tables, abbreviated *SHRB*.
- *Ground layer*: Dwarf shrubs (less than 50 centimeters tall), forbs, graminoids, ferns and fern allies, and non-vascular plants.

Text description

In tree-dominated vegetation, the text description in the first sentence uses the terms below to describe the typical total crown cover of the GT5 canopy[30] and understory[31] structural groups.

Crown cover of GT5 trees, over five meters high[32]

- *Closed forest*: Tree crown cover 65% or greater.
- *Mostly closed forest*: Tree crown cover 55–65%.
- *Semi-open forest*: Tree crown cover 45–55%.
- *Open forest*: Tree crown cover 35–45%.
- *Woodland*: Tree crown cover 20–35%.
- *Open woodland*: Tree crown cover 10–20%.
- *Not tree-dominated*: Tree crown cover less than 10%.

Crown cover of understory structural groups

- *Unbroken*: Crown cover 70% or greater.
- *Very dense*: Crown cover 50–70%.
- *Dense*: Crown cover 30–50%.
- *Abundant*: Crown cover 15–30%.
- *Substantial*: Crown cover 5–15%.
- *Prominent*: Crown cover 2–5%.
- *Scant*: Layer present, with less than 2% crown cover.
- *Present*: Layer present, at any abundance.

[29] *Crown cover* is the fraction of ground surface covered by vegetative crowns, without attempting to compensate for spaces between leaves and branches. Visual estimates tend to vary widely between individuals and are likely systematically biased as well; be skeptical in interpreting these values. We do not recommend using thresholds of crown cover estimates to define any vegetation type (we have nonetheless done just that in the indicator tables, but only where abundance in one type is so much greater than in the other that confusion is unlikely).

[30] The *canopy* is the upper vertical stratum of any vegetation type; the species cohort forming the tallest layer and providing the general aspect of the vegetation. A vegetation type with a relatively constant canopy height can be described as even-canopied. Uneven canopies have variable canopy height (e.g., old-growth forests with extensive canopy gaps, woodlands with large openings between trees).

[31] The *understory* is composed of any vegetation present beneath the upper canopy.

[32] The thresholds here and below resulted from an analysis of field crew-generated quantitative canopy cover estimates cross-referenced to their verbal descriptions of the canopy density. They are meant only for interpretation of cover values provided here, and are not suggested for use beyond this project. Use them more as comparative guides than as literal definitions.

The overstory and regeneration layers of tree-dominated vegetation types are described as conifer, broadleaf, or mixed. The categories were assigned by the relative crown cover proportions of conifer and broadleaf species within the GT5 and LT5 layers, as follows.

Forest type (applicable to GT5 and LT5 layers independently)

- *Conifer*: conifer cover >= 3x broadleaf cover
- *Broadleaf*: broadleaf cover >= 3x conifer cover
- *Mixed conifer-broadleaf*: 3x broadleaf cover > conifer cover > broadleaf cover
- *Mixed broadleaf-conifer*: 3x conifer cover > broadleaf cover >= conifer cover

If lidar-based canopy height estimates are available (only at MORA and the main inland unit of OLYM), the 25th and 75th percentile values of dominant canopy height are given in parentheses after the forest type.

In non-tree-dominated vegetation, the structural group that defines the canopy is given, and the terms below are used to describe its typical total crown cover. Crown cover of understory groups are described using the understory crown cover terms above.

Crown cover of canopy for non-tree-dominated vegetation (LT5 trees, shrubs and herbaceous vegetation)

- *Closed*: Crown cover 65% or greater.
- *Semi-closed*: Crown cover 50–65%.
- *Semi-open*: Crown cover 35–50%.
- *Open*: Crown cover 10–35%.
- *Sparse*: Layer present, with less than 10% crown cover.

Understory structural groups in both tree-dominated and non-tree-dominated vegetation are mentioned in the text description if they occur with at least 75% frequency and have at least 10% crown cover. Groups with less than 10% crown cover may be mentioned, especially in sparser understory stands.

Quantitative description

The average total vascular plant cover is given in addition to the frequency and average cover values for each physiognomic component that has either (frequency >= 50%) or (frequency >= 10% and cover >= 2%). The frequency and cover of each component are given in the format [*component name*] [*frequency*] @ [*cover*], where the component names include broadleaf and conifer trees, broadleaf and conifer regeneration, tall shrubs, shrubs, dwarf shrubs, forbs, grasses, sedges, rushes and ferns. Frequency is given as a decimal fraction ranging from 0.10–0.95; it is omitted for components with at least 0.95 frequency. Cover is given as an integer and represents the average crown cover of the component in percent.

Ecology (section Ecology)

The ecology field includes qualitative habitat-relevant information (e.g., slope, aspect, landform, slope position), soil descriptions, relation of the association to disturbance and successional processes, available information about canopy structure and species composition of the regeneration and occasionally other understory layers, observations regarding wildlife use, and common adjacent associations or land cover types. The slope, aspect, and regeneration layer information come directly from extraction of relevant quantities from GIS layers at plot locations or from quantitative analyses of field-collected data. The soils information typically relies heavily on Crawford et al. (2009). The slope position information integrates quantitative analysis of extracted local topographic curvature data, with field observations, and information from Crawford et al. (2009). The other information is compiled from accumulated field experience and/or observations made during plot quality control and classification revision.

Terms used to describe slope, aspect, soil moisture, and slope position are defined below.

Slope steepness[33]

- *Nearly flat*: Midpoint of extracted slope values 1–5 degrees.
- *Very gentle*: Midpoint 6–10 degrees.
- *Gentle*: Midpoint 11–15 degrees.
- *Fairly gentle*: Midpoint 16–22 degrees.
- <no steepness adjective>: Midpoint 23–28 degrees.
- *Fairly steep*: Midpoint 29–35 degrees.
- *Steep*: Midpoint 36–40 degrees.
- *Very steep*: Midpoint 41–45 degrees.
- *Precipitous*: Midpoint 45+ degrees.

Slope aspect[34]

- *South-facing*, *east-facing*: Slope aspect usually strongly oriented toward the south or east, 25th percentile southness or eastness value ≥ 80.
- *North-facing*, *west-facing*: Slope aspect usually strongly oriented toward the north or west; 75th percentile southness or eastness value ≤ 20.
- *Southerly aspects/tendencies*, *easterly aspects/tendencies*: Slope aspect typically with at least some southerly or easterly component, 25th percentile southness or eastness value ≥ 60.
- *Northerly aspects/tendencies*, *westerly aspects/tendencies*: Slope aspect typically with at least some northerly or westerly component 75th percentile southness or eastness value ≤ 40.

Soil moisture availability[35]

- *Dry*: Vegetation composition and structure strongly limited by moisture availability; forest canopies are at least somewhat open, and moist site indicator species[36] are absent. Soils are well-drained and very dry by summer's end.
- *Dry-mesic*: Conditions and vegetation composition intermediate between dry and mesic sites. Tree spacing (especially of regeneration layer) is wider, reflecting the larger soil area needed to draw water in summer.
- *Mesic*: Soils moist for much of the year, but dry by summer's end. Understory vegetation can be sparse or lush, but lacks both abundant tender herbaceous species and dry site indicators.[37] Lowland and montane mesic conifer forests often have depauperate understories due to low light penetration, especially in earlier seral stages.
- *Wet-mesic*: Soils moist year round, with plants experiencing little to no water stress. Sites usually support a lush, tender herbaceous layer (e.g., *Athyrium filix-femina, Tiarella trifoliata*) and/or a dense thin-leaved shrub layer (e.g., *Vaccinium ovalifolium, Rubus spectabilis*). Soils are usually rich in organic matter. Moisture availability does not limit tree spacing as much as light availability (often evidenced by the strong response of understory density to canopy openings, often including dense tree regeneration).
- *Wet*: Wetlands, with soils saturated at least part of the year. Species have adaptations to flooding or hydric soils.

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[33] The 25th and 75th percentile slope values compiled for each association were used to select one of these terms; see Environmental metrics for more information.

[34] The 25th and 75th percentile southness and eastness values compiled for each association were used; see Environmental metrics.

[35] We reference indicator species in distinguishing these moisture zones. However, this is not cut and dry (or wet). What might be a dry site indicator in some places may indicate moist sites in others. Local condition indicators tend to be most reliable toward the edges of a species' range: dry site indicators are most indicative at the wettest edge of their range, and wet site indicators are most indicative at the drier end of their range. For example, *Calamagrostis rubescens*, a species associated with the interior West, is most indicative of locally dry conditions at its western (climatically moistest) limit in the NCCN parks.

[36] Moist site indicators are restricted to wetter sites, and include *Adiantum aleuticum*, *Athyrium filix-femina*, *Carex nigricans*, *Carex spectabilis*, *Circaea alpina*, *Claytonia sibirica*, *Cornus stolonifera/occidentalis*, *Gentiana calycosa*, *Gymnocarpium dryopteris*, *Maianthemum dilatatum*, *Oplopanax horridus*, *Pedicularis groenlandica*, *Rubus spectabilis*, *Sambucus racemosa*, *Senecio triangularis*, *Struthiopteris spicant*, *Tiarella trifoliata*, *Urtica dioica*, *Valeriana sitchensis*, *Veratrum viride*, and *Viola glabella*.

[37] Dry and dry-mesic sites tend to have open understories, so indicator species are often shade-intolerant. They include *Apocynum androsaemifolium*, *Arctostaphylos nevadensis*, *Balsamorhiza sagittata*, *Berberis aquifolium*, *Calamagrostis rubescens*, *Chimaphila umbellata*, *Festuca occidentalis*, *Holodiscus discolor*, *Juniperus communis*, *Lewisia* spp., *Lomatium brandegeei*, and *Pseudoroegneria spicata*. The indicators are usually not restricted to dry sites, but are instead are tolerant of them, while other species are not. Because dry site indicators can also be found on wetter sites, their presence alone is not conclusive. Indicators of the driest sites (e.g., *Pseudoroegneria spicata*) tend to have ranges that extend beyond the park boundaries to the east.

Slope position[38]

- *Valley bottom*: A nearly level to gently sloping valley surface, including floodplains, low terraces and side stream channels. Very low topographic position percentile values are typical.
- *Toeslope*: The gently inclined base of a slope. These are depositional forms, including alluvial fans, debris aprons, and other colluvial deposits. Low topographic position values are typical, 75th percentile slope convexity value ≤ 45.
- *Lower slope*: The lower portion of a hill slope, concave in cross-section, and generally transitional to a depositional toeslope below. 75th percentile slope convexity value ≤ 45.
- *Midslope*: The middle and typically the steepest section of a hill slope, usually linear in cross-section (neither concave nor convex).
- *Upper slope*: The upper portion (or shoulder) of a hill slope. An erosional surface, convex in cross-section. 25th percentile slope convexity value ≥ 55.
- *Ridgetop*: The gentle inclined sides or flat top of a long and comparatively narrow summit ridge separating valleys. High topographic position values are typical, 25th percentile slope convexity value ≥ 55.

Environmental metrics (section Metrics)

In this field, summaries of a variety of environmental variables extracted from GIS layers at each collected plot are provided. For each variable, the 25th and 75th percentile values for the association are given. The range between these values, the *interquartile range*, represents the values of the variable that are exhibited by "typical" plots assigned to the association. Note that half of all plots in the association will have values lying either above or below this range, so it is expected that a representative example of an association will fall outside the given ranges for one or more of the variables. Be suspicious, however, if a plot fails to fit many of the metrics.

Only variables likely to be useful in the field are included. While climatic variables (e.g., annual precipitation, maximum summer temperatures) could have been provided, for the purposes of field use those variables are redundant with the range and elevation information provided above, and would have been more difficult to use.

- *slope*: local slope, in degrees
- *vdp*: vertical distance above nearest perennial stream channel, in meters
- *vdr*: vertical distance above nearest major river, in meters
- *east*: the east/west component of aspect; a site facing directly east has value 100, a site facing directly west has value 0, and a site facing directly north or south has value 50. (Technically, this is based on the sine of the compass aspect in degrees.)
- *south*: the south/north component of aspect; a site facing directly south has value 100, a site facing directly north has value 0, and a site facing directly east or west has value 50. (Technically, this is based on the negative cosine of the compass aspect in degrees.)
- *conv*: slope convexity calculated at 150-meter scale; values over 50 describe convex landforms, values below 50 describe concave landforms. The metric doesn't respond very intensely at typical sites: values of 60 or 40 represent very obviously convex and concave sites respectively. You'll rarely see values much higher (or lower) than those.
- *tpp*: topographic position percentile, calculated at 1500-meter scale. Values over 50 describe sites that have higher elevation than the majority of the surroundings within a 1500-meter radius. Values near 100 represent sites on a significant ridgetop. Likewise, values under 50 describe sites with lower elevations than the majority of the surroundings. This metric is helpful for assessing position on valley walls, etc.
- *solar*: direct solar radiation, where 100 represents the maximum exposure seen in the plot data (a subalpine site at MORA, on a SSW-facing 42-degree slope) and 0 represents the minimum seen (an alpine site at NOCA, on a NNE-facing 59-degree slope in a narrow concavity, collected via photointerpretation). Flat sites have values averaging 59, but range from 50 to 75, depending on elevation, latitude, and surrounding topography.
- *wet*: topographic wetness based on modeled hydrological flow accumulation and local slope, scaled as a categorical variable between 0 and 10. Values of 0 and 1 indicate very dry settings on midslopes and upper slopes, extremely steep and far above any perennial stream. Values of 2 and 3 indicate progressively more mesic sites, usually typically steep Pacific Northwest mountain sites, and may be no more than 30 to 80 vertical meters above a stream. Values of 4 indicate moist sites, usually on fairly gentle lower slopes and toeslopes, typically less than ten meters above a stream. Values of 5 indicate gently sloped sites typically along or immediately above the banks of a perennial stream, though still generally over 100 meters above any river. Values of 6 and higher indicate nearly flat settings in major river valleys and typically no more than a vertical meter or two above flowing water. Values of 6 may correspond to benches 20 to 30 meters above rivers, while values of 7 and 8 are associated with floodplains in increasing proximity to rivers. Values of 9 and 10 indicate the margins of rivers and are likely often underwater.

[38] The 25th and 75th percentile slope convexity and topographic position values compiled for each association were combined with field observations and notes from Crawford et al. (2009) to select one of these terms; see Environmental metrics.

Map class (section Map class)

This field gives the map class that the association was included in for mapping purposes. Occasionally associations were treated in different map classes for different parks, usually because a given map class was too rare in a particular park to permit accurate mapping. Refer to the map class description documents for the appropriate parks (Nielsen et al. 2021d-f) for more information.

Map class codes consist of a letter and a two-digit number. The letter represents the following categories: ***C*** (conifer-dominated), ***B*** (broadleaf tree-dominated), ***S*** (shrublands), ***H*** (herbaceous), ***R*** (rock), ***W*** (water, snow and ice) and ***M*** (miscellaneous, mostly disturbed and/or anthropogenic). The first digit is reserved by category: the ***00s*** are for lowland conifers, ***10s*** for montane conifers, ***20s*** for subalpine and alpine conifers, ***30s*** for broadleaf trees, ***40s*** for shrublands, ***50s*** for subalpine and lower elevation herbaceous vegetation, ***60s*** for alpine herbaceous vegetation, ***70s*** for rock barrens, ***80s*** for free or frozen water and ***90s*** for miscellaneous types. Within each "decade" map classes are loosely sorted by their environment, with ascending numbers signaling a gradient from wetter toward drier conditions. Map classes which include a large proportion of wetland occurrences (not including riparian) are given a ***W*** suffix.

Map class names generally describe the most typical expression of the class, and are most applicable at the park in which the class is most prominent. A species mentioned in the name need not necessarily be present, especially if it has a limited geographic range that doesn't include the area in which you are working.

Relation to C09 types (section Rel to C09)

This field explains the origin of each association, with reference to the C09 types. The seven following terms are used in the explanations:

- *Same*: The association was not intentionally modified and was maintained with the same name and abbreviation. However, with the benefit of the many plots collected, it may have become evident that the concept of the association differs from that described by Crawford. If this has been noted, it will be described, but the new associations have not been systematically compared to the originals so there are likely concept changes that are not noted here.
- *Similar*: The association was not intentionally modified; however, enough plots changed places between the original C09 type and other associations that it may have inadvertently taken on a different concept.
- *New abbreviation*: No intentional modifications were made and the association was maintained with the same name, but the abbreviation was changed to agree with the full name, or to remove confusion (e.g., VACOVA could mean either VACOVAL or VACOVAT).
- *New name*: No intentional modifications were made, but the name of the association was changed because it had caused significant confusion during the plot QC process due to its disagreement with the floristics of the NCCN plots that had been assigned to it. Only some names that misrepresent NCCN floristics were changed; many of the associations still have names that agree poorly.
- *Expanded*: The association was maintained with the same name and abbreviation, but significant numbers of plots originally assigned to other associations have been reassigned to it, likely altering its concept in some way. These reassignments may have been made because the plots were poor fits to their original assignment, or because the original assignment was eliminated due to heterogeneity, ambiguity, etc.
- *Evolved*: A new association name was created to represent a Crawford type that was eliminated but for which the majority of plots went into a single new association, where they were typically joined by plots reassigned from other C09 types.
- *Split*: A heterogeneous Crawford type was eliminated and broken into two or more new associations representing variants of the original type, where they were often joined by plots reassigned from other C09 types.
- *Created*: A new association was created by combining plots assigned to multiple different C09 types, with no single main Crawford type forming its core.

For an explanation of the changes to the classification made from the perspective of the Crawford et al. (2009) associations, see Modifications to Crawford et al. (2009) associations.

Similar associations & indicators (section Similar)

The similar associations portion of the description is meant to help users determine if another association might be a better match for a plot they are considering. It includes two sections.

First, the ten floristically most similar associations are given, beginning with the most similar.[39] Each of the association abbreviations is preceded by letters that specify which of the three major NCCN parks it is known from (i.e., various combinations of the letters M, N and O), so irrelevant results can be skipped.

The second section provides indicators for distinguishing the five most similar associations from the current one.[40] The indicators are chosen from both species and from summed physiognomic layers.[41] The first characteristics listed—after the ID of the alternate section and before [keep]—are indications that the alternate association is preferable to the current association; those after [keep] indicate the current association is better. Two kinds of indicators are provided. (1) Presence indicators are signaled with stars (*, **, ***), and provide evidence no matter the amount of cover, as long as a species is present. The number of stars indicates the strength and reliability of the indicator. You can compare the strength of evidence for each class by adding up the total number of stars corresponding to the species that are present in the plot. (2) Cover indicators are signaled with a number. If the species (or structural layer) has percent cover equal to or exceeding that value, it constitutes evidence roughly equivalent to a 2-star presence indicator. If a cover indicator is also a presence indicator, it is only listed once, with both star(s) and a number. Indicators are listed with layer totals first and then species in alphabetical order, to make scanning the list easier. ***Important***: Lack of an indicator is not evidence against a map class, but the absence of species listed as occurring at very high frequency in the floristics table for a map class can be construed that way. Always consult the floristics table and check for presence of species that are documented there at very high frequency.

Floristics table (section Floristics)

The floristics table gives the frequency (constancy) and average cover for all species[42] that occur with regularity in the full floristics plots collected across the three large NCCN parks. Species are binned in the table by their frequency and their lifeform. Within each bin, species are listed with a number that represents their average cover when they are present.[43] All species which occur with at least 25% frequency are included. Species which occur in 10–25% (very rarely, 10–40%) of plots are only included if they have an average cover greater than the value indicated in the header.[44] Species occurring in less than 10% of the association's plots are not listed, regardless of their average cover when they do occur. The header of the table, in addition to giving the cover threshold for inclusion for species in the 10–25% frequency category, also gives the number of plots with full floristics in each of the NCCN parks.

[39] The assessment of similar was based on the SCM analysis developed during the mapping project; see the mapping reports for a description of this multivariate assessment of floristic fit.

[40] To save space, only the 3-digit association ID for the alternate associations is given here. Indicators are listed in numeric order by association ID, not in order of similarity.

[41] GT5 tree cover totals are given as C-GT5 for conifers and B-GT5 for broadleaf trees, and LT5 (regen) tree totals are given as C-LT5 for conifers and B-LT5 for broadleaf trees. Tall shrub (TSHRB) and shrub (SHRB) group totals are also given. The only ground layer structural group used in indicator tables are forbs, abbreviated FORB.

[42] Rarer or more-difficult-to-identify-correctly species are often binned into groups identified by a typical member and a plus sign. These groups, called SCM groups, were created during the mapping project to handle incomplete floristic information. For definitions of the members of all SCM groups, see the taxonomic tables (Institute for Natural Resources 2021) accompanying the vegetation mapping reports.

[43] Average cover of 0 indicates trace amounts (less than 0.5% cover).

[44] For example, if the header says "at 10–25% frequency, includes only species with cover ≥ 0.5%," the table includes all species with frequency at least 25%, and species with average cover greater than 0.5% for those with frequency 10–25%. Species with frequency less than 10% are never included.

Additional squishy terms

The following rather subjective terms are occasionally used in various verbal descriptions.

Frequency of physiognomic groups or species

- Always: Present in 95–100% of occurrences of a vegetation type
- Usually/typically: Present in 80–95% ...
- Frequently: ... 60–80% ...
- Often: ... 40–60% ...
- Sometimes: ... 25–40% ...
- Occasionally: ... 10–25% ...
- Rarely: ... less than 10% ...

Abundance of physiognomic groups or species

- *Dominant*: The most abundant physiognomic group or species in a vertical layer.
- *Codominant*: Physiognomic groups or species that share dominance with others in a vertical layer.
- *Well-developed*: Groups or species with crown cover at least 10%.
- *Prominent*: Key components that are noticed almost immediately; crown cover at least 2%.
- *Significant*: Components with crown cover more than a trace.
- *Present*: Components that are present at any abundance.

Guide to use

The main part of this document—from the beginning of the Vegetation association descriptions section above onward—is designed for efficient use in the field. The pages preceding that section are not needed in the field, unless insomnia is an issue.

Taxonomy follows Hitchcock and Cronquist (2018). You may wish to have available a copy of INR (2021); **Table 1** there contains a list of taxa known from the associations in this classification and a cross-reference to older accepted names. The **Similar** and **Floristics** sections often refer to artificial sub-genus groups called *SCM taxa*, which are indicated by a '+' after a species name. These groups are defined in **Table 2** in INR (2021). Presence of all species in the group should be summed for comparison with the information given here. Qualitative terms used in the association descriptions are defined in the tables above, but in general they are there just for convenience. Most are backed up by quantitative descriptions in the **Range**, **Struct**, **Metrics**, and **Floristics** sections of the descriptions.

In the field

1. Find a patch

To identify a vegetation patch, begin by finding one. The association descriptions work best for plots with homogeneous structure and species composition. Plots must be large enough to contain all species with significant presence in the vegetation type, and must show no obvious trends in the dominant canopy as the plot is traversed. They should be homogeneous at the association level, containing no inclusions of alternate associations that are of mappable size, generally 100 m^2 (e.g., 10x10 meters) or greater.

In general, the minimum plot size will depend on the size of the dominant individual plants. Most forest plots should be at least 400 m^2 to provide a sample sufficient to encompass the full mix of overstory species mix and smooth over understory patchiness. However, distinct patches in the alpine zone which match association concepts may be only meters across. Although some associations may be recognizable at spatial extents smaller than ten meters, be aware that in general the vegetation map does not show patches narrower than that in their narrowest dimension.

Most single-species patches do not represent a community that can be placed in this classification. Expand the spatial scale; you are likely looking at an instance of heterogeneity in the background association. Although theoretically many of the associations in this classification can occur with extremely low vascular vegetation cover, a patch without sufficient cover to provide an informative species sample will be difficult to identify reliably at the association level. Such areas are typically mapped as one of the unvegetated map classes.

Determining the appropriate scale for sampling and delineating an appropriate patch depend to some extent on being aware of the association possibilities. Familiarize yourself with the classification!

2. Note the vegetation structure and the ecological setting

Note the relative abundance of vegetation in each physiognomic group and which group comprises the dominant vegetation (generally the uppermost vertical strata with at least 10% or so canopy cover). The association descriptions provide information

for the following groups: conifers over 5 meters tall, conifers under 5 meters tall, broadleaf trees over 5 meters tall, broadleaf trees under 5 meters tall, tall shrubs, shrubs, dwarf shrubs, forbs and graminoids. Within the graminoids, grasses, sedges and rushes are split out for some purposes. Occasionally non-vascular vegetation, especially moss cover, can be very informative.

Take note also whether the vegetation patch lies in some clear environmental setting (e.g., wetlands or valley bottoms, exposed rock slopes or bedrock balds) and whether it is or has been obviously influenced by disturbance processes (e.g., avalanche, rock slide, fire). Many of the associations are strongly tied to particular settings and disturbance types, and will state that clearly in their descriptions.

3. Identify the dominant species

Begin by identifying the dominant species (possibly plural) in the dominant layer and in well-represented structural layers beneath that. Refer to the Regional association lists for the park section you are in (or nearest to). Scan the *Well-established* list given there for an association abbreviation beginning with any of the dominant species from the dominant layer.[45] If none match, consider the associations listed under the *Rare, restricted or uncertain* list. If multiple associations are listed beginning with the dominant species in the dominant layer, pick the one that most closely matches your observations of the dominants in lower layers. (Remember that species abbreviations shown in parentheses are often absent, while those without parentheses are almost always present!)

If you prefer to review all descriptions for associations whose names start with any given species, independent of distributional range, you can locate the first page by using the bookmarks table at the beginning of the Association treatments.

4. Confirm the match

Turn to the descriptions page for the association whose name best matches your plot (associations are ordered sequentially by number, which is identified at the top of each page). Compare the information given in the **Range**, **Struct** and **Ecology** sections to your site, and check that the species shown in the Floristics section as being present 80% or more of the time are present in your plot, and with cover that is in the same order of magnitude as is typical. Also confirm that the overall species composition of your plot appears to be within the typical range of variation for the association (e.g., not including too many species that aren't listed, including at least a few of the more common species, cover values generally not wildly different, etc.). If you have any doubts (you should always have doubts) then also review the information in the **Metrics** section, which describes the "typical" plot in terms of its position along environmental gradients. ***Remember that many plots which are perfectly good fits may differ in one or more regards from the information given in all these sections.*** However, if several distinct elements appear amiss, be quite wary.

5. Compare alternatives

Always at least scan the list of floristically similar associations given in the **Similar** section. If there are multiple points of departure from the characteristics reviewed above, then consider that list deeply. If the names of any of the alternatives seem to match your site well, then see if indicator species are given to compare to that alternative (indicators are only listed for the first five or so most similar alternatives). If indicators are given, apply them as described in the Similar associations & indicators section above. If the indicator results indicate that the alternative may be as likely, or if no indicators are listed but the alternative seems plausible based on its name, then turn to that association and begin by checking that the species shown with 80% or higher frequency in the Floristics table are present and proceeding to assess in the manner described above. You may find an alternative that is preferable but which itself leads you on to an even better association.

In the office

The same procedure suggested above can be applied to assign plots to associations in the office, provided good floristic data were collected. However, assignments will likely be more reliable, and definitely much easier to generate, using the multivariate approach discussed in this report. If you are interested, contact the lead author for R code and/or spreadsheet-driven tools to use for this purpose. Also, although space limitations here only allowed showing indicators for a few alternates to each association, they have been generated to distinguish between all possible pairs of associations. Those are available in a spreadsheet format.

[45] Remember that although full species names are given based on Hitchcock and Cronquist (2018), species abbreviations may be derived from an older accepted name (e.g., associations dominated by Alaska-cedar, *Callitropsis nootkatensis*, are abbreviated beginning with CUPNOO—the shortened form of its previous name, *Cupressus nootkatensis*). VACALA, MENFER, RUBPAR, LUPARC, ARECAP and BLESPI represent some other frequently encountered changed names. See INR (2021) and familiarize yourself with species with changed names so you will not be thrown.

Regional association lists

Association list for MORA northwest region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[007] ABIAMA-TSUHET/ORTSEC
[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN	[008] ABIAMA-TSUHET-(PSEMEN)/VACALA
[003] ABIAMA-PSEMEN/ACHTRI	[011] ABIAMA-TSUMER/MENFER
[006] ABIAMA-TSUHET/OPLHOR	[012] ABIAMA-TSUMER/VACMEM
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT
[013] ABIAMA-TSUMER/VACMEM/ERYMON	[016] ABILAS-(ABIAMA)/VACMEM/XERTEN
[014] ABIAMA/VACMEM/RUBLAS	[020] ABILAS-(PINALB)/JUNCOM_KRUMM
[028] ABILAS/VACDEL-VALSIT	[030] ABILAS/VACMEM/LUPARC
[037] ACECIR-OPLHOR/ATHFIL	[031] ABILAS/VACSCO-VALSIT
[048] ALNRUB/OPLHOR-RUBSPE	[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN
[055] ALNVIR-OPLHOR	[052] ALNRUB/RUBSPE/POLMUN-CLASIB
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[058] ALNVIR-(SAMRAC)/THAOCC
[063] ARCUVA-(DASFLO)	[059] ANTLAN-(OREALP-VACDEL)
[073] CARNIG-KALMIC-(VACDEL)	[065] ARCUVA-JUNCOM
[074] CARNIG-LUEPEC	[067] ATHAME-CRYACR
[076] CARSPE-(LUPARC-POLBIS)	[072] CAREX-CALLEP-(LEPPYR)
[077] CASMER-PHYEMP	[075] CARSPE-CARNIG-(POTFLA)
[086] EMPNIG-LUPSEL	[091] FESVIR-LUPARC-(ANTLAN-POTFLA)
[106] PHYEMP-VACDEL-(CASMER)	[095] JUNCOM-(PHLDIF)
[107] PHYEMP-(VACDEL)/LUPARC	[100] LUEPEC-(CARSPE)
[150] PSEMEN-TSUHET/(ACECIR)/POLMUN	[162] RUBPAR/PTEAQU-CHAANG
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[166] SALSIT-(CORSER)/URTDIO
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[169] SAXTOL-LUZPIP-(CARNIG)
[156] PSEMEN-TSUHET/MAHNER/POLMUN	[181] TSUHET-ABIAMA-PSEMEN/GAUSHA
[160] PSEMEN-TSUHET/VACALA/XERTEN	[182] TSUHET-ABIAMA-PSEMEN/MAHNER
[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)	[188] TSUHET-PICSIT/POLMUN-BLESPI
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	[199] TSUHET-THUPLI/GAUSHA/LYSAME
[179] TRICAE-DODJEF	[201] TSUHET-THUPLI/LYSAME-ATHFIL
[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN	[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	[207] TSUMER-ABILAS/VACMEM/XERTEN
[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI	[209] VACDEL-FESVIR
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[187] TSUHET-ABIAMA/VACALA/TIATRI	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[194] TSUHET-PSEMEN/POLMUN-BLESPI	
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	
[204] TSUMER-ABIAMA/RHOALB	
[205] TSUMER-ABILAS/PHYEMP_KRUMM	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[208] TSUMER/PHYEMP-VACDEL	
[213] VACMEM/XERTEN	

Association list for MORA northeast region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[006] ABIAMA-TSUHET/OPLHOR
[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN	[013] ABIAMA-TSUMER/VACMEM/ERYMON
[003] ABIAMA-PSEMEN/ACHTRI	[035] ACECIR/GALIUM-(POLMUN)
[004] ABIAMA-PSEMEN/VACMEM	[046] ALNRUB/ATHFIL-LYSAME
[005] ABIAMA/RHOALB	[054] ALNRUB/STACHA-TOLMEN
[007] ABIAMA-TSUHET/ORTSEC	[055] ALNVIR-OPLHOR
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[065] ARCUVA-JUNCOM
[012] ABIAMA-TSUMER/VACMEM	[071] CARNIG-CARLEN-(CALCAN)
[014] ABIAMA/VACMEM/RUBLAS	[072] CAREX-CALLEP-(LEPPYR)
[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT	[073] CARNIG-KALMIC-(VACDEL)
[016] ABILAS-(ABIAMA)/VACMEM/XERTEN	[074] CARNIG-LUEPEC
[019] ABILAS-(PINALB)/FESVIR-LUPARC	[084] DASFLO-(PHLDIF)
[020] ABILAS-(PINALB)/JUNCOM_KRUMM	[092] FESVIR-PHLDIF-ARECAP
[027] ABILAS/RHOALB/RUBLAS	[101] LUIHYP-(LOMMAR-CASPAR)
[028] ABILAS/VACDEL-VALSIT	[102] PAXMYR/PHLDIF
[030] ABILAS/VACMEM/LUPARC	[103] PENDAV/RACOMITRIUM
[031] ABILAS/VACSCO-VALSIT	[104] PHLDIF-(LOMMAR-CARPHA)
[032] ABILAS/VALSIT	[106] PHYEMP-VACDEL-(CASMER)
[033] ABILAS/VERVIR	[118] PINALB/JUNCOM
[058] ALNVIR-(SAMRAC)/THAOCC	[140] PSEMEN/MAHNER/ACHTRI
[059] ANTLAN-(OREALP-VACDEL)	[144] PSEMEN-(PINCON)/ARCUVA/RACCAN
[063] ARCUVA-(DASFLO)	[151] PSEMEN-TSUHET/ACHTRI
[075] CARSPE-CARNIG-(POTFLA)	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[076] CARSPE-(LUPARC-POLBIS)	[154] PSEMEN-TSUHET/GAUSHA-VACPAR
[077] CASMER-PHYEMP	[156] PSEMEN-TSUHET/MAHNER/POLMUN
[080] CUPNOO-(ABILAS)/CLIUNI	[157] PSEMEN-TSUHET/PAXMYR/LINBOR
[082] CUPNOO-(VACMEM)/PAXMYR	[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR
[086] EMPNIG-LUPSEL	[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI
[087] ERIPYR-POLDAV	[187] TSUHET-ABIAMA/VACALA/TIATRI
[090] FESVIR-EUC(LED,ENG)	[206] TSUMER-ABILAS/VACDEL-PHYEMP
[091] FESVIR-LUPARC-(ANTLAN-POTFLA)	[209] VACDEL-FESVIR
[100] LUEPEC-(CARSPE)	[211] VACMEM/PAXMYR-VACSCO-CARGEY
[105] PHLDIF-LUPSEL-(PEDCON)	[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS
[107] PHYEMP-(VACDEL)/LUPARC	[213] VACMEM/XERTEN
[155] PSEMEN-TSUHET/MAHNER	[214] VACSCO-FESVIR-ARECAP
[163] SALCOM/CAREX-(LEPPYR)	[215] VALSIT-CARSPE
[164] SALCOM/VALSIT	
[169] SAXTOL-LUZPIP-(CARNIG)	
[171] SORSIT-VACMEM/VALSIT	
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[204] TSUMER-ABIAMA/RHOALB	
[216] VALSIT-LIGGRA	
[217] VALSIT-VERVIR	

Association list for MORA southwest region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[005] ABIAMA/RHOALB
[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN	[011] ABIAMA-TSUMER/MENFER
[003] ABIAMA-PSEMEN/ACHTRI	[014] ABIAMA/VACMEM/RUBLAS
[004] ABIAMA-PSEMEN/VACMEM	[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT
[006] ABIAMA-TSUHET/OPLHOR	[016] ABILAS-(ABIAMA)/VACMEM/XERTEN
[007] ABIAMA-TSUHET/ORTSEC	[019] ABILAS-(PINALB)/FESVIR-LUPARC
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[027] ABILAS/RHOALB/RUBLAS
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[031] ABILAS/VACSCO-VALSIT
[012] ABIAMA-TSUMER/VACMEM	[032] ABILAS/VALSIT
[013] ABIAMA-TSUMER/VACMEM/ERYMON	[033] ABILAS/VERVIR
[028] ABILAS/VACDEL-VALSIT	[038] (ACEMAC)/ACECIR-PAXMYR
[035] ACECIR/GALIUM-(POLMUN)	[042] ACEMAC-(PSEMEN)/POLMUN
[036] ACECIR-(HOLDIS)	[044] ACEMAC/RUBSPE/TOLMEN
[046] ALNRUB/ATHFIL-LYSAME	[052] ALNRUB/RUBSPE/POLMUN-CLASIB
[048] ALNRUB/OPLHOR-RUBSPE	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[054] ALNRUB/STACHA-TOLMEN
[071] CARNIG-CARLEN-(CALCAN)	[055] ALNVIR-OPLHOR
[074] CARNIG-LUEPEC	[059] ANTLAN-(OREALP-VACDEL)
[075] CARSPE-CARNIG-(POTFLA)	[070] CARAQU-(MENTRI-EQUISETUM)
[076] CARSPE-(LUPARC-POLBIS)	[073] CARNIG-KALMIC-(VACDEL)
[077] CASMER-PHYEMP	[082] CUPNOO-(VACMEM)/PAXMYR
[090] FESVIR-EUC(LED,ENG)	[086] EMPNIG-LUPSEL
[100] LUEPEC-(CARSPE)	[091] FESVIR-LUPARC-(ANTLAN-POTFLA)
[106] PHYEMP-VACDEL-(CASMER)	[103] PENDAV/RACOMITRIUM
[107] PHYEMP-(VACDEL)/LUPARC	[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM
[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN	[125] POPBAL-(ALNRUB)/SALSIT
[150] PSEMEN-TSUHET/(ACECIR)/POLMUN	[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN
[151] PSEMEN-TSUHET/ACHTRI	[137] PSEMEN/GAUSHA-MAHNER
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[144] PSEMEN-(PINCON)/ARCUVA/RACCAN
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[157] PSEMEN-TSUHET/PAXMYR/LINBOR
[155] PSEMEN-TSUHET/MAHNER	[163] SALCOM/CAREX-(LEPPYR)
[156] PSEMEN-TSUHET/MAHNER/POLMUN	[164] SALCOM/VALSIT
[160] PSEMEN-TSUHET/VACALA/XERTEN	[169] SAXTOL-LUZPIP-(CARNIG)
[162] RUBPAR/PTEAQU-CHAANG	[171] SORSIT-VACMEM/VALSIT
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	[187] TSUHET-ABIAMA/VACALA/TIATRI
[181] TSUHET-ABIAMA-PSEMEN/GAUSHA	[194] TSUHET-PSEMEN/POLMUN-BLESPI
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	[199] TSUHET-THUPLI/GAUSHA/LYSAME
[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI	[207] TSUMER-ABILAS/VACMEM/XERTEN
[186] TSUHET-ABIAMA/VACALA/RUBPED	[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	[213] VACMEM/XERTEN
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[201] TSUHET-THUPLI/LYSAME-ATHFIL	
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	
[204] TSUMER-ABIAMA/RHOALB	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[208] TSUMER/PHYEMP-VACDEL	
[209] VACDEL-FESVIR	
[215] VALSIT-CARSPE	
[216] VALSIT-LIGGRA	
[217] VALSIT-VERVIR	

Association list for MORA southeast region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[005] ABIAMA/RHOALB
[003] ABIAMA-PSEMEN/ACHTRI	[011] ABIAMA-TSUMER/MENFER
[004] ABIAMA-PSEMEN/VACMEM	[013] ABIAMA-TSUMER/VACMEM/ERYMON
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[016] ABILAS-(ABIAMA)/VACMEM/XERTEN
[012] ABIAMA-TSUMER/VACMEM	[031] ABILAS/VACSCO-VALSIT
[014] ABIAMA/VACMEM/RUBLAS	[038] (ACEMAC)/ACECIR-PAXMYR
[019] ABILAS-(PINALB)/FESVIR-LUPARC	[046] ALNRUB/ATHFIL-LYSAME
[027] ABILAS/RHOALB/RUBLAS	[048] ALNRUB/OPLHOR-RUBSPE
[028] ABILAS/VACDEL-VALSIT	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[030] ABILAS/VACMEM/LUPARC	[058] ALNVIR-(SAMRAC)/THAOCC
[032] ABILAS/VALSIT	[059] ANTLAN-(OREALP-VACDEL)
[033] ABILAS/VERVIR	[063] ARCUVA-(DASFLO)
[035] ACECIR/GALIUM-(POLMUN)	[065] ARCUVA-JUNCOM
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[073] CARNIG-KALMIC-(VACDEL)
[071] CARNIG-CARLEN-(CALCAN)	[082] CUPNOO-(VACMEM)/PAXMYR
[074] CARNIG-LUEPEC	[086] EMPNIG-LUPSEL
[075] CARSPE-CARNIG-(POTFLA)	[087] ERIPYR-POLDAV
[076] CARSPE-(LUPARC-POLBIS)	[091] FESVIR-LUPARC-(ANTLAN-POTFLA)
[077] CASMER-PHYEMP	[092] FESVIR-PHLDIF-ARECAP
[090] FESVIR-EUC(LED,ENG)	[104] PHLDIF-(LOMMAR-CARPHA)
[100] LUEPEC-(CARSPE)	[105] PHLDIF-LUPSEL-(PEDCON)
[103] PENDAV/RACOMITRIUM	[139] PSEMEN/HOLDIS-ROSGYM/FESOCC
[106] PHYEMP-VACDEL-(CASMER)	[164] SALCOM/VALSIT
[107] PHYEMP-(VACDEL)/LUPARC	[172] SPISPL/CARSPE
[137] PSEMEN/GAUSHA-MAHNER	[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)
[140] PSEMEN/MAHNER/ACHTRI	[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR
[151] PSEMEN-TSUHET/ACHTRI	[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[198] TSUHET-(PSEMEN)/VACALA/POLMUN
[155] PSEMEN-TSUHET/MAHNER	[208] TSUMER/PHYEMP-VACDEL
[160] PSEMEN-TSUHET/VACALA/XERTEN	[209] VACDEL-FESVIR
[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)	[214] VACSCO-FESVIR-ARECAP
[169] SAXTOL-LUZPIP-(CARNIG)	[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM
[171] SORSIT-VACMEM/VALSIT	
[181] TSUHET-ABIAMA-PSEMEN/GAUSHA	
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[187] TSUHET-ABIAMA/VACALA/TIATRI	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)	
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	
[204] TSUMER-ABIAMA/RHOALB	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS	
[213] VACMEM/XERTEN	
[215] VALSIT-CARSPE	
[216] VALSIT-LIGGRA	
[217] VALSIT-VERVIR	

Association list for NOCA northwest region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[028] ABILAS/VACDEL-VALSIT
[006] ABIAMA-TSUHET/OPLHOR	[036] ACECIR-(HOLDIS)
[007] ABIAMA-TSUHET/ORTSEC	[041] ACEMAC/POLMUN-TOLMEN
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[048] ALNRUB/OPLHOR-RUBSPE
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[055] ALNVIR-OPLHOR
[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL	[056] ALNVIR/PTEAQU-ATHFIL
[011] ABIAMA-TSUMER/MENFER	[071] CARNIG-CARLEN-(CALCAN)
[012] ABIAMA-TSUMER/VACMEM	[072] CAREX-CALLEP-(LEPPYR)
[034] ACER-CORSER/(PTEAQU)	[073] CARNIG-KALMIC-(VACDEL)
[035] ACECIR/GALIUM-(POLMUN)	[075] CARSPE-CARNIG-(POTFLA)
[037] ACECIR-OPLHOR/ATHFIL	[079] CHALAT-(OXYDIG-VALSIT)
[038] (ACEMAC)/ACECIR-PAXMYR	[086] EMPNIG-LUPSEL
[042] ACEMAC-(PSEMEN)/POLMUN	[088] EUCPAU-(PHAHAS-CASMIN)
[044] ACEMAC/RUBSPE/TOLMEN	[104] PHLDIF-(LOMMAR-CARPHA)
[052] ALNRUB/RUBSPE/POLMUN-CLASIB	[108] PHYGLA-(CASMER)
[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL	[120] PINCON-PSEMEN/GAUSHA
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[122] POPBAL-ACEMAC/ACECIR/POLMUN
[058] ALNVIR-(SAMRAC)/THAOCC	[125] POPBAL-(ALNRUB)/SALSIT
[067] ATHAME-CRYACR	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[069] BETPAP-(THUPLI)/ACECIR/MAHNER	[157] PSEMEN-TSUHET/PAXMYR/LINBOR
[070] CARAQU-(MENTRI-EQUISETUM)	[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN
[074] CARNIG-LUEPEC	[162] RUBPAR/PTEAQU-CHAANG
[076] CARSPE-(LUPARC-POLBIS)	[181] TSUHET-ABIAMA-PSEMEN/GAUSHA
[077] CASMER-PHYEMP	[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI
[082] CUPNOO-(VACMEM)/PAXMYR	[217] VALSIT-VERVIR
[100] LUEPEC-(CARSPE)	
[106] PHYEMP-VACDEL-(CASMER)	
[107] PHYEMP-(VACDEL)/LUPARC	
[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM	
[150] PSEMEN-TSUHET/(ACECIR)/POLMUN	
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	
[169] SAXTOL-LUZPIP-(CARNIG)	
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[187] TSUHET-ABIAMA/VACALA/TIATRI	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	
[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)	
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	
[204] TSUMER-ABIAMA/RHOALB	
[205] TSUMER-ABILAS/PHYEMP_KRUMM	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[208] TSUMER/PHYEMP-VACDEL	
[215] VALSIT-CARSPE	

Association list for NOCA northeast region

Well-established	Rare, restricted or uncertain
[004] ABIAMA-PSEMEN/VACMEM	[007] ABIAMA-TSUHET/ORTSEC
[006] ABIAMA-TSUHET/OPLHOR	[011] ABIAMA-TSUMER/MENFER
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[014] ABIAMA/VACMEM/RUBLAS
[012] ABIAMA-TSUMER/VACMEM	[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT
[026] ABILAS-(PSEMEN)/VACMEM/CALRUB	[016] ABILAS-(ABIAMA)/VACMEM/XERTEN
[028] ABILAS/VACDEL-VALSIT	[027] ABILAS/RHOALB/RUBLAS
[030] ABILAS/VACMEM/LUPARC	[036] ACECIR-(HOLDIS)
[034] ACER-CORSER/(PTEAQU)	[037] ACECIR-OPLHOR/ATHFIL
[035] ACECIR/GALIUM-(POLMUN)	[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM
[038] (ACEMAC)/ACECIR-PAXMYR	[062] ARCNEV/PSESPI
[046] ALNRUB/ATHFIL-LYSAME	[067] ATHAME-CRYACR
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[071] CARNIG-CARLEN-(CALCAN)
[064] ARCUVA-FRAVIR/RACOMITRIUM	[072] CAREX-CALLEP-(LEPPYR)
[068] BETPAP-PSEMEN/ACECIR/PAXMYR	[078] CEAVEL-(SPIBET)/CALRUB
[069] BETPAP-(THUPLI)/ACECIR/MAHNER	[082] CUPNOO-(VACMEM)/PAXMYR
[070] CARAQU-(MENTRI-EQUISETUM)	[090] FESVIR-EUC(LED,ENG)
[074] CARNIG-LUEPEC	[093] HERMAX-(THAOCC-SAUAME)
[077] CASMER-PHYEMP	[094] JUNPAR-(POLBIS)
[092] FESVIR-PHLDIF-ARECAP	[104] PHLDIF-(LOMMAR-CARPHA)
[102] PAXMYR/PHLDIF	[108] PHYGLA-(CASMER)
[103] PENDAV/RACOMITRIUM	[118] PINALB/JUNCOM
[106] PHYEMP-VACDEL-(CASMER)	[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR
[107] PHYEMP-(VACDEL)/LUPARC	[145] PSEMEN-PINPON/ARCNEV
[119] PINCON/PAXMYR/CALRUB	[146] PSEMEN-PINPON/CALRUB
[120] PINCON-PSEMEN/GAUSHA	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM	[154] PSEMEN-TSUHET/GAUSHA-VACPAR
[126] POPBAL/CORSER	[156] PSEMEN-TSUHET/MAHNER/POLMUN
[129] POPTRE-PAXMYR_SHRUB	[162] RUBPAR/PTEAQU-CHAANG
[131] PSESPI/SELWAL	[165] SALSCO-SORSCO-AMEALN/PAXMYR
[133] PSEMEN/ACECIR/MAHNER	[170] SORSIT/VACDEL-PHYEMP
[138] PSEMEN/HOLDIS/CALRUB	[172] SPISPL/CARSPE
[141] PSEMEN/MAHNER/CALRUB	[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR
[143] PSEMEN-PINCON/ARCNEV	[187] TSUHET-ABIAMA/VACALA/TIATRI
[144] PSEMEN-(PINCON)/ARCUVA/RACCAN	[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL
[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR	[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)
[155] PSEMEN-TSUHET/MAHNER	[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)
[157] PSEMEN-TSUHET/PAXMYR/LINBOR	[205] TSUMER-ABILAS/PHYEMP_KRUMM
[166] SALSIT-(CORSER)/URTDIO	[209] VACDEL-FESVIR
[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)	[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM
[169] SAXTOL-LUZPIP-(CARNIG)	
[171] SORSIT-VACMEM/VALSIT	
[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL	
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[201] TSUHET-THUPLI/LYSAME-ATHFIL	
[204] TSUMER-ABIAMA/RHOALB	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[208] TSUMER/PHYEMP-VACDEL	
[210] VACMEM/PAXMYR-ARECAP-(CALRUB)	
[215] VALSIT-CARSPE	

Association list for NOCA central-west region

Well-established	Rare, restricted or uncertain
[006] ABIAMA-TSUHET/OPLHOR	[004] ABIAMA-PSEMEN/VACMEM
[007] ABIAMA-TSUHET/ORTSEC	[008] ABIAMA-TSUHET-(PSEMEN)/VACALA
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[013] ABIAMA-TSUMER/VACMEM/ERYMON
[012] ABIAMA-TSUMER/VACMEM	[014] ABIAMA/VACMEM/RUBLAS
[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM	[033] ABILAS/VERVIR
[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL	[035] ACECIR/GALIUM-(POLMUN)
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[038] (ACEMAC)/ACECIR-PAXMYR
[074] CARNIG-LUEPEC	[042] ACEMAC-(PSEMEN)/POLMUN
[077] CASMER-PHYEMP	[046] ALNRUB/ATHFIL-LYSAME
[100] LUEPEC-(CARSPE)	[052] ALNRUB/RUBSPE/POLMUN-CLASIB
[106] PHYEMP-VACDEL-(CASMER)	[064] ARCUVA-FRAVIR/RACOMITRIUM
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[066] ARTLUD-LOMMAR
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[067] ATHAME-CRYACR
[155] PSEMEN-TSUHET/MAHNER	[069] BETPAP-(THUPLI)/ACECIR/MAHNER
[162] RUBPAR/PTEAQU-CHAANG	[070] CARAQU-(MENTRI-EQUISETUM)
[166] SALSIT-(CORSER)/URTDIO	[072] CAREX-CALLEP-(LEPPYR)
[169] SAXTOL-LUZPIP-(CARNIG)	[076] CARSPE-(LUPARC-POLBIS)
[170] SORSIT/VACDEL-PHYEMP	[079] CHALAT-(OXYDIG-VALSIT)
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	[082] CUPNOO-(VACMEM)/PAXMYR
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	[083] DANINT/RACOMITRIUM
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	[086] EMPNIG-LUPSEL
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	[108] PHYGLA-(CASMER)
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	[120] PINCON-PSEMEN/GAUSHA
[206] TSUMER-ABILAS/VACDEL-PHYEMP	[122] POPBAL-ACEMAC/ACECIR/POLMUN
[208] TSUMER/PHYEMP-VACDEL	[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM
[215] VALSIT-CARSPE	[125] POPBAL-(ALNRUB)/SALSIT
[217] VALSIT-VERVIR	[126] POPBAL/CORSER
[006] ABIAMA-TSUHET/OPLHOR	[137] PSEMEN/GAUSHA-MAHNER
[007] ABIAMA-TSUHET/ORTSEC	[144] PSEMEN-(PINCON)/ARCUVA/RACCAN
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[150] PSEMEN-TSUHET/(ACECIR)/POLMUN
[012] ABIAMA-TSUMER/VACMEM	[156] PSEMEN-TSUHET/MAHNER/POLMUN
[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM	[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN
[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL	[164] SALCOM/VALSIT
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)
[074] CARNIG-LUEPEC	[172] SPISPL/CARSPE
[077] CASMER-PHYEMP	[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN
[100] LUEPEC-(CARSPE)	[186] TSUHET-ABIAMA/VACALA/RUBPED
[106] PHYEMP-VACDEL-(CASMER)	[187] TSUHET-ABIAMA/VACALA/TIATRI
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)
[155] PSEMEN-TSUHET/MAHNER	[204] TSUMER-ABIAMA/RHOALB
[162] RUBPAR/PTEAQU-CHAANG	[205] TSUMER-ABILAS/PHYEMP_KRUMM
[166] SALSIT-(CORSER)/URTDIO	
[169] SAXTOL-LUZPIP-(CARNIG)	
[170] SORSIT/VACDEL-PHYEMP	
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[208] TSUMER/PHYEMP-VACDEL	
[215] VALSIT-CARSPE	
[217] VALSIT-VERVIR	

Association list for NOCA central-east region

Well-established	Rare, restricted or uncertain
[004] ABIAMA-PSEMEN/VACMEM	[001] ABIAMA-CUPNOO-TSUHET/VACALA
[006] ABIAMA-TSUHET/OPLHOR	[009] ABIAMA-TSUHET/RUBPED-TIATRI
[007] ABIAMA-TSUHET/ORTSEC	[012] ABIAMA-TSUMER/VACMEM
[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT	[014] ABIAMA/VACMEM/RUBLAS
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[028] ABILAS/VACDEL-VALSIT
[058] ALNVIR-(SAMRAC)/THAOCC	[031] ABILAS/VACSCO-VALSIT
[064] ARCUVA-FRAVIR/RACOMITRIUM	[038] (ACEMAC)/ACECIR-PAXMYR
[077] CASMER-PHYEMP	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[102] PAXMYR/PHLDIF	[062] ARCNEV/PSESPI
[133] PSEMEN/ACECIR/MAHNER	[070] CARAQU-(MENTRI-EQUISETUM)
[144] PSEMEN-(PINCON)/ARCUVA/RACCAN	[074] CARNIG-LUEPEC
[155] PSEMEN-TSUHET/MAHNER	[075] CARSPE-CARNIG-(POTFLA)
[157] PSEMEN-TSUHET/PAXMYR/LINBOR	[076] CARSPE-(LUPARC-POLBIS)
[162] RUBPAR/PTEAQU-CHAANG	[078] CEAVEL-(SPIBET)/CALRUB
[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)	[079] CHALAT-(OXYDIG-VALSIT)
[170] SORSIT/VACDEL-PHYEMP	[083] DANINT/RACOMITRIUM
[171] SORSIT-VACMEM/VALSIT	[090] FESVIR-EUC(LED,ENG)
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	[092] FESVIR-PHLDIF-ARECAP
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	[096] LARLYA/CASMER-LUEPEC
[204] TSUMER-ABIAMA/RHOALB	[098] LARLYA/VACDEL
[205] TSUMER-ABILAS/PHYEMP_KRUMM	[100] LUEPEC-(CARSPE)
[215] VALSIT-CARSPE	[103] PENDAV/RACOMITRIUM
[004] ABIAMA-PSEMEN/VACMEM	[106] PHYEMP-VACDEL-(CASMER)
[006] ABIAMA-TSUHET/OPLHOR	[118] PINALB/JUNCOM
[007] ABIAMA-TSUHET/ORTSEC	[120] PINCON-PSEMEN/GAUSHA
[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT	[121] PINCON/VACMEM
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM
[058] ALNVIR-(SAMRAC)/THAOCC	[125] POPBAL-(ALNRUB)/SALSIT
[064] ARCUVA-FRAVIR/RACOMITRIUM	[126] POPBAL/CORSER
[077] CASMER-PHYEMP	[138] PSEMEN/HOLDIS/CALRUB
[102] PAXMYR/PHLDIF	[141] PSEMEN/MAHNER/CALRUB
[133] PSEMEN/ACECIR/MAHNER	[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR
[144] PSEMEN-(PINCON)/ARCUVA/RACCAN	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[155] PSEMEN-TSUHET/MAHNER	[154] PSEMEN-TSUHET/GAUSHA-VACPAR
[157] PSEMEN-TSUHET/PAXMYR/LINBOR	[163] SALCOM/CAREX-(LEPPYR)
[162] RUBPAR/PTEAQU-CHAANG	[164] SALCOM/VALSIT
[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)	[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)
[170] SORSIT/VACDEL-PHYEMP	[186] TSUHET-ABIAMA/VACALA/RUBPED
[171] SORSIT-VACMEM/VALSIT	[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM
[204] TSUMER-ABIAMA/RHOALB	
[205] TSUMER-ABILAS/PHYEMP_KRUMM	
[215] VALSIT-CARSPE	

Association list for NOCA south region

Well-established	Well-established, cont.
[004] ABIAMA-PSEMEN/VACMEM	[171] SORSIT-VACMEM/VALSIT
[014] ABIAMA/VACMEM/RUBLAS	[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL
[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT	[204] TSUMER-ABIAMA/RHOALB
[017] ABILAS-PICENG/RHOALB/ARNLAT	[209] VACDEL-FESVIR
[018] ABILAS-PICENG/VACMEM/VACSCO-ARNLAT	[210] VACMEM/PAXMYR-ARECAP-(CALRUB)
[020] ABILAS-(PINALB)/JUNCOM_KRUMM	[214] VACSCO-FESVIR-ARECAP
[021] ABILAS-PINALB/PAXMYR-(CALRUB)	[215] VALSIT-CARSPE
[026] ABILAS-(PSEMEN)/VACMEM/CALRUB	[216] VALSIT-LIGGRA
[028] ABILAS/VACDEL-VALSIT	
[030] ABILAS/VACMEM/LUPARC	**Rare, restricted or uncertain**
[033] ABILAS/VERVIR	[007] ABIAMA-TSUHET/ORTSEC
[038] (ACEMAC)/ACECIR-PAXMYR	[012] ABIAMA-TSUMER/VACMEM
[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM	[013] ABIAMA-TSUMER/VACMEM/ERYMON
[043] ACEMAC-PSEMEN/SYMALB/OSMBER	[032] ABILAS/VALSIT
[056] ALNVIR/PTEAQU-ATHFIL	[034] ACER-CORSER/(PTEAQU)
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[035] ACECIR/GALIUM-(POLMUN)
[058] ALNVIR-(SAMRAC)/THAOCC	[055] ALNVIR-OPLHOR
[061] ARCNEV-PAXMYR/CALRUB	[059] ANTLAN-(OREALP-VACDEL)
[062] ARCNEV/PSESPI	[066] ARTLUD-LOMMAR
[067] ATHAME-CRYACR	[070] CARAQU-(MENTRI-EQUISETUM)
[071] CARNIG-CARLEN-(CALCAN)	[072] CAREX-CALLEP-(LEPPYR)
[073] CARNIG-KALMIC-(VACDEL)	[074] CARNIG-LUEPEC
[076] CARSPE-(LUPARC-POLBIS)	[082] CUPNOO-(VACMEM)/PAXMYR
[077] CASMER-PHYEMP	[086] EMPNIG-LUPSEL
[078] CEAVEL-(SPIBET)/CALRUB	[094] JUNPAR-(POLBIS)
[079] CHALAT-(OXYDIG-VALSIT)	[100] LUEPEC-(CARSPE)
[090] FESVIR-EUC(LED,ENG)	[103] PENDAV/RACOMITRIUM
[092] FESVIR-PHLDIF-ARECAP	[108] PHYGLA-(CASMER)
[093] HERMAX-(THAOCC-SAUAME)	[119] PINCON/PAXMYR/CALRUB
[096] LARLYA/CASMER-LUEPEC	[128] POPTRE/CORNUT
[097] LARLYA/LUZGLA	[131] PSESPI/SELWAL
[098] LARLYA/VACDEL	[138] PSEMEN/HOLDIS/CALRUB
[099] LEWCOL-(JUNPAR)	[147] PSEMEN-(PINPON)/SYMALB
[102] PAXMYR/PHLDIF	[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR
[106] PHYEMP-VACDEL-(CASMER)	[164] SALCOM/VALSIT
[116] PINALB-(ABILAS)/VACSCO/LUZGLA	[168] SAXBRO-(DOULAE-SEDUM)
[117] PINALB/FESVIR-ARECAP	[169] SAXTOL-LUZPIP-(CARNIG)
[118] PINALB/JUNCOM	[170] SORSIT/VACDEL-PHYEMP
[121] PINCON/VACMEM	[172] SPISPL/CARSPE
[125] POPBAL-(ALNRUB)/SALSIT	[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)
[126] POPBAL/CORSER	[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL
[129] POPTRE-PAXMYR_SHRUB	[205] TSUMER-ABILAS/PHYEMP_KRUMM
[130] PRUEMA-AMEALN-CEAVEL/MAIRAC	[206] TSUMER-ABILAS/VACDEL-PHYEMP
[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR	[208] TSUMER/PHYEMP-VACDEL
[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC	[211] VACMEM/PAXMYR-VACSCO-CARGEY
[142] PSEMEN/PAXMYR-SPIBET	[217] VALSIT-VERVIR
[143] PSEMEN-PINCON/ARCNEV	
[145] PSEMEN-PINPON/ARCNEV	
[146] PSEMEN-PINPON/CALRUB	
[161] PSEMEN/VACMEM	
[162] RUBPAR/PTEAQU-CHAANG	
[163] SALCOM/CAREX-(LEPPYR)	
[165] SALSCO-SORSCO-AMEALN/PAXMYR	
[166] SALSIT-(CORSER)/URTDIO	

Association list for OLYM northwest region

Well-established	Rare, restricted or uncertain
[070] CARAQU-(MENTRI-EQUISETUM)	[046] ALNRUB/ATHFIL-LYSAME
[112] PICSIT-THUPLI/VACOVAT	[049] ALNRUB-PICSIT/POLMUN-(HERMAX)
[114] PICSIT-TSUHET/GAUSHA/POLMUN	[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN
[115] PICSIT-TSUHET/POLMUN	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[174] THUPLI/LEDGRO/CAROBN/SPHAGN	[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN
[178] THUPLI-TSUHET/VACOVAT	[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN
[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI	[125] POPBAL-(ALNRUB)/SALSIT
[199] TSUHET-THUPLI/GAUSHA/LYSAME	[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)
[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI	[176] THUPLI-TSUHET/LYSAME/SPHAGN
	[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN
	[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN

Association list for OLYM southwest region

Well-established	Well-established, cont.
[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN	[199] TSUHET-THUPLI/GAUSHA/LYSAME
[045] AGR(CAP,STO)	[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI
[049] ALNRUB-PICSIT/POLMUN-(HERMAX)	[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI
[051] ALNRUB/RUBSPE/CAROBN-LYSAME	
[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL	**Rare, restricted or uncertain**
[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN	[048] ALNRUB/OPLHOR-RUBSPE
[110] PICSIT/RUBSPE/CAROBN-LYSAME	[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN
[111] PICSIT-THUPLI/MAIDIL	[070] CARAQU-(MENTRI-EQUISETUM)
[112] PICSIT-THUPLI/VACOVAT	[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)
[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN	[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN
[114] PICSIT-TSUHET/GAUSHA/POLMUN	[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI
[115] PICSIT-TSUHET/POLMUN	
[123] POPBAL-ALNRUB/CAROBN	
[125] POPBAL-(ALNRUB)/SALSIT	
[127] POPBAL-PICSIT-(ACEMAC)/OXAORE	
[176] THUPLI-TSUHET/LYSAME/SPHAGN	
[178] THUPLI-TSUHET/VACOVAT	
[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN	
[199] TSUHET-THUPLI/GAUSHA/LYSAME	
[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI	
[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI	
[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN	
[045] AGR(CAP,STO)	
[049] ALNRUB-PICSIT/POLMUN-(HERMAX)	
[051] ALNRUB/RUBSPE/CAROBN-LYSAME	
[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL	
[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN	
[110] PICSIT/RUBSPE/CAROBN-LYSAME	
[111] PICSIT-THUPLI/MAIDIL	
[112] PICSIT-THUPLI/VACOVAT	
[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN	
[114] PICSIT-TSUHET/GAUSHA/POLMUN	
[115] PICSIT-TSUHET/POLMUN	
[123] POPBAL-ALNRUB/CAROBN	
[125] POPBAL-(ALNRUB)/SALSIT	
[127] POPBAL-PICSIT-(ACEMAC)/OXAORE	
[176] THUPLI-TSUHET/LYSAME/SPHAGN	
[178] THUPLI-TSUHET/VACOVAT	
[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN	

Association list for OLYM north-central region

Well-established	Well-established, cont.
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[207] TSUMER-ABILAS/VACMEM/XERTEN
[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN	[208] TSUMER/PHYEMP-VACDEL
[003] ABIAMA-PSEMEN/ACHTRI	[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS
[006] ABIAMA-TSUHET/OPLHOR	[217] VALSIT-VERVIR
[007] ABIAMA-TSUHET/ORTSEC	
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	**Rare, restricted or uncertain**
[013] ABIAMA-TSUMER/VACMEM/ERYMON	[004] ABIAMA-PSEMEN/VACMEM
[016] ABILAS-(ABIAMA)/VACMEM/XERTEN	[009] ABIAMA-TSUHET/RUBPED-TIATRI
[027] ABILAS/RHOALB/RUBLAS	[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL
[029] ABILAS/VACMEM/ERYMON	[011] ABIAMA-TSUMER/MENFER
[032] ABILAS/VALSIT	[012] ABIAMA-TSUMER/VACMEM
[044] ACEMAC/RUBSPE/TOLMEN	[014] ABIAMA/VACMEM/RUBLAS
[047] ALNRUB/ELYGLA	[020] ABILAS-(PINALB)/JUNCOM_KRUMM
[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN	[025] ABILAS-PSEMEN/MAHNER
[054] ALNRUB/STACHA-TOLMEN	[028] ABILAS/VACDEL-VALSIT
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[030] ABILAS/VACMEM/LUPARC
[067] ATHAME-CRYACR	[035] ACECIR/GALIUM-(POLMUN)
[070] CARAQU-(MENTRI-EQUISETUM)	[036] ACECIR-(HOLDIS)
[072] CAREX-CALLEP-(LEPPYR)	[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN
[076] CARSPE-(LUPARC-POLBIS)	[041] ACEMAC/POLMUN-TOLMEN
[088] EUCPAU-(PHAHAS-CASMIN)	[042] ACEMAC-(PSEMEN)/POLMUN
[093] HERMAX-(THAOCC-SAUAME)	[048] ALNRUB/OPLHOR-RUBSPE
[095] JUNCOM-(PHLDIF)	[051] ALNRUB/RUBSPE/CAROBN-LYSAME
[104] PHLDIF-(LOMMAR-CARPHA)	[052] ALNRUB/RUBSPE/POLMUN-CLASIB
[106] PHYEMP-VACDEL-(CASMER)	[055] ALNVIR-OPLHOR
[107] PHYEMP-(VACDEL)/LUPARC	[058] ALNVIR-(SAMRAC)/THAOCC
[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN	[060] ARCCOL/RACOMITRIUM
[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS	[065] ARCUVA-JUNCOM
[137] PSEMEN/GAUSHA-MAHNER	[074] CARNIG-LUEPEC
[139] PSEMEN/HOLDIS-ROSGYM/FESOCC	[075] CARSPE-CARNIG-(POTFLA)
[150] PSEMEN-TSUHET/(ACECIR)/POLMUN	[077] CASMER-PHYEMP
[151] PSEMEN-TSUHET/ACHTRI	[080] CUPNOO-(ABILAS)/CLIUNI
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	[081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[082] CUPNOO-(VACMEM)/PAXMYR
[156] PSEMEN-TSUHET/MAHNER/POLMUN	[085] ELMRAC-EPIANA
[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN	[094] JUNPAR-(POLBIS)
[163] SALCOM/CAREX-(LEPPYR)	[100] LUEPEC-(CARSPE)
[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN	[101] LUIHYP-(LOMMAR-CASPAR)
[181] TSUHET-ABIAMA-PSEMEN/GAUSHA	[103] PENDAV/RACOMITRIUM
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN
[186] TSUHET-ABIAMA/VACALA/RUBPED	[140] PSEMEN/MAHNER/ACHTRI
[188] TSUHET-PICSIT/POLMUN-BLESPI	[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN
[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN	[152] PSEMEN-TSUHET/GAUSHA-HOLDIS
[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI	[157] PSEMEN-TSUHET/PAXMYR/LINBOR
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	[160] PSEMEN-TSUHET/VACALA/XERTEN
[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE	[162] RUBPAR/PTEAQU-CHAANG
[194] TSUHET-PSEMEN/POLMUN-BLESPI	[168] SAXBRO-(DOULAE-SEDUM)
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	[173] SYMALB-MALFUS
[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)	[179] TRICAE-DODJEF
[198] TSUHET-(PSEMEN)/VACALA/POLMUN	[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	[187] TSUHET-ABIAMA/VACALA/TIATRI
[204] TSUMER-ABIAMA/RHOALB	[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL
[205] TSUMER-ABILAS/PHYEMP_KRUMM	[215] VALSIT-CARSPE
[206] TSUMER-ABILAS/VACDEL-PHYEMP	

Association list for OLYM northeast region

Well-established	Well-established, cont.
[003] ABIAMA-PSEMEN/ACHTRI	[217] VALSIT-VERVIR
[004] ABIAMA-PSEMEN/VACMEM	
[007] ABIAMA-TSUHET/ORTSEC	**Rare, restricted or uncertain**
[009] ABIAMA-TSUHET/RUBPED-TIATRI	[001] ABIAMA-CUPNOO-TSUHET/VACALA
[016] ABILAS-(ABIAMA)/VACMEM/XERTEN	[005] ABIAMA/RHOALB
[020] ABILAS-(PINALB)/JUNCOM_KRUMM	[012] ABIAMA-TSUMER/VACMEM
[022] ABILAS-(PINCON)/JUNCOM-LOMMAR	[014] ABIAMA/VACMEM/RUBLAS
[023] ABILAS-(PINCON)/LUPARC	[025] ABILAS-PSEMEN/MAHNER
[024] ABILAS/POLPUL-PEDRAC	[029] ABILAS/VACMEM/ERYMON
[027] ABILAS/RHOALB/RUBLAS	[036] ACECIR-(HOLDIS)
[028] ABILAS/VACDEL-VALSIT	[041] ACEMAC/POLMUN-TOLMEN
[030] ABILAS/VACMEM/LUPARC	[042] ACEMAC-(PSEMEN)/POLMUN
[032] ABILAS/VALSIT	[044] ACEMAC/RUBSPE/TOLMEN
[033] ABILAS/VERVIR	[047] ALNRUB/ELYGLA
[058] ALNVIR-(SAMRAC)/THAOCC	[048] ALNRUB/OPLHOR-RUBSPE
[059] ANTLAN-(OREALP-VACDEL)	[054] ALNRUB/STACHA-TOLMEN
[066] ARTLUD-LOMMAR	[055] ALNVIR-OPLHOR
[070] CARAQU-(MENTRI-EQUISETUM)	[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)
[074] CARNIG-LUEPEC	[060] ARCCOL/RACOMITRIUM
[076] CARSPE-(LUPARC-POLBIS)	[075] CARSPE-CARNIG-(POTFLA)
[077] CASMER-PHYEMP	[081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON
[080] CUPNOO-(ABILAS)/CLIUNI	[082] CUPNOO-(VACMEM)/PAXMYR
[084] DASFLO-(PHLDIF)	[100] LUEPEC-(CARSPE)
[085] ELMRAC-EPIANA	[104] PHLDIF-(LOMMAR-CARPHA)
[088] EUCPAU-(PHAHAS-CASMIN)	[120] PINCON-PSEMEN/GAUSHA
[089] FESROE-(PHLDIF-ARECAP)	[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS
[093] HERMAX-(THAOCC-SAUAME)	[150] PSEMEN-TSUHET/(ACECIR)/POLMUN
[094] JUNPAR-(POLBIS)	[155] PSEMEN-TSUHET/MAHNER
[095] JUNCOM-(PHLDIF)	[158] PSEMEN-TSUHET/RHOMAC
[106] PHYEMP-VACDEL-(CASMER)	[166] SALSIT-(CORSER)/URTDIO
[107] PHYEMP-(VACDEL)/LUPARC	[182] TSUHET-ABIAMA-PSEMEN/MAHNER
[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN	[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR
[137] PSEMEN/GAUSHA-MAHNER	[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL
[139] PSEMEN/HOLDIS-ROSGYM/FESOCC	[199] TSUHET-THUPLI/GAUSHA/LYSAME
[144] PSEMEN-(PINCON)/ARCUVA/RACCAN	[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS
[151] PSEMEN-TSUHET/ACHTRI	[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM
[152] PSEMEN-TSUHET/GAUSHA-HOLDIS	
[153] PSEMEN-TSUHET/GAUSHA-MAHNER	
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	
[156] PSEMEN-TSUHET/MAHNER/POLMUN	
[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN	
[162] RUBPAR/PTEAQU-CHAANG	
[163] SALCOM/CAREX-(LEPPYR)	
[164] SALCOM/VALSIT	
[168] SAXBRO-(DOULAE-SEDUM)	
[169] SAXTOL-LUZPIP-(CARNIG)	
[173] SYMALB-MALFUS	
[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)	
[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[204] TSUMER-ABIAMA/RHOALB	
[205] TSUMER-ABILAS/PHYEMP_KRUMM	
[206] TSUMER-ABILAS/VACDEL-PHYEMP	
[215] VALSIT-CARSPE	

Association list for OLYM south-central region

Well-established	Rare, restricted or uncertain
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[001] ABIAMA-CUPNOO-TSUHET/VACALA
[012] ABIAMA-TSUMER/VACMEM	[009] ABIAMA-TSUHET/RUBPED-TIATRI
[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN	[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL
[045] AGR(CAP,STO)	[013] ABIAMA-TSUMER/VACMEM/ERYMON
[047] ALNRUB/ELYGLA	[020] ABILAS-(PINALB)/JUNCOM_KRUMM
[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN	[030] ABILAS/VACMEM/LUPARC
[054] ALNRUB/STACHA-TOLMEN	[032] ABILAS/VALSIT
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[035] ACECIR/GALIUM-(POLMUN)
[070] CARAQU-(MENTRI-EQUISETUM)	[041] ACEMAC/POLMUN-TOLMEN
[072] CAREX-CALLEP-(LEPPYR)	[046] ALNRUB/ATHFIL-LYSAME
[074] CARNIG-LUEPEC	[051] ALNRUB/RUBSPE/CAROBN-LYSAME
[076] CARSPE-(LUPARC-POLBIS)	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[077] CASMER-PHYEMP	[067] ATHAME-CRYACR
[088] EUCPAU-(PHAHAS-CASMIN)	[075] CARSPE-CARNIG-(POTFLA)
[106] PHYEMP-VACDEL-(CASMER)	[080] CUPNOO-(ABILAS)/CLIUNI
[107] PHYEMP-(VACDEL)/LUPARC	[081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON
[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN	[085] ELMRAC-EPIANA
[127] POPBAL-PICSIT-(ACEMAC)/OXAORE	[093] HERMAX-(THAOCC-SAUAME)
[150] PSEMEN-TSUHET/(ACECIR)/POLMUN	[094] JUNPAR-(POLBIS)
[163] SALCOM/CAREX-(LEPPYR)	[095] JUNCOM-(PHLDIF)
[168] SAXBRO-(DOULAE-SEDUM)	[100] LUEPEC-(CARSPE)
[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN	[104] PHLDIF-(LOMMAR-CARPHA)
[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI	[120] PINCON-PSEMEN/GAUSHA
[186] TSUHET-ABIAMA/VACALA/RUBPED	[125] POPBAL-(ALNRUB)/SALSIT
[187] TSUHET-ABIAMA/VACALA/TIATRI	[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN
[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN	[151] PSEMEN-TSUHET/ACHTRI
[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE	[154] PSEMEN-TSUHET/GAUSHA-VACPAR
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	[155] PSEMEN-TSUHET/MAHNER
[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)	[156] PSEMEN-TSUHET/MAHNER/POLMUN
[198] TSUHET-(PSEMEN)/VACALA/POLMUN	[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	[166] SALSIT-(CORSER)/URTDIO
[204] TSUMER-ABIAMA/RHOALB	[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)
[205] TSUMER-ABILAS/PHYEMP_KRUMM	[169] SAXTOL-LUZPIP-(CARNIG)
[206] TSUMER-ABILAS/VACDEL-PHYEMP	[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR
[208] TSUMER/PHYEMP-VACDEL	[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN
[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS	[188] TSUHET-PICSIT/POLMUN-BLESPI
	[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN
	[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)
	[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY
	[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI
	[215] VALSIT-CARSPE
	[217] VALSIT-VERVIR

Association list for OLYM southeast region

Well-established	Rare, restricted or uncertain
[001] ABIAMA-CUPNOO-TSUHET/VACALA	[003] ABIAMA-PSEMEN/ACHTRI
[006] ABIAMA-TSUHET/OPLHOR	[004] ABIAMA-PSEMEN/VACMEM
[008] ABIAMA-TSUHET-(PSEMEN)/VACALA	[007] ABIAMA-TSUHET/ORTSEC
[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL	[009] ABIAMA-TSUHET/RUBPED-TIATRI
[012] ABIAMA-TSUMER/VACMEM	[014] ABIAMA/VACMEM/RUBLAS
[035] ACECIR/GALIUM-(POLMUN)	[029] ABILAS/VACMEM/ERYMON
[041] ACEMAC/POLMUN-TOLMEN	[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN
[042] ACEMAC-(PSEMEN)/POLMUN	[046] ALNRUB/ATHFIL-LYSAME
[044] ACEMAC/RUBSPE/TOLMEN	[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL
[047] ALNRUB/ELYGLA	[056] ALNVIR/PTEAQU-ATHFIL
[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN	[058] ALNVIR-(SAMRAC)/THAOCC
[054] ALNRUB/STACHA-TOLMEN	[067] ATHAME-CRYACR
[055] ALNVIR-OPLHOR	[070] CARAQU-(MENTRI-EQUISETUM)
[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA)	[077] CASMER-PHYEMP
[072] CAREX-CALLEP-(LEPPYR)	[080] CUPNOO-(ABILAS)/CLIUNI
[074] CARNIG-LUEPEC	[082] CUPNOO-(VACMEM)/PAXMYR
[075] CARSPE-CARNIG-(POTFLA)	[094] JUNPAR-(POLBIS)
[076] CARSPE-(LUPARC-POLBIS)	[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN
[085] ELMRAC-EPIANA	[120] PINCON-PSEMEN/GAUSHA
[088] EUCPAU-(PHAHAS-CASMIN)	[123] POPBAL-ALNRUB/CAROBN
[093] HERMAX-(THAOCC-SAUAME)	[137] PSEMEN/GAUSHA-MAHNER
[104] PHLDIF-(LOMMAR-CARPHA)	[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN
[106] PHYEMP-VACDEL-(CASMER)	[150] PSEMEN-TSUHET/(ACECIR)/POLMUN
[107] PHYEMP-(VACDEL)/LUPARC	[153] PSEMEN-TSUHET/GAUSHA-MAHNER
[125] POPBAL-(ALNRUB)/SALSIT	[155] PSEMEN-TSUHET/MAHNER
[151] PSEMEN-TSUHET/ACHTRI	[157] PSEMEN-TSUHET/PAXMYR/LINBOR
[154] PSEMEN-TSUHET/GAUSHA-VACPAR	[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME)
[156] PSEMEN-TSUHET/MAHNER/POLMUN	[171] SORSIT-VACMEM/VALSIT
[158] PSEMEN-TSUHET/RHOMAC	[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN
[162] RUBPAR/PTEAQU-CHAANG	[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI
[163] SALCOM/CAREX-(LEPPYR)	[188] TSUHET-PICSIT/POLMUN-BLESPI
[164] SALCOM/VALSIT	[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI
[166] SALSIT-(CORSER)/URTDIO	[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN)
[172] SPISPL/CARSPE	[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)
[181] TSUHET-ABIAMA-PSEMEN/GAUSHA	[206] TSUMER-ABILAS/VACDEL-PHYEMP
[182] TSUHET-ABIAMA-PSEMEN/MAHNER	[207] TSUMER-ABILAS/VACMEM/XERTEN
[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR	[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS
[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN	[213] VACMEM/XERTEN
[186] TSUHET-ABIAMA/VACALA/RUBPED	
[187] TSUHET-ABIAMA/VACALA/TIATRI	
[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL	
[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY	
[198] TSUHET-(PSEMEN)/VACALA/POLMUN	
[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)	
[204] TSUMER-ABIAMA/RHOALB	
[205] TSUMER-ABILAS/PHYEMP_KRUMM	
[208] TSUMER/PHYEMP-VACDEL	
[215] VALSIT-CARSPE	
[217] VALSIT-VERVIR	

Association treatments

Bookmarks, by first species in name[46]

Abies amabilis ..... [001]
Abies lasiocarpa ..... [015]
Acer circinatum ..... [034]
Acer macrophyllum ..... [038]
Agrostis spp ..... [045]
Alnus rubra ..... [046]
Alnus viridis ..... [055]
Antennaria lanata ..... [059]
Anticlea/Toxicoscordion ..... [218]
Arctostaphylos columbiana, A. nevadensis, A. uva-ursi ..... [060]
Artemisia ludoviciana, Athyrium distentifolium ..... [066]
Betula papyrifera ..... [068]
Callitropsis nootkatensis ..... [080]
Carex aquatilis ..... [070]
Carex nigricans ..... [071]
Carex spectabilis ..... [075]
Cassiope mertensiana, Ceanothus velutinus, Chamaenerion latifolium ..... [077]
*Cupressus nootkatensis ..... [080]
Danthonia intermedia, Dasiphora fruticosa, Elmera racemosa, Empetrum nigrum, Eriogonum pyrolifolium, Eucephalus paucicapitatus ..... [083]
Festuca roemeri, F. viridula ..... [089]
Heracleum maximum, Juncus parryi, Juniperus communis ..... [093]
Larix lyallii ..... [096]
Lewisia columbiana, Luetkea pectinata, Luina hypoleuca ..... [099]
Micranthes tolmiei ..... [169]
Paxistima myrsinites, Penstemon davidsonii ..... [102]
Phlox diffusa ..... [104]
Phyllodoce empetriformis, P. glanduliflora ..... [106]
Picea sitchensis ..... [109]
Pinus albicaulis ..... [116]
Pinus contorta ..... [119]
*Populus balsamifera ..... [122]
Populus tremuloides ..... [128]
Populus trichocarpa ..... [122]
Prunus emarginata, Pseudoroegneria spicata ..... [130]
Pseudotsuga menziesii ..... [132]
Rubus nutkanus ..... [162]
Salix commutata, S. scouleriana, S. sitchensis ..... [163]
Saxifraga austromontana/vespertina, *S. tolmiei ..... [168]
Sorbus sitchensis ..... [170]
Spiraea splendens, Symphoricarpos albus ..... [172]
Thuja plicata ..... [174]
Trichophorum cespitosum ..... [179]
Tsuga heterophylla ..... [180]
Tsuga mertensiana ..... [203]
Vaccinium deliciosum, V. membranaceum, V. scoparium ..... [209]
Valeriana sitchensis ..... [215]
*Zigadenus ..... [218]

[46] Associations starting with less common species are combined on a single line. Species with name changes in Hitchcock and Cronquist (2018) are listed under both their old and new names. The old name, which determines the order associations appear in, is marked with an asterisk.

{001} Abies amabilis, Callitropsis nootkatensis, Tsuga heterophylla, Vaccinium ovalifolium
Silver fir, Alaska-cedar, western hemlock & Alaska blueberry forest
ABIAMA-CUPNOO-TSUHET/VACALA



Range: Transitional between lower and upper montane zones. **MORA**-20: **nw**-**ne**-**sw***-**se** 1290-1380m. **NOCA**-7: **nw** (ce) 1060-1260m. **OLYM**-7: **nc**-**se** (ne-sc) 1060-1310m.

Struct: Mostly closed conifer forest (33-41m) with abundant conifer regen, abundant shrubs, and substantial forbs. Avg vasc cover 123: conif tree 59, shrb 30, conif regen 18, forb 0.91 @ 12, dwf shrb 0.68 @ 2, fern 0.45 @ 4, tall shrb 0.36 @ 5.

Ecology: Fairly gentle midslopes, on well-drained soils. Regen dominated by *Abies amabilis*, with smaller amounts of *Tsuga heterophylla* and *Callitropsis nootkatensis*.

Metrics: slope 13-30°, vdp 9-90m, vdr 231-512m, east 6-68, south 49-97, conv 45-55, tpp 22-55, solar 63-79, wet 3-4

Map class: C12–Silver fir, hemlock & Alaska blueberry forest

Rel to C09: Evolved from ABIAMA-(TSUHET)/VACMEM-VACALA, incorporating some plots from ABIAMA/MENFER.

Similar: MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MNO:[004] ABIAMA-PSEMEN/VACMEM, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[011] ABIAMA-TSUMER/MENFER, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[007] ABIAMA-TSUHET/ORTSEC.
Also see: [080] CUPNOO-(ABILAS)/CLIUNI

▶ [**002**] Abies procera*** Pseudotsuga menziesii* Rhododendron albiflorum 2 Xerophyllum tenax*** 2 [**keep**] SHRB 14 TSHRB* 2 Achlys triphylla 2 Chimaphila menziesii* Clintonia uniflora* Cornus unalaschkensis* Goodyera oblongifolia* Orthilia secunda* Rhododendron menziesii 2 Rhododendron menziesii* Rubus pedatus** Tiarella trifoliata** Vaccinium ovalifolium 5 Vaccinium ovalifolium*
▶ [**004**] Abies lasiocarpa* Acer circinatum** Amelanchier alnifolia** Chimaphila umbellata* Linnaea borealis 2 Paxistima myrsinites* Pseudotsuga menziesii* Thuja plicata* [**keep**] Chimaphila menziesii* Corallorhiza* Cornus unalaschkensis*** Erythronium montanum+*** Gaultheria ovatifolia* Neottia** Rubus pedatus* Struthiopteris spicant*** Vaccinium ovalifolium** 2 Vaccinium parvifolium***
▶ [**008**] Acer circinatum** Cornus unalaschkensis 2 Thuja plicata* Vaccinium parvifolium* 2 [**keep**] Arnica latifolia+*** Callitropsis nootkatensis*** 6 Erythronium montanum+** Mitella*** Rhododendron menziesii 2 Sorbus sitchensis** Streptopus lanceolatus** Tsuga mertensiana*** Valeriana sitchensis*** Veratrum viride*** Viola orbiculata+***
▶ [**186**] Acer circinatum** 2 Athyrium filix-femina* Cornus unalaschkensis* 2 Thuja plicata* Vaccinium parvifolium* 2 [**keep**] Callitropsis nootkatensis*** 4 Goodyera oblongifolia** Orthilia secunda** Vaccinium membranaceum** 3
▶ [**187**] Achlys triphylla* Athyrium filix-femina* Clintonia uniflora* Gymnocarpium dryopteris* Maianthemum dilatatum 2 Polystichum munitum 2 Rubus spectabilis* Streptopus lanceolatus* Struthiopteris spicant 2 Tiarella trifoliata* 2 Vaccinium parvifolium* 2 [**keep**] Callitropsis nootkatensis* Chimaphila menziesii** Chimaphila umbellata*** Corallorhiza* Erythronium montanum+** Gaultheria ovatifolia*** Goodyera oblongifolia** Orthilia secunda** Rubus lasiococcus* Vaccinium membranaceum**

Floristics (22 plots, MORA 8, NOCA 7, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 36, Tsuga heterophylla 22, Callitropsis nootkatensis 15	Vaccinium ovalifolium 18		
80-95		Vaccinium membranaceum 8		moss 27
60-80			Rubus pedatus 2, Orthilia secunda 1, Goodyera oblongifolia 0	
40-60	Pseudotsuga menziesii 7, Tsuga mertensiana 3	Rhododendron menziesii 7	Rubus lasiococcus 2, Clintonia uniflora 2, Tiarella trifoliata 1, Chimaphila menziesii 0	
25-40		Vaccinium parvifolium 1	Achlys triphylla 7, Erythronium montanum+ 3, Gaultheria ovatifolia 2, Streptopus lanceolatus 1, Chimaphila umbellata 1, Linnaea borealis 1, Cornus unalaschkensis 1, Neottia 1, Corallorhiza 0	Struthiopteris spicant 0
10-25		Alnus viridis 7, Rubus spectabilis 2	Viola glabella+ 2, Valeriana sitchensis 2, Xerophyllum tenax 1, Galium 1	Athyrium filix-femina 3, Gymnocarpium dryopteris 2

{002} Abies amabilis, Pseudotsuga menziesii*, Abies procera*, Vaccinium membranaceum, Xerophyllum tenax
Silver fir, Douglas-fir*, noble fir*, big huckleberry & beargrass forest
ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN



Range: Warm sites in upper montane zone. **MORA**-39: **nw*-ne-sw*** 1340-1490m. **OLYM**-4: **nc** 1240-1300m.

Struct: Mostly closed conifer forest (22-36m) with abundant conifer regen, abundant forbs, and substantial shrubs. Avg vasc cover 117: conif tree 63, forb 23, conif regen 19, shrb 0.94 @ 9, dwf shrb 0.47 @ 5, fern 0.24 @ 3.

Ecology: Fairly steep upper slopes and ridgetops with southerly aspects, on dry and shallow soils. Generally associated with historic burns; early successional species often prominent in canopy (*Pseudotsuga menziesii, Abies procera, Abies lasiocarpa*). Regen dominated by *Abies amabilis* with small amounts of *Tsuga heterophylla*.

Metrics: slope 19-34°, vdp 68-184m, vdr 262-687m, east 20-67, south 77-99, conv 52-64, tpp 51-84, solar 72-89, wet 2-3

Map class: C14–Silver fir, big huckleberry & beargrass forest

Rel to C09: Expanded, incorporating some plots from ABIAMA-(TSUHET)/VACMEM and other discontinued C09 types.

Similar: MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MNO:[007] ABIAMA-TSUHET/ORTSEC, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI.

▶ [**001**] SHRB 14 TSHRB* 2 Achlys triphylla 2 Chimaphila menziesii* Clintonia uniflora* Cornus unalaschkensis* Goodyera oblongifolia* Orthilia secunda* Rhododendron menziesii* 2 Rubus pedatus** Tiarella trifoliata** Vaccinium ovalifolium* 5 [**keep**] Abies procera*** Pseudotsuga menziesii* Rhododendron albiflorum 2 Xerophyllum tenax*** 2

▶ [**003**] TSHRB* 2 Acer circinatum*** 2 Achlys triphylla*** 2 Berberis nervosa** Chimaphila umbellata* Clintonia uniflora* Linnaea borealis* Polystichum munitum 2 Tiarella trifoliata 2 Vaccinium parvifolium* [**keep**] Abies lasiocarpa 3 Abies procera** 3 Callitropsis nootkatensis** Rhododendron albiflorum*** Tsuga mertensiana 2 Vaccinium membranaceum* 3 Xerophyllum tenax** 3

▶ [**004**] TSHRB* 2 Acer circinatum* Achlys triphylla* 2 Amelanchier alnifolia* Chimaphila umbellata* Clintonia uniflora* 2 Orthilia secunda* Paxistima myrsinites* Rhododendron menziesii 2 Sorbus sitchensis* Thuja plicata* Tiarella trifoliata* [**keep**] Abies procera*** 2 Xerophyllum tenax** 3

▶ [**007**] Linnaea borealis* Orthilia secunda* Thuja plicata*** 2 Vaccinium parvifolium* [**keep**] FORB 3 SHRB 3 Vaccinium membranaceum* 2 Xerophyllum tenax***

▶ [**160**] Acer circinatum** Berberis nervosa** Gaultheria ovatifolia* Gaultheria shallon*** 2 Linnaea borealis* Rhododendron menziesii 2 Thuja plicata** Vaccinium parvifolium* [**keep**] Abies lasiocarpa** 2 Abies procera* 6 Rhododendron albiflorum*** 2 Rubus lasiococcus* Tsuga mertensiana* 2 Vaccinium membranaceum 2

Floristics (17 plots, MORA 13, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 28			
80-95	Tsuga heterophylla 29	Vaccinium membranaceum 6	Xerophyllum tenax 22	moss 9
60-80	Pseudotsuga menziesii 13, Callitropsis nootkatensis 9			
40-60	Abies procera 13	Vaccinium ovalifolium 3	Rubus lasiococcus 1	
25-40	Abies lasiocarpa 8, Tsuga mertensiana 6	Rhododendron albiflorum 4	Goodyera oblongifolia 1, Orthilia secunda 0	
10-25	Pinus monticola 3	Rhododendron menziesii 1, Vaccinium parvifolium 1	Chimaphila umbellata 4, Linnaea borealis 3, Rubus pedatus 2, Penstemon serrulatus+ 2, Vaccinium scoparium+ 1, Paxistima myrsinites 1, Viola orbiculata+ 1, Corallorhiza 1, Hieracium albiflorum 1, Lilium 1, Chamaenerion angustifolium 1, Streptopus lanceolatus 1	Pteridium aquilinum 4

{003} Abies amabilis, Pseudotsuga menziesii, Achlys triphylla
Silver fir, Douglas-fir & vanillaleaf forest
ABIAMA-PSEMEN/ACHTRI



Range: Lower montane. **MORA**-21: **nw**-**ne**-**sw**-**se** 840-1200m. **OLYM**-12: **nc**-**ne** (se) 870-1050m.

Struct: Closed conifer forest (40-49m) with abundant conifer regen & forbs, and substantial dwarf shrubs. Avg vasc cover 123: conif tree 69, conif regen 18, forb 14, shrb 3, dwf shrb 0.9 @ 9, tall shrb 0.55 @ 15, fern 0.45 @ 5.

Ecology: Fairly gentle slopes, on deep, well-drained soils. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*.

Metrics: slope 13-34°, vdp 4-61m, vdr 52-407m, east 11-94, south 41-92, conv 42-50, tpp 21-51, solar 55-75, wet 2-4

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Expanded, incorporating plots from ABIAMA-(PSEMEN)/ACHTRI-TIATRI, PSEMEN-(TSUHET)/dep and other discontinued C09 types.

Similar: MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[007] ABIAMA-TSUHET/ORTSEC, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MO:[140] PSEMEN/MAHNER/ACHTRI.

▶ [**004**] SHRB 5 Abies lasiocarpa* 3 Callitropsis nootkatensis* Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Rhododendron menziesii* 2 Sorbus sitchensis** Vaccinium membranaceum* 3 [**keep**] TSHRB 6 Achlys triphylla* Berberis nervosa* Linnaea borealis* Polystichum munitum 2 Tiarella trifoliata 2 Vaccinium parvifolium***

▶ [**007**] Chimaphila menziesii* Paxistima myrsinites* Pyrola asarifolia+* Rhododendron menziesii* Taxus brevifolia* Thuja plicata* [**keep**] FORB 3 TSHRB 2 Acer circinatum 2 Achlys triphylla*** 2 Berberis nervosa 2 Polystichum munitum 2 Tiarella trifoliata 2

▶ [**151**] Abies grandis* 2 Gaultheria shallon*** Lysimachia latifolia* Rosa* Thuja plicata 3 Viola sempervirens** [**keep**] Abies amabilis* 5 Orthilia secunda* Rubus lasiococcus** Vaccinium ovalifolium*

▶ [**160**] Callitropsis nootkatensis* Gaultheria ovatifolia* Gaultheria shallon** 2 Pinus monticola*** 2 Rhododendron menziesii** 2 Vaccinium ovalifolium 2 Xerophyllum tenax** 3 [**keep**] TSHRB* Acer circinatum* Achlys triphylla** Chimaphila umbellata* Clintonia uniflora** Cornus unalaschkensis* Polystichum munitum** 2 Rosa** Tiarella trifoliata** 2

▶ [**183**] SHRB 6 Cornus unalaschkensis* Gaultheria shallon** Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant** Thuja plicata* 3 Vaccinium ovalifolium* 3 Vaccinium parvifolium 3 [**keep**] TSHRB* 7 Acer circinatum* 6 Achlys triphylla* Berberis nervosa* Rosa*** Rubus lasiococcus* Tiarella trifoliata 2 Vaccinium membranaceum*

Floristics (20 plots, MORA 8, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 35, Pseudotsuga menziesii 31, Abies amabilis 21			
80-95			Achlys triphylla 5	moss 24
60-80		Vaccinium parvifolium 2	Berberis nervosa 5, Linnaea borealis 4	
40-60		Acer circinatum 17, Vaccinium ovalifolium 1	Chimaphila umbellata 4, Rubus lasiococcus 2, Clintonia uniflora 2, Orthilia secunda 2	Polystichum munitum 4
25-40		Vaccinium membranaceum 2, Rosa 1	Tiarella trifoliata 5, Cornus unalaschkensis 1, Goodyera oblongifolia 1, Rubus ursinus 1, Chimaphila menziesii 0	
10-25	Callitropsis nootkatensis 6, Thuja plicata 2, Abies lasiocarpa 2	Oplopanax horridus 3	Maianthemum stellatum 6, Adenocaulon bicolor 4, Prosartes 4, Galium 2, Osmorhiza 2, Xerophyllum tenax 2, Streptopus lanceolatus 2, Viola sempervirens 2, Lysimachia latifolia 1, Gaultheria ovatifolia 1, Penstemon serrulatus+ 1, Pyrola picta 1, Maianthemum dilatatum 1, Rubus pedatus 1, Viola orbiculata+ 1, Trillium ovatum 1, Monotropa 1	Pteridium aquilinum 4, Bromus vulgaris+ 1

{004} Abies amabilis, Pseudotsuga menziesii, Vaccinium membranaceum
Silver fir, Douglas-fir & big huckleberry forest
ABIAMA-PSEMEN/VACMEM



Range: Transitional between lower and upper montane zones. **MORA**-10: **ne**-**sw**-**se** 1220-1440m. **NOCA**-11: **ne**-**ce**-**s** (cw) 840-1420m. **OLYM**-6: **ne** (nc-se) 1200-1340m.

Struct: Semi-open conifer forest (29-35m) with substantial conifer regen & shrubs, and substantial forbs. Avg vasc cover 96: conif tree 53, conif regen 15, shrb 12, forb 9, dwf shrb 0.74 @ 6, tall shrb 0.48 @ 4.

Ecology: Fairly gentle midslopes, on well-drained shallow soils. Sites are more variable east of the Cascade crest. Regen dominated by *Abies amabilis* with small amounts of *Tsuga heterophylla*.

Metrics: slope 15-30°, vdp 6-32m, vdr 64-469m, east 15-79, south 48-93, conv 44-54, tpp 16-52, solar 60-81, wet 3-4

Map class: C14–Silver fir, big huckleberry & beargrass forest

Rel to C09: Evolved from ABIAMA-(TSUHET)/VACMEM, incorporating plots from ABIAMA/MENFER and other discontinued C09 types.

Similar: MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[007] ABIAMA-TSUHET/ORTSEC, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI.

▶ [**001**] Chimaphila menziesii* Corallorhiza* Cornus unalaschkensis*** Erythronium montanum+*** Gaultheria ovatifolia* Neottia** Rubus pedatus* Struthiopteris spicant*** Vaccinium ovalifolium** 2 Vaccinium parvifolium*** [**keep**] Abies lasiocarpa* Acer circinatum** Amelanchier alnifolia** Chimaphila umbellata* Linnaea borealis 2 Paxistima myrsinites* Pseudotsuga menziesii* Thuja plicata*
▶ [**002**] Abies procera*** 2 Xerophyllum tenax** 3 [**keep**] TSHRB* 2 Acer circinatum* Achlys triphylla* 2 Amelanchier alnifolia* Chimaphila umbellata* Clintonia uniflora* 2 Orthilia secunda* Paxistima myrsinites* Rhododendron menziesii 2 Sorbus sitchensis* Thuja plicata* Tiarella trifoliata*
▶ [**003**] TSHRB 6 Achlys triphylla* Berberis nervosa* Linnaea borealis* Polystichum munitum 2 Tiarella trifoliata 2 Vaccinium parvifolium*** [**keep**] SHRB 5 Abies lasiocarpa* 3 Callitropsis nootkatensis* Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Rhododendron menziesii* 2 Sorbus sitchensis** Vaccinium membranaceum* 3
▶ [**007**] Linnaea borealis* Thuja plicata* Vaccinium ovalifolium* Vaccinium parvifolium*** [**keep**] FORB 3 SHRB 3 TSHRB* 2 Abies lasiocarpa*** Achlys triphylla*** 2 Callitropsis nootkatensis* Clintonia uniflora* 2 Linnaea borealis 2 Rhododendron menziesii 2 Sorbus sitchensis** Vaccinium membranaceum* 2
▶ [**157**] Berberis nervosa* Gaultheria ovatifolia* Hieracium albiflorum*** Linnaea borealis* Pinus monticola* Pyrola asarifolia+* Thuja plicata* 4 Vaccinium parvifolium*** [**keep**] Abies amabilis* 5 Abies lasiocarpa* 2 Achlys triphylla** 2 Callitropsis nootkatensis* 2 Clintonia uniflora* Orthilia secunda* Sorbus sitchensis* Tiarella trifoliata*

Floristics (23 plots, MORA 6, NOCA 13, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 27, Tsuga heterophylla 19, Pseudotsuga menziesii 13	Vaccinium membranaceum 10		
80-95			Orthilia secunda 2	moss 15
60-80				
40-60	Callitropsis nootkatensis 5		Clintonia uniflora 4, Paxistima myrsinites 2, Chimaphila umbellata 2, Goodyera oblongifolia 0	
25-40	Abies lasiocarpa 7	Rhododendron menziesii 4, Sorbus sitchensis 0	Achlys triphylla 13, Linnaea borealis 4, Tiarella trifoliata 1, Rubus lasiococcus 1	
10-25	Tsuga mertensiana 17, Thuja plicata 2, Pinus monticola 1	Acer circinatum 6, Acer glabrum 1, Vaccinium ovalifolium 1, Sorbus scopulina 1	Berberis nervosa 3, Streptopus lanceolatus 2, Rubus pedatus 2, Chimaphila menziesii 1, Pyrola asarifolia+ 1	

{005} Abies amabilis, Rhododendron albiflorum
Silver fir & Cascade azalea forest
ABIAMA/RHOALB



Range: Upper montane. **MORA**-12: **ne*** (sw-se) 1500-1610m. **OLYM**-1: (ne) 1310-1320m.

Struct: Semi-open conifer forest (33-36m) with substantial conifer regen, dense shrubs, and abundant forbs. Avg vasc cover 130: conif tree 50, shrb 42, forb 25, conif regen 12, sedge 0.17 @ 3.

Ecology: Fairly gentle slopes with easterly aspects, on shallow well-drained soils. Regen dominated by *Abies amabilis*.

Metrics: slope 16-29°, vdp 17-96m, vdr 409-503m, east 62-96, south 18-63, conv 48-54, tpp 38-57, solar 49-68, wet 2-3

Map class: C13–Mountain hemlock, silver fir & Cascade azalea forest

Rel to C09: Same, although site characteristics appear to disagree with those described there.

Similar: MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[012] ABIAMA-TSUMER/VACMEM, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[004] ABIAMA-PSEMEN/VACMEM, MNO:[011] ABIAMA-TSUMER/MENFER.

▶ [**002**] Abies procera 2 Pseudotsuga menziesii*** 2 Tsuga heterophylla* 5 Xerophyllum tenax* 2 [**keep**] SHRB 15 Erythronium montanum+** 2 Rhododendron albiflorum* 6 Rhododendron menziesii 2 Rubus lasiococcus* 2 Rubus pedatus** Tsuga mertensiana* Vaccinium membranaceum 9 Viola orbiculata+*
▶ [**012**] Tsuga mertensiana 4 Vaccinium deliciosum* 2 Vaccinium ovalifolium 2 [**keep**] FORB 11 Callitropsis nootkatensis* 6 Erythronium montanum+* Goodyera oblongifolia* Rhododendron albiflorum* 3 Rhododendron menziesii 3 Rubus lasiococcus* 4 Viola orbiculata+***
▶ [**013**] Abies procera 2 Clintonia uniflora 2 Streptopus lanceolatus** 2 Tiarella trifoliata* Tsuga mertensiana 4 Valeriana sitchensis* Xerophyllum tenax* 2 [**keep**] SHRB 16 Abies lasiocarpa 2 Callitropsis nootkatensis* 5 Goodyera oblongifolia*** Orthilia secunda* Rhododendron albiflorum* 4 Rhododendron menziesii 7 Rubus lasiococcus 4 Viola orbiculata+*
▶ [**014**] Clintonia uniflora** 2 Picea engelmannii 2 Streptopus lanceolatus*** Tiarella trifoliata* Vaccinium ovalifolium 2 Valeriana sitchensis* [**keep**] Callitropsis nootkatensis* Carex spectabilis+*** Corallorhiza*** Erythronium montanum+* 5 Luzula hitchcockii+*** Mitella*** Monotropa*** Phyllodoce empetriformis*** Rhododendron albiflorum* 4 Rhododendron menziesii 6 Viola orbiculata+*
▶ [**016**] Abies lasiocarpa* 9 Lupinus latifolius* Paxistima myrsinites* Pinus monticola* Pseudotsuga menziesii 2 Xerophyllum tenax* 2 [**keep**] Rhododendron albiflorum*** 2 Rhododendron menziesii 5 Rubus lasiococcus 4 Rubus pedatus** Tsuga heterophylla 2
▶ [**027**] TSHRB 2 Abies lasiocarpa* 10 Hieracium albiflorum* Lupinus latifolius* 2 Moehringia macrophylla* Pseudotsuga menziesii* 2 Valeriana sitchensis* Xerophyllum tenax 2 [**keep**] Abies amabilis* 15 Callitropsis nootkatensis* Goodyera oblongifolia** Neottia*** Rhododendron menziesii* Rubus pedatus** Tsuga heterophylla* Viola orbiculata+*
▶ [**204**] TSHRB 2 Phyllodoce empetriformis 2 Sorbus sitchensis 2 Tsuga mertensiana 4 Vaccinium deliciosum* 2 Valeriana sitchensis* [**keep**] Abies procera** Carex spectabilis+* Corallorhiza** Goodyera oblongifolia** Monotropa*** Neottia* Tsuga heterophylla* Viola orbiculata+*

Floristics (6 plots, MORA 5, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 45	Vaccinium membranaceum 20, Rhododendron albiflorum 14	Rubus lasiococcus 10	
80-95	Callitropsis nootkatensis 14			
60-80	Tsuga mertensiana 2		Rubus pedatus 3, Orthilia secunda 2	moss 6
40-60			Erythronium montanum+ 13, Viola orbiculata+ 2, Goodyera oblongifolia 1	
25-40	Abies lasiocarpa 6, Tsuga heterophylla 3	Rhododendron menziesii 20, Sorbus sitchensis 1	Neottia 1	
10-25			Valeriana sitchensis 15, Arnica latifolia+ 8, Veratrum viride 1, Xerophyllum tenax 1, Monotropa 1, Phyllodoce empetriformis 1, Corallorhiza 1, Tiarella trifoliata 1, Mitella 1	Carex spectabilis+ 3, Luzula hitchcockii+ 1

{006} Abies amabilis, Tsuga heterophylla, Oplopanax horridus
Silver fir, western hemlock & devil's club forest
ABIAMA-TSUHET/OPLHOR



Range: Lower montane zone, cool sites in lowland zone. **MORA**-13: **nw**-**sw** (ne) 740-980m. **NOCA**-23: **nw**-**ne**-**cw**-**ce** 730-1080m. **OLYM**-7: **nc**-**se** 780-940m.

Struct: Semi-open conifer forest (38-46m) with substantial conifer regen, dense shrubs, and abundant forbs & ferns. Avg vasc cover 154: conif tree 52, shrb 36, forb 28, fern 17, conif regen 13, tall shrb 0.74 @ 5, dwf shrb 0.26 @ 3.

Ecology: Springs, seeps or along small streams, on poorly drained soils. Not associated with avalanche chutes. Regen codominated by *Tsuga heterophylla* and *Abies amabilis*.

Metrics: slope 3-16°, vdp 1-4m, vdr 5-290m, east 14-77, south 5-78, conv 38-47, tpp 9-23, solar 49-60, wet 4-6

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Expanded, with incorporation of some plots from TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN.

Similar: MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL.

▶ [**009**] Linnaea borealis* 3 Maianthemum dilatatum* Pseudotsuga menziesii* Streptopus streptopoides** Taxus brevifolia** Viola orbiculata+*** [**keep**] SHRB 12 TSHRB 2 Acer circinatum 2 Claytonia sibirica+** Corydalis*** Mitella* Oplopanax horridus 3 Prosartes* Ribes bracteosum+* Rubus nutkanus** Rubus spectabilis 3 Streptopus amplexifolius* Tolmiea menziesii** Vaccinium membranaceum** Viola glabella+*
▶ [**010**] B-GT5* Acer macrophyllum** Achlys triphylla* 4 Adenocaulon bicolor* Adiantum aleuticum* Alnus rubra* Circaea alpina* Maianthemum dilatatum** 2 Oxalis oregana* Pteridium aquilinum* Rubus spectabilis 11 Tolmiea menziesii 2 Veratrum viride* [**keep**] Clintonia uniflora* Maianthemum stellatum 2 Oplopanax horridus* 7 Prosartes*** Ribes lacustre* Streptopus amplexifolius* Streptopus lanceolatus 2 Thuja plicata* 6 Trillium ovatum* Vaccinium membranaceum**
▶ [**177**] TSHRB 8 Abies grandis*** Acer circinatum 8 Acer glabrum*** Acer macrophyllum*** Actaea rubra** Adenocaulon bicolor** Adiantum aleuticum** Asarum caudatum** Berberis nervosa** Circaea alpina** Pseudotsuga menziesii 4 Rosa*** [**keep**] Abies amabilis* 7 Rubus pedatus* Vaccinium ovalifolium*
▶ [**184**] Boykinia*** Gaultheria shallon** Maianthemum dilatatum** 2 Pseudotsuga menziesii* Rhododendron menziesii* 2 Struthiopteris spicant* 4 Vaccinium ovalifolium 9 Vaccinium parvifolium 4 [**keep**] TSHRB** Acer circinatum 2 Athyrium filix-femina* Dryopteris** Galium** Gymnocarpium dryopteris* Maianthemum stellatum* Oplopanax horridus* 7 Rubus spectabilis* Sambucus racemosa** Trillium ovatum* Viola glabella+*
▶ [**187**] Achlys triphylla* Maianthemum dilatatum** 2 Rhododendron menziesii 2 Vaccinium ovalifolium 8 [**keep**] Claytonia sibirica+* Corydalis** Galium* Maianthemum stellatum* Oplopanax horridus 6 Ribes lacustre** Rubus nutkanus* Sambucus racemosa* Thuja plicata* 6 Tolmiea menziesii*** Viola glabella+**

Floristics (35 plots, MORA 10, NOCA 19, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 28, Tsuga heterophylla 27	Oplopanax horridus 22	Tiarella trifoliata 7	
80-95		Rubus spectabilis 7		Athyrium filix-femina 8, Gymnocarpium dryopteris 8
60-80	Thuja plicata 13	Vaccinium ovalifolium 5, Vaccinium parvifolium 2, Sambucus racemosa 2	Clintonia uniflora 4, Rubus pedatus 3	moss 26
40-60			Maianthemum stellatum 4, Streptopus lanceolatus 4, Viola glabella+ 3, Cornus unalaschkensis 2, Trillium ovatum 1	Struthiopteris spicant 2
25-40		Acer circinatum 5, Vaccinium membranaceum 3, Rhododendron menziesii 1, Ribes lacustre 1	Streptopus amplexifolius 2, Prosartes 1, Galium 0	Dryopteris 3, Polystichum munitum 2
10-25	Pseudotsuga menziesii 3	Rubus nutkanus 3, Ribes bracteosum+ 2	Corydalis 19, Mitella 4, Circaea alpina 4, Achlys triphylla 3, Linnaea borealis 2, Goodyera oblongifolia 2	Equisetum arvense+ 6

{007} Abies amabilis, Tsuga heterophylla, Orthilia secunda
Silver fir, western hemlock & one-sided wintergreen forest
ABIAMA-TSUHET/ORTSEC



Range: Lower montane. **MORA**-23: **ne**-**sw** (nw) 970-1200m. **NOCA**-41: **nw**-**cw**-**ce*** (ne-s) 860-1170m. **OLYM**-18: **nc**-**ne** (se) 780-1190m.

Struct: Closed conifer forest (29-43m) with abundant conifer regen and prominent dwarf shrubs. Avg vasc cover 89: conif tree 66, conif regen 18, shrb 2, forb 0.95 @ 2, dwf shrb 0.84 @ 2.

Ecology: Even-aged stands on fairly gentle midslopes, developing after disturbance. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*. Deep shade, poor soils and abundant litter accumulation strongly limit the cover and diversity of the vascular understory.

Metrics: slope 15-29°, vdp 5-62m, vdr 57-456m, east 18-88, south 12-83, conv 44-53, tpp 18-56, solar 46-70, wet 3-4

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Evolved from ABIAMA-TSUHET/dep, incorporating many sparse plots from ABIAMA-(TSUHET)/VACMEM, TSUHET-ABIAMA-(PSEMEN)/VACALA, [192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN) and PSEMEN-(TSUHET)/dep.

Similar: MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[004] ABIAMA-PSEMEN/VACMEM, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[181] TSUHET-ABIAMA-PSEMEN/GAUSHA, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR. Also see: [192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN) (lower elev, *Abies amabilis* not prominent).

▶ [**003**] FORB 3 TSHRB 2 Acer circinatum 2 Achlys triphylla*** 2 Berberis nervosa 2 Polystichum munitum 2 Tiarella trifoliata 2 [**keep**] Chimaphila menziesii* Paxistima myrsinites* Pyrola asarifolia+* Rhododendron menziesii* Taxus brevifolia* Thuja plicata*
▶ [**004**] FORB 3 SHRB 3 TSHRB* 2 Abies lasiocarpa*** Achlys triphylla*** 2 Callitropsis nootkatensis* Clintonia uniflora* 2 Linnaea borealis 2 Rhododendron menziesii 2 Sorbus sitchensis** Vaccinium membranaceum* 2 [**keep**] Linnaea borealis* Thuja plicata* Vaccinium ovalifolium* Vaccinium parvifolium***
▶ [**008**] SHRB 3 Achlys triphylla*** Cornus unalaschkensis 2 Rubus pedatus* Struthiopteris spicant* Vaccinium membranaceum 2 Vaccinium ovalifolium* 2 Vaccinium parvifolium 2 [**keep**] Berberis nervosa** Chimaphila umbellata* Corallorhiza* Goodyera oblongifolia* Linnaea borealis* Orthilia secunda* Paxistima myrsinites** Thuja plicata*
▶ [**009**] FORB 3 Athyrium filix-femina** Cornus unalaschkensis* Dryopteris*** Gymnocarpium dryopteris** 2 Linnaea borealis 2 Oplopanax horridus** Polystichum munitum* Rubus pedatus** 2 Rubus spectabilis*** Struthiopteris spicant** 2 Tiarella trifoliata** 2 [**keep**] Berberis nervosa* Chimaphila menziesii* Chimaphila umbellata* Corallorhiza** Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites** Pseudotsuga menziesii* Vaccinium membranaceum**. Note: [009] mosaics with [007] are possible.
▶ [**182**] FORB 2 SHRB 3 TSHRB* 2 Acer circinatum* 2 Achlys triphylla*** Berberis nervosa* 2 Clintonia uniflora* Cornus unalaschkensis* Gaultheria shallon* Linnaea borealis 2 Pyrola asarifolia+* Rubus pedatus* Taxus brevifolia* 3 Trillium ovatum* Vaccinium ovalifolium 2 [**keep**] –
▶ [**183**] FORB 3 SHRUB 4 TSHRB 2 Achlys triphylla*** Berberis nervosa 2 Clintonia uniflora* Cornus unalaschkensis* 2 Gaultheria shallon** Linnaea borealis 2 Neottia* Polystichum munitum* Rubus pedatus* Struthiopteris spicant* Tiarella trifoliata* Trillium ovatum* Vaccinium ovalifolium 2 Vaccinium parvifolium 2 [**keep**] Orthilia secunda* Paxistima myrsinites* Pyrola asarifolia+* Vaccinium membranaceum*

Floristics (73 plots, MORA 14, NOCA 41, OLYM 18): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 44, Abies amabilis 25			moss 38
80-95	Pseudotsuga menziesii 11			
60-80	Thuja plicata 6	Vaccinium ovalifolium 1, Vaccinium parvifolium 1	Linnaea borealis 1, Orthilia secunda 0	
40-60		Vaccinium membranaceum 1	Chimaphila umbellata 1, Goodyera oblongifolia 0, Chimaphila menziesii 0	
25-40			Berberis nervosa 1, Paxistima myrsinites 0, Corallorhiza 0	
10-25	Callitropsis nootkatensis 4, Taxus brevifolia 2	Acer circinatum 1	Gaultheria ovatifolia 1, Clintonia uniflora 1, Rubus lasiococcus 1, Cornus unalaschkensis 1	

{008} Abies amabilis, Tsuga heterophylla, Pseudotsuga menziesii*, Vaccinium ovalifolium
Silver fir, western hemlock, Douglas-fir* & Alaska blueberry forest
ABIAMA-TSUHET-(PSEMEN)/VACALA



Range: Lower montane. **MORA**-22: **ne**-**sw**-**se** (nw) 950-1180m. **NOCA**-11: **nw**-**ne** (cw) 730-990m. **OLYM**-25: **nc***-**sc**-**se** 810-1040m.

Struct: Mostly closed conifer forest (34-44m) with abundant conifer regen, abundant shrubs, and prominent forbs. Avg vasc cover 118: conif tree 61, conif regen 27, shrb 23, forb 4, dwf shrb 0.66 @ 3.

Ecology: Fairly gentle midslopes with moderately dry, well-drained soils. Mid- to late-successional; *Abies amabilis* has a strong canopy presence. It also dominates regen, with smaller but substantial amounts of *Tsuga heterophylla*.

Metrics: slope 10-31°, vdp 6-40m, vdr 43-418m, east 12-73, south 20-91, conv 45-53, tpp 17-54, solar 50-72, wet 3-4

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Evolved from TSUHET-ABIAMA-(PSEMEN)/VACALA, incorporating several plots from ABIAMA-TSUHET/dep, ABIAMA-(TSUHET)/VACMEM-VACALA, ABIAMA/MENFER and other discontinued C09 types. Name changed to emphasize later successional status.

Similar: MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MNO:[007] ABIAMA-TSUHET/ORTSEC, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MO:[003] ABIAMA-PSEMEN/ACHTRI, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN. Also see: [180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN

▶ [**001**] Arnica latifolia+*** Callitropsis nootkatensis*** 6 Erythronium montanum+** Mitella*** Rhododendron menziesii 2 Sorbus sitchensis** Streptopus lanceolatus** Tsuga mertensiana*** Valeriana sitchensis*** Veratrum viride*** Viola orbiculata+*** [**keep**] Acer circinatum** Cornus unalaschkensis 2 Thuja plicata* Vaccinium parvifolium* 2
▶ [**007**] Berberis nervosa** Chimaphila umbellata* Corallorhiza* Goodyera oblongifolia* Linnaea borealis* Orthilia secunda* Paxistima myrsinites** Thuja plicata* [**keep**] SHRB 3 Achlys triphylla*** Cornus unalaschkensis 2 Rubus pedatus* Struthiopteris spicant* Vaccinium membranaceum 2 Vaccinium ovalifolium* 2 Vaccinium parvifolium 2
▶ [**009**] FORB 7 Athyrium filix-femina* 2 Dryopteris*** Gymnocarpium dryopteris** 2 Oplopanax horridus*** Polystichum munitum* Rubus pedatus* 2 Rubus spectabilis** Struthiopteris spicant* 2 Thuja plicata* Tiarella trifoliata*** 2 [**keep**] SHRB 11 Chimaphila menziesii* Orthilia secunda* Vaccinium membranaceum** Vaccinium ovalifolium 6
▶ [**183**] Chimaphila umbellata* Clintonia uniflora* Cornus unalaschkensis* Linnaea borealis* Polystichum munitum** Pseudotsuga menziesii* Thuja plicata* Tiarella trifoliata*** Vaccinium parvifolium* [**keep**] Abies amabilis 20 Vaccinium membranaceum*
▶ [**186**] FORB 7 TSHRB 3 Acer circinatum 4 Achlys triphylla* Athyrium filix-femina* Clintonia uniflora* Cornus unalaschkensis* Gymnocarpium dryopteris* Rhododendron menziesii 2 Rubus pedatus* 2 Rubus spectabilis*** Streptopus lanceolatus*** Tiarella trifoliata** [**keep**] Chimaphila menziesii*** Orthilia secunda*
▶ [**187**] FORB 7 Achlys triphylla* Athyrium filix-femina** 2 Clintonia uniflora* Gymnocarpium dryopteris** 2 Rubus pedatus* 2 Rubus spectabilis*** 2 Streptopus lanceolatus*** Struthiopteris spicant 2 Tiarella trifoliata*** [**keep**] Chimaphila menziesii** Chimaphila umbellata*** Goodyera oblongifolia* Linnaea borealis* Orthilia secunda* Pseudotsuga menziesii* Thuja plicata* Vaccinium membranaceum*

Floristics (41 plots, MORA 8, NOCA 11, OLYM 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 45, Tsuga heterophylla 35	Vaccinium ovalifolium 19		moss 36
80-95				
60-80		Vaccinium parvifolium 5		
40-60	Pseudotsuga menziesii 11		Orthilia secunda 1, Chimaphila menziesii 0	
25-40		Vaccinium membranaceum 4, Rhododendron menziesii 1	Cornus unalaschkensis 3, Clintonia uniflora 3, Rubus pedatus 1	
10-25	Thuja plicata 6, Callitropsis nootkatensis 4	Acer circinatum 2	Linnaea borealis 4, Achlys triphylla 2, Chimaphila umbellata 2, Neottia 1, Gaultheria ovatifolia 1	Struthiopteris spicant 1

{009} Abies amabilis, Tsuga heterophylla, Rubus pedatus, Tiarella trifoliata
Silver fir, western hemlock, trailing raspberry & foamflower forest
ABIAMA-TSUHET/RUBPED-TIATRI



Range: Lower montane zone, cool sites in lowland zone. **MORA**-19: **nw*-ne-sw-se** 810-1200m. **NOCA**-13: **nw*-cw** (ce) 720-930m. **OLYM**-6: **ne** (nc-sc-se) 700-910m.

Struct: Mostly closed conifer forest (38-48m) with abundant conifer regen, abundant forbs & ferns, and substantial shrubs. Avg vasc cover 121: conif tree 62, forb 20, conif regen 17, shrb 7, fern 0.88 @ 12, tall shrb 0.55 @ 1, dwf shrb 0.52 @ 7, brdlf regen 0.12 @ 5.

Ecology: Cool lower slopes, on moist but well-drained soils. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*.

Metrics: slope 5-26°, vdp 1-22m, vdr 6-189m, east 12-70, south 7-52, conv 42-49, tpp 12-30, solar 47-61, wet 3-5

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Same, although *Abies procera* and *Picea engelmannii* are infrequent and *Tiarella trifoliata* is clearly the dominant understory plant.

Similar: MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[006] ABIAMA-TSUHET/OPLHOR, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[007] ABIAMA-TSUHET/ORTSEC (species-poor understory), NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER.

▶ [**006**] SHRB 12 TSHRB 2 Acer circinatum 2 Claytonia sibirica+** Corydalis*** Mitella* Oplopanax horridus 3 Prosartes* Ribes bracteosum+* Rubus nutkanus** Rubus spectabilis 3 Streptopus amplexifolius* Tolmiea menziesii** Vaccinium membranaceum** Viola glabella+* [**keep**] Linnaea borealis* 3 Maianthemum dilatatum* Pseudotsuga menziesii* Streptopus streptopoides** Taxus brevifolia** Viola orbiculata+***

▶ [**180**] Achlys triphylla* Luzula parviflora*** Maianthemum dilatatum* Polystichum munitum* 4 Struthiopteris spicant* Vaccinium parvifolium 3 [**keep**] Acer circinatum* Goodyera oblongifolia* Gymnocarpium dryopteris* Linnaea borealis* 2 Maianthemum stellatum* Oplopanax horridus* Orthilia secunda* Rhododendron menziesii* Streptopus lanceolatus* Trillium ovatum*

▶ [**184**] SHRB 12 Boykinia*** 2 Gaultheria shallon** Maianthemum dilatatum* 2 Rhododendron menziesii* 2 Struthiopteris spicant* Vaccinium ovalifolium 6 Vaccinium parvifolium 3 [**keep**] TSHRB* Acer circinatum* Dryopteris** Gymnocarpium dryopteris* Linnaea borealis* Sambucus racemosa*

▶ [**185**] TSHRB 2 Acer circinatum 2 Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 4 Rhododendron menziesii 2 Vaccinium ovalifolium 6 [**keep**] Athyrium filix-femina* Dryopteris* Maianthemum stellatum* Rubus spectabilis* Trillium ovatum*

▶ [**186**] SHRB 12 TSHRB 2 Acer circinatum 2 Rhododendron menziesii 2 Rubus lasiococcus* Vaccinium membranaceum** Vaccinium ovalifolium 6 Vaccinium parvifolium 3 [**keep**] Athyrium filix-femina* Dryopteris** Gymnocarpium dryopteris* Oplopanax horridus** Polystichum munitum** Rubus spectabilis* Struthiopteris spicant* 2 Thuja plicata* Tiarella trifoliata*

▶ [**187**] SHRB 12 Achlys triphylla** Callitropsis nootkatensis* Maianthemum dilatatum* 2 Rhododendron menziesii 2 Rubus lasiococcus* Sorbus sitchensis*** Vaccinium membranaceum* Vaccinium ovalifolium 6 Vaccinium parvifolium 3 Veratrum viride** [**keep**] Cornus unalaschkensis* Dryopteris* Linnaea borealis*** Polystichum munitum* Pseudotsuga menziesii*** Thuja plicata***

Floristics (33 plots, MORA 15, NOCA 13, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 36, Abies amabilis 32		Tiarella trifoliata 5	
80-95				moss 41
60-80		Vaccinium ovalifolium 3, Oplopanax horridus 2, Vaccinium parvifolium 2	Rubus pedatus 5, Cornus unalaschkensis 3, Clintonia uniflora 2	Gymnocarpium dryopteris 5
40-60	Thuja plicata 9, Pseudotsuga menziesii 6	Rubus spectabilis 2	Linnaea borealis 7, Streptopus lanceolatus 1	Struthiopteris spicant 5, Athyrium filix-femina 3, Dryopteris 3, Polystichum munitum 2
25-40		Acer circinatum 1, Rhododendron menziesii 1, Sambucus racemosa 1	Maianthemum stellatum 3, Streptopus streptopoides 2, Trillium ovatum 0	
10-25	Taxus brevifolia 1		Achlys triphylla 7, Valeriana sitchensis 3, Maianthemum dilatatum 1, Galium 1, Prosartes 1, Neottia 1, Orthilia secunda 1	

{010} Abies amabilis, Tsuga heterophylla, Rubus spectabilis, Tiarella trifoliata, Athyrium filix-femina
Silver fir, western hemlock, salmonberry, foamflower & lady fern forest
ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL



Range: Lowland zone, on or near valley bottoms. **NOCA**-6: **nw*** 300-850m. **OLYM**-11: **se*** (nc-sc) 420-610m.

Struct: Open conifer forest (43-49m) with substantial conifer regen, dense shrubs & forbs, abundant ferns, and substantial tall shrubs. Avg vasc cover 164: shrb 44, conif tree 43, forb 36, fern 18, conif regen 0.88 @ 14, tall shrb 0.82 @ 10, brdlf tree 0.24 @ 5, grass 0.12 @ 4.

Ecology: Very gentle slopes, often on riparian terraces. Regen codominated by *Tsuga heterophylla* and *Abies amabilis*.

Metrics: slope 4-15°, vdp 1-5m, vdr 8-25m, east 24-84, south 56-95, conv 40-47, tpp 8-17, solar 55-64, wet 3-6

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Evolved from ABIAMA/RUBSPE-VACALA, incorporating some plots from [006] ABIAMA-TSUHET/OPLHOR.

Similar: MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[006] ABIAMA-TSUHET/OPLHOR, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI.

▶ [**006**] Clintonia uniflora* Maianthemum stellatum 2 Oplopanax horridus* 7 Prosartes*** Ribes lacustre* Streptopus amplexifolius* Streptopus lanceolatus 2 Thuja plicata* 6 Trillium ovatum* Vaccinium membranaceum** [**keep**] B-GT5* Acer macrophyllum** Achlys triphylla* 4 Adenocaulon bicolor* Adiantum aleuticum* Alnus rubra* Circaea alpina* Maianthemum dilatatum** 2 Oxalis oregana* Pteridium aquilinum* Rubus spectabilis 11 Tolmiea menziesii 2 Veratrum viride*
▶ [**009**] Linnaea borealis*** 2 Pseudotsuga menziesii* Thuja plicata* [**keep**] B-GT5* SHRB 12 TSHRB 2 Acer circinatum 2 Achlys triphylla* Alnus rubra* Athyrium filix-femina* Circaea alpina*** 2 Claytonia sibirica+** Galium* Maianthemum dilatatum 2 Oxalis oregana*** Ribes bracteosum+* Rubus spectabilis* 4 Sambucus racemosa 2 Tolmiea menziesii***
▶ [**180**] Luzula parviflora* Mitella** Polystichum munitum 4 Prosartes** Pseudotsuga menziesii* Streptopus streptopoides** Struthiopteris spicant* Vaccinium parvifolium* [**keep**] TSHRB* 3 Acer circinatum*** 2 Alnus rubra*** Circaea alpina** 2 Gymnocarpium dryopteris* Oplopanax horridus 2 Ribes bracteosum+*** 2 Rubus pedatus* Rubus spectabilis 6 Tolmiea menziesii** Viola glabella+***
▶ [**185**] Cornus unalaschkensis 5 Oxalis oregana* Polystichum munitum 4 Pseudotsuga menziesii** [**keep**] Athyrium filix-femina* Circaea alpina 2 Ribes bracteosum+ 2 Rubus spectabilis* 2 Tolmiea menziesii 2 Viola glabella+ 2
▶ [**187**] Callitropsis nootkatensis* Clintonia uniflora* Neottia* Prosartes* Rhododendron menziesii* Streptopus lanceolatus* 2 Streptopus streptopoides* [**keep**] TSHRB 4 Acer circinatum* Alnus rubra*** 2 Circaea alpina** 2 Galium* Polystichum munitum* Ribes bracteosum+* Rubus spectabilis 9 Sambucus racemosa* Thuja plicata* Tolmiea menziesii*** 2 Viola glabella+* 2

Floristics (17 plots, NOCA 6, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 28, Abies amabilis 22	Rubus spectabilis 27, Vaccinium ovalifolium 10		Athyrium filix-femina 10
80-95			Tiarella trifoliata 7, Rubus pedatus 6	moss 34
60-80				Gymnocarpium dryopteris 4, Polystichum munitum 2
40-60		Acer circinatum 8, Sambucus racemosa 5, Oplopanax horridus 4, Vaccinium parvifolium 3	Achlys triphylla 9, Circaea alpina 6, Tolmiea menziesii 4, Cornus unalaschkensis 3, Clintonia uniflora 2	Struthiopteris spicant 3
25-40	Thuja plicata 4, Alnus rubra 3	Ribes bracteosum+ 4	Maianthemum dilatatum 5, Viola glabella+ 4, Galium 2, Streptopus lanceolatus 1	Dryopteris 2
10-25	Pseudotsuga menziesii 20, Acer macrophyllum 1	Alnus viridis 8, Rhododendron menziesii 5, Rubus nutkanus 4, Gaultheria shallon 2	Oxalis oregana 14, Boykinia 2, Veratrum viride 2, Maianthemum stellatum 1, Stellaria 1, Hydrophyllum tenuipes 1, Streptopus amplexifolius 1, Adenocaulon bicolor 1, Dicentra formosa 1, Claytonia sibirica+ 1	Pteridium aquilinum 4, liverwort 3, Adiantum aleuticum 2, Carex deweyana+ 2

{011} Abies amabilis, Tsuga mertensiana, Rhododendron menziesii
Silver fir, mountain hemlock & fool's huckleberry forest
ABIAMA-TSUMER/MENFER



Range: Upper montane. **MORA**-4: (nw-sw-se) 1350-1430m. **NOCA**-13: **nw*** (ne) 1220-1340m. **OLYM**-1: (nc) 1220-1230m.

Struct: Semi-open conifer forest (26-33m) with abundant conifer regen, very dense shrubs, and substantial forbs. Avg vasc cover 132: conif tree 52, shrb 51, conif regen 20, forb 7, dwf shrb 0.59 @ 1.

Ecology: Fairly gentle midslopes with southerly aspects. Regen dominated by *Abies amabilis*, with small amounts of *Tsuga mertensiana* and *Callitropsis nootkatensis*.

Metrics: slope 13-28°, vdp 14-52m, vdr 371-771m, east 46-95, south 68-99, conv 46-52, tpp 23-65, solar 68-82, wet 3-4

Map class: C12–Silver fir, hemlock & Alaska blueberry forest

Rel to C09: Expanded, incorporating plots from ABIAMA-TSUMER/VACMEM/RUBLAS, ABIAMA-(TSUHET)/VACMEM-VACALA, TSUMER-ABIAMA/VACALA/RUBPED and other discontinued C09 types.

Similar: MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[012] ABIAMA-TSUMER/VACMEM, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MO:[005] ABIAMA/RHOALB, MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN.

▶ [**001**] Achlys triphylla** 2 Chimaphila umbellata* Corallorhiza* Cornus unalaschkensis*** Linnaea borealis* Neottia* Rubus lasiococcus* Tiarella trifoliata* Tsuga heterophylla 11 Vaccinium parvifolium* [**keep**] Rhododendron albiflorum 2 Rhododendron menziesii* Tsuga mertensiana* 5

▶ [**012**] Rubus lasiococcus* Vaccinium deliciosum*** 2 [**keep**] Callitropsis nootkatensis* Chimaphila menziesii** Gaultheria ovatifolia* Goodyera oblongifolia* Gymnocarpium dryopteris*** Orthilia secunda* Rhododendron albiflorum 2 Rhododendron menziesii* 3 Tsuga heterophylla** Vaccinium ovalifolium** 7

▶ [**014**] Abies lasiocarpa* Clintonia uniflora 2 Paxistima myrsinites*** Picea engelmannii*** 2 Ribes lacustre** Rubus lasiococcus* 4 Rubus pedatus 2 Streptopus lanceolatus* Tiarella trifoliata* Valeriana sitchensis*** [**keep**] Callitropsis nootkatensis* Rhododendron menziesii* Tsuga mertensiana 5 Vaccinium ovalifolium* 6

▶ [**203**] Achlys triphylla** Alnus viridis** Arnica latifolia+** Athyrium filix-femina* Erythronium montanum+* Neottia** Phyllodoce empetriformis* Rubus pedatus 2 Streptopus streptopoides** Struthiopteris spicant* 2 Valeriana sitchensis* [**keep**] Orthilia secunda*** Rhododendron menziesii* Vaccinium membranaceum*

▶ [**204**] Abies lasiocarpa* Arnica latifolia+** Erythronium montanum+* Phyllodoce empetriformis* 2 Rhododendron albiflorum* 8 Rubus lasiococcus* Vaccinium deliciosum** 2 Valeriana sitchensis* 2 [**keep**] Chimaphila menziesii*** Clintonia uniflora* Gaultheria ovatifolia** Goodyera oblongifolia** Gymnocarpium dryopteris* Orthilia secunda* Rhododendron menziesii* Rubus pedatus* Tsuga heterophylla*** Vaccinium ovalifolium* 9

Floristics (17 plots, MORA 2, NOCA 14, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 38, Tsuga mertensiana 19	Vaccinium membranaceum 21, Vaccinium ovalifolium 19, Rhododendron menziesii 9		moss 25
80-95	Callitropsis nootkatensis 10		Orthilia secunda 1	
60-80	Tsuga heterophylla 7		Rubus pedatus 1	
40-60		Rhododendron albiflorum 5, Sorbus sitchensis 2	Goodyera oblongifolia 0	
25-40			Clintonia uniflora 1, Streptopus lanceolatus 1, Gaultheria ovatifolia 1, Chimaphila menziesii 1	Gymnocarpium dryopteris 0
10-25	Pseudotsuga menziesii 6, Pinus monticola 2	Rubus spectabilis 2, Vaccinium parvifolium 1	Erythronium montanum+ 17, Rubus lasiococcus 2, Viola orbiculata+ 2, Tiarella trifoliata 1, Pyrola asarifolia+ 1, Monotropa 1, Xerophyllum tenax 1, Linnaea borealis 1	Struthiopteris spicant 1

{012} Abies amabilis, Tsuga mertensiana, Vaccinium membranaceum
Silver fir, mountain hemlock & big huckleberry forest
ABIAMA-TSUMER/VACMEM



Range: Upper montane, bordering on subalpine zone. **MORA**-18: **ne**-**sw**-**se** (nw) 1500-1580m. **NOCA**-33: **nw***-**ne**-**cw** (ce-s) 1430-1570m. **OLYM**-12: **sc**-**se** (nc-ne) 1190-1380m.

Struct: Open conifer forest (21-30m) with abundant conifer regen, abundant shrubs and substantial forbs. Avg vasc cover 106: conif tree 45, shrb 27, conif regen 21, forb 7, dwf shrb 0.55 @ 8, tall shrb 0.53 @ 2.

Ecology: Fairly steep slopes, on well-drained, fairly dry soils. Regen dominated by *Abies amabilis* with smaller amounts of *Tsuga mertensiana*.

Metrics: slope 19-33°, vdp 30-170m, vdr 541-891m, east 7-85, south 51-91, conv 48-60, tpp 37-75, solar 66-80, wet 2-3

Map class: C13–Mountain hemlock, silver fir & Cascade azalea forest

Rel to C09: Evolved from ABIAMA-TSUMER/VACMEM/RUBLAS, incorporating many plots from ABIAMA-(TSUHET)/ VACMEM, several from TSUMER-ABIAMA/VACMEM/XERTEN, and more from other discontinued C09 types.

Similar: MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[011] ABIAMA-TSUMER/MENFER, MO:[005] ABIAMA/RHOALB, MNO:[208] TSUMER/PHYEMP-VACDEL (tree islands and open woodlands with mountain heathers), MNO:[016] ABILAS-(ABIAMA)/ VACMEM/XERTEN, MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN.

▶ [**005**] FORB 11 Callitropsis nootkatensis* 6 Erythronium montanum+* Goodyera oblongifolia* Rhododendron albiflorum* 3 Rhododendron menziesii 3 Rubus lasiococcus* 4 Viola orbiculata+*** [**keep**] Tsuga mertensiana 4 Vaccinium deliciosum* 2 Vaccinium ovalifolium 2
▶ [**011**] Callitropsis nootkatensis* Chimaphila menziesii** Gaultheria ovatifolia* Goodyera oblongifolia* Gymnocarpium dryopteris*** Orthilia secunda* Rhododendron albiflorum 2 Rhododendron menziesii* 3 Tsuga heterophylla** Vaccinium ovalifolium** 7 [**keep**] Rubus lasiococcus* Vaccinium deliciosum*** 2
▶ [**013**] FORB 11 Abies procera*** 2 Clintonia uniflora 2 Erythronium montanum+* 10 Rubus lasiococcus* Streptopus lanceolatus* 2 Tiarella trifoliata* 2 Valeriana sitchensis* Xerophyllum tenax* [**keep**] Orthilia secunda* Vaccinium deliciosum* 2 Vaccinium ovalifolium 2
▶ [**014**] Clintonia uniflora* 2 Goodyera oblongifolia* Paxistima myrsinites* Picea engelmannii*** 2 Ribes lacustre*** Rubus lasiococcus* Streptopus lanceolatus* Tiarella trifoliata* Tsuga heterophylla* Valeriana sitchensis* [**keep**] Tsuga mertensiana 5 Vaccinium deliciosum*** 2
▶ [**203**] Callitropsis nootkatensis* 6 Clintonia uniflora* Erythronium montanum+* Neottia** Rhododendron albiflorum 3 Rubus pedatus* Struthiopteris spicant** 2 Tiarella trifoliata* Tsuga heterophylla* Vaccinium ovalifolium** 8 [**keep**] Abies lasiocarpa*** Luetkea pectinata* Lupinus latifolius** Luzula hitchcockii+** Orthilia secunda* Paxistima myrsinites** Vaccinium deliciosum** Vaccinium membranaceum* Vahlodea atropurpurea** Veratrum viride*
▶ [**204**] Abies lasiocarpa* Arnica latifolia+* Gymnocarpium dryopteris* Neottia* Phyllodoce empetriformis* Picea engelmannii*** Rhododendron albiflorum* 3 Rhododendron menziesii 3 Valeriana sitchensis* Viola glabella+** Viola orbiculata+* [**keep**] Clintonia uniflora* Goodyera oblongifolia* Tsuga heterophylla* Vahlodea atropurpurea*. Note: [204] is not found as tree islands less than 2-3 trees deep.

Floristics (47 plots, MORA 5, NOCA 32, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 41, Tsuga mertensiana 21	Vaccinium membranaceum 25		
80-95				
60-80				moss 10
40-60	Callitropsis nootkatensis 4	Sorbus sitchensis 2, Rhododendron albiflorum 2	Rubus lasiococcus 3, Rubus pedatus 2, Orthilia secunda 1	
25-40		Vaccinium ovalifolium 4, Rhododendron menziesii 2	Vaccinium deliciosum 10, Veratrum viride 0	
10-25	Tsuga heterophylla 7, Abies lasiocarpa 5, Pseudotsuga menziesii 3		Erythronium montanum+ 6, Xerophyllum tenax 6, Phyllodoce empetriformis 3, Lupinus latifolius 3, Luetkea pectinata 2, Valeriana sitchensis 2, Clintonia uniflora 1, Arnica latifolia+ 1, Streptopus lanceolatus 1, Tiarella trifoliata 1	

{013} Abies amabilis, Tsuga mertensiana, Vaccinium membranaceum, Erythronium montanum*
Silver fir, mountain hemlock, big huckleberry & avalanche lily* forest
ABIAMA-TSUMER/VACMEM/ERYMON



Range: Upper montane. **MORA**-8: **nw*** (ne-sw-se) 1470-1570m. **NOCA**-2: (cw-s) 1570-1580m. **OLYM**-5: **nc** (sc) 1270-1440m.

Struct: Mostly closed conifer forest (29-33m) with substantial conifer regen, abundant forbs, and substantial shrubs. Avg vasc cover 115: conif tree 62, forb 30, conif regen 13, shrb 10, tall shrb 0.5 @ 1.

Ecology: Fairly steep midslopes. Regen dominated by *Abies amabilis*.

Metrics: slope 21-34°, vdp 33-153m, vdr 613-781m, east 13-70, south 30-92, conv 47-55, tpp 52-81, solar 52-84, wet 2-3

Map class: C13–Mountain hemlock, silver fir & Cascade azalea forest

Rel to C09: Evolved from ABIAMA-TSUMER/STRLAN, incorporating plots from ABIAMA-TSUMER/VACMEM/RUBLAS, TSUMER-ABIAMA/VACMEM/VALSIT and other discontinued C09 types.

Similar: MNO:[012] ABIAMA-TSUMER/VACMEM, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MO:[005] ABIAMA/RHOALB, MNO:[208] TSUMER/PHYEMP-VACDEL, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[011] ABIAMA-TSUMER/MENFER, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN.

▶ [**005**] SHRB 16 Abies lasiocarpa 2 Callitropsis nootkatensis* 5 Goodyera oblongifolia*** Orthilia secunda* Rhododendron albiflorum* 4 Rhododendron menziesii 7 Rubus lasiococcus 4 Viola orbiculata+* [**keep**] Abies procera 2 Clintonia uniflora 2 Streptopus lanceolatus** 2 Tiarella trifoliata* Tsuga mertensiana 4 Valeriana sitchensis* Xerophyllum tenax* 2
▶ [**012**] Orthilia secunda* Vaccinium deliciosum* 2 Vaccinium ovalifolium 2 [**keep**] FORB 11 Abies procera*** 2 Clintonia uniflora 2 Erythronium montanum+* 10 Rubus lasiococcus* Streptopus lanceolatus* 2 Tiarella trifoliata* 2 Valeriana sitchensis* Xerophyllum tenax*
▶ [**014**] Callitropsis nootkatensis 5 Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Picea engelmannii* 2 Ribes lacustre* Tsuga heterophylla* 2 Vaccinium ovalifolium 2 [**keep**] Abies procera** Erythronium montanum+* 5 Luzula parviflora* Mitella*** Streptopus lanceolatus 3 Tsuga mertensiana 5 Veratrum viride* Xerophyllum tenax*
▶ [**203**] SHRB 16 Callitropsis nootkatensis* 5 Rhododendron albiflorum 3 Rubus pedatus* Struthiopteris spicant 2 Tsuga heterophylla 2 Vaccinium ovalifolium* 2 [**keep**] Abies procera*** 2 Luzula parviflora** Mitella* Rubus lasiococcus* Streptopus lanceolatus* 3 Valeriana sitchensis* Veratrum viride* Xerophyllum tenax*
▶ [**204**] SHRB 16 TSHRB 2 Abies lasiocarpa* 2 Phyllodoce empetriformis* 2 Rhododendron albiflorum* 4 Sorbus sitchensis 2 Vaccinium deliciosum 2 [**keep**] Abies procera*** Clintonia uniflora* Erythronium montanum+* Luzula parviflora*** Mitella* Streptopus lanceolatus* Tiarella trifoliata* Xerophyllum tenax*
▶ [**208**] Abies lasiocarpa 2 Callitropsis nootkatensis* Cassiope mertensiana** 2 Luetkea pectinata** 2 Phyllodoce empetriformis** 2 Vaccinium deliciosum** 2 [**keep**] Abies amabilis 18 Abies procera*** 2 Clintonia uniflora*** 2 Erythronium montanum+ 7 Luzula parviflora*** Mitella* Orthilia secunda** Rhododendron menziesii** Rubus lasiococcus*** Streptopus lanceolatus*** Tiarella trifoliata*** 2 Valeriana sitchensis*

Floristics (8 plots, MORA 4, NOCA 2, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 50, Tsuga mertensiana 18			
80-95		Vaccinium membranaceum 8		
60-80			Erythronium montanum+ 20, Rubus lasiococcus 3	
40-60		Sorbus sitchensis 1	Streptopus lanceolatus 6, Xerophyllum tenax 5, Tiarella trifoliata 3, Valeriana sitchensis 2	
25-40	Abies procera 14, Callitropsis nootkatensis 3	Rhododendron menziesii 4, Rhododendron albiflorum 2, Vaccinium ovalifolium 1	Clintonia uniflora 5, Rubus pedatus 4, Arnica latifolia+ 2, Veratrum viride 1, Mitella 1, Orthilia secunda 0	moss 6, Luzula parviflora 1
10-25			Viola orbiculata+ 1	Athyrium filix-femina 2, Gymnocarpium dryopteris 1

{014} Abies amabilis, Vaccinium membranaceum, Rubus lasiococcus
Silver fir, big huckleberry & dwarf bramble forest
ABIAMA/VACMEM/RUBLAS



Range: Upper montane. **MORA**-14: **nw-ne*-se** (sw) 1440-1510m. **NOCA**-15: **s*** (ne-cw-ce) 1340-1470m. **OLYM**-2: (nc-ne-se) 1260-1310m.

Struct: Semi-open conifer forest (29-38m) with abundant conifer regen and abundant shrubs & forbs. Avg vasc cover 113: conif tree 52, shrb 24, conif regen 18, forb 18, tall shrb 0.54 @ 1.

Ecology: Fairly gentle slopes, on shallow soils. Regen dominated by *Abies amabilis*.

Metrics: slope 14-30°, vdp 4-62m, vdr 340-546m, east 4-70, south 40-87, conv 44-53, tpp 15-52, solar 55-78, wet 3-4

Map class: C13–Mountain hemlock, silver fir & Cascade azalea forest

Rel to C09: Expanded, incorporating many plots from ABIAMA-(TSUHET)/VACMEM and some from ABIAMA-TSUMER/VACMEM/RUBLAS and other discontinued C09 types.

Similar: MNO:[012] ABIAMA-TSUMER/VACMEM, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MO:[005] ABIAMA/RHOALB, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[004] ABIAMA-PSEMEN/VACMEM, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT (higher elevations).

▶ [**004**] Achlys triphylla 2 Chimaphila umbellata*** Linnaea borealis 2 Pseudotsuga menziesii** Tsuga heterophylla* 9 [**keep**] Rubus lasiococcus* 2 Rubus pedatus* 2 Streptopus lanceolatus* Tiarella trifoliata* Tsuga mertensiana* Valeriana sitchensis*
▶ [**005**] Callitropsis nootkatensis* Carex spectabilis+*** Corallorhiza*** Erythronium montanum+* 5 Luzula hitchcockii+*** Mitella*** Monotropa*** Phyllodoce empetriformis*** Rhododendron albiflorum* 4 Rhododendron menziesii 6 Viola orbiculata+* [**keep**] Clintonia uniflora** 2 Picea engelmannii 2 Streptopus lanceolatus*** Tiarella trifoliata* Vaccinium ovalifolium 2 Valeriana sitchensis*
▶ [**012**] Tsuga mertensiana 5 Vaccinium deliciosum*** 2 [**keep**] Clintonia uniflora* 2 Goodyera oblongifolia* Paxistima myrsinites* Picea engelmannii*** 2 Ribes lacustre*** Rubus lasiococcus* Streptopus lanceolatus* Tiarella trifoliata* Tsuga heterophylla* Valeriana sitchensis*
▶ [**013**] Abies procera** Erythronium montanum+* 5 Luzula parviflora* Mitella*** Streptopus lanceolatus 3 Tsuga mertensiana 5 Veratrum viride* Xerophyllum tenax* [**keep**] Callitropsis nootkatensis 5 Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Picea engelmannii* 2 Ribes lacustre* Tsuga heterophylla* 2 Vaccinium ovalifolium 2
▶ [**016**] Abies lasiocarpa 4 Chimaphila umbellata** Erythronium montanum+ 5 Gaultheria ovatifolia** Linnaea borealis** Lupinus latifolius** Moehringia macrophylla*** Pedicularis racemosa** Phyllodoce empetriformis** Pinus monticola** Vaccinium deliciosum** Xerophyllum tenax** [**keep**] Clintonia uniflora* 2 Rubus pedatus** Streptopus lanceolatus*** Tiarella trifoliata* Tsuga heterophylla 2 Valeriana sitchensis*
▶ [**204**] Abies lasiocarpa* 4 Erythronium montanum+* 4 Phyllodoce empetriformis*** Rhododendron albiflorum* 4 Tsuga mertensiana 5 Vaccinium deliciosum** 2 Veratrum viride* [**keep**] Clintonia uniflora** Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Picea engelmannii* Ribes lacustre** Rubus pedatus* Streptopus lanceolatus* Tiarella trifoliata* Tsuga heterophylla**

Floristics (24 plots, MORA 9, NOCA 13, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 58	Vaccinium membranaceum 21		
80-95			Orthilia secunda 2	
60-80	Tsuga mertensiana 3		Rubus lasiococcus 7, Rubus pedatus 5, Tiarella trifoliata 2	moss 8
40-60	Tsuga heterophylla 6		Clintonia uniflora 5, Streptopus lanceolatus 2, Valeriana sitchensis 1	
25-40	Callitropsis nootkatensis 11, Picea engelmannii 4, Abies lasiocarpa 2	Vaccinium ovalifolium 3, Rhododendron menziesii 3, Rhododendron albiflorum 2, Sorbus sitchensis 2, Ribes lacustre 1	Paxistima myrsinites 2, Goodyera oblongifolia 0	
10-25			Xerophyllum tenax 8, Erythronium montanum+ 3, Neottia 1, Veratrum viride 1, Arnica latifolia+ 1	Gymnocarpium dryopteris 2

{015} Abies lasiocarpa, Abies amabilis, Picea engelmannii*, Vaccinium membranaceum, Valeriana sitchensis
Subalpine fir, silver fir, Engelmann spruce, big huckleberry & Sitka valerian forest
ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT



Range: Upper montane, transitional to subalpine zone. **MORA**-17: **ne*** (nw-sw-se) 1550-1650m. **NOCA**-32: **ce-s*** (ne) 1520-1700m.

Struct: Semi-open conifer forest (20-23m) with substantial conifer regen, dense forbs, and abundant shrubs. Avg vasc cover 144: conif tree 52, forb 42, shrb 29, conif regen 13, dwf shrb 0.81 @ 4, tall shrb 0.74 @ 2, rush 0.5 @ 6.

Ecology: Fairly gentle slopes with southerly aspects, on well-drained soils. Regen dominated by *Abies amabilis*, usually with codominant *Abies lasiocarpa*.

Metrics: slope 13-22°, vdp 2-58m, vdr 479-713m, east 10-77, south 68-93, conv 42-50, tpp 20-53, solar 68-85, wet 3-4

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS-(ABIAMA)/VACMEM/VALSIT.

Similar: N:[017] ABILAS-PICENG/RHOALB/ARNLAT, MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[014] ABIAMA/VACMEM/RUBLAS, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB. Also see: [080] CUPNOO-(ABILAS)/CLIUNI.

▶ [**017**] Canadanthus modestus* Erigeron** Leptarrhena pyrolifolia*** Lupinus latifolius* Pedicularis bracteosa* Phyllodoce empetriformis*** 2 Potentilla flabellifolia+ 2 Rhododendron albiflorum* 4 Vaccinium deliciosum* 5 Vaccinium scoparium+* [**keep**] Abies amabilis* Hieracium albiflorum* Paxistima myrsinites* Ribes acerifolium+* Thalictrum occidentale*

▶ [**030**] TSHRB 3 Achillea millefolium*** Bistorta bistortoides* Carex spectabilis+* Erigeron** Festuca viridula** Juncus parryi+** Moehringia macrophylla* Penstemon serrulatus+*** Phlox diffusa** Pinus albicaulis** Sorbus sitchensis 2 [**keep**] Abies amabilis* 2 Orthilia secunda* Osmorhiza** Picea engelmannii** 5 Rhododendron albiflorum* Rubus lasiococcus 7 Thalictrum occidentale* Tiarella trifoliata** 2 Valeriana sitchensis* Veratrum viride* Viola glabella+*

▶ [**031**] Achillea millefolium*** Callitropsis nootkatensis** Festuca viridula*** Lupinus latifolius* Pinus albicaulis*** Rainiera stricta* Vaccinium deliciosum** Vaccinium scoparium+** 7 Viola orbiculata+* Xerophyllum tenax*** 5 [**keep**] Abies amabilis 4 Goodyera oblongifolia* Heracleum maximum* Mitella* Orthilia secunda* Osmorhiza* Picea engelmannii 10 Ribes acerifolium+* Streptopus lanceolatus* Thalictrum occidentale** Tiarella trifoliata* 2 Viola glabella+*

▶ [**032**] Achlys triphylla** Bistorta bistortoides* Carex spectabilis+* Claytonia sibirica+** Elymus* Erythronium montanum+* Festuca viridula** Luzula hitchcockii+ 9 Potentilla flabellifolia+* Vaccinium deliciosum* Veronica cusickii+** [**keep**] SHRB 8 Abies amabilis* Arnica latifolia+* Orthilia secunda* Paxistima myrsinites*** 2 Picea engelmannii*** 2 Vaccinium membranaceum 5

▶ [**033**] TSHRB 3 Bistorta bistortoides*** Chamaenerion angustifolium* Erigeron*** Ligusticum* 2 Lupinus latifolius* Mitella* 2 Senecio triangularis+** 2 Sorbus sitchensis 2 Veratrum viride* 3 [**keep**] TSHRB* Orthilia secunda* Paxistima myrsinites** 2 Picea engelmannii* Rubus lasiococcus* 4 Tiarella trifoliata 2 Vaccinium membranaceum 6

Floristics (42 plots, MORA 7, NOCA 35): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 28, Abies amabilis 15	Vaccinium membranaceum 26		
80-95	Picea engelmannii 21		Valeriana sitchensis 9, Orthilia secunda 2	
60-80			Rubus lasiococcus 16, Arnica latifolia+ 5, Paxistima myrsinites 4	
40-60	Tsuga mertensiana 3	Rhododendron albiflorum 2, Sorbus sitchensis 1	Tiarella trifoliata 4, Pedicularis racemosa 2, Viola glabella+ 2, Veratrum viride 2, Thalictrum occidentale 1, Polemonium pulcherrimum 1, Osmorhiza 1	moss 7, Luzula hitchcockii+ 6
25-40		Ribes acerifolium+ 1	Viola orbiculata+ 3, Lupinus latifolius 3, Streptopus lanceolatus 2, Eucephalus ledophyllus+ 2, Mitella 1, Hieracium albiflorum 1, Heracleum maximum 1, Goodyera oblongifolia 1, Ligusticum 1, Chamaenerion angustifolium 0	
10-25	Callitropsis nootkatensis 18, Pseudotsuga menziesii 3	Rubus nutkanus 3, Ribes lacustre 2, Alnus viridis 2, Sorbus scopulina 1	Clintonia uniflora 12, Moehringia macrophylla 2, Canadanthus modestus 1, Galium 1, Viola sempervirens 1, Pedicularis bracteosa 1, Aquilegia formosa 0	Bromus vulgaris+ 1, Calamagrostis rubescens+ 1

{016} Abies lasiocarpa, Abies amabilis*, Vaccinium membranaceum, Xerophyllum tenax
Subalpine fir, silver fir*, big huckleberry & beargrass forest
ABILAS-(ABIAMA)/VACMEM/XERTEN



Range: Upper montane, transitional to subalpine zone. **MORA**-6: **ne** (nw-sw-se) 1560-1650m. **NOCA**-1: (ne) 1400-1410m. **OLYM**-9: **nc*-ne** 1340-1480m.

Struct: Open conifer forest (15-24m) with abundant conifer regen, dense forbs, and substantial shrubs & dwarf shrubs. Avg vasc cover 117: conif tree 43, forb 31, conif regen 16, shrb 15, dwf shrb 0.85 @ 13, fern 0.23 @ 3.

Ecology: Midslopes with southerly aspects, on dry shallow soils. Regen dominated by *Abies amabilis* with smaller amounts of *Abies lasiocarpa*.

Metrics: slope 15-35°, vdp 17-94m, vdr 546-861m, east 34-77, south 77-98, conv 47-56, tpp 46-59, solar 78-90, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Expanded, incorporating plots from ABIAMA-TSUMER/VACMEM/RUBLAS and other discontinued C09 types.

Similar: MO:[207] TSUMER-ABILAS/VACMEM/XERTEN, MNO:[027] ABILAS/RHOALB/RUBLAS, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[032] ABILAS/VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MO:[080] CUPNOO-(ABILAS)/CLIUNI, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[028] ABILAS/VACDEL-VALSIT, O:[029] ABILAS/VACMEM/ERYMON. Also see: [002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN (warmer sites).

▶ [**027**] TSHRB 2 Rhododendron albiflorum*** 2 [**keep**] Abies amabilis* Callitropsis nootkatensis* Chimaphila umbellata* Gaultheria ovatifolia** Goodyera oblongifolia* Linnaea borealis** Pedicularis racemosa* Pinus monticola* Viola orbiculata+* Xerophyllum tenax*

▶ [**030**] TSHRB 2 Achillea millefolium** Arnica latifolia+* Chamaenerion angustifolium** Hieracium albiflorum* Lupinus latifolius* Paxistima myrsinites* 2 Phlox diffusa** Polemonium pulcherrimum*** Sorbus sitchensis* 3 [**keep**] Abies amabilis* 2 Callitropsis nootkatensis* Erythronium montanum+ 6 Xerophyllum tenax*** 2

▶ [**031**] Achillea millefolium** Arnica latifolia+*** Chamaenerion angustifolium** Eucephalus ledophyllus+*** Festuca viridula** Ligusticum*** Luzula hitchcockii+*** Orthilia secunda 2 Paxistima myrsinites 2 Pinus albicaulis** Polemonium pulcherrimum** Rainiera stricta** 2 Rubus lasiococcus 5 Vaccinium scoparium+ 8 [**keep**] Abies amabilis 4 Chimaphila umbellata* Erythronium montanum+ 4 Gaultheria ovatifolia* Goodyera oblongifolia* Linnaea borealis* Pinus monticola** Pseudotsuga menziesii* 2 Xerophyllum tenax*

▶ [**032**] Arnica latifolia+* 2 Ligusticum* Lupinus latifolius 4 Luzula hitchcockii+* 5 Mitella** Osmorhiza* Polemonium pulcherrimum* Ribes acerifolium+* Rubus lasiococcus 5 Sorbus sitchensis* Valeriana sitchensis* 5 Viola glabella+** [**keep**] SHRB 7 Callitropsis nootkatensis* Erythronium montanum+ 5 Goodyera oblongifolia*** Orthilia secunda* Paxistima myrsinites*** Pinus monticola** Tsuga mertensiana* Vaccinium membranaceum 5 Xerophyllum tenax**

▶ [**207**] Carex geyeri+*** Heuchera micrantha*** 2 Lomatium martindalei*** Luzula hitchcockii+*** Moehringia macrophylla 2 Pinus albicaulis*** Polystichum munitum*** Salix nivalis+*** 2 Sedum divergens*** Sorbus sitchensis* Tsuga mertensiana 11 Vaccinium deliciosum** [**keep**] Lupinus latifolius* Pseudotsuga menziesii 2 Valeriana sitchensis 2

Floristics (13 plots, MORA 3, NOCA 1, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 21, Callitropsis nootkatensis 11	Vaccinium membranaceum 14		
80-95	Abies amabilis 22		Xerophyllum tenax 19	
60-80			Rubus lasiococcus 3	
40-60	Tsuga mertensiana 6		Lupinus latifolius 2, Orthilia secunda 1	
25-40	Pseudotsuga menziesii 7, Pinus monticola 0		Erythronium montanum+ 19, Valeriana sitchensis 3, Viola orbiculata+ 1, Paxistima myrsinites 1, Moehringia macrophylla 1, Goodyera oblongifolia 1	
10-25	Picea engelmannii 3, Tsuga heterophylla 1	Sorbus sitchensis 2	Vaccinium deliciosum 14, Phyllodoce empetriformis 8, Linnaea borealis 5, Chimaphila umbellata 5, Vaccinium scoparium+ 4, Gaultheria ovatifolia 3, Penstemon serrulatus+ 2, Tiarella trifoliata 2, Veratrum viride 2, Neottia 1, Monotropa 1, Hieracium albiflorum 1, Pedicularis racemosa 1	moss 18, Pteridium aquilinum 4

{017} Abies lasiocarpa, Picea engelmannii, Rhododendron albiflorum, Arnica latifolia
Subalpine fir, Engelmann spruce, Cascade azalea & broad-leaved arnica forest
ABILAS-PICENG/RHOALB/ARNLAT



Range: Lower subalpine. **NOCA**-19: **s*** 1690-1790m.

Struct: Open conifer forest with substantial conifer regen, dense shrubs, abundant forbs, and substantial dwarf shrubs. Avg vasc cover 136: shrb 43, conif tree 41, forb 27, conif regen 9, dwf shrb 0.83 @ 13, rush 0.67 @ 4, tall shrb 0.58 @ 2.

Ecology: Fairly gentle slopes. Regen mostly *Abies lasiocarpa*, often with *Picea engelmannii* and *Abies amabilis*.

Metrics: slope 11-24°, vdp 1-26m, vdr 679-782m, east 4-58, south 15-70, conv 41-48, tpp 23-40, solar 56-74, wet 3-4

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS/RHOALB, incorporating some plots from ABILAS-(ABIAMA)/VACMEM/VALSIT and other discontinued C09 types.

Similar: MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, MNO:[033] ABILAS/VERVIR, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[032] ABILAS/VALSIT, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[204] TSUMER-ABIAMA/RHOALB. Also see: [098] LARLYA/VACDEL

▶ [**015**] Abies amabilis* Hieracium albiflorum* Paxistima myrsinites* Ribes acerifolium+* Thalictrum occidentale* [**keep**] Canadanthus modestus* Erigeron** Leptarrhena pyrolifolia*** Lupinus latifolius* Pedicularis bracteosa* Phyllodoce empetriformis*** 2 Potentilla flabellifolia+ 2 Rhododendron albiflorum* 4 Vaccinium deliciosum* 5 Vaccinium scoparium+*
▶ [**027**] Callitropsis nootkatensis** 2 Erythronium montanum+* 2 Xerophyllum tenax* 2 [**keep**] Arnica latifolia+* Canadanthus modestus 2 Luzula hitchcockii+* Pedicularis bracteosa** Pedicularis racemosa** Picea engelmannii*** 2 Polemonium pulcherrimum** Potentilla flabellifolia+ 2 Vaccinium deliciosum 4 Vaccinium scoparium+ 2 Veratrum viride*
▶ [**030**] TSHRB 3 Achillea millefolium** Callitropsis nootkatensis** 2 Chamaenerion angustifolium* Eucephalus ledophyllus+* Hieracium albiflorum* Moehringia macrophylla* Paxistima myrsinites* 5 Penstemon serrulatus+** Phlox diffusa** Sorbus sitchensis 2 [**keep**] Abies amabilis 2 Arnica latifolia+* Picea engelmannii*** 5 Potentilla flabellifolia+ 2 Rhododendron albiflorum** 5 Vaccinium deliciosum 6
▶ [**031**] Achillea millefolium* Callitropsis nootkatensis*** 2 Chamaenerion angustifolium* Eucephalus ledophyllus+* Festuca viridula* Hieracium albiflorum* Orthilia secunda 2 Pinus albicaulis* Rainiera stricta* 2 Viola orbiculata+* Xerophyllum tenax** 2 [**keep**] SHRB 20 Canadanthus modestus* 2 Dodecatheon* Erigeron* Leptarrhena pyrolifolia* Neottia* Osmorhiza* Phyllodoce empetriformis 2 Picea engelmannii 10 Potentilla flabellifolia+ 2 Rhododendron albiflorum* 5 Senecio triangularis+* Tiarella trifoliata* Viola glabella+*
▶ [**033**] TSHRB 3 Aconitum columbianum* Athyrium filix-femina* Bistorta bistortoides*** Callitropsis nootkatensis* 2 Chamaenerion angustifolium* Cirsium edule+* Erythronium montanum+* Ligusticum* Mitella 2 Ranunculus uncinatus+* Ribes acerifolium+* Sorbus sitchensis 2 Veratrum viride 3 Viola glabella+ 2 [**keep**] SHRB 17 Canadanthus modestus* Goodyera oblongifolia* Leptarrhena pyrolifolia* Orthilia secunda* Pedicularis racemosa* Phyllodoce empetriformis* 2 Picea engelmannii* Rhododendron albiflorum* 9 Rubus lasiococcus 3 Vaccinium membranaceum 6 Vaccinium scoparium+** 2

Floristics (12 plots, NOCA 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 22, Picea engelmannii 22	Rhododendron albiflorum 24, Vaccinium membranaceum 18	Arnica latifolia+ 4	
60-80			Valeriana sitchensis 6, Lupinus latifolius 2, Veratrum viride 1	Luzula hitchcockii+ 4
40-60	Abies amabilis 7, Tsuga mertensiana 4	Sorbus sitchensis 1	Rubus lasiococcus 9, Vaccinium scoparium+ 9, Phyllodoce empetriformis 3, Polemonium pulcherrimum 1, Pedicularis racemosa 1, Orthilia secunda 1, Pedicularis bracteosa 1	
25-40			Vaccinium deliciosum 13, Potentilla flabellifolia+ 3, Paxistima myrsinites 3, Canadanthus modestus 3, Tiarella trifoliata 2, Erigeron 2, Leptarrhena pyrolifolia 2, Osmorhiza 1, Viola glabella+ 1, Viola orbiculata+ 1, Dodecatheon 1, Senecio triangularis+ 1, Trollius albiflorus 1, Neottia 1, Mitella 0, Goodyera oblongifolia 0	
10-25	Pseudotsuga menziesii 4, Larix lyallii 4		Streptopus lanceolatus 4, Thalictrum occidentale 2	

{018} Abies lasiocarpa, Picea engelmannii, Vaccinium membranaceum, V. scoparium, Arnica latifolia
Subalpine fir, Engelmann spruce, big huckleberry, grouse whortleberry & broad-leaved arnica forest/woodland
ABILAS-PICENG/VACMEM/VACSCO-ARNLAT



Range: Subalpine. **NOCA**-3: **s** 1880-1970m.

Struct: Open conifer forest with substantial conifer regen, dense dwarf shrubs, and abundant forbs & shrubs. Avg vasc cover 131: conif tree 35, dwf shrb 34, forb 24, shrb 18, conif regen 15, rush 2, grass 0.33 @ 7.

Ecology: South-facing slopes on shallow soils. Regen codominated by *Abies lasiocarpa* and *Picea engelmannii*.

Metrics: slope 17-28°, vdp 5-128m, vdr 906-1081m, east 23-62, south 80-93, conv 45-58, tpp 42-67, solar 78-86, wet 3-4

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS-PICENG/VACSCO, incorporating a plot from ABILAS/VACSCO/VALSIT. Concept perhaps different; has prominent *Vaccinium membranaceum* and lush forbs.

Similar: N:[017] ABILAS-PICENG/RHOALB/ARNLAT, N:[097] LARLYA/LUZGLA, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[028] ABILAS/VACDEL-VALSIT, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MNO:[032] ABILAS/VALSIT.

▶ [**015**] TSHRB* Abies amabilis* 2 Luzula hitchcockii+ 3 Orthilia secunda* Rubus lasiococcus* 2 Tiarella trifoliata 2 Tsuga mertensiana 2 [**keep**] Arnica cordifolia** 2 Calamagrostis rubescens+ 2 Erigeron*** Festuca viridula 2 Ligusticum* Lupinus latifolius* Luzula hitchcockii+* Pedicularis bracteosa* Pedicularis racemosa* Pinus albicaulis*** Polemonium pulcherrimum* Vaccinium deliciosum 4 Vaccinium scoparium+** 7

▶ [**017**] TSHRB* Abies amabilis* 2 Phyllodoce empetriformis* 2 Rhododendron albiflorum 2 Rubus lasiococcus* 2 Sorbus sitchensis* Tsuga mertensiana* 2 [**keep**] Arnica cordifolia*** 2 Calamagrostis rubescens+ 2 Erigeron* Festuca viridula 2 Ligusticum* Pinus albicaulis*** Vaccinium scoparium+* 14

▶ [**030**] TSHRB* 2 Callitropsis nootkatensis 2 Hieracium albiflorum* Paxistima myrsinites 4 Rubus lasiococcus* 2 Sorbus sitchensis* 2 Tsuga mertensiana 2 [**keep**] Arnica cordifolia*** 2 Erigeron* Ligusticum* Luzula hitchcockii+* Pedicularis bracteosa** Pedicularis racemosa* Picea engelmannii** 5 Pinus albicaulis* Vaccinium scoparium+* 8

▶ [**031**] TSHRB* Abies amabilis* Callitropsis nootkatensis* 2 Orthilia secunda 2 Rainiera stricta 2 Rubus lasiococcus** 2 Sorbus sitchensis* Tsuga mertensiana* Viola orbiculata+* Xerophyllum tenax 2 [**keep**] Arnica cordifolia*** 2 Calamagrostis rubescens+ 2 Erigeron*** Ligusticum* Pedicularis bracteosa* Pedicularis racemosa* Picea engelmannii 10 Pinus albicaulis* Polemonium pulcherrimum*. Note: [031] is at higher elevations with deep snowpack.

▶ [**033**] TSHRB 2 Abies amabilis* 2 Bistorta bistortoides* Callitropsis nootkatensis 2 Mitella* Senecio triangularis+* Sorbus sitchensis 2 Tsuga mertensiana* Valeriana sitchensis 7 Veratrum viride 2 [**keep**] Arnica cordifolia* Calamagrostis rubescens+ 2 Pedicularis bracteosa* Pedicularis racemosa* Picea engelmannii* Pinus albicaulis* Vaccinium membranaceum 6 Vaccinium scoparium+*** 2

▶ [**097**] Antennaria lanata+ 2 Eremogone capillaris* Juncus parryi+* Larix lyallii* 2 Luetkea pectinata 2 Luzula hitchcockii+ 3 Phlox diffusa* Phyllodoce empetriformis* Senecio integerrimus* Vaccinium cespitosum 2 Veronica cusickii+* [**keep**] Aquilegia formosa** Arnica cordifolia** 2 Calamagrostis rubescens+** 2 Canadanthus modestus** Goodyera oblongifolia** Micranthes odontoloma+** Picea engelmannii 10 Salix commutata+** Thalictrum occidentale*** Viola glabella+** Viola sempervirens**

Floristics (3 plots, NOCA 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Picea engelmannii 30, Abies lasiocarpa 18, Pinus albicaulis 2	Vaccinium membranaceum 17	Vaccinium scoparium+ 29, Arnica latifolia+ 7, Lupinus latifolius 5, Arnica cordifolia 3, Erigeron 1, Pedicularis racemosa 1, Polemonium pulcherrimum 1, Pedicularis bracteosa 1, Ligusticum 1	Luzula hitchcockii+ 2
60-80		Rhododendron albiflorum 1	Valeriana sitchensis 4, Paxistima myrsinites 3, Veratrum viride 1, Thalictrum occidentale 1, Hieracium triste 0	
25-40	Larix lyallii 1	Salix commutata+ 1	Vaccinium deliciosum 10, Agoseris 1, Chamaenerion angustifolium 0, Viola sempervirens 0, Lomatium brandegeei+ 0, Micranthes odontoloma+ 0, Orthilia secunda 0, Canadanthus modestus 0, Viola glabella+ 0, Goodyera oblongifolia 0, Aquilegia formosa 0	Calamagrostis rubescens+ 4, Festuca viridula 3

{019} Abies lasiocarpa, Pinus albicaulis*, Festuca viridula, Lupinus latifolius
Subalpine fir, whitebark pine, green fescue & subalpine lupine woodland
ABILAS-(PINALB)/FESVIR-LUPARC



Range: Upper subalpine. **MORA**-37: **ne*-se** (sw) 1860-1960m. May occur on NOCA east side.

Struct: Conifer woodlands (5-10m), often in tree islands or ribbons, with substantial conifer regen, dense forbs, and substantial grasses. Avg vasc cover 97: forb 42, conif tree 24, grass 12, conif regen 10, dwf shrb 0.43 @ 10, sedge 0.43 @ 5, rush 0.43 @ 4, shrb 0.14 @ 2.

Ecology: Upper slopes with southerly aspects. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Pinus albicaulis*.

Metrics: slope 15-31°, vdp 114-158m, vdr 684-760m, east 29-67, south 75-98, conv 54-64, tpp 61-82, solar 82-94, wet 2-3

Map class: C23–Mt Rainier subalpine fir & whitebark pine wdlnd

Rel to C09: Evolved from ABILAS-(TSUMER)/FESVIR, with secondary tree species *Pinus albicaulis* rather than *Tsuga mertensiana*. Incorporates some plots from PINALB/FESVIR, ABILAS-(TSUMER)/EUCLED-LUPARC, and other discontinued C09 types.

Similar: O:[024] ABILAS/POLPUL-PEDRAC, MNO:[030] ABILAS/VACMEM/LUPARC, N:[117] PINALB/FESVIR-ARECAP, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MN:[090] FESVIR-EUC(LED,ENG), MN:[118] PINALB/JUNCOM, MN:[216] VALSIT-LIGGRA.

▶ [**020**] C-LT5 17 Callitropsis nootkatensis** 2 Juniperus communis* Paxistima myrsinites* [**keep**] C-GT5* Eucephalus ledophyllus+** 2 Festuca viridula*** 5 Ligusticum*** Lupinus latifolius* Pinus albicaulis* Polemonium pulcherrimum* Rainiera stricta 2 Vaccinium scoparium+ 2 Valeriana sitchensis* Veronica cusickii+ 2
▶ [**021**] SHRB* 4 TSHRB* Arctostaphylos uva-ursi+*** 2 Arnica cordifolia*** Calamagrostis rubescens+** 2 Eremogone capillaris** Lomatium brandegeei+*** Paxistima myrsinites** 5 Pseudotsuga menziesii 2 Sedum lanceolatum+*** Vaccinium membranaceum*** 2 [**keep**] Carex spectabilis+ 2 Festuca viridula 2 Ligusticum* Phlox diffusa* Polemonium pulcherrimum* Rainiera stricta 2 Valeriana sitchensis*** 2 Veronica cusickii+ 2
▶ [**024**] Eremogone capillaris* Pedicularis racemosa* Ribes acerifolium+* [**keep**] Eucephalus ledophyllus+** 2 Festuca viridula*** 2 Ligusticum** Pinus albicaulis** 2 Rainiera stricta 2 Vaccinium scoparium+ 2
▶ [**030**] SHRB* 4 TSHRB* 2 Callitropsis nootkatensis 2 Paxistima myrsinites* Rubus lasiococcus* 2 Sorbus sitchensis 2 Tsuga mertensiana 2 Vaccinium membranaceum*** 2 [**keep**] Aconogonon davisiae** Anemone occidentalis+** Arnica mollis+** Eucephalus ledophyllus+ 4 Festuca viridula* 3 Juniperus communis* Ligusticum* Pedicularis contorta+** Pinus albicaulis* 3 Rainiera stricta* 3 Veronica cusickii+* 2
▶ [**117**] SHRB* 3 Eremogone capillaris*** 2 Erythronium montanum+ 2 Juncus parryi+** 2 Lomatium brandegeei+** Paxistima myrsinites* Picea engelmannii 2 Sedum lanceolatum+** Senecio integerrimus** Vaccinium membranaceum** 2 [**keep**] Carex spectabilis+ 2 Eucephalus ledophyllus+* Ligusticum* Lupinus latifolius 3 Polemonium pulcherrimum* Rainiera stricta 2 Vaccinium scoparium+ 2 Valeriana sitchensis** 2

Floristics (7 plots, MORA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 26		Lupinus latifolius 8	Festuca viridula 12
80-95	Pinus albicaulis 6		Eucephalus ledophyllus+ 8, Phlox diffusa 4	
60-80			Valeriana sitchensis 7, Polemonium pulcherrimum 3, Ligusticum 2	
40-60			Rainiera stricta 9, Vaccinium scoparium+ 7, Achillea millefolium 2, Bistorta bistortoides 2, Erigeron 1	Luzula hitchcockii+ 4
25-40	Abies amabilis 3		Veronica cusickii+ 4, Juniperus communis 2, Veratrum viride 2, Potentilla flabellifolia+ 2, Arnica latifolia+ 2, Arnica mollis+ 2, Anemone occidentalis+ 2, Pedicularis contorta+ 1, Aconogonon davisiae 1	Carex spectabilis+ 6
10-25	Abies procera 15	Rhododendron menziesii 1, Spiraea splendens 1	Pedicularis racemosa 8, Paxistima myrsinites 3, Agoseris 3, Epilobium 1, Hieracium albiflorum 1, Polemonium californicum 1, Lomatium martindalei 1, Penstemon procerus+ 1, Castilleja miniata 1, Campanula rotundifolia+ 1, Cherleria/Sabulina 1, Silene parryi 1, Penstemon serrulatus+ 1, Rubus lasiococcus 1, Phyllodoce empetriformis 1, Pedicularis bracteosa 1	Elymus 6, Carex kelloggii+ 3

{020} Abies lasiocarpa, Pinus albicaulis*, Juniperus communis
Subalpine fir, whitebark pine* & common juniper shrubland
ABILAS-(PINALB)/JUNCOM_KRUMM



Range: Alpine. **MORA**-10: **ne*** (nw) 2000-2090m. **NOCA**-2: **s** 2120-2200m. **OLYM**-10: **ne*** (nc-sc) 1790-1930m.

Struct: Semi-closed canopy stunted conifers, with occasional taller stems, over substantial forbs and dwarf shrubs. Avg vasc cover 92: conif LT5 60, forb 15, dwf shrb 6, conif GT5 0.54 @ 8, sedge 0.46 @ 5, rush 0.46 @ 4, grass 0.31 @ 4.

Ecology: Fairly steep upper slopes with southerly aspects.

Metrics: slope 23-38°, vdp 41-249m, vdr 778-1013m, east 18-69, south 62-97, conv 54-67, tpp 63-87, solar 71-95, wet 1-2

Map class: C26–Conifer krummholz & treed cliff

Rel to C09: Evolved from KRUMM ABILAS, gaining plots from ABILAS-PICENG/PHYEMP and PINALB, shedding plots to [205] TSUMER-ABILAS/PHYEMP_KRUMM.

Similar: O:[024] ABILAS/POLPUL-PEDRAC, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[032] ABILAS/VALSIT, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[033] ABILAS/VERVIR, MNO:[205] TSUMER-ABILAS/PHYEMP_KRUMM, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, MNO:[082] CUPNOO-(VACMEM)/PAXMYR (maintained by avalanche disturbance), MNO:[027] ABILAS/RHOALB/RUBLAS.

▶ [**022**] Allium** Artemisia* Chimaphila umbellata* Erysimum arenicola* Festuca roemeri* 2 Hieracium albiflorum* Paxistima myrsinites 3 Penstemon serrulatus+* Pinus contorta* 2 Pinus monticola*** 2 Pseudotsuga menziesii** 10 [**keep**] C-LT5 24 Antennaria lanata+* Callitropsis nootkatensis* 10 Luetkea pectinata* Luzula hitchcockii+* Micranthes tolmiei+* Pedicularis racemosa* Polemonium pulcherrimum* Vaccinium deliciosum*

▶ [**024**] C-GT5 12 SHRB 2 Arnica latifolia+* Bistorta bistortoides** Carex spectabilis+* Eremogone capillaris* Pedicularis racemosa* 3 Polemonium pulcherrimum* Ribes acerifolium+*** Valeriana sitchensis* [**keep**] C-LT5 14 Callitropsis nootkatensis* Juniperus communis*

▶ [**030**] C-GT5* 12 SHRB* 2 TSHRB** 2 Arnica latifolia+* Hieracium albiflorum* Lupinus latifolius* Paxistima myrsinites 3 Polemonium pulcherrimum* Rubus lasiococcus** 2 Sorbus sitchensis*** 2 Vaccinium membranaceum** 2 [**keep**] C-LT5 20 Callitropsis nootkatensis 10 Juniperus communis***

▶ [**032**] C-GT5* 13 FORB 24 SHRB* 2 TSHRB* Abies amabilis* 2 Luzula hitchcockii+* 7 Rubus lasiococcus** 2 Sorbus sitchensis** Vaccinium deliciosum 2 Vaccinium membranaceum* Valeriana sitchensis* [**keep**] C-LT5 18 Achillea millefolium* Callitropsis nootkatensis* 10 Juniperus communis*** 2 Paxistima myrsinites*** Phlox diffusa*

▶ [**104**] Artemisia** 2 Bistorta bistortoides* Carex phaeocephala+* 2 Eriophyllum lanatum*** 2 Erysimum arenicola** Gentiana calycosa* Juniperus communis 7 Phacelia* Phlox diffusa 3 Poa cusickii+* Silene parryi* Trisetum** [**keep**] C-LT5 6 C-GT5 2 Abies lasiocarpa* 4 Antennaria lanata+* Callitropsis nootkatensis* 3 Hieracium triste* Juncus parryi+* Luetkea pectinata* Luzula hitchcockii+* Pedicularis racemosa* Pinus albicaulis* Polemonium pulcherrimum*

Floristics (13 plots, MORA 2, NOCA 1, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 48			
80-95			Juniperus communis 4	
60-80	Callitropsis nootkatensis 25		Phlox diffusa 2	
40-60			Lupinus latifolius 6, Paxistima myrsinites 2, Achillea millefolium 1	
25-40			Micranthes tolmiei+ 1, Lomatium martindalei 1	lichen 9
10-25	Pinus albicaulis 2	Vaccinium membranaceum 1	Valeriana sitchensis 16, Polemonium pulcherrimum 4, Luetkea pectinata 2, Arnica cordifolia 2, Arnica latifolia+ 2, Pedicularis racemosa 2, Hieracium triste 1, Penstemon procerus+ 1, Moehringia macrophylla 1, Vaccinium scoparium+ 1, Hieracium albiflorum 1, Vaccinium deliciosum 1, Phyllodoce glanduliflora 1, Phyllodoce empetriformis 1	Carex geyeri+ 7, Carex spectabilis+ 6, Juncus parryi+ 5, Luzula hitchcockii+ 4, moss 2, Cryptogramma acrostichoides 1, Carex phaeocephala+ 1

{021} Abies lasiocarpa, Pinus albicaulis, Paxistima myrsinites, Calamagrostis rubescens*
Subalpine fir, whitebark pine, Oregon-box & pinegrass* woodland
ABILAS-PINALB/PAXMYR-(CALRUB)



Range: Upper subalpine. **NOCA**-10: **s*** 1810-2110m.

Struct: Open conifer woodlands with substantial conifer regen, abundant dwarf shrubs, and substantial forbs. Avg vasc cover 86: dwf shrb 24, conif tree 20, conif regen 11, forb 10, grass 0.86 @ 4, shrb 0.71 @ 22, tall shrb 0.57 @ 1.

Ecology: Steep west-facing upper slopes in parklands, on fairly well-developed soils. Little snow accumulation due to high winds and sublimation. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Pinus albicaulis*.

Metrics: slope 33-41°, vdp 117-202m, vdr 1158-1356m, east 6-15, south 59-85, conv 54-61, tpp 55-84, solar 67-89, wet 2

Map class: C25–N Casc subalpine fir & whitebark pine wdlnd

Rel to C09: Evolved from PINALB/CALRUB, gaining plots from ABILAS-(PSEMEN)/VACMEM/CALRUB, PINALB-(ABILAS)/VACSCO/LUZGLA, etc. NCCN PINALB/CALRUB plots had *Abies lasiocarpa* generally codominant with *Pinus albicaulis*.

Similar: N:[117] PINALB/FESVIR-ARECAP, MN:[118] PINALB/JUNCOM, N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MNO:[030] ABILAS/VACMEM/LUPARC, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, MN:[102] PAXMYR/PHLDIF, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM.

▶ [**030**] TSHRB 2 Arnica latifolia+* Callitropsis nootkatensis 2 Hieracium albiflorum* Polemonium pulcherrimum* Rubus lasiococcus** 2 Sorbus sitchensis* 2 Tsuga mertensiana 2 Valeriana sitchensis* 2 [**keep**] Agoseris** Arctostaphylos uva-ursi+** 2 Arnica cordifolia*** Arnica mollis+** Calamagrostis rubescens+** Ceanothus velutinus** Hieracium scouleri+** Pinus albicaulis* 3 Salix scouleriana* Sedum lanceolatum+***

▶ [**116**] Antennaria lanata+* Erigeron** Festuca viridula 2 Juncus parryi+*** Larix lyallii 2 Pedicularis racemosa 2 Phlox diffusa* Senecio integerrimus* Vaccinium scoparium+* 7 [**keep**] Arctostaphylos uva-ursi+* 2 Arnica mollis+* Calamagrostis rubescens+* 2 Ceanothus velutinus* Chamaenerion angustifolium* Eucephalus ledophyllus+* 2 Paxistima myrsinites 7 Pseudotsuga menziesii 2 Rhododendron albiflorum*

▶ [**117**] Achillea millefolium* Antennaria lanata+* Erigeron* Eriogonum pyrolifolium** Erythronium montanum+ 2 Festuca viridula 2 Juncus parryi+*** 2 Phlox diffusa* 2 Picea engelmannii 2 Senecio integerrimus* [**keep**] Arctostaphylos uva-ursi+ 2 Arnica cordifolia*** Calamagrostis rubescens+** 2 Carex geyeri+* Ceanothus velutinus* Chamaenerion angustifolium* Eucephalus ledophyllus+* Pseudotsuga menziesii 2 Rhododendron albiflorum* Vaccinium scoparium+* 2

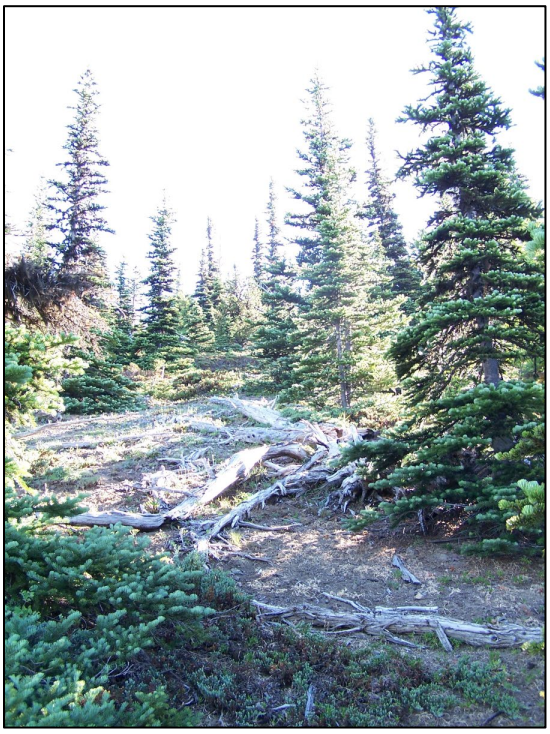
▶ [**118**] Juncus parryi+*** Juniperus communis* Lewisia** Penstemon procerus+* Phlox diffusa* Tsuga mertensiana 2 Vaccinium deliciosum 2 [**keep**] SHRB 9 Agoseris*** Arnica mollis+*** Calamagrostis rubescens+** 2 Ceanothus velutinus*** Eucephalus ledophyllus+* 2 Lupinus latifolius* Pseudotsuga menziesii* 2 Rhododendron albiflorum*** Salix scouleriana* Vaccinium membranaceum 9 Vaccinium scoparium+*

▶ [**210**] TSHRB 2 Achillea millefolium* Amelanchier alnifolia 2 Carex geyeri+ 2 Carex spectabilis+ 2 Erythronium montanum+*** Festuca viridula 2 Hieracium albiflorum* Hydrophyllum capitatum*** Lilium*** Luzula hitchcockii+** Phlox diffusa* 2 Sorbus scopulina* [**keep**] C-LT5 4 C-GT5* 5 Abies lasiocarpa 4 Arctostaphylos uva-ursi+ 2 Arnica cordifolia** Arnica mollis+* Ceanothus velutinus** Pedicularis racemosa** Pinus albicaulis* 2 Rhododendron albiflorum** Sedum lanceolatum+* Vaccinium scoparium+** 2

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 21, Pinus albicaulis 8		Paxistima myrsinites 14	
80-95			Lupinus latifolius 3	
60-80		Vaccinium membranaceum 20	Arctostaphylos uva-ursi+ 10, Lomatium brandegeei+ 1, Arnica cordifolia 0, Sedum lanceolatum+ 0	
40-60	Pseudotsuga menziesii 5	Rhododendron albiflorum 1, Salix scouleriana 1, Ceanothus velutinus 0	Eucephalus ledophyllus+ 5, Vaccinium scoparium+ 4, Eremogone capillaris 2, Pedicularis racemosa 1, Chamaenerion angustifolium 1, Hieracium scouleri+ 1, Arnica mollis+ 1, Penstemon procerus+ 0, Agoseris 0, Castilleja miniata 0, Pedicularis bracteosa 0	Calamagrostis rubescens+ 5, Carex geyeri+ 1, Festuca viridula 1
25-40			Vaccinium cespitosum 2, Phlox diffusa 2, Antennaria racemosa+ 1, Senecio integerrimus 1, Achillea millefolium 1, Hieracium triste 1, Packera 0, Moehringia macrophylla 0	moss 4, Trisetum 0
10-25		Ribes acerifolium+ 1	Erigeron 3, Hieracium albiflorum 1	

{022} Abies lasiocarpa, Pinus contorta*, Juniperus communis, Lomatium martindalei
Subalpine fir, lodgepole pine*, common juniper & Cascade desert-parsley woodland
ABILAS-(PINCON)/JUNCOM-LOMMAR



Range: Subalpine. **OLYM**-8: **ne*** 1560-1710m.

Struct: Conifer woodland (7-10m) with substantial conifer regen, dwarf shrubs & forbs. Avg vasc cover 75: conif tree 25, dwf shrb 17, forb 15, conif regen 15, grass 0.38 @ 4, rush 0.25 @ 2, sedge 0.13 @ 5, tall shrb 0.13 @ 2.

Ecology: Fairly steep south-facing upper slopes and ridgetops, with shallow well-drained soils. Regen dominated by *Abies lasiocarpa* and/or *Pseudotsuga menziesii*.

Metrics: slope 25-32°, vdp 119-248m, vdr 899-1056m, east 29-82, south 84-98, conv 57-70, tpp 67-88, solar 78-88, wet 2

Map class: C24–Olympic subalpine fir & lodgepole pine woodland

Rel to C09: Same.

Similar: MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, O:[023] ABILAS-(PINCON)/LUPARC, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[030] ABILAS/VACMEM/LUPARC, MO:[095] JUNCOM-(PHLDIF), N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, MNO:[032] ABILAS/VALSIT, N:[143] PSEMEN-PINCON/ARCNEV, O:[089] FESROE-(PHLDIF-ARECAP).

▶ [**020**] C-LT5 24 Antennaria lanata+* Callitropsis nootkatensis* 10 Luetkea pectinata* Luzula hitchcockii+* Micranthes tolmiei+* Pedicularis racemosa* Polemonium pulcherrimum* Vaccinium deliciosum* [**keep**] Allium** Artemisia* Chimaphila umbellata* Erysimum arenicola* Festuca roemeri* 2 Hieracium albiflorum* Paxistima myrsinites 3 Penstemon serrulatus+* Pinus contorta* 2 Pinus monticola*** 2 Pseudotsuga menziesii** 10

▶ [**023**] SHRB* Lupinus latifolius* 5 Orthilia secunda* Osmorhiza** Pinus contorta* 11 Polemonium pulcherrimum** 2 Rosa** Viola orbiculata+** [**keep**] Allium* Artemisia* Callitropsis nootkatensis 2 Eremogone capillaris* 2 Erysimum arenicola* Juniperus communis 2 Penstemon procerus+* Phacelia* Phlox diffusa* Pinus monticola* 2 Pseudotsuga menziesii 10

▶ [**024**] Bistorta bistortoides** 2 Carex spectabilis+* Lupinus latifolius 5 Luzula hitchcockii+ 2 Pedicularis racemosa** 2 Polemonium pulcherrimum** 2 Valeriana sitchensis** [**keep**] Hieracium albiflorum** Juniperus communis* Lomatium martindalei*** Paxistima myrsinites 2 Pinus contorta 2 Pinus monticola 2 Pseudotsuga menziesii* 2

▶ [**030**] SHRB* 3 TSHRB* 3 Arnica latifolia+* Chamaenerion angustifolium* Polemonium pulcherrimum* Rubus lasiococcus** 2 Sorbus sitchensis** 2 Tsuga mertensiana 2 Vaccinium membranaceum* 5 Valeriana sitchensis* 2 [**keep**] Festuca roemeri 2 Juniperus communis** 5 Lomatium martindalei*** Pinus contorta 2 Pinus monticola 2

▶ [**104**] Artemisia 4 Bistorta bistortoides* Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* Gentiana calycosa* Micranthes tolmiei+* Silene parryi** 2 [**keep**] C-LT5 5 C-GT5* 2 Abies lasiocarpa* 4 Hieracium albiflorum** Lomatium martindalei* Paxistima myrsinites 2 Pinus contorta 2 Pinus monticola*** 2 Pseudotsuga menziesii* 8

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 19		Lomatium martindalei 2	
80-95			Juniperus communis 14	
60-80	Pseudotsuga menziesii 23		Phlox diffusa 4, Hieracium albiflorum 1	
40-60	Pinus monticola 5		Paxistima myrsinites 6, Lupinus latifolius 3	
25-40	Pinus contorta 6, Callitropsis nootkatensis 6, Pinus albicaulis 1		Eremogone capillaris 3, Allium 2, Achillea millefolium 2, Artemisia 2, Chimaphila umbellata 2, Silene douglasii 2, Phacelia 1, Erysimum arenicola 1, Penstemon procerus+ 1, Penstemon serrulatus+ 0	moss 12, Festuca roemeri 4
10-25		Vaccinium membranaceum 3, Amelanchier alnifolia 2	Arctostaphylos uva-ursi+ 10, Campanula rotundifolia+ 5, Eriophyllum lanatum 5, Luina hypoleuca 4, Collinsia parviflora 3, Pedicularis contorta+ 3, Moehringia macrophylla 3, Berberis nervosa 2, Eucephalus paucicapitatus 2, Sedum lanceolatum+ 2, Orthilia secunda 1, Solidago multiradiata 1, Sedum divergens 1, Hieracium triste 1	Carex spectabilis+ 3, Juncus parryi+ 3, Carex geyeri+ 2, Luzula piperi+ 1

{023} Abies lasiocarpa, Pinus contorta*, Lupinus latifolius
Subalpine fir, lodgepole pine* & subalpine lupine forest/woodland
ABILAS-(PINCON)/LUPARC



Range: Subalpine. **OLYM**-10: **ne*** 1630-1770m.

Struct: Open conifer forest (6-14m) with abundant conifer regen, abundant forbs, and substantial dwarf shrubs. Avg vasc cover 103: conif tree 42, forb 25, conif regen 17, dwf shrb 13, shrb 0.83 @ 4, grass 0.5 @ 2, sedge 0.33 @ 2, tall shrb 0.17 @ 8.

Ecology: South-facing upper slopes and ridgetops in the driest rain shadows. Regen usually dominated by *Abies lasiocarpa*, occasionally by *Pinus contorta*.

Metrics: slope 21-28°, vdp 139-249m, vdr 874-954m, east 30-64, south 83-99, conv 54-64, tpp 73-88, solar 83-92, wet 2-3

Map class: C24–Olympic subalpine fir & lodgepole pine woodland

Rel to C09: Same, gaining two plots from PSEMEN-(PINCON)/ARCUVA/RACCAN.

Similar: O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, O:[024] ABILAS/POLPUL-PEDRAC, N:[143] PSEMEN-PINCON/ARCNEV, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, MNO:[032] ABILAS/VALSIT, MNO:[104] PHLDIF-(LOMMAR-CARPHA), N:[121] PINCON/VACMEM, N:[119] PINCON/PAXMYR/CALRUB, MNO:[033] ABILAS/VERVIR. Also see: [027] ABILAS/RHOALB/RUBLAS

▶ [**020**] C-LT5 26 Antennaria lanata+* Callitropsis nootkatensis* 2 Luzula hitchcockii+* Micranthes tolmiei+* Pedicularis racemosa* Penstemon procerus+* Phlox diffusa* Vaccinium deliciosum* [**keep**] C-GT5 13 SHRB* 2 Achillea millefolium 2 Arctostaphylos uva-ursi+** 2 Chimaphila umbellata** Festuca roemeri** Hieracium albiflorum* Orthilia secunda** Osmorhiza** Paxistima myrsinites 3 Penstemon serrulatus+** Phlox diffusa 3 Pinus contorta*** 2 Pseudotsuga menziesii* Rosa**
▶ [**022**] Allium* Artemisia* Callitropsis nootkatensis 2 Eremogone capillaris* 2 Erysimum arenicola* Juniperus communis 2 Penstemon procerus+* Phacelia* Phlox diffusa* Pinus monticola* 2 Pseudotsuga menziesii 10 [**keep**] SHRB* Lupinus latifolius* 5 Orthilia secunda* Osmorhiza** Pinus contorta* 11 Polemonium pulcherrimum** 2 Rosa** Viola orbiculata+**
▶ [**024**] Arnica latifolia+* Bistorta bistortoides* 2 Carex spectabilis+* 2 Eremogone capillaris* Luzula hitchcockii+* 2 Pedicularis racemosa*** 2 Ribes acerifolium+* Valeriana sitchensis* [**keep**] Arctostaphylos uva-ursi+ 2 Chimaphila umbellata** Hieracium albiflorum** Juniperus communis** Lomatium martindalei*** Orthilia secunda** Paxistima myrsinites* 2 Pinus contorta*** 2 Pseudotsuga menziesii 2
▶ [**030**] SHRB 7 TSHRB* Arnica latifolia+* Callitropsis nootkatensis 2 Chamaenerion angustifolium* Rubus lasiococcus** 2 Sorbus sitchensis* Tsuga mertensiana 2 Vaccinium membranaceum* 2 Valeriana sitchensis 2 [**keep**] Achillea millefolium 2 Arctostaphylos uva-ursi+ 2 Juniperus communis*** Lomatium martindalei** Phlox diffusa 3 Pinus contorta*** 2
▶ [**143**] TSHRB* Arctostaphylos uva-ursi+* Calamagrostis rubescens+*** 2 Pinus monticola 2 Pseudotsuga menziesii* Salix scouleriana*** Vaccinium membranaceum* 2 [**keep**] FORB 5 Abies lasiocarpa 7 Achillea millefolium*** 2 Festuca roemeri* Juniperus communis* Lomatium martindalei* Lupinus latifolius* 2 Orthilia secunda*** Osmorhiza* Penstemon serrulatus+* Phlox diffusa 2 Pinus contorta 16 Polemonium pulcherrimum* Viola orbiculata+*

Floristics (6 plots, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Lupinus latifolius 12, Juniperus communis 1	
80-95	Abies lasiocarpa 31			
60-80	Pinus contorta 44		Paxistima myrsinites 8, Lomatium martindalei 3	
40-60			Achillea millefolium 5, Orthilia secunda 2, Chimaphila umbellata 2, Hieracium albiflorum 2	
25-40	Pseudotsuga menziesii 6	Rosa 0	Arctostaphylos uva-ursi+ 15, Phlox diffusa 7, Polemonium pulcherrimum 3, Viola orbiculata+ 2, Penstemon serrulatus+ 2, Osmorhiza 0	Festuca roemeri 3, moss 2
10-25	Pinus albicaulis 4	Sorbus sitchensis 8, Vaccinium ovalifolium 8, Spiraea splendens 8, Symphoricarpos albus 1, Rhododendron albiflorum 1, Vaccinium membranaceum 1	Luetkea pectinata 3, Collinsia parviflora 3, Moehringia macrophylla 2, Silene parryi 1, Thalictrum occidentale 1, Erythronium montanum+ 1, Bistorta bistortoides 1, Valeriana sitchensis 1, Arnica mollis+ 1, Pedicularis bracteosa 1, Erigeron 1, Solidago multiradiata 1, Sedum divergens 1, Hieracium triste 1	Carex geyeri+ 3, Poa cusickii+ 1, Phleum alpinum 1, lichen 1, Carex spectabilis+ 1, Juncus parryi+ 1

{024} Abies lasiocarpa, Polemonium pulcherrimum, Pedicularis racemosa
Subalpine fir, Jacob's ladder & sickletop lousewort woodland
ABILAS/POLPUL-PEDRAC



Range: Subalpine. **OLYM**-7: **ne*** 1650-1810m.

Struct: Conifer woodland (8-12m), often as tree islands, with substantial conifer regen and dense forbs. Avg vasc cover 105: forb 41, conif tree 30, conif regen 0.8 @ 8, rush 0.6 @ 13, sedge 0.6 @ 13, dwf shrb 0.6 @ 2, shrb 0.4 @ 3, grass 0.2 @ 37, tall shrb 0.2 @ 3.

Ecology: Upper slopes with southwesterly aspects, in parklands. Regen dominated by *Abies lasiocarpa*.

Metrics: slope 17-32°, vdp 144-228m, vdr 998-1272m, east 20-40, south 72-99, conv 55-66, tpp 69-92, solar 74-89, wet 2-3

Map class: C24–Olympic subalpine fir & lodgepole pine woodland

Rel to C09: Same.

Similar: MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[028] ABILAS/VACDEL-VALSIT, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[093] HERMAX-(THAOCC-SAUAME).

▶ [**020**] C-LT5 14 Callitropsis nootkatensis* Juniperus communis* [**keep**] C-GT5 12 SHRB 2 Arnica latifolia+* Bistorta bistortoides** Carex spectabilis+* Eremogone capillaris* Pedicularis racemosa* 3 Polemonium pulcherrimum* Ribes acerifolium+*** Valeriana sitchensis*

▶ [**028**] TSHRB* Abies amabilis 2 Phyllodoce empetriformis* 2 Sorbus sitchensis*** Tsuga mertensiana** 2 Vaccinium deliciosum*** 2 Vaccinium membranaceum** 2 [**keep**] Carex spectabilis+ 5 Danthonia** Eucephalus paucicapitatus** Festuca roemeri** Hydrophyllum fendleri** Lonicera utahensis** Pedicularis racemosa 2 Phacelia** Phlox diffusa 2 Polemonium pulcherrimum 2 Ribes lacustre** Sambucus racemosa** Sedum divergens** Veronica cusickii+**

▶ [**030**] SHRB* 5 TSHRB* Hieracium albiflorum* Paxistima myrsinites* 2 Rubus lasiococcus* Sorbus sitchensis* 2 Tsuga mertensiana 2 Vaccinium membranaceum*** 2 Valeriana sitchensis 3 [**keep**] Anemone occidentalis+* Carex spectabilis+ 4 Danthonia* Elymus* Festuca roemeri* Heracleum maximum* Hydrophyllum fendleri* Micranthes tolmiei+* Pedicularis racemosa 2 Phacelia* Polemonium pulcherrimum 2 Sambucus racemosa* Silene douglasii*

▶ [**032**] SHRB* TSHRB* Abies amabilis* 2 Rubus lasiococcus* 3 Sorbus sitchensis* Tsuga mertensiana 2 Vaccinium deliciosum 2 Vaccinium membranaceum* Valeriana sitchensis 3 [**keep**] Anemone occidentalis+** Carex spectabilis+* 3 Danthonia** Eremogone capillaris*** Juniperus communis** Micranthes tolmiei+** Orthocarpus imbricatus** Paxistima myrsinites** Phlox diffusa 2 Polemonium pulcherrimum 3 Sedum divergens** Silene douglasii**

▶ [**033**] Abies amabilis** 2 Ligusticum** Mitella** Picea engelmannii 2 Rhododendron albiflorum** 2 Senecio triangularis+** Sorbus sitchensis 2 Thalictrum occidentale** Tsuga mertensiana** Vaccinium membranaceum*** Valeriana sitchensis 3 Veratrum viride** Viola glabella+** [**keep**] Carex spectabilis+*** 2 Eremogone capillaris** Pedicularis racemosa* 2 Phlox diffusa*

Floristics (5 plots, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 34			
80-95				
60-80			Lupinus latifolius 15, Polemonium pulcherrimum 6, Pedicularis racemosa 6, Bistorta bistortoides 5, Valeriana sitchensis 2	Carex spectabilis+ 13
40-60		Ribes acerifolium+ 1	Phlox diffusa 4, Arnica latifolia+ 3, Eremogone capillaris 2	Luzula hitchcockii+ 6
25-40				
10-25	Callitropsis nootkatensis 15	Sambucus racemosa 3, Lonicera utahensis 2, Ribes lacustre 2	Erigeron 20, Anemone occidentalis+ 15, Hydrophyllum fendleri 8, Achillea millefolium 8, Luetkea pectinata 8, Potentilla flabellifolia+ 5, Juniperus communis 5, Heracleum maximum 4, Veratrum viride 3, Phacelia 3, Silene douglasii 2, Rubus lasiococcus 2, Veronica cusickii+ 2, Eucephalus paucicapitatus 2, Erythronium montanum+ 2, Sedum divergens 2, Antennaria lanata+ 1, Phyllodoce empetriformis 1, Paxistima myrsinites 1, Viola orbiculata+ 1	Luzula parviflora 20, Festuca roemeri 20, Elymus 10, Juncus parryi+ 8, Danthonia 7

{025} Abies lasiocarpa, Pseudotsuga menziesii, Berberis nervosa
Subalpine fir, Douglas-fir & dwarf Oregon-grape forest
ABILAS-PSEMEN/MAHNER



Range: Upper montane. **OLYM**-2: (nc-ne) 1330-1430m.

Struct: Semi-open conifer forest (26-29m) with substantial conifer regen, very dense forbs, abundant dwarf shrubs & shrubs, and substantial grasses. Avg vasc cover 177: forb 57, conif tree 52, dwf shrb 25, shrb 22, grass 11, conif regen 8, fern 2, tall shrb 0.5 @ 1.

Ecology: Steep south-facing upper slopes with westerly tendencies, on rocky soils. Regen a mix of *Abies lasiocarpa*, *Pseudotsuga menziesii*, and often *Callitropsis nootkatensis* or *Pinus monticola*.

Metrics: slope 34-37°, vdp 113-137m, vdr 789-848m, east 18-36, south 84-95, conv 54-58, tpp 68-77, solar 80-86, wet 2

Map class: C08–Olympic dry Douglas-fir forest

Rel to C09: Same.

Similar: MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[161] PSEMEN/VACMEM, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[030] ABILAS/VACMEM/LUPARC, N:[141] PSEMEN/MAHNER/CALRUB, MO:[080] CUPNOO-(ABILAS)/CLIUNI, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR.

▶ [**026**] TSHRB 2 Abies amabilis* Calamagrostis rubescens+* 2 Goodyera oblongifolia* Hieracium albiflorum* Linnaea borealis 2 Paxistima myrsinites 2 Pedicularis racemosa* Rubus lasiococcus 2 Sorbus scopulina* Vaccinium membranaceum 9 [**keep**] Achlys triphylla*** 2 Berberis nervosa** 2 Fragaria virginiana** Galium** Lupinus latifolius* Melica subulata+ 2 Polystichum munitum** Rosa** 2 Symphoricarpos albus*** Tsuga heterophylla* Valeriana sitchensis** Xerophyllum tenax 2
▶ [**030**] TSHRB 2 Paxistima myrsinites 2 Rubus lasiococcus* 2 Sorbus sitchensis* 2 Tsuga mertensiana 2 Vaccinium membranaceum 9 [**keep**] Achlys triphylla** 4 Berberis nervosa** Fragaria virginiana* Galium* Melica subulata+ 2 Polystichum munitum*** Pseudotsuga menziesii* Rosa*** 2 Symphoricarpos albus** 2 Tsuga heterophylla*** Xerophyllum tenax 2
▶ [**139**] TSHRB 2 Acer glabrum 2 Holodiscus discolor 2 Lathyrus polyphyllus 2 Linnaea borealis 2 Lysimachia latifolia* Tsuga heterophylla 2 [**keep**] Abies lasiocarpa** 5 Fragaria virginiana** Galium* Lupinus latifolius* Melica subulata+ 3 Vaccinium membranaceum*** 2 Valeriana sitchensis** 2 Xerophyllum tenax 2
▶ [**140**] TSHRB 2 Abies procera 2 Acer circinatum* 2 Linnaea borealis 2 Rubus ursinus* Tsuga heterophylla 2 Vaccinium parvifolium* [**keep**] SHRB 7 Abies lasiocarpa*** 2 Chimaphila umbellata 2 Fragaria virginiana* Galium* Lupinus latifolius* Melica subulata+ 2 Polystichum munitum* Rosa 2 Symphoricarpos albus* Vaccinium membranaceum 2 Valeriana sitchensis***
▶ [**161**] TSHRB 2 Acer glabrum 2 Calamagrostis rubescens+* 2 Goodyera oblongifolia* Hieracium albiflorum* Linnaea borealis 2 Maianthemum racemosum* Paxistima myrsinites 2 Pedicularis racemosa* Rubus lasiococcus* Rubus nutkanus 2 Salix scouleriana* Sorbus scopulina* Spiraea lucida* [**keep**] Achlys triphylla*** 2 Berberis nervosa* 3 Fragaria virginiana*** Galium* Lupinus latifolius* 2 Melica subulata+ 2 Polystichum munitum** Rosa* Symphoricarpos albus*** Tsuga heterophylla* Valeriana sitchensis*** Xerophyllum tenax 2

Floristics (2 plots, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 42, Abies lasiocarpa 14, Tsuga heterophylla 1	Rosa 10, Vaccinium membranaceum 6, Symphoricarpos albus 4	Berberis nervosa 20, Achlys triphylla 18, Lupinus latifolius 9, Valeriana sitchensis 4, Galium 4, Fragaria virginiana 2	Polystichum munitum 1
40-60	Pinus monticola 3, Callitropsis nootkatensis 3	Acer glabrum 1, Lonicera ciliosa 1, Symphoricarpos mollis 1, Ribes lacustre 1, Holodiscus discolor 0, Amelanchier alnifolia 0	Xerophyllum tenax 23, Chimaphila umbellata 8, Adenocaulon bicolor 3, Orthilia secunda 3, Osmorhiza 3, Campanula scouleri 1, Lactuca 1, Anemone deltoidea+ 1, Fragaria vesca 1, Lathyrus nevadensis 1, Linnaea borealis 1, Streptopus lanceolatus 1, Aquilegia formosa 1, Penstemon serrulatus+ 1, Moehringia macrophylla 1, Achillea millefolium 1, Paxistima myrsinites 1	Melica subulata+ 20, moss 7, Pteridium aquilinum 2, Festuca occidentalis+ 1, Bromus vulgaris+ 1, lichen 1

{026} Abies lasiocarpa, Pseudotsuga menziesii*, Vaccinium membranaceum, Calamagrostis rubescens
Subalpine fir, Douglas-fir*, big huckleberry & pinegrass forest
ABILAS-(PSEMEN)/VACMEM/CALRUB



Range: Lower and upper montane zones. **NOCA**-25: **ne-s*** 1160-1430m.

Struct: Open conifer forest with substantial conifer regen, abundant shrubs & dwarf shrubs, and substantial forbs, grasses & tall shrubs. Avg vasc cover 111: conif tree 35, shrb 23, dwf shrb 17, conif regen 13, forb 10, tall shrb 6, grass 0.85 @ 9.

Ecology: Midslopes. May develop from [121] PINCON/VACMEM. Regen dominated by *Abies lasiocarpa*, with small amounts of *Pseudotsuga menziesii* and/or *Pinus monticola*.

Metrics: slope 20-30°, vdp 16-55m, vdr 107-467m, east 9-60, south 32-90, conv 46-53, tpp 16-51, solar 52-76, wet 3

Map class: C16–North Casc Doug-fir & subalpine fir woodland

Rel to C09: Expanded, incorporating ABILAS-PSEMEN/CALRUB and several plots from PSEMEN/VACMEM.

Similar: N:[161] PSEMEN/VACMEM, MNO:[030] ABILAS/VACMEM/LUPARC, N:[143] PSEMEN-PINCON/ARCNEV, N:[142] PSEMEN/PAXMYR-SPIBET, N:[121] PINCON/VACMEM, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MNO:[027] ABILAS/RHOALB/RUBLAS, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MNO:[032] ABILAS/VALSIT, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN. Also see: [038] (ACEMAC)/ACECIR-PAXMYR.

▶ [**030**] Achillea millefolium* Arnica latifolia+*** Erigeron** Lupinus latifolius 2 Luzula hitchcockii+*** Penstemon serrulatus+** Phlox diffusa** Polemonium pulcherrimum* Sorbus sitchensis** 2 Valeriana sitchensis* Viola orbiculata+** [**keep**] Abies amabilis 2 Amelanchier alnifolia* Arctostaphylos uva-ursi+ 2 Arnica cordifolia*** Calamagrostis rubescens+** Chimaphila umbellata* Goodyera oblongifolia** Linnaea borealis 2 Picea engelmannii** Pinus monticola* Pseudotsuga menziesii* Salix scouleriana* Sorbus scopulina**

▶ [**121**] Amelanchier alnifolia 2 Arctostaphylos uva-ursi+ 6 Pinus contorta** 4 Racomitrium 2 Salix scouleriana* [**keep**] FORB 4 Abies amabilis*** 2 Abies lasiocarpa 9 Arnica cordifolia*** Eucephalus ledophyllus+*** Goodyera oblongifolia** Moehringia macrophylla*** Orthilia secunda* Pedicularis racemosa* Picea engelmannii* 2 Pinus monticola*.

▶ [**142**] FORB 15 Acer circinatum 2 Acer glabrum* Adenocaulon bicolor 2 Bromus vulgaris+* Cacaliopsis nardosmia* 7 Erythronium montanum+* Galium** Lilium* Maianthemum racemosum* 2 Platanthera*** Prunus emarginata** Spiraea lucida* [**keep**] C-LT5 3 SHRB 4 Abies amabilis* Abies lasiocarpa* 8 Arctostaphylos uva-ursi+ 2 Linnaea borealis 2 Orthilia secunda* Pedicularis racemosa* Pinus monticola* Rubus lasiococcus* 2 Salix scouleriana* Vaccinium membranaceum* 3

▶ [**143**] Apocynum androsaemifolium** Arctostaphylos uva-ursi+* 6 Danthonia** Eremogone capillaris* Juniperus communis*** Lewisia* Phlox diffusa* Pinus contorta* 4 Racomitrium* Salix scouleriana* [**keep**] FORB 4 SHRB 10 TSHRB 3 Abies amabilis* Abies lasiocarpa 7 Arnica cordifolia** Eucephalus ledophyllus+** Goodyera oblongifolia** Moehringia macrophylla* Orthilia secunda*** Pedicularis racemosa* Picea engelmannii* Rubus lasiococcus** 2 Sorbus scopulina* 2 Vaccinium membranaceum 10

▶ [**161**] Acer glabrum* Adenocaulon bicolor** 2 Clintonia uniflora* Galium** Maianthemum racemosum* Pyrola picta*** Rhododendron albiflorum 2 Rosa** Rubus nutkanus* 3 Spiraea lucida* Taxus brevifolia* [**keep**] Abies lasiocarpa 7 Hieracium scouleri+*** Lomatium brandegeei+** Lupinus latifolius*. Note: [161] is found at lower elevations.

Floristics (27 plots, NOCA 27): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 21, Pseudotsuga menziesii 19	Vaccinium membranaceum 21	Paxistima myrsinites 12	
80-95		Sorbus scopulina 3	Goodyera oblongifolia 0	
60-80	Pinus monticola 3	Amelanchier alnifolia 2	Chimaphila umbellata 1, Pedicularis racemosa 1, Hieracium albiflorum 1	Calamagrostis rubescens+ 9, moss 6
40-60	Picea engelmannii 4, Abies amabilis 3	Salix scouleriana 3	Rubus lasiococcus 4, Orthilia secunda 1, Arnica cordifolia 1, Eucephalus ledophyllus+ 1, Lomatium brandegeei+ 1, Moehringia macrophylla 1	
25-40	Pinus contorta 2	Ribes acerifolium+ 1	Linnaea borealis 9, Arctostaphylos uva-ursi+ 4, Lupinus latifolius 2, Pyrola asarifolia+ 1, Chamaenerion angustifolium 0, Maianthemum racemosum 0, Hieracium scouleri+ 0	
10-25	Callitropsis nootkatensis 4, Tsuga mertensiana 2, Thuja plicata 1, Tsuga heterophylla 1, Taxus brevifolia 1	Acer glabrum 3, Alnus viridis 2, Ceanothus velutinus 2, Rubus nutkanus 2	Spiraea lucida 4, Cacaliopsis nardosmia 4, Pedicularis bracteosa 3, Clintonia uniflora 1, Thalictrum occidentale 1, Canadanthus modestus 1, Antennaria racemosa+ 1, Polemonium pulcherrimum 1, Berberis nervosa 1, Erythronium montanum+ 1	Bromus vulgaris+ 4, Carex geyeri+ 1, Festuca occidentalis+ 1, Pteridium aquilinum 1

{027} Abies lasiocarpa, Rhododendron albiflorum, Rubus lasiococcus
Subalpine fir, Cascade azalea & dwarf bramble forest
ABILAS/RHOALB/RUBLAS



Range: Upper montane, transitional to subalpine zone. **MORA**-10: **ne*-se** (sw) 1590-1710m. **NOCA**-1: (ne) 1590-1600m. **OLYM**-14: **nc-ne*** 1410-1540m.

Struct: Open conifer forest (11-20m) with abundant conifer regen and abundant shrubs & forbs. Avg vasc cover 118: conif tree 45, shrb 30, forb 22, conif regen 17, dwf shrb 0.47 @ 4, tall shrb 0.41 @ 4, rush 0.24 @ 2.

Ecology: Fairly gentle slopes, on well-drained shallow soils. Often in avalanche chutes. Regen dominated by *Abies lasiocarpa*, often with smaller amounts of *Abies amabilis*.

Metrics: slope 12-31°, vdp 7-117m, vdr 623-933m, east 16-94, south 49-87, conv 42-57, tpp 35-83, solar 59-80, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Same, adding several plots from ABIAMA/RHOALB and shedding several to TSUMER-ABIAMA/RHOALB.

Similar: MNO:[032] ABILAS/VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[028] ABILAS/VACDEL-VALSIT, MO:[080] CUPNOO-(ABILAS)/CLIUNI, O:[029] ABILAS/VACMEM/ERYMON, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, N:[017] ABILAS-PICENG/RHOALB/ARNLAT. Also see: [005] ABIAMA/RHOALB, [023] ABILAS-(PINCON)/LUPARC, [204] TSUMER-ABIAMA/RHOALB

▶ [**016**] Abies amabilis* Callitropsis nootkatensis* Chimaphila umbellata* Gaultheria ovatifolia** Goodyera oblongifolia* Linnaea borealis** Pedicularis racemosa* Pinus monticola* Viola orbiculata+* Xerophyllum tenax* [**keep**] TSHRB 2 Rhododendron albiflorum*** 2

▶ [**030**] TSHRB* Achillea millefolium*** Arnica latifolia+* Chamaenerion angustifolium*** Lupinus latifolius* Paxistima myrsinites* Pedicularis racemosa* Phlox diffusa** Polemonium pulcherrimum*** Sorbus sitchensis* [**keep**] Abies amabilis 2 Rhododendron albiflorum** 4 Xerophyllum tenax 2

▶ [**031**] Achillea millefolium** Chamaenerion angustifolium** Eucephalus ledophyllus+** Festuca viridula** Luzula hitchcockii+ 2 Picea engelmannii*** 2 Pinus albicaulis** Polemonium pulcherrimum** Rainiera stricta** 2 Vaccinium scoparium+* 2 Viola orbiculata+* [**keep**] TSHRB 2 Abies amabilis 4 Callitropsis nootkatensis 7 Pseudotsuga menziesii 2 Rhododendron albiflorum* 5

▶ [**032**] Arnica latifolia+* Luzula hitchcockii+* 3 Mitella* Osmorhiza* Pedicularis racemosa* Polemonium pulcherrimum** Ribes acerifolium+* Tiarella trifoliata* Valeriana sitchensis 7 Viola glabella+* Viola orbiculata+* [**keep**] SHRB 8 Rhododendron albiflorum*** 2 Vaccinium membranaceum 5

▶ [**033**] Arnica latifolia+* Bistorta bistortoides*** Chamaenerion angustifolium*** Erigeron*** Luzula hitchcockii+ 2 Mitella** 2 Picea engelmannii 2 Polemonium pulcherrimum*** Senecio triangularis+*** Thalictrum occidentale** Valeriana sitchensis 8 Veratrum viride* 3 Viola glabella+** [**keep**] Hieracium albiflorum* Moehringia macrophylla* Orthilia secunda* Pseudotsuga menziesii* 2 Rhododendron albiflorum* 8 Rubus lasiococcus* 3 Vaccinium membranaceum 6 Xerophyllum tenax* 2

Floristics (17 plots, MORA 6, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 47	Rhododendron albiflorum 18		
80-95		Vaccinium membranaceum 14		
60-80			Rubus lasiococcus 8, Valeriana sitchensis 5	
40-60	Callitropsis nootkatensis 15, Abies amabilis 9		Lupinus latifolius 6, Orthilia secunda 1	moss 7
25-40	Pseudotsuga menziesii 6, Tsuga mertensiana 4	Sorbus sitchensis 3	Xerophyllum tenax 8, Erythronium montanum+ 7, Moehringia macrophylla 1, Hieracium albiflorum 0	
10-25	Pinus monticola 1	Rhododendron menziesii 7	Rubus pedatus 4, Paxistima myrsinites 4, Arnica latifolia+ 3, Vaccinium deliciosum 2, Veratrum viride 2, Phyllodoce empetriformis 2, Penstemon serrulatus+ 1, Vaccinium scoparium+ 1, Viola orbiculata+ 1	Luzula hitchcockii+ 1

{028} Abies lasiocarpa, Vaccinium deliciosum, Valeriana sitchensis*
Subalpine fir, Cascade blueberry & Sitka valerian* forest
ABILAS/VACDEL-VALSIT



Range: Subalpine. **MORA**-43: **nw-ne-sw-se*** 1620-1740m. **NOCA**-10: **ne-s** (nw-ce) 1730-1860m. **OLYM**-5: **ne** (nc) 1550-1670m.

Struct: Open conifer forest (11-17m), often in tree islands, with abundant conifer regen, dense dwarf shrubs & forbs, and substantial shrubs. Avg vasc cover 142: dwf shrb 39, conif tree 37, forb 32, conif regen 17, tall shrb 0.92 @ 3, shrb 0.77 @ 12, rush 0.77 @ 5, sedge 0.38 @ 3.

Ecology: Fairly gentle slopes, often in parklands. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Tsuga mertensiana*.

Metrics: slope 12-24°, vdp 21-99m, vdr 492-765m, east 6-65, south 52-97, conv 46-57, tpp 43-76, solar 70-85, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS/VACDEL, gaining many plots from TSUMER-ABILAS/VACDEL-PHYEMP. ABILAS/VACDEL was a very heterogeneous type encompassing both forested and meadow variants. This corresponds to the most abundant group of forested plots within it.

Similar: MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[030] ABILAS/VACMEM/LUPARC, O:[029] ABILAS/VACMEM/ERYMON, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[171] SORSIT-VACMEM/VALSIT, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN.

▶ [**029**] Callitropsis nootkatensis* Luzula parviflora* Penstemon serrulatus+** Stellaria** Tiarella trifoliata** Xerophyllum tenax* [**keep**] Abies amabilis 2 Arnica latifolia+*** Lupinus latifolius* Luzula hitchcockii+* 2 Phyllodoce empetriformis*** 2 Rhododendron albiflorum 2 Vaccinium deliciosum* 4
▶ [**030**] Achillea millefolium* Chamaenerion angustifolium* Hieracium albiflorum* Moehringia macrophylla** Paxistima myrsinites** 2 Penstemon serrulatus+*** Phlox diffusa* Polemonium pulcherrimum* [**keep**] Abies amabilis 2 Luzula hitchcockii+* Phyllodoce empetriformis*** Tsuga mertensiana* Vaccinium deliciosum** 6 Valeriana sitchensis* Veratrum viride 2
▶ [**031**] Callitropsis nootkatensis** Eucephalus ledophyllus+* Hieracium albiflorum* Orthilia secunda 2 Paxistima myrsinites* 2 Picea engelmannii* Pinus albicaulis** Rainiera stricta*** 2 Vaccinium scoparium+** 12 Viola orbiculata+* Xerophyllum tenax* 9 [**keep**] Abies amabilis 4 Bistorta bistortoides* Carex spectabilis+* Erigeron* Erythronium montanum+* Luetkea pectinata** 2 Phyllodoce empetriformis* 2 Tsuga mertensiana 4 Vaccinium deliciosum 10
▶ [**032**] Achlys triphylla** Clintonia uniflora* Hieracium albiflorum* Luzula hitchcockii+ 7 Moehringia macrophylla** Osmorhiza* Thalictrum occidentale** Tiarella trifoliata*** Viola glabella+*** Viola orbiculata+* [**keep**] TSHRB* Arnica latifolia+* Phyllodoce empetriformis*** 2 Rhododendron albiflorum 2 Sorbus sitchensis* Tsuga mertensiana* Vaccinium deliciosum** 9 Vaccinium membranaceum 4
▶ [**033**] TSHRB 5 Chamaenerion angustifolium* Erigeron* Eucephalus ledophyllus+ 2 Ligusticum* 2 Mitella* Picea engelmannii 7 Polemonium pulcherrimum* Senecio triangularis+* Thalictrum occidentale*** Valeriana sitchensis 9 Veratrum viride* Viola glabella+*** 2 [**keep**] TSHRB* Erythronium montanum+* Luetkea pectinata* 2 Pedicularis racemosa* Phyllodoce empetriformis* 2 Rubus lasiococcus 3 Sorbus sitchensis* Vaccinium deliciosum* 8 Vaccinium membranaceum 5

Floristics (26 plots, MORA 11, NOCA 9, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 39		Vaccinium deliciosum 34	
80-95		Sorbus sitchensis 3	Valeriana sitchensis 6, Lupinus latifolius 5	
60-80	Tsuga mertensiana 10	Vaccinium membranaceum 11	Rubus lasiococcus 6, Phyllodoce empetriformis 5, Arnica latifolia+ 2	Luzula hitchcockii+ 4
40-60	Abies amabilis 11		Erythronium montanum+ 9, Luetkea pectinata 8, Veratrum viride 4, Pedicularis racemosa 1	moss 8
25-40		Rhododendron albiflorum 4	Mitella 2, Bistorta bistortoides 2, Ligusticum 1, Erigeron 1, Pedicularis bracteosa 0	Carex spectabilis+ 3
10-25	Picea engelmannii 4, Callitropsis nootkatensis 3	Ribes acerifolium+ 1	Vaccinium scoparium+ 8, Xerophyllum tenax 6, Potentilla flabellifolia+ 2, Viola orbiculata+ 1, Orthilia secunda 1, Hieracium albiflorum 1, Eucephalus ledophyllus+ 1, Lomatium martindalei 1, Polemonium pulcherrimum 1, Hieracium triste 1, Paxistima myrsinites 1	Festuca viridula 2, Juncus parryi+ 2

{029} Abies lasiocarpa, Vaccinium membranaceum, Erythronium montanum
Subalpine fir, big huckleberry & avalanche lily forest
ABILAS/VACMEM/ERYMON



Range: Subalpine. **OLYM**-5: **nc** (ne-se) 1510-1710m.

Struct: Open conifer forest (16-17m) with substantial conifer regen, dense forbs, and substantial shrubs. Avg vasc cover 120: forb 47, conif tree 40, shrb 13, conif regen 0.83 @ 14, tall shrb 0.67 @ 5, rush 0.33 @ 8, sedge 0.33 @ 4, dwf shrb 0.33 @ 3.

Ecology: Upper slopes with southeasterly aspects. Regen dominated by *Abies lasiocarpa*.

Metrics: slope 25-30°, vdp 171-219m, vdr 861-930m, east 62-96, south 71-99, conv 64-72, tpp 74-91, solar 78-84, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS/ERYMON. Concept different; rather than "shrub layer is largely absent," prominent *Vaccinium membranaceum* always occurs.

Similar: MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[032] ABILAS/VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[033] ABILAS/VERVIR, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN, O:[024] ABILAS/POLPUL-PEDRAC, MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS.

▶ [**027**] Abies amabilis 2 Callitropsis nootkatensis 7 Pseudotsuga menziesii 2 Rhododendron albiflorum*** 2 [**keep**] Bistorta bistortoides* Carex spectabilis+** 2 Chamaenerion angustifolium* Erythronium montanum+* 11 Juncus parryi+* Luetkea pectinata* Luzula parviflora* Sorbus sitchensis* Spiraea splendens* Stellaria*

▶ [**028**] Abies amabilis 2 Arnica latifolia+*** Lupinus latifolius* Luzula hitchcockii+* 2 Phyllodoce empetriformis*** 2 Rhododendron albiflorum 2 Vaccinium deliciosum* 4 [**keep**] Callitropsis nootkatensis* Luzula parviflora* Penstemon serrulatus+** Stellaria** Tiarella trifoliata** Xerophyllum tenax*

▶ [**030**] Achillea millefolium** Arnica latifolia+** Hieracium albiflorum* Lupinus latifolius** Paxistima myrsinites** 2 Pedicularis racemosa** Phlox diffusa** Polemonium pulcherrimum** [**keep**] Erythronium montanum+** 6 Rubus lasiococcus 7 Tsuga mertensiana 6 Xerophyllum tenax 2

▶ [**031**] Abies amabilis*** Arnica latifolia+*** Callitropsis nootkatensis* Lupinus latifolius* Luzula hitchcockii+* 2 Paxistima myrsinites 2 Picea engelmannii 2 Rainiera stricta 2 Rubus lasiococcus* Vaccinium scoparium+*** 2 [**keep**] TSHRB 2 Carex spectabilis+ 2 Erythronium montanum+* 5 Luetkea pectinata 2 Sorbus sitchensis 2 Tsuga mertensiana 4

▶ [**032**] Abies amabilis*** 2 Arnica latifolia+** 2 Lupinus latifolius** Luzula hitchcockii+* 2 Mitella** Polemonium pulcherrimum* Valeriana sitchensis* Viola glabella+** [**keep**] SHRB 7 Carex spectabilis+* Erythronium montanum+** 6 Juncus parryi+* Luetkea pectinata** Paxistima myrsinites*** Penstemon serrulatus+* Sorbus sitchensis 2 Spiraea splendens* Stellaria* Tsuga mertensiana* Vaccinium membranaceum 4 Xerophyllum tenax*

Floristics (6 plots, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 42	Vaccinium membranaceum 13	Erythronium montanum+ 25	
80-95				
60-80	Tsuga mertensiana 12	Sorbus sitchensis 5		
40-60			Rubus lasiococcus 16, Valeriana sitchensis 10	
25-40	Callitropsis nootkatensis 4		Xerophyllum tenax 12, Luetkea pectinata 4, Veratrum viride 2, Vaccinium deliciosum 2	Carex spectabilis+ 4, moss 2
10-25		Spiraea splendens 3	Viola orbiculata+ 5, Stellaria 3, Penstemon serrulatus+ 3, Lupinus latifolius 3, Chamaenerion angustifolium 1, Tiarella trifoliata 1, Bistorta bistortoides 1, Hieracium albiflorum 1, Paxistima myrsinites 1	Juncus parryi+ 13, Luzula parviflora 1, Luzula hitchcockii+ 1

{030} Abies lasiocarpa, Vaccinium membranaceum, Lupinus latifolius
Subalpine fir, big huckleberry & subalpine lupine woodland
ABILAS/VACMEM/LUPARC



Range: Subalpine and upper montane zones. **MORA**-11: **ne-se** (nw) 1460-1690m. **NOCA**-5: **ne-s** 1680-1770m. **OLYM**-12: **ne*** (nc-sc) 1500-1730m.

Struct: Conifer woodland (11-16m) with substantial conifer regen, abundant shrubs & forbs, and substantial dwarf shrubs. Avg vasc cover 122: shrb 29, forb 26, conif tree 0.94 @ 34, conif regen 0.89 @ 12, dwf shrb 0.83 @ 13, tall shrb 0.72 @ 9, rush 0.61 @ 4, grass 0.39 @ 2, fern 0.17 @ 17.

Ecology: Slopes with southerly aspects, on shallow well-drained soils. Regen dominated by *Abies lasiocarpa*.

Metrics: slope 21-33°, vdp 20-154m, vdr 588-820m, east 13-66, south 72-98, conv 45-57, tpp 35-71, solar 74-87, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Expanded, including many plots from ABILAS-(ABIAMA)/VACMEM/VALSIT.

Similar: MNO:[032] ABILAS/VALSIT, MN:[031] ABILAS/VACSCO-VALSIT, MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MNO:[033] ABILAS/VERVIR, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, O:[024] ABILAS/POLPUL-PEDRAC, O:[029] ABILAS/VACMEM/ERYMON, MO:[213] VACMEM/XERTEN, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN.

▶ [**028**] Abies amabilis 2 Luzula hitchcockii+* Phyllodoce empetriformis*** Tsuga mertensiana* Vaccinium deliciosum** 6 Valeriana sitchensis* Veratrum viride 2 [**keep**] Achillea millefolium* Chamaenerion angustifolium* Hieracium albiflorum* Moehringia macrophylla** Paxistima myrsinites** 2 Penstemon serrulatus+*** Phlox diffusa* Polemonium pulcherrimum*

▶ [**031**] Abies amabilis* Callitropsis nootkatensis* Luzula hitchcockii+* Orthilia secunda 2 Picea engelmannii*** Tsuga mertensiana* Vaccinium deliciosum** Vaccinium scoparium+* 7 Valeriana sitchensis* Veratrum viride* Viola orbiculata+* Xerophyllum tenax 2 [**keep**] TSHRB 2 Bistorta bistortoides* Carex spectabilis+* Erigeron* Penstemon serrulatus+* Phlox diffusa** Sorbus sitchensis 2

▶ [**032**] Abies amabilis* 2 Achlys triphylla* Clintonia uniflora* Luzula hitchcockii+ 5 Mitella* Osmorhiza** Rubus lasiococcus 6 Tiarella trifoliata** Vaccinium deliciosum* Valeriana sitchensis* Viola glabella+* [**keep**] SHRB 8 TSHRB 3 Paxistima myrsinites*** 2 Sorbus sitchensis 3 Vaccinium membranaceum 5

▶ [**033**] Abies amabilis* 2 Erigeron* Ligusticum* Mitella** 2 Picea engelmannii 5 Rhododendron albiflorum* Senecio triangularis+*** Thalictrum occidentale* Valeriana sitchensis* Veratrum viride* 2 Viola glabella+** 2 [**keep**] TSHRB* Achillea millefolium* Hieracium albiflorum** Paxistima myrsinites*** 2 Pedicularis racemosa* Phlox diffusa* Rubus lasiococcus* Vaccinium membranaceum 6

▶ [**212**] Anaphalis margaritacea* Artemisia 2 Bistorta bistortoides* Eucephalus paucicapitatus** 2 Gentiana calycosa*** Silene parryi* Spiraea splendens** Valeriana sitchensis* Veratrum viride* Xerophyllum tenax** 2 [**keep**] C-GT5* 8 Abies lasiocarpa 10 Arnica latifolia+* Paxistima myrsinites* Polemonium pulcherrimum** Rubus lasiococcus*

Floristics (18 plots, MORA 3, NOCA 5, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 36	Vaccinium membranaceum 27		
80-95			Lupinus latifolius 6	
60-80			Paxistima myrsinites 10, Rubus lasiococcus 4	
40-60		Sorbus sitchensis 7	Valeriana sitchensis 7, Arnica latifolia+ 3, Phlox diffusa 2, Hieracium albiflorum 2, Chamaenerion angustifolium 2, Polemonium pulcherrimum 1	moss 6
25-40	Callitropsis nootkatensis 6, Tsuga mertensiana 4		Eucephalus ledophyllus+ 2, Erigeron 2, Penstemon serrulatus+ 2, Viola orbiculata+ 2, Pedicularis racemosa 1, Moehringia macrophylla 1, Achillea millefolium 1	Luzula hitchcockii+ 3
10-25	Pseudotsuga menziesii 21, Abies procera 4, Pinus albicaulis 2, Abies amabilis 1	Amelanchier alnifolia 13, Sorbus scopulina 8, Spiraea splendens 8, Rhododendron albiflorum 2, Ribes acerifolium+ 2	Bistorta bistortoides 5, Galium 5, Luetkea pectinata 4, Vaccinium scoparium+ 4, Vaccinium deliciosum 4, Erythronium montanum+ 3, Fragaria virginiana 3, Campanula scouleri 3, Eremogone capillaris 2, Senecio integerrimus 2, Chimaphila umbellata 2, Rainiera stricta 2, Thalictrum occidentale 1, Lomatium brandegeei+ 1, Antennaria lanata+ 1, Polemonium californicum 1, Orthilia secunda 1, Castilleja miniata 1, Anaphalis margaritacea 1, Viola sempervirens 1, Veratrum viride 1	Pteridium aquilinum 24, Juncus parryi+ 5, Carex spectabilis+ 2, Festuca occidentalis+ 2, Festuca viridula 2, Luzula parviflora 2, Carex geyeri+ 1, lichen 1, Bromus vulgaris+ 1

{031} Abies lasiocarpa, Vaccinium scoparium, Valeriana sitchensis
Subalpine fir, grouse whortleberry & Sitka valerian forest/woodland
ABILAS/VACSCO-VALSIT



Range: Subalpine. **MORA**-13: **ne*** (nw-sw-se) 1680-1760m. **NOCA**-1: (ce) 1850-1860m.

Struct: Open conifer forest (9-15m) with substantial conifer regen, dense forbs, abundant dwarf shrubs, and substantial shrubs & rushes. Avg vasc cover 136: forb 41, conif tree 40, dwf shrb 25, shrb 13, conif regen 10, rush 0.78 @ 7, tall shrb 0.67 @ 1, grass 0.44 @ 2, sedge 0.22 @ 2.

Ecology: Fairly gentle slopes, on well-drained soils. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Callitropsis nootkatensis*.

Metrics: slope 16-26°, vdp 6-181m, vdr 557-685m, east 19-75, south 50-97, conv 41-63, tpp 37-66, solar 73-89, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from ABILAS/VACSCO/VALSIT, but most plots in the original type were shed to other assns and most plots in the new assn came from other discontinued C09 types.

Similar: MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[027] ABILAS/RHOALB/RUBLAS, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, O:[024] ABILAS/POLPUL-PEDRAC, N:[017] ABILAS-PICENG/RHOALB/ARNLAT, O:[029] ABILAS/VACMEM/ERYMON. Also see: [018] ABILAS-PICENG/VACMEM/VACSCO-ARNLAT

▶ [**016**] Abies amabilis 4 Chimaphila umbellata* Erythronium montanum+ 4 Gaultheria ovatifolia* Goodyera oblongifolia* Linnaea borealis* Pinus monticola** Pseudotsuga menziesii* 2 Xerophyllum tenax* [**keep**] Achillea millefolium** Arnica latifolia+*** Chamaenerion angustifolium** Eucephalus ledophyllus+*** Festuca viridula** Ligusticum*** Luzula hitchcockii+*** Orthilia secunda 2 Paxistima myrsinites 2 Pinus albicaulis** Polemonium pulcherrimum** Rainiera stricta** 2 Rubus lasiococcus 5 Vaccinium scoparium+ 8

▶ [**028**] Abies amabilis 4 Bistorta bistortoides* Carex spectabilis+* Erigeron* Erythronium montanum+* Luetkea pectinata** 2 Phyllodoce empetriformis* 2 Tsuga mertensiana 4 Vaccinium deliciosum 10 [**keep**] Callitropsis nootkatensis** Eucephalus ledophyllus+* Hieracium albiflorum* Orthilia secunda 2 Paxistima myrsinites* 2 Picea engelmannii* Pinus albicaulis** Rainiera stricta*** 2 Vaccinium scoparium+** 12 Viola orbiculata+* Xerophyllum tenax* 9

▶ [**030**] TSHRB 2 Bistorta bistortoides* Carex spectabilis+* Erigeron* Penstemon serrulatus+* Phlox diffusa** Sorbus sitchensis 2 [**keep**] Abies amabilis* Callitropsis nootkatensis* Luzula hitchcockii+* Orthilia secunda 2 Picea engelmannii*** Tsuga mertensiana* Vaccinium deliciosum** Vaccinium scoparium+* 7 Valeriana sitchensis* Veratrum viride* Viola orbiculata+* Xerophyllum tenax 2

▶ [**032**] Abies amabilis 4 Achlys triphylla* Luzula hitchcockii+ 7 Mitella* Osmorhiza* Ribes acerifolium+* Thalictrum occidentale* Tiarella trifoliata* Viola glabella+* [**keep**] Callitropsis nootkatensis* Eucephalus ledophyllus+* Paxistima myrsinites*** 2 Picea engelmannii*** 2 Pinus albicaulis*** Rainiera stricta* Rhododendron albiflorum** 2 Vaccinium deliciosum* Vaccinium membranaceum 4 Vaccinium scoparium+* 6 Xerophyllum tenax*

▶ [**033**] TSHRB 2 Bistorta bistortoides** Erigeron** Mitella** 2 Senecio triangularis+** Sorbus sitchensis 2 Thalictrum occidentale** Valeriana sitchensis 10 Veratrum viride 2 Viola glabella+** 2 [**keep**] Callitropsis nootkatensis* Hieracium albiflorum** Paxistima myrsinites** 2 Pedicularis racemosa* Picea engelmannii* Rainiera stricta 2 Rubus lasiococcus* 3 Vaccinium deliciosum* Vaccinium scoparium+*** 2 Viola orbiculata+* Xerophyllum tenax** 2

Floristics (9 plots, MORA 8, NOCA 1): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 37	Vaccinium membranaceum 11	Rubus lasiococcus 11	
80-95	Callitropsis nootkatensis 5		Valeriana sitchensis 6, Lupinus latifolius 5	
60-80	Tsuga mertensiana 3, Abies amabilis 2	Sorbus sitchensis 1	Vaccinium scoparium+ 24, Vaccinium deliciosum 6, Arnica latifolia+ 3, Viola orbiculata+ 1	moss 5, Luzula hitchcockii+ 4
40-60	Picea engelmannii 6		Xerophyllum tenax 18, Paxistima myrsinites 5, Eucephalus ledophyllus+ 3, Pedicularis racemosa 2, Ligusticum 2, Hieracium albiflorum 1, Veratrum viride 1	
25-40	Pinus albicaulis 2	Rhododendron albiflorum 3	Rainiera stricta 4, Orthilia secunda 3, Polemonium pulcherrimum 2, Chamaenerion angustifolium 1, Achillea millefolium 1	Festuca viridula 3
10-25	Pinus contorta 8	Rhododendron menziesii 8	Symphyotrichum foliaceum 3, Erythronium montanum+ 2, Pedicularis bracteosa 2	Juncus parryi+ 8, Racomitrium 3, Carex geyeri+ 2

{032} Abies lasiocarpa, Valeriana sitchensis
Subalpine fir & Sitka valerian forest
ABILAS/VALSIT



Range: Lower subalpine. **MORA**-34: **ne*-se** (sw) 1660-1770m. **NOCA**-1: (s) 1830-1840m. **OLYM**-16: **nc-ne** (sc) 1380-1500m.

Struct: Open conifer forest (16-22m), occasionally in tree islands, with substantial conifer regen, very dense forbs, and prominent shrubs. Avg vasc cover 132: forb 57, conif tree 43, conif regen 0.94 @ 10, shrb 0.77 @ 4, grass 0.61 @ 9, rush 0.58 @ 18, tall shrb 0.52 @ 2, dwf shrb 0.39 @ 5.

Ecology: Fairly gentle slopes with southerly aspects, on well-drained soils. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Abies amabilis*.

Metrics: slope 15-25°, vdp 9-147m, vdr 567-795m, east 26-88, south 67-96, conv 45-59, tpp 45-81, solar 72-87, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Expanded, including many plots from ABILAS-(ABIAMA)/VACMEM/VALSIT and several from ABILAS/VACDEL.

Similar: MNO:[033] ABILAS/VERVIR, MNO:[030] ABILAS/VACMEM/LUPARC, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, O:[029] ABILAS/VACMEM/ERYMON, MO:[080] CUPNOO-(ABILAS)/CLIUNI.

▶ [**027**] SHRB 8 Rhododendron albiflorum*** 2 Vaccinium membranaceum 5 [**keep**] Arnica latifolia+* Luzula hitchcockii+* 3 Mitella* Osmorhiza* Pedicularis racemosa* Polemonium pulcherrimum** Ribes acerifolium+* Tiarella trifoliata* Valeriana sitchensis 7 Viola glabella+* Viola orbiculata+*
▶ [**028**] TSHRB* Arnica latifolia+* Phyllodoce empetriformis*** 2 Rhododendron albiflorum 2 Sorbus sitchensis* Tsuga mertensiana* Vaccinium deliciosum** 9 Vaccinium membranaceum 4 [**keep**] Achlys triphylla** Clintonia uniflora* Hieracium albiflorum* Luzula hitchcockii+ 7 Moehringia macrophylla** Osmorhiza* Thalictrum occidentale** Tiarella trifoliata*** Viola glabella+*** Viola orbiculata+*
▶ [**030**] SHRB 8 TSHRB 3 Paxistima myrsinites*** 2 Sorbus sitchensis 3 Vaccinium membranaceum 5 [**keep**] Abies amabilis* 2 Achlys triphylla* Clintonia uniflora* Luzula hitchcockii+ 5 Mitella* Osmorhiza** Rubus lasiococcus 6 Tiarella trifoliata** Vaccinium deliciosum* Valeriana sitchensis* Viola glabella+*
▶ [**031**] Callitropsis nootkatensis* Eucephalus ledophyllus+* Paxistima myrsinites*** 2 Picea engelmannii*** 2 Pinus albicaulis*** Rainiera stricta* Rhododendron albiflorum** 2 Vaccinium deliciosum* Vaccinium membranaceum 4 Vaccinium scoparium+* 6 Xerophyllum tenax* [**keep**] Abies amabilis 4 Achlys triphylla* Luzula hitchcockii+ 7 Mitella* Osmorhiza* Ribes acerifolium+* Thalictrum occidentale* Tiarella trifoliata* Viola glabella+*
▶ [**033**] TSHRB 3 Arnica latifolia+* Bistorta bistortoides* Chamaenerion angustifolium* Erigeron** Ligusticum* Mitella 2 Picea engelmannii 2 Polemonium pulcherrimum* Rhododendron albiflorum*** 2 Senecio triangularis+** Sorbus sitchensis 3 Thalictrum occidentale* Veratrum viride* 3 [**keep**] Hieracium albiflorum* Moehringia macrophylla* Rubus lasiococcus* 4 Tiarella trifoliata* Viola orbiculata+*

Floristics (31 plots, MORA 14, NOCA 1, OLYM 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 40		Valeriana sitchensis 15	
80-95			Rubus lasiococcus 13	
60-80	Abies amabilis 10	Vaccinium membranaceum 3	Lupinus latifolius 7	
40-60		Sorbus sitchensis 2		Luzula hitchcockii+ 21, moss 4
25-40	Tsuga mertensiana 7, Callitropsis nootkatensis 6	Ribes acerifolium+ 1	Arnica latifolia+ 5, Vaccinium deliciosum 5, Erythronium montanum+ 3, Viola orbiculata+ 3, Viola glabella+ 3, Tiarella trifoliata 2, Pedicularis racemosa 2, Polemonium pulcherrimum 2, Veratrum viride 2, Moehringia macrophylla 1, Mitella 1, Ligusticum 1, Osmorhiza 1, Hieracium albiflorum 1	
10-25	Pseudotsuga menziesii 11, Tsuga heterophylla 1	Ribes lacustre 2	Polemonium californicum 16, Achlys triphylla 10, Chamaenerion angustifolium 4, Vaccinium scoparium+ 3, Orthilia secunda 3, Clintonia uniflora 3, Actaea rubra 3, Galium 3, Thalictrum occidentale 3, Achillea millefolium 2, Bistorta bistortoides 2, Eucephalus ledophyllus+ 2, Phlox diffusa 1, Claytonia sibirica+ 1, Trillium ovatum 1, Potentilla flabellifolia+ 1, Veronica cusickii+ 1, Pedicularis contorta+ 1, Pedicularis bracteosa 1	Bromus vulgaris+ 16, Elymus 7, Festuca viridula 4, Carex spectabilis+ 2, Vahlodea atropurpurea 1

{033} Abies lasiocarpa, Veratrum viride
Subalpine fir & corn-lily woodland
ABILAS/VERVIR



Range: Subalpine and upper montane zones. **MORA**-6: **ne**-**se** (sw) 1630-1890m. **NOCA**-5: **s** (cw) 1650-1730m. **OLYM**-2: **ne** 1620-1690m.

Struct: Conifer woodland (11-15m) with prominent conifer regen, very dense forbs, and substantial shrubs. Avg vasc cover 126: forb 69, conif tree 28, shrb 0.88 @ 10, conif regen 0.75 @ 6, rush 0.63 @ 10, grass 0.5 @ 4, tall shrb 0.38 @ 14, dwf shrb 0.38 @ 3, sedge 0.13 @ 3.

Ecology: Fairly gentle slopes, on very moist soils; in distinct and typically small patches within conifer forests or park-lands. Regen dominated by *Abies lasiocarpa*, with small amounts of *Abies amabilis*.

Metrics: slope 13-27°, vdp 1-102m, vdr 508-867m, east 17-66, south 41-98, conv 41-53, tpp 16-74, solar 61-88, wet 2-4

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Same, adding plots from ABILAS-(ABIAMA)/ VACMEM/VALSIT and ABILAS/VALSIT.

Similar: MNO:[032] ABILAS/VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[028] ABILAS/VACDEL-VALSIT, O:[024] ABILAS/POLPUL-PEDRAC, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, MN:[015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT, MNO:[217] VALSIT-VERVIR, MNO:[171] SORSIT-VACMEM/VALSIT, N:[017] ABILAS-PICENG/RHOALB/ARNLAT.

▶ [**024**] Carex spectabilis+*** 2 Eremogone capillaris** Pedicularis racemosa* 2 Phlox diffusa* [**keep**] Abies amabilis** 2 Ligusticum** Mitella** Picea engelmannii 2 Rhododendron albiflorum** 2 Senecio triangularis+** Sorbus sitchensis 2 Thalictrum occidentale** Tsuga mertensiana** Vaccinium membranaceum*** Valeriana sitchensis 3 Veratrum viride** Viola glabella+**

▶ [**028**] TSHRB* Erythronium montanum+* Luetkea pectinata* 2 Pedicularis racemosa* Phyllodoce empetriformis* 2 Rubus lasiococcus 3 Sorbus sitchensis* Vaccinium deliciosum* 8 Vaccinium membranaceum 5 [**keep**] TSHRB 5 Chamaenerion angustifolium* Erigeron* Eucephalus ledophyllus+ 2 Ligusticum* 2 Mitella* Picea engelmannii 7 Polemonium pulcherrimum* Senecio triangularis+* Thalictrum occidentale*** Valeriana sitchensis 9 Veratrum viride* Viola glabella+*** 2

▶ [**030**] TSHRB* Achillea millefolium* Hieracium albiflorum** Paxistima myrsinites*** 2 Pedicularis racemosa* Phlox diffusa* Rubus lasiococcus* Vaccinium membranaceum 6 [**keep**] Abies amabilis* 2 Erigeron* Ligusticum* Mitella** 2 Picea engelmannii 5 Rhododendron albiflorum* Senecio triangularis+*** Thalictrum occidentale* Valeriana sitchensis* Veratrum viride* 2 Viola glabella+** 2

▶ [**031**] Callitropsis nootkatensis* Hieracium albiflorum** Paxistima myrsinites** 2 Pedicularis racemosa* Picea engelmannii* Rainiera stricta 2 Rubus lasiococcus* 3 Vaccinium deliciosum* Vaccinium scoparium+*** 2 Viola orbiculata+* Xerophyllum tenax** 2 [**keep**] TSHRB 2 Bistorta bistortoides** Erigeron** Mitella** 2 Senecio triangularis+** Sorbus sitchensis 2 Thalictrum occidentale** Valeriana sitchensis 10 Veratrum viride 2 Viola glabella+** 2

▶ [**032**] Hieracium albiflorum* Moehringia macrophylla* Rubus lasiococcus* 4 Tiarella trifoliata* Viola orbiculata+* [**keep**] TSHRB 3 Arnica latifolia+* Bistorta bistortoides* Chamaenerion angustifolium* Erigeron** Ligusticum* Mitella 2 Picea engelmannii 2 Polemonium pulcherrimum* Rhododendron albiflorum*** 2 Senecio triangularis+** Sorbus sitchensis 3 Thalictrum occidentale* Veratrum viride* 3

Floristics (8 plots, MORA 2, NOCA 4, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 20		Valeriana sitchensis 24, Veratrum viride 11	
80-95			Lupinus latifolius 7	
60-80	Abies amabilis 7	Vaccinium membranaceum 4	Mitella 5, Arnica latifolia+ 4, Polemonium pulcherrimum 2, Erigeron 2	Luzula hitchcockii+ 10
40-60	Tsuga mertensiana 4	Rhododendron albiflorum 6	Viola glabella+ 4, Ligusticum 4, Senecio triangularis+ 3, Bistorta bistortoides 2, Thalictrum occidentale 2, Chamaenerion angustifolium 1	
25-40	Picea engelmannii 17, Callitropsis nootkatensis 8	Sorbus sitchensis 8, Ribes acerifolium+ 1	Vaccinium deliciosum 4, Eucephalus ledophyllus+ 4, Erythronium montanum+ 3, Pedicularis bracteosa 3, Ranunculus uncinatus+ 3, Osmorhiza 2, Rubus lasiococcus 2, Aconitum columbianum 2, Heracleum maximum 1, Potentilla flabellifolia+ 1, Cirsium edule+ 1, Veronica cusickii+ 1	moss 17, Elymus 1, Athyrium filix-femina 1
10-25		Spiraea splendens 25, Sorbus scopulina 10, Alnus viridis 8	Arnica cordifolia 10, Nothocalais 4, Oreostemma alpigenum 4, Polemonium californicum 4, Castilleja miniata 3, Epilobium 3, Penstemon serrulatus+ 2, Phlox diffusa 2	Festuca viridula 12, Carex kelloggii+ 3

{034} Acer circinatum*, Acer glabrum*, Cornus stolonifera/occidentalis, Pteridium aquilinum*
Vine maple*, Rocky Mountain maple*, red-osier dogwood & bracken fern* shrubland
ACER-CORSER/(PTEAQU)



Range: Lower montane. **NOCA**-10: **nw-ne** (s) 690-900m.

Struct: Closed canopy tall shrubland with substantial ferns, forbs & shrubs. Avg vasc cover 116: tall shrb 84, fern 0.9 @ 11, forb 0.9 @ 11, shrb 0.9 @ 10, conif GT5 0.6 @ 2, brdlf GT5 0.2 @ 2, brdlf LT5 0.1 @ 3.

Ecology: Fairly gentle lower slopes and toeslopes. Frequently below avalanche chutes.

Metrics: slope 14-22°, vdp 1-5m, vdr 34-68m, east 2-54, south 31-79, conv 43-45, tpp 16-30, solar 46-67, wet 3-5

Map class: S45–Vine maple shrubland

Rel to C09: Split from ACECIR, adding several plots from CORSER.

Similar: MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[036] ACECIR-(HOLDIS), MN:[038] (ACEMAC)/ACECIR-PAXMYR, MN:[037] ACECIR-OPLHOR/ATHFIL, N:[126] POPBAL/CORSER, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[162] RUBPAR/PTEAQU-CHAANG.

▶ [**035**] C-LT5 2 Abies amabilis* Achlys triphylla** Alnus viridis 3 Asarum caudatum* Carex deweyana+* Clintonia uniflora 2 Cryptogramma acrostichoides* Gaultheria ovatifolia* Moehringia macrophylla* Prosartes* Rosa* Vaccinium parvifolium* [**keep**] Athyrium filix-femina* 2 Cornus stolonifera/occidentalis*** 6 Maianthemum racemosum* Ribes lacustre 3

▶ [**036**] B-GT5 3 C-LT5* Cryptogramma acrostichoides*** Frangula purshiana 2 Pseudotsuga menziesii* Xerophyllum tenax*** 2 [**keep**] SHRB 2 Acer glabrum** 2 Athyrium filix-femina** Cornus stolonifera/occidentalis* 4 Galium** Hydrophyllum fendleri 2 Maianthemum racemosum** Maianthemum stellatum** Oplopanax horridus** Pteridium aquilinum 2 Ribes lacustre 2 Rubus nutkanus*

▶ [**037**] Corydalis** 2 Gymnocarpium dryopteris* Hydrophyllum tenuipes 2 Oplopanax horridus 2 Rhododendron menziesii*** Rubus spectabilis* 3 Sambucus racemosa* 2 Stellaria*** Streptopus amplexifolius** Struthiopteris spicant** Tiarella trifoliata** Trillium ovatum* [**keep**] C-GT5** Acer glabrum* Cornus stolonifera/occidentalis* 13 Dicentra formosa 2 Hydrophyllum fendleri 2 Maianthemum racemosum* Maianthemum stellatum* Pteridium aquilinum 3 Rubus nutkanus* 2

▶ [**038**] B-LT5* 5 B-GT5* 4 C-LT5* 2 C-GT5 3 Abies grandis 2 Acer macrophyllum* 6 Amelanchier alnifolia** Corylus cornuta** 2 Cryptogramma acrostichoides** Paxistima myrsinites* 3 Prunus emarginata** 2 Pseudotsuga menziesii* [**keep**] Alnus viridis* Athyrium filix-femina* 2 Claytonia sibirica+*** Cornus stolonifera/occidentalis** 5 Dicentra formosa* 2 Maianthemum stellatum* Oplopanax horridus** Pteridium aquilinum 5 Ribes lacustre 3 Rubus nutkanus* Rubus spectabilis*** Urtica dioica***

▶ [**126**] B-LT5* B-GT5* 4 C-LT5** Abies amabilis** Abies grandis** Abies lasiocarpa* 2 Asarum caudatum** Circaea alpina* Clintonia uniflora* Osmorhiza** Populus trichocarpa*** 2 Rubus spectabilis 3 Salix sitchensis+** 2 Symphoricarpos albus 2 Thalictrum occidentale* [**keep**] Acer circinatum 8 Acer glabrum 6 Heracleum maximum* Hydrophyllum fendleri* 2 Maianthemum racemosum* Pteridium aquilinum 2 Ribes lacustre* Salix scouleriana* Trillium ovatum* Viola glabella+*

Floristics (10 plots, NOCA 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Cornus stolonifera/occidentalis 28		
80-95		Acer circinatum 48		
60-80		Acer glabrum 15, Rubus nutkanus 5, Oplopanax horridus 1	Maianthemum stellatum 3, Maianthemum racemosum 0, Galium 0	Athyrium filix-femina 5
40-60		Ribes lacustre 6, Alnus viridis 2, Rubus spectabilis 2, Sambucus racemosa 1	Dicentra formosa 4, Paxistima myrsinites 2, Claytonia sibirica+ 1, Urtica dioica 1	Pteridium aquilinum 15
25-40		Ribes bracteosum+ 2	Hydrophyllum fendleri 6, Viola glabella+ 2	moss 10, Dryopteris 1, Polystichum munitum 0
10-25	Acer macrophyllum 4, Tsuga heterophylla 3, Pseudotsuga menziesii 2, Thuja plicata 1, Abies lasiocarpa 1	Salix scouleriana 8, Crataegus douglasii 2, Sorbus scopulina 2, Lonicera involucrata 2, Symphoricarpos albus 1	Lysimachia latifolia 4, Tolmiea menziesii 3, Circaea alpina 1, Thalictrum occidentale 1, Actaea rubra 1, Heracleum maximum 1	Polystichum andersonii 1

{035} Acer circinatum, Galium*, Pteridium aquilinum*
Vine maple, bedstraw & sword fern* shrubland
ACECIR/GALIUM-(POLMUN)



Range: Lower montane. **MORA**-12: **sw-se*** (ne) 790-1120m. **NOCA**-7: **nw-ne** (cw-s) 660-880m. **OLYM**-11: **se*** (nc-sc) 630-860m.

Struct: Closed canopy tall shrubland with abundant forbs and substantial shrubs & ferns. Avg vasc cover 117: tall shrb 85, forb 16, shrb 0.89 @ 8, fern 0.79 @ 6, dwf shrb 0.43 @ 4, conif LT5 0.36 @ 3, brdlf LT5 0.14 @ 5.

Ecology: Fairly gentle rocky toeslopes, old rock slides, and avalanche runouts at the base of valley walls, often on stable talus. May result from high severity fires and persist due to repeated disturbance.

Metrics: slope 14-28°, vdp 1-5m, vdr 19-98m, east 29-94, south 43-94, conv 39-47, tpp 12-27, solar 55-74, wet 3-4

Map class: S45–Vine maple shrubland

Rel to C09: Split from ACECIR, incorporating many plots from ACECIR/ATHFIL-TOLMEN and ALNVIR-ACECIR.

Similar: MNO:[036] ACECIR-(HOLDIS), N:[034] ACER-CORSER/(PTEAQU), MN:[037] ACECIR-OPLHOR/ATHFIL, MN:[038] (ACEMAC)/ACECIR-PAXMYR, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[055] ALNVIR-OPLHOR, MNO:[162] RUBPAR/PTEAQU-CHAANG.

▶ [**034**] Athyrium filix-femina* 2 Cornus stolonifera/occidentalis*** 6 Maianthemum racemosum* Ribes lacustre 3 [**keep**] C-LT5 2 Abies amabilis* Achlys triphylla** Alnus viridis 3 Asarum caudatum* Carex deweyana+* Clintonia uniflora 2 Cryptogramma acrostichoides* Gaultheria ovatifolia* Moehringia macrophylla* Prosartes* Rosa* Vaccinium parvifolium*

▶ [**036**] B-GT5 3 Amelanchier alnifolia* Asplenium trichomanes* Chamaenerion angustifolium* Collomia*** Cornus stolonifera/occidentalis* Frangula purshiana* Heuchera micrantha* Phyllodoce empetriformis*** Pseudotsuga menziesii 2 Rhododendron menziesii* Tsuga heterophylla 2 Xerophyllum tenax** 2 [**keep**] FORB 4 SHRB 2 Acer glabrum* 2 Achlys triphylla* Alnus viridis 3 Clintonia uniflora 2 Galium* Maianthemum stellatum* Polystichum munitum* Pteridium aquilinum 2 Rubus nutkanus 2 Sambucus racemosa* Tolmiea menziesii* Trillium ovatum* Viola glabella+*

▶ [**037**] SHRB 13 Athyrium filix-femina* Corydalis* 3 Dryopteris* Gymnocarpium dryopteris** Hydrophyllum tenuipes 2 Oplopanax horridus* 3 Rhododendron menziesii* Rubus spectabilis 5 Stellaria* Streptopus amplexifolius*** Struthiopteris spicant** Tiarella trifoliata* [**keep**] C-GT5* Alnus viridis* 4 Anaphalis margaritacea* Carex deweyana+* Clintonia uniflora 2 Gaultheria ovatifolia* Lilium* Lysimachia latifolia* Maianthemum stellatum 2 Moehringia macrophylla* Pteridium aquilinum 3 Rosa* Rubus nutkanus* 2 Rumex acetosella+*. Note: [037] is in riparian areas and on cooler north-facing slopes.

▶ [**038**] B-LT5* 8 B-GT5 3 C-GT5 2 Abies grandis** 2 Acer macrophyllum* 7 Amelanchier alnifolia* Chamaenerion angustifolium* Corylus cornuta* Holodiscus discolor* Maianthemum racemosum* Prunus emarginata** Pseudotsuga menziesii 2 Sorbus scopulina** Symphoricarpos albus* [**keep**] FORB 8 Achlys triphylla* Alnus viridis 3 Carex deweyana+* Circaea alpina** Claytonia sibirica+** Clintonia uniflora** 2 Moehringia macrophylla** Rubus spectabilis** 2 Tolmiea menziesii*** Trillium ovatum* Tsuga heterophylla*

▶ [**058**] Abies lasiocarpa* Alnus viridis* 20 Aruncus dioicus* Callitropsis nootkatensis* Heracleum maximum** 2 Hydrophyllum fendleri* Osmorhiza** Prosartes 2 Salix sitchensis+* Sambucus racemosa 3 Thalictrum occidentale*** Veratrum viride** 2 [**keep**] Acer circinatum*** 2 Pteridium aquilinum 2

Floristics (28 plots, MORA 12, NOCA 6, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Acer circinatum 76		
60-80			Galium 2	
40-60		Alnus viridis 12, Rubus nutkanus 7, Sambucus racemosa 2	Maianthemum stellatum 4, Viola glabella+ 2	Polystichum munitum 2
25-40	Tsuga heterophylla 1	Acer glabrum 7, Rubus spectabilis 3, Oplopanax horridus 2	Clintonia uniflora 6, Paxistima myrsinites 4, Tolmiea menziesii 3, Achlys triphylla 2, Trillium ovatum 1, Prosartes 1, Maianthemum racemosum 1	moss 12, Pteridium aquilinum 8, Carex deweyana+ 1
10-25	Callitropsis nootkatensis 8, Acer macrophyllum 4, Alnus rubra 2	Corylus cornuta 5, Sorbus sitchensis 2, Ribes bracteosum+ 2, Ribes lacustre 2, Vaccinium parvifolium 2	Claytonia sibirica+ 5, Rumex acetosella+ 5, Rubus lasiococcus 3, Stachys cooleyae 3, Dicentra formosa 2, Moehringia macrophylla 2	lichen 4

{036} Acer circinatum, Holodiscus discolor*
Vine maple & oceanspray* shrubland
ACECIR-(HOLDIS)



Range: Lower montane and lowland zones, on exposed rock. **MORA**-2: **sw** 1020-1160m. **NOCA**-2: (nw-ne) 410-650m. **OLYM**-1: (nc-ne) 450-460m.

Struct: Semi-open tall shrubland with prominent forbs & dwarf shrubs. Avg vasc cover 40: tall shrb 30, shrb 1, conif GT5 0.75 @ 3, forb 0.75 @ 2, dwf shrb 0.75 @ 2, fern 0.75 @ 1, conif LT5 0.5 @ 1, brdlf GT5 0.25 @ 6, brdlf LT5 0.25 @ 2.

Ecology: Fairly steep south-facing lower slopes, on exposed rock and rock slide debris.

Metrics: slope 30-32°, vdp 1-45m, vdr 34-110m, east 48-85, south 84-96, conv 34-46, tpp 23-34, solar 61-73, wet 2-3

Map class: S45–Vine maple shrubland

Rel to C09: Evolved from ACECIR-(HOLDIS) SPARSE, incorporating some plots from ACECIR. The name is misleading; *Holodiscus discolor* is not found in the NCCN plots.

Similar: MNO:[035] ACECIR/GALIUM-(POLMUN), MN:[038] (ACEMAC)/ACECIR-PAXMYR, MN:[037] ACECIR-OPLHOR/ATHFIL, N:[034] ACER-CORSER/(PTEAQU), MNO:[103] PENDAV/RACOMITRIUM, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, N:[129] POPTRE-PAXMYR_SHRUB, N:[133] PSEMEN/ACECIR/MAHNER.

▶ [**034**] SHRB 2 Acer glabrum** 2 Athyrium filix-femina** Cornus stolonifera/occidentalis* 4 Galium** Hydrophyllum fendleri 2 Maianthemum racemosum** Maianthemum stellatum** Oplopanax horridus** Pteridium aquilinum 2 Ribes lacustre 2 Rubus nutkanus* [**keep**] B-GT5 3 C-LT5* Cryptogramma acrostichoides*** Frangula purshiana 2 Pseudotsuga menziesii* Xerophyllum tenax*** 2

▶ [**035**] FORB 4 SHRB 2 Acer glabrum* 2 Achlys triphylla* Alnus viridis 3 Clintonia uniflora 2 Galium* Maianthemum stellatum* Polystichum munitum* Pteridium aquilinum 2 Rubus nutkanus 2 Sambucus racemosa* Tolmiea menziesii* Trillium ovatum* Viola glabella+* [**keep**] B-GT5 3 Amelanchier alnifolia* Asplenium trichomanes* Chamaenerion angustifolium* Collomia*** Cornus stolonifera/occidentalis* Frangula purshiana* Heuchera micrantha* Phyllodoce empetriformis*** Pseudotsuga menziesii 2 Rhododendron menziesii* Tsuga heterophylla 2 Xerophyllum tenax** 2

▶ [**037**] FORB 4 SHRB 2 Athyrium filix-femina** Claytonia sibirica+* Corydalis 2 Dryopteris* Galium* Hydrophyllum tenuipes 2 Oplopanax horridus** 2 Rubus spectabilis* 2 Sambucus racemosa** 2 [**keep**] C-GT5** Acer macrophyllum 3 Cryptogramma acrostichoides* Paxistima myrsinites* Pseudotsuga menziesii* 2 Tsuga heterophylla 2 Xerophyllum tenax*** 2

▶ [**038**] B-LT5* 4 C-LT5 2 SHRB 2 Abies grandis 2 Acer glabrum* 2 Acer macrophyllum* Corylus cornuta* 2 Maianthemum racemosum* Paxistima myrsinites 4 Rubus nutkanus 2 [**keep**] Collomia** Cystopteris fragilis* Frangula purshiana* 2 Heuchera micrantha* Phyllodoce empetriformis** Rhododendron menziesii* Rubus spectabilis** Tsuga heterophylla* 2 Vaccinium parvifolium* Xerophyllum tenax*** 2.
Note: [038] has denser shrub cover and occurs in avalanche chutes.

▶ [**103**] FORB 4 Arctostaphylos uva-ursi+* 2 Lomatium martindalei 2 Luzula hitchcockii+* Montia* Penstemon procerus+* 2 Racomitrium* 2 Selaginella wallacei+ 2 [**keep**] B-GT5 2 SHRB* TSHRB* 2 Acer circinatum*** 2 Acer macrophyllum 3 Frangula purshiana 2 Tsuga heterophylla 2 Xerophyllum tenax 2

Floristics (4 plots, MORA 2, NOCA 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Acer circinatum 28		
60-80			Paxistima myrsinites 2	moss 40
40-60	Pseudotsuga menziesii 4	Ribes lacustre 1	Xerophyllum tenax 4	Cryptogramma acrostichoides 2
25-40	Acer macrophyllum 8, Tsuga heterophylla 3	Frangula purshiana 5, Cornus stolonifera/occidentalis 2, Alnus viridis 2, Rhododendron menziesii 1, Vaccinium parvifolium 1, Amelanchier alnifolia 0, Rubus nutkanus 0, Rubus spectabilis 0, Corylus cornuta 0, Rubus leucodermis 0	Heuchera micrantha 0, Chamaenerion angustifolium 0, Phyllodoce empetriformis 0, Collomia 0	lichen 10, Asplenium trichomanes 0, Cystopteris fragilis 0

{037} Acer circinatum, Oplopanax horridus, Athyrium filix-femina
Vine maple, devil's club & lady fern shrubland
ACECIR-OPLHOR/ATHFIL



Range: Lowland zone. **MORA**-10: **nw*** 770-870m. **NOCA**-5: **nw** (ne) 390-790m.

Struct: Closed canopy tall shrubland with abundant shrubs & forbs, and substantial ferns. Avg vasc cover 138: tall shrb 81, shrb 30, forb 16, fern 8, brdlf GT5 0.23 @ 4, dwf shrb 0.23 @ 3.

Ecology: Lower slopes with northerly aspects, on old talus or in more gentle avalanche runouts. Exposed rock is not abundant.

Metrics: slope 21-29°, vdp 1-13m, vdr 15-85m, east 28-84, south 4-25, conv 38-48, tpp 20-31, solar 33-48, wet 3-4

Map class: S45–Vine maple shrubland

Rel to C09: Evolved from ACECIR/ATHFIL-TOLMEN, shedding plots to [035] ACECIR/GALIUM-(POLMUN) and gaining from ACECIR and RUBSPE-RIBBRA.

Similar: MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[036] ACECIR-(HOLDIS), N:[034] ACER-CORSER/(PTEAQU), MNO:[055] ALNVIR-OPLHOR, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MN:[038] (ACEMAC)/ACECIR-PAXMYR, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[058] ALNVIR-(SAMRAC)/THAOCC, N:[126] POPBAL/CORSER.

▶ [**034**] C-GT5** Acer glabrum* Cornus stolonifera/occidentalis* 13 Dicentra formosa 2 Hydrophyllum fendleri 2 Maianthemum racemosum* Maianthemum stellatum* Pteridium aquilinum 3 Rubus nutkanus* 2 [**keep**] Corydalis** 2 Gymnocarpium dryopteris* Hydrophyllum tenuipes 2 Oplopanax horridus 2 Rhododendron menziesii*** Rubus spectabilis* 3 Sambucus racemosa* 2 Stellaria*** Streptopus amplexifolius** Struthiopteris spicant** Tiarella trifoliata** Trillium ovatum*

▶ [**035**] C-GT5* Alnus viridis* 4 Anaphalis margaritacea* Carex deweyana+* Clintonia uniflora 2 Gaultheria ovatifolia* Lilium* Lysimachia latifolia* Maianthemum stellatum 2 Moehringia macrophylla* Pteridium aquilinum 3 Rosa* Rubus nutkanus* 2 Rumex acetosella+* [**keep**] SHRB 13 Athyrium filix-femina* Corydalis* 3 Dryopteris* Gymnocarpium dryopteris** Hydrophyllum tenuipes 2 Oplopanax horridus* 3 Rhododendron menziesii* Rubus spectabilis 5 Stellaria* Streptopus amplexifolius*** Struthiopteris spicant** Tiarella trifoliata*. Note: [035] occurs on warmer south-facing slopes.

▶ [**036**] C-GT5** Acer macrophyllum 3 Cryptogramma acrostichoides* Paxistima myrsinites* Pseudotsuga menziesii* 2 Tsuga heterophylla 2 Xerophyllum tenax*** 2 [**keep**] FORB 4 SHRB 2 Athyrium filix-femina** Claytonia sibirica+* Corydalis 2 Dryopteris* Galium* Hydrophyllum tenuipes 2 Oplopanax horridus** 2 Rubus spectabilis* 2 Sambucus racemosa** 2

▶ [**055**] Achlys triphylla 4 Alnus viridis* 5 Claytonia sibirica+ 3 Heracleum maximum** Micranthes odontoloma+** Ribes bracteosum+* 3 Streptopus lanceolatus 2 Veratrum viride* Viola glabella+* [**keep**] Acer circinatum* 34 Dryopteris** Gymnocarpium dryopteris* Polystichum munitum*** Rhododendron menziesii*** Ribes lacustre* Stellaria* Struthiopteris spicant*** Tiarella trifoliata*** Trillium ovatum*

▶ [**057**] C-GT5* Abies amabilis* Alnus viridis* 5 Callitropsis nootkatensis* Maianthemum racemosum* Sorbus sitchensis* 2 Vaccinium membranaceum** 2 Valeriana sitchensis* 2 Veratrum viride* Viola glabella+* 2 [**keep**] Acer circinatum** 15 Corydalis** Dryopteris** Hydrophyllum tenuipes 2 Oplopanax horridus* Polystichum andersonii** Ribes lacustre* Stellaria** Struthiopteris spicant** Trillium ovatum* Vaccinium parvifolium***

Floristics (13 plots, MORA 8, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Acer circinatum 71		
80-95		Rubus spectabilis 18, Oplopanax horridus 12, Sambucus racemosa 4		Athyrium filix-femina 4
60-80		Ribes lacustre 3	Claytonia sibirica+ 1, Galium 1	moss 40, Dryopteris 2
40-60		Rhododendron menziesii 2	Dicentra formosa 1, Trillium ovatum 1, Stellaria 1	Polystichum munitum 2, Gymnocarpium dryopteris 1
25-40		Vaccinium parvifolium 2	Corydalis 11, Hydrophyllum tenuipes 6, Achlys triphylla 2, Tiarella trifoliata 1, Streptopus amplexifolius 1, Streptopus lanceolatus 1, Maianthemum stellatum 1, Clintonia uniflora 1	Struthiopteris spicant 2, Polystichum andersonii 2
10-25	Acer macrophyllum 2	Acer glabrum 9, Cornus stolonifera/occidentalis 8, Alnus viridis 3, Ribes bracteosum+ 2, Vaccinium ovalifolium 2, Rubus nutkanus 2	Paxistima myrsinites 3, Mertensia paniculata 3, Tolmiea menziesii 2, Maianthemum dilatatum 2, Asarum caudatum 2, Mitella 2, Rubus pedatus 2	liverwort 2, Pteridium aquilinum 2

{038} Acer macrophyllum*, Acer circinatum, Paxistima myrsinites
Bigleaf maple*, vine maple & Oregon-box shrubland
(ACEMAC)/ACECIR-PAXMYR



Range: Lower montane and lowland zones. **MORA**-3: (sw-se) 940-1020m. **NOCA**-23: **nw-ne*-s** (cw-ce) 650-930m.

Struct: Closed canopy tall shrubland or woodland, usually with substantial shrub-form and/or emergent broadleaf trees, over substantial dwarf shrubs & forbs, and prominent shrubs. Avg vasc cover 117: tall shrb 66, forb 5, shrb 0.92 @ 4, dwf shrb 0.8 @ 11, fern 0.68 @ 4, brdlf LT5 0.64 @ 22, conif LT5 0.6 @ 5, conif GT5 0.52 @ 7, brdlf GT5 0.44 @ 24.

Ecology: Fairly steep old talus slopes, debris aprons and debris avalanche runouts, often with southerly aspects. Typically on stable moss-covered rocks with little soil development, generally with less evidence of past fire than in most eastside dry shrublands.

Metrics: slope 24-33°, vdp 1-6m, vdr 54-143m, east 27-90, south 40-99, conv 40-46, tpp 22-40, solar 53-73, wet 3-4

Map class: S45–Vine maple shrubland

Rel to C09: Split from ACECIR to represent eastside variant, incorporating plots from ACEMAC/ACECIR and ACEMAC/PAXMYR.

Similar: MNO:[036] ACECIR-(HOLDIS), MNO:[035] ACECIR/GALIUM-(POLMUN), N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[034] ACER-CORSER/(PTEAQU), N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, MN:[037] ACECIR-OPLHOR/ATHFIL, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, NO:[041] ACEMAC/POLMUN-TOLMEN. Also see: [026] ABILAS-(PSEMEN)/VACMEM/CALRUB, [078] CEAVEL-(SPIBET)/CALRUB

▶ [**034**] Alnus viridis* Athyrium filix-femina* 2 Claytonia sibirica+*** Cornus stolonifera/occidentalis** 5 Dicentra formosa* 2 Maianthemum stellatum* Oplopanax horridus** Pteridium aquilinum 5 Ribes lacustre 3 Rubus nutkanus* Rubus spectabilis*** Urtica dioica*** [**keep**] B-LT5* 5 B-GT5* 4 C-LT5* 2 C-GT5 3 Abies grandis 2 Acer macrophyllum* 6 Amelanchier alnifolia** Corylus cornuta** 2 Cryptogramma acrostichoides** Paxistima myrsinites* 3 Prunus emarginata** 2 Pseudotsuga menziesii*

▶ [**035**] FORB 8 Achlys triphylla* Alnus viridis 3 Carex deweyana+* Circaea alpina** Claytonia sibirica+** Clintonia uniflora** 2 Moehringia macrophylla** Rubus spectabilis** 2 Tolmiea menziesii*** Trillium ovatum* Tsuga heterophylla* [**keep**] B-LT5* 8 B-GT5 3 C-GT5 2 Abies grandis** 2 Acer macrophyllum* 7 Amelanchier alnifolia* Chamaenerion angustifolium* Corylus cornuta* Holodiscus discolor* Maianthemum racemosum* Prunus emarginata** Pseudotsuga menziesii 2 Sorbus scopulina** Symphoricarpos albus*

▶ [**036**] Collomia** Cystopteris fragilis* Frangula purshiana* 2 Heuchera micrantha* Phyllodoce empetriformis** Rhododendron menziesii* Rubus spectabilis** Tsuga heterophylla* 2 Vaccinium parvifolium* Xerophyllum tenax*** 2 [**keep**] B-LT5* 4 C-LT5 2 SHRB 2 Abies grandis 2 Acer glabrum* 2 Acer macrophyllum* Corylus cornuta* 2 Maianthemum racemosum* Paxistima myrsinites 4 Rubus nutkanus 2

▶ [**039**] FORB 8 SHRB 7 Actaea rubra** Asarum caudatum** Athyrium filix-femina 2 Circaea alpina*** Cornus stolonifera/occidentalis 5 Galium* Maianthemum stellatum 3 Oplopanax horridus* 2 Osmorhiza*** Rubus nutkanus* Salix scouleriana 3 Thalictrum occidentale* Thuja plicata* Viola glabella+* [**keep**] C-LT5 2 TSHRB 28 Abies grandis 2 Acer circinatum* 13 Acer glabrum* Amelanchier alnifolia* Corylus cornuta** 2 Cryptogramma acrostichoides* Paxistima myrsinites 2 Prunus emarginata* 2

▶ [**165**] Abies lasiocarpa* Amelanchier alnifolia 3 Ceanothus velutinus*** 2 Chamaenerion angustifolium* Eucephalus ledophyllus+*** Rubus nutkanus* Salix scouleriana* 4 Sorbus scopulina* 3 Thalictrum occidentale* Vaccinium membranaceum** 2 Viola glabella+* [**keep**] B-LT5* 8 B-GT5 4 Abies grandis 2 Acer circinatum* Acer macrophyllum* 12 Corylus cornuta*** 2

Floristics (25 plots, MORA 3, NOCA 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Acer circinatum 49		
80-95	Acer macrophyllum 28		Paxistima myrsinites 11	
60-80		Acer glabrum 10, Corylus cornuta 10	Maianthemum racemosum 1	
40-60	Pseudotsuga menziesii 3	Prunus emarginata 4, Amelanchier alnifolia 2		Cryptogramma acrostichoides 1
25-40	Abies grandis 4	Rubus nutkanus 4, Sorbus scopulina 2, Symphoricarpos albus 2, Holodiscus discolor 2, Rosa 1	Galium 1, Chamaenerion angustifolium 0	moss 16
10-25	Abies lasiocarpa 17, Taxus brevifolia 6, Callitropsis nootkatensis 1, Thuja plicata 1, Populus trichocarpa 1	Cornus stolonifera/occidentalis 3, Alnus viridis 2, Salix scouleriana 2, Ribes lacustre 2, Sambucus racemosa 1, Lonicera ciliosa 1	Thalictrum occidentale 5, Prosartes 3, Hydrophyllum fendleri 2, Maianthemum stellatum 2, Viola glabella+ 2, Lactuca 1, Aruncus dioicus 1	Polystichum munitum 4, Pteridium aquilinum 3, Athyrium filix-femina 1

{039} Acer macrophyllum, Acer circinatum/glabrum, Rubus nutkanus, Maianthemum racemosa/stellatum
Bigleaf maple, vine or Rocky Mountain maple, thimbleberry & Solomon's plants forest/woodland
ACEMAC/ACER-RUBPAR/MAIANTHEMUM



Range: Lowland zone. **NOCA**-9: **cw-s*** (ne) 720-870m.

Struct: Semi-open broadleaf forest or shrubby woodland with abundant broadleaf regen, abundant forbs & tall shrubs, and substantial shrubs & ferns. Avg vasc cover 125: forb 20, brdlf regen 19, tall shrb 18, shrb 14, brdlf tree 0.78 @ 55, fern 0.78 @ 8, conif tree 0.67 @ 4, grass 0.56 @ 2, dwf shrb 0.56 @ 1.

Ecology: Fairly gentle slopes with southwesterly aspects; on rocky toeslopes and debris aprons. Regen dominated by *Acer macrophyllum*.

Metrics: slope 13-29°, vdp 1-7m, vdr 61-138m, east 4-28, south 70-95, conv 41-48, tpp 14-38, solar 65-72, wet 3-5

Map class: B34–Bigleaf maple & Doug-fir debris apron forest

Rel to C09: Evolved from ACEMAC/MAISTE, incorporating some plots from ACEMAC/SYMALB and ACEMAC/PAXMYR.

Similar: MN:[038] (ACEMAC)/ACECIR-PAXMYR, NO:[041] ACEMAC/POLMUN-TOLMEN, N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, N:[126] POPBAL/CORSER, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[034] ACER-CORSER/(PTEAQU), MNO:[044] ACEMAC/RUBSPE/TOLMEN, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM.

▶ [**038**] C-LT5 2 TSHRB 28 Abies grandis 2 Acer circinatum* 13 Acer glabrum* Amelanchier alnifolia* Corylus cornuta** 2 Cryptogramma acrostichoides* Paxistima myrsinites 2 Prunus emarginata* 2 [**keep**] FORB 8 SHRB 7 Actaea rubra** Asarum caudatum** Athyrium filix-femina 2 Circaea alpina*** Cornus stolonifera/occidentalis 5 Galium* Maianthemum stellatum 3 Oplopanax horridus* 2 Osmorhiza*** Rubus nutkanus* Salix scouleriana 3 Thalictrum occidentale* Thuja plicata* Viola glabella+*

▶ [**041**] Adiantum aleuticum 2 Alnus rubra** 2 Carex deweyana+* Circaea alpina 2 Claytonia sibirica+* Lactuca* Polystichum munitum* 2 Rubus spectabilis* Rubus ursinus* Stachys cooleyae** Tolmiea menziesii* 2 Urtica dioica* [**keep**] Acer glabrum 2 Cornus stolonifera/occidentalis 2 Maianthemum racemosum*** Maianthemum stellatum* 2 Osmorhiza* Paxistima myrsinites** Pteridium aquilinum* Rubus nutkanus*** 2 Salix scouleriana 2 Sambucus racemosa** Thalictrum occidentale** Thuja plicata*

▶ [**042**] C-LT5* 2 Acer circinatum* Alnus rubra*** 2 Betula papyrifera 2 Lactuca* Polystichum munitum* 2 Rubus ursinus*** Thuja plicata 4 Tsuga heterophylla** 2 [**keep**] B-LT5* 4 Acer glabrum 2 Actaea rubra* Cornus stolonifera/occidentalis*** 2 Maianthemum racemosum*** Maianthemum stellatum* 2 Oplopanax horridus** Paxistima myrsinites*** Rubus nutkanus* 2 Salix scouleriana 2 Sambucus racemosa* Thalictrum occidentale*** Viola glabella+*

▶ [**043**] Abies grandis** 2 Adenocaulon bicolor*** Amelanchier alnifolia* Berberis aquifolium** Cornus nuttallii** 2 Elymus*** Populus trichocarpa 3 Pseudotsuga menziesii* 5 Rubus ursinus** Spiraea lucida* Symphoricarpos albus* 6 [**keep**] Acer glabrum 2 Actaea rubra*** Athyrium filix-femina 2 Circaea alpina*** Cornus stolonifera/occidentalis* Maianthemum stellatum** 2 Oplopanax horridus*** 2 Sambucus racemosa*** Thalictrum occidentale*** Viola glabella+*

Floristics (9 plots, NOCA 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 61			
80-95		Rubus nutkanus 7	Galium 0	
60-80			Maianthemum racemosum 2	Pteridium aquilinum 4
40-60	Pseudotsuga menziesii 3, Thuja plicata 2	Cornus stolonifera/occidentalis 12, Acer circinatum 8, Oplopanax horridus 5, Sambucus racemosa 1	Maianthemum stellatum 14, Thalictrum occidentale 3, Prosartes 1, Viola glabella+ 1, Paxistima myrsinites 1, Circaea alpina 1, Osmorhiza 0, Asarum caudatum 0, Actaea rubra 0	
25-40	Populus trichocarpa 1	Acer glabrum 9, Salix scouleriana 7, Rosa 1, Ribes lacustre 0	Tellima grandiflora 1, Trillium ovatum 0	moss 14, Athyrium filix-femina 9
10-25	Tsuga heterophylla 1, Abies amabilis 1	Sambucus nigra 21, Symphoricarpos mollis 8, Philadelphus lewisii 6, Prunus virginiana 5, Ribes bracteosum+ 5, Symphoricarpos albus 4, Holodiscus discolor 4, Rubus spectabilis 2, Frangula purshiana 1, Ceanothus velutinus 1, Sorbus scopulina 1	Apocynum androsaemifolium 8, Chamaenerion angustifolium 7, Cacaliopsis nardosmia 6, Claytonia sibirica+ 3, Epilobium 2, Achillea millefolium 2, Hydrophyllum fendleri 2, Heracleum maximum 2, Clintonia uniflora 2, Artemisia 1, Anaphalis margaritacea 1, Dicentra formosa 1, Canadanthus modestus 1, Moehringia macrophylla 1, Tolmiea menziesii 1	Calamagrostis rubescens+ 5, Bromus sitchensis 3, Polystichum andersonii 2

{040} Acer macrophyllum, Picea sitchensis, Acer circinatum, Oxalis oregana, Polystichum munitum
Bigleaf maple, Sitka spruce, vine maple, Oregon wood-sorrel & sword fern forest
ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN



Range: Lowland and coastal zones, on valley bottoms. **OLYM**-11: **sw-sc*** (nc-se) 80-180m.

Struct: Closed mixed broadleaf-conifer forest (31-47m) with scant conifer regen, dense forbs & ferns, and substantial tall shrubs & shrubs. Avg vasc cover 210: brdlf tree 60, forb 50, fern 41, conif tree 25, tall shrb 14, shrb 8, grass 0.89 @ 5, sedge 0.67 @ 6, rush 0.67 @ 2, conif regen 0.56 @ 3, dwf shrb 0.44 @ 2.

Ecology: Nearly flat sites; riparian terraces and other moist areas such as alluvial fans, toeslopes, and adjacent to wetlands. Regen dominated by *Picea sitchensis*.

Metrics: slope 1-5°, vdp 1-3m, vdr 2-3m, east 23-69, south 6-70, conv 47-51, tpp 15-30, solar 58-60, wet 6-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Evolved from ACEMAC/OXAORE, adding plots from ACEMAC/RUBSPE. *Picea sitchensis* is consistently important in NCCN plots.

Similar: NO:[041] ACEMAC/POLMUN-TOLMEN, O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MO:[054] ALNRUB/STACHA-TOLMEN, MNO:[044] ACEMAC/RUBSPE/TOLMEN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, O:[047] ALNRUB/ELYGLA, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME.

▶ [**041**] B-LT5* 2 Abies grandis* Adiantum aleuticum 2 Bromus vulgaris+* Circaea alpina 3 Dactylis glomerata* 2 Equisetum arvense+ 2 Geranium robertianum* Lactuca* Nemophila parviflora* Symphoricarpos albus* Urtica dioica** Viola glabella+* 2 [**keep**] Elymus** 2 Frangula purshiana** Luzula parviflora* Mitella** Oxalis oregana** Picea sitchensis*** 2 Ranunculus repens+* Rubus laciniatus** Rubus spectabilis 4 Tiarella trifoliata* 2 Vaccinium parvifolium*

▶ [**044**] B-LT5* 2 SHRB 13 Abies amabilis** Athyrium filix-femina 2 Elymus 5 Gymnocarpium dryopteris** Lactuca* Pseudotsuga menziesii* Rubus spectabilis 12 Sambucus racemosa** 2 Thuja plicata** Viola glabella+* 2 [**keep**] Oxalis oregana*** 2 Picea sitchensis*** 2 Polystichum munitum 9 Tiarella trifoliata 5

▶ [**050**] B-LT5 2 Circaea alpina 3 Ranunculus repens+ 4 Sambucus racemosa** Tsuga heterophylla* Vaccinium parvifolium 2 [**keep**] Acer macrophyllum 11 Athyrium filix-femina* Hydrophyllum tenuipes** Mitella* Polypodium glycyrrhiza* Populus trichocarpa** Rubus laciniatus*** Rubus ursinus* Rumex occidentalis* Stachys cooleyae* Stellaria*. Note: [050] is recognized less by dominance of *Alnus rubra* than by the lack of *Acer macrophyllum* even approaching codominance.

▶ [**054**] B-LT5** 2 Abies grandis 2 Athyrium filix-femina 2 Circaea alpina 3 Poa cusickii+ 5 Ranunculus repens+ 4 Stachys cooleyae* [**keep**] C-GT5* 8 TSHRB* Acer circinatum* 4 Acer macrophyllum 11 Carex deweyana+* Elymus* Frangula purshiana** Hydrophyllum tenuipes*** Luzula parviflora* Oxalis oregana 12 Polypodium glycyrrhiza** Polystichum munitum 11 Populus trichocarpa*** Rubus laciniatus** Struthiopteris spicant* Tiarella trifoliata 3

▶ [**127**] B-LT5* 2 Bromus vulgaris+ 2 Populus trichocarpa* 2 Ranunculus repens+ 4 Rumex acetosella+** [**keep**] Athyrium filix-femina** Claytonia sibirica+* Frangula purshiana* Galium* Luzula parviflora** Mitella*** Polypodium glycyrrhiza*** Rubus ursinus* Stellaria* Tiarella trifoliata 3 Vaccinium parvifolium***

Floristics (9 plots, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 46, Picea sitchensis 17		Oxalis oregana 26	Polystichum munitum 38, moss 6
80-95		Acer circinatum 15, Rubus spectabilis 8	Tolmiea menziesii 5, Claytonia sibirica+ 3	Athyrium filix-femina 1
60-80	Alnus rubra 22		Galium 3, Ranunculus repens+ 2, Circaea alpina 2	Carex deweyana+ 5, Luzula parviflora 2
40-60	Tsuga heterophylla 6	Frangula purshiana 2, Vaccinium parvifolium 1, Rubus laciniatus 1	Tiarella trifoliata 13, Rubus ursinus 2, Stellaria 1, Mitella 1	Elymus 3, Polypodium glycyrrhiza 1
25-40	Populus trichocarpa 0		Stachys cooleyae 2, Rumex occidentalis 2, Hydrophyllum tenuipes 1	Struthiopteris spicant 1
10-25	Pseudotsuga menziesii 50, Thuja plicata 13	Vaccinium ovalifolium 2	Erythranthe 2	Carex obnupta+ 8, Pteridium aquilinum 6, Agrostis 4, Poa cusickii+ 3, Melica subulata+ 2

{041} Acer macrophyllum, Polystichum munitum, Tolmiea menziesii
Bigleaf maple, sword fern & piggyback plant forest
ACEMAC/POLMUN-TOLMEN



Range: Lowland zone. **NOCA**-1: (nw) 140-150m. **OLYM**-15: **se** (nc-ne-sc) 130-480m.

Struct: Closed broadleaf forest (28-41m) with substantial broadleaf regen, dense forbs & ferns, and substantial grasses & shrubs. Avg vasc cover 178: brdlf tree 63, forb 39, fern 37, shrb 0.92 @ 5, grass 0.77 @ 9, brdlf regen 0.69 @ 7, tall shrb 0.62 @ 18, conif tree 0.54 @ 9, dwf shrb 0.54 @ 2, sedge 0.46 @ 4, conif regen 0.46 @ 3.

Ecology: Gentle slopes, typically on river terraces not susceptible to major flooding. Regen mostly *Acer macrophyllum*, often with *Alnus rubra* and *Abies grandis*.

Metrics: slope 5-21°, vdp 1-5m, vdr 3-53m, east 29-93, south 26-87, conv 44-49, tpp 9-22, solar 55-65, wet 2-5

Map class: B33–Upland red alder, bigleaf maple & conifer forest

Rel to C09: Same.

Similar: MNO:[044] ACEMAC/RUBSPE/TOLMEN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, MO:[054] ALNRUB/STACHA-TOLMEN, O:[047] ALNRUB/ELYGLA (riparian), O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, MNO:[046] ALNRUB/ATHFIL-LYSAME, MN:[038] (ACEMAC)/ACECIR-PAXMYR. Also see: [122] POPBAL-ACEMAC/ACECIR/POLMUN

▶ [**039**] Acer glabrum 2 Cornus stolonifera/occidentalis 2 Maianthemum racemosum*** Maianthemum stellatum* 2 Osmorhiza* Paxistima myrsinites** Pteridium aquilinum* Rubus nutkanus*** 2 Salix scouleriana 2 Sambucus racemosa** Thalictrum occidentale** Thuja plicata* [**keep**] Adiantum aleuticum 2 Alnus rubra** 2 Carex deweyana+* Circaea alpina 2 Claytonia sibirica+* Lactuca* Polystichum munitum* 2 Rubus spectabilis* Rubus ursinus* Stachys cooleyae** Tolmiea menziesii* 2 Urtica dioica*

▶ [**040**] Elymus** 2 Frangula purshiana** Luzula parviflora* Mitella** Oxalis oregana** Picea sitchensis*** 2 Ranunculus repens+* Rubus laciniatus** Rubus spectabilis 4 Tiarella trifoliata* 2 Vaccinium parvifolium* [**keep**] B-LT5* 2 Abies grandis* Adiantum aleuticum 2 Bromus vulgaris+* Circaea alpina 3 Dactylis glomerata* 2 Equisetum arvense+ 2 Geranium robertianum* Lactuca* Nemophila parviflora* Symphoricarpos albus* Urtica dioica** Viola glabella+* 2

▶ [**042**] C-LT5* 4 C-GT5* Berberis nervosa* Betula papyrifera** 2 Dryopteris* Frangula purshiana 2 Lysimachia latifolia* Pteridium aquilinum* Rubus nutkanus** Thuja plicata* 5 Tsuga heterophylla* 4 Vaccinium parvifolium* [**keep**] Abies grandis** Adiantum aleuticum 2 Carex deweyana+** Dactylis glomerata*** 2 Equisetum arvense+** 2 Galium 2 Hydrophyllum tenuipes* Nemophila parviflora* Stachys cooleyae*** 2 Stellaria** Symphoricarpos albus* Urtica dioica*. Note: [042] is in disturbed sites, e.g. debris slides, logging recovery.

▶ [**044**] SHRB 9 Abies amabilis*** Acer circinatum* Athyrium filix-femina 5 Elymus 2 Gymnocarpium dryopteris*** Pseudotsuga menziesii* Rubus spectabilis 5 Sambucus racemosa*** 2 Thuja plicata* Tiarella trifoliata* 2 Tsuga heterophylla* [**keep**] Adiantum aleuticum 2 Bromus vulgaris+* Dactylis glomerata* 2 Equisetum arvense+* 2 Geranium robertianum* Polystichum munitum 9 Stachys cooleyae 2 Symphoricarpos albus* Urtica dioica*

▶ [**052**] SHRB 9 Acer glabrum** Alnus rubra 18 Asarum caudatum* Dryopteris* Mitella** 2 Oplopanax horridus*** Ribes lacustre** 2 Rubus nutkanus** Rubus spectabilis 4 Sambucus racemosa*** 2 Tiarella trifoliata* Vaccinium parvifolium* [**keep**] Abies grandis* Adiantum aleuticum 3 Bromus vulgaris+* Dactylis glomerata* 2 Equisetum arvense+ 2 Geranium robertianum* Hydrophyllum tenuipes* Nemophila parviflora* Stachys cooleyae 2 Symphoricarpos albus* Urtica dioica** Viola glabella+ 2

Floristics (13 plots, OLYM 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 57			Polystichum munitum 32
80-95				
60-80	Alnus rubra 11	Rubus spectabilis 2	Tolmiea menziesii 10, Circaea alpina 10, Galium 5, Claytonia sibirica+ 4	moss 8
40-60		Acer circinatum 20	Stachys cooleyae 5, Viola glabella+ 5, Rubus ursinus 2, Urtica dioica 1, Lactuca 1	Carex deweyana+ 4
25-40	Pseudotsuga menziesii 13, Tsuga heterophylla 3, Abies grandis 2	Symphoricarpos albus 4	Geranium robertianum 4, Stellaria 3, Nemophila parviflora 2, Hydrophyllum tenuipes 1	Adiantum aleuticum 9, Equisetum arvense+ 9, Dactylis glomerata 5, Bromus vulgaris+ 4, Athyrium filix-femina 4, Polypodium glycyrrhiza 1
10-25	Populus trichocarpa 12, Thuja plicata 3	Ribes bracteosum+ 2, Rosa 2, Symphoricarpos mollis 1, Oemleria cerasiformis 1	Achlys triphylla 4, Dicentra formosa 4, Hydrophyllum fendleri 2, Fragaria vesca 2, Ranunculus uncinatus+ 2, Claytonia perfoliata 1, Prosartes 1, Ranunculus repens+ 1, Adenocaulon bicolor 1, Osmorhiza 1, Tellima grandiflora 1	Melica subulata+ 2, lichen 1, liverwort 1, Dryopteris 1

{042} Acer macrophyllum, Pseudotsuga menziesii*, Polystichum munitum
Bigleaf maple, Douglas-fir* & sword fern forest
ACEMAC-(PSEMEN)/POLMUN



Range: Lowland zone. **MORA**-1: (sw) 760-770m. **NOCA**-16: **nw*** (cw) 160-270m. **OLYM**-6: **se** (nc-ne) 150-540m.

Struct: Closed mixed broadleaf-conifer forest (28-43m) with substantial conifer regen, dense ferns, abundant tall shrubs, and substantial forbs. Avg vasc cover 142: brdlf tree 47, fern 37, conif tree 0.94 @ 21, conif regen 0.94 @ 11, forb 0.94 @ 8, tall shrb 0.83 @ 16, shrb 0.78 @ 3, dwf shrb 0.78 @ 3, brdlf regen 0.44 @ 2.

Ecology: Seral forests on fairly gentle lower slopes, developing after logging or debris flows and less commonly after fire. Regen codominated by *Thuja plicata* and *Tsuga heterophylla*.

Metrics: slope 12-24°, vdp 2-8m, vdr 17-74m, east 15-94, south 56-87, conv 42-49, tpp 22-45, solar 55-65, wet 3-4

Map class: B33–Upland red alder, bigleaf maple & conifer forest

Rel to C09: Same, adding a few plots from ACEMAC/POLMUN-TOLMEN and TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL.

Similar: MNO:[044] ACEMAC/RUBSPE/TOLMEN, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, N:[069] BETPAP-(THUPLI)/ACECIR/MAHNER, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[048] ALNRUB/OPLHOR-RUBSPE.

▶ [**039**] B-LT5* 4 Acer glabrum 2 Actaea rubra* Cornus stolonifera/occidentalis*** 2 Maianthemum racemosum*** Maianthemum stellatum* 2 Oplopanax horridus** Paxistima myrsinites*** Rubus nutkanus* 2 Salix scouleriana 2 Sambucus racemosa* Thalictrum occidentale*** Viola glabella+* [**keep**] C-LT5* 2 Acer circinatum* Alnus rubra*** 2 Betula papyrifera 2 Lactuca* Polystichum munitum* 2 Rubus ursinus*** Thuja plicata 4 Tsuga heterophylla** 2

▶ [**041**] Abies grandis** Adiantum aleuticum 2 Carex deweyana+** Dactylis glomerata*** 2 Equisetum arvense+** 2 Galium 2 Hydrophyllum tenuipes* Nemophila parviflora* Stachys cooleyae*** 2 Stellaria** Symphoricarpos albus* Urtica dioica* [**keep**] C-LT5* 4 C-GT5* Berberis nervosa* Betula papyrifera** 2 Dryopteris* Frangula purshiana 2 Lysimachia latifolia* Pteridium aquilinum* Rubus nutkanus** Thuja plicata* 5 Tsuga heterophylla* 4 Vaccinium parvifolium*

▶ [**044**] B-LT5* 4 FORB 13 SHRB 5 Abies amabilis** Carex deweyana+** 2 Elymus 2 Gymnocarpium dryopteris*** Oplopanax horridus** Ribes bracteosum+** Rubus spectabilis** 6 Sambucus racemosa* 2 Tiarella trifoliata* Tolmiea menziesii* Viola glabella+** 2 [**keep**] Berberis nervosa** Betula papyrifera** 2 Dryopteris* Lysimachia latifolia*** Polystichum munitum 9 Pteridium aquilinum** Rubus ursinus* Vaccinium parvifolium*

▶ [**052**] SHRB 5 Acer glabrum*** Alnus rubra 12 Athyrium filix-femina* Claytonia sibirica+* 2 Dicentra formosa* Mitella*** 2 Oplopanax horridus** Ribes lacustre 2 Rubus spectabilis* 5 Sambucus racemosa* Tellima grandiflora* Tolmiea menziesii* [**keep**] C-LT5 5 Berberis nervosa* Betula papyrifera* 2 Frangula purshiana 2 Lysimachia latifolia** Prosartes* Pteridium aquilinum* Rubus ursinus*

▶ [**195**] SHRB 5 Achlys triphylla 2 Adiantum aleuticum 2 Athyrium filix-femina* Gymnocarpium dryopteris*** Oplopanax horridus*** 2 Pseudotsuga menziesii* Rubus spectabilis* Tiarella trifoliata** 2 Tsuga heterophylla 14 [**keep**] B-GT5 10 Acer macrophyllum 9 Alnus rubra* Berberis nervosa* Betula papyrifera** 2 Circaea alpina* Claytonia sibirica+* Frangula purshiana 2 Lactuca* Lysimachia latifolia* Pteridium aquilinum* Rubus ursinus* Tolmiea menziesii*

Floristics (18 plots, NOCA 13, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 37			Polystichum munitum 33
80-95	Thuja plicata 16, Tsuga heterophylla 9, Alnus rubra 6	Acer circinatum 13		
60-80			Rubus ursinus 2, Lactuca 1	moss 16
40-60	Pseudotsuga menziesii 15		Circaea alpina 4, Lysimachia latifolia 1, Claytonia sibirica+ 1, Galium 1	
25-40	Betula papyrifera 11	Frangula purshiana 3, Rubus spectabilis 3, Rubus nutkanus 1, Vaccinium parvifolium 1	Tolmiea menziesii 4, Berberis nervosa 2, Osmorhiza 1, Prosartes 0	Athyrium filix-femina 8, Dryopteris 3, Pteridium aquilinum 1
10-25	Populus trichocarpa 11, Abies amabilis 4, Cornus nuttallii 1	Corylus cornuta 5, Vaccinium ovalifolium 3, Oemleria cerasiformis 2, Amelanchier alnifolia 2	Adenocaulon bicolor 1, Tiarella trifoliata 1, Tellima grandiflora 1, Viola glabella+ 1, Dicentra formosa 1, Urtica dioica 1, Geranium robertianum 1	lichen 3, Melica smithii 2, Bromus vulgaris+ 1

{043} Acer macrophyllum, Pseudotsuga menziesii, Symphoricarpos albus, Osmorhiza berteroi
Bigleaf maple, Douglas-fir, snowberry & mountain sweet cicely forest
ACEMAC-PSEMEN/SYMALB/OSMBER



Range: Lowland zone. **NOCA**-16: **s*** 370-450m.

Struct: Mostly closed mixed broadleaf-conifer forest (often short stature) with abundant broadleaf regen, abundant shrubs, tall shrubs & forbs, and substantial ferns. Avg vasc cover 151: brdlf tree 29, conif tree 28, shrb 25, brdlf regen 22, tall shrb 17, forb 13, conif regen 0.94 @ 4, dwf shrb 0.81 @ 4, fern 0.75 @ 8, grass 0.75 @ 4.

Ecology: Very gentle toeslopes, benches and terraces just above rivers. Often recovering from fire. Regen dominated by *Acer macrophyllum*, with small amounts of *Pseudotsuga menziesii*.

Metrics: slope 1-13°, vdp 1-1m, vdr 1-10m, east 23-92, south 24-88, conv 44-49, tpp 15-32, solar 56-63, wet 5-7

Map class: B34–Bigleaf maple & Doug-fir debris apron forest

Rel to C09: Evolved from ACEMAC/SYMALB, adding several plots from PSEMEN-(ABIGRA)/ACECIR-PAXMYR and PSEMEN-(PINPON)/SYMALB.

Similar: N:[147] PSEMEN-(PINPON)/SYMALB, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MN:[038] (ACEMAC)/ACECIR-PAXMYR, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, O:[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS.

▶ [**039**] Acer glabrum 2 Actaea rubra*** Athyrium filix-femina 2 Circaea alpina*** Cornus stolonifera/occidentalis* Maianthemum stellatum** 2 Oplopanax horridus*** 2 Sambucus racemosa*** Thalictrum occidentale*** Viola glabella+* [**keep**] Abies grandis** 2 Adenocaulon bicolor*** Amelanchier alnifolia* Berberis aquifolium** Cornus nuttallii** 2 Elymus*** Populus trichocarpa 3 Pseudotsuga menziesii* 5 Rubus ursinus** Spiraea lucida* Symphoricarpos albus* 6. Note: [039] is in moister settings.
▶ [**132**] Abies amabilis** 2 Acer glabrum* Clintonia uniflora** Maianthemum stellatum** Oplopanax horridus*** Orthilia secunda* Pyrola asarifolia+* Thuja plicata 10 Tsuga heterophylla** 2 Vaccinium membranaceum*** Viola glabella+* [**keep**] B-LT5 3 B-GT5 5 SHRB 3 Acer macrophyllum 8 Cornus nuttallii** 2 Elymus** Galium* Osmorhiza* Populus trichocarpa 2 Pteridium aquilinum 2 Symphoricarpos albus* 2
▶ [**134**] Abies lasiocarpa** Acer glabrum** 2 Alnus viridis 2 Clintonia uniflora* Lilium* Maianthemum stellatum* Paxistima myrsinites 3 Pinus monticola* Rosa 2 Salix scouleriana** 5 Sorbus scopulina*** Taxus brevifolia** Vaccinium membranaceum** [**keep**] Abies grandis* 2 Asarum caudatum* 2 Elymus** Lactuca* Lonicera ciliosa* Moehringia macrophylla* Osmorhiza* Philadelphus lewisii* Pinus ponderosa 2 Populus trichocarpa 2 Rubus ursinus* Sambucus nigra* Symphoricarpos albus 2
▶ [**139**] Acer glabrum 2 Achlys triphylla** Berberis nervosa* 2 Bromus vulgaris+** Campanula scouleri** Festuca occidentalis+* Holodiscus discolor* 4 Lathyrus polyphyllus 2 Linnaea borealis** 2 Polystichum munitum** Symphoricarpos mollis* Tsuga heterophylla** [**keep**] B-LT5* 4 Acer circinatum** 2 Acer macrophyllum 7 Cornus nuttallii*** 2 Elymus* Paxistima myrsinites* Philadelphus lewisii** Populus trichocarpa 2 Pteridium aquilinum* Rubus nutkanus** Sambucus nigra** Spiraea lucida** Symphoricarpos albus 4 Trillium ovatum*
▶ [**147**] Acer glabrum 2 Achnatherum*** Adenocaulon bicolor 4 Anaphalis margaritacea* Artemisia*** Berberis aquifolium* Bromus tectorum+*** 2 Calamagrostis rubescens+* Hieracium albiflorum* Holodiscus discolor* Pinus ponderosa* Rosa 2 Rubus leucodermis* [**keep**] Abies grandis 2 Acer circinatum 2 Adenocaulon bicolor* Galium* Populus trichocarpa 2 Prosartes* Pteridium aquilinum** 2 Rubus nutkanus 2

Floristics (16 plots, NOCA 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 32, Pseudotsuga menziesii 21			
80-95	Cornus nuttallii 16		Osmorhiza 4, Prosartes 2	
60-80		Symphoricarpos albus 25, Rubus nutkanus 7, Rosa 1	Adenocaulon bicolor 2, Galium 2	Pteridium aquilinum 8, Elymus 4
40-60	Abies grandis 12, Thuja plicata 6	Berberis aquifolium 3, Amelanchier alnifolia 2	Rubus ursinus 2, Spiraea lucida 2, Paxistima myrsinites 2, Maianthemum racemosum 1, Trillium ovatum 1	
25-40	Populus trichocarpa 20, Pinus ponderosa 6	Acer circinatum 34, Philadelphus lewisii 3, Holodiscus discolor 2, Lonicera ciliosa 1, Sambucus nigra 0	Asarum caudatum 5, Cacaliopsis nardosmia 3, Lactuca 2, Chimaphila umbellata 1, Moehringia macrophylla 1, Lysimachia latifolia 1, Goodyera oblongifolia 0	moss 3
10-25	Pinus monticola 2	Cornus stolonifera/occidentalis 13	Clintonia uniflora 2, Moehringia lateriflora 1, Achillea millefolium 1, Hieracium albiflorum 1, Hieracium scouleri+ 1, Anaphalis margaritacea 1	Calamagrostis rubescens+ 2

{044} Acer macrophyllum, Rubus spectabilis, Tolmiea menziesii
Bigleaf maple, salmonberry & piggyback plant forest
ACEMAC/RUBSPE/TOLMEN



Range: Lowland zone, on valley bottoms. **MORA**-1: (sw) 620-630m. **NOCA**-3: **nw** 270-340m. **OLYM**-5: **nc**-**se** (ne) 260-490m.

Struct: Mostly closed mixed broadleaf-conifer forest (29-32m) with substantial broadleaf regen, dense forbs & shrubs, abundant tall shrubs, and substantial ferns & grasses. Avg vasc cover 184: brdlf tree 40, forb 33, shrb 32, tall shrb 26, brdlf regen 10, grass 7, conif tree 0.88 @ 20, fern 0.88 @ 15, conif regen 0.75 @ 4, sedge 0.38 @ 7, dwf shrb 0.25 @ 3.

Ecology: Nearly flat floodplains and low riparian terraces, or associated with seeps. Regen dominated by *Acer macrophyllum*, usually with codominant *Alnus rubra*.

Metrics: slope 1-4°, vdp 1-2m, vdr 2-4m, east 36-96, south 46-72, conv 35-47, tpp 4-14, solar 51-60, wet 6-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Evolved from ACEMAC/RUBSPE. NCCN plots have a significant forb layer.

Similar: MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[048] ALNRUB/OPLHOR-RUBSPE, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MO:[054] ALNRUB/STACHA-TOLMEN, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME.

▶ [**041**] Adiantum aleuticum 2 Bromus vulgaris+* Dactylis glomerata* 2 Equisetum arvense+* 2 Geranium robertianum* Polystichum munitum 9 Stachys cooleyae 2 Symphoricarpos albus* Urtica dioica* [**keep**] SHRB 9 Abies amabilis*** Acer circinatum* Athyrium filix-femina 5 Elymus 2 Gymnocarpium dryopteris*** Pseudotsuga menziesii* Rubus spectabilis 5 Sambucus racemosa*** 2 Thuja plicata* Tiarella trifoliata* 2 Tsuga heterophylla*
▶ [**042**] Berberis nervosa** Betula papyrifera** 2 Dryopteris* Lysimachia latifolia*** Polystichum munitum 9 Pteridium aquilinum** Rubus ursinus* Vaccinium parvifolium* [**keep**] B-LT5* 4 FORB 13 SHRB 5 Abies amabilis** Carex deweyana+** 2 Elymus 2 Gymnocarpium dryopteris*** Oplopanax horridus** Ribes bracteosum+** Rubus spectabilis** 6 Sambucus racemosa* 2 Tiarella trifoliata* Tolmiea menziesii* Viola glabella+** 2
▶ [**048**] C-LT5 6 Abies amabilis 3 Achlys triphylla* Alnus rubra 23 Claytonia sibirica+ 4 Heracleum maximum 2 Petasites frigidus** Ribes bracteosum+ 2 Struthiopteris spicant* Vaccinium parvifolium* [**keep**] Acer circinatum* Acer macrophyllum* 3 Carex deweyana+ 2 Circaea alpina* 2 Claytonia sibirica+* Elymus 2 Galium* Lactuca*** Tolmiea menziesii* 2 Viola glabella+*
▶ [**052**] Acer glabrum** Adiantum aleuticum* Alnus rubra 23 Asarum caudatum* Claytonia sibirica+ 4 Dicentra formosa* Dryopteris** Mitella** 2 Ribes lacustre** 2 Rubus nutkanus 2 Tellima grandiflora* Vaccinium parvifolium* [**keep**] Abies amabilis* Carex deweyana+ 2 Elymus* 2 Oemleria cerasiformis* Prosartes* Ribes bracteosum+** Rubus ursinus 2 Tiarella trifoliata 2 Trisetum* Vaccinium ovalifolium* Viola glabella+* 2
▶ [**195**] C-LT5 6 Abies amabilis 4 Achlys triphylla* Adiantum aleuticum 2 Dryopteris* Polystichum munitum 9 Streptopus amplexifolius* Struthiopteris spicant* Tiarella trifoliata* 5 Trillium ovatum* Tsuga heterophylla 12 Vaccinium parvifolium* [**keep**] B-LT5* B-GT5 10 Acer macrophyllum 9 Alnus rubra* Carex deweyana+ 2 Circaea alpina* Claytonia sibirica+* Elymus 2 Rubus spectabilis 11 Sambucus racemosa 2 Tolmiea menziesii*** Viola glabella+*

Floristics (8 plots, MORA 1, NOCA 3, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 37	Rubus spectabilis 30, Acer circinatum 22	Tolmiea menziesii 13	
80-95	Alnus rubra 15, Thuja plicata 7			
60-80	Pseudotsuga menziesii 11, Tsuga heterophylla 7		Circaea alpina 6, Viola glabella+ 4, Galium 4, Claytonia sibirica+ 2, Lactuca 1	Athyrium filix-femina 12, Polystichum munitum 5
40-60	Abies amabilis 2	Sambucus racemosa 5	Tiarella trifoliata 3	moss 17, Gymnocarpium dryopteris 3
25-40		Oplopanax horridus 3, Ribes bracteosum+ 1, Vaccinium ovalifolium 1, Oemleria cerasiformis 1, Rubus nutkanus 0	Hydrophyllum tenuipes 3, Rubus ursinus 3, Dicentra formosa 1, Stachys cooleyae 1, Prosartes 0	Elymus 15, Carex deweyana+ 7, Luzula parviflora 0, Trisetum 0
10-25	Abies grandis 7, Populus trichocarpa 5	Frangula purshiana 10	Aruncus dioicus 8, Achlys triphylla 5, Geum 5, Hydrophyllum fendleri 5, Tellima grandiflora 3, Stellaria 2, Osmorhiza 2, Clintonia uniflora 2	Melica subulata+ 3, Dryopteris 2, lichen 2

{045} Agrostis capillaris/stolonifera
Exotic pasture vegetation
AGR(CAP,STO)



Range: Lowland and coastal zones, in disturbed sites. **OLYM**-10: **sw*-sc** 40-90m.

Struct: Closed canopy mixed herbaceous vegetation with very dense grasses, abundant forbs, and prominent shrubs. Avg vasc cover 104: forb 24, grass 0.88 @ 67, shrb 0.75 @ 5, sedge 0.5 @ 22, fern 0.5 @ 6, tall shrb 0.5 @ 3, conif LT5 0.25 @ 4, dwf shrb 0.13 @ 3, brdlf LT5 0.13 @ 2.

Ecology: Former pastures on flats or benches, dominated by pasture grasses such as *Agrostis capillaris*, *A. stolonifera* and *Holcus lanata*. Forbs associated with disturbance are common. *Carex obnupta* may dominate wetter portions. Historical structures often nearby.

Metrics: slope 0-2°, vdp 1-2m, vdr 2-4m, east 30-72, south 7-87, conv 47-51, tpp 24-31, solar 57-60, wet 7

Map class: M90–Ruderal meadow

Rel to C09: Created in the field to represent this unique vegetation type.

Similar: NO:[093] HERMAX-(THAOCC-SAUAME), MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[070] CARAQU-(MENTRI-EQUISETUM), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[100] LUEPEC-(CARSPE), MNO:[125] POPBAL-(ALNRUB)/SALSIT, MNO:[103] PENDAV/RACOMITRIUM, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME).

▶ [**070**] Carex aquatilis+* 2 Equisetum hyemale+ 2 Menyanthes trifoliata 2 Scirpus microcarpus* 2 Spiraea douglasii* 2 [**keep**] Agrostis** 2 Carex obnupta+ 7 Holcus lanatus*** 2 Hypochaeris radicata 2 Pteridium aquilinum 2 Ranunculus repens+** Rubus laciniatus*** Trifolium repens+***

▶ [**071**] Calamagrostis canadensis+ 2 Carex aquatilis+ 2 Carex kelloggii+** 2 Carex nigricans+* 2 Eriophorum angustifolium 2 Gentiana calycosa* Phyllodoce empetriformis** Potentilla flabellifolia+** Salix commutata+* Spiraea splendens* [**keep**] TSHRB* Agrostis* 2 Carex obnupta+** 2 Cirsium arvense+** Holcus lanatus*** 2 Hypochaeris radicata** 2 Pteridium aquilinum** 2 Ranunculus repens+*** Rubus laciniatus*** Rumex acetosella+** Trifolium repens+***

▶ [**079**] Athyrium distentifolium** 2 Chamaenerion latifolium** 2 Epilobium** Erythranthe lewisii+** Luetkea pectinata** 2 Oxyria digyna** 2 Senecio triangularis+* Valeriana sitchensis** 2 Veratrum viride* Veronica cusickii+** [**keep**] Agrostis** 2 Carex obnupta+** 2 Cirsium arvense+*** Holcus lanatus*** 2 Hypochaeris radicata** 2 Pteridium aquilinum** 2 Ranunculus repens+*** Rubus laciniatus*** Rumex acetosella+** Trifolium repens+***

▶ [**093**] Bromus sitchensis 2 Carex spectabilis+ 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Thalictrum occidentale** 2 [**keep**] Agrostis*** 2 Carex obnupta+*** 2 Cirsium arvense+*** Holcus lanatus*** 2 Hypochaeris radicata*** 2 Prunella vulgaris 2 Pteridium aquilinum* Ranunculus repens+*** Rubus laciniatus*** Rumex acetosella+*** Trifolium repens+***

▶ [**100**] C-LT5* Abies lasiocarpa* Carex spectabilis+* 2 Cassiope mertensiana** Hieracium triste** Juncus parryi+** Luetkea pectinata** 2 Luzula piperi+** Phyllodoce empetriformis** 2 [**keep**] TSHRB* Agrostis* 2 Carex obnupta+** 2 Cirsium arvense+*** Holcus lanatus*** 2 Hypochaeris radicata** 2 Pteridium aquilinum** 2 Ranunculus repens+*** Rubus laciniatus*** Rumex acetosella+** Trifolium repens+***

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Ranunculus repens+ 5, Trifolium repens+ 5	
80-95				Agrostis 40, Holcus lanatus 19
60-80		Rubus laciniatus 4	Cirsium arvense+ 5	
40-60			Hypochaeris radicata 8, Rumex acetosella+ 3	Carex obnupta+ 22, Pteridium aquilinum 6
25-40	Picea sitchensis 4, Alnus rubra 2	Frangula purshiana 3	Prunella vulgaris 5, Plantago lanceolata 3, Rumex occidentalis 2, Achillea millefolium 1	Juncus mertensianus+ 1
10-25		Ribes lacustre 3, Rubus spectabilis 3, Salix sitchensis+ 2	Cerastium arvense 20, Rubus ursinus 3, Rubus lasiococcus 2, Senecio triangularis+ 1	moss 10, Phalaris arundinacea 5, Bromus vulgaris+ 1

{046} Alnus rubra, Athyrium filix-femina, Lysichiton americanus
Red alder, lady fern & skunk-cabbage forest
ALNRUB/ATHFIL-LYSAME



Range: Lowland zone, in wetlands. **MORA**-5: **sw** (ne-se) 640-890m. **NOCA**-4: **ne** (cw) 560-610m. **OLYM**-2: (nw-sc-se) 150-450m.

Struct: Semi-open broadleaf forest (23-29m) with substantial conifer regen, very dense forbs, abundant tall shrubs & sedges, and substantial ferns & shrubs. Avg vasc cover 179: forb 56, brdlf tree 44, shrb 12, sedge 0.89 @ 16, fern 0.89 @ 15, tall shrb 0.78 @ 17, conif tree 0.78 @ 11, conif regen 0.78 @ 11, grass 0.67 @ 3, brdlf regen 0.56 @ 6, dwf shrb 0.44 @ 5.

Ecology: Swamps, in depressions and near ponds and lakes, on poorly drained soils. Regen a mix of *Alnus rubra*, *Thuja plicata* and *Tsuga heterophylla*.

Metrics: slope 1-4°, vdp 1-2m, vdr 1-9m, east 21-67, south 9-66, conv 45-50, tpp 12-22, solar 58-66, wet 6-7

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same.

Similar: MNO:[048] ALNRUB/OPLHOR-RUBSPE, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, O:[047] ALNRUB/ELYGLA, MO:[054] ALNRUB/STACHA-TOLMEN, MN:[201] TSUHET-THUPLI/LYSAME-ATHFIL, MNO:[125] POPBAL-(ALNRUB)/SALSIT, MNO:[044] ACEMAC/RUBSPE/TOLMEN, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX).

▶ [**047**] Bromus sitchensis 2 Claytonia sibirica+*** Elymus*** 2 Picea sitchensis*** 2 Poa cusickii+ 2 Polystichum munitum** Ranunculus repens+** 2 Rubus ursinus* Stachys cooleyae* [**keep**] Athyrium filix-femina** Carex deweyana+* 2 Cornus stolonifera/occidentalis*** 2 Equisetum arvense+* Lysichiton americanus** 2 Oplopanax horridus 2 Scirpus microcarpus*** Thuja plicata* Tiarella trifoliata* Vaccinium parvifolium** Viola glabella+** 2
▶ [**048**] Abies amabilis* Acer circinatum 2 Claytonia sibirica+* 2 Petasites frigidus** Polystichum munitum* Pseudotsuga menziesii 2 Ribes bracteosum+ 2 Rubus nutkanus* Sambucus racemosa* 2 Tolmiea menziesii* [**keep**] Carex deweyana+* 2 Cornus stolonifera/occidentalis** 2 Equisetum arvense+** Galium* Lactuca** Lysichiton americanus*** 2 Scirpus microcarpus** 2 Viola glabella+ 2
▶ [**052**] Acer circinatum** 2 Acer macrophyllum** 2 Circaea alpina 2 Claytonia sibirica+*** 2 Dicentra formosa** Dryopteris* Polystichum munitum** 5 Sambucus racemosa* Tolmiea menziesii* [**keep**] Abies grandis* Carex deweyana+ 3 Cornus stolonifera/occidentalis** 2 Cornus unalaschkensis* Equisetum hyemale+* Gaultheria shallon* Lysichiton americanus** 2 Maianthemum dilatatum* Rosa* Scirpus microcarpus** 2 Viburnum edule* Viola glabella+ 2
▶ [**053**] Claytonia sibirica+** Dicentra formosa* Maianthemum stellatum* 2 Polystichum munitum* Populus trichocarpa* Ribes bracteosum+* 2 Rubus nutkanus* Rubus spectabilis 6 Sambucus racemosa* 2 Tolmiea menziesii* Urtica dioica 2 [**keep**] Alnus viridis** Berberis nervosa** Clintonia uniflora** Gaultheria shallon 2 Hydrophyllum tenuipes** Linnaea borealis** Lysichiton americanus*** 9 Maianthemum dilatatum 2 Malus fusca** Platanthera** Scirpus microcarpus** Struthiopteris spicant 2 Veronica serpyllifolia+** Viola glabella+ 2
▶ [**124**] Acer circinatum* 2 Circaea alpina 2 Maianthemum stellatum** 2 Osmorhiza* Polystichum munitum* Populus trichocarpa** 5 Pseudotsuga menziesii 2 Ribes lacustre* Rubus nutkanus*** Sambucus racemosa* [**keep**] Carex deweyana+* 4 Epilobium* Equisetum hyemale+* Lonicera involucrata* Lysichiton americanus* 2 Maianthemum dilatatum 2 Scirpus microcarpus** 2 Spiraea douglasii* Stachys cooleyae** Struthiopteris spicant 2 Vaccinium parvifolium* Viburnum edule*

Floristics (9 plots, MORA 4, NOCA 4, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 44			
80-95	Thuja plicata 8	Rubus spectabilis 4	Lysichiton americanus 34	Athyrium filix-femina 11
60-80	Tsuga heterophylla 7	Cornus stolonifera/occidentalis 9	Viola glabella+ 11, Galium 2	
40-60		Vaccinium parvifolium 2	Tiarella trifoliata 4, Stachys cooleyae 4, Lactuca 2, Circaea alpina 1	moss 18, Carex deweyana+ 15, Scirpus microcarpus 8, Equisetum arvense+ 3
25-40	Abies grandis 4	Oplopanax horridus 10, Gaultheria shallon 6, Rosa 2, Viburnum edule 1, Lonicera involucrata 1, Spiraea douglasii 0, Ribes lacustre 0	Maianthemum dilatatum 5, Cornus unalaschkensis 3, Epilobium 1	Struthiopteris spicant 8, Equisetum hyemale+ 1, Gymnocarpium dryopteris 1
10-25	Betula papyrifera 25, Callitropsis nootkatensis 9, Picea engelmannii 4, Abies amabilis 3, Populus trichocarpa 3	Salix sitchensis+ 20, Malus fusca 6, Rhododendron menziesii 4, Alnus viridis 3	Tolmiea menziesii 13, Linnaea borealis 6, Mitella 4, Achlys triphylla 4, Veratrum viride 3, Rubus pedatus 3, Tellima grandiflora 3, Berberis nervosa 2, Rubus ursinus 2, Veronica serpyllifolia+ 2	Carex obnupta+ 15, Bromus vulgaris+ 10, Glyceria 3, Polystichum munitum 3, liverwort 3

{047} Alnus rubra, Elymus glaucus
Red alder & blue wildrye forest
ALNRUB/ELYGLA



Range: Lowland zone, on valley bottoms. **OLYM**-13: **nc**-**sc**-**se** (ne) 110-260m.

Struct: Mostly closed broadleaf forest (22-30m) with substantial mixed conifer-broadleaf regen, dense forbs & grasses, abundant shrubs, and substantial ferns. Avg vasc cover 178: brdlf tree 53, forb 42, grass 36, fern 6, shrb 0.92 @ 24, conif regen 0.69 @ 6, dwf shrb 0.69 @ 3, tall shrb 0.62 @ 5, brdlf regen 0.54 @ 8, conif tree 0.54 @ 7.

Ecology: Nearly flat floodplains and lower riparian terraces, on coarsely textured, well-drained soils. Cobble often present under vegetation and leaf litter. Regen codominated by *Alnus rubra* and *Picea sitchensis*. Often impacted by elk grazing; *Poa trivialis*, *P. pratensis*, or *Bromus sitchensis* may dominate the grass layer in these sites.

Metrics: slope 0-3°, vdp 1-2m, vdr 1-2m, east 15-76, south 26-87, conv 42-50, tpp 8-16, solar 56-60, wet 8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same, but concept appears to differ. *Rubus spectabilis* is very prominent in NCCN plots, and several plots from ALNRUB/RUBSPE were a better fit here.

Similar: MO:[054] ALNRUB/STACHA-TOLMEN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX), MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MNO:[046] ALNRUB/ATHFIL-LYSAME, O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, O:[123] POPBAL-ALNRUB/CAROBN, MNO:[048] ALNRUB/OPLHOR-RUBSPE. Also see: [041] ACEMAC/POLMUN-TOLMEN.

▶ [**049**] Achillea millefolium** Anaphalis margaritacea*** 2 Angelica 2 Equisetum arvense+** Gaultheria shallon*** 2 Heracleum maximum* Lonicera involucrata 2 Maianthemum dilatatum* Sambucus racemosa** 2 Vicia** [**keep**] Bromus sitchensis 2 Claytonia sibirica+* Elymus*** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Rubus ursinus*** Stachys cooleyae** Tolmiea menziesii 2

▶ [**050**] C-GT5* Acer circinatum* Acer macrophyllum* Carex deweyana+ 2 Luzula parviflora** 2 Oxalis oregana* 6 Polystichum munitum 9 Sambucus racemosa** Tiarella trifoliata* Tsuga heterophylla* Vaccinium parvifolium** 2 [**keep**] Agrostis** Bromus sitchensis* Galium 2 Heracleum maximum** Populus trichocarpa** 2 Prunella vulgaris** Rosa** Rubus ursinus** 2 Rumex occidentalis* Stachys cooleyae*** Symphoricarpos albus**

▶ [**051**] Carex obnupta+*** 2 Rubus laciniatus 2 Rumex acetosella+ 2 [**keep**] Bromus sitchensis 2 Claytonia sibirica+* 2 Elymus* Galium* 2 Poa cusickii+ 2 Populus trichocarpa 2 Rubus ursinus*

▶ [**052**] TSHRB 8 Acer circinatum* Acer macrophyllum* Athyrium filix-femina* 4 Dicentra formosa** Dryopteris*** Lactuca* Mitella 2 Oplopanax horridus*** Pseudotsuga menziesii 2 Ribes lacustre 2 Sambucus racemosa*** Thuja plicata 4 Tsuga heterophylla* [**keep**] Bromus sitchensis 2 Elymus** 2 Picea sitchensis** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Rubus ursinus* Stachys cooleyae*

▶ [**054**] Abies grandis* Acer macrophyllum* Athyrium filix-femina* Equisetum arvense+* Luzula parviflora* Mitella* 2 Osmorhiza* Rumex occidentalis 2 Stellaria* 2 Tiarella trifoliata* Vaccinium parvifolium** [**keep**] Bromus sitchensis** 2 Elymus* Galium 3 Populus trichocarpa*** 2 Rubus ursinus* Symphoricarpos albus**

Floristics (13 plots, OLYM 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 54			Polystichum munitum 6
80-95		Rubus spectabilis 24	Stachys cooleyae 4	
60-80	Picea sitchensis 7		Ranunculus repens+ 20, Galium 7, Claytonia sibirica+ 6, Rubus ursinus 3	Elymus 11
40-60			Tolmiea menziesii 10, Circaea alpina 5	
25-40	Populus trichocarpa 5, Tsuga heterophylla 4	Acer circinatum 7, Symphoricarpos albus 2	Oxalis oregana 4, Rumex occidentalis 1, Lactuca 1	Poa cusickii+ 12, Bromus sitchensis 9
10-25	Acer macrophyllum 11, Thuja plicata 2, Pseudotsuga menziesii 1	Salix sitchensis+ 4, Rosa 1	Plantago lanceolata 3, Heracleum maximum 3, Maianthemum dilatatum 2, Prunella vulgaris 1, Trifolium repens+ 1	Poa pratensis 54, Agrostis 22, Bromus vulgaris+ 12, moss 11, Holcus lanatus 8, Athyrium filix-femina 2, Carex deweyana+ 1

{048} Alnus rubra, Oplopanax horridus, Rubus spectabilis
Red alder, devil's club & salmonberry forest
ALNRUB/OPLHOR-RUBSPE



Range: Lowland zone, on valley bottoms. **MORA**-6: **nw-sw** (se) 720-830m. **NOCA**-1: (nw) 320-330m. **OLYM**-3: (nc-ne-sw) 220-540m.

Struct: Mostly closed mixed broadleaf-conifer forest (26-34m) with abundant mixed broadleaf-conifer regen, abundant shrubs, and substantial forbs, tall shrubs & ferns. Avg vasc cover 134: brdlf tree 43, shrb 27, forb 13, fern 9, conif tree 0.88 @ 19, brdlf regen 0.75 @ 11, tall shrb 0.75 @ 11, conif regen 0.63 @ 11, grass 0.38 @ 6.

Ecology: Floodplains, riparian terraces, and very gentle toeslopes, on poorly drained soils. Regen codominated by *Alnus rubra* and *Tsuga heterophylla*.

Metrics: slope 2-6°, vdp 0-2m, vdr 1-7m, east 13-59, south 26-93, conv 43-49, tpp 14-26, solar 57-67, wet 6-7

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same, but joined by stray plots from several C09 types. *Oplopanax horridus* and the herbaceous layer are less abundant than described.

Similar: MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MO:[054] ALNRUB/STACHA-TOLMEN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, O:[047] ALNRUB/ELYGLA, MNO:[044] ACEMAC/RUBSPE/TOLMEN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL.

▶ [**046**] Carex deweyana+* 2 Cornus stolonifera/occidentalis** 2 Equisetum arvense+** Galium* Lactuca** Lysichiton americanus*** 2 Scirpus microcarpus** 2 Viola glabella+ 2 [**keep**] Abies amabilis* Acer circinatum 2 Claytonia sibirica+* 2 Petasites frigidus** Polystichum munitum* Pseudotsuga menziesii 2 Ribes bracteosum+ 2 Rubus nutkanus* Sambucus racemosa* 2 Tolmiea menziesii*
▶ [**052**] Acer circinatum* Acer macrophyllum* 3 Circaea alpina* 2 Claytonia sibirica+* Dicentra formosa* Dryopteris* Lactuca*** Mitella 2 Polystichum munitum 8 Tolmiea menziesii* 2 [**keep**] C-LT5 5 Abies amabilis* 2 Achlys triphylla* Corydalis* Heracleum maximum 2 Linnaea borealis* Oplopanax horridus 2 Petasites frigidus** Ribes bracteosum+* 2 Rosa* Stachys cooleyae 2 Struthiopteris spicant* Vaccinium ovalifolium*
▶ [**053**] Circaea alpina* Cornus stolonifera/occidentalis*** 2 Dicentra formosa* Glyceria 2 Populus trichocarpa** 2 Ribes bracteosum+* Ribes lacustre* Tolmiea menziesii 3 Urtica dioica 2 [**keep**] B-LT5 4 C-LT5 5 C-GT5 8 Abies amabilis* Achlys triphylla* Chamaenerion angustifolium* Claytonia sibirica+ 3 Corydalis* Heracleum maximum* Linnaea borealis*** Petasites frigidus** Pseudotsuga menziesii*** 2 Struthiopteris spicant* Tsuga heterophylla 6 Vaccinium parvifolium*
▶ [**054**] Acer macrophyllum* Circaea alpina* 2 Claytonia sibirica+* Oxalis oregana* Picea sitchensis** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Stachys cooleyae* Tolmiea menziesii* 2 [**keep**] Abies amabilis** Gymnocarpium dryopteris* Oplopanax horridus*** 2 Petasites frigidus* Pseudotsuga menziesii* 2 Ribes bracteosum+ 2 Sambucus racemosa* 2 Thuja plicata** Tsuga heterophylla* 4
▶ [**124**] Acer circinatum* Circaea alpina 2 Cornus stolonifera/occidentalis 2 Equisetum arvense+ 2 Galium* Lactuca** Maianthemum stellatum* 2 Osmorhiza* Populus trichocarpa*** 2 Ribes lacustre* Rosa* Rubus nutkanus* [**keep**] B-LT5 5 Achlys triphylla* Claytonia sibirica+ 5 Corydalis* Heracleum maximum 2 Ribes bracteosum+ 2 Rubus spectabilis 6 Stachys cooleyae* 2 Struthiopteris spicant* Vaccinium ovalifolium* Vaccinium parvifolium*

Floristics (8 plots, MORA 5, NOCA 1, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 51			
80-95	Tsuga heterophylla 15	Rubus spectabilis 20		
60-80	Abies amabilis 7, Thuja plicata 4	Sambucus racemosa 7, Oplopanax horridus 5, Vaccinium parvifolium 2	Tiarella trifoliata 2	moss 9, Athyrium filix-femina 5, Polystichum munitum 5
40-60	Pseudotsuga menziesii 6		Petasites frigidus 2	Gymnocarpium dryopteris 2
25-40	Acer macrophyllum 2	Acer circinatum 10, Ribes bracteosum+ 6, Vaccinium ovalifolium 2, Rubus nutkanus 2, Rosa 1	Claytonia sibirica+ 10, Stachys cooleyae 3, Heracleum maximum 3, Achlys triphylla 2, Corydalis 2, Viola glabella+ 1, Tolmiea menziesii 1, Galium 1, Chamaenerion angustifolium 1, Maianthemum stellatum 1, Linnaea borealis 1, Streptopus amplexifolius 1, Circaea alpina 1	Dryopteris 1, Struthiopteris spicant 1
10-25	Abies grandis 6	Ribes lacustre 20	Oxalis oregana 3	

{049} Alnus rubra, Picea sitchensis, Polystichum munitum, Heracleum maximum*
Red alder, Sitka spruce, sword fern & cow parsnip* forest
ALNRUB-PICSIT/POLMUN-(HERMAX)



Range: Coastal zone. **OLYM**-19: **sw*** (nw) 10-40m.

Struct: Semi-open broadleaf forest with substantial mixed broadleaf-conifer regen and abundant forbs, shrubs & ferns. Avg vasc cover 152: brdlf tree 50, forb 30, fern 22, shrb 0.91 @ 24, conif regen 0.82 @ 5, conif tree 0.73 @ 10, brdlf regen 0.64 @ 11, tall shrb 0.55 @ 9, grass 0.36 @ 4.

Ecology: Fairly gentle south-facing slopes, typically successional after slope failures on coastal bluffs. Not associated with floodplains. May develop into [109] PICSIT-(ALNRUB)/RUBSPE/POLMUN; regen dominated by *Alnus rubra*, with smaller amounts of *Picea sitchensis*.

Metrics: slope 17-24°, vdp 6-19m, vdr 12-31m, east 22-41, south 86-99, conv 47-51, tpp 49-59, solar 63-71, wet 3-4

Map class: B32–Coastal red alder forest

Rel to C09: Split from ALNRUB/POLMUN to represent coastal bluff variant of that association.

Similar: O:[047] ALNRUB/ELYGLA, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, MO:[054] ALNRUB/STACHA-TOLMEN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MNO:[046] ALNRUB/ATHFIL-LYSAME, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MNO:[048] ALNRUB/OPLHOR-RUBSPE, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM. Also see: [042] ACEMAC-(PSEMEN)/POLMUN

▶ [**046**] Athyrium filix-femina* Carex deweyana+* Cornus stolonifera/occidentalis*** 2 Galium* Lysichiton americanus*** 2 Oplopanax horridus 2 Scirpus microcarpus** 2 Thuja plicata*** Tsuga heterophylla* Viola glabella+*** 2 [**keep**] Anaphalis margaritacea 2 Angelica 2 Heracleum maximum*** 2 Picea sitchensis*** 2 Polystichum munitum** Sambucus racemosa 2
▶ [**047**] Bromus sitchensis 2 Claytonia sibirica+* Elymus*** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Rubus ursinus*** Stachys cooleyae** Tolmiea menziesii 2 [**keep**] Achillea millefolium** Anaphalis margaritacea*** 2 Angelica 2 Equisetum arvense+** Gaultheria shallon*** 2 Heracleum maximum* Lonicera involucrata 2 Maianthemum dilatatum* Sambucus racemosa** 2 Vicia**
▶ [**050**] Acer circinatum** 2 Acer macrophyllum** Circaea alpina 2 Oxalis oregana*** 2 Ranunculus repens+** 2 Tolmiea menziesii 2 Tsuga heterophylla* [**keep**] Achillea millefolium*** Anaphalis margaritacea*** 2 Angelica 2 Equisetum arvense+* Gaultheria shallon*** 2 Heracleum maximum*** 2 Lonicera involucrata 2 Maianthemum dilatatum*
▶ [**054**] Acer macrophyllum*** Circaea alpina*** 2 Claytonia sibirica+* Oxalis oregana*** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Stachys cooleyae** Tolmiea menziesii*** 2 [**keep**] Achillea millefolium*** Anaphalis margaritacea*** 2 Angelica 2 Equisetum arvense+* Gaultheria shallon*** 2 Heracleum maximum*** 2 Maianthemum dilatatum* Sambucus racemosa 2
▶ [**109**] C-LT5 7 Athyrium filix-femina* Claytonia sibirica+* Dryopteris* 2 Struthiopteris spicant** Tsuga heterophylla** [**keep**] B-LT5* Achillea millefolium*** Anaphalis margaritacea*** 2 Angelica 3 Equisetum arvense+** Gaultheria shallon* Heracleum maximum*** 2 Lonicera involucrata 2

Floristics (11 plots, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 57, Picea sitchensis 9			Polystichum munitum 20
80-95			Heracleum maximum 12	
60-80		Rubus spectabilis 17, Gaultheria shallon 10		Equisetum arvense+ 4
40-60		Sambucus racemosa 11	Anaphalis margaritacea 7, Maianthemum dilatatum 6, Achillea millefolium 2, Vicia 1	
25-40		Lonicera involucrata 6	Angelica 7, Claytonia sibirica+ 5, Galium 3, Tellima grandiflora 2	
10-25	Tsuga heterophylla 10		Petasites frigidus 25, Osmorhiza 2, Stellaria 1, Lactuca 1	moss 13, Luzula parviflora 2, Athyrium filix-femina 2, Bromus sitchensis 1, Juncus mertensianus+ 1

{050} Alnus rubra, Picea sitchensis, Rubus spectabilis, Oxalis oregana, Polystichum munitum
Red alder, Sitka spruce, salmonberry, Oregon wood-sorrel & sword fern forest
ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN



Range: Lowland and coastal zones, on valley bottoms. **MORA**-1: (nw) 550-560m. **OLYM**-16: **nc**-**sc***-**se** (nw-sw) 70-240m.

Struct: Semi-open mixed broadleaf-conifer forest (26-46m) with substantial mixed broadleaf-conifer regen, dense forbs, and abundant ferns & shrubs. Avg vasc cover 153: brdlf tree 36, forb 33, fern 23, conif tree 17, shrb 17, tall shrb 0.81 @ 8, conif regen 0.75 @ 6, grass 0.5 @ 8, brdlf regen 0.44 @ 11, sedge 0.44 @ 7, rush 0.38 @ 3.

Ecology: Very gentle slopes on floodplains, streambanks, alluvial fans and riparian terraces, on fairly well-drained soils. Regen a mix of *Alnus rubra*, *Tsuga heterophylla* and *Picea sitchensis*.

Metrics: slope 1-7°, vdp 1-2m, vdr 1-4m, east 29-77, south 31-96, conv 46-50, tpp 10-39, solar 59-63, wet 6-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Evolved from ALNRUB/OXAORE, incorporating similar plots from ALNRUB/RUBSPE, ALNRUB/POLMUN, and other types.

Similar: MO:[054] ALNRUB/STACHA-TOLMEN, O:[047] ALNRUB/ELYGLA, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, MNO:[048] ALNRUB/OPLHOR-RUBSPE, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX), O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN.

▶ [**040**] Acer macrophyllum 11 Athyrium filix-femina* Hydrophyllum tenuipes** Mitella* Polypodium glycyrrhiza* Populus trichocarpa** Rubus laciniatus*** Rubus ursinus* Rumex occidentalis* Stachys cooleyae* Stellaria* [**keep**] B-LT5 2 Circaea alpina 3 Ranunculus repens+ 4 Sambucus racemosa** Tsuga heterophylla* Vaccinium parvifolium 2. Note: [040] is recognized not by dominance of *Acer macrophyllum*, but simply by its high cover, and by understory indicators. There can be as much or more *Alnus rubra*.
▶ [**047**] Agrostis** Bromus sitchensis* Galium 2 Heracleum maximum** Populus trichocarpa** 2 Prunella vulgaris** Rosa** Rubus ursinus** 2 Rumex occidentalis* Stachys cooleyae*** Symphoricarpos albus** [**keep**] C-GT5* Acer circinatum* Acer macrophyllum* Carex deweyana+ 2 Luzula parviflora** 2 Oxalis oregana* 6 Polystichum munitum 9 Sambucus racemosa** Tiarella trifoliata* Tsuga heterophylla* Vaccinium parvifolium** 2
▶ [**052**] Acer circinatum 11 Athyrium filix-femina* Circaea alpina* Claytonia sibirica+* Dicentra formosa*** Dryopteris* Lactuca** Oplopanax horridus*** [**keep**] Elymus 2 Oxalis oregana*** 2 Picea sitchensis*** 2 Ranunculus repens+ 2 Tiarella trifoliata 2
▶ [**054**] B-LT5* Abies grandis 2 Circaea alpina* Claytonia sibirica+ 6 Poa cusickii+ 9 Stachys cooleyae*** Stellaria 2 Tolmiea menziesii* [**keep**] C-GT5* 8 Polystichum munitum 10 Tiarella trifoliata 2 Tsuga heterophylla* 3
▶ [**109**] Athyrium filix-femina* Dryopteris* Gaultheria shallon** 2 Lysichiton americanus** Maianthemum dilatatum* Sambucus racemosa 4 Struthiopteris spicant* 2 Vaccinium ovatum** [**keep**] TSHRB* Acer circinatum*** 2 Acer macrophyllum*** 2 Elymus 2 Oxalis oregana** Ranunculus repens+*** 2 Tiarella trifoliata 2. Note: [049] and [109] are on slopes near the ocean, not on floodplains.

Floristics (16 plots, MORA 1, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 37, Tsuga heterophylla 11			
80-95	Picea sitchensis 9	Rubus spectabilis 16	Oxalis oregana 13	Polystichum munitum 22
60-80		Acer circinatum 7		
40-60	Acer macrophyllum 7	Sambucus racemosa 3	Ranunculus repens+ 10, Tolmiea menziesii 7, Claytonia sibirica+ 4	moss 14
25-40	Thuja plicata 4	Vaccinium parvifolium 4	Circaea alpina 7, Tiarella trifoliata 5, Erythranthe 2, Galium 1	Carex deweyana+ 7, Elymus 6, Luzula parviflora 3, Athyrium filix-femina 3
10-25	Pseudotsuga menziesii 6	Frangula purshiana 4, Rubus nutkanus 2	Mitella 8, Achlys triphylla 3, Claytonia lanceolata 3, Maianthemum dilatatum 3, Rubus pedatus 2, Petasites frigidus 2, Rubus ursinus 1, Stellaria 1, Lactuca 1	Equisetum arvense+ 12, Carex obnupta+ 9, Poa cusickii+ 6, Dryopteris 3, Struthiopteris spicant 1

{051} Alnus rubra, Rubus spectabilis, Carex obnupta, Lysichiton americanus
Red alder, salmonberry, slough sedge & skunk-cabbage forest
ALNRUB/RUBSPE/CAROBN-LYSAME



Range: Coastal and lowland zones, in wetlands. **OLYM**-5: **sw** (nc-sc) 70-110m.

Struct: Mostly closed broadleaf forest (30-32m) with substantial mixed broadleaf-conifer regen, abundant forbs & sedges, and substantial tall shrubs & shrubs. Avg vasc cover 158: brdlf tree 59, forb 26, sedge 25, shrb 10, conif regen 4, fern 3, tall shrb 0.75 @ 13, conif tree 0.75 @ 4, grass 0.5 @ 29, brdlf regen 0.5 @ 9, dwf shrb 0.25 @ 5.

Ecology: Swamps on floodplains and riparian terraces, including depressional areas on upper terraces. On poorly drained soils. Regen dominated by *Picea sitchensis* and/or *Alnus rubra*.

Metrics: slope 0-5°, vdp 1-1m, vdr 2-2m, east 50-74, south 35-95, conv 49-50, tpp 19-24, solar 58-60, wet 6-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Expanded, adding two plots from ALNRUB/ELYGLA. The concept may differ; *Lysichiton americanus* does not occur in the NCCN plots.

Similar: O:[047] ALNRUB/ELYGLA, MO:[054] ALNRUB/STACHA-TOLMEN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, O:[123] POPBAL-ALNRUB/CAROBN, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX), MNO:[046] ALNRUB/ATHFIL-LYSAME, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL.

▶ [**047**] Bromus sitchensis 2 Claytonia sibirica+* 2 Elymus* Galium* 2 Poa cusickii+ 2 Populus trichocarpa 2 Rubus ursinus* [**keep**] Carex obnupta+*** 2 Rubus laciniatus 2 Rumex acetosella+ 2
▶ [**050**] Carex deweyana+ 2 Circaea alpina 2 Oxalis oregana 2 Polystichum munitum 4 Tsuga heterophylla** 2 [**keep**] Agrostis*** 2 Bromus vulgaris+ 2 Carex obnupta+** Lactuca* Prunella vulgaris*** Rubus laciniatus*** 2 Rubus ursinus 2 Rumex acetosella+ 2 Stachys cooleyae*
▶ [**054**] Athyrium filix-femina 2 Carex deweyana+* Circaea alpina* 2 Claytonia sibirica+* 2 Galium* Oxalis oregana 2 Poa cusickii+ 2 Rumex occidentalis* Stellaria* Tiarella trifoliata* Vaccinium parvifolium* [**keep**] Acer circinatum 5 Agrostis* 5 Bromus vulgaris+ 2 Carex obnupta+*** 2 Prunella vulgaris* Rubus laciniatus* Rumex acetosella+ 2
▶ [**123**] Carex deweyana+ 2 Cirsium arvense+** Fragaria vesca 2 Plantago lanceolata* Poa cusickii+ 2 Populus trichocarpa* 2 Rumex occidentalis 2 Senecio triangularis+* Symphoricarpos albus* [**keep**] TSHRB 2 Acer circinatum* 2 Acer macrophyllum 5 Bromus vulgaris+ 2 Rubus laciniatus 2 Stachys cooleyae 2
▶ [**127**] Carex deweyana+ 2 Claytonia sibirica+ 2 Oxalis oregana 2 Polystichum munitum 4 Populus trichocarpa* 2 [**keep**] Agrostis 9 Carex obnupta+*** 8 Rubus laciniatus 2 Rumex acetosella+ 2

Floristics (4 plots, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 56, Picea sitchensis 7	Rubus spectabilis 8	Ranunculus repens+ 20	Carex obnupta+ 24, Polystichum munitum 2
60-80			Oxalis oregana 1	
40-60	Acer macrophyllum 15	Acer circinatum 20, Rubus laciniatus 4	Stachys cooleyae 4, Tolmiea menziesii 3, Prunella vulgaris 1, Lactuca 0	Agrostis 22, moss 8, Athyrium filix-femina 1
25-40	Populus trichocarpa 1	Frangula purshiana 0	Rumex acetosella+ 5, Rubus ursinus 5, Digitalis purpurea 0, Claytonia sibirica+ 0, Circaea alpina 0	Bromus vulgaris+ 5, Elymus 5

{052} Alnus rubra, Rubus spectabilis, Polystichum munitum, Claytonia sibirica
Red alder, salmonberry, sword fern & springbeauty forest
ALNRUB/RUBSPE/POLMUN-CLASIB



Range: Lowland zone. **MORA**-3: (nw-sw) 840-990m. **NOCA**-4: **nw** (cw) 290-530m. **OLYM**-2: (nc) 470-490m.

Struct: Closed broadleaf forest (17-19m) with substantial mixed broadleaf-conifer regen, dense forbs, and abundant ferns, tall shrubs & shrubs. Avg vasc cover 183: brdlf tree 57, forb 35, fern 29, tall shrb 24, shrb 0.88 @ 22, conif tree 0.75 @ 12, conif regen 0.75 @ 3, brdlf regen 0.63 @ 9, grass 0.5 @ 3.

Ecology: Fairly gentle slopes, occasionally associated with seeps but more often successional after logging, fires and landslides. Regen a mix of *Alnus rubra*, *Thuja plicata*, *Tsuga heterophylla* and *Acer macrophyllum*.

Metrics: slope 12-28°, vdp 1-12m, vdr 17-196m, east 5-49, south 41-71, conv 42-45, tpp 16-51, solar 53-61, wet 3-4

Map class: B33–Upland red alder, bigleaf maple & conifer forest

Rel to C09: Split from ALNRUB/POLMUN to represent an inland (non-coastal bluff) variant of that type.

Similar: MNO:[044] ACEMAC/RUBSPE/TOLMEN, MNO:[048] ALNRUB/OPLHOR-RUBSPE, MO:[054] ALNRUB/STACHA-TOLMEN, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, O:[047] ALNRUB/ELYGLA, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN.

▶ [**044**] Abies amabilis* Carex deweyana+ 2 Elymus* 2 Oemleria cerasiformis* Prosartes* Ribes bracteosum+** Rubus ursinus 2 Tiarella trifoliata 2 Trisetum* Vaccinium ovalifolium* Viola glabella+* 2 [**keep**] Acer glabrum** Adiantum aleuticum* Alnus rubra 23 Asarum caudatum* Claytonia sibirica+ 4 Dicentra formosa* Dryopteris** Mitella** 2 Ribes lacustre** 2 Rubus nutkanus 2 Tellima grandiflora* Vaccinium parvifolium*
▶ [**046**] Abies grandis* Carex deweyana+ 3 Cornus stolonifera/occidentalis** 2 Cornus unalaschkensis* Equisetum hyemale+* Gaultheria shallon* Lysichiton americanus** 2 Maianthemum dilatatum* Rosa* Scirpus microcarpus** 2 Viburnum edule* Viola glabella+ 2 [**keep**] Acer circinatum** 2 Acer macrophyllum** 2 Circaea alpina 2 Claytonia sibirica+*** 2 Dicentra formosa** Dryopteris* Polystichum munitum** 5 Sambucus racemosa* Tolmiea menziesii*
▶ [**048**] C-LT5 5 Abies amabilis* 2 Achlys triphylla* Corydalis* Heracleum maximum 2 Linnaea borealis* Oplopanax horridus 2 Petasites frigidus** Ribes bracteosum+* 2 Rosa* Stachys cooleyae 2 Struthiopteris spicant* Vaccinium ovalifolium* [**keep**] Acer circinatum* Acer macrophyllum* 3 Circaea alpina* 2 Claytonia sibirica+* Dicentra formosa* Dryopteris* Lactuca*** Mitella 2 Polystichum munitum 8 Tolmiea menziesii* 2
▶ [**053**] Cornus stolonifera/occidentalis** 2 Glyceria 2 Populus trichocarpa** 2 Ribes bracteosum+** 2 Urtica dioica 2 [**keep**] Acer circinatum* Acer glabrum*** Acer macrophyllum** 3 Adiantum aleuticum** Asarum caudatum** Claytonia sibirica+ 3 Dryopteris* Lactuca* Mitella* Polystichum munitum* 4 Pseudotsuga menziesii** 2 Ribes lacustre 2
▶ [**054**] Oxalis oregana** 2 Picea sitchensis** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Stachys cooleyae* 2 [**keep**] TSHRB 8 Acer circinatum 5 Acer glabrum** Adiantum aleuticum** Asarum caudatum** Dicentra formosa** Dryopteris** Oplopanax horridus*** Pseudotsuga menziesii 2 Rubus nutkanus** 2 Sambucus racemosa* 2 Tellima grandiflora** Thuja plicata* Tsuga heterophylla 3

Floristics (8 plots, MORA 2, NOCA 4, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 52			Polystichum munitum 18
80-95		Acer circinatum 22, Rubus spectabilis 16	Claytonia sibirica+ 9	
60-80	Acer macrophyllum 16, Tsuga heterophylla 7	Sambucus racemosa 4, Oplopanax horridus 1	Tolmiea menziesii 14, Circaea alpina 9, Galium 2, Dicentra formosa 1, Lactuca 1	moss 14, Athyrium filix-femina 9, Dryopteris 3
40-60	Thuja plicata 9			
25-40	Pseudotsuga menziesii 5	Ribes lacustre 6, Rubus nutkanus 3, Acer glabrum 2, Rubus leucodermis 1, Vaccinium parvifolium 1	Mitella 7, Tellima grandiflora 2, Maianthemum stellatum 2, Asarum caudatum 1, Mertensia paniculata 1, Stellaria 1, Stachys cooleyae 1, Tiarella trifoliata 0, Viola glabella+ 0, Rubus ursinus 0	Gymnocarpium dryopteris 2, Adiantum aleuticum 2, Carex deweyana+ 2, Polypodium glycyrrhiza 1, Luzula parviflora 1
10-25	Abies amabilis 1	Alnus viridis 8, Salix sitchensis+ 3, Corylus cornuta 3	Hydrophyllum tenuipes 8, Ranunculus uncinatus+ 1, Berberis nervosa 1, Maianthemum racemosum 1, Sedum divergens 1, Trillium ovatum 1, Aruncus dioicus 1, Chamaenerion angustifolium 1, Heracleum maximum 1, Anaphalis margaritacea 1, Achlys triphylla 1, Digitalis purpurea 1	Polystichum andersonii 5, Melica subulata+ 3, Bromus vulgaris+ 3, Pteridium aquilinum 2, Melica smithii 1, Equisetum arvense+ 1, Struthiopteris spicant 1

{053} Alnus rubra, Rubus spectabilis, Tolmiea menziesii, Athyrium filix-femina
Red alder, salmonberry, piggyback plant & lady fern forest
ALNRUB/RUBSPE/TOLMEN-ATHFIL



Range: Lowland and coastal zones, on valley bottoms. **MORA**-2: (sw-se) 670-700m. **NOCA**-21: **nw-cw** (ce) 520-660m. **OLYM**-6: **sw** (nw-sc-se) 10-590m.

Struct: Mostly closed broadleaf forest (25-32m) with prominent mixed conifer-broadleaf regen, dense shrubs, dense forbs, abundant tall shrubs, and substantial ferns. Avg vasc cover 171: brdlf tree 52, shrb 43, forb 31, fern 11, tall shrb 0.85 @ 21, conif tree 0.81 @ 5, grass 0.65 @ 8, conif regen 0.65 @ 3, brdlf regen 0.46 @ 3, sedge 0.35 @ 7.

Ecology: Nearly flat areas on floodplains and low riparian terraces, moist toeslopes, and transitional edges of depressional wetlands. Regen a mix of *Alnus rubra*, *Thuja plicata* and *Tsuga heterophylla*.

Metrics: slope 0-4°, vdp 1-1m, vdr 1-4m, east 18-66, south 5-53, conv 43-48, tpp 9-15, solar 55-59, wet 7-9

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Evolved from ALNRUB/RUBSPE, after shedding outlier plots to many similar associations.

Similar: MNO:[048] ALNRUB/OPLHOR-RUBSPE, MNO:[046] ALNRUB/ATHFIL-LYSAME, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MO:[054] ALNRUB/STACHA-TOLMEN, O:[047] ALNRUB/ELYGLA, MNO:[044] ACEMAC/RUBSPE/TOLMEN, N:[126] POPBAL/CORSER, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN. Also see: [051] ALNRUB/RUBSPE/CAROBN-LYSAME (coastal), [122] POPBAL-ACEMAC/ACECIR/POLMUN.

▶ [**046**] Alnus viridis** Berberis nervosa** Clintonia uniflora** Gaultheria shallon 2 Hydrophyllum tenuipes** Linnaea borealis** Lysichiton americanus*** 9 Maianthemum dilatatum 2 Malus fusca** Platanthera** Scirpus microcarpus** Struthiopteris spicant 2 Veronica serpyllifolia+** Viola glabella+ 2 [**keep**] Claytonia sibirica+** Dicentra formosa* Maianthemum stellatum* 2 Polystichum munitum* Populus trichocarpa* Ribes bracteosum+* 2 Rubus nutkanus* Rubus spectabilis 6 Sambucus racemosa* 2 Tolmiea menziesii* Urtica dioica 2
▶ [**048**] B-LT5 4 C-LT5 5 C-GT5 8 Abies amabilis* Achlys triphylla* Chamaenerion angustifolium* Claytonia sibirica+ 3 Corydalis* Heracleum maximum* Linnaea borealis*** Petasites frigidus** Pseudotsuga menziesii*** 2 Struthiopteris spicant* Tsuga heterophylla 6 Vaccinium parvifolium* [**keep**] Circaea alpina* Cornus stolonifera/occidentalis*** 2 Dicentra formosa* Glyceria 2 Populus trichocarpa** 2 Ribes bracteosum+* Ribes lacustre* Tolmiea menziesii 3 Urtica dioica 2
▶ [**052**] Acer circinatum* Acer glabrum*** Acer macrophyllum** 3 Adiantum aleuticum** Asarum caudatum** Claytonia sibirica+ 3 Dryopteris* Lactuca* Mitella* Polystichum munitum* 4 Pseudotsuga menziesii** 2 Ribes lacustre 2 [**keep**] Cornus stolonifera/occidentalis** 2 Glyceria 2 Populus trichocarpa** 2 Ribes bracteosum+** 2 Urtica dioica 2
▶ [**054**] B-LT5* Acer macrophyllum** 3 Claytonia sibirica+ 3 Oxalis oregana** Picea sitchensis*** 2 Poa cusickii+ 2 Ranunculus repens+** 3 Stachys cooleyae* [**keep**] TSHRB* Athyrium filix-femina* Cornus stolonifera/occidentalis*** 2 Glyceria 2 Oplopanax horridus** Populus trichocarpa** 2 Ribes bracteosum+*** 2 Sambucus racemosa* 2 Thuja plicata** Tsuga heterophylla* Viola glabella+*
▶ [**124**] Abies grandis 5 Acer circinatum* Acer glabrum*** Actaea rubra** Amelanchier alnifolia*** Aruncus dioicus* Asarum caudatum** Circaea alpina 5 Lactuca* Osmorhiza* Populus trichocarpa 10 Pseudotsuga menziesii** 2 Ribes lacustre 2 Rosa* [**keep**] Circaea alpina* Glyceria 2 Ribes bracteosum+* 2 Rubus spectabilis 7 Tolmiea menziesii* 2 Urtica dioica 2

Floristics (26 plots, MORA 1, NOCA 20, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 50	Rubus spectabilis 27		
80-95		Sambucus racemosa 13		Athyrium filix-femina 10
60-80	Tsuga heterophylla 3, Thuja plicata 3	Ribes bracteosum+ 19, Cornus stolonifera/occidentalis 10	Tolmiea menziesii 17, Circaea alpina 3, Galium 2, Claytonia sibirica+ 2	moss 7
40-60	Populus trichocarpa 6	Oplopanax horridus 4, Ribes lacustre 1	Dicentra formosa 4, Tiarella trifoliata 2, Viola glabella+ 1	Polystichum munitum 2
25-40	Abies grandis 3, Abies amabilis 3	Rubus nutkanus 3	Urtica dioica 9, Maianthemum stellatum 6	Glyceria 9, Carex deweyana+ 3, Equisetum arvense+ 2, Gymnocarpium dryopteris 1
10-25	Acer macrophyllum 2	Lonicera involucrata 7, Acer circinatum 7, Rosa 6, Frangula purshiana 1, Vaccinium parvifolium 1	Tellima grandiflora 6, Stachys cooleyae 4, Mitella 3, Ranunculus repens+ 2, Stellaria 2, Erythranthe 1, Osmorhiza 1, Streptopus amplexifolius 1, Epilobium 1, Prunella vulgaris 1	Cinna latifolia 6, Dryopteris 2, Elymus 1, Equisetum hyemale+ 1

{054} Alnus rubra, Stachys cooleyae, Tolmiea menziesii
Red alder, hedgenettle & piggyback plant forest
ALNRUB/STACHA-TOLMEN



Range: Lowland zone, on valley bottoms. **MORA**-2: (ne-sw) 820-840m. **OLYM**-12: **nc**-**sc**-**se** (ne) 170-400m.

Struct: Closed broadleaf forest (23-27m) with substantial mixed broadleaf-conifer regen, very dense forbs, abundant grasses, and substantial shrubs & ferns. Avg vasc cover 183: brdlf tree 65, forb 61, grass 16, shrb 13, fern 0.92 @ 9, brdlf regen 0.83 @ 8, conif regen 0.83 @ 5, sedge 0.5 @ 6, conif tree 0.5 @ 5, tall shrb 0.5 @ 5, dwf shrb 0.25 @ 2.

Ecology: Nearly flat areas on floodplains and streambanks with moist but well-drained soils. Periodically flooded; mineral soil deposits and debris are often apparent. Regen dominated by *Alnus rubra* and/or *Picea sitchensis*.

Metrics: slope 2-6°, vdp 1-1m, vdr 1-2m, east 13-43, south 42-94, conv 44-50, tpp 7-17, solar 58-62, wet 6-7

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same, although *Rubus spectabilis* occurs in greater abundance than described. Several plots from ALNRUB/RUBSPE fit better here.

Similar: O:[047] ALNRUB/ELYGLA, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[048] ALNRUB/OPLHOR-RUBSPE, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX), O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE.

▶ [**047**] Bromus sitchensis** 2 Elymus* Galium 3 Populus trichocarpa*** 2 Rubus ursinus* Symphoricarpos albus** [**keep**] Abies grandis* Acer macrophyllum* Athyrium filix-femina* Equisetum arvense+* Luzula parviflora* Mitella* 2 Osmorhiza* Rumex occidentalis 2 Stellaria* 2 Tiarella trifoliata* Vaccinium parvifolium**

▶ [**050**] C-GT5* 8 Polystichum munitum 10 Tiarella trifoliata 2 Tsuga heterophylla* 3 [**keep**] B-LT5* Abies grandis 2 Circaea alpina* Claytonia sibirica+ 6 Poa cusickii+ 9 Stachys cooleyae*** Stellaria 2 Tolmiea menziesii*

▶ [**051**] Acer circinatum 5 Agrostis* 5 Bromus vulgaris+ 2 Carex obnupta+*** 2 Prunella vulgaris* Rubus laciniatus* Rumex acetosella+ 2 [**keep**] Athyrium filix-femina 2 Carex deweyana+* Circaea alpina* 2 Claytonia sibirica+* 2 Galium* Oxalis oregana 2 Poa cusickii+ 2 Rumex occidentalis* Stellaria* Tiarella trifoliata* Vaccinium parvifolium*

▶ [**052**] TSHRB 8 Acer circinatum 5 Acer glabrum** Adiantum aleuticum** Asarum caudatum** Dicentra formosa** Dryopteris** Oplopanax horridus*** Pseudotsuga menziesii 2 Rubus nutkanus** 2 Sambucus racemosa* 2 Tellima grandiflora** Thuja plicata* Tsuga heterophylla 3 [**keep**] Oxalis oregana** 2 Picea sitchensis** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Stachys cooleyae* 2

▶ [**053**] TSHRB* Athyrium filix-femina* Cornus stolonifera/occidentalis*** 2 Glyceria 2 Oplopanax horridus** Populus trichocarpa** 2 Ribes bracteosum+*** 2 Sambucus racemosa* 2 Thuja plicata** Tsuga heterophylla* Viola glabella+* [**keep**] B-LT5* Acer macrophyllum** 3 Claytonia sibirica+ 3 Oxalis oregana** Picea sitchensis*** 2 Poa cusickii+ 2 Ranunculus repens+** 3 Stachys cooleyae*

Floristics (12 plots, MORA 1, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 68	Rubus spectabilis 10		
80-95			Tolmiea menziesii 9	
60-80			Ranunculus repens+ 16, Claytonia sibirica+ 12, Circaea alpina 11, Stachys cooleyae 8	Polystichum munitum 6
40-60	Picea sitchensis 7, Acer macrophyllum 6	Acer circinatum 3	Oxalis oregana 8, Rumex occidentalis 4, Galium 2, Tiarella trifoliata 2	Athyrium filix-femina 7, moss 6
25-40	Abies grandis 5, Tsuga heterophylla 2	Vaccinium parvifolium 1	Mitella 5, Stellaria 3, Rubus ursinus 2, Lactuca 1, Osmorhiza 1	Poa cusickii+ 19, Carex deweyana+ 2, Bromus vulgaris+ 1, Luzula parviflora 1, Equisetum arvense+ 1
10-25	Pseudotsuga menziesii 1	Ribes lacustre 2, Oemleria cerasiformis 1, Sambucus racemosa 1	Viola sempervirens 1, Petasites frigidus 1	Elymus 20, Melica subulata+ 1

{055} Alnus viridis, Oplopanax horridus
Sitka alder & devil's club shrubland
ALNVIR-OPLHOR



Range: Upper and lower montane zones. **MORA**-5: **nw** (ne-sw) 1000-1280m. **NOCA**-3: (nw-s) 1070-1260m. **OLYM**-8: **se*** (nc-ne) 960-1230m.

Struct: Closed canopy tall shrubland with dense forbs & shrubs and substantial ferns. Avg vasc cover 172: tall shrb 72, forb 42, shrb 41, fern 0.92 @ 13, grass 0.62 @ 3, conif LT5 0.46 @ 2, conif GT5 0.23 @ 4.

Ecology: Runouts of talus slopes, debris fields and avalanche chutes, with subsurface irrigation.

Metrics: slope 22-34°, vdp 1-10m, vdr 119-475m, east 33-92, south 6-68, conv 35-45, tpp 16-26, solar 34-63, wet 2-4

Map class: S43–Sitka alder shrubland

Rel to C09: Same.

Similar: MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MNO:[058] ALNVIR-(SAMRAC)/THAOCC, NO:[056] ALNVIR/PTEAQU-ATHFIL, MN:[037] ACECIR-OPLHOR/ATHFIL, MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[166] SALSIT-(CORSER)/URTDIO, N:[126] POPBAL/CORSER, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[046] ALNRUB/ATHFIL-LYSAME.

▶ [**035**] B-GT5* Acer circinatum* Acer glabrum* 2 Carex deweyana+* Clintonia uniflora* 2 Paxistima myrsinites** 2 Polystichum munitum*** Pteridium aquilinum** 2 Rubus nutkanus* 2 Trillium ovatum* Tsuga heterophylla* [**keep**] Athyrium filix-femina** 2 Claytonia sibirica+* Heracleum maximum** Hydrophyllum tenuipes 2 Micranthes odontoloma+** Mitella* Oplopanax horridus* 4 Ribes bracteosum+* Rubus spectabilis* 5 Streptopus lanceolatus*** 2 Veratrum viride***
▶ [**037**] Acer circinatum* 34 Dryopteris** Gymnocarpium dryopteris* Polystichum munitum*** Rhododendron menziesii*** Ribes lacustre* Stellaria* Struthiopteris spicant*** Tiarella trifoliata*** Trillium ovatum* [**keep**] Achlys triphylla 4 Alnus viridis* 5 Claytonia sibirica+ 3 Heracleum maximum** Micranthes odontoloma+** Ribes bracteosum+* 3 Streptopus lanceolatus 2 Veratrum viride* Viola glabella+*
▶ [**056**] Gymnocarpium dryopteris* Maianthemum stellatum* Pteridium aquilinum*** 2 Tiarella trifoliata** [**keep**] SHRB 4 Acer circinatum 2 Achlys triphylla 2 Oplopanax horridus* 2 Ribes bracteosum+ 2 Rubus spectabilis* Tolmiea menziesii 2
▶ [**057**] Aruncus dioicus*** Clintonia uniflora*** 2 Pteridium aquilinum** Rhododendron menziesii** Rubus nutkanus 2 Sorbus sitchensis* Tiarella trifoliata*** 2 Tsuga mertensiana*** Vaccinium membranaceum* 2 Veratrum viride* [**keep**] Hydrophyllum tenuipes 2 Oplopanax horridus***
▶ [**058**] Abies lasiocarpa* Acer glabrum* Aruncus dioicus** 2 Chamaenerion angustifolium* Hydrophyllum fendleri* 2 Osmorhiza* Prosartes 4 Ribes acerifolium+* Rubus nutkanus* Salix sitchensis+** Thalictrum occidentale* [**keep**] Acer circinatum*** 2 Achlys triphylla*** 2 Athyrium filix-femina 2 Circaea alpina* Hydrophyllum tenuipes*** 2 Micranthes odontoloma+*** Oplopanax horridus*** Ribes bracteosum+** Rubus spectabilis** 5 Streptopus lanceolatus* Tolmiea menziesii*

Floristics (13 plots, MORA 5, NOCA 3, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Oplopanax horridus 17		
80-95		Alnus viridis 64, Rubus spectabilis 21		Athyrium filix-femina 11
60-80		Sambucus racemosa 8		
40-60		Ribes bracteosum+ 11	Claytonia sibirica+ 9, Streptopus lanceolatus 6, Viola glabella+ 3, Galium 1	
25-40		Acer circinatum 22	Achlys triphylla 10, Tolmiea menziesii 8, Hydrophyllum tenuipes 6, Mitella 6, Heracleum maximum 4, Circaea alpina 3, Veratrum viride 2, Micranthes odontoloma+ 1	moss 5
10-25	Callitropsis nootkatensis 6, Abies amabilis 1	Vaccinium ovalifolium 4, Sorbus sitchensis 3, Rubus nutkanus 2, Ribes lacustre 1, Vaccinium membranaceum 1	Corydalis 29, Maianthemum stellatum 22, Stachys cooleyae 8, Thalictrum occidentale 5, Streptopus amplexifolius 4, Dicentra formosa 4, Prosartes 2, Valeriana sitchensis 2, Maianthemum racemosum 1	Gymnocarpium dryopteris 12, Elymus 3, Poa cusickii+ 2, Polystichum lonchitis 1

{056} Alnus viridis, Pteridium aquilinum, Athyrium filix-femina
Sitka alder, bracken fern & lady fern shrubland
ALNVIR/PTEAQU-ATHFIL



Range: Upper montane. **NOCA**-6: **s*** (nw) 940-1480m. **OLYM**-1: (se) 1060-1070m.

Struct: Closed canopy tall shrubland with very dense ferns and substantial forbs. Avg vasc cover 176: tall shrb 89, fern 66, forb 13, shrb 0.83 @ 2, grass 0.5 @ 0, rush 0.17 @ 30, conif GT5 0.17 @ 5.

Ecology: Boulder fields on lower slopes.

Metrics: slope 15-31°, vdp 1-6m, vdr 189-478m, east 5-62, south 53-81, conv 38-47, tpp 12-27, solar 50-68, wet 3-5

Map class: S43–Sitka alder shrubland

Rel to C09: Split from ALNVIR-RUBSPE/ATHFIL, incorporating some plots from ALNVIR.

Similar: MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[055] ALNVIR-OPLHOR, MNO:[035] ACECIR/GALIUM-(POLMUN), N:[034] ACER-CORSER/(PTEAQU), MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), NO:[093] HERMAX-(THAOCC-SAUAME), N:[126] POPBAL/CORSER.

▶ [**034**] C-GT5* SHRB 4 Acer circinatum* 2 Acer glabrum* Cornus stolonifera/occidentalis* 8 Dicentra formosa 2 Oplopanax horridus* Paxistima myrsinites* Ribes lacustre* 2 Rubus nutkanus 2 Urtica dioica* [**keep**] Abies lasiocarpa* Alnus viridis* 4 Athyrium filix-femina 9 Gymnocarpium dryopteris* 2 Maianthemum stellatum 5 Mitella* Prosartes* Pteridium aquilinum* Streptopus lanceolatus*** 2 Tiarella trifoliata** Vaccinium membranaceum* Veratrum viride*

▶ [**035**] C-LT5 2 SHRB 4 Acer circinatum* 2 Achlys triphylla* Clintonia uniflora 2 Paxistima myrsinites* 2 Polystichum munitum** Rubus nutkanus 2 Tolmiea menziesii* Trillium ovatum* Tsuga heterophylla* [**keep**] Abies lasiocarpa* Alnus viridis 21 Athyrium filix-femina** 2 Gymnocarpium dryopteris*** 2 Heracleum maximum** Mitella* Pteridium aquilinum* 13 Streptopus lanceolatus*** 2 Tiarella trifoliata** Vaccinium membranaceum* Veratrum viride***

▶ [**055**] SHRB 4 Acer circinatum 2 Achlys triphylla 2 Oplopanax horridus* 2 Ribes bracteosum+ 2 Rubus spectabilis* Tolmiea menziesii 2 [**keep**] Gymnocarpium dryopteris* Maianthemum stellatum* Pteridium aquilinum*** 2 Tiarella trifoliata**

▶ [**057**] SHRB 4 Achlys triphylla* Callitropsis nootkatensis* Dicentra formosa 2 Ribes bracteosum+* 2 Rubus spectabilis* 5 Sorbus sitchensis* 2 Tolmiea menziesii* Vaccinium ovalifolium* Valeriana sitchensis 2 [**keep**] Aconitum columbianum** Asarum caudatum** Cornus stolonifera/occidentalis** Cystopteris fragilis** Pinus monticola*** Platanthera** Polystichum imbricans+*** Prunus emarginata*** Pteridium aquilinum 10 Salix scouleriana** Spiraea douglasii**

▶ [**058**] C-LT5 2 SHRB 4 Callitropsis nootkatensis* 2 Chamaenerion angustifolium* Heracleum maximum 2 Osmorhiza* Prosartes 3 Ribes acerifolium+* Rubus nutkanus 2 Salix sitchensis+* Thalictrum occidentale* 2 Urtica dioica* [**keep**] Athyrium filix-femina* 2 Pteridium aquilinum*** 2

Floristics (6 plots, NOCA 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Alnus viridis 84		Athyrium filix-femina 25
80-95				Pteridium aquilinum 44
60-80		Sambucus racemosa 4	Maianthemum stellatum 11, Streptopus lanceolatus 3	
40-60			Viola glabella+ 2, Tiarella trifoliata 0, Maianthemum racemosum 0	Gymnocarpium dryopteris 9, moss 6
25-40	Abies lasiocarpa 3	Rubus spectabilis 3, Rubus nutkanus 1, Vaccinium membranaceum 1	Veratrum viride 2, Claytonia sibirica+ 2, Prosartes 2, Heracleum maximum 1, Galium 0, Mitella 0, Circaea alpina 0	
10-25		Acer glabrum 5, Cornus stolonifera/occidentalis 5, Oplopanax horridus 1, Ribes lacustre 1	Hydrophyllum fendleri 2, Clintonia uniflora 1, Valeriana sitchensis 1	Luzula hitchcockii+ 30, lichen 1

{057} Alnus viridis, Rubus spectabilis, Athyrium filix-femina, Viola glabella*
Sitka alder, salmonberry, lady fern & pioneer violet shrubland
ALNVIR-RUBSPE/ATHFIL-(VIOGLA)



Range: Transitional between lower and upper montane zones. **MORA**-18: **nw**-**sw**-**se** (ne) 1230-1400m. **NOCA**-20: **nw**-**ne**-**cw**-**ce**-**s** 1010-1420m. **OLYM**-21: **nc**-**sc**-**se** (ne) 830-1210m.

Struct: Closed canopy tall shrubland with dense shrubs & forbs and abundant ferns. Avg vasc cover 169: tall shrb 74, shrb 38, forb 37, fern 0.92 @ 17, conif LT5 0.51 @ 3, grass 0.51 @ 2, conif GT5 0.37 @ 3.

Ecology: On toeslopes near small streams, along steep streams associated with avalanche chutes, cobble deposits, and moist talus slopes. *Callitropsis nootkatensis* and/or *Abies amabilis* regen are often present. [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON is often adjacent.

Metrics: slope 17-30°, vdp 2-21m, vdr 175-469m, east 21-93, south 20-78, conv 39-46, tpp 15-36, solar 45-70, wet 2-4

Map class: S43–Sitka alder shrubland

Rel to C09: Evolved from ALNVIR-RUBSPE/ATHFIL, gaining plots from ALNVIR and shedding to [056] ALNVIR/PTEAQU-ATHFIL.

Similar: MNO:[055] ALNVIR-OPLHOR, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, NO:[056] ALNVIR/PTEAQU-ATHFIL, MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), N:[126] POPBAL/CORSER, MN:[037] ACECIR-OPLHOR/ATHFIL, MNO:[162] RUBPAR/PTEAQU-CHAANG, NO:[093] HERMAX-(THAOCC-SAUAME).

▶ [**035**] B-GT5* Acer circinatum** 15 Acer macrophyllum* Asarum caudatum* Cryptogramma acrostichoides* Gaultheria ovatifolia** Paxistima myrsinites** 2 Polystichum munitum* Pseudotsuga menziesii* Rosa** Vaccinium parvifolium*** [**keep**] Alnus viridis 20 Athyrium filix-femina* 2 Callitropsis nootkatensis* Mitella* Rubus spectabilis* 5 Sorbus sitchensis* Streptopus lanceolatus** 2 Tiarella trifoliata* Vaccinium membranaceum* Valeriana sitchensis** 2 Veratrum viride***
▶ [**055**] Hydrophyllum tenuipes 2 Oplopanax horridus*** [**keep**] Aruncus dioicus*** Clintonia uniflora*** 2 Pteridium aquilinum** Rhododendron menziesii** Rubus nutkanus 2 Sorbus sitchensis* Tiarella trifoliata*** 2 Tsuga mertensiana*** Vaccinium membranaceum* 2 Veratrum viride*
▶ [**056**] Aconitum columbianum** Asarum caudatum** Cornus stolonifera/occidentalis** Cystopteris fragilis** Pinus monticola*** Platanthera** Polystichum imbricans+*** Prunus emarginata*** Pteridium aquilinum 10 Salix scouleriana** Spiraea douglasii** [**keep**] SHRB 4 Achlys triphylla* Callitropsis nootkatensis* Dicentra formosa 2 Ribes bracteosum+* 2 Rubus spectabilis* 5 Sorbus sitchensis* 2 Tolmiea menziesii* Vaccinium ovalifolium* Valeriana sitchensis 2
▶ [**058**] Aquilegia formosa* Artemisia*** Cirsium edule+* Cryptogramma acrostichoides* Hydrophyllum fendleri* Osmorhiza* Prosartes* 5 Pseudotsuga menziesii* Ribes acerifolium+* Thalictrum occidentale* [**keep**] SHRB 13 Achlys triphylla*** Athyrium filix-femina* 2 Clintonia uniflora* Gymnocarpium dryopteris* Pteridium aquilinum*** Ribes bracteosum+* Rubus spectabilis* 5 Streptopus lanceolatus* Tiarella trifoliata* 2 Vaccinium membranaceum 2 Vaccinium ovalifolium*
▶ [**166**] Chamaenerion angustifolium* 2 Cornus stolonifera/occidentalis*** 2 Heracleum maximum* Hydrophyllum fendleri* Ribes bracteosum+* Salix sitchensis+** 11 Thalictrum occidentale* Tolmiea menziesii* Urtica dioica* [**keep**] Alnus viridis* 14 Athyrium filix-femina* 4 Claytonia sibirica+* Mitella** 2 Sambucus racemosa* Sorbus sitchensis* Streptopus lanceolatus*** 2 Vaccinium membranaceum*** 2 Veratrum viride** Viola glabella+*

Floristics (51 plots, MORA 14, NOCA 18, OLYM 19): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Alnus viridis 65, Rubus spectabilis 28		
80-95				Athyrium filix-femina 13
60-80		Sambucus racemosa 6		
40-60	Abies amabilis 2	Sorbus sitchensis 6	Claytonia sibirica+ 7, Viola glabella+ 7, Dicentra formosa 6, Mitella 5, Veratrum viride 3	
25-40	Callitropsis nootkatensis 3, Tsuga mertensiana 3	Ribes bracteosum+ 7, Rubus nutkanus 5, Vaccinium membranaceum 5, Vaccinium ovalifolium 4	Valeriana sitchensis 6, Streptopus lanceolatus 5, Tiarella trifoliata 5, Maianthemum stellatum 4, Clintonia uniflora 3, Galium 3, Maianthemum racemosum 2, Aruncus dioicus 2	moss 6
10-25	Abies lasiocarpa 2	Oplopanax horridus 9, Acer glabrum 7, Salix sitchensis+ 6, Rhododendron menziesii 6, Ribes lacustre 5, Spiraea splendens 3	Tolmiea menziesii 8, Circaea alpina 4, Achlys triphylla 4, Thalictrum occidentale 3, Heracleum maximum 3, Delphinium 3, Urtica dioica 2, Erythronium montanum+ 2, Streptopus amplexifolius 2, Mertensia paniculata 2	Pteridium aquilinum 6, Polystichum munitum 5, Gymnocarpium dryopteris 4

{058} Alnus viridis, Sambucus racemosa*, Thalictrum occidentale*
Sitka alder, red elderberry* & western meadowrue* shrubland
ALNVIR-(SAMRAC)/THAOCC



Range: Lower montane zone, transitional to upper montane. **MORA**-5: **ne** (nw-se) 1450-1580m. **NOCA**-18: **nw-ce-s*** 1130-1500m. **OLYM**-14: **ne*** (nc-se) 1100-1370m.

Struct: Closed canopy tall shrubland with dense forbs and substantial shrubs. Avg vasc cover 134: tall shrb 85, forb 33, shrb 0.77 @ 8, grass 0.69 @ 4, conif LT5 0.58 @ 5, fern 0.5 @ 2, conif GT5 0.38 @ 4, dwf shrb 0.12 @ 10.

Ecology: Fairly gentle lower slopes on talus and debris cones, avalanche runouts, above glacier meadows, and near lateral moraines. Conifer regen dominated by *Callitropsis nootkatensis* and/or *Abies lasiocarpa* is often present. [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON is often adjacent.

Metrics: slope 14-28°, vdp 1-8m, vdr 140-508m, east 26-95, south 27-79, conv 39-46, tpp 14-25, solar 54-71, wet 3-4

Map class: S43–Sitka alder shrubland

Rel to C09: Split from ALNVIR, gaining plots from ALNVIR-ACECIR, ALNVIR-RUBSPE/ATHFIL and TSUMER-ABILAS/ALNVIR.

Similar: MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), NO:[056] ALNVIR/PTEAQU-ATHFIL, MNO:[055] ALNVIR-OPLHOR, MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[035] ACECIR/GALIUM-(POLMUN), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), N:[126] POPBAL/CORSER, MO:[080] CUPNOO-(ABILAS)/CLIUNI.

▶ [**035**] Acer circinatum*** 2 Pteridium aquilinum 2 [**keep**] Abies lasiocarpa* Alnus viridis* 20 Aruncus dioicus* Callitropsis nootkatensis* Heracleum maximum** 2 Hydrophyllum fendleri* Osmorhiza** Prosartes 2 Salix sitchensis+* Sambucus racemosa 3 Thalictrum occidentale*** Veratrum viride** 2

▶ [**055**] Acer circinatum*** 2 Achlys triphylla*** 2 Athyrium filix-femina 2 Circaea alpina* Hydrophyllum tenuipes*** 2 Micranthes odontoloma+*** Oplopanax horridus*** Ribes bracteosum+** Rubus spectabilis** 5 Streptopus lanceolatus* Tolmiea menziesii* [**keep**] Abies lasiocarpa* Acer glabrum* Aruncus dioicus** 2 Chamaenerion angustifolium* Hydrophyllum fendleri* 2 Osmorhiza* Prosartes 4 Ribes acerifolium+* Rubus nutkanus* Salix sitchensis+** Thalictrum occidentale*

▶ [**056**] Athyrium filix-femina* 2 Pteridium aquilinum*** 2 [**keep**] C-LT5 2 SHRB 4 Callitropsis nootkatensis* 2 Chamaenerion angustifolium* Heracleum maximum 2 Osmorhiza* Prosartes 3 Ribes acerifolium+* Rubus nutkanus 2 Salix sitchensis+* Thalictrum occidentale* 2 Urtica dioica*

▶ [**057**] SHRB 13 Achlys triphylla*** Athyrium filix-femina* 2 Clintonia uniflora* Gymnocarpium dryopteris* Pteridium aquilinum*** Ribes bracteosum+* Rubus spectabilis* 5 Streptopus lanceolatus* Tiarella trifoliata* 2 Vaccinium membranaceum 2 Vaccinium ovalifolium* [**keep**] Aquilegia formosa* Artemisia*** Cirsium edule+* Cryptogramma acrostichoides* Hydrophyllum fendleri* Osmorhiza* Prosartes* 5 Pseudotsuga menziesii* Ribes acerifolium+* Thalictrum occidentale*. Note: [057] occurs in wetter sites.

▶ [**166**] Chamaenerion angustifolium* 2 Cornus stolonifera/occidentalis*** 2 Ribes bracteosum+*** Rubus spectabilis* Salix sitchensis+* 5 Tolmiea menziesii** Urtica dioica* [**keep**] C-LT5* Alnus viridis* 14 Aruncus dioicus 2 Callitropsis nootkatensis* 2 Claytonia sibirica+* Maianthemum stellatum* Prosartes* 2 Ribes acerifolium+** Ribes lacustre** Sambucus racemosa* Veratrum viride* 2 Viola glabella+*

Floristics (26 plots, MORA 1, NOCA 13, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Alnus viridis 72		
60-80		Sambucus racemosa 9		
40-60	Callitropsis nootkatensis 5, Abies lasiocarpa 2		Viola glabella+ 5, Heracleum maximum 4, Thalictrum occidentale 4	
25-40		Rubus nutkanus 4, Salix sitchensis+ 2, Ribes lacustre 2	Prosartes 12, Veratrum viride 5, Hydrophyllum fendleri 3, Aruncus dioicus 3, Claytonia sibirica+ 3, Galium 2, Osmorhiza 1	moss 10, Athyrium filix-femina 1
10-25	Tsuga mertensiana 4, Pseudotsuga menziesii 1, Abies amabilis 1	Acer glabrum 19, Sorbus sitchensis 6, Ribes acerifolium+ 6, Rubus spectabilis 3, Vaccinium membranaceum 1	Valeriana sitchensis 19, Streptopus lanceolatus 14, Stachys cooleyae 8, Maianthemum racemosum 7, Maianthemum stellatum 5, Artemisia 5, Delphinium 4, Mitella 3, Dicentra formosa 3, Urtica dioica 3, Aquilegia formosa 2, Penstemon serrulatus+ 1, Cirsium edule+ 1, Chamaenerion angustifolium 1, Senecio triangularis+ 1	Elymus 3, Bromus vulgaris+ 2, Calamagrostis canadensis+ 2, Cryptogramma acrostichoides 1, Polystichum lonchitis 1

{059} Antennaria lanata, Oreostemma alpigenum*, Vaccinium deliciosum*
Woolly pussytoes, alpine aster* & Cascade blueberry* herbaceous vegetation
ANTLAN-(OREALP-VACDEL)



Range: Subalpine and alpine zones. **MORA**-15: **ne*** (nw-sw-se) 1700-1900m. **NOCA**-1: (s) 2220-2230m. **OLYM**-6: **ne*** 1780-1970m.

Struct: Semi-closed canopy short-stature forb-dominated vegetation, frequently with abundant dwarf shrubs. Avg vasc cover 77: forb 51, dwf shrb 0.72 @ 18, sedge 0.61 @ 9, grass 0.61 @ 4, rush 0.5 @ 8.

Ecology: Very gentle basins and flats with late snowmelt. Heavy snow accumulation on coarse well-drained soils results in a seasonal wet/dry dynamic.

Metrics: slope 1-13°, vdp 5-105m, vdr 612-842m, east 19-87, south 24-87, conv 47-55, tpp 47-85, solar 73-78, wet 3-6

Map class: H56–Subalpine summer-dry grass-forb meadow

Rel to C09: Created by merging various plots from ANTLAN, VACDEL, PHLDIF-LUPSEL-(PEDCON), JUNPAR-(POLBIS), and other C09 types.

Similar: M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), NO:[094] JUNPAR-(POLBIS), MNO:[100] LUEPEC-(CARSPE), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[075] CARSPE-CARNIG-(POTFLA), MN:[216] VALSIT-LIGGRA, MN:[071] CARNIG-CARLEN-(CALCAN), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[217] VALSIT-VERVIR.

▶ [**076**] SHRB* Arnica latifolia+** Carex spectabilis+* 17 Erigeron* Lupinus latifolius* Phleum alpinum* Spiraea splendens** Valeriana sitchensis* Veratrum viride* [**keep**] Antennaria lanata+** 5 Oreostemma alpigenum*** 8 Phlox diffusa 2 Vaccinium deliciosum 7
▶ [**091**] Festuca viridula** 5 Lupinus latifolius** [**keep**] Carex nigricans+*** 2 Luetkea pectinata* Pedicularis ornithorhynchos** Phlox diffusa* Phyllodoce empetriformis* Vaccinium deliciosum* 6
▶ [**094**] Carex spectabilis+* Danthonia** Eremogone capillaris* Erythronium montanum+*** Festuca roemeri*** 2 Hieracium triste* Juncus parryi+* Lupinus latifolius* Phlox diffusa* [**keep**] Anemone occidentalis+ 2 Antennaria lanata+* 7 Cassiope mertensiana* Castilleja parviflora+* Festuca viridula* Gentiana calycosa** Oreostemma alpigenum*** 4 Pedicularis contorta+** Pedicularis ornithorhynchos** Phyllodoce empetriformis* Potentilla flabellifolia+* 4
▶ [**100**] C-LT5* Cassiope mertensiana* Epilobium** Hieracium triste* Luetkea pectinata* Luzula piperi+*** Micranthes tolmiei+*** Phyllodoce empetriformis* Tsuga mertensiana*** Vahlodea atropurpurea*** [**keep**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides** Oreostemma alpigenum** 2 Potentilla flabellifolia+** 2 Vaccinium deliciosum* 3
▶ [**107**] C-LT5* 2 Abies lasiocarpa* 2 Cassiope mertensiana* Erythronium montanum+** Lupinus latifolius* Phyllodoce empetriformis* 5 Tsuga mertensiana*** Valeriana sitchensis* [**keep**] Antennaria lanata+** 5 Eremogone capillaris*** Juncus parryi+** 4 Oreostemma alpigenum*** 8 Phlox diffusa 2 Potentilla flabellifolia+* Veronica cusickii+*

Floristics (18 plots, MORA 11, NOCA 1, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Antennaria lanata+ 16	
60-80			Oreostemma alpigenum 15, Vaccinium deliciosum 13, Potentilla flabellifolia+ 8	
40-60			Bistorta bistortoides 6, Phyllodoce empetriformis 3	Juncus parryi+ 7
25-40	Abies lasiocarpa 1		Anemone occidentalis+ 9, Lupinus latifolius 6, Phlox diffusa 6, Luetkea pectinata 4, Erigeron 3, Veronica cusickii+ 2, Eremogone capillaris 2, Castilleja parviflora+ 2	Carex spectabilis+ 11, Carex nigricans+ 4, moss 3, Luzula hitchcockii+ 1
10-25	Pinus albicaulis 1		Empetrum nigrum 12, Pedicularis contorta+ 6, Vaccinium cespitosum 6, Pedicularis ornithorhynchos 5, Hieracium triste 4, Cassiope mertensiana 3, Valeriana sitchensis 3, Ligusticum 3, Gentiana calycosa 2, Silene parryi 1	lichen 13, Danthonia 10, Festuca viridula 3, Poa cusickii+ 1

{060} Arctostaphylos columbiana, Racomitrium spp.
Hairy manzanita & racomitrium shrubland
ARCCOL/RACOMITRIUM



Range: Lowland zone, on balds. **OLYM**-4: (nc-ne) 730-850m.

Struct: Semi-open shrubland with substantial forbs, dwarf shrubs & small conifers. Avg vasc cover 86: shrb 46, forb 12, dwf shrb 11, grass 3, conif LT5 0.75 @ 8, tall shrb 0.75 @ 1, brdlf LT5 0.5 @ 7, conif GT5 0.5 @ 4, fern 0.5 @ 1, rush 0.5 @ 1.

Ecology: Small forest openings on or around cliffs and rock outcrops, on fairly steep south-facing upper slopes and ridgetops. Small *Pseudotsuga menziesii* and/or *Juniperus scopulorum* are usually present.

Metrics: slope 29-40°, vdp 218-245m, vdr 558-675m, east 26-44, south 91-100, conv 71-76, tpp 70-74, solar 67-72, wet 0-1

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: New name for ARCCOL to clarify affinities with balds.

Similar: MNO:[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, MNO:[103] PENDAV/RACOMITRIUM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[131] PSESPI/SELWAL, N:[061] ARCNEV-PAXMYR/CALRUB, MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[078] CEAVEL-(SPIBET)/CALRUB, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[104] PHLDIF-(LOMMAR-CARPHA).

▶ [**064**] Achillea millefolium 2 Cryptogramma acrostichoides* Fragaria virginiana 2 Penstemon procerus+ 2 Spiraea lucida** Woodsia* [**keep**] B-LT5 2 SHRB 11 Anticlea/Toxicoscordion* Arbutus menziesii 2 Arctostaphylos columbiana*** 2 Berberis aquifolium* Castilleja hispida** Ceanothus sanguineus 2 Eriophyllum lanatum* Festuca roemeri** Fritillaria affinis** Juniperus scopulorum 2 Lomatium martindalei** Lomatium nudicaule+* Rosa*

▶ [**103**] Collinsia parviflora* Juncus parryi+* Lomatium martindalei 2 Micranthes tolmiei+* Montia* Penstemon procerus+* 2 Pinus contorta* Selaginella wallacei+ 12 [**keep**] B-LT5 2 C-LT5 2 SHRB 2 VASC VEG 42 Anticlea/Toxicoscordion** Arbutus menziesii 2 Arctostaphylos columbiana*** 2 Berberis aquifolium** Ceanothus sanguineus 2 Eriophyllum lanatum* Festuca roemeri* Fragaria virginiana* Fritillaria affinis* Holodiscus discolor 2 Juniperus scopulorum 2 Lomatium nudicaule+* Rosa*** Symphoricarpos mollis**

▶ [**131**] Aspidotis densa* Bromus vulgaris+ 2 Castilleja miniata* Koeleria macrantha 2 Philadelphus lewisii* 2 Pinus ponderosa 2 Pseudoroegneria spicata** 2 Vicia* [**keep**] B-LT5 2 SHRB 8 Arbutus menziesii 2 Arctostaphylos columbiana*** 2 Castilleja hispida* Festuca roemeri** Juniperus scopulorum 2 Lomatium martindalei** Paxistima myrsinites* Racomitrium* 8 Rosa* Selaginella wallacei+ 2 Symphoricarpos mollis**

▶ [**139**] C-GT5* 7 TSHRB 2 Acer glabrum 2 Achlys triphylla* Berberis nervosa** 2 Chimaphila umbellata* Festuca occidentalis+* Lathyrus polyphyllus 2 Linnaea borealis 2 Polystichum munitum* Pseudotsuga menziesii 6 [**keep**] Achillea millefolium*** Anticlea/Toxicoscordion** Arbutus menziesii 2 Arctostaphylos columbiana*** 2 Castilleja hispida** Eriophyllum lanatum*** Festuca roemeri*** Fritillaria affinis** Juniperus scopulorum 2 Lomatium nudicaule+*** Paxistima myrsinites** Racomitrium** 4 Selaginella wallacei+ 2

▶ [**218**] Anticlea/Toxicoscordion 2 Berberis aquifolium 2 Calamagrostis rubescens+* 2 Collinsia parviflora* Collomia* Danthonia* Festuca roemeri 3 Galium* Hemieva ranunculifolia* Koeleria macrantha* 2 Micranthes tolmiei+* Selaginella wallacei+* [**keep**] B-LT5 2 C-LT5 2 SHRB 8 Arbutus menziesii 2 Arctostaphylos columbiana* 2 Arctostaphylos uva-ursi+ 3 Castilleja hispida** Ceanothus sanguineus 2 Holodiscus discolor* Juniperus scopulorum 2 Paxistima myrsinites*** Rosa*** Symphoricarpos mollis**. Note: [218] is a grass-dominated bald.

Floristics (4 plots, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Arctostaphylos columbiana 38, Holodiscus discolor 4, Rosa 1	Paxistima myrsinites 2, Achillea millefolium 1	Racomitrium 27, lichen 12
60-80	Pseudotsuga menziesii 3	Amelanchier alnifolia 1, Berberis aquifolium 1, Symphoricarpos mollis 1	Arctostaphylos uva-ursi+ 12, Eriophyllum lanatum 2, Lomatium nudicaule+ 1, Lomatium martindalei 1, Fragaria virginiana 1, Castilleja hispida 1, Fritillaria affinis 1, Anticlea/Toxicoscordion 1	moss 12, Festuca roemeri 2
40-60	Juniperus scopulorum 12, Arbutus menziesii 6		Epilobium 1, Luina hypoleuca 1, Cerastium arvense 1, Sedum spathulifolium 1, Lysimachia latifolia 1	Elymus 1, Luzula hitchcockii+ 1
25-40		Ceanothus sanguineus 3, Symphoricarpos albus 1, Gaultheria shallon 1, Lonicera ciliosa 1	Erythronium montanum+ 1, Juniperus communis 1, Penstemon procerus+ 1, Viola orbiculata+ 1, Cherleria/Sabulina 1, Allium 1, Silene douglasii 1, Microseris 1, Arnica cordifolia 1	Selaginella wallacei+ 8, Polystichum imbricans+ 1, Bromus vulgaris+ 1, Cryptogramma acrostichoides 1

{061} Arctostaphylos nevadensis, Paxistima myrsinites, Calamagrostis rubescens*
Kinnikinnick, Oregon-box & pinegrass* dwarf shrubland
ARCNEV-PAXMYR/CALRUB



Range: Ranging upward and downward from the lower montane zone, on balds. **NOCA**-14: **s*** 740-1430m.

Struct: Semi-open dwarf shrubland with substantial grasses & forbs, and scant conifer regen. Avg vasc cover 63: dwf shrb 37, grass 14, forb 7, conif LT5 1, tall shrb 0.85 @ 1, fern 0.85 @ 0, shrb 0.69 @ 2, conif GT5 0.54 @ 2.

Ecology: Bedrock balds on fairly steep slopes, frequently with exposed rock. Typically embedded in *Pseudotsuga menziesii* and *Pinus ponderosa* woodlands, with small individuals of those species usually present.

Metrics: slope 26-32°, vdp 22-108m, vdr 156-424m, east 3-66, south 54-95, conv 49-63, tpp 36-54, solar 58-79, wet 3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Split from ARC(NEV,UVA)-PAXMYR, much of the remainder of which went to [062] ARCNEV/PSESPI.

Similar: N:[062] ARCNEV/PSESPI, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, MNO:[103] PENDAV/RACOMITRIUM, N:[143] PSEMEN-PINCON/ARCNEV, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[145] PSEMEN-PINPON/ARCNEV, MN:[102] PAXMYR/PHLDIF, N:[146] PSEMEN-PINPON/CALRUB, N:[099] LEWCOL-(JUNPAR), MNO:[104] PHLDIF-(LOMMAR-CARPHA). Also see: [131] PSESPI/SELWAL

▶ [**062**] Amelanchier alnifolia* Anticlea/Toxicoscordion*** Aspidotis densa** Balsamorhiza sagittata* Carex geyeri+* Ceanothus velutinus* Lomatium nudicaule+*** Penstemon serrulatus+ 2 Pseudoroegneria spicata* [**keep**] Abies lasiocarpa* Eremogone capillaris* Eriogonum umbellatum* Festuca viridula* Hieracium scouleri+* Juncus parryi+* Paxistima myrsinites 3 Phlox diffusa* Senecio integerrimus* Vaccinium membranaceum*. Note: [062] is at higher elevations.

▶ [**064**] SHRB 2 Achillea millefolium 2 Collinsia parviflora** Erythronium montanum+** Fragaria virginiana*** 2 Holodiscus discolor 2 Luzula hitchcockii+** Penstemon procerus+* Pinus contorta* Racomitrium* 11 Selaginella wallacei+* 2 Spiraea lucida** Woodsia* [**keep**] C-LT5* Calamagrostis rubescens+* Hieracium scouleri+** Paxistima myrsinites 2 Pinus ponderosa** Pseudoroegneria spicata 2

▶ [**078**] B-LT5** SHRB 3 TSHRB 2 Acer glabrum** Amelanchier alnifolia 2 Carex geyeri+* Castilleja hispida* Ceanothus velutinus* 3 Chamaenerion angustifolium* 2 Collomia** Hieracium albiflorum** Moehringia macrophylla** Prunus emarginata 2 Salix scouleriana* 2 Spiraea lucida** [**keep**] Arctostaphylos uva-ursi+* 9 Cryptogramma acrostichoides* Eremogone capillaris* Eriogonum umbellatum* Hieracium scouleri+* Lewisia*** Pinus ponderosa* Pseudoroegneria spicata* Racomitrium*** 2

▶ [**103**] Collinsia parviflora* Lomatium martindalei 2 Luzula hitchcockii+** Micranthes tolmiei+* Montia* Penstemon procerus+* Racomitrium 12 Selaginella wallacei+* 2 [**keep**] C-LT5* SHRB* TSHRB* Arctostaphylos uva-ursi+ 9 Calamagrostis rubescens+* 2 Eremogone capillaris** Hieracium scouleri+*** Paxistima myrsinites* 2 Pinus ponderosa** Pseudoroegneria spicata 2. Note: [103] is a mid-elevation bald, often in *Pinus contorta* woods.

▶ [**143**] C-LT5 2 C-GT5* 4 SHRB 2 Abies lasiocarpa* Chimaphila umbellata*** Hieracium albiflorum** Pinus contorta** 3 Pinus monticola* 2 Pseudotsuga menziesii 3 Salix scouleriana* Sorbus scopulina* Spiraea lucida* Vaccinium membranaceum* 2 [**keep**] Achillea millefolium** Cryptogramma acrostichoides* Eremogone capillaris* Eriogonum umbellatum** Penstemon serrulatus+** Pinus ponderosa* Pseudoroegneria spicata** 2

Floristics (13 plots, NOCA 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Arctostaphylos uva-ursi+ 30	
80-95	Pseudotsuga menziesii 2		Paxistima myrsinites 8, Hieracium scouleri+ 1	
60-80	Pinus ponderosa 1			Calamagrostis rubescens+ 11
40-60		Amelanchier alnifolia 1	Eremogone capillaris 1, Achillea millefolium 1	Pseudoroegneria spicata 6, moss 5, Cryptogramma acrostichoides 0
25-40		Salix scouleriana 1	Lewisia 2, Phlox diffusa 1, Penstemon serrulatus+ 0, Eriogonum umbellatum 0	Racomitrium 7, Myriopteris gracillima 1
10-25	Pinus contorta 2, Abies lasiocarpa 1	Ceanothus velutinus 1, Vaccinium membranaceum 1, Holodiscus discolor 1	Antennaria racemosa+ 5, Balsamorhiza sagittata 4, Lomatium brandegeei+ 2, Sedum divergens 2, Penstemon procerus+ 2, Chamaenerion angustifolium 1, Senecio integerrimus 1, Crepis 1	Danthonia 4, Festuca viridula 1, Juncus parryi+ 1, Festuca occidentalis+ 1, Achnatherum 1

{062} Arctostaphylos nevadensis, Pseudoroegneria spicata
Pinemat manzanita & bluebunch wheatgrass dwarf shrubland
ARCNEV/PSESPI



Range: Lowland zone, on balds. **NOCA**-15: **s*** (ne-ce) 620-860m.

Struct: Open dwarf shrubland with abundant grasses, substantial forbs, prominent shrubs, and scant conifer regen. Avg vasc cover 57: grass 24, dwf shrb 17, forb 8, shrb 2, fern 0.92 @ 1, conif LT5 0.92 @ 1, tall shrb 0.85 @ 2, conif GT5 0.54 @ 3.

Ecology: Dry rocky balds on slopes with southerly aspects. A few small *Pinus ponderosa* or *Pseudotsuga menziesii* are usually present.

Metrics: slope 23-32°, vdp 30-130m, vdr 179-252m, east 9-41, south 67-98, conv 49-64, tpp 50-55, solar 64-74, wet 2-3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Evolved from ARC(NEV,UVA)/PSESPI, but mainly consists of ARC(NEV,UVA)-PAXMYR plots that were split from [061] ARCNEV-PAXMYR/CALRUB.

Similar: N:[061] ARCNEV-PAXMYR/CALRUB, N:[131] PSESPI/SELWAL, MNO:[103] PENDAV/RACOMITRIUM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[145] PSEMEN-PINPON/ARCNEV, N:[146] PSEMEN-PINPON/CALRUB, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[065] ARCUVA-JUNCOM.

▶ [**061**] Abies lasiocarpa* Eremogone capillaris* Eriogonum umbellatum* Festuca viridula* Hieracium scouleri+* Juncus parryi+* Paxistima myrsinites 3 Phlox diffusa* Senecio integerrimus* Vaccinium membranaceum* [**keep**] Amelanchier alnifolia* Anticlea/Toxicoscordion*** Aspidotis densa** Balsamorhiza sagittata* Carex geyeri+* Ceanothus velutinus* Lomatium nudicaule+*** Penstemon serrulatus+ 2 Pseudoroegneria spicata*

▶ [**064**] C-LT5 2 Achillea millefolium 2 Collinsia parviflora* Erythronium montanum+* Fragaria virginiana* 2 Holodiscus discolor 2 Luzula hitchcockii+* Penstemon procerus+* Pinus contorta* Racomitrium* Selaginella wallacei+* 3 Spiraea lucida* Woodsia* [**keep**] C-LT5* SHRB* Bromus tectorum+ 2 Ceanothus velutinus** Pinus ponderosa*** Pseudoroegneria spicata*** 2

▶ [**078**] B-LT5* SHRB 4 TSHRB 3 Acer glabrum** Castilleja hispida* Ceanothus velutinus 4 Chamaenerion angustifolium* 2 Hieracium albiflorum** Moehringia macrophylla** Paxistima myrsinites 3 Prunus emarginata 2 Salix scouleriana* 2 Spiraea lucida* Vaccinium membranaceum** [**keep**] Anticlea/Toxicoscordion*** Aspidotis densa** Balsamorhiza sagittata** Crepis** Epilobium* Erigeron** Lomatium nudicaule+* Penstemon serrulatus+ 2 Poa cusickii+** Pseudoroegneria spicata** Racomitrium** 2

▶ [**103**] Juncus parryi+* Lomatium martindalei 2 Luzula hitchcockii+* Micranthes tolmiei+* Montia* Penstemon procerus+* Pinus contorta* Racomitrium* 28 Selaginella wallacei+ 4 [**keep**] SHRB* Anticlea/Toxicoscordion** Arctostaphylos uva-ursi+ 8 Aspidotis densa** Balsamorhiza sagittata** Bromus tectorum+ 2 Calamagrostis rubescens+* 2 Ceanothus velutinus** Hieracium scouleri+** Lomatium nudicaule+* Penstemon serrulatus+** 2 Pinus ponderosa*** Pseudoroegneria spicata* 2

▶ [**131**] C-LT5 2 Allium** Anticlea/Toxicoscordion 2 Berberis aquifolium** Bromus vulgaris+** 2 Castilleja miniata** Cerastium arvense*** Eriophyllum lanatum** Fragaria virginiana* Fritillaria affinis* Philadelphus lewisii*** 2 Pinus ponderosa 2 Vicia*** [**keep**] Arctostaphylos uva-ursi+ 4 Bromus tectorum+ 2 Calamagrostis rubescens+ 2 Ceanothus velutinus** Pinus ponderosa* Racomitrium 8

Floristics (13 plots, NOCA 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Arctostaphylos uva-ursi+ 16	Pseudoroegneria spicata 15
80-95	Pinus ponderosa 1	Amelanchier alnifolia 2		
60-80	Pseudotsuga menziesii 1	Ceanothus velutinus 2	Paxistima myrsinites 2, Achillea millefolium 1	moss 17, Calamagrostis rubescens+ 9, Cryptogramma acrostichoides 0
40-60			Penstemon serrulatus+ 4, Balsamorhiza sagittata 2, Lomatium nudicaule+ 1, Anticlea/Toxicoscordion 1, Hieracium scouleri+ 0	Carex geyeri+ 2, Aspidotis densa 1
25-40			Erigeron 2, Epilobium 1, Crepis 0, Spiraea lucida 0, Collomia 0, Polygonum douglasii+ 0, Antennaria racemosa+ 0	Racomitrium 18, Bromus tectorum+ 3, Poa cusickii+ 1
10-25		Salix scouleriana 1, Sambucus nigra 1	Gayophytum 2, Penstemon procerus+ 2, Erythronium montanum+ 2, Arabis 1, Lewisia 1, Lomatium brandegeei+ 1, Montia 1, Fragaria virginiana 1, Eriogonum umbellatum 1	Koeleria macrantha 4, Vulpia 4, lichen 3, Selaginella wallacei+ 2, Diphasiastrum sitchense+ 2

{063} Arctostaphylos uva-ursi, Dasiphora fruticosa*
Kinnikinnick & shrubby cinquefoil* dwarf shrubland
ARCUVA-(DASFLO)



Range: Alpine. **MORA**-6: **nw-ne** (se) 2030-2060m.

Struct: Semi-closed canopy dwarf shrubland with substantial forbs & shrubs, and scant conifer regen. Avg vasc cover 81: dwf shrb 58, forb 14, conif LT5 1, shrb 0.8 @ 7, grass 0.6 @ 2, sedge 0.2 @ 2.

Ecology: Fairly gentle upper slopes with southwesterly aspects. Some *Abies lasiocarpa* regen is usually present.

Metrics: slope 9-23°, vdp 108-223m, vdr 777-792m, east 18-30, south 77-96, conv 61-67, tpp 74-92, solar 77-94, wet 2-3

Map class: S49–Alpine heather shrubland

Rel to C09: Same.

Similar: MO:[095] JUNCOM-(PHLDIF), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[065] ARCUVA-JUNCOM, N:[061] ARCNEV-PAXMYR/CALRUB, MN:[086] EMPNIG-LUPSEL, MNO:[103] PENDAV/RACOMITRIUM, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, NO:[093] HERMAX-(THAOCC-SAUAME), N:[108] PHYGLA-(CASMER), MNO:[059] ANTLAN-(OREALP-VACDEL).

▶ [**061**] TSHRB** Calamagrostis rubescens+* 2 Hieracium scouleri+** Paxistima myrsinites** 2 Pseudoroegneria spicata 2 Pseudotsuga menziesii** Racomitrium 2 [**keep**] SHRB 2 Abies lasiocarpa* Campanula rotundifolia+** Dasiphora fruticosa*** 2 Empetrum nigrum** 2 Juniperus communis* 2 Lupinus latifolius 2 Lupinus lepidus*** 2 Solidago multiradiata***

▶ [**065**] Achillea millefolium 2 Allium* Cerastium arvense* Erigeron* Eriophyllum lanatum* Festuca roemeri* 2 Lilium* Luzula hitchcockii+* Paxistima myrsinites* 2 Pseudoroegneria spicata* Sedum lanceolatum+* [**keep**] C-LT5** SHRB* 2 Dasiphora fruticosa* 2 Empetrum nigrum 2 Lupinus latifolius 2 Lupinus lepidus* 2 Solidago multiradiata*

▶ [**086**] Antennaria lanata+* Bistorta bistortoides* Carex spectabilis+* Cassiope mertensiana* 2 Cherleria/Sabulina 2 Empetrum nigrum 16 Erigeron* Luetkea pectinata* Pedicularis ornithorhynchos* Phyllodoce glanduliflora 2 Salix nivalis+ 2 Vaccinium deliciosum* Veronica cusickii+* [**keep**] C-LT5* SHRB*** 2 Abies lasiocarpa* Arctostaphylos uva-ursi+** 16 Dasiphora fruticosa*** 2 Solidago multiradiata*

▶ [**095**] Antennaria lanata+* Bistorta bistortoides* Douglasia laevigata* Erysimum arenicola* Juncus parryi+* 2 Juniperus communis 10 Luzula hitchcockii+* Micranthes tolmiei+* [**keep**] SHRB* 2 Arctostaphylos uva-ursi+** 8 Campanula rotundifolia+* Dasiphora fruticosa** 2 Empetrum nigrum*** 2 Lupinus lepidus* 2 Solidago multiradiata*

▶ [**104**] C-GT5* Bistorta bistortoides* Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* 2 Juniperus communis 10 Micranthes tolmiei+* Paxistima myrsinites* Phacelia* Phlox diffusa 5 Poa cusickii+* Silene parryi 2 [**keep**] SHRB* Abies lasiocarpa* Arctostaphylos uva-ursi+*** 2 Campanula rotundifolia+** Dasiphora fruticosa*** 2 Empetrum nigrum** 2 Lupinus lepidus*** 2 Solidago multiradiata*

Floristics (5 plots, MORA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 1		Arctostaphylos uva-ursi+ 45	
80-95		Dasiphora fruticosa 7	Juniperus communis 6, Lupinus lepidus 4, Solidago multiradiata 1	
60-80			Empetrum nigrum 10, Phlox diffusa 3, Campanula rotundifolia+ 1, Achillea millefolium 1	
40-60	Pinus albicaulis 1		Lupinus latifolius 4, Pedicularis contorta+ 2, Penstemon procerus+ 2	
10-25	Pinus contorta 1		Phyllodoce empetriformis 10, Artemisia 5, Lomatium martindalei 3, Eremogone capillaris 2, Potentilla flabellifolia+ 2, Silene parryi 1, Phyllodoce glanduliflora 1, Gentiana calycosa 1, Cherleria/Sabulina 1	lichen 40, Phleum alpinum 2, Carex spectabilis+ 2, Festuca viridula 2, Elymus 1, Trisetum 1

{064} Arctostaphylos uva-ursi, Fragaria virginiana, Racomitrium spp.
Kinnikinnick, Virginia strawberry & racomitrium dwarf shrubland
ARCUVA-FRAVIR/RACOMITRIUM



Range: Lowland and lower montane zones, on balds. **NOCA-5**: **ne**-**ce** (cw) 550-700m. May occur in MORA.

Struct: Open dwarf shrubland with dense mosses & lichens, and substantial forbs & grasses. Avg vasc cover 44: dwf shrb 15, forb 11, grass 7, fern 2, tall shrb 0.8 @ 1, shrb 0.4 @ 6, conif LT5 0.4 @ 4, conif GT5 0.4 @ 3.

Ecology: Bedrock bald openings on fairly steep slopes and midslope benches with southerly aspects, embedded in dry *Pseudotsuga menziesii* woodland. Small *Pseudotsuga menziesii* are frequently present, often with small *Pinus contorta*.

Metrics: slope 27-36°, vdp 26-79m, vdr 170-206m, east 9-71, south 77-95, conv 52-54, tpp 33-53, solar 64-72, wet 2-3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: New name for ARCUVA-FRAVIR-(FESROE) to clarify that the NCCN plots are only in NOCA and therefore lack *Festuca roemeri*.

Similar: MNO:[103] PENDAV/RACOMITRIUM, N:[061] ARCNEV-PAXMYR/CALRUB, MNO:[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, N:[062] ARCNEV/PSESPI, N:[119] PINCON/PAXMYR/CALRUB, N:[131] PSESPI/SELWAL, N:[078] CEAVEL-(SPIBET)/CALRUB, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[099] LEWCOL-(JUNPAR). Also see: [060] ARCCOL/RACOMITRIUM, [083] DANINT/RACOMITRIUM, [095] JUNCOM-(PHLDIF), [102] PAXMYR/PHLDIF

▶ [**061**] C-LT5* Calamagrostis rubescens+* Hieracium scouleri+** Paxistima myrsinites 2 Pinus ponderosa** Pseudoroegneria spicata 2 [**keep**] SHRB 2 Achillea millefolium 2 Collinsia parviflora** Erythronium montanum+** Fragaria virginiana*** 2 Holodiscus discolor 2 Luzula hitchcockii+** Penstemon procerus+* Pinus contorta* Racomitrium* 11 Selaginella wallacei+* 2 Spiraea lucida** Woodsia*

▶ [**062**] C-LT5* SHRB* Bromus tectorum+ 2 Ceanothus velutinus** Pinus ponderosa*** Pseudoroegneria spicata*** 2 [**keep**] C-LT5 2 Achillea millefolium 2 Collinsia parviflora* Erythronium montanum+* Fragaria virginiana* 2 Holodiscus discolor 2 Luzula hitchcockii+* Penstemon procerus+* Pinus contorta* Racomitrium* Selaginella wallacei+* 3 Spiraea lucida* Woodsia*

▶ [**103**] Juncus parryi+* Lomatium martindalei 2 Micranthes tolmiei+* Montia* Selaginella wallacei+ 11 [**keep**] C-LT5 2 SHRB 2 Achillea millefolium 2 Fragaria virginiana* 2 Holodiscus discolor 2 Paxistima myrsinites* Spiraea lucida** Woodsia***

▶ [**119**] C-LT5* C-GT5 5 SHRB* Calamagrostis rubescens+** Ceanothus velutinus*** 2 Paxistima myrsinites 2 Pinus contorta* 4 Pseudotsuga menziesii 4 Salix scouleriana* Spiraea lucida 2 [**keep**] Achillea millefolium* 2 Amelanchier alnifolia* Arctostaphylos uva-ursi+ 6 Collinsia parviflora* Cryptogramma acrostichoides* Fragaria virginiana*** Holodiscus discolor 2 Luzula hitchcockii+* Penstemon procerus+ 2 Selaginella wallacei+* 2 Woodsia***

▶ [**218**] Allium* Anticlea/Toxicoscordion* 2 Berberis aquifolium* 2 Eriophyllum lanatum* Festuca roemeri 2 Fritillaria affinis* Lomatium martindalei* Lomatium nudicaule+* Micranthes tolmiei+* Selaginella wallacei+* [**keep**] C-LT5 2 Arctostaphylos uva-ursi+* 3 Paxistima myrsinites*** Penstemon procerus+ 2 Spiraea lucida*. Note: [218] is a grass-dominated bald.

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Arctostaphylos uva-ursi+ 14, Paxistima myrsinites 1, Spiraea lucida 0	
80-95		Amelanchier alnifolia 1	Achillea millefolium 5	Racomitrium 41, moss 24, Cryptogramma acrostichoides 2
60-80	Pseudotsuga menziesii 3		Fragaria virginiana 3	Woodsia 0
40-60	Pinus contorta 2	Holodiscus discolor 6	Penstemon procerus+ 4, Collinsia parviflora 1, Erythronium montanum+ 0	Selaginella wallacei+ 6, Danthonia 2, Luzula hitchcockii+ 0
10-25	Callitropsis nootkatensis 1	Prunus emarginata 2	Eriophyllum lanatum 3, Penstemon serrulatus+ 3, Eremogone capillaris 3, Lomatium nudicaule+ 2, Antennaria lanata+ 1, Stellaria 1	Calamagrostis rubescens+ 15, Koeleria macrantha 10, Elymus 3, Vulpia 2, lichen 2, Carex geyeri+ 1

{065} Arctostaphylos uva-ursi, Juniperus communis
Kinnikinnick & common juniper dwarf shrubland
ARCUVA-JUNCOM



Range: Subalpine zone, on balds. **MORA**-3: (nw-ne-se) 1700-1760m. **OLYM**-1: (nc) 1330-1340m.

Struct: Semi-open dwarf shrubland with substantial forbs and prominent grasses. Avg vasc cover 51: dwf shrb 40, forb 7, grass 4, conif GT5 0.5 @ 0, rush 0.5 @ 0.

Ecology: Balds on fairly steep south-facing upper slopes, on very dry shallow soils.

Metrics: slope 28-34°, vdp 180-214m, vdr 650-938m, east 43-58, south 94-100, conv 64-72, tpp 73-94, solar 80-88, wet 1

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Evolved from the single plot called to ARC(NEV,UVA)-JUNCOM which was not a better fit for other assns, incorporating a treeless plot from [022] ABILAS-(PINCON)/JUNCOM-LOMMAR and several other stray plots.

Similar: MNO:[103] PENDAV/RACOMITRIUM, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[095] JUNCOM-(PHLDIF), O:[089] FESROE-(PHLDIF-ARECAP), M:[063] ARCUVA-(DASFLO), N:[061] ARCNEV-PAXMYR/CALRUB, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, N:[099] LEWCOL-(JUNPAR), N:[062] ARCNEV/PSESPI, NO:[093] HERMAX-(THAOCC-SAUAME).

▶ [**063**] C-LT5** SHRB* 2 Dasiphora fruticosa* 2 Empetrum nigrum 2 Lupinus latifolius 2 Lupinus lepidus* 2 Solidago multiradiata* [**keep**] Achillea millefolium 2 Allium* Cerastium arvense* Erigeron* Eriophyllum lanatum* Festuca roemeri* 2 Lilium* Luzula hitchcockii+* Paxistima myrsinites* 2 Pseudoroegneria spicata* Sedum lanceolatum+*

▶ [**089**] C-LT5 2 FORB 13 Eremogone capillaris* 2 Festuca roemeri 8 Juncus parryi+ 2 Lupinus latifolius 2 Phlox diffusa 2 [**keep**] Arctostaphylos uva-ursi+*** 2 Erigeron* Juniperus communis 4 Lilium** Luzula hitchcockii+** Paxistima myrsinites** 2 Penstemon procerus+** Pseudoroegneria spicata** Sedum lanceolatum+**

▶ [**095**] C-LT5* Eremogone capillaris 2 Juncus parryi+ 2 Phlox diffusa 2 [**keep**] C-GT5* Allium* Arctostaphylos uva-ursi+* 8 Cerastium arvense* Eriophyllum lanatum* Lilium*** Paxistima myrsinites* Pseudoroegneria spicata***

▶ [**103**] Cryptogramma acrostichoides* Lomatium martindalei 3 Penstemon procerus+ 2 Pseudotsuga menziesii* Racomitrium* 2 Selaginella wallacei+ 2 [**keep**] Abies lasiocarpa* Achillea millefolium 2 Allium* Arctostaphylos uva-ursi+ 9 Campanula rotundifolia+*** Cerastium arvense* Elymus* Erigeron*** Eriophyllum lanatum* Festuca roemeri* Juniperus communis 4 Phlox diffusa*** Sedum lanceolatum+***. Note: [103] is a bald with dense non-vascular cover.

▶ [**104**] C-LT5* FORB 12 Artemisia 2 Carex phaeocephala+ 2 Carex spectabilis+ 2 Lupinus latifolius* Phlox diffusa 2 Silene parryi 2 [**keep**] Arctostaphylos uva-ursi+*** 2 Campanula rotundifolia+** Cerastium arvense* Elymus* Festuca roemeri* Lilium** Luzula hitchcockii+** Paxistima myrsinites 2 Penstemon procerus+* Pseudoroegneria spicata** Sedum lanceolatum+**

Floristics (2 plots, MORA 1, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Arctostaphylos uva-ursi+ 22, Juniperus communis 16, Phlox diffusa 1, Penstemon procerus+ 1	
40-60	Abies lasiocarpa 0		Paxistima myrsinites 3, Achillea millefolium 3, Sedum lanceolatum+ 2, Lomatium martindalei 2, Eriophyllum lanatum 2, Erigeron 1, Campanula rotundifolia+ 1, Allium 0, Lilium 0, Erysimum arenicola 0, Cerastium arvense 0	moss 10, lichen 10, Festuca roemeri 5, Pseudoroegneria spicata 1, Elymus 1, Luzula hitchcockii+ 0

{066} Artemisia ludoviciana, Lomatium martindalei
White sagebrush & Cascades desert-parsley herbaceous vegetation
ARTLUD-LOMMAR



Range: Upper montane and subalpine zones, on exposed rocks. **NOCA**-1: (cw-s) 1590-1600m. **OLYM**-2: **ne** 1680-1690m.

Struct: Semi-closed canopy forb-dominated vegetation. Avg vasc cover 66: forb 62, grass 0.67 @ 3, sedge 0.67 @ 2, fern 0.33 @ 3. (Assumes plot delineation excludes much of the open rock that is typical in the surroundings.)

Ecology: Concavities on steep south-facing scree and talus slopes.

Metrics: slope 29-45°, vdp 49-84m, vdr 761-767m, east 37-60, south 94-96, conv 39-44, tpp 37-43, solar 80-87, wet 3

Map class: H55–Olympic aster scree meadow

Rel to C09: Same.

Similar: NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[093] HERMAX-(THAOCC-SAUAME), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[217] VALSIT-VERVIR, MNO:[215] VALSIT-CARSPE, O:[085] ELMRAC-EPIANA, O:[089] FESROE-(PHLDIF-ARECAP), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[100] LUEPEC-(CARSPE).

▶ [**079**] C-LT5* SHRB* TSHRB* Arnica latifolia+ 2 Aruncus dioicus* Athyrium distentifolium* 2 Chamaenerion latifolium 2 Erythranthe lewisii+* Luetkea pectinata* 2 Oxyria digyna* 2 Senecio triangularis+* Veratrum viride* Veronica cusickii+* [**keep**] Artemisia*** 2 Bistorta bistortoides 2 Cirsium edule+ 2 Lomatium martindalei*** Phacelia*** 2 Phlox diffusa 2 Viola glabella+***

▶ [**088**] C-LT5* SHRB* 2 Achillea millefolium* Carex spectabilis+ 2 Eucephalus paucicapitatus* 2 Lupinus latifolius* 2 Silene parryi* Spiraea splendens 2 Vaccinium membranaceum 2 [**keep**] Agrostis** Allium* Aquilegia formosa* Artemisia 9 Calamagrostis canadensis+** 2 Carex phaeocephala+* Chamaenerion latifolium** Cirsium edule+ 2 Heuchera cylindrica** Penstemon serrulatus+* Silene douglasii** 2 Viola glabella+***

▶ [**093**] C-LT5* SHRB* TSHRB* Achillea millefolium* Bromus sitchensis* 2 Carex spectabilis+ 2 Elymus* 2 Heracleum maximum* 2 Thalictrum occidentale* 2 [**keep**] Artemisia* 12 Carex phaeocephala+ 2 Cryptogramma acrostichoides 2 Lomatium martindalei*** Phacelia** Phlox diffusa 2 Valeriana sitchensis 4 Viola glabella+*

▶ [**104**] C-LT5* 2 Abies lasiocarpa* Achillea millefolium* Carex spectabilis+ 2 Eriophyllum lanatum 2 Juniperus communis* 2 Lupinus latifolius* 2 Phlox diffusa* Silene parryi* 2 [**keep**] Aquilegia formosa* Artemisia* Bistorta bistortoides 3 Castilleja hispida 2 Castilleja miniata* Cirsium edule+** 2 Cryptogramma acrostichoides 2 Epilobium** Lomatium martindalei* Phacelia* Valeriana sitchensis* 2 Viola glabella+***

▶ [**217**] SHRB 2 Carex spectabilis+ 2 Lupinus latifolius* 2 Potentilla flabellifolia+ 2 Senecio triangularis+ 2 Veratrum viride* 2 [**keep**] Artemisia*** 2 Carex phaeocephala+ 2 Castilleja hispida 2 Cirsium edule+ 2 Lomatium martindalei*** Phacelia** Silene douglasii 2 Viola glabella+*

Floristics (3 plots, NOCA 1, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Artemisia 27, Phacelia 3, Lomatium martindalei 1, Viola glabella+ 1	
60-80			Valeriana sitchensis 10, Cirsium edule+ 7, Aquilegia formosa 3, Castilleja miniata 2, Epilobium 1	
25-40			Phlox diffusa 20, Bistorta bistortoides 8, Castilleja hispida 3, Silene douglasii 3, Agoseris 1, Sedum divergens 1, Chamaenerion angustifolium 1, Orthocarpus imbricatus 1, Eucephalus paucicapitatus 1, Arnica mollis+ 1, Penstemon serrulatus+ 1, Allium 1, Heuchera cylindrica 0, Delphinium 0, Hedysarum occidentale 0, Chamaenerion latifolium 0, Erigeron 0, Campanula rotundifolia+ 0	Carex phaeocephala+ 3, Calamagrostis canadensis+ 3, Cryptogramma acrostichoides 3, moss 3, Agrostis 1, Poa cusickii+ 1, Carex spectabilis+ 1

{067} Athyrium distentifolium, Cryptogramma acrostichoides
Alpine lady fern & American parsley fern herbaceous vegetation
ATHAME-CRYACR



Range: Upper montane zone, on exposed rocks. **MORA**-1: (nw) 1630-1640m. **NOCA**-13: **nw-s*** (ne-cw) 1260-1520m. **OLYM**-4: **nc** (sc-se) 1450-1500m.

Struct: Open mixed herbaceous vegetation with abundant ferns and substantial forbs & sedges. Avg vasc cover 30: fern 15, forb 0.94 @ 9, sedge 0.81 @ 5, conif LT5 0.5 @ 0.

Ecology: Moist concavities on talus slopes.

Metrics: slope 17-29°, vdp 1-10m, vdr 413-878m, east 35-97, south 33-87, conv 34-38, tpp 15-40, solar 49-70, wet 3-5

Map class: H54–Moist talus vegetation

Rel to C09: Same, though shedding some plots to [169] SAXTOL-LUZPIP-(CARNIG).

Similar: MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[100] LUEPEC-(CARSPE), MNO:[217] VALSIT-VERVIR, O:[085] ELMRAC-EPIANA, MNO:[215] VALSIT-CARSPE, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[103] PENDAV/RACOMITRIUM, MNO:[070] CARAQU-(MENTRI-EQUISETUM), MN:[071] CARNIG-CARLEN-(CALCAN).

▶ [**079**] FORB 16 Arnica latifolia+ 2 Aruncus dioicus* Chamaenerion latifolium*** 2 Erythranthe lewisii+* Oxyria digyna* 2 Senecio triangularis+* Valeriana sitchensis 3 Veronica cusickii+* [**keep**] Carex spectabilis+* Cryptogramma acrostichoides*
▶ [**085**] Arnica latifolia+ 2 Elmera racemosa** [**keep**] Athyrium distentifolium* 3 Carex spectabilis+*** 2 Cryptogramma acrostichoides*
▶ [**100**] Cassiope mertensiana* Juncus parryi+* Luetkea pectinata* Luzula piperi+*** Phyllodoce empetriformis* [**keep**] TSHRB* Athyrium distentifolium* 2 Cryptogramma acrostichoides* Sorbus sitchensis** Valeriana sitchensis* Veratrum viride*
▶ [**215**] Abies lasiocarpa* Arnica latifolia+* Bistorta bistortoides* 2 Chamaenerion angustifolium* Erythronium montanum+* Eucephalus ledophyllus+** 2 Lupinus latifolius*** 2 Pedicularis bracteosa** Potentilla flabellifolia+* Thalictrum occidentale 2 Vaccinium deliciosum** Valeriana sitchensis 3 [**keep**] Athyrium distentifolium** 3 Cryptogramma acrostichoides***
▶ [**217**] FORB 17 SHRB 2 Lupinus latifolius** 2 Potentilla flabellifolia+ 2 Senecio triangularis+ 2 Valeriana sitchensis 3 Veratrum viride* 2 [**keep**] Athyrium distentifolium*** 2 Cryptogramma acrostichoides*** Luetkea pectinata***

Floristics (16 plots, NOCA 12, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Athyrium distentifolium 15
80-95				Carex spectabilis+ 5
60-80			Valeriana sitchensis 2	Cryptogramma acrostichoides 0
40-60		Sorbus sitchensis 0	Luetkea pectinata 5, Veratrum viride 0, Epilobium 0	moss 3
25-40			Phyllodoce empetriformis 1, Erigeron 1, Phacelia 1, Hieracium triste 0	Juncus parryi+ 1, Vahlodea atropurpurea 1
10-25			Artemisia 7, Elmera racemosa 3, Chamaenerion angustifolium 3, Anaphalis margaritacea 2, Symphyotrichum foliaceum 1, Erythranthe lewisii+ 1, Potentilla flabellifolia+ 1, Oxyria digyna 1, Arnica latifolia+ 1	lichen 2, Juncus mertensianus+ 1

{068} Betula papyrifera, Pseudotsuga menziesii, Acer circinatum, Paxistima myrsinites
Paper birch, Douglas-fir, vine maple & Oregon-box forest
BETPAP-PSEMEN/ACECIR/PAXMYR



Range: Lowland zone. **NOCA**-7: **ne*** 630-750m.

Struct: Mostly closed mixed broadleaf-conifer forest with prominent conifer regen, very dense tall shrubs, abundant dwarf shrubs, and substantial shrubs. Avg vasc cover 154: tall shrb 52, brdlf tree 36, dwf shrb 28, conif tree 23, shrb 8, forb 3, conif regen 0.71 @ 3, fern 0.29 @ 2.

Ecology: Seral forests on fairly steep slopes, on lower slope debris aprons or near rock slides and outcrops. Typically impacted by blowdown and/or fire. Regen usually dominated by *Pseudotsuga menziesii*, occasionally by *Thuja plicata*. The name is somewhat misleading in that *Berberis nervosa* is the dominant dwarf shrub. Prominent *Paxistima myrsinites* is more useful in discriminating the association, however.

Metrics: slope 24-35°, vdp 9-21m, vdr 112-210m, east 15-87, south 52-90, conv 44-49, tpp 38-49, solar 57-70, wet 3-4

Map class: B35–Upland paper birch & conifer forest

Rel to C09: Split from [069] BETPAP-(THUPLI)/ACECIR/MAHNER to represent a variant with more eastside affinities; adding some plots from PSEMEN/ACECIR/MAHNER.

Similar: N:[069] BETPAP-(THUPLI)/ACECIR/MAHNER, N:[133] PSEMEN/ACECIR/MAHNER, MN:[038] (ACEMAC)/ACECIR-PAXMYR, N:[141] PSEMEN/MAHNER/CALRUB, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, N:[138] PSEMEN/HOLDIS/CALRUB, MO:[140] PSEMEN/MAHNER/ACHTRI, N:[142] PSEMEN/PAXMYR-SPIBET, N:[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR.

▶ [**038**] B-LT5 2 Acer macrophyllum* 14 Callitropsis nootkatensis* Chamaenerion angustifolium* Corylus cornuta 2 Cryptogramma acrostichoides* Galium* Maianthemum racemosum* Maianthemum stellatum* Populus trichocarpa* Rubus leucodermis* Sambucus racemosa* [**keep**] B-GT5* C-GT5* 11 Amelanchier alnifolia* Berberis aquifolium*** Berberis nervosa*** 8 Betula papyrifera*** 10 Chimaphila umbellata*** Lysimachia latifolia** Pseudotsuga menziesii* 6 Rosa* Rubus nutkanus* Rubus ursinus 2 Spiraea lucida***
▶ [**069**] Alnus rubra 2 Gaultheria shallon* 2 Linnaea borealis* 2 Pteridium aquilinum* Thuja plicata* 3 Tsuga heterophylla* Vaccinium parvifolium* [**keep**] TSHRB 26 Acer glabrum* 3 Amelanchier alnifolia* 2 Berberis aquifolium** Chimaphila umbellata* Corylus cornuta* Paxistima myrsinites 2 Prosartes* Prunus emarginata* Rubus nutkanus* Spiraea lucida* Symphoricarpos albus***
▶ [**133**] Festuca occidentalis+** Fragaria virginiana* Galium* Hieracium albiflorum** Holodiscus discolor 2 Linnaea borealis*** Thuja plicata 2 Tsuga heterophylla* Vaccinium membranaceum*** Vaccinium parvifolium* [**keep**] B-GT5* 4 Acer glabrum 6 Acer macrophyllum 4 Betula papyrifera** 3 Prunus emarginata** Rubus nutkanus* Rubus ursinus 2
▶ [**139**] FORB 6 Achlys triphylla** 2 Bromus vulgaris+* Campanula scouleri* Chimaphila umbellata 2 Festuca occidentalis+** Hieracium albiflorum* Holodiscus discolor* 2 Lathyrus polyphyllus 2 Linnaea borealis* 2 Polystichum munitum* Symphoricarpos mollis* Tsuga heterophylla* [**keep**] B-GT5* 8 TSHRB 18 Acer circinatum*** 2 Acer glabrum* Amelanchier alnifolia* Berberis aquifolium* Betula papyrifera*** 2 Corylus cornuta*** Paxistima myrsinites** 2 Prunus emarginata** Rubus nutkanus***
▶ [**141**] Arctostaphylos uva-ursi+ 2 Calamagrostis rubescens+*** 2 Festuca occidentalis+** Fragaria virginiana** Goodyera oblongifolia* Hieracium albiflorum*** Holodiscus discolor* Linnaea borealis** 2 Lonicera ciliosa* Moehringia macrophylla** Symphoricarpos albus 2 Vaccinium membranaceum 2 [**keep**] B-GT5** 2 TSHRB 14 Acer circinatum 7 Acer glabrum* 6 Acer macrophyllum 4 Betula papyrifera*** 6 Paxistima myrsinites 3 Rubus nutkanus**

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Betula papyrifera 33, Pseudotsuga menziesii 24	Acer circinatum 34, Acer glabrum 12, Rosa 3	Berberis nervosa 19, Lysimachia latifolia 2	
80-95		Amelanchier alnifolia 3, Rubus nutkanus 2	Paxistima myrsinites 8	
60-80		Berberis aquifolium 3, Prunus emarginata 3, Corylus cornuta 1		
40-60	Acer macrophyllum 9, Thuja plicata 1	Symphoricarpos albus 1, Lonicera ciliosa 1	Rubus ursinus 3, Chimaphila umbellata 1, Spiraea lucida 1, Orthilia secunda 1, Goodyera oblongifolia 0, Chimaphila menziesii 0, Prosartes 0	moss 4
25-40		Holodiscus discolor 0	Osmorhiza 1, Maianthemum racemosum 0	
10-25	Tsuga heterophylla 3, Abies grandis 2, Taxus brevifolia 1	Oplopanax horridus 1, Cornus stolonifera/occidentalis 1	Streptopus amplexifolius 3, Cornus unalaschkensis 2, Corallorhiza 1, Pyrola asarifolia+ 1	Pteridium aquilinum 3, Polypodium hesperium+ 1

{069} Betula papyrifera, Thuja plicata*, Acer circinatum, Berberis nervosa
Paper birch, redcedar*, vine maple & dwarf Oregon-grape forest
BETPAP-(THUPLI)/ACECIR/MAHNER



Range: Lowland zone. **NOCA**-16: **nw-ne*** (cw) 320-540m.

Struct: Closed mixed conifer-broadleaf forest with substantial conifer regen, abundant dwarf shrubs & tall shrubs, and substantial shrubs. Avg vasc cover 131: conif tree 42, brdlf tree 30, tall shrb 17, dwf shrb 0.94 @ 21, conif regen 0.94 @ 5, forb 0.88 @ 4, shrb 0.81 @ 12, fern 0.63 @ 5, brdlf regen 0.63 @ 1. A dense moss layer is typical.

Ecology: Seral forests on fairly gentle slopes, on lower slope debris aprons or near rock slides and outcrops. Typically impacted by blowdown and/or fire. Regen dominated by *Thuja plicata* and/or *Pseudotsuga menziesii*.

Metrics: slope 10-27°, vdp 1-13m, vdr 19-165m, east 15-70, south 57-90, conv 45-50, tpp 39-51, solar 56-68, wet 3-5

Map class: B35–Upland paper birch & conifer forest

Rel to C09: Similar, but excluding plots segregated into the eastside variant [068] BETPAP-PSEMEN/ACECIR/PAXMYR, and adding some plots from PSEMEN/ACECIR/MAHNER and PSEMEN/GAUSHA-VACPAR.

Similar: N:[133] PSEMEN/ACECIR/MAHNER, N:[068] BETPAP-PSEMEN/ACECIR/PAXMYR, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, N:[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR, MO:[151] PSEMEN-TSUHET/ACHTRI. Also see: [155] PSEMEN-TSUHET/MAHNER.

▶ [**042**] Acer macrophyllum 11 Alnus rubra* Athyrium filix-femina** 2 Circaea alpina** 2 Claytonia sibirica+*** Dryopteris* Galium* Lactuca** Polystichum munitum* 3 Prosartes* Tolmiea menziesii*** 2 [**keep**] SHRB 5 Acer glabrum*** Berberis nervosa* 3 Betula papyrifera* Gaultheria shallon 2 Goodyera oblongifolia*** Linnaea borealis 2 Paxistima myrsinites*** Pseudotsuga menziesii* Rosa**
▶ [**068**] TSHRB 26 Acer glabrum* 3 Amelanchier alnifolia* 2 Berberis aquifolium** Chimaphila umbellata* Corylus cornuta* Paxistima myrsinites 2 Prosartes* Prunus emarginata* Rubus nutkanus* Spiraea lucida* Symphoricarpos albus*** [**keep**] Alnus rubra 2 Gaultheria shallon* 2 Linnaea borealis* 2 Pteridium aquilinum* Thuja plicata* 3 Tsuga heterophylla* Vaccinium parvifolium*
▶ [**132**] Abies amabilis 2 Clintonia uniflora** Maianthemum racemosum* Maianthemum stellatum* Oplopanax horridus*** Prosartes** 2 Rubus nutkanus* Spiraea lucida* Trillium ovatum* Vaccinium membranaceum* Viola glabella+** [**keep**] B-GT5 6 SHRB 3 Alnus rubra 2 Berberis nervosa* 4 Betula papyrifera** 2 Gaultheria shallon 2 Pteridium aquilinum 2 Tsuga heterophylla*
▶ [**133**] Amelanchier alnifolia*** Berberis aquifolium*** Chimaphila umbellata** Corylus cornuta* Holodiscus discolor* 2 Linnaea borealis* Lonicera ciliosa** Lysimachia latifolia* Paxistima myrsinites 2 Spiraea lucida** Vaccinium membranaceum** [**keep**] B-LT5* B-GT5* 4 Acer macrophyllum* Alnus rubra 2 Betula papyrifera** 3 Gaultheria shallon 2 Pteridium aquilinum* 2 Rubus ursinus*
▶ [**157**] Chimaphila umbellata* Gaultheria ovatifolia** Hieracium albiflorum* Linnaea borealis* Pinus monticola*** Pyrola asarifolia+* Tsuga heterophylla 12 Vaccinium membranaceum** 2 [**keep**] B-GT5*** Acer macrophyllum 2 Alnus rubra 2 Berberis nervosa 4 Betula papyrifera*** 2 Gaultheria shallon 2

Floristics (16 plots, NOCA 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 25, Betula papyrifera 25			
80-95	Thuja plicata 19, Tsuga heterophylla 8	Acer circinatum 16	Berberis nervosa 19	moss 33
60-80	Acer macrophyllum 6	Rosa 1		Pteridium aquilinum 4
40-60		Acer glabrum 2	Paxistima myrsinites 1, Lysimachia latifolia 1, Rubus ursinus 1, Goodyera oblongifolia 0	
25-40	Alnus rubra 3	Gaultheria shallon 25, Corylus cornuta 2, Vaccinium parvifolium 2, Rubus nutkanus 1, Holodiscus discolor 1	Linnaea borealis 3, Chimaphila umbellata 1, Cornus unalaschkensis 1, Osmorhiza 1, Adenocaulon bicolor 0	Polystichum munitum 1
10-25	Populus trichocarpa 6, Cornus nuttallii 2	Lonicera ciliosa 1, Frangula purshiana 1, Prunus emarginata 1, Amelanchier alnifolia 1, Vaccinium membranaceum 1, Rhododendron menziesii 1	Claytonia perfoliata 8, Clintonia uniflora 2, Maianthemum stellatum 1, Maianthemum racemosum 1, Spiraea lucida 1, Orthilia secunda 1, Pyrola asarifolia+ 1, Prosartes 1	

{070} Carex aquatilis, Menyanthes trifoliata*, Equisetum spp.*
Water sedge, buckbean* & horsetail* herbaceous vegetation
CARAQU-(MENTRI-EQUISETUM)



Range: Coastal, lowland and lower montane zones, in wetlands. **MORA**-1: (sw) 750-760m. **NOCA**-17: **nw**-**ne** (cw-ce-s) 500-710m. **OLYM**-14: **nw**-**nc**-**ne**-**sc** (sw-se) 50-970m.

Struct: Emergent and aquatic bed marshes; closed canopy sedge-dominated vegetation, frequently with substantial submerged and floating forbs. Avg vasc cover 76: sedge 55, forb 0.74 @ 11, shrb 0.63 @ 5, grass 0.52 @ 9, tall shrb 0.41 @ 3, rush 0.19 @ 3.

Ecology: Freshwater marshes, on organic soils, typically on pond and lake margins with standing water much of the year. Adjacent landward vegetation is often dominated by *Spiraea douglasii*.

Metrics: slope 0-3°, vdp 1-1m, vdr 1-297m, east 41-92, south 6-68, conv 43-49, tpp 10-31, solar 58-62, wet 6-8

Map class: H50W–Lowland marsh & meadow

Rel to C09: Created from a large variety of lower elevation single-species wetland types, e.g. CAREXS, SCIMIC, CARUTR, CARAQD, NUPLUT, whose floristics had significant overlap.

Similar: MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MN:[071] CARNIG-CARLEN-(CALCAN), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[100] LUEPEC-(CARSPE), MNO:[103] PENDAV/RACOMITRIUM, MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[217] VALSIT-VERVIR, MO:[179] TRICAE-DODJEF.

▶ [**071**] Agrostis** Carex kelloggii+** Carex nigricans+*** 2 Danthonia 2 Erigeron 2 Eriophorum angustifolium 9 Gentiana calycosa*** Juncus mertensianus+* Leptarrhena pyrolifolia*** Phyllodoce empetriformis*** Potentilla flabellifolia+*** Salix commutata+*** 2 Spiraea splendens** [**keep**] B-LT5* TSHRB* Carex aquatilis+* 19 Equisetum hyemale+* 2 Menyanthes trifoliata* 2 Salix sitchensis+* Scirpus microcarpus** 2 Spiraea douglasii** 2 Thuja plicata*

▶ [**093**] Achillea millefolium*** Artemisia 2 Cirsium edule+*** Elymus 2 Heracleum maximum*** 2 Lupinus latifolius 2 Thalictrum occidentale*** 2 [**keep**] B-LT5* Carex aquatilis+*** 2 Equisetum hyemale+** 2 Menyanthes trifoliata** 2 Salix sitchensis+* Scirpus microcarpus*** 2 Spiraea douglasii** Thuja plicata**

▶ [**100**] C-LT5* Cassiope mertensiana*** Juncus parryi+*** Luetkea pectinata*** 2 Luzula piperi+*** Phyllodoce empetriformis*** 2 [**keep**] B-LT5** SHRB* 2 TSHRB* Carex aquatilis+*** 2 Equisetum hyemale+** 2 Menyanthes trifoliata** 2 Salix sitchensis+* Scirpus microcarpus** 2 Spiraea douglasii** 2 Thuja plicata**

▶ [**103**] Arctostaphylos uva-ursi+*** 2 Cryptogramma acrostichoides*** Lomatium martindalei 2 Luzula hitchcockii+*** Montia*** Penstemon procerus+*** 2 Pseudotsuga menziesii** Racomitrium*** 2 Selaginella wallacei+ 2 [**keep**] SHRB* 2 Carex aquatilis+** 2 Equisetum hyemale+* 2 Menyanthes trifoliata* 2 Salix sitchensis+* Scirpus microcarpus* 2 Spiraea douglasii* 2 Thuja plicata*

▶ [**167**] B-LT5 2 B-GT5* C-GT5* TSHRB* 5 Alnus viridis 2 Athyrium filix-femina* Cornus stolonifera/occidentalis* 2 Equisetum arvense+ 2 Lysichiton americanus* 2 Rubus spectabilis*** Salix sitchensis+* 4 Spiraea douglasii* [**keep**] Equisetum hyemale+ 4 Erythranthe* Juncus mertensianus+* Menyanthes trifoliata* Nuphar polysepala* Platanthera* Scirpus microcarpus*

Floristics (27 plots, MORA 1, NOCA 18, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
60-80				Carex aquatilis+ 45
40-60		Spiraea douglasii 5		Scirpus microcarpus 30
25-40	Thuja plicata 1	Salix sitchensis+ 2	Menyanthes trifoliata 9	Equisetum hyemale+ 14
10-25	Tsuga heterophylla 1, Alnus rubra 1	Alnus viridis 1, Cornus stolonifera/occidentalis 1	Nuphar polysepala 12, Platanthera 5, Viola glabella+ 2, Erythranthe 2, Comarum palustre 2, Lysichiton americanus 1, Epilobium 1	Calamagrostis canadensis+ 12, moss 5, Juncus mertensianus+ 3, Glyceria 3, Phalaris arundinacea 3, Athyrium filix-femina 1, Equisetum arvense+ 1

{071} Carex nigricans, Carex kelloggii, Calamagrostis canadensis*
Black alpine sedge, lakeshore sedge & bluejoint reedgrass* herbaceous vegetation
CARNIG-CARLEN-(CALCAN)



Range: Upper montane, transitional to subalpine zone, in wetlands. **MORA**-8: **sw-se** (ne) 1420-1650m. **NOCA**-10: **se** (nw-ne-sw) 1490-1690m.

Struct: Closed canopy sedge-dominated vegetation with abundant forbs and substantial shrubs. Avg vasc cover 98: sedge 64, forb 0.92 @ 18, shrb 0.85 @ 7, dwf shrb 0.69 @ 3, grass 0.62 @ 10, rush 0.62 @ 2.

Ecology: Nearly flat areas in and adjacent to pooled channels.

Metrics: slope 1-4°, vdp 1-34m, vdr 441-792m, east 31-84, south 26-86, conv 41-48, tpp 29-62, solar 64-71, wet 6-8

Map class: H51W–Subalpine herbaceous wetland

Rel to C09: Created by merging various plots from CARLEN, ERIANG/SPHAGN, CARNIG, CARSPE-CARNIG-(POTFLA), etc., and from ambiguous plots with alliance-level calls.

Similar: MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[163] SALCOM/CAREX-(LEPPYR), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[072] CAREX-CALLEP-(LEPPYR), MNO:[164] SALCOM/VALSIT, MNO:[070] CARAQU-(MENTRI-EQUISETUM), MNO:[074] CARNIG-LUEPEC, MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), MO:[179] TRICAE-DODJEF.

▶ [**072**] Bistorta bistortoides*** Caltha* 7 Carex spectabilis+* 2 Cassiope mertensiana* Dodecatheon* 3 Juncus parryi+* Leptarrhena pyrolifolia 4 Micranthes odontoloma+** Pedicularis groenlandica* Petasites frigidus 2 Veratrum viride* Veronica cusickii+* [**keep**] Agrostis* Calamagrostis canadensis+** 2 Carex kelloggii+** 4 Danthonia** 2 Eriophorum angustifolium** 2 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla*** Salix commutata+ 2. Note: [072] is in somewhat higher topographic positions.
▶ [**073**] C-LT5* Caltha* Cassiope mertensiana* 2 Castilleja parviflora+** Dodecatheon* Kalmia microphylla* 3 Larix lyallii*** Tauschia stricklandii 2 Trollius albiflorus* Vaccinium cespitosum** 2 Vaccinium deliciosum* 4 [**keep**] Carex aquatilis+* 2 Carex kelloggii+* Equisetum arvense+ 2 Erigeron 3 Eriophorum angustifolium 9 Juncus mertensianus+* Leptarrhena pyrolifolia* Spiraea splendens*
▶ [**075**] Bistorta bistortoides*** 2 Carex nigricans+* Carex spectabilis+* 2 Castilleja parviflora+** 2 Hieracium triste** Lupinus latifolius* Oreostemma alpigenum 2 Potentilla flabellifolia+ 7 Vaccinium deliciosum* [**keep**] Calamagrostis canadensis+* 2 Carex aquatilis+* 2 Carex kelloggii+* 21 Equisetum arvense+* Eriophorum angustifolium* 2 Juncus mertensianus+* Kalmia microphylla* Leptarrhena pyrolifolia* Sphagnum** Spiraea splendens 2 Triantha occidentalis**
▶ [**163**] C-LT5* SHRB 12 Abies lasiocarpa* Arnica latifolia+** Bistorta bistortoides** Caltha* Carex spectabilis+ 2 Equisetum arvense+* Leptarrhena pyrolifolia 4 Parnassia fimbriata* 2 Pedicularis groenlandica* Phyllodoce empetriformis 3 Salix commutata+* 8 [**keep**] Agrostis* Calamagrostis canadensis+*** 2 Carex kelloggii+* 19 Danthonia* 3 Eriophorum angustifolium* 12 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla*** Potentilla flabellifolia+* Spiraea splendens* 2
▶ [**164**] C-LT5 2 SHRB 12 TSHRB 2 Abies lasiocarpa 2 Mitella*** Phleum alpinum* Salix commutata+* 9 Senecio triangularis+* 2 Valeriana sitchensis** 2 Viola glabella+*** 2 [**keep**] Calamagrostis canadensis+* Carex aquatilis+*** 2 Carex kelloggii+* 19 Carex nigricans+** 6 Danthonia* 3 Eriophorum angustifolium*** 2 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla***

Floristics (13 plots, MORA 4, NOCA 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
60-80			Potentilla flabellifolia+ 4, Phyllodoce empetriformis 2	Carex kelloggii+ 50
40-60		Spiraea splendens 6, Salix commutata+ 5	Gentiana calycosa 3, Leptarrhena pyrolifolia 3	Carex nigricans+ 34, moss 22, Juncus mertensianus+ 2, Agrostis 1
25-40	Abies lasiocarpa 1		Erigeron 9, Caltha 4, Pedicularis groenlandica 3, Kalmia microphylla 2, Veronica cusickii+ 1	Eriophorum angustifolium 32, Carex aquatilis+ 12, Calamagrostis canadensis+ 10, Danthonia 8, Equisetum arvense+ 4
10-25	Picea engelmannii 1		Arnica mollis+ 10, Packera 6, Vaccinium deliciosum 2, Luetkea pectinata 2, Dodecatheon 2, Epilobium 1, Triantha occidentalis 1, Cassiope mertensiana 1, Lupinus latifolius 1, Parnassia fimbriata 1, Symphyotrichum foliaceum 1, Platanthera 1	Sphagnum 27, Phleum alpinum 1, Carex spectabilis+ 1

{072} Carex nigricans*, Carex spectabilis*, Caltha leptosepala, Leptarrhena pyrolifolia*
Black alpine sedge*, showy sedge*, white marsh-marigold & leatherleaf saxifrage* herbaceous vegetation
CAREX-CALLEP-(LEPPYR)



Range: Upper montane and subalpine zones, in wetlands. **MORA**-2: (nw-ne) 1790-1830m. **NOCA**-2: (nw-ne-cw-s) 1470-1640m. **OLYM**-19: **nc**-**sc**-**se** 1270-1460m.

Struct: Closed canopy short-stature mixed herbaceous vegetation with dense forbs, abundant sedges, and prominent dwarf shrubs. Avg vasc cover 83: forb 44, sedge 29, dwf shrb 0.94 @ 4, shrb 0.71 @ 2, conif LT5 0.65 @ 1, rush 0.59 @ 3.

Ecology: Very gentle slopes adjacent to shallow perennial streams, on organic soils which may dry out in late summer. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 1-10°, vdp 1-12m, vdr 593-902m, east 30-86, south 11-83, conv 40-49, tpp 32-48, solar 59-71, wet 4-5

Map class: H51W–Subalpine herbaceous wetland

Rel to C09: Split from CAR(AQD,NIG)-CALLEP to represent higher elevation plots with *Carex nigricans* or *C. spectabilis*, combined with LEPPYR and plots from CARSPE-CARNIG-(POTFLA) and CARNIG.

Similar: MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[163] SALCOM/CAREX-(LEPPYR), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[074] CARNIG-LUEPEC, MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[217] VALSIT-VERVIR, MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[079] CHALAT-(OXYDIG-VALSIT). Also see: [070] CARAQU-(MENTRI-EQUISETUM) (grading to at lower elevations).

▶ [**071**] Agrostis* Calamagrostis canadensis+** 2 Carex kelloggii+** 4 Danthonia** 2 Eriophorum angustifolium** 2 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla*** Salix commutata+ 2 [**keep**] Bistorta bistortoides*** Caltha* 7 Carex spectabilis+* 2 Cassiope mertensiana* Dodecatheon* 3 Juncus parryi+* Leptarrhena pyrolifolia 4 Micranthes odontoloma+** Pedicularis groenlandica* Petasites frigidus 2 Veratrum viride* Veronica cusickii+*

▶ [**073**] Cassiope mertensiana 2 Danthonia 2 Kalmia microphylla*** 2 Vaccinium cespitosum 2 Vaccinium deliciosum 3 [**keep**] Bistorta bistortoides* Carex aquatilis+** 2 Carex spectabilis+* Dodecatheon 2 Equisetum arvense+* 2 Juncus parryi+* Leptarrhena pyrolifolia* 2 Micranthes odontoloma+* Pedicularis groenlandica* Petasites frigidus 2 Spiraea splendens* Veratrum viride*

▶ [**074**] Luetkea pectinata* Micranthes tolmiei+** [**keep**] C-LT5* SHRB** Caltha*** 4 Carex aquatilis+*** Dodecatheon*** 2 Equisetum arvense+ 2 Leptarrhena pyrolifolia** 2 Pedicularis groenlandica*** Petasites frigidus 2 Potentilla flabellifolia+* Veratrum viride** Veronica cusickii+*

▶ [**075**] Antennaria lanata+* Bistorta bistortoides 2 Carex spectabilis+ 10 Danthonia* Gentiana calycosa* Hieracium triste* Oreostemma alpigenum** 2 Phleum alpinum* Potentilla flabellifolia+ 9 Salix commutata+ 2 [**keep**] Caltha* Carex aquatilis+* 2 Dodecatheon* 2 Equisetum arvense+* Juncus parryi+* Leptarrhena pyrolifolia** Micranthes odontoloma+* Pedicularis groenlandica* Petasites frigidus*** 2 Veratrum viride*

▶ [**163**] C-LT5 2 C-GT5* SHRB 3 Carex kelloggii+* 3 Gentiana calycosa 2 Parnassia fimbriata* Platanthera** Poa cusickii+* Salix commutata+* 2 Triantha occidentalis* [**keep**] Cassiope mertensiana* Dodecatheon* Erigeron* Micranthes odontoloma+* Petasites frigidus 2 Potentilla flabellifolia+* 3 Spiraea splendens* Vaccinium deliciosum* Veratrum viride*** Veronica cusickii+*

Floristics (17 plots, MORA 1, NOCA 2, OLYM 14): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Caltha 14	Carex nigricans+ 22
80-95			Leptarrhena pyrolifolia 9, Potentilla flabellifolia+ 6, Phyllodoce empetriformis 3	moss 20
60-80			Pedicularis groenlandica 3, Veronica cusickii+ 1	
40-60	Abies lasiocarpa 1	Spiraea splendens 2, Salix commutata+ 1	Dodecatheon 7, Erigeron 3, Micranthes odontoloma+ 2, Vaccinium deliciosum 2, Cassiope mertensiana 1, Bistorta bistortoides 1, Veratrum viride 1	Carex spectabilis+ 6, Equisetum arvense+ 5, Carex aquatilis+ 5, Juncus parryi+ 3
25-40	Tsuga mertensiana 0		Petasites frigidus 5, Luetkea pectinata 2, Lupinus latifolius 1, Castilleja parviflora+ 0	
10-25			Erythranthe lewisii+ 11, Trollius albiflorus 7, Parnassia fimbriata 1, Arnica latifolia+ 1, Valeriana sitchensis 1, Ranunculus eschscholtzii+ 1, Gentiana calycosa 1, Erythranthe 1	Carex kelloggii+ 2, Agrostis 1, Phleum alpinum 1, Vahlodea atropurpurea 1, Juncus mertensianus+ 1

{073} Carex nigricans, Kalmia microphylla, Vaccinium deliciosum*
Black alpine sedge, western bog-laurel & Cascade blueberry* dwarf shrubland
CARNIG-KALMIC-(VACDEL)



Range: Subalpine zone, in wetlands. **MORA**-7: **nw*** (ne-sw-se) 1620-1790m. **NOCA**-6: **s*** (nw) 1730-1960m.

Struct: Semi-open dwarf shrubland with abundant sedges & forbs, and prominent conifer regen. Avg vasc cover 96: dwf shrb 44, sedge 21, forb 16, conif LT5 0.88 @ 2, shrb 0.63 @ 5, grass 0.38 @ 25, conif GT5 0.13 @ 5.

Ecology: Nearly flat stream-fed meadows, snowbeds and lake margins, on poorly drained organic soils. Water table near the surface for much of the growing season; decomposition is slow. *Abies lasiocarpa* and/or *Larix lyalli* regen are usually present.

Metrics: slope 2-5°, vdp 0-16m, vdr 473-859m, east 9-71, south 22-88, conv 41-49, tpp 43-61, solar 69-74, wet 5-7

Map class: H51W–Subalpine herbaceous wetland

Rel to C09: Evolved from KALMIC-CARNIG, incorporating some oddball wet plots with *Vaccinium deliciosum* or *V. caespitosum* and high elevation *Carex* and grasses.

Similar: MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[163] SALCOM/CAREX-(LEPPYR), MNO:[072] CAREX-CALLEP-(LEPPYR), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[074] CARNIG-LUEPEC, MNO:[100] LUEPEC-(CARSPE), MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[164] SALCOM/VALSIT, MNO:[106] PHYEMP-VACDEL-(CASMER).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides** Juncus parryi+* 2 Lupinus latifolius 2 Oreostemma alpigenum* 2 [**keep**] C-LT5* SHRB** Abies lasiocarpa* Caltha*** 2 Carex nigricans+* 6 Kalmia microphylla*** 2 Larix lyallii** Phyllodoce empetriformis 4 Salix commutata+** Sphagnum 2
▶ [**071**] Carex aquatilis+* 2 Carex kelloggii+* Equisetum arvense+ 2 Erigeron 3 Eriophorum angustifolium 9 Juncus mertensianus+* Leptarrhena pyrolifolia* Spiraea splendens* [**keep**] C-LT5* Caltha* Cassiope mertensiana* 2 Castilleja parviflora+** Dodecatheon* Kalmia microphylla* 3 Larix lyallii*** Tauschia stricklandii 2 Trollius albiflorus* Vaccinium cespitosum** 2 Vaccinium deliciosum* 4
▶ [**072**] Bistorta bistortoides* Carex aquatilis+** 2 Carex spectabilis+* Dodecatheon 2 Equisetum arvense+* 2 Juncus parryi+* Leptarrhena pyrolifolia* 2 Micranthes odontoloma+* Pedicularis groenlandica* Petasites frigidus 2 Spiraea splendens* Veratrum viride* [**keep**] Cassiope mertensiana 2 Danthonia 2 Kalmia microphylla*** 2 Vaccinium cespitosum 2 Vaccinium deliciosum 3
▶ [**075**] Bistorta bistortoides** 2 Carex spectabilis+* 4 Epilobium* Lupinus latifolius* Oreostemma alpigenum 2 Potentilla flabellifolia+ 7 Spiraea splendens* [**keep**] C-LT5* Cassiope mertensiana 2 Kalmia microphylla*** Larix lyallii*** Sphagnum 2 Tauschia stricklandii 2 Vaccinium cespitosum 2 Vaccinium deliciosum 6
▶ [**163**] SHRB 9 Carex aquatilis+* 2 Dodecatheon 2 Equisetum arvense+* 2 Leptarrhena pyrolifolia* 2 Parnassia fimbriata* Pedicularis groenlandica* Salix commutata+ 6 [**keep**] Danthonia 3 Kalmia microphylla*** 2 Larix lyallii*** Potentilla flabellifolia+* Sphagnum 2 Tauschia stricklandii 2 Vaccinium cespitosum 2 Vaccinium deliciosum*

Floristics (8 plots, MORA 2, NOCA 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Kalmia microphylla 14	
80-95				Carex nigricans+ 18
60-80	Larix lyallii 2, Abies lasiocarpa 1	Salix commutata+ 3	Vaccinium deliciosum 20, Phyllodoce empetriformis 9, Caltha 4, Potentilla flabellifolia+ 4	moss 14
40-60			Cassiope mertensiana 6, Gentiana calycosa 2, Erigeron 2	
25-40	Picea engelmannii 1		Vaccinium cespitosum 11, Tauschia stricklandii 10, Veronica cusickii+ 3, Luetkea pectinata 2, Arnica mollis+ 2, Pedicularis groenlandica 2, Castilleja parviflora+ 1, Hieracium triste 1, Dodecatheon 1, Trollius albiflorus 0, Antennaria lanata+ 0	Danthonia 17, Sphagnum 11, Carex spectabilis+ 2, Agrostis 0
10-25	Pinus contorta 3	Spiraea splendens 10	Gaultheria humifusa 3, Pedicularis ornithorhynchos 2, Ranunculus uncinatus+ 2, Packera 2, Leptarrhena pyrolifolia 1, Veratrum viride 1, Lupinus latifolius 1	Carex kelloggii+ 35, Calamagrostis canadensis+ 15, Poa cusickii+ 10, Eriophorum angustifolium 5, Equisetum arvense+ 1

{074} Carex nigricans, Luetkea pectinata
Black alpine sedge & partridgefoot herbaceous vegetation
CARNIG-LUEPEC



Range: Lower alpine zone. **MORA**-21: **nw**-**sw**-**se** (ne) 1730-1860m. **NOCA**-20: **nw**-**ne**-**cw** (ce-s) 1670-1770m. **OLYM**-16: **ne**-**sc**-**se** (nc) 1560-1730m.

Struct: Closed canopy turfy sedge-dominated vegetation with substantial forbs, and prominent dwarf shrubs & rushes. Avg vasc cover 73: sedge 56, forb 11, dwf shrb 0.88 @ 4, rush 0.79 @ 3.

Ecology: Flats and snowmelt depressions on gentle slopes, on poorly drained, seasonally wet organic soils. Fed by snowmelt, not by flowing water, so may dry out in late summer. Patches of bare ground may occur.

Metrics: slope 4-15°, vdp 28-136m, vdr 666-1040m, east 17-84, south 11-75, conv 48-61, tpp 54-82, solar 63-79, wet 3-5

Map class: H60W–Black alpine sedge wetland

Rel to C09: Evolved from CARNIG, shedding some dissimilar plots and incorporating oddball plots from CARSPE-CARNIG-(POTFLA), VACDEL, and other types.

Similar: MNO:[075] CARSPE-CARNIG-(POTFLA), MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[100] LUEPEC-(CARSPE), MNO:[169] SAXTOL-LUZPIP-(CARNIG), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[072] CAREX-CALLEP-(LEPPYR), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[079] CHALAT-(OXYDIG-VALSIT), NO:[094] JUNPAR-(POLBIS).

▶ [**059**] FORB 18 Anemone occidentalis+ 3 Antennaria lanata+** Juncus parryi+ 2 Oreostemma alpigenum*** 2 Phlox diffusa 2 Potentilla flabellifolia+* Vaccinium deliciosum 2 [**keep**] Carex nigricans+* 7 Carex spectabilis+* Cassiope mertensiana* Luetkea pectinata* Micranthes tolmiei+**
▶ [**071**] SHRB** Calamagrostis canadensis+** 2 Carex aquatilis+*** 2 Carex kelloggii+*** 2 Danthonia** Equisetum arvense+** Erigeron 2 Eriophorum angustifolium** 2 Kalmia microphylla*** Pedicularis groenlandica** Salix commutata+** Spiraea splendens** [**keep**] Carex nigricans+* Carex spectabilis+* 2 Cassiope mertensiana* Juncus parryi+* Luetkea pectinata* 3 Micranthes tolmiei+** Vaccinium deliciosum*
▶ [**072**] C-LT5* SHRB** Caltha*** 4 Carex aquatilis+*** Dodecatheon*** 2 Equisetum arvense+ 2 Leptarrhena pyrolifolia** 2 Pedicularis groenlandica*** Petasites frigidus 2 Potentilla flabellifolia+* Veratrum viride** Veronica cusickii+* [**keep**] Luetkea pectinata* Micranthes tolmiei+**. Note: [072] has flowing water nearby.
▶ [**075**] FORB 17 SHRB** Abies lasiocarpa* Caltha** Carex spectabilis+ 10 Erigeron 2 Gentiana calycosa** Oreostemma alpigenum*** 2 Pedicularis groenlandica*** Phleum alpinum*** Potentilla flabellifolia+* 4 Salix commutata+** 2 Spiraea splendens** Valeriana sitchensis*** [**keep**] Juncus parryi+* Luetkea pectinata* Luzula piperi+* Micranthes tolmiei+*. Note: [075] is found in slope concavities.
▶ [**100**] C-LT5* Abies lasiocarpa* Anaphalis margaritacea*** Arnica mollis+** Cryptogramma acrostichoides* Diphasiastrum sitchense+** Erythranthe lewisii+* Poa cusickii+** Senecio triangularis+*** Trisetum*** Tsuga mertensiana*** [**keep**] Bistorta bistortoides* Carex nigricans+* 5 Castilleja parviflora+* Erythronium montanum+** Potentilla flabellifolia+* Vaccinium deliciosum*
▶ [**169**] Luzula piperi+* Micranthes tolmiei+* 2 [**keep**] VASC VEG 32 Bistorta bistortoides* Carex nigricans+* 6 Carex spectabilis+* 3 Castilleja parviflora+* Erigeron* Erythronium montanum+*** Potentilla flabellifolia+*** Vaccinium deliciosum*. Note: [169] is a much sparser vegetation type.

Floristics (33 plots, MORA 4, NOCA 16, OLYM 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Luetkea pectinata 5	Carex nigricans+ 51
60-80			Phyllodoce empetriformis 3, Vaccinium deliciosum 1	moss 14, Carex spectabilis+ 7
40-60			Micranthes tolmiei+ 1, Cassiope mertensiana 1	Juncus parryi+ 1
25-40			Potentilla flabellifolia+ 2, Castilleja parviflora+ 0	Luzula piperi+ 2, Vahlodea atropurpurea 1
10-25	Abies lasiocarpa 1		Antennaria lanata+ 5, Hieracium triste 3, Bistorta bistortoides 3, Lupinus latifolius 2, Leptarrhena pyrolifolia 1, Erigeron 1, Erythronium montanum+ 1, Epilobium 0	Juncus mertensianus+ 5, lichen 2, Athyrium distentifolium 1, Luzula hitchcockii+ 1

{075} Carex spectabilis, Carex nigricans, Potentilla flabellifolia*
Showy sedge, black alpine sedge & fan-leaf cinquefoil* herbaceous vegetation
CARSPE-CARNIG-(POTFLA)



Range: Subalpine zone, in wetlands. **MORA**-19: **ne*-sw-se*** (nw) 1570-1740m. **NOCA**-3: (nw-ce) 1540-1610m. **OLYM**-6: **se** (nc-ne-sc) 1310-1460m.

Struct: Closed canopy mixed herbaceous vegetation with dense forbs, dense sedges, and substantial dwarf shrubs. Avg vasc cover 90: forb 41, sedge 36, dwf shrb 0.75 @ 6, grass 0.63 @ 9, shrb 0.63 @ 2, rush 0.38 @ 2.

Ecology: Concave basins or flats on organic soils that are typically saturated year-round. Can occur in small concavities on ridgetops. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 1-5°, vdp 0-9m, vdr 486-655m, east 6-83, south 26-74, conv 43-49, tpp 24-58, solar 68-77, wet 5-7

Map class: H51W–Subalpine herbaceous wetland

Rel to C09: Same, adding plots from CARNIG and PHYEMP-VACDEL-(CASMER), and shedding to [076] CARSPE-(LUPARC-POLBIS) and [072] CAREX-CALLEP-(LEPPYR).

Similar: MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[074] CARNIG-LUEPEC, MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[072] CAREX-CALLEP-(LEPPYR), MNO:[100] LUEPEC-(CARSPE), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[215] VALSIT-CARSPE, NO:[094] JUNPAR-(POLBIS), MNO:[217] VALSIT-VERVIR.

▶ [**059**] Anemone occidentalis+* 2 Antennaria lanata+** 2 Eremogone capillaris** Festuca viridula** Juncus parryi+* 2 Lupinus latifolius 2 Luzula hitchcockii+** Oreostemma alpigenum* Pedicularis contorta+** Phlox diffusa** 2 [**keep**] SHRB** Caltha*** 2 Carex nigricans+* 6 Carex spectabilis+* Epilobium* Erigeron* Gentiana calycosa* Pedicularis groenlandica** Phleum alpinum* Salix commutata+* Spiraea splendens***
▶ [**071**] Calamagrostis canadensis+* 2 Carex aquatilis+* 2 Carex kelloggii+* 21 Equisetum arvense+* Eriophorum angustifolium* 2 Juncus mertensianus+* Kalmia microphylla* Leptarrhena pyrolifolia* Sphagnum** Spiraea splendens 2 Triantha occidentalis** [**keep**] Bistorta bistortoides*** 2 Carex nigricans+* Carex spectabilis+* 2 Castilleja parviflora+** 2 Hieracium triste** Lupinus latifolius* Oreostemma alpigenum 2 Potentilla flabellifolia+ 7 Vaccinium deliciosum*
▶ [**072**] Caltha* Carex aquatilis+* 2 Dodecatheon* 2 Equisetum arvense+* Juncus parryi+* Leptarrhena pyrolifolia** Micranthes odontoloma+* Pedicularis groenlandica* Petasites frigidus*** 2 Veratrum viride* [**keep**] Antennaria lanata+* Bistorta bistortoides 2 Carex spectabilis+ 10 Danthonia* Gentiana calycosa* Hieracium triste* Oreostemma alpigenum** 2 Phleum alpinum* Potentilla flabellifolia+ 9 Salix commutata+ 2
▶ [**074**] Juncus parryi+* Luetkea pectinata* Luzula piperi+* Micranthes tolmiei+* [**keep**] FORB 17 SHRB** Abies lasiocarpa* Caltha** Carex spectabilis+ 10 Erigeron 2 Gentiana calycosa** Oreostemma alpigenum*** 2 Pedicularis groenlandica*** Phleum alpinum*** Potentilla flabellifolia+* 4 Salix commutata+** 2 Spiraea splendens** Valeriana sitchensis***
▶ [**076**] Achillea millefolium* Callitropsis nootkatensis* Cirsium edule+* Elymus* Festuca viridula* Lupinus latifolius* 2 Luzula hitchcockii+* Phlox diffusa* Silene parryi* Veratrum viride* [**keep**] Agrostis** Caltha*** Carex nigricans+** 4 Cassiope mertensiana* Epilobium* Gentiana calycosa* Oreostemma alpigenum** Pedicularis groenlandica*** Phyllodoce empetriformis* Potentilla flabellifolia+ 6 Salix commutata+*** 2

Floristics (16 plots, MORA 8, NOCA 3, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Potentilla flabellifolia+ 21	
80-95				Carex spectabilis+ 21, Carex nigricans+ 18
60-80			Vaccinium deliciosum 3, Phyllodoce empetriformis 3	
40-60	Abies lasiocarpa 0		Luetkea pectinata 5, Erigeron 5, Bistorta bistortoides 3, Gentiana calycosa 3, Lupinus latifolius 1, Veronica cusickii+ 1	moss 9
25-40		Salix commutata+ 3, Spiraea splendens 0	Oreostemma alpigenum 14, Caltha 6, Castilleja parviflora+ 3, Valeriana sitchensis 1, Hieracium triste 1, Pedicularis groenlandica 1, Cassiope mertensiana 0, Epilobium 0	Agrostis 2, Phleum alpinum 0
10-25			Leptarrhena pyrolifolia 4, Arnica latifolia+ 3, Pedicularis ornithorhynchos 2, Erythronium montanum+ 1, Symphyotrichum foliaceum 1, Antennaria lanata+ 1, Ligusticum 1, Dodecatheon 1	Danthonia 21, Carex kelloggii+ 13, Vahlodea atropurpurea 6, Diphasiastrum sitchense+ 4, Juncus mertensianus+ 3, Juncus parryi+ 1, Carex aquatilis+ 1, Calamagrostis canadensis+ 1

{076} Carex spectabilis, Lupinus latifolius*, Bistorta bistortoides*
Showy sedge, subalpine lupine* & American bistort* herbaceous vegetation
CARSPE-(LUPARC-POLBIS)



Range: Subalpine. **MORA**-46: **nw**-**ne**-**sw**-**se** 1710-1820m. **NOCA**-12: **nw**-**s** (cw-ce) 1270-1980m. **OLYM**-42: **nc**-**ne**-**sc**-**se** 1440-1670m.

Struct: Closed canopy mixed herbaceous vegetation with dense forbs and sedges. Avg vasc cover 94: forb 44, sedge 38, grass 0.73 @ 5, dwf shrb 0.66 @ 7, conif LT5 0.58 @ 2, shrb 0.39 @ 2, rush 0.34 @ 3.

Ecology: Fairly gentle slopes, on well-drained but somewhat moist soils. Sometimes maintained by periodic avalanches. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 7-28°, vdp 7-158m, vdr 563-1011m, east 11-75, south 43-91, conv 45-60, tpp 49-84, solar 65-83, wet 2-4

Map class: H53–Showy sedge & Sitka valerian meadow

Rel to C09: Expanded, incorporating plots from CARSPE-CARNIG-(POTFLA), LUPARC, FESVIR-LUPARC, and eleven other types, and shedding a few plots to [215] VALSIT-CARSPE.

Similar: MNO:[215] VALSIT-CARSPE, MNO:[217] VALSIT-VERVIR, MNO:[075] CARSPE-CARNIG-(POTFLA), NO:[094] JUNPAR-(POLBIS), MN:[216] VALSIT-LIGGRA, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[059] ANTLAN-(OREALP-VACDEL), M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), NO:[088] EUCPAU-(PHAHAS-CASMIN), NO:[093] HERMAX-(THAOCC-SAUAME). Also see: [079] CHALAT-(OXYDIG-VALSIT).

▶ [**075**] Agrostis** Caltha*** Carex nigricans+** 4 Cassiope mertensiana* Epilobium* Gentiana calycosa* Oreostemma alpigenum** Pedicularis groenlandica*** Phyllodoce empetriformis* Potentilla flabellifolia+ 6 Salix commutata+*** 2 [**keep**] Achillea millefolium* Callitropsis nootkatensis* Cirsium edule+* Elymus* Festuca viridula* Lupinus latifolius* 2 Luzula hitchcockii+* Phlox diffusa* Silene parryi* Veratrum viride*
▶ [**094**] Antennaria lanata+* Danthonia*** 2 Eremogone capillaris*** Erythronium montanum+* 2 Festuca roemeri*** 6 Hieracium triste* Juncus parryi+** 5 Luetkea pectinata* Phlox diffusa* [**keep**] SHRB* Carex spectabilis+ 18 Castilleja parviflora+* Erigeron* Lupinus latifolius 7 Phleum alpinum* Phyllodoce empetriformis 2 Potentilla flabellifolia+* Valeriana sitchensis* Veratrum viride**
▶ [**215**] TSHRB* Chamaenerion angustifolium*** Erythronium montanum+* 2 Eucephalus ledophyllus+*** Pedicularis bracteosa*** Sorbus sitchensis*** Thalictrum occidentale 2 Valeriana sitchensis* 4 Veratrum viride* [**keep**] Achillea millefolium* Agoseris* Castilleja parviflora+* Phleum alpinum* Phlox diffusa* Veronica cusickii+*
▶ [**216**] Erythronium montanum+ 2 Festuca viridula*** Ligusticum*** Valeriana sitchensis* 4 [**keep**] Bistorta bistortoides* Carex spectabilis+* 16 Cirsium edule+* Luetkea pectinata* Phlox diffusa* Silene parryi* Spiraea splendens* Vahlodea atropurpurea*
▶ [**217**] SHRB 4 TSHRB* 2 Chamaenerion angustifolium* Epilobium* Luzula hitchcockii+* Senecio triangularis+*** Sorbus sitchensis** Vaccinium membranaceum* Valeriana sitchensis* 4 Veratrum viride* 5 Viola glabella+** [**keep**] Abies lasiocarpa* Achillea millefolium** Castilleja parviflora+* Erigeron* Hieracium triste*** Luetkea pectinata*** Phleum alpinum* Spiraea splendens* Vaccinium deliciosum* Veronica cusickii+*

Floristics (64 plots, MORA 19, NOCA 8, OLYM 37): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Carex spectabilis+ 38
80-95			Lupinus latifolius 18	
60-80			Bistorta bistortoides 9, Erigeron 4	
40-60	Abies lasiocarpa 2		Vaccinium deliciosum 4, Potentilla flabellifolia+ 4	
25-40		Spiraea splendens 2	Luetkea pectinata 6, Phyllodoce empetriformis 4, Veratrum viride 3, Veronica cusickii+ 3, Arnica latifolia+ 3, Castilleja parviflora+ 2, Valeriana sitchensis 2, Hieracium triste 1	Phleum alpinum 0
10-25	Callitropsis nootkatensis 2	Vaccinium membranaceum 1	Anemone occidentalis+ 4, Antennaria lanata+ 3, Ligusticum 3, Silene parryi 2, Achillea millefolium 2, Phlox diffusa 2, Cirsium edule+ 1, Erythronium montanum+ 1, Agoseris 1	Festuca viridula 7, Juncus parryi+ 3, Elymus 3, Carex nigricans+ 2, Vahlodea atropurpurea 2, Luzula hitchcockii+ 2, Poa cusickii+ 2

{077} Cassiope mertensiana, Phyllodoce empetriformis
White & pink mountain-heather dwarf shrubland
CASMER-PHYEMP



Range: Alpine and upper subalpine zones. **MORA**-30: **nw**-**ne**-**sw**-**se** 1750-1960m. **NOCA**-62: **nw***-**ne**-**cw**-**ce**-**s** 1710-1940m. **OLYM**-13: **ne**-**sc** (nc-se) 1480-1600m.

Struct: Semi-closed canopy dwarf shrubland with substantial forbs. Avg vasc cover 71: dwf shrb 57, forb 7, rush 0.71 @ 2, sedge 0.64 @ 3, conif LT5 0.64 @ 1.

Ecology: Fairly gentle typically upper slopes, on rocky and well-drained but mesic soils. May occur in cold basins below the elevation of surrounding forests. Some *Tsuga mertensiana* regen is often present.

Metrics: slope 11-26°, vdp 35-190m, vdr 752-1083m, east 33-95, south 11-74, conv 48-60, tpp 62-85, solar 56-76, wet 3-4

Map class: S49–Alpine heather shrubland

Rel to C09: Same.

Similar: MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[100] LUEPEC-(CARSPE), MNO:[107] PHYEMP-(VACDEL)/LUPARC, N:[108] PHYGLA-(CASMER), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[169] SAXTOL-LUZPIP-(CARNIG), MNO:[074] CARNIG-LUEPEC, MN:[086] EMPNIG-LUPSEL, MN:[071] CARNIG-CARLEN-(CALCAN), MN:[073] CARNIG-KALMIC-(VACDEL).

▶ [**059**] FORB 13 Anemone occidentalis+ 2 Antennaria lanata+* 4 Bistorta bistortoides 2 Oreostemma alpigenum** 6 Phlox diffusa 2 Potentilla flabellifolia+*** [**keep**] Cassiope mertensiana* 6 Diphasiastrum sitchense+** 2 Hieracium triste* Luetkea pectinata* Luzula piperi+* Micranthes tolmiei+** Phyllodoce empetriformis* 5 Tsuga mertensiana**

▶ [**100**] Agrostis** Anaphalis margaritacea*** Arnica mollis+*** Epilobium*** Erythranthe lewisii+** Juncus mertensianus+*** Micranthes odontoloma+*** Ranunculus eschscholtzii+** Senecio triangularis+** Trisetum*** [**keep**] Cassiope mertensiana 2 Diphasiastrum sitchense+ 2 Phyllodoce empetriformis 7 Vaccinium deliciosum* 2. Note: [100] has poorly developed soils.

▶ [**106**] C-LT5 2 C-GT5*** SHRB** TSHRB* Abies lasiocarpa* Bistorta bistortoides* Callitropsis nootkatensis* Erigeron* Erythronium montanum+*** Lupinus latifolius* Potentilla flabellifolia+*** Sorbus sitchensis* Tsuga mertensiana* 2 Vaccinium deliciosum 11 [**keep**] Diphasiastrum sitchense+* Luzula piperi+** Micranthes tolmiei+**. Note: [106] is in subalpine settings; *Vaccinium deliciosum* attains more typical heights.

▶ [**107**] FORB 12 Abies lasiocarpa* Anemone occidentalis+ 2 Bistorta bistortoides* 2 Carex spectabilis+* Castilleja parviflora+* Erigeron 2 Erythronium montanum+** Lupinus latifolius** 6 Potentilla flabellifolia+*** Valeriana sitchensis*** 2 [**keep**] Carex nigricans+* Cassiope mertensiana* Diphasiastrum sitchense+** 2 Hieracium triste* Luetkea pectinata* Luzula piperi+* Micranthes tolmiei+**

▶ [**108**] Empetrum nigrum** 4 Juniperus communis 2 Penstemon procerus+*** Phyllodoce glanduliflora*** Poa cusickii+ 2 Vaccinium cespitosum 2 [**keep**] Cassiope mertensiana* Diphasiastrum sitchense+* Hieracium triste* Phyllodoce empetriformis 8 Tsuga mertensiana* Vaccinium deliciosum* 2

Floristics (69 plots, MORA 10, NOCA 50, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phyllodoce empetriformis 26, Cassiope mertensiana 25	
80-95			Vaccinium deliciosum 7, Luetkea pectinata 5	
40-60	Tsuga mertensiana 1		Hieracium triste 1	moss 8, Diphasiastrum sitchense+ 4, Carex nigricans+ 2, Luzula piperi+ 1
25-40	Abies lasiocarpa 1		Micranthes tolmiei+ 1	lichen 4, Juncus parryi+ 3, Carex spectabilis+ 3, Vahlodea atropurpurea 0
10-25			Lupinus latifolius 4, Antennaria lanata+ 2, Bistorta bistortoides 1, Veronica cusickii+ 1, Pedicularis ornithorhynchos 1, Castilleja parviflora+ 1	Luzula hitchcockii+ 1

{078} Ceanothus velutinus, Spiraea lucida*, Calamagrostis rubescens
Snowbrush, white spirea* & pinegrass shrubland
CEAVEL-(SPIBET)/CALRUB



Range: Ranging upward and downward from the lower montane zone. **NOCA**-24: **s*** (ne-ce) 770-1280m.

Struct: Open tall shrubland with substantial dwarf shrubs, grasses, tall shrubs & forbs, and prominent conifer regen. Avg vasc cover 96: shrb 41, dwf shrb 14, tall shrb 13, forb 8, grass 0.92 @ 14, conif LT5 0.83 @ 4, conif GT5 0.63 @ 3, brdlf LT5 0.38 @ 3.

Ecology: Slopes with southerly aspects, on dry rocky soils. Often results from burns but may persist long thereafter. Rarely associated with avalanche chutes. Can occur as smaller openings in [142] PSEMEN/PAXMYR-SPIBET forest. *Pseudotsuga menziesii* regen is usually present.

Metrics: slope 22-32°, vdp 16-108m, vdr 115-331m, east 37-70, south 77-100, conv 47-55, tpp 26-53, solar 67-83, wet 3

Map class: S46–Snowbrush & Scouler's willow shrubland

Rel to C09: Split from CEAVEL to distinguish from [130] PRUEMA-AMEALN-CEAVEL/MAIRAC.

Similar: N:[130] PRUEMA-AMEALN-CEAVEL/MAIRAC, N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, N:[061] ARCNEV-PAXMYR/CALRUB, N:[146] PSEMEN-PINPON/CALRUB, N:[062] ARCNEV/PSESPI, N:[142] PSEMEN/PAXMYR-SPIBET, N:[161] PSEMEN/VACMEM, N:[119] PINCON/PAXMYR/CALRUB, N:[143] PSEMEN-PINCON/ARCNEV, MNO:[103] PENDAV/RACOMITRIUM. Also see: [038] (ACEMAC)/ACECIR-PAXMYR

▶ [**061**] Arctostaphylos uva-ursi+* 9 Cryptogramma acrostichoides* Eremogone capillaris* Eriogonum umbellatum* Hieracium scouleri+* Lewisia*** Pinus ponderosa* Pseudoroegneria spicata* Racomitrium*** 2 [**keep**] B-LT5** SHRB 3 TSHRB 2 Acer glabrum** Amelanchier alnifolia 2 Carex geyeri+* Castilleja hispida* Ceanothus velutinus* 3 Chamaenerion angustifolium* 2 Collomia** Hieracium albiflorum** Moehringia macrophylla** Prunus emarginata 2 Salix scouleriana* 2 Spiraea lucida**

▶ [**062**] Anticlea/Toxicoscordion*** Aspidotis densa** Balsamorhiza sagittata** Crepis** Epilobium* Erigeron** Lomatium nudicaule+* Penstemon serrulatus+ 2 Poa cusickii+** Pseudoroegneria spicata** Racomitrium** 2 [**keep**] B-LT5* SHRB 4 TSHRB 3 Acer glabrum** Castilleja hispida* Ceanothus velutinus 4 Chamaenerion angustifolium* 2 Hieracium albiflorum** Moehringia macrophylla** Paxistima myrsinites 3 Prunus emarginata 2 Salix scouleriana* 2 Spiraea lucida* Vaccinium membranaceum**

▶ [**130**] TSHRB 21 Acer glabrum* 3 Amelanchier alnifolia* Eucephalus ledophyllus+* Maianthemum racemosum** Prosartes*** Prunus emarginata* Rosa 2 Rubus nutkanus 2 Sorbus scopulina* Symphoricarpos albus*** 2 Thalictrum occidentale* 2 [**keep**] C-LT5 2 Arctostaphylos uva-ursi+*** 2 Carex geyeri+* Castilleja hispida* Collomia** Hieracium albiflorum** Moehringia macrophylla* Pinus ponderosa** Vaccinium membranaceum*

▶ [**146**] C-GT5* 6 Apocynum androsaemifolium* Arnica cordifolia* Balsamorhiza sagittata** Bromus tectorum+* Elymus* 2 Hieracium scouleri+* Holodiscus discolor 3 Pinus ponderosa* 2 Platanthera** Polystichum lonchitis** Pseudoroegneria spicata* Pseudotsuga menziesii 6 [**keep**] SHRB 14 TSHRB 5 Abies lasiocarpa* Acer glabrum* Amelanchier alnifolia 2 Cacaliopsis nardosmia* Castilleja hispida** Ceanothus velutinus 6 Eremogone capillaris*** Eucephalus ledophyllus+** Lomatium brandegeei+* Prunus emarginata* 2 Thalictrum occidentale*** Vaccinium membranaceum**

▶ [**165**] TSHRB 22 Abies lasiocarpa* Acer circinatum 8 Acer glabrum* 4 Amelanchier alnifolia* Maianthemum racemosum* Rubus nutkanus* 2 Sorbus scopulina* 3 Thalictrum occidentale* Viola glabella+*** [**keep**] SHRB 19 Arctostaphylos uva-ursi+** 2 Cacaliopsis nardosmia** Calamagrostis rubescens+* 4 Carex geyeri+** Castilleja hispida*** Ceanothus velutinus 7 Chamaenerion angustifolium 2 Collomia*** Hieracium scouleri+** Lupinus latifolius** Pinus ponderosa*** Spiraea lucida**

Floristics (24 plots, NOCA 24): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Ceanothus velutinus 38		
80-95	Pseudotsuga menziesii 3		Paxistima myrsinites 8	Calamagrostis rubescens+ 14
60-80		Salix scouleriana 9	Spiraea lucida 4	
40-60		Amelanchier alnifolia 4	Chamaenerion angustifolium 7, Arctostaphylos uva-ursi+ 6, Moehringia macrophylla 0	Carex geyeri+ 2
25-40	Acer macrophyllum 2, Pinus ponderosa 0	Prunus emarginata 5, Vaccinium membranaceum 2, Acer glabrum 2, Sorbus scopulina 2, Holodiscus discolor 2, Rubus nutkanus 1	Eucephalus ledophyllus+ 2, Hieracium scouleri+ 1, Collomia 1, Cacaliopsis nardosmia 1, Achillea millefolium 1, Antennaria racemosa+ 1, Hieracium albiflorum 1, Lupinus latifolius 0, Penstemon serrulatus+ 0, Castilleja hispida 0	moss 7
10-25	Callitropsis nootkatensis 5, Pinus contorta 4, Abies lasiocarpa 3	Berberis aquifolium 3, Prunus virginiana 3	Apocynum androsaemifolium 2	Pseudoroegneria spicata 5, Pteridium aquilinum 4

{079} Chamaenerion latifolium, Oxyria digyna*, Valeriana sitchensis*
Red willow-herb, alpine mountain sorrel* & Sitka valerian* herbaceous vegetation
CHALAT-(OXYDIG-VALSIT)



Range: Upper montane and lower subalpine zones, on exposed rocks. **NOCA-22: s*** (nw-cw-ce) 1300-1580m.

Struct: Semi-closed canopy mixed herbaceous vegetation with dense forbs, substantial ferns, and prominent grasses. Avg vasc cover 56: forb 43, fern 6, grass 0.77 @ 3, tall shrb 0.59 @ 2, rush 0.5 @ 0, sedge 0.32 @ 6.

Ecology: North-facing lower slopes on scree or talus. Typically fed by snow-melt, either by way of streams or sub-irrigation.

Metrics: slope 22-34°, vdp 1-7m, vdr 411-553m, east 45-77, south 1-14, conv 36-42, tpp 17-28, solar 24-37, wet 3-4

Map class: H54–Moist talus vegetation

Rel to C09: Evolved from CHALAT and VALSIT-ATHAME (a NOCA field call variant of VALSIT-ATHFIL), incorporating some plots from OXYDIG and other single-species C09 types.

Similar: MNO:[100] LUEPEC-(CARSPE), MNO:[217] VALSIT-VERVIR, MNO:[067] ATHAME-CRYACR, O:[085] ELMRAC-EPIANA, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[215] VALSIT-CARSPE, NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[216] VALSIT-LIGGRA, MN:[071] CARNIG-CARLEN-(CALCAN). Also see: [076] CARSPE-(LUPARC-POLBIS)

▶ [**067**] Carex spectabilis+* Cryptogramma acrostichoides* [**keep**] FORB 16 Arnica latifolia+ 2 Aruncus dioicus* Chamaenerion latifolium*** 2 Erythranthe lewisii+* Oxyria digyna* 2 Senecio triangularis+* Valeriana sitchensis 3 Veronica cusickii+*
▶ [**085**] Allium** Elmera racemosa* 2 Lomatium martindalei** Phacelia*** [**keep**] FORB 21 SHRB** TSHRB* VASC VEG 24 Aruncus dioicus** Athyrium distentifolium* 2 Chamaenerion latifolium* Erythranthe lewisii+* Luetkea pectinata 4 Oxyria digyna* 2 Valeriana sitchensis* 3 Veratrum viride** Veronica cusickii+**
▶ [**093**] Artemisia 2 Bromus sitchensis 2 Cirsium edule+*** Elymus 3 Heracleum maximum** 2 Thalictrum occidentale** 2 [**keep**] Athyrium distentifolium*** 2 Chamaenerion latifolium*** 2 Epilobium* Erythranthe lewisii+*** Luetkea pectinata*** 2 Oxyria digyna*** 2 Valeriana sitchensis* 4 Veronica cusickii+**
▶ [**100**] Abies lasiocarpa* Carex spectabilis+* Cassiope mertensiana* Erigeron** Hieracium triste* Juncus parryi+* Luzula piperi+* Micranthes tolmiei+* Phyllodoce empetriformis* 2 Tsuga mertensiana* [**keep**] TSHRB** Aruncus dioicus*** Athyrium distentifolium* 2 Chamaenerion latifolium* 2 Erythranthe lewisii+* Oxyria digyna*** 2 Senecio triangularis+* Valeriana sitchensis* 2 Veratrum viride*
▶ [**217**] C-LT5 2 SHRB 3 Bistorta bistortoides*** 2 Carex spectabilis+* Lupinus latifolius** Potentilla flabellifolia+ 2 Veratrum viride* 3 [**keep**] TSHRB* Athyrium distentifolium*** 2 Chamaenerion latifolium*** 2 Epilobium* Erythranthe lewisii+** Luetkea pectinata*** Oxyria digyna*** 2 Veronica cusickii+*

Floristics (22 plots, NOCA 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Athyrium distentifolium 6
60-80			Valeriana sitchensis 17, Luetkea pectinata 13, Chamaenerion latifolium 8, Epilobium 1	
40-60			Oxyria digyna 7, Senecio triangularis+ 3, Aruncus dioicus 2, Veratrum viride 1, Erythranthe lewisii+ 1, Veronica cusickii+ 1	moss 5
25-40		Alnus viridis 2, Sorbus sitchensis 0	Arnica latifolia+ 4, Petasites frigidus 1, Aquilegia formosa 1, Potentilla flabellifolia+ 1, Ranunculus eschscholtzii+ 0, Elmera racemosa 0, Phyllodoce empetriformis 0	Vahlodea atropurpurea 0, Juncus parryi+ 0, Cryptogramma acrostichoides 0, Juncus mertensianus+ 0
10-25	Tsuga mertensiana 1	Ribes lacustre 2, Ribes acerifolium+ 2	Vaccinium deliciosum 4, Anemone occidentalis+ 2, Romanzoffia sitchensis 1, Micranthes odontoloma+ 1, Hydrophyllum fendleri 1, Castilleja parviflora+ 1	Carex spectabilis+ 7, Poa cusickii+ 5, Phleum alpinum 1

{080} Callitropsis nootkatensis, Abies lasiocarpa*, Clintonia uniflora*
Alaska-cedar, subalpine fir* & queen's cup* forest
CUPNOO-(ABILAS)/CLIUNI



Range: Upper and lower montane zones. **MORA**-3: **ne** 1340-1410m. **OLYM**-14: **ne*** (nc-sc-se) 1200-1430m.

Struct: Mostly closed mature conifer forest (24-29m) with substantial conifer regen, dense forbs, and abundant shrubs. Avg vasc cover 142: conif tree 61, forb 47, shrb 0.94 @ 18, conif regen 0.89 @ 13, tall shrb 0.56 @ 4, grass 0.5 @ 2, fern 0.39 @ 2, sedge 0.11 @ 3.

Ecology: Lower slopes with southerly aspects, often in avalanche-disturbed sites with lower elevations than typical for the tree species. Trees frequently pistol-butted. Likely developed from [081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON. Regen dominated by *Callitropsis nootkatensis*, usually with *Abies lasiocarpa* and/or *Abies amabilis*. Active avalanche chutes often adjacent.

Metrics: slope 18-31°, vdp 2-12m, vdr 425-607m, east 50-92, south 74-87, conv 39-48, tpp 16-36, solar 69-76, wet 3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved out of plots from CUPNOO/VALSIT, CUPNOO/STRLAN, CUPNOO/RIBLAC, CUPNOO/OPLHOR-(ALNVIR), etc.

Similar: MNO:[082] CUPNOO-(VACMEM)/PAXMYR, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[032] ABILAS/VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS, O:[081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON, MNO:[033] ABILAS/VERVIR, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[030] ABILAS/VACMEM/LUPARC, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM.
Also see: [001] ABIAMA-CUPNOO-TSUHET/VACALA, [015] ABILAS-ABIAMA-(PICENG)/VACMEM/VALSIT

▶ [**016**] Erythronium montanum+* 5 Lupinus latifolius** Pinus monticola** Rubus lasiococcus* Tsuga mertensiana** 2 Vaccinium membranaceum* 3 Xerophyllum tenax*** 2 [**keep**] Achlys triphylla* 2 Actaea rubra** Clintonia uniflora** 2 Galium** Osmorhiza** Ribes lacustre** 2 Rubus spectabilis 2 Streptopus lanceolatus** 2 Thalictrum occidentale** Tiarella trifoliata* Viola glabella+**
▶ [**027**] Erythronium montanum+* Lupinus latifolius*** 2 Rhododendron albiflorum* Rubus lasiococcus* Tsuga mertensiana** 2 Vaccinium membranaceum* 3 Xerophyllum tenax** 2 [**keep**] Achlys triphylla*** 2 Actaea rubra** Clintonia uniflora** 4 Galium** Osmorhiza*** Ribes lacustre*** 2 Rubus spectabilis 2 Streptopus lanceolatus** 2 Thalictrum occidentale* Tiarella trifoliata** Viola glabella+*
▶ [**032**] Arnica latifolia+* 2 Ligusticum** Lupinus latifolius*** 2 Luzula hitchcockii+* 2 Mitella* Ribes acerifolium+** Sorbus sitchensis* Tsuga mertensiana** 2 Vaccinium deliciosum** 2 Veratrum viride* [**keep**] Alnus viridis*** Callitropsis nootkatensis* 11 Clintonia uniflora 5 Galium* Goodyera oblongifolia*** Paxistima myrsinites*** Polystichum munitum*** Ribes lacustre* 3 Rubus spectabilis*** 2 Streptopus lanceolatus* 2 Vaccinium ovalifolium*
▶ [**081**] TSHRB 6 Alnus viridis* 7 Erythronium montanum+** Mitella* 2 Rhododendron albiflorum* Ribes acerifolium+*** Sorbus sitchensis 2 Vaccinium membranaceum* Veratrum viride* Viola glabella+ 2 [**keep**] Abies amabilis 2 Achlys triphylla* 2 Clintonia uniflora** 2 Galium* Moehringia macrophylla* Osmorhiza* Pseudotsuga menziesii 2 Rubus lasiococcus 2 Tiarella trifoliata*
▶ [**082**] C-LT5 20 Acer circinatum** 2 Amelanchier alnifolia** Bistorta bistortoides** Chamaenerion angustifolium*** Cryptogramma acrostichoides** Lupinus latifolius*** Paxistima myrsinites 2 Pedicularis bracteosa** Sorbus sitchensis* Tsuga mertensiana** Vaccinium deliciosum** Vaccinium membranaceum 3 [**keep**] Achlys triphylla*** 2 Clintonia uniflora*** 2 Ribes lacustre* 2 Rubus spectabilis 2 Streptopus lanceolatus 2 Tiarella trifoliata*

Floristics (18 plots, MORA 3, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns
95-100	Callitropsis nootkatensis 46			
80-95	Abies lasiocarpa 17			
60-80		Ribes lacustre 8	Clintonia uniflora 16, Achlys triphylla 11, Tiarella trifoliata 6, Valeriana sitchensis 4	
40-60	Abies amabilis 14, Pseudotsuga menziesii 3		Osmorhiza 2, Viola glabella+ 2, Galium 1, Moehringia macrophylla 1	moss 5
25-40		Rubus spectabilis 16, Alnus viridis 5, Lonicera utahensis 3, Vaccinium membranaceum 2, Vaccinium ovalifolium 2	Rubus lasiococcus 11, Streptopus lanceolatus 7, Maianthemum stellatum 2, Orthilia secunda 2, Actaea rubra 2, Paxistima myrsinites 1, Thalictrum occidentale 1, Goodyera oblongifolia 1, Trillium ovatum 0	Polystichum munitum 1
10-25	Picea engelmannii 4	Rosa 7, Oplopanax horridus 7, Rhododendron albiflorum 6, Sambucus racemosa 3, Rubus nutkanus 2	Rubus pedatus 14, Streptopus amplexifolius 7, Lysimachia latifolia 4, Erythronium montanum+ 3, Viola sempervirens 3, Claytonia sibirica+ 3, Veratrum viride 3, Circaea alpina 3, Linnaea borealis 3, Prosartes 2, Maianthemum racemosum 2, Asarum caudatum 2, Polemonium pulcherrimum 2, Stachys cooleyae 2	Bromus sitchensis 3, Gymnocarpium dryopteris 2, Carex spectabilis+ 2, Polystichum lonchitis 2

{081} Callitropsis nootkatensis, Alnus viridis, Oplopanax horridus*, Erythronium montanum
Alaska-cedar, Sitka alder, devil's club* & avalanche lily woodland
CUPNOO-ALNVIR-(OPLHOR)/ERYMON



Range: Upper montane. **OLYM**-6: (nc-ne-sc) 1300-1440m.

Struct: Conifer woodland (5-8m), a dense mix of small trees and conifer regen, with abundant forbs & tall shrubs, and substantial shrubs. Avg vasc cover 104: conif tree 33, conif regen 28, forb 18, tall shrb 17, shrb 0.75 @ 10, sedge 0.25 @ 3, dwf shrb 0.25 @ 2.

Ecology: Avalanche chutes on fairly steep lower slopes, on sub-irrigated soils. Probably eventually develops into [080] CUPNOO-(ABILAS)/CLIUNI. Usually occurs in a matrix of *Alnus viridis*, e.g., [057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), [058] ALNVIR-(SAMRAC)/THAOCC. More mature forests may be nearby.

Metrics: slope 26-31°, vdp 4-13m, vdr 542-787m, east 28-89, south 42-84, conv 38-42, tpp 14-28, solar 49-77, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from core plots in CUPNOO/OPLHOR-(ALNVIR), shedding plots to [080] CUPNOO-(ABILAS)/CLIUNI, [082] CUPNOO-(VACMEM)/PAXMYR, etc., and gaining plots from CUPNOO, CUPNOO/STRLAN and CUPNOO/VALSIT.

Similar: MO:[080] CUPNOO-(ABILAS)/CLIUNI, MNO:[082] CUPNOO-(VACMEM)/PAXMYR, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, MNO:[033] ABILAS/VERVIR, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[032] ABILAS/VALSIT, O:[024] ABILAS/POLPUL-PEDRAC.

▶ [**020**] Abies lasiocarpa 14 Achillea millefolium* Juniperus communis* 2 Lupinus latifolius 2 Paxistima myrsinites* Phlox diffusa* [**keep**] SHRB 2 TSHRB** 2 Alnus viridis*** 2 Erythronium montanum+** Mitella* Rhododendron albiflorum** Ribes acerifolium+** Ribes lacustre** Rubus spectabilis 2 Sorbus sitchensis 2 Streptopus lanceolatus*** Tiarella trifoliata 2 Valeriana sitchensis* Veratrum viride* Viola glabella+** 2
▶ [**033**] Arnica latifolia+* Bistorta bistortoides* Erigeron* Ligusticum* Lupinus latifolius** 2 Luzula hitchcockii+ 2 Picea engelmannii 2 Senecio triangularis+* Tsuga mertensiana* Valeriana sitchensis 4 Veratrum viride 2 [**keep**] C-LT5 10 TSHRB* Alnus viridis** Callitropsis nootkatensis* 13 Erythronium montanum+* Oplopanax horridus 2 Ribes lacustre 2 Rubus spectabilis 2 Streptopus lanceolatus*** Tiarella trifoliata 2
▶ [**058**] TSHRB 28 Alnus viridis 26 Galium* Heracleum maximum* Prosartes 2 Rubus nutkanus* 2 Sambucus racemosa* 2 Veratrum viride 2 [**keep**] C-LT5 9 C-GT5* 7 Abies lasiocarpa* 3 Callitropsis nootkatensis* 9 Carex spectabilis+ 2 Erythronium montanum+*** Rhododendron albiflorum 2 Streptopus lanceolatus** Tiarella trifoliata 3 Vaccinium membranaceum* Valeriana sitchensis*
▶ [**080**] Abies amabilis 2 Achlys triphylla* 2 Clintonia uniflora** 2 Galium* Moehringia macrophylla* Osmorhiza* Pseudotsuga menziesii 2 Rubus lasiococcus 2 Tiarella trifoliata* [**keep**] TSHRB 6 Alnus viridis* 7 Erythronium montanum+** Mitella* 2 Rhododendron albiflorum* Ribes acerifolium+*** Sorbus sitchensis 2 Vaccinium membranaceum* Veratrum viride* Viola glabella+ 2
▶ [**082**] Lupinus latifolius* Paxistima myrsinites* 2 Rubus lasiococcus 2 Rubus nutkanus 2 Vaccinium membranaceum 4 Valeriana sitchensis 4 [**keep**] Alnus viridis** 2 Erythronium montanum+*** 2 Rubus spectabilis 2 Tiarella trifoliata 5 Viola glabella+ 2. Note: [082] is in drier habitats, often on avalanche-affected talus slopes, occasionally as discrete dense stands of *Callitropsis nootkatensis* in meadows.

Floristics (4 plots, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Callitropsis nootkatensis 52, Abies lasiocarpa 8	Alnus viridis 16	Erythronium montanum+ 5	
80-95				
60-80		Vaccinium membranaceum 2	Valeriana sitchensis 2, Streptopus lanceolatus 2	
40-60		Ribes lacustre 3, Rhododendron albiflorum 3, Ribes acerifolium+ 2	Viola glabella+ 6, Mitella 4, Veratrum viride 1	
25-40	Abies amabilis 0	Rubus spectabilis 5, Sorbus sitchensis 5, Oplopanax horridus 3, Spiraea splendens 1, Acer glabrum 0, Sambucus racemosa 0	Tiarella trifoliata 12, Spiraea lucida 2, Chamaenerion angustifolium 1, Thalictrum occidentale 1, Claytonia sibirica+ 1, Polemonium pulcherrimum 1, Hydrophyllum fendleri 0, Actaea rubra 0, Trillium ovatum 0, Rubus pedatus 0	Carex spectabilis+ 3, moss 2, Luzula hitchcockii+ 0

{082} Callitropsis nootkatensis, Vaccinium membranaceum*, Paxistima myrsinites*
Alaska-cedar, big huckleberry* & Oregon-box* woodland
CUPNOO-(VACMEM)/PAXMYR



Range: Upper and lower montane zones. **MORA**-4: **ne** (sw-se) 1450-1590m. **NOCA**-6: **nw** (ne-cw-s) 1060-1210m. **OLYM**-3: (nc-ne-se) 1310-1550m.

Struct: Conifer woodland (8-13m), a dense closed canopy mix of small trees and conifer regen, with abundant shrubs and substantial forbs. Avg vasc cover 107: conif regen 0.89 @ 41, conif tree 0.89 @ 33, shrb 0.89 @ 17, forb 0.89 @ 15, dwf shrb 0.67 @ 12, tall shrb 0.67 @ 8, fern 0.56 @ 0.

Ecology: Fairly steep lower slopes with southerly aspects, in avalanche-impacted areas. Typically occurs as discrete stands of short *Callitropsis nootkatensis* surrounded by talus or meadows rather than by *Alnus viridis*.

Metrics: slope 31-37°, vdp 4-42m, vdr 279-661m, east 52-95, south 65-96, conv 39-44, tpp 19-42, solar 64-83, wet 2-3

Map class: C20–Subalpine fir & Sitka valerian forest/woodland

Rel to C09: Evolved from CUPNOO_AVAL (a NOCA field call), incorporating some plots from CUPNOO/OPLHOR-(ALNVIR), CUPNOO/VALSIT, etc.

Similar: MO:[080] CUPNOO-(ABILAS)/CLIUNI, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, O:[081] CUPNOO-ALNVIR-(OPLHOR)/ERYMON, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[030] ABILAS/VACMEM/LUPARC, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[032] ABILAS/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[217] VALSIT-VERVIR. Also see: [166] SALSIT-(CORSER)/URTDIO.

▶ [**016**] Abies amabilis* Abies lasiocarpa* 6 Erythronium montanum+ 2 Pseudotsuga menziesii 2 Vaccinium membranaceum* Xerophyllum tenax*** 2 [**keep**] TSHRB 2 Acer circinatum** 2 Bistorta bistortoides* Callitropsis nootkatensis 19 Chamaenerion angustifolium** Cryptogramma acrostichoides* Galium* Paxistima myrsinites 2 Polemonium pulcherrimum* Ribes lacustre** Rubus lasiococcus 5 Rubus nutkanus** 2

▶ [**020**] Abies lasiocarpa* 7 Achillea millefolium** Juniperus communis*** 2 Lupinus latifolius 3 Phlox diffusa*** [**keep**] C-GT5 12 SHRB* 2 TSHRB** 2 Acer circinatum** 2 Chamaenerion angustifolium* Paxistima myrsinites 3 Ribes lacustre** Rubus lasiococcus* 2 Rubus nutkanus** 2 Sorbus sitchensis** Vaccinium membranaceum* 2 Valeriana sitchensis*

▶ [**030**] Abies lasiocarpa* 7 Achillea millefolium** Arnica latifolia+* Hieracium albiflorum* Lupinus latifolius* Pedicularis racemosa* Phlox diffusa** Polemonium pulcherrimum* Rubus lasiococcus* Sorbus sitchensis 2 Vaccinium membranaceum* [**keep**] C-LT5 19 Acer circinatum*** 2 Callitropsis nootkatensis* 11 Ribes lacustre* Rubus nutkanus*** 2

▶ [**080**] Achlys triphylla*** 2 Clintonia uniflora*** 2 Ribes lacustre* 2 Rubus spectabilis 2 Streptopus lanceolatus 2 Tiarella trifoliata* [**keep**] C-LT5 20 Acer circinatum** 2 Amelanchier alnifolia** Bistorta bistortoides** Chamaenerion angustifolium*** Cryptogramma acrostichoides** Lupinus latifolius*** Paxistima myrsinites 2 Pedicularis bracteosa** Sorbus sitchensis* Tsuga mertensiana** Vaccinium deliciosum** Vaccinium membranaceum 3. Note: [080] is typically a mature forest with most trees well over 5m high.

▶ [**081**] Alnus viridis** 2 Erythronium montanum+*** 2 Rubus spectabilis 2 Tiarella trifoliata 5 Viola glabella+ 2 [**keep**] Lupinus latifolius* Paxistima myrsinites* 2 Rubus lasiococcus 2 Rubus nutkanus 2 Vaccinium membranaceum 4 Valeriana sitchensis 4. Note: [0821] is moister, typically a variable mosaic of *Callitropsis nootkatensis* and *Alnus viridis*-dominated patches, in a more conventional avalanche chute with mature forest surrounding.

Floristics (9 plots, MORA 1, NOCA 5, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Callitropsis nootkatensis 58			
40-60	Abies lasiocarpa 4	Vaccinium membranaceum 28	Valeriana sitchensis 9, Paxistima myrsinites 8, Lupinus latifolius 2, Chamaenerion angustifolium 1	moss 34
25-40		Rubus nutkanus 5, Acer circinatum 4, Sorbus sitchensis 1, Ribes lacustre 1	Rubus lasiococcus 10	
10-25	Abies amabilis 18, Taxus brevifolia 5, Tsuga mertensiana 5	Acer glabrum 25, Oplopanax horridus 6, Frangula purshiana 2, Amelanchier alnifolia 2, Alnus viridis 1, Ribes acerifolium+ 1	Vaccinium deliciosum 14, Anaphalis margaritacea 7, Heracleum maximum 7, Sedum spathulifolium 7, Tiarella trifoliata 3, Trillium ovatum 3, Arnica latifolia+ 2, Pedicularis racemosa 1, Erigeron 1, Mertensia paniculata 1, Osmorhiza 1, Mitella 1, Pedicularis bracteosa 1, Galium 1, Viola orbiculata+ 1, Veratrum viride 1, Polemonium pulcherrimum 1	Luzula hitchcockii+ 1

{083} Danthonia intermedia, Racomitrium spp.
Timber oatgrass & racomitrium herbaceous vegetation
DANINT/RACOMITRIUM



Range: Lowland zone, on balds. **NOCA**-3: (cw-ce) 470-530m.

Struct: Semi-open mixed herbaceous vegetation with abundant grasses, substantial forbs, prominent conifer regen, and dense mosses & lichens. Avg vasc cover 47: grass 20, forb 14, dwf shrb 3, conif LT5 2, sedge 0.5 @ 8, fern 0.5 @ 2.

Ecology: Bedrock bald openings upper slopes and ridgetops with southeasterly aspects. Embedded in *Pinus contorta* woodlands, with small *Pinus contorta* usually present.

Metrics: slope 22-26°, vdp 97-144m, vdr 109-161m, east 79-96, south 66-88, conv 60-65, tpp 37-56, solar 60-67, wet 2

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: New name for DANINT to emphasize that it is a bald type.

Similar: MNO:[103] PENDAV/RACOMITRIUM, MNO:[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, N:[061] ARCNEV-PAXMYR/CALRUB, MN:[071] CARNIG-CARLEN-(CALCAN), N:[099] LEWCOL-(JUNPAR), N:[062] ARCNEV/PSESPI, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[059] ANTLAN-(OREALP-VACDEL).

▶ [**061**] SHRB* TSHRB* Arctostaphylos uva-ursi+ 5 Calamagrostis rubescens+* 2 Hieracium scouleri+* Paxistima myrsinites* 2 Pseudoroegneria spicata 2 Pseudotsuga menziesii* [**keep**] Achillea millefolium 2 Agrostis** Anticlea/Toxicoscordion** Carex geyeri+* 2 Castilleja miniata* Collinsia parviflora** Danthonia 6 Erythranthe alsinoides+** Micranthes tolmiei+*** Pinus contorta* Racomitrium 12 Selaginella wallacei+** 2 Vulpia**

▶ [**064**] C-GT5 2 SHRB 2 TSHRB* Amelanchier alnifolia* Arctostaphylos uva-ursi+ 5 Fragaria virginiana 2 Holodiscus discolor 2 Paxistima myrsinites** Penstemon procerus+ 2 Spiraea lucida** [**keep**] Achillea millefolium 7 Agrostis* 2 Anticlea/Toxicoscordion 2 Apocynum androsaemifolium* Carex geyeri+ 2 Castilleja miniata* Danthonia 4 Micranthes tolmiei+*** Myriopteris gracillima*. Note: [064] is in *Pseudotsuga menziesii* woodlands, codominated by dwarf shrubs and forbs.

▶ [**071**] SHRB* Calamagrostis canadensis+ 2 Carex aquatilis+ 2 Carex kelloggii+* 2 Carex nigricans+ 2 Eriophorum angustifolium 2 Phyllodoce empetriformis* Potentilla flabellifolia+* [**keep**] C-LT5* Achillea millefolium 2 Arctostaphylos uva-ursi+*** 2 Carex geyeri+ 2 Danthonia* Micranthes tolmiei+*** Pinus contorta*** Racomitrium*** 2 Selaginella wallacei+*** 2

▶ [**103**] Lomatium martindalei 2 Penstemon procerus+* 2 Pseudotsuga menziesii* Selaginella wallacei+ 5 [**keep**] Achillea millefolium 2 Agrostis*** 2 Anticlea/Toxicoscordion*** 2 Apocynum androsaemifolium* Carex geyeri+ 2 Castilleja miniata*** Danthonia** 2 Erythranthe alsinoides+*** Micranthes tolmiei+* Pinus contorta* Selaginella wallacei+* Vulpia***. Note: [103] is forb-dominated.

▶ [**218**] SHRB* 2 Allium* Berberis aquifolium* 2 Calamagrostis rubescens+ 2 Eriophyllum lanatum* 2 Festuca roemeri 2 Fragaria virginiana* Fritillaria affinis* Koeleria macrantha 2 Lomatium martindalei* Lomatium nudicaule+* Pseudotsuga menziesii* [**keep**] Achillea millefolium 6 Agrostis 2 Apocynum androsaemifolium* Carex geyeri+* 2 Danthonia 3 Erythranthe alsinoides+ 2 Myriopteris gracillima* Pinus contorta*

Floristics (2 plots, NOCA 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus contorta 2		Arctostaphylos uva-ursi+ 3, Micranthes tolmiei+ 1	Racomitrium 45, Danthonia 14, Selaginella wallacei+ 3, moss 3
40-60			Achillea millefolium 20, Erythranthe alsinoides+ 3, Anticlea/Toxicoscordion 3, Collinsia parviflora 1, Castilleja miniata 0, Apocynum androsaemifolium 0	lichen 13, Carex geyeri+ 8, Agrostis 3, Vulpia 3, Cryptogramma acrostichoides 1, Myriopteris gracillima 1

{084} Dasiphora fruticosa, Phlox diffusa*
Shrubby cinquefoil & spreading phlox* herbaceous vegetation
DASFLO-(PHLDIF)



Range: Alpine. **MORA**-1: (ne) 2180-2190m. **OLYM**-8: **ne*** 1930-2000m.

Struct: Open forb-dominated vegetation with forbs, substantial shrubs (dwarfed), and prominent grasses. Avg vasc cover 31: forb 19, shrb 9, grass 0.86 @ 2.

Ecology: Fairly gentle south-facing upper slopes with westerly tendencies, usually on loose scree with some soil development.

Metrics: slope 18-25°, vdp 249-299m, vdr 1030-1117m, east 16-38, south 87-98, conv 62-69, tpp 90-97, solar 86-91, wet 2

Map class: H61–Spreading phlox & common juniper dry meadow

Rel to C09: Expanded, gaining plots from DASFLO SPARSE.

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[168] SAXBRO-(DOULAE-SEDUM), O:[089] FESROE-(PHLDIF-ARECAP), NO:[088] EUCPAU-(PHAHAS-CASMIN), NO:[093] HERMAX-(THAOCC-SAUAME), MO:[095] JUNCOM-(PHLDIF), MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), M:[063] ARCUVA-(DASFLO), MNO:[103] PENDAV/RACOMITRIUM. Also see: [105] PHLDIF-LUPSEL-(PEDCON).

▶ [**088**] C-LT5* Artemisia 2 Bistorta bistortoides* Carex spectabilis+* 2 Castilleja miniata* Eucephalus paucicapitatus** 2 Lomatium martindalei* Lupinus latifolius** 2 Silene parryi* Valeriana sitchensis** 2 [**keep**] SHRB* Anemone occidentalis+* Dasiphora fruticosa*** 2 Lupinus lepidus*** 2 Micranthes tolmiei+*** Silene acaulis 2 Smelowskia*** Solidago multiradiata**

▶ [**089**] C-LT5 2 Eremogone capillaris* 2 Festuca roemeri* 4 Juncus parryi+ 2 Juniperus communis* Lupinus latifolius 2 [**keep**] SHRB* 2 Anemone occidentalis+* Dasiphora fruticosa*** 2 Lupinus lepidus* Micranthes tolmiei+*** Phacelia* Silene acaulis 2 Smelowskia*** Solidago multiradiata*

▶ [**093**] Bromus sitchensis 2 Carex spectabilis+ 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Thalictrum occidentale** 2 [**keep**] SHRB* Anemone occidentalis+*** Dasiphora fruticosa*** 2 Lupinus lepidus*** 2 Micranthes tolmiei+*** Phacelia** Phlox diffusa*** 2 Silene acaulis 2 Smelowskia*** Solidago multiradiata***

▶ [**104**] C-LT5* C-GT5* Abies lasiocarpa* Artemisia 2 Bistorta bistortoides* Carex phaeocephala+ 2 Eriophyllum lanatum* 2 Gentiana calycosa* Juniperus communis* 4 Lupinus latifolius** Paxistima myrsinites* Penstemon procerus+* Poa cusickii+* Silene parryi* 2 [**keep**] SHRB* Anemone occidentalis+*** Dasiphora fruticosa*** 2 Lupinus lepidus*** 2 Micranthes tolmiei+* Phacelia* Silene acaulis 2 Smelowskia*** Solidago multiradiata*

▶ [**105**] Artemisia 2 Carex spectabilis+*** 2 Cherleria/Sabulina 2 Festuca viridula 2 Oreostemma alpigenum** 2 Pedicularis contorta+*** [**keep**] SHRB* Anemone occidentalis+** Dasiphora fruticosa* Micranthes tolmiei+** Phacelia** Silene acaulis 2 Smelowskia** Solidago multiradiata*. Note: [105] may be mostly restricted to pumice substrates.

▶ [**168**] Antennaria lanata+** Cryptogramma acrostichoides** Epilobium* Luina hypoleuca* 2 Micranthes tolmiei+ 2 Oxyria digyna* Penstemon procerus+* Poa cusickii+* Sedum oreganum** [**keep**] SHRB** 2 Anemone occidentalis+* Dasiphora fruticosa** 2 Lupinus lepidus*** 2 Phlox diffusa* Silene acaulis 2 Smelowskia*** Solidago multiradiata*

Floristics (7 plots, MORA 1, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs (dwarfed)	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Dasiphora fruticosa 9		
80-95			Phlox diffusa 5	
60-80			Lupinus lepidus 3, Smelowskia 2, Phacelia 2, Achillea millefolium 2, Solidago multiradiata 2, Micranthes tolmiei+ 1, Anemone occidentalis+ 1	
40-60			Silene acaulis 3, Agoseris 2	Festuca roemeri 2, Elymus 1, Luzula hitchcockii+ 1, Carex phaeocephala+ 1
25-40			Eremogone capillaris 1, Douglasia laevigata 1	lichen 8, Trisetum 0
10-25	Abies lasiocarpa 1		Allium 3, Juniperus communis 2, Sedum divergens 1, Phyllodoce glanduliflora 1, Silene parryi 1, Artemisia 1, Polemonium elegans+ 1, Silene douglasii 1, Collomia 1, Potentilla flabellifolia+ 1, Castilleja miniata 1	Festuca brachyphylla 3, moss 2

{085} Elmera racemosa, Epilobium anagallidifolium
Yellow coralbells & alpine willowherb herbaceous vegetation
ELMRAC-EPIANA



Range: Upper subalpine zone, on exposed rocks. **OLYM**-7: **ne**-**se** (nc-sc) 1500-1720m.

Struct: Open forb-dominated vegetation. Avg vasc cover 15: forb 14.

Ecology: Early seral vegetation in concavities in talus and scree, on fairly steep slopes with easterly aspects.

Metrics: slope 30-39°, vdp 29-51m, vdr 892-1125m, east 66-99, south 10-60, conv 33-45, tpp 50-79, solar 38-73, wet 2

Map class: H54–Moist talus vegetation

Rel to C09: Evolved from ELMRAC-(SENNEO) SPARSE, incorporating a plot from ARNXDIV SPARSE.

Similar: MN:[079] CHALAT-(OXYDIG-VALSIT), NO:[168] SAXBRO-(DOULAE-SEDUM), MNO:[100] LUEPEC-(CARSPE), NO:[093] HERMAX-(THAOCC-SAUAME), NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[103] PENDAV/RACOMITRIUM, MNO:[067] ATHAME-CRYACR, MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[070] CARAQU-(MENTRI-EQUISETUM). Also see: [066] ARTLUD-LOMMAR

▶ [**079**] FORB 21 SHRB** TSHRB* VASC VEG 24 Aruncus dioicus** Athyrium distentifolium* 2 Chamaenerion latifolium* Erythranthe lewisii+* Luetkea pectinata 4 Oxyria digyna* 2 Valeriana sitchensis* 3 Veratrum viride** Veronica cusickii+** [**keep**] Allium** Elmera racemosa* 2 Lomatium martindalei** Phacelia***

▶ [**088**] SHRB* 2 Achillea millefolium* Artemisia 2 Bistorta bistortoides* Carex spectabilis+* 2 Castilleja miniata* Eucephalus paucicapitatus* 2 Lupinus latifolius** 2 Phacelia* Phlox diffusa* 2 Silene parryi* Valeriana sitchensis* [**keep**] Allium* Arnica latifolia+ 3 Athyrium distentifolium*** Elmera racemosa** 3 Epilobium* Luetkea pectinata* Polystichum lonchitis** Senecio triangularis+*

▶ [**093**] SHRB* TSHRB* Achillea millefolium* Bromus sitchensis* 2 Carex spectabilis+* 2 Chamaenerion angustifolium* Cirsium edule+* Elymus* 2 Heracleum maximum** 2 Thalictrum occidentale** 2 [**keep**] Elmera racemosa*** 2

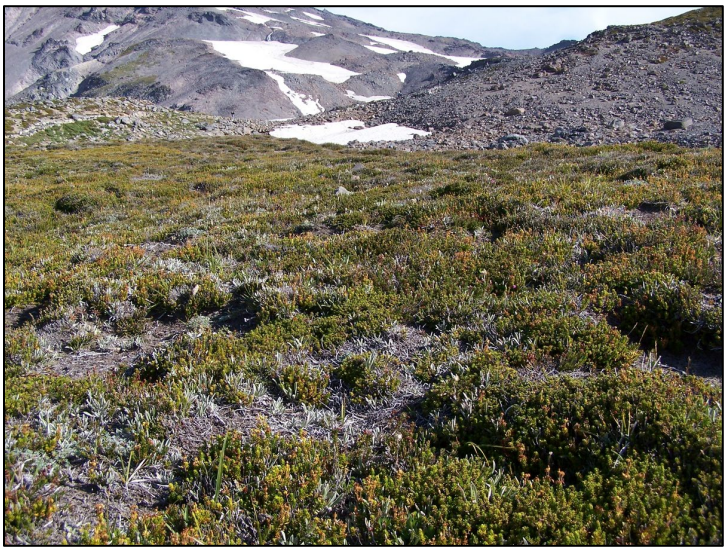
▶ [**100**] Carex spectabilis+ 2 Cassiope mertensiana** Juncus parryi+* Luetkea pectinata* 4 Luzula piperi+** Phyllodoce empetriformis*** 2 [**keep**] Allium** Arnica latifolia+ 3 Elmera racemosa** 2 Epilobium* Lomatium martindalei** Phacelia*** Polystichum lonchitis* Valeriana sitchensis*

▶ [**168**] Achillea millefolium* Antennaria lanata+* Carex phaeocephala+** Douglasia laevigata* Juniperus communis** Luina hypoleuca** 2 Micranthes tolmiei+** Penstemon procerus+** Phlox diffusa** Sedum oreganum* [**keep**] Arnica latifolia+ 2 Athyrium distentifolium** Elmera racemosa** 2 Epilobium* Hieracium triste* Polystichum lonchitis* Senecio triangularis+* Valeriana sitchensis*

Floristics (7 plots, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Elmera racemosa 7	
80-95			Epilobium 2	
40-60			Luetkea pectinata 3, Phacelia 1	moss 2, Athyrium distentifolium 1
25-40	Abies lasiocarpa 0		Arnica latifolia+ 6, Lomatium martindalei 2, Valeriana sitchensis 2, Senecio triangularis+ 1, Allium 1, Hieracium triste 0	Polystichum lonchitis 0
10-25			Micranthes tolmiei+ 3, Chamaenerion latifolium 3, Antennaria lanata+ 2, Sanicula 1	Cryptogramma acrostichoides 1, Luzula hitchcockii+ 1

{086} Empetrum nigrum, Lupinus lepidus
Black crowberry & Donner Lake lupine dwarf shrubland
EMPNIG-LUPSEL



Range: Alpine. **MORA**-11: **nw-ne** (sw-se) 2010-2110m. **NOCA**-3: (nw-cw-s) 2010-2090m.

Struct: Semi-closed canopy dwarf shrubland with substantial forbs and prominent sedges. Avg vasc cover 74: dwf shrb 60, forb 11, sedge 0.75 @ 3, conif LT5 0.38 @ 3.

Ecology: Gentle upper slopes on well-drained soils.

Metrics: slope 9-19°, vdp 42-216m, vdr 766-930m, east 17-59, south 5-90, conv 51-68, tpp 70-89, solar 63-87, wet 2-4

Map class: S49–Alpine heather shrubland

Rel to C09: Same.

Similar: N:[108] PHYGLA-(CASMER), MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[095] JUNCOM-(PHLDIF), M:[063] ARCUVA-(DASFLO), MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[076] CARSPE-(LUPARC-POLBIS), NO:[093] HERMAX-(THAOCC-SAUAME), MN:[071] CARNIG-CARLEN-(CALCAN).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Oreostemma alpigenum* 2 Potentilla flabellifolia+** 2 Vaccinium deliciosum 2 [**keep**] Artemisia** Cherleria/Sabulina** 2 Empetrum nigrum** Juniperus communis** 2 Lupinus lepidus*** 2 Luzula piperi+* Penstemon procerus+** Phleum alpinum* Phyllodoce glanduliflora*** 2 Salix nivalis+** 2

▶ [**095**] Achillea millefolium* Douglasia laevigata* Eremogone capillaris 2 Erysimum arenicola* Festuca brachyphylla* Juncus parryi+ 2 Juniperus communis 11 Lomatium martindalei* Luzula hitchcockii+* Phlox diffusa* Silene parryi* Trisetum* [**keep**] Carex spectabilis+* Cassiope mertensiana** 2 Cherleria/Sabulina 2 Empetrum nigrum*** 2 Luetkea pectinata* Lupinus lepidus* Phyllodoce empetriformis* 2 Phyllodoce glanduliflora 2 Vaccinium deliciosum*

▶ [**100**] C-LT5* Epilobium** Hieracium triste* Juncus parryi+* Luetkea pectinata* 2 Luzula piperi+* Micranthes tolmiei+* Phyllodoce empetriformis* Tsuga mertensiana* Vahlodea atropurpurea* [**keep**] Bistorta bistortoides* Cassiope mertensiana 2 Cherleria/Sabulina 2 Empetrum nigrum** 2 Gentiana calycosa*** Juniperus communis** 2 Lupinus latifolius* Lupinus lepidus** Pedicularis ornithorhynchos*** Phyllodoce glanduliflora* 3

▶ [**104**] C-GT5* Achillea millefolium* Artemisia 2 Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* 2 Lomatium martindalei* Paxistima myrsinites* Phacelia* Phlox diffusa* 4 Silene parryi* 2 [**keep**] Antennaria lanata+* Cassiope mertensiana* 2 Cherleria/Sabulina 2 Empetrum nigrum*** 2 Luetkea pectinata* Lupinus lepidus** Pedicularis ornithorhynchos** Phyllodoce empetriformis* 2 Phyllodoce glanduliflora** 2 Vaccinium deliciosum* Veronica cusickii+*

▶ [**108**] Antennaria lanata+ 2 Luzula piperi+* Micranthes tolmiei+* Penstemon procerus+* Phyllodoce glanduliflora* Pinus albicaulis** Poa cusickii+* 2 Vaccinium cespitosum 2 [**keep**] C-LT5 2 Artemisia* Cherleria/Sabulina* 2 Empetrum nigrum 15 Lupinus lepidus*** 2 Oreostemma alpigenum* Pedicularis contorta+* Phleum alpinum* Salix nivalis+* 2

Floristics (8 plots, MORA 5, NOCA 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Empetrum nigrum 42	
60-80			Juniperus communis 7	Carex spectabilis+ 4
40-60			Phyllodoce empetriformis 8, Lupinus latifolius 8, Cassiope mertensiana 4, Lupinus lepidus 4, Vaccinium deliciosum 1, Luetkea pectinata 1, Gentiana calycosa 0	
25-40	Abies lasiocarpa 3		Phyllodoce glanduliflora 11, Cherleria/Sabulina 4, Salix nivalis+ 4, Phlox diffusa 3, Pedicularis contorta+ 2, Antennaria lanata+ 1, Oreostemma alpigenum 1, Artemisia 1, Erigeron 0, Veronica cusickii+ 0, Bistorta bistortoides 0, Penstemon procerus+ 0, Pedicularis ornithorhynchos 0, Hieracium triste 0	Phleum alpinum 1, Luzula piperi+ 0
10-25	Pinus contorta 1		Arctostaphylos uva-ursi+ 10, Vaccinium scoparium+ 5, Solidago multiradiata 3, Achillea millefolium 2, Ligusticum 2, Sedum lanceolatum+ 1, Castilleja parviflora+ 1	lichen 1

{087} Eriogonum pyrolifolium, Aconogonon davisiae
Dirty-socks & Davis' knotweed herbaceous vegetation
ERIPYR-POLDAV



Range: Alpine, on exposed rocks. **MORA**-11: **ne*** (se) 2020-2170m. Found on other Cascades volcanoes.

Struct: Open forb-dominated vegetation with prominent rushes & sedges. Avg vasc cover 22: forb 17, rush 0.75 @ 3, sedge 0.75 @ 2.

Ecology: Gentle east-facing upper slopes with southerly tendencies. Snowmelt is late but sites are very well-drained; soils often composed largely of pumice.

Metrics: slope 9-20°, vdp 36-151m, vdr 748-841m, east 86-95, south 61-86, conv 49-57, tpp 62-88, solar 80-86, wet 3-4

Map class: H63–Alpine buckwheat pumice vegetation

Rel to C09: Created by merging ERIPYR SPARSE and POLDAV.

Similar: MNO:[100] LUEPEC-(CARSPE), NO:[168] SAXBRO-(DOULAE-SEDUM), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[059] ANTLAN-(OREALP-VACDEL), O:[085] ELMRAC-EPIANA, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[169] SAXTOL-LUZPIP-(CARNIG), MNO:[103] PENDAV/RACOMITRIUM, NO:[088] EUCPAU-(PHAHAS-CASMIN).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides** Oreostemma alpigenum* 3 Potentilla flabellifolia+** 2 Vaccinium deliciosum** 2 [**keep**] Aconogonon davisiae** Eriogonum pyrolifolium*** 2
▶ [**079**] TSHRB* Arnica latifolia+ 2 Athyrium distentifolium** 2 Chamaenerion latifolium** 2 Epilobium* Erythranthe lewisii+* Luetkea pectinata* Oxyria digyna* 2 Senecio triangularis+* Valeriana sitchensis** 2 Veratrum viride* Veronica cusickii+* [**keep**] Aconogonon davisiae*** 2 Eriogonum pyrolifolium*** 2
▶ [**085**] Arnica latifolia+ 2 Elmera racemosa** 2 Epilobium** [**keep**] Aconogonon davisiae** 2 Carex spectabilis+* Eriogonum pyrolifolium** 2
▶ [**100**] C-LT5** Abies lasiocarpa* Carex spectabilis+ 3 Cassiope mertensiana** Epilobium* Erigeron* Hieracium triste* Juncus parryi+* Luetkea pectinata* Luzula piperi+* Phyllodoce empetriformis* 2 [**keep**] Aconogonon davisiae*** 2 Eriogonum pyrolifolium** 2
▶ [**168**] Achillea millefolium** Cryptogramma acrostichoides* Douglasia laevigata** Epilobium* Juniperus communis* Luina hypoleuca* 2 Micranthes tolmiei+ 2 Oxyria digyna* Phacelia* Phlox diffusa* Sedum oreganum* [**keep**] Aconogonon davisiae** 2 Carex spectabilis+** Eriogonum pyrolifolium*** 2

Floristics (8 plots, MORA 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Eriogonum pyrolifolium 8	
80-95			Aconogonon davisiae 7	
60-80				Carex spectabilis+ 2
40-60			Micranthes tolmiei+ 2	
25-40			Oreostemma alpigenum 2, Phyllodoce empetriformis 1, Antennaria lanata+ 1, Agoseris 1, Lupinus lepidus 1, Penstemon procerus+ 1	Juncus parryi+ 1, Luzula piperi+ 1
10-25			Luetkea pectinata 5, Microseris 1, Cardamine 1, Anemone occidentalis+ 1, Veronica cusickii+ 1	Luzula hitchcockii+ 10, Poa cusickii+ 1, Carex nigricans+ 1, Festuca viridula 1

{088} Eucephalus paucicapitatus, Phacelia hastata*, Castilleja miniata*
Olympic aster, silver-leaf phacelia* & scarlet Indian paintbrush* herbaceous vegetation
EUCPAU-(PHAHAS-CASMIN)



Range: Alpine and upper subalpine zones, on exposed rocks. **NOCA**-1: (nw) 1450-1460m. **OLYM**-27: **nc**-**ne**-**sc**-**se** 1510-1750m.

Struct: Semi-closed canopy forb-dominated vegetation. Avg vasc cover 71: forb 58, grass 0.7 @ 4, dwf shrb 0.48 @ 6, shrb 0.48 @ 6, sedge 0.48 @ 5, rush 0.19 @ 3. (Assumes plot delineation excludes much of the open rock that is typical in the surroundings.)

Ecology: Fairly steep slopes with southerly aspects, on poorly developed soils, typically with patches of talus or scree. Sometimes on colluvial fans.

Metrics: slope 32-38°, vdp 41-146m, vdr 780-1028m, east 19-86, south 67-97, conv 40-53, tpp 42-82, solar 72-88, wet 2

Map class: H55–Olympic aster scree meadow

Rel to C09: Evolved from EUCPAU, adding some plots from [104] PHLDIF-(LOMMAR-CARPHA) and several other assns.

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[217] VALSIT-VERVIR, MNO:[215] VALSIT-CARSPE, MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[079] CHALAT-(OXYDIG-VALSIT), MN:[090] FESVIR-EUC(LED,ENG), NO:[066] ARTLUD-LOMMAR, O:[089] FESROE-(PHLDIF-ARECAP), MNO:[059] ANTLAN-(OREALP-VACDEL). Also see: [085] ELMRAC-EPIANA

▶ [**076**] Bistorta bistortoides 4 Carex spectabilis+* 9 Castilleja parviflora+** Erigeron* Luetkea pectinata* Phleum alpinum** Phyllodoce empetriformis** 2 Potentilla flabellifolia+* Vaccinium deliciosum* 2 Veratrum viride* Veronica cusickii+* [**keep**] Anemone occidentalis+* Artemisia** Castilleja miniata*** 2 Cirsium edule+* Eucephalus paucicapitatus*** 5 Hieracium albiflorum*** Lomatium martindalei** Phacelia*** Phlox diffusa* 3 Silene parryi* Vaccinium membranaceum 2

▶ [**093**] Bromus sitchensis 2 Cirsium edule+* Elymus 2 Heracleum maximum** 2 Thalictrum occidentale** [**keep**] Anemone occidentalis+ 2 Castilleja miniata* Eucephalus paucicapitatus*** 5 Lomatium martindalei*** Lupinus latifolius* Phacelia** Phlox diffusa** 2 Spiraea splendens 2 Valeriana sitchensis*

▶ [**104**] C-GT5* Carex phaeocephala+** Douglasia laevigata* Eriophyllum lanatum* Gentiana calycosa* Juniperus communis** Micranthes tolmiei+*** Paxistima myrsinites* Penstemon procerus+* Phlox diffusa* [**keep**] Agoseris* Anemone occidentalis+** 2 Castilleja miniata* Cirsium edule+** Epilobium** Eucephalus paucicapitatus*** 4 Hieracium albiflorum* Phacelia* Spiraea splendens** 2 Valeriana sitchensis* 2

▶ [**215**] Arnica latifolia+* Carex spectabilis+* 8 Chamaenerion angustifolium 3 Erigeron* Erythronium montanum+* 2 Eucephalus ledophyllus+** Pedicularis bracteosa** Potentilla flabellifolia+* Sorbus sitchensis* Vaccinium deliciosum* 2 Valeriana sitchensis 7 Veratrum viride* [**keep**] SHRB 3 Achillea millefolium* Agoseris** Artemisia** 2 Castilleja miniata* 2 Eucephalus paucicapitatus** 7 Hieracium albiflorum*** Lomatium martindalei*** Phacelia** Phlox diffusa** Silene parryi*

▶ [**217**] Festuca viridula* Ligusticum* Luzula hitchcockii+* Osmorhiza* Pedicularis bracteosa* Phyllodoce empetriformis* Potentilla flabellifolia+* 2 Senecio triangularis+* 2 Vaccinium deliciosum 2 Valeriana sitchensis 7 Veratrum viride* 6 Viola glabella+* [**keep**] Achillea millefolium** Agoseris* Artemisia*** 2 Castilleja miniata** Eucephalus paucicapitatus*** 11 Hieracium albiflorum*** Lomatium martindalei*** Phacelia** Phlox diffusa* Silene parryi***

Floristics (27 plots, NOCA 1, OLYM 26): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Eucephalus paucicapitatus 23, Phacelia 2	
60-80			Lupinus latifolius 7, Valeriana sitchensis 5, Castilleja miniata 4	
40-60			Phlox diffusa 9, Bistorta bistortoides 3, Silene parryi 2, Lomatium martindalei 2, Achillea millefolium 1, Cirsium edule+ 1	Carex spectabilis+ 5
25-40	Callitropsis nootkatensis 2, Abies lasiocarpa 1	Spiraea splendens 4, Vaccinium membranaceum 3	Artemisia 6, Anemone occidentalis+ 3, Anaphalis margaritacea 3, Chamaenerion angustifolium 2, Epilobium 1, Sedum divergens 1, Agoseris 1, Hieracium albiflorum 0	Poa cusickii+ 1
10-25		Rubus nutkanus 3, Sorbus sitchensis 2	Hedysarum occidentale 12, Juniperus communis 11, Eriophyllum lanatum 7, Thalictrum occidentale 6, Paxistima myrsinites 6, Aquilegia formosa 4, Erigeron 4, Veratrum viride 3, Elmera racemosa 2, Luetkea pectinata 2, Sedum oreganum 2, Gentiana calycosa 2, Arnica latifolia+ 2, Mertensia paniculata 2, Penstemon procerus+ 2, Potentilla flabellifolia+ 1, Castilleja hispida 1, Campanula rotundifolia+ 1, Vaccinium deliciosum 1, Hieracium triste 1, Eremogone capillaris 1, Erythronium montanum+ 1	Festuca roemeri 14, Festuca brachyphylla 3, Juncus parryi+ 3, Bromus sitchensis 1, Cryptogramma acrostichoides 1, Elymus 1

{089} Festuca roemeri, Phlox diffusa*, Eremogone capillaris*
Roemer's fescue, spreading phlox* & mountain sandwort* herbaceous vegetation
FESROE-(PHLDIF-ARECAP)



Range: Subalpine and lower alpine zones. **OLYM**-20: **ne*** 1540-1750m.

Struct: Closed canopy mixed herbaceous vegetation with dense forbs and abundant grasses. Avg vasc cover 76: forb 47, grass 19, dwf shrb 0.75 @ 3, conif LT5 0.42 @ 3, rush 0.25 @ 6, sedge 0.17 @ 19.

Ecology: Fairly gentle south-facing upper slopes, on relatively deep but poorly developed soils, typically acidic sandy loams. These meadows typically occur in large patches. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 15-28°, vdp 205-304m, vdr 1130-1241m, east 24-62, south 82-99, conv 56-68, tpp 88-95, solar 80-88, wet 2-3

Map class: H61–Spreading phlox & common juniper dry meadow

Rel to C09: Same, adding a few plots from PHLDIF-(LOMMAR-CARPHA).

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[095] JUNCOM-(PHLDIF), NO:[088] EUCPAU-(PHAHAS-CASMIN), MO:[065] ARCUVA-JUNCOM, NO:[093] HERMAX-(THAOCC-SAUAME), MN:[102] PAXMYR/PHLDIF, MNO:[059] ANTLAN-(OREALP-VACDEL), NO:[094] JUNPAR-(POLBIS), MN:[090] FESVIR-EUC(LED,ENG), MNO:[100] LUEPEC-(CARSPE). Also see: [218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM.

▶ [**065**] Arctostaphylos uva-ursi+*** 2 Erigeron* Juniperus communis 4 Lilium** Luzula hitchcockii+** Paxistima myrsinites** 2 Penstemon procerus+** Pseudoroegneria spicata** Sedum lanceolatum+** [**keep**] C-LT5 2 FORB 13 Eremogone capillaris* 2 Festuca roemeri 8 Juncus parryi+ 2 Lupinus latifolius 2 Phlox diffusa 2
▶ [**088**] SHRB 2 Artemisia 2 Castilleja miniata*** 2 Eucephalus paucicapitatus** Lupinus latifolius* Phacelia* Spiraea splendens 2 Vaccinium membranaceum 2 Valeriana sitchensis*** 2 [**keep**] Allium 2 Eremogone capillaris*** 2 Festuca roemeri*** Phlox diffusa*
▶ [**093**] SHRB 2 Artemisia 2 Bromus sitchensis 2 Cirsium edule+** Elymus 2 Heracleum maximum* Hydrophyllum fendleri 2 Thalictrum occidentale** 2 [**keep**] Allium 2 Eremogone capillaris*** 2 Festuca roemeri*** 6 Juncus parryi+ 2 Juniperus communis*** Phlox diffusa*** 2
▶ [**095**] Douglasia laevigata** Festuca brachyphylla* Gentiana calycosa** Juniperus communis 5 Luzula hitchcockii+** Micranthes tolmiei+** Penstemon procerus+* Pinus albicaulis** Sedum divergens** Sedum lanceolatum+** Trisetum** [**keep**] Anemone occidentalis+ 2 Eremogone capillaris* Festuca roemeri** 5. Note: [095] is codominated by dwarf shrubs and forbs.
▶ [**104**] Artemisia 2 Douglasia laevigata** Eriophyllum lanatum* Gentiana calycosa** Juniperus communis 5 Lupinus latifolius* Micranthes tolmiei+** Paxistima myrsinites** Penstemon procerus+* Silene parryi* 2 [**keep**] Anemone occidentalis+ 2 Eremogone capillaris*** 5 Festuca roemeri**

Floristics (12 plots, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phlox diffusa 14, Eremogone capillaris 9	Festuca roemeri 16
60-80			Juniperus communis 3, Achillea millefolium 2	
40-60	Abies lasiocarpa 2		Lomatium martindalei 3, Erysimum arenicola 1	
25-40			Lupinus latifolius 5, Allium 3, Anemone occidentalis+ 3, Campanula rotundifolia+ 2, Antennaria lanata+ 1	lichen 11, moss 8, Juncus parryi+ 6
10-25			Eucephalus paucicapitatus 15, Cerastium arvense 15, Bistorta bistortoides 6, Eriophyllum lanatum 4, Silene douglasii 3, Vaccinium deliciosum 3, Potentilla flabellifolia+ 2, Phacelia 2, Orthocarpus imbricatus 2, Microseris 2, Agoseris 2, Silene parryi 1, Collinsia parviflora 1, Artemisia 1	Carex phaeocephala+ 18, Poa cusickii+ 6, Selaginella wallacei+ 5, Elymus 1

{090} Festuca viridula, Eucephalus ledophyllus/engelmannii
Green fescue & Cascade or Engelmann's aster herbaceous vegetation
FESVIR-EUC(LED,ENG)



Range: Alpine and upper subalpine zones at MORA, subalpine and upper montane zones at NOCA. **MORA**-40: **ne*-sw-se** 1800-1950m. **NOCA**-23: **s*** (ne-ce) 1570-1870m.

Struct: Closed canopy mixed herbaceous vegetation with dense forbs and abundant grasses. Avg vasc cover 87: forb 48, grass 28, conif LT5 0.61 @ 1, dwf shrb 0.59 @ 6, sedge 0.54 @ 8, shrb 0.29 @ 8.

Ecology: South-facing midslopes on dry talus-derived soils, often with significant bare ground and cliffs above. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 14-33°, vdp 38-183m, vdr 674-861m, east 27-68, south 84-99, conv 46-60, tpp 49-85, solar 80-92, wet 2-3

Map class: H57–Green fescue dry meadow

Rel to C09: Evolved from FESVIR-EUCLED to incorporate similar vegetation with *Eucephalus engelmannii* instead of *E. ledophyllus*; also added many plots from the very heterogeneous FESVIR-LUPARC and several other assns.

Similar: MN:[216] VALSIT-LIGGRA, M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), MN:[092] FESVIR-PHLDIF-ARECAP, MN:[102] PAXMYR/PHLDIF, MN:[209] VACDEL-FESVIR, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[217] VALSIT-VERVIR, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[215] VALSIT-CARSPE, NO:[088] EUCPAU-(PHAHAS-CASMIN). Also see: [213] VACMEM/XERTEN.

▶ [**091**] Antennaria lanata+* Bistorta bistortoides* Oreostemma alpigenum*** 2 Potentilla flabellifolia+* Veronica cusickii+* [**keep**] SHRB 2 Achillea millefolium* Arnica mollis+** Castilleja miniata** Elymus** Eremogone capillaris* Eucephalus ledophyllus+** 4 Ligusticum 5 Lomatium brandegeei+** Phlox diffusa* Silene parryi** Thalictrum occidentale** 2 Valeriana sitchensis 2
▶ [**092**] Antennaria lanata+* Eremogone capillaris* Juncus parryi+** Luzula hitchcockii+ 2 Senecio integerrimus** [**keep**] SHRB* 3 TSHRB*** Achillea millefolium* Carex spectabilis+** 3 Elymus*** Eucephalus ledophyllus+*** 2 Hieracium scouleri+* Ligusticum 3 Thalictrum occidentale*** 2 Valeriana sitchensis** 2
▶ [**102**] SHRB* Antennaria lanata+* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Hieracium scouleri+* Juncus parryi+** 4 Lewisia*** Lomatium brandegeei+* Paxistima myrsinites* 5 Sedum lanceolatum+** Selaginella wallacei+ 2 Vaccinium membranaceum* 2 [**keep**] Erigeron* Eucephalus ledophyllus+* 7 Festuca viridula 9 Ligusticum** 2 Lupinus latifolius 2 Thalictrum occidentale 2
▶ [**209**] Anemone occidentalis+* Antennaria lanata+* Erythronium montanum+* Juncus parryi+* Luzula hitchcockii+* Phyllodoce empetriformis** Senecio integerrimus*** Spiraea splendens 2 Vaccinium deliciosum** 13 Valeriana sitchensis* Veronica cusickii+* 2 [**keep**] Achillea millefolium* Arnica mollis+** Elymus* Eucephalus ledophyllus+* Hieracium scouleri+* Ligusticum* 2 Silene parryi** Thalictrum occidentale* 2
▶ [**216**] Bistorta bistortoides* Castilleja parviflora+* Epilobium* Gentiana calycosa** Luzula hitchcockii+ 2 Polemonium pulcherrimum* Potentilla flabellifolia+* Senecio triangularis+** Vaccinium deliciosum* Valeriana sitchensis* 5 Veratrum viride* 3 Veronica cusickii+ 2 [**keep**] SHRB 2 Achillea millefolium* Eremogone capillaris*** Eucephalus ledophyllus+* Phlox diffusa*** 2 Silene parryi*. Note: [216] is in moister sites, often concavities rather than open slopes.

Floristics (41 plots, MORA 18, NOCA 23): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Festuca viridula 23
80-95			Eucephalus ledophyllus+ 17	
60-80			Lupinus latifolius 6	
40-60	Abies lasiocarpa 1		Ligusticum 11, Phlox diffusa 4, Erigeron 3, Arnica mollis+ 3, Eremogone capillaris 3, Achillea millefolium 2, Castilleja miniata 2, Silene parryi 2	Carex spectabilis+ 9
25-40			Thalictrum occidentale 4, Valeriana sitchensis 3, Lomatium brandegeei+ 3, Erythronium montanum+ 2, Hieracium scouleri+ 2	Elymus 3, Poa cusickii+ 1
10-25	Pinus albicaulis 1	Rubus nutkanus 8, Dasiphora fruticosa 8, Vaccinium membranaceum 1	Vaccinium deliciosum 8, Phyllodoce empetriformis 3, Symphyotrichum foliaceum 3, Paxistima myrsinites 3, Potentilla flabellifolia+ 3, Anemone occidentalis+ 3, Antennaria lanata+ 2, Veratrum viride 2, Bistorta bistortoides 2, Senecio integerrimus 2, Penstemon procerus+ 1, Hydrophyllum fendleri 1, Chamaenerion angustifolium 1, Cirsium edule+ 1, Pedicularis bracteosa 1, Veronica cusickii+ 1, Angelica 1, Eriogonum umbellatum 1, Lilium 1, Drymocallis glandulosa+ 1, Agoseris 0	Calamagrostis rubescens+ 11, Danthonia 5, Bromus vulgaris+ 3, Juncus parryi+ 3, Trisetum 1

{091} Festuca viridula, Lupinus latifolius, Antennaria lanata*, Potentilla flabellifolia*
Green fescue, subalpine lupine, woolly pussytoes* & fan-leaf cinquefoil* herbaceous vegetation
FESVIR-LUPARC-(ANTLAN-POTFLA)



Range: Subalpine. **MORA**-26: **ne*** (nw-sw-se) 1710-1970m.

Struct: Closed canopy mixed herbaceous vegetation with dense forbs and grasses. Avg vasc cover 88: forb 44, grass 35, sedge 0.46 @ 6, dwf shrb 0.38 @ 5, rush 0.31 @ 9.

Ecology: Very gentle slopes. Although the setting is subalpine, the vegetation may have an alpine character.

Metrics: slope 2-12°, vdp 15-106m, vdr 622-738m, east 27-96, south 49-95, conv 49-53, tpp 57-88, solar 74-85, wet 3-6

Map class: H56–Subalpine summer-dry grass-forb meadow

Rel to C09: Created by merging a subset of FESVIR-LUPARC plots with oddball plots from eight other C09 types.

Similar: MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[090] FESVIR-EUC(LED,ENG), MN:[216] VALSIT-LIGGRA, MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[092] FESVIR-PHLDIF-ARECAP, MNO:[217] VALSIT-VERVIR, MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[215] VALSIT-CARSPE, MN:[214] VACSCO-FESVIR-ARECAP, NO:[093] HERMAX-(THAOCC-SAUAME).

▶ [**059**] Carex nigricans+*** 2 Luetkea pectinata* Pedicularis ornithorhynchos** Phlox diffusa* Phyllodoce empetriformis* Vaccinium deliciosum* 6 [**keep**] Festuca viridula** 5 Lupinus latifolius**

▶ [**076**] C-LT5* SHRB** Arnica latifolia+* Carex spectabilis+* 10 Castilleja parviflora+* Erigeron* Luetkea pectinata* Phleum alpinum* Spiraea splendens* Vaccinium deliciosum* Valeriana sitchensis** Veratrum viride* [**keep**] Antennaria lanata+** Festuca viridula** 12 Oreostemma alpigenum*** Veronica cusickii+*

▶ [**090**] SHRB 2 Achillea millefolium* Arnica mollis+** Castilleja miniata** Elymus** Eremogone capillaris* Eucephalus ledophyllus+** 4 Ligusticum 5 Lomatium brandegeei+** Phlox diffusa* Silene parryi** Thalictrum occidentale** 2 Valeriana sitchensis 2 [**keep**] Antennaria lanata+* Bistorta bistortoides* Oreostemma alpigenum*** 2 Potentilla flabellifolia+* Veronica cusickii+*

▶ [**092**] C-LT5* Arnica mollis+ 2 Castilleja miniata** Eremogone capillaris* 2 Erigeron* Erythronium montanum+ 2 Juncus parryi+* Phlox diffusa** Senecio integerrimus*** [**keep**] Bistorta bistortoides*** 2 Carex spectabilis+** 3 Lupinus latifolius 7 Oreostemma alpigenum*** 2 Potentilla flabellifolia+*

▶ [**216**] C-LT5* Abies lasiocarpa* Erigeron* Erythronium montanum+ 2 Eucephalus ledophyllus+ 3 Ligusticum* Vaccinium deliciosum 6 Valeriana sitchensis*** 2 [**keep**] Antennaria lanata+* 2 Bistorta bistortoides* Oreostemma alpigenum* 2 Veronica cusickii+*

Floristics (13 plots, MORA 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Lupinus latifolius 14	
80-95			Potentilla flabellifolia+ 7	Festuca viridula 30
60-80			Antennaria lanata+ 6, Bistorta bistortoides 4, Veronica cusickii+ 2	
40-60			Oreostemma alpigenum 5	Carex spectabilis+ 6
25-40	Abies lasiocarpa 1		Ligusticum 3, Gentiana calycosa 3	
10-25			Luetkea pectinata 8, Pedicularis contorta+ 7, Erigeron 7, Anemone occidentalis+ 7, Veratrum viride 5, Vaccinium deliciosum 4, Castilleja parviflora+ 3, Cassiope mertensiana 3, Phyllodoce empetriformis 3, Solidago multiradiata 3, Eremogone capillaris 1	Danthonia 30, Juncus parryi+ 11, Luzula hitchcockii+ 2

{092} Festuca viridula, Phlox diffusa, Eremogone capillaris
Green fescue, spreading phlox & mountain sandwort herbaceous vegetation
FESVIR-PHLDIF-ARECAP



Range: Upper subalpine. **MORA**-4: (ne-se) 1890-1950m. **NOCA**-23: **ne-s*** (ce) 1960-2050m.

Struct: Semi-closed canopy mixed herbaceous vegetation with dense forbs, abundant grasses, and substantial rushes. Avg vasc cover 75: forb 41, grass 22, rush 0.92 @ 7, conif LT5 0.71 @ 1, dwf shrb 0.5 @ 9, shrb 0.13 @ 2.

Ecology: Fairly gentle south-facing slopes, on dry soils with much exposed bare soil and rock. Significantly more exposed soil than is typical in *Festuca viridula* meadows. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 14-29°, vdp 47-175m, vdr 911-1026m, east 13-53, south 80-100, conv 47-59, tpp 64-83, solar 80-91, wet 2-4

Map class: H57–Green fescue dry meadow

Rel to C09: Created out of some plots from the extremely heterogeneous association FESVIR-LUPARC, to provide a NOCA variation of [089] FESROE-(PHLDIF-ARECAP) with *Festuca viridula*.

Similar: MN:[090] FESVIR-EUC(LED,ENG), MN:[102] PAXMYR/PHLDIF, MN:[209] VACDEL-FESVIR, M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), MN:[214] VACSCO-FESVIR-ARECAP, MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[216] VALSIT-LIGGRA, NO:[094] JUNPAR-(POLBIS), MNO:[104] PHLDIF-(LOMMAR-CARPHA), O:[089] FESROE-(PHLDIF-ARECAP). Also see: [100] LUEPEC-(CARSPE)

▶ [**089**] Allium 2 Anemone occidentalis+ 2 Festuca roemeri*** 2 Juniperus communis*** [**keep**] Antennaria lanata+* 2 Erigeron* 2 Erythronium montanum+ 2 Festuca viridula** 2 Juncus parryi+* Lupinus latifolius* Luzula hitchcockii+ 2 Senecio integerrimus**. Note: [089] is a variant at OLYM.
▶ [**090**] SHRB* 3 TSHRB*** Achillea millefolium* Carex spectabilis+** 3 Elymus*** Eucephalus ledophyllus+*** 2 Hieracium scouleri+* Ligusticum 3 Thalictrum occidentale*** 2 Valeriana sitchensis** 2 [**keep**] Antennaria lanata+* Eremogone capillaris* Juncus parryi+** Luzula hitchcockii+ 2 Senecio integerrimus**
▶ [**091**] Bistorta bistortoides*** 2 Carex spectabilis+** 3 Lupinus latifolius 7 Oreostemma alpigenum*** 2 Potentilla flabellifolia+* [**keep**] C-LT5* Arnica mollis+ 2 Castilleja miniata** Eremogone capillaris* 2 Erigeron* Erythronium montanum+ 2 Juncus parryi+* Phlox diffusa** Senecio integerrimus***
▶ [**102**] SHRB* Achillea millefolium* Arctostaphylos uva-ursi+ 2 Eucephalus ledophyllus+ 2 Hieracium scouleri+* Lewisia*** 2 Lomatium brandegeei+* Paxistima myrsinites** 3 Sedum lanceolatum+*** Selaginella wallacei+ 2 Vaccinium membranaceum* [**keep**] Agoseris* Anemone occidentalis+* Antennaria lanata+ 2 Arnica mollis+ 2 Erigeron* Festuca viridula 9 Hieracium triste* Ligusticum** Lupinus latifolius 2 Luzula hitchcockii+ 2 Senecio integerrimus* Veronica cusickii+*
▶ [**209**] SHRB* 3 TSHRB** Arnica latifolia+* Carex spectabilis+** Chamaenerion angustifolium** Eucephalus ledophyllus+* 2 Phyllodoce empetriformis* Sorbus sitchensis** Spiraea splendens** 2 Vaccinium deliciosum* 5 Valeriana sitchensis*** Veratrum viride** [**keep**] C-GT5* Arnica mollis+* 2 Hieracium triste* Juncus parryi+* Phlox diffusa* Potentilla flabellifolia+* Silene parryi*
▶ [**214**] TSHRB** Anaphalis margaritacea** Carex geyeri+* Chamaenerion angustifolium* 2 Hieracium albiflorum* Hieracium triste 2 Packera** 2 Paxistima myrsinites* Salix scouleriana** Sedum lanceolatum+*** 2 Trisetum** Vaccinium scoparium+*** 2 [**keep**] Antennaria lanata+ 2 Arnica mollis+ 2 Castilleja miniata* Eremogone capillaris 3 Erythronium montanum+* 2 Juncus parryi+ 3 Lomatium brandegeei+* Phlox diffusa*

Floristics (24 plots, MORA 2, NOCA 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Eremogone capillaris 8	Festuca viridula 21
80-95			Phlox diffusa 7, Antennaria lanata+ 5, Erigeron 5, Lupinus latifolius 4	Juncus parryi+ 6
60-80			Senecio integerrimus 3, Castilleja miniata 0	
40-60	Abies lasiocarpa 1		Erythronium montanum+ 5, Lomatium brandegeei+ 3, Agoseris 2, Ligusticum 2, Veronica cusickii+ 2, Hieracium triste 1	moss 4
25-40	Pinus albicaulis 1		Arnica mollis+ 8, Vaccinium deliciosum 3, Pedicularis bracteosa 1, Anemone occidentalis+ 1, Penstemon procerus+ 1, Achillea millefolium 1, Silene parryi 1	Luzula hitchcockii+ 3
10-25		Vaccinium membranaceum 2	Vaccinium cespitosum 24, Potentilla flabellifolia+ 5, Hieracium scouleri+ 3, Phyllodoce empetriformis 2, Eriogonum pyrolifolium 2, Paxistima myrsinites 2, Arnica latifolia+ 1, Microseris 1, Eriogonum umbellatum 1	

{093} Heracleum maximum, Thalictrum occidentale*, Saussurea americana*
Cow parsnip, western meadowrue* & American sawwort* herbaceous vegetation
HERMAX-(THAOCC-SAUAME)



Range: Upper and lower montane zones. **NOCA**-9: **s** (ne) 1200-1530m. **OLYM**-33: **nc**-**ne***-**se** (sc) 1200-1480m.

Struct: Closed canopy herbaceous vegetation with unbroken forbs and abundant grasses. Avg vasc cover 104: forb 71, grass 0.92 @ 16, conif LT5 0.46 @ 3, sedge 0.41 @ 11, shrb 0.41 @ 8, conif GT5 0.19 @ 4, dwf shrb 0.14 @ 4, fern 0.11 @ 51.

Ecology: Fairly gentle toeslopes and lower slopes, often in avalanche runouts. Evidence of past fire may be seen. Some *Abies lasiocarpa* and/or *Callitropsis nootkatensis* regen is often present. Patches of *Alnus viridis* are often nearby.

Metrics: slope 8-23°, vdp 1-23m, vdr 276-779m, east 33-93, south 54-94, conv 39-46, tpp 14-37, solar 60-76, wet 3-4

Map class: H52–Cow parsnip meadow

Rel to C09: Created by merging HERMAX, SAUAME-(HERMAX), and oddball plots from PTEAQU and several other assns.

Similar: MNO:[217] VALSIT-VERVIR, NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[215] VALSIT-CARSPE, MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[162] RUBPAR/PTEAQU-CHAANG, MN:[090] FESVIR-EUC(LED,ENG), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL). Also see: [216] VALSIT-LIGGRA

▶ [**079**] Athyrium distentifolium*** 2 Chamaenerion latifolium*** 2 Epilobium* Erythranthe lewisii+*** Luetkea pectinata*** 2 Oxyria digyna*** 2 Valeriana sitchensis* 4 Veronica cusickii+** [**keep**] Artemisia 2 Bromus sitchensis 2 Cirsium edule+*** Elymus 3 Heracleum maximum** 2 Thalictrum occidentale** 2

▶ [**088**] Anemone occidentalis+ 2 Castilleja miniata* Eucephalus paucicapitatus*** 5 Lomatium martindalei*** Lupinus latifolius* Phacelia** Phlox diffusa** 2 Spiraea splendens 2 Valeriana sitchensis* [**keep**] Bromus sitchensis 2 Cirsium edule+* Elymus 2 Heracleum maximum** 2 Thalictrum occidentale**

▶ [**104**] Carex phaeocephala+** 2 Douglasia laevigata** Eriophyllum lanatum* Gentiana calycosa* Juniperus communis*** 2 Lomatium martindalei*** Micranthes tolmiei+** Penstemon procerus+** Phlox diffusa*** 2 Silene parryi* [**keep**] Bromus sitchensis 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Hydrophyllum fendleri 2 Thalictrum occidentale* 2

▶ [**162**] SHRB* 13 TSHRB* 3 Acer glabrum*** Chamaenerion angustifolium* Galium** Hydrophyllum fendleri* Melica smithii*** Pteridium aquilinum** Rubus nutkanus** 5 Salix sitchensis+ 2 Sambucus racemosa* Urtica dioica* Viola glabella+* [**keep**] Abies lasiocarpa* Achillea millefolium* Artemisia 3 Bromus sitchensis* Callitropsis nootkatensis 2 Carex spectabilis+* 3 Cirsium edule+* Elymus 4 Erigeron** Lupinus latifolius** 2 Veratrum viride*. Note: [162] is composed of areas of mixed shrub and herbaceous vegetation.

▶ [**215**] Anemone occidentalis+*** 2 Erythronium montanum+*** 2 Luetkea pectinata** Phyllodoce empetriformis** Potentilla flabellifolia+** 2 Sorbus sitchensis* Spiraea splendens** Vaccinium deliciosum*** 2 Vahlodea atropurpurea** Valeriana sitchensis* 4 [**keep**] Achillea millefolium* Angelica* Artemisia* 2 Bromus sitchensis* 3 Cirsium edule+* Delphinium*** Elymus* 2 Heracleum maximum** 3 Hydrophyllum fendleri** 2 Thalictrum occidentale*

▶ [**217**] Bistorta bistortoides* Lupinus latifolius* Luzula hitchcockii+*** Phyllodoce empetriformis** Potentilla flabellifolia+** 2 Senecio triangularis+* Sorbus sitchensis* Vaccinium deliciosum*** 2 Valeriana sitchensis* 4 Veratrum viride* 8 [**keep**] Achillea millefolium*** Artemisia 2 Cirsium edule+* Heracleum maximum** 8 Hydrophyllum fendleri 2 Thalictrum occidentale*** 2

Floristics (37 plots, NOCA 9, OLYM 28): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Heracleum maximum 17, Cirsium edule+ 3	
60-80			Thalictrum occidentale 15	
40-60			Chamaenerion angustifolium 5, Achillea millefolium 4	Carex spectabilis+ 11, Elymus 10, Bromus sitchensis 10
25-40	Callitropsis nootkatensis 4, Abies lasiocarpa 3		Lupinus latifolius 9, Artemisia 7, Hydrophyllum fendleri 6, Veratrum viride 5, Erigeron 4, Valeriana sitchensis 2, Castilleja miniata 2	
10-25		Rubus nutkanus 3, Alnus viridis 2	Trifolium longipes 8, Aquilegia formosa 8, Senecio triangularis+ 8, Saussurea americana 8, Delphinium 7, Eucephalus ledophyllus+ 7, Urtica dioica 5, Phacelia 4, Lathyrus nevadensis 4, Canadanthus modestus 4, Solidago elongata/lepida 4, Bistorta bistortoides 3, Anaphalis margaritacea 3, Vicia 3, Angelica 3, Arnica cordifolia 3, Agoseris 2, Arnica latifolia+ 2, Epilobium 2, Geum 2, Viola glabella+ 2, Taraxacum officinale 2, Polemonium pulcherrimum 2, Lilium 2, Pedicularis bracteosa 1, Ligusticum 1, Osmorhiza 1, Arnica mollis+ 1, Hackelia micrantha 1, Aconitum columbianum 1	Pteridium aquilinum 51, Calamagrostis canadensis+ 5, Bromus vulgaris+ 5, Poa cusickii+ 3, Melica subulata+ 3, Calamagrostis rubescens+ 1, Phleum alpinum 1

{094} Juncus parryi, Bistorta bistortoides*
Parry's rush & American bistort* herbaceous vegetation
JUNPAR-(POLBIS)



Range: Alpine. **NOCA**-2: (ne-s) 1820-2040m. **OLYM**-19: **ne*** (nc-sc-se) 1680-1860m.

Struct: Semi-closed canopy mixed herbaceous vegetation with dense forbs, abundant rushes, and substantial grasses & sedges. Avg vasc cover 81: forb 33, rush 20, sedge 13, grass 0.79 @ 13, dwf shrb 0.64 @ 7.

Ecology: Fairly gentle upper slopes and ridges with southerly aspects, on rocky soil. Frequently adjacent to *Abies lasiocarpa* tree islands.

Metrics: slope 14-23°, vdp 132-224m, vdr 959-1088m, east 21-67, south 79-99, conv 53-62, tpp 73-88, solar 76-89, wet 2-3

Map class: H56–Subalpine summer-dry grass-forb meadow

Rel to C09: Same.

Similar: MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[100] LUEPEC-(CARSPE), MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[215] VALSIT-CARSPE, MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[217] VALSIT-VERVIR, MNO:[107] PHYEMP-(VACDEL)/LUPARC, O:[024] ABILAS/POLPUL-PEDRAC. Also see: [089] FESROE-(PHLDIF-ARECAP), [099] LEWCOL-(JUNPAR)

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 7 Cassiope mertensiana* Castilleja parviflora+* Festuca viridula* Gentiana calycosa** Oreostemma alpigenum*** 4 Pedicularis contorta+** Pedicularis ornithorhynchos** Phyllodoce empetriformis* Potentilla flabellifolia+* 4 [**keep**] Carex spectabilis+* Danthonia** Eremogone capillaris* Erythronium montanum+*** Festuca roemeri*** 2 Hieracium triste* Juncus parryi+* Lupinus latifolius* Phlox diffusa*

▶ [**075**] SHRB* Caltha** 2 Carex nigricans+* 6 Cassiope mertensiana* Epilobium** Gentiana calycosa*** Oreostemma alpigenum 3 Pedicularis groenlandica** Phleum alpinum** Phyllodoce empetriformis* Potentilla flabellifolia+* 4 Salix commutata+** 2 [**keep**] Antennaria lanata+* 2 Danthonia* Eremogone capillaris*** 2 Erythronium montanum+* Festuca roemeri*** 2 Juncus parryi+** 3 Lupinus latifolius* 2 Phlox diffusa***

▶ [**076**] SHRB* Carex spectabilis+ 18 Castilleja parviflora+* Erigeron* Lupinus latifolius 7 Phleum alpinum* Phyllodoce empetriformis 2 Potentilla flabellifolia+* Valeriana sitchensis* Veratrum viride** [**keep**] Antennaria lanata+* Danthonia*** 2 Eremogone capillaris*** Erythronium montanum+* 2 Festuca roemeri*** 6 Hieracium triste* Juncus parryi+** 5 Luetkea pectinata* Phlox diffusa*

▶ [**100**] Cassiope mertensiana** Epilobium** Luzula piperi+*** Micranthes tolmiei+** Phyllodoce empetriformis* 2 Tsuga mertensiana* Vahlodea atropurpurea* [**keep**] Bistorta bistortoides*** 2 Carex spectabilis+* Danthonia** Eremogone capillaris*** 2 Erythronium montanum+*** Festuca roemeri** 2 Juncus parryi+ 3 Lupinus latifolius* Phlox diffusa* Vaccinium deliciosum 2

▶ [**215**] SHRB* TSHRB* Anemone occidentalis+ 2 Arnica latifolia+* Chamaenerion angustifolium** Eucephalus ledophyllus+** 2 Pedicularis bracteosa** Sorbus sitchensis* Thalictrum occidentale 2 Valeriana sitchensis** 4 Veratrum viride** 2 [**keep**] Antennaria lanata+** 2 Bistorta bistortoides* Danthonia*** 2 Eremogone capillaris** 2 Festuca roemeri*** 2 Hieracium triste* Juncus parryi+** 2 Luetkea pectinata* Phlox diffusa*

Floristics (14 plots, NOCA 2, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Juncus parryi+ 20
80-95			Bistorta bistortoides 9	Carex spectabilis+ 12
60-80			Luetkea pectinata 6, Eremogone capillaris 5, Lupinus latifolius 4	
40-60	Abies lasiocarpa 1		Antennaria lanata+ 5, Erythronium montanum+ 5, Phlox diffusa 4, Hieracium triste 2	Festuca roemeri 17, moss 6, Danthonia 3
25-40			Vaccinium deliciosum 9, Erigeron 3, Potentilla flabellifolia+ 2, Juniperus communis 2	lichen 3, Luzula hitchcockii+ 2
10-25			Eucephalus paucicapitatus 4, Veronica cusickii+ 3, Silene parryi 2, Castilleja parviflora+ 1, Anemone occidentalis+ 1, Arnica latifolia+ 1	Carex geyeri+ 6, Carex nigricans+ 3, Poa cusickii+ 1, Agrostis 1, Trisetum 1

{095} Juniperus communis, Phlox diffusa*
Common juniper & spreading phlox* dwarf shrubland
JUNCOM-(PHLDIF)



Range: Alpine. **MORA**-1: (nw) 1800-1810m. **OLYM**-22: **nc-ne*** (sc) 1770-1990m.

Struct: Open dwarf shrubland with abundant forbs and scant grasses. Avg vasc cover 57: dwf shrb 28, forb 21, grass 0.93 @ 2, conif LT5 0.71 @ 2, rush 0.71 @ 2, sedge 0.43 @ 7, co-nif GT5 0.14 @ 3.

Ecology: South-facing upper slopes on loose dry scree and soil. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 17-36°, vdp 226-298m, vdr 1070-1285m, east 19-54, south 87-99, conv 59-69, tpp 88-95, solar 84-90, wet 1-3

Map class: H61–Spreading phlox & common juniper dry meadow

Rel to C09: Expanded, incorporating some plots that had been assigned to JUNCOM SPARSE.

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), O:[089] FESROE-(PHLDIF-ARECAP), MO:[065] ARCUVA-JUNCOM, NO:[088] EUCPAU-(PHAHAS-CASMIN), MN:[102] PAXMYR/PHLDIF, MNO:[059] ANTLAN-(OREALP-VACDEL), O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, MNO:[100] LUEPEC-(CARSPE), NO:[093] HERMAX-(THAOCC-SAUAME), M:[063] ARCUVA-(DASFLO). Also see: [168] SAXBRO-(DOULAE-SEDUM), [218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM.

▶ [**065**] C-GT5* Allium* Arctostaphylos uva-ursi+* 8 Cerastium arvense* Eriophyllum lanatum* Lilium*** Paxistima myrsinites* Pseudoro-egneria spicata*** [**keep**] C-LT5* Eremogone capillaris 2 Juncus parryi+ 2 Phlox diffusa 2
▶ [**088**] SHRB 2 Anemone occidentalis+** Artemisia* 2 Castilleja miniata* 2 Cirsium edule+** Eucephalus paucicapitatus*** 2 Hieracium albiflorum* Phacelia** Spiraea splendens** 2 Vaccinium membranaceum* Valeriana sitchensis** 2 [**keep**] Antennaria lanata+* Douglasia laevigata* Eremogone capillaris 2 Erysimum arenicola*** Juniperus communis** Luzula hitchcockii+** Micranthes tolmiei+*** Penstemon procerus+* Pinus albicaulis*** Sedum lanceolatum+*** Solidago multiradiata*
▶ [**089**] Anemone occidentalis+ 2 Eremogone capillaris* Festuca roemeri** 5 [**keep**] Douglasia laevigata** Festuca brachyphylla* Gentiana calycosa** Juniperus communis 5 Luzula hitchcockii+** Micranthes tolmiei+** Penstemon procerus+* Pinus albicaulis** Sedum divergens** Sedum lanceolatum+** Trisetum**. Note: [089] is dominated by forbs with substantial grasses.
▶ [**102**] SHRB* Castilleja miniata* Eremogone capillaris* Erythronium montanum+ 2 Festuca viridula*** 2 Hieracium scouleri+*** Lew-isia*** Lomatium brandegeei+*** Lupinus latifolius* Paxistima myrsinites** 5 Sedum lanceolatum+* Vaccinium deliciosum 2 Vaccinium membranaceum* 2 [**keep**] Bistorta bistortoides** Douglasia laevigata** Erysimum arenicola*** Festuca brachyphylla** Gentiana calycosa** Juniperus communis 2 Lomatium martindalei* Micranthes tolmiei+* Sedum divergens** Solidago multiradiata** Trisetum*
▶ [**104**] C-GT5* Artemisia* 2 Eriophyllum lanatum* Paxistima myrsinites* Phacelia* [**keep**] Antennaria lanata+* Eremogone capillaris* Festuca brachyphylla* Juncus parryi+* Luzula hitchcockii+*** Pinus albicaulis* Sedum lanceolatum+**

Floristics (14 plots, MORA 1, OLYM 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Juniperus communis 26, Phlox diffusa 6, Achillea mille-folium 1	
40-60	Abies lasio-carpa 2		Bistorta bistortoides 3, Lupinus latifolius 2, Silene parryi 2, Antennaria lanata+ 1, Penstemon procerus+ 1, Ery-simum arenicola 0	Festuca brachyphylla 2
25-40	Pinus albicaulis 0		Eremogone capillaris 5, Solidago multiradiata 1, Genti-ana calycosa 1, Lomatium martindalei 1, Micranthes tolmiei+ 1, Douglasia laevigata 1, Sedum divergens 1, Se-dum lanceolatum+ 1	Juncus parryi+ 3, moss 2, Luzula hitchcockii+ 0, Trisetum 0
10-25	Pseudotsuga menziesii 5		Arctostaphylos uva-ursi+ 4, Paxistima myrsinites 3, Luet-kea pectinata 2, Erigeron 1, Sedum oreganum 1, Phacelia 1, Campanula rotundifolia+ 1, Phyllodoce glanduliflora 1, Castilleja miniata 1, Hedysarum occidentale 1, Agoseris 1	Carex spectabilis+ 10, Selaginella wallacei+ 4, Carex phaeoceph-ala+ 3, Festuca roemeri 3, Bro-mus vulgaris+ 1, lichen 1

{096} Larix lyallii, Cassiope mertensiana, Luetkea pectinata
Subalpine larch, white mountain-heather & partridgefoot woodland
LARLYA/CASMER-LUEPEC



Range: Subalpine. **NOCA**-16: **s*** (ce) 1870-1980m.

Struct: Open conifer woodland of scattered trees or clustered patches, with abundant conifer regen, very dense dwarf shrubs, and substantial forbs. Avg vasc cover 107: dwf shrb 56, conif regen 24, forb 6, conif tree 0.94 @ 16, rush 0.81 @ 3, shrb 0.44 @ 2.

Ecology: Harsh and windswept upper slopes with deep lingering snowpacks. Regen dominated by *Larix lyalli*, with smaller amounts of *Abies lasiocarpa*.

Metrics: slope 20-31°, vdp 36-169m, vdr 889-1151m, east 33-93, south 6-43, conv 53-64, tpp 47-70, solar 39-67, wet 2-3

Map class: C22–Subalpine larch woodland

Rel to C09: Same.

Similar: N:[098] LARLYA/VACDEL, MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, N:[097] LARLYA/LUZGLA, MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[205] TSUMER-ABILAS/PHYEMP_KRUMM, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[100] LUEPEC-(CARSPE), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[208] TSUMER/PHYEMP-VACDEL.

▶ [**097**] Arnica latifolia+* Eremogone capillaris* Erigeron* Festuca viridula** Hieracium triste* Lupinus latifolius** Luzula hitchcockii+ 4 Phlox diffusa* Picea engelmannii*** 2 Pinus albicaulis 2 Senecio integerrimus*** Vaccinium cespitosum 2 Vaccinium membranaceum 2 Vaccinium scoparium+** [**keep**] Cassiope mertensiana* 8 Luetkea pectinata* Phyllodoce empetriformis 5 Rhododendron albiflorum 2 Tsuga mertensiana** 3 Vaccinium deliciosum*
▶ [**098**] SHRB 3 Antennaria lanata+* Arnica latifolia+* Festuca viridula** 2 Lupinus latifolius* Picea engelmannii** Vaccinium deliciosum 12 Vaccinium membranaceum* 2 Valeriana sitchensis* [**keep**] Bistorta bistortoides** Cassiope mertensiana 12 Juniperus communis*** Ligusticum* Micranthes tolmiei+* Vahlodea atropurpurea*. Note: [098] sites have deeper winter snowpacks.
▶ [**106**] Callitropsis nootkatensis* Carex spectabilis+** 2 Erythronium montanum+** Lupinus latifolius* 2 Vaccinium deliciosum 11 [**keep**] C-LT5 9 C-GT5* 4 Abies lasiocarpa 4 Larix lyallii*** 4 Luzula hitchcockii+** Pinus albicaulis*** Rhododendron albiflorum 2
▶ [**205**] Abies lasiocarpa 13 Achillea millefolium* Callitropsis nootkatensis* 2 Castilleja parviflora+* Lupinus latifolius* 2 Penstemon procerus+* Phyllodoce glanduliflora* Silene parryi* [**keep**] C-GT5* 4 Cassiope mertensiana* 11 Larix lyallii*** 2 Luzula hitchcockii+* Phyllodoce empetriformis 10 Pinus albicaulis*
▶ [**206**] SHRB 4 Callitropsis nootkatensis** 2 Erythronium montanum+** 2 Lupinus latifolius* 2 Vaccinium membranaceum* 2 Xerophyllum tenax 2 [**keep**] Cassiope mertensiana 13 Larix lyallii*** 2

Floristics (16 plots, NOCA 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Larix lyallii 23, Abies lasiocarpa 7			
80-95			Cassiope mertensiana 26, Phyllodoce empetriformis 24, Vaccinium deliciosum 8, Luetkea pectinata 5	
60-80	Tsuga mertensiana 11, Pinus albicaulis 0			Luzula hitchcockii+ 2
40-60				moss 8
25-40		Rhododendron albiflorum 4, Sorbus sitchensis 2, Vaccinium membranaceum 0	Erigeron 2, Veronica cusickii+ 1, Micranthes tolmiei+ 1, Hieracium triste 0	lichen 5, Juncus parryi+ 2
10-25	Abies amabilis 3		Vaccinium scoparium+ 15, Antennaria lanata+ 2, Penstemon procerus+ 2, Eremogone capillaris 1, Juniperus communis 1, Valeriana sitchensis 1, Lewisia 1, Lupinus latifolius 1	Carex nigricans+ 2, Carex geyeri+ 1, Vahlodea atropurpurea 1

{097} Larix lyallii, Luzula hitchcockii
Subalpine larch & smooth woodrush woodland
LARLYA/LUZGLA



Range: Upper subalpine. **NOCA**-20: **s*** 2000-2090m.

Struct: Conifer woodland of scattered trees or clustered patches, with abundant conifer regen, abundant dwarf shrubs & forbs, and substantial rushes. Avg vasc cover 122: conif tree 31, dwf shrb 29, conif regen 21, forb 21, rush 12, grass 0.68 @ 5, shrb 0.53 @ 8.

Ecology: Fairly gentle slopes. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Larix lyalli* and *Pinus albicaulis*.

Metrics: slope 14-24°, vdp 38-217m, vdr 982-1290m, east 7-91, south 49-86, conv 47-58, tpp 58-88, solar 70-84, wet 3-4

Map class: C22–Subalpine larch woodland

Rel to C09: Same but concept likely differs; *Pinus albicaulis* is always present and typically prominent in NCCN plots.

Similar: N:[098] LARLYA/VACDEL, N:[117] PINALB/FESVIR-ARECAP, MN:[214] VACSCO-FESVIR-ARECAP, N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MNO:[030] ABILAS/VACMEM/LUPARC, MN:[031] ABILAS/VACSCO-VALSIT, MN:[118] PINALB/JUNCOM, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[033] ABILAS/VERVIR, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC.

▶ [**030**] SHRB* 12 TSHRB** 2 Callitropsis nootkatensis 2 Hieracium albiflorum** Paxistima myrsinites** 2 Rubus lasiococcus** 2 Sorbus sitchensis** 2 Vaccinium membranaceum* 12 [**keep**] Antennaria lanata+ 2 Eremogone capillaris* Erigeron* Festuca viridula* Hieracium triste** Larix lyallii*** 2 Luzula hitchcockii+* 5 Phyllodoce empetriformis** Picea engelmannii** Pinus albicaulis* Vaccinium cespitosum 2 Vaccinium scoparium+* 7
▶ [**098**] Luetkea pectinata* Phyllodoce empetriformis 5 Rhododendron albiflorum 2 Tsuga mertensiana*** 3 Vaccinium deliciosum* [**keep**] Anemone occidentalis+* Castilleja miniata** Hieracium triste* Ligusticum*** Luzula hitchcockii+ 4 Pedicularis racemosa* Picea engelmannii 2 Pinus albicaulis 2 Polemonium pulcherrimum* Senecio integerrimus* Vaccinium cespitosum** 3 Vaccinium scoparium+** 10 Veronica cusickii+*
▶ [**116**] SHRB* Achillea millefolium*** Agoseris* Castilleja miniata* Lomatium brandegeei+* Paxistima myrsinites** 2 Penstemon procerus+* Pinus albicaulis 8 Sedum lanceolatum+* Vaccinium membranaceum* [**keep**] Anemone occidentalis+* Antennaria lanata+ 2 Arnica latifolia+* Cassiope mertensiana* Larix lyallii* Luetkea pectinata* 2 Luzula hitchcockii+ 2 Phyllodoce empetriformis* Picea engelmannii 2 Vaccinium deliciosum* 3 Valeriana sitchensis* Veratrum viride*
▶ [**117**] Achillea millefolium*** Arctostaphylos uva-ursi+** Eriogonum pyrolifolium** Hieracium scouleri+** Lomatium brandegeei+* Paxistima myrsinites* 2 Phlox diffusa 2 Pinus albicaulis 7 Salix scouleriana 2 Sedum lanceolatum+* [**keep**] Arnica latifolia+* Hieracium triste* Larix lyallii* 2 Luzula hitchcockii+* 2 Phyllodoce empetriformis** Picea engelmannii* Vaccinium cespitosum 2 Vaccinium deliciosum 2 Vaccinium scoparium+* 2 Veronica cusickii+*
▶ [**214**] TSHRB* Agoseris* Anaphalis margaritacea* Chamaenerion angustifolium 2 Festuca viridula 6 Hieracium albiflorum** Hieracium triste 2 Packera** 2 Paxistima myrsinites* Poa cusickii+* Salix scouleriana** Sedum lanceolatum+* 2 Silene parryi** Trisetum*** [**keep**] C-LT5 4 C-GT5* 2 Abies lasiocarpa 2 Hieracium triste* Larix lyallii* 2 Luzula hitchcockii+* Phyllodoce empetriformis* Picea engelmannii* 2 Vaccinium cespitosum 2 Vaccinium deliciosum 2

Floristics (19 plots, NOCA 19): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 25, Larix lyallii 17, Pinus albicaulis 5			
80-95				Luzula hitchcockii+ 12
60-80	Picea engelmannii 6		Vaccinium scoparium+ 23, Phyllodoce empetriformis 3, Eremogone capillaris 2, Lupinus latifolius 2, Erigeron 1, Hieracium triste 1	Festuca viridula 4
40-60		Vaccinium membranaceum 8	Vaccinium deliciosum 12, Antennaria lanata+ 5, Arnica latifolia+ 4, Veronica cusickii+ 3, Pedicularis racemosa 2, Phlox diffusa 1, Senecio integerrimus 1	Juncus parryi+ 1
25-40			Vaccinium cespitosum 9, Luetkea pectinata 7, Cassiope mertensiana 5, Valeriana sitchensis 2, Gentiana calycosa 1, Pedicularis bracteosa 1, Veratrum viride 1, Lomatium brandegeei+ 1, Ligusticum 1, Castilleja miniata 0, Penstemon procerus+ 0, Polemonium pulcherrimum 0, Anemone occidentalis+ 0	Carex geyeri+ 2, moss 1
10-25	Tsuga mertensiana 2		Potentilla flabellifolia+ 3, Moehringia macrophylla 2	Poa cusickii+ 2

{098} Larix lyallii, Vaccinium deliciosum
Subalpine larch & Cascade blueberry woodland
LARLYA/VACDEL



Range: Subalpine. **NOCA**-28: **s*** (ce) 1880-2030m.

Struct: Conifer woodland of scattered trees or clustered patches, with abundant conifer regen, very dense dwarf shrubs, and substantial forbs. Avg vasc cover 116: dwf shrb 51, conif tree 24, conif regen 19, forb 11, rush 3, shrb 0.69 @ 8, grass 0.59 @ 3, sedge 0.28 @ 3.

Ecology: Fairly gentle slopes. Regen dominated by *Abies lasiocarpa*, with smaller amounts of *Larix lyalli* and *Tsuga mertensiana*.

Metrics: slope 14-26°, vdp 28-176m, vdr 907-1027m, east 2-87, south 45-84, conv 46-58, tpp 52-79, solar 63-81, wet 3-4

Map class: C22–Subalpine larch woodland

Rel to C09: Same.

Similar: N:[096] LARLYA/CASMER-LUEPEC, N:[097] LARLYA/LUZGLA, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MNO:[205] TSUMER-ABILAS/PHYEMP_KRUMM, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[033] ABILAS/VERVIR, O:[024] ABILAS/POLPUL-PEDRAC. Also see: [017] ABILAS-PICENG/RHOALB/ARNLAT

▶ [**028**] TSHRB* Abies amabilis* 3 Bistorta bistortoides*** Carex spectabilis+*** Erythronium montanum+* 2 Lupinus latifolius* 2 Pedicularis racemosa* Rubus lasiococcus* Sorbus sitchensis* Valeriana sitchensis* 2 Veratrum viride* 2 [**keep**] Antennaria lanata+*** Cassiope mertensiana*** Larix lyallii*** 2 Luetkea pectinata* Phyllodoce empetriformis 8 Pinus albicaulis***

▶ [**096**] Bistorta bistortoides** Cassiope mertensiana 12 Juniperus communis*** Ligusticum* Micranthes tolmiei+* Vahlodea atropurpurea* [**keep**] SHRB 3 Antennaria lanata+* Arnica latifolia+* Festuca viridula** 2 Lupinus latifolius* Picea engelmannii** Vaccinium deliciosum 12 Vaccinium membranaceum* 2 Valeriana sitchensis*. Note: [096] sites have lighter winter snowpacks.

▶ [**097**] Anemone occidentalis+* Castilleja miniata** Hieracium triste* Ligusticum*** Luzula hitchcockii+ 4 Pedicularis racemosa* Picea engelmannii 2 Pinus albicaulis 2 Polemonium pulcherrimum* Senecio integerrimus* Vaccinium cespitosum** 3 Vaccinium scoparium+** 10 Veronica cusickii+* [**keep**] Luetkea pectinata* Phyllodoce empetriformis 5 Rhododendron albiflorum 2 Tsuga mertensiana*** 3 Vaccinium deliciosum*

▶ [**205**] C-LT5 30 Abies amabilis* Achillea millefolium** Callitropsis nootkatensis*** 2 Castilleja parviflora+** Penstemon procerus+* Phyllodoce glanduliflora** Silene parryi* Tsuga mertensiana 12 [**keep**] C-GT5* 5 SHRB* Antennaria lanata+** Festuca viridula 2 Larix lyallii*** 2 Luzula hitchcockii+* Phyllodoce empetriformis 9 Pinus albicaulis** Vaccinium deliciosum* 10 Vaccinium membranaceum*

▶ [**206**] Callitropsis nootkatensis*** 2 Erythronium montanum+ 2 Lupinus latifolius 2 Xerophyllum tenax 2 [**keep**] Antennaria lanata+*** Festuca viridula 2 Larix lyallii*** 2 Luzula hitchcockii+* Pinus albicaulis*

Floristics (29 plots, NOCA 29): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 20, Larix lyallii 14		Vaccinium deliciosum 25, Phyllodoce empetriformis 20	
80-95	Tsuga mertensiana 8		Luetkea pectinata 4	Luzula hitchcockii+ 2
60-80	Pinus albicaulis 1	Vaccinium membranaceum 6	Cassiope mertensiana 8, Antennaria lanata+ 3	
40-60	Picea engelmannii 1		Lupinus latifolius 2, Valeriana sitchensis 1, Arnica latifolia+ 1, Eremogone capillaris 1	Festuca viridula 3, Juncus parryi+ 1
25-40		Rhododendron albiflorum 5, Sorbus sitchensis 1	Erigeron 1, Veronica cusickii+ 1, Phlox diffusa 0, Hieracium triste 0	moss 4
10-25			Vaccinium scoparium+ 7, Rubus lasiococcus 2, Pedicularis racemosa 2, Paxistima myrsinites 1, Erythronium montanum+ 1, Senecio integerrimus 1, Claytonia lanceolata 1	Carex nigricans+ 4, Carex geyeri+ 3, lichen 2

{099} Lewisia columbiana, Juncus parryi*
Columbia bitterroot & Parry's rush* herbaceous vegetation
LEWCOL-(JUNPAR)



Range: Upper montane zone, on balds. **NOCA**-6: **s** 1450-1810m.

Struct: Open forb-dominated vegetation with prominent dwarf shrubs. Avg vasc cover 17: forb 8, rush 2, dwf shrb 0.83 @ 3, grass 0.83 @ 2, fern 0.83 @ 1, conif LT5 0.83 @ 0, tall shrb 0.67 @ 0, shrb 0.5 @ 0.

Ecology: Bedrock balds on fairly steep south-facing slopes with westerly tendencies. Small *Abies lasiocarpa* and/or *Pinus albicaulis* are usually present.

Metrics: slope 29-35°, vdp 42-99m, vdr 653-980m, east 20-25, south 89-93, conv 50-57, tpp 30-58, solar 80-84, wet 2-3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Created as a NOCA field call.

Similar: MN:[102] PAXMYR/PHLDIF, MNO:[103] PENDAV/RACOMITRIUM, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[100] LUEPEC-(CARSPE), N:[061] ARCNEV-PAXMYR/CALRUB, MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[071] CARNIG-CARLEN-(CALCAN), MN:[079] CHALAT-(OXYDIG-VALSIT), O:[089] FESROE-(PHLDIF-ARECAP), NO:[094] JUNPAR-(POLBIS).

▶ [**061**] Arctostaphylos uva-ursi+* 7 Calamagrostis rubescens+* 2 Hieracium scouleri+* Paxistima myrsinites 2 Pseudoroegneria spicata 2 Pseudotsuga menziesii* Racomitrium 2 [**keep**] Abies lasiocarpa* Danthonia* Juncus parryi+* Lomatium brandegeei+* Micranthes tolmiei+*** Montia** Phlox diffusa* Pinus albicaulis* Poa cusickii+* Polygonum douglasii+***. Note: [061] is a mid-elevation bald.
▶ [**100**] Carex spectabilis+ 2 Cassiope mertensiana* Hieracium triste* Luetkea pectinata* 2 Luzula piperi+** Phyllodoce empetriformis* 2 [**keep**] TSHRB** Arctostaphylos uva-ursi+ 2 Cryptogramma acrostichoides* Danthonia*** Eremogone capillaris*** Festuca viridula 2 Lewisia*** 2 Lomatium brandegeei+** Montia*** Myriopteris gracillima*** Paxistima myrsinites** Phlox diffusa*
▶ [**102**] SHRB 2 VASC VEG 28 Castilleja miniata* Erythronium montanum+ 2 Festuca viridula* Lupinus latifolius** Paxistima myrsinites 2 Phlox diffusa 2 Vaccinium deliciosum 2 Vaccinium membranaceum 2 [**keep**] Danthonia** Diphasiastrum sitchense+** Larix lyallii** Montia** Myriopteris gracillima** Penstemon serrulatus+** Polygonum douglasii+*** Racomitrium** Sedum divergens** Spiraea splendens**
▶ [**103**] Lomatium martindalei 2 Luzula hitchcockii+* Penstemon procerus+* 2 Pseudotsuga menziesii* Racomitrium 2 Selaginella wallacei+ 5 [**keep**] Eremogone capillaris*** Festuca viridula 2 Juncus parryi+* Lewisia* Lomatium brandegeei+*** Phlox diffusa**
▶ [**104**] FORB 13 Artemisia 2 Bistorta bistortoides* Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* 2 Gentiana calycosa* Juniperus communis* 2 Lomatium martindalei* Lupinus latifolius** Phacelia* Phlox diffusa 2 Silene parryi* [**keep**] TSHRB*** Arctostaphylos uva-ursi+ 2 Cryptogramma acrostichoides*** Danthonia*** Eremogone capillaris** Festuca viridula 2 Juncus parryi+** Lewisia*** 2 Lomatium brandegeei+*** Montia*** Myriopteris gracillima***

Floristics (6 plots, NOCA 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Lewisia 4, Lomatium brandegeei+ 1, Phlox diffusa 1	moss 8, Juncus parryi+ 2
80-95			Eremogone capillaris 0	Cryptogramma acrostichoides 0
60-80	Abies lasiocarpa 0		Paxistima myrsinites 1, Montia 1	lichen 2, Myriopteris gracillima 1, Danthonia 0
40-60	Pinus albicaulis 0		Arctostaphylos uva-ursi+ 4, Micranthes tolmiei+ 0, Polygonum douglasii+ 0	Poa cusickii+ 1
25-40	Larix lyallii 0	Spiraea splendens 1, Amelanchier alnifolia 0, Vaccinium membranaceum 0, Sorbus sitchensis 0	Sedum divergens 2, Juniperus communis 1, Sedum lanceolatum+ 0, Penstemon serrulatus+ 0, Achillea millefolium 0	Festuca viridula 3, Selaginella wallacei+ 2, Racomitrium 1, Diphasiastrum sitchense+ 1, Carex spectabilis+ 1
10-25	Pinus ponderosa 1			

{100} Luetkea pectinata, Carex spectabilis
Partridgefoot & showy sedge herbaceous vegetation
LUEPEC-(CARSPE)



Range: Alpine and upper subalpine zones, on exposed rocks. **MORA**-26: **ne**-**sw**-**se** (nw) 1830-2010m. **NOCA**-9: **nw**-**cw** (ce-s) 1610-1810m. **OLYM**-5: (nc-ne-sc) 1580-1650m.

Struct: Open forb-dominated vegetation with substantial dwarf shrubs and prominent rushes. Avg vasc cover 31: forb 15, dwf shrb 0.94 @ 5, rush 0.94 @ 2, grass 0.78 @ 2, sedge 0.72 @ 7, conif LT5 0.72 @ 2, fern 0.5 @ 0.

Ecology: Fairly gentle slopes on stabilized talus and scree. Often early seral, with sparse colonizing vegetation. Some *Abies lasiocarpa* and/or *Tsuga mertensiana* regen is frequently present.

Metrics: slope 12-26°, vdp 20-96m, vdr 606-886m, east 13-81, south 15-88, conv 42-57, tpp 46-74, solar 56-84, wet 2-4

Map class: H62–Alpine sparse herbaceous vegetation

Rel to C09: Evolved from LUEPEC, incorporating some plots from JUNPAR-(POLBIS) and CARSPE SPARSE.

Similar: MNO:[169] SAXTOL-LUZPIP-(CARNIG), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[107] PHYEMP-(VACDEL)/LUPARC, NO:[094] JUNPAR-(POLBIS), MNO:[074] CARNIG-LUEPEC, MNO:[076] CARSPE-(LUPARC-POLBIS), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[104] PHLDIF-(LOMMAR-CARPHA). Also see: [067] ATHAME-CRYACR, [077] CASMER-PHYEMP, [085] ELMRAC-EPIANA, [092] FESVIR-PHLDIF-ARECAP, [168] SAXBRO-(DOULAE-SEDUM).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides** Oreostemma alpigenum** 2 Potentilla flabellifolia+** 2 Vaccinium deliciosum* 3 [**keep**] C-LT5* Cassiope mertensiana* Epilobium** Hieracium triste* Luetkea pectinata* Luzula piperi+*** Micranthes tolmiei+*** Phyllodoce empetriformis* Tsuga mertensiana*** Vahlodea atropurpurea***. Note: [059] is in the subalpine zone, with more continuous turfy vegetation.

▶ [**071**] Calamagrostis canadensis+** 2 Caltha** Carex aquatilis+** 2 Carex kelloggii+*** 2 Carex nigricans+ 5 Danthonia** Equisetum arvense+** Eriophorum angustifolium** 2 Gentiana calycosa*** Kalmia microphylla** Potentilla flabellifolia+** [**keep**] C-LT5* Carex spectabilis+ 2 Cassiope mertensiana* Hieracium triste** Juncus parryi+** Luetkea pectinata* 3 Luzula piperi+***

▶ [**079**] TSHRB** Aruncus dioicus*** Athyrium distentifolium* 2 Chamaenerion latifolium* 2 Erythranthe lewisii+* Oxyria digyna*** 2 Senecio triangularis+* Valeriana sitchensis* 2 Veratrum viride* [**keep**] Abies lasiocarpa* Carex spectabilis+* Cassiope mertensiana* Erigeron** Hieracium triste* Juncus parryi+* Luzula piperi+* Micranthes tolmiei+* Phyllodoce empetriformis* 2 Tsuga mertensiana*

▶ [**107**] Bistorta bistortoides* 2 Cassiope mertensiana 2 Castilleja parviflora+* Erigeron 2 Erythronium montanum+** Lupinus latifolius* Vaccinium deliciosum* 3 Valeriana sitchensis* 2 [**keep**] Agrostis** Anaphalis margaritacea** Epilobium*** Erythranthe lewisii+** Luzula piperi+** Micranthes odontoloma+** Poa cusickii+** Ranunculus eschscholtzii+** Senecio triangularis+** Trisetum**

▶ [**169**] Luzula piperi+ 2 Micranthes tolmiei+* 2 [**keep**] SHRB*** Agrostis* Anaphalis margaritacea*** Carex spectabilis+ 3 Diphasiastrum sitchense+* Erigeron* Erythranthe lewisii+* Luetkea pectinata 5 Poa cusickii+** Ranunculus eschscholtzii+*** Senecio triangularis+*** Trisetum*** Veronica cusickii+**

Floristics (18 plots, MORA 5, NOCA 9, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Luetkea pectinata 11, Phyllodoce empetriformis 4	
60-80			Cassiope mertensiana 1	Juncus parryi+ 2, Luzula piperi+ 1
40-60	Abies lasiocarpa 1		Hieracium triste 0, Epilobium 0, Erigeron 0	Carex spectabilis+ 8
25-40	Tsuga mertensiana 1		Vaccinium deliciosum 1, Micranthes tolmiei+ 0, Antennaria lanata+ 0, Veronica cusickii+ 0	moss 4, Carex nigricans+ 3, Vahlodea atropurpurea 3, Juncus mertensianus+ 1, Poa cusickii+ 1, Athyrium distentifolium 0, Cryptogramma acrostichoides 0
10-25	Callitropsis nootkatensis 2	Salix commutata+ 2, Spiraea splendens 1	Lupinus latifolius 5, Phlox diffusa 5, Castilleja parviflora+ 4, Erythranthe lewisii+ 2, Arnica latifolia+ 2, Phyllodoce glanduliflora 2, Anaphalis margaritacea 1, Senecio triangularis+ 1, Empetrum nigrum 1, Leptarrhena pyrolifolia 1, Chamaenerion latifolium 1	

{101} Luina hypoleuca, Lomatium martindalei*, Castilleja parviflora*
Littleleaf silverback, Cascade desert-parsley* & mountain indian paintbrush* herbaceous vegetation
LUIHYP-(LOMMAR-CASPAR)



Range: Subalpine zone, on balds. **MORA**-1: (ne) 1690-1700m. **OLYM**-2: (nc) 1390-1410m.

Struct: Open forb-dominated vegetation. Avg vasc cover 33: forb 29, tall shrb 0.5 @ 5, conif GT5 0.5 @ 2, conif LT5 0.5 @ 2, shrb 0.5 @ 0.

Ecology: Steep and unstable east-facing slopes with southerly tendencies, along ridges and near cliffs. Small *Abies lasiocarpa* are often present; *A. lasiocarpa* and *Callitropsis nootkatensis* are typically present in surrounding forests.

Metrics: slope 39-41°, vdp 279-290m, vdr 827-836m, east 91-97, south 65-77, conv 72-78, tpp 80-84, solar 59-66, wet 1

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Evolved from LUIHYP, shedding plots that were a better fit to [168] SAXBRO-(DOULAE-SEDUM).

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[088] EUCPAU-(PHAHAS-CASMIN), NO:[093] HERMAX-(THAOCC-SAUAME), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[100] LUEPEC-(CARSPE), NO:[168] SAXBRO-(DOULAE-SEDUM), MNO:[217] VALSIT-VERVIR, MNO:[076] CARSPE-(LUPARC-POLBIS), O:[089] FESROE-(PHLDIF-ARECAP).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides* Carex spectabilis+ 2 Oreostemma alpigenum* 2 Potentilla flabellifolia+* Vaccinium deliciosum* 2 [**keep**] C-GT5** SHRB* TSHRB** 2 Acer circinatum** 2 Callitropsis nootkatensis** Castilleja parviflora+* Cerastium arvense** Hieracium albiflorum** Lomatium martindalei** 2 Luina hypoleuca*** 2 Penstemon serrulatus+** Sedum spathulifolium** 2 Vaccinium membranaceum**
▶ [**079**] Athyrium distentifolium* 2 Chamaenerion latifolium* 2 Epilobium* Erythranthe lewisii+* Luetkea pectinata* 2 Oxyria digyna* 2 Valeriana sitchensis* 2 Veronica cusickii+* [**keep**] TSHRB 2 Abies lasiocarpa 2 Acer circinatum 2 Castilleja parviflora+* 2 Lomatium martindalei*** 2 Luina hypoleuca*** 2 Lupinus latifolius**
▶ [**088**] SHRB 2 Artemisia 2 Carex spectabilis+ 2 Castilleja miniata* Eucephalus paucicapitatus* 2 Phacelia* Phlox diffusa 3 Valeriana sitchensis* 2 [**keep**] Acer circinatum 2 Castilleja parviflora+*** 2 Luina hypoleuca** 2 Sedum spathulifolium 2
▶ [**093**] Bromus sitchensis 2 Carex spectabilis+ 2 Cirsium edule+* Elymus 2 Heracleum maximum* 2 Thalictrum occidentale* 2 [**keep**] Castilleja parviflora+*** 2 Lomatium martindalei*** 2 Luina hypoleuca*** 2 Lupinus latifolius* Sedum spathulifolium 2
▶ [**104**] Achillea millefolium* Artemisia 2 Carex phaeocephala+ 2 Eriophyllum lanatum 2 Juniperus communis* 2 Phlox diffusa 3 [**keep**] TSHRB 2 Acer circinatum 2 Castilleja parviflora+*** 2 Luina hypoleuca*** 2 Sedum spathulifolium 2

Floristics (2 plots, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Luina hypoleuca 12, Castilleja parviflora+ 5, Lomatium martindalei 4, Lupinus latifolius 4	
40-60	Abies lasiocarpa 3, Callitropsis nootkatensis 1	Acer circinatum 5, Vaccinium membranaceum 0	Sedum spathulifolium 3, Cerastium arvense 2, Penstemon serrulatus+ 2, Phlox diffusa 2, Hieracium albiflorum 1	

{102} Paxistima myrsinites, Phlox diffusa
Oregon-box & spreading phlox dwarf shrubland
PAXMYR/PHLDIF



Range: Subalpine. **MORA**-1: (ne) 1650-1660m. **NOCA**-16: **ne-ce-s*** 1750-1970m.

Struct: Open dwarf shrubland with dense forbs, substantial grasses & rushes, and prominent conifer regen. Avg vasc cover 80: forb 34, dwf shrb 23, grass 0.94 @ 9, rush 0.88 @ 7, conif LT5 0.88 @ 2, shrb 0.71 @ 5, conif GT5 0.41 @ 3, sedge 0.24 @ 3.

Ecology: Fairly steep upper slopes with southerly aspects. Dry openings in forests, but not balds. Evidence of past disturbance (e.g., blowdown, fire scars) may be seen. *Abies lasiocarpa* regen is usually present.

Metrics: slope 31-38°, vdp 82-243m, vdr 813-1168m, east 17-68, south 68-96, conv 53-63, tpp 54-84, solar 72-90, wet 2-3

Map class: H57–Green fescue dry meadow

Rel to C09: Expanded to include some plots that had been assigned to ARC(NEV,UVA)-PAXMYR, JUNPAR-(POLBIS) and several other C09 types.

Similar: N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), MN:[092] FESVIR-PHLDIF-ARECAP, MN:[090] FESVIR-EUC(LED,ENG), MNO:[104] PHLDIF-(LOMMAR-CARPHA), N:[099] LEWCOL-(JUNPAR), N:[117] PINALB/FESVIR-ARECAP, MNO:[030] ABILAS/VACMEM/LUPARC, MN:[209] VACDEL-FESVIR, N:[061] ARCNEV-PAXMYR/CALRUB, MO:[095] JUNCOM-(PHLDIF).

▶ [**090**] Erigeron* Eucephalus ledophyllus+* 7 Festuca viridula 9 Ligusticum** 2 Lupinus latifolius 2 Thalictrum occidentale 2 [**keep**] SHRB* Antennaria lanata+* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Hieracium scouleri+* Juncus parryi+** 4 Lewisia*** Lomatium brandegeei+* Paxistima myrsinites* 5 Sedum lanceolatum+** Selaginella wallacei+ 2 Vaccinium membranaceum* 2
▶ [**092**] Agoseris* Anemone occidentalis+* Antennaria lanata+ 2 Arnica mollis+ 2 Erigeron* Festuca viridula 9 Hieracium triste* Ligusticum** Lupinus latifolius 2 Luzula hitchcockii+ 2 Senecio integerrimus* Veronica cusickii+* [**keep**] SHRB* Achillea millefolium* Arctostaphylos uva-ursi+ 2 Eucephalus ledophyllus+ 2 Hieracium scouleri+* Lewisia*** 2 Lomatium brandegeei+* Paxistima myrsinites** 3 Sedum lanceolatum+*** Selaginella wallacei+ 2 Vaccinium membranaceum*
▶ [**099**] Danthonia** Diphasiastrum sitchense+** Larix lyallii** Montia** Myriopteris gracillima** Penstemon serrulatus+** Polygonum douglasii+*** Racomitrium** Sedum divergens** Spiraea splendens** [**keep**] SHRB 2 VASC VEG 28 Castilleja miniata* Erythronium montanum+ 2 Festuca viridula* Lupinus latifolius** Paxistima myrsinites 2 Phlox diffusa 2 Vaccinium deliciosum 2 Vaccinium membranaceum 2
▶ [**104**] Artemisia 2 Bistorta bistortoides** Carex phaeocephala+** 2 Douglasia laevigata** Eriophyllum lanatum** 2 Gentiana calycosa** Juniperus communis* 2 Lomatium martindalei* Micranthes tolmiei+* Phacelia** Silene parryi 2 [**keep**] SHRB* Antennaria lanata+* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Eremogone capillaris** Erythronium montanum+ 2 Festuca viridula*** 2 Hieracium scouleri+*** Juncus parryi+** Lewisia*** Lomatium brandegeei+*** Paxistima myrsinites* 2 Sedum lanceolatum+*** Selaginella wallacei+ 2
▶ [**210**] SHRB 8 TSHRB* 2 Amelanchier alnifolia 2 Calamagrostis rubescens+* 4 Carex geyeri+* 2 Chamaenerion angustifolium* Hieracium albiflorum* 2 Hydrophyllum capitatum*** Lilium*** Luzula hitchcockii+* Pedicularis bracteosa* Salix scouleriana** Sorbus scopulina** Vaccinium membranaceum 8 [**keep**] Arctostaphylos uva-ursi+ 2 Castilleja miniata* Erythronium montanum+ 2 Juncus parryi+* 2 Juniperus communis* Lewisia** Sedum lanceolatum+* Selaginella wallacei+ 2 Vaccinium deliciosum* 2

Floristics (17 plots, NOCA 17): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Paxistima myrsinites 15	
80-95	Abies lasiocarpa 3		Phlox diffusa 12, Eremogone capillaris 4, Lomatium brandegeei+ 2, Lupinus latifolius 1, Castilleja miniata 0	Festuca viridula 6
60-80		Vaccinium membranaceum 5	Sedum lanceolatum+ 0	Juncus parryi+ 9
40-60			Vaccinium deliciosum 8, Lewisia 3, Senecio integerrimus 3, Penstemon procerus+ 2, Achillea millefolium 2, Hieracium scouleri+ 1, Antennaria lanata+ 1, Eriogonum umbellatum 1, Juniperus communis 0	
25-40	Pseudotsuga menziesii 1, Pinus albicaulis 1		Arctostaphylos uva-ursi+ 12, Erythronium montanum+ 6, Eucephalus ledophyllus+ 4, Erigeron 3, Silene parryi 1	Selaginella wallacei+ 4
10-25		Sorbus sitchensis 2, Ceanothus velutinus 1	Hieracium triste 4, Pedicularis bracteosa 3, Vaccinium scoparium+ 3, Chamaenerion angustifolium 2, Claytonia lanceolata 1, Arnica latifolia+ 1, Hieracium albiflorum 1, Agoseris 1, Phyllodoce empetriformis 1, Viola orbiculata+ 1, Thalictrum occidentale 1	moss 12, Poa cusickii+ 6, Calamagrostis rubescens+ 2, Luzula hitchcockii+ 1, Carex geyeri+ 1

{103} Penstemon davidsonii, Racomitrium spp.
Davidson's penstemon & racomitrium herbaceous vegetation
PENDAV/RACOMITRIUM



Range: Lower montane zone, on balds. **MORA**-4: **se** (ne-sw) 840-1000m. **NOCA**-8: **ne*** (ce-s) 770-1060m. **OLYM**-1: (nc) 1320-1330m.

Struct: Open forb-dominated vegetation with substantial dwarf shrubs and dense mosses, spikemosses & lichens. Avg vasc cover 27: forb 8, dwf shrb 0.83 @ 6, grass 0.75 @ 1, rush 0.75 @ 1, fern 0.67 @ 1, conif LT5 0.5 @ 1.

Ecology: Bedrock balds on slopes with southerly aspects, often embedded in [144] PSEMEN-(PINCON)/ARCUVA/RACCAN woods. Some *Pseudotsuga menziesii* regen is often present.

Metrics: slope 15-34°, vdp 16-147m, vdr 55-461m, east 5-41, south 72-94, conv 46-63, tpp 33-69, solar 65-74, wet 2-3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Evolved from RACCAN-(PENDAV), a NOCA field call, and gaining plots from several other assns, e.g., ARC(NEV,UVA)-PAXMYR, DANINT, SELWAL-(FESROE,FESBRA).

Similar: N:[064] ARCUVA-FRAVIR/RACOMITRIUM, MNO:[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, N:[061] ARCNEV-PAXMYR/CALRUB, MO:[065] ARCUVA-JUNCOM, MNO:[104] PHLDIF-(LOMMAR-CARPHA), N:[099] LEWCOL-(JUNPAR), MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), NO:[093] HERMAX-(THAOCC-SAUAME), N:[062] ARCNEV/PSESPI. Also see: [083] DANINT/RACOMITRIUM.

▶ [**061**] C-LT5* SHRB* TSHRB* Arctostaphylos uva-ursi+ 9 Calamagrostis rubescens+* 2 Eremogone capillaris** Hieracium scouleri+*** Paxistima myrsinites* 2 Pinus ponderosa** Pseudoroegneria spicata 2 [**keep**] Collinsia parviflora* Lomatium martindalei 2 Luzula hitchcockii+** Micranthes tolmiei+* Montia* Penstemon procerus+* Racomitrium 12 Selaginella wallacei+* 2. Note: [061] is a mid-elevation bald, usually *Pinus ponderosa* woods.

▶ [**064**] C-LT5 2 SHRB 2 Achillea millefolium 2 Fragaria virginiana* 2 Holodiscus discolor 2 Paxistima myrsinites* Spiraea lucida** Woodsia*** [**keep**] Juncus parryi+* Lomatium martindalei 2 Micranthes tolmiei+* Montia* Selaginella wallacei+ 11

▶ [**065**] Abies lasiocarpa* Achillea millefolium 2 Allium* Arctostaphylos uva-ursi+ 9 Campanula rotundifolia+*** Cerastium arvense* Elymus* Erigeron*** Eriophyllum lanatum* Festuca roemeri* Juniperus communis 4 Phlox diffusa*** Sedum lanceolatum+*** [**keep**] Cryptogramma acrostichoides* Lomatium martindalei 3 Penstemon procerus+ 2 Pseudotsuga menziesii* Racomitrium* 2 Selaginella wallacei+ 2. Note: [065] is an erosive bald, lacking *Racomitrium*.

▶ [**104**] FORB 14 Abies lasiocarpa* Artemisia 2 Bistorta bistortoides* Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* 2 Gentiana calycosa* Juniperus communis 4 Lupinus latifolius*** Phacelia* Phlox diffusa** 3 Silene parryi** [**keep**] TSHRB** Amelanchier alnifolia** Arctostaphylos uva-ursi+*** 2 Cryptogramma acrostichoides*** Lomatium martindalei 3 Luzula hitchcockii+** Montia** Penstemon procerus+* Pseudotsuga menziesii* Racomitrium* 14 Selaginella wallacei+ 2

▶ [**218**] SHRB* 2 Achillea millefolium* Allium* Anticlea/Toxicoscordion*** 2 Berberis aquifolium*** 2 Calamagrostis rubescens+ 2 Eriophyllum lanatum* Festuca roemeri 4 Fragaria virginiana* Fritillaria affinis* Koeleria macrantha 2 Lomatium martindalei* Lomatium nudicaule+** Selaginella wallacei+* [**keep**] Arctostaphylos uva-ursi+ 2 Penstemon procerus+** 2 Selaginella wallacei+ 9

Floristics (12 plots, MORA 4, NOCA 7, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
60-80			Arctostaphylos uva-ursi+ 5, Penstemon procerus+ 3	Racomitrium 62, lichen 12
40-60	Pseudotsuga menziesii 2	Amelanchier alnifolia 1	Montia 1, Achillea millefolium 0	moss 25, Cryptogramma acrostichoides 1, Luzula hitchcockii+ 0
25-40	Pinus contorta 1		Lomatium martindalei 7, Juniperus communis 2, Paxistima myrsinites 1, Micranthes tolmiei+ 1, Collinsia parviflora 1	Selaginella wallacei+ 28, Juncus parryi+ 1, Carex geyeri+ 1
10-25		Holodiscus discolor 1	Lewisia 10, Polygonum douglasii+ 4, Madia 1	Danthonia 1, Festuca occidentalis+ 1, Calamagrostis rubescens+ 1

{104} Phlox diffusa, Lomatium martindalei*, Carex phaeocephala*
Spreading phlox, Cascades desert-parsley* & dunhead sedge* herbaceous vegetation
PHLDIF-(LOMMAR-CARPHA)



Range: Alpine and upper subalpine zones. **MORA**-2: (ne-se) 1730-1880m. **NOCA**-1: (nw-ne) 1870-1880m. **OLYM**-11: **nc-se** (ne-sc) 1530-1690m.

Struct: Semi-open mixed herbaceous-dwarf shrubland with dense forbs and abundant dwarf shrubs. Avg vasc cover 66: forb 37, dwf shrb 0.86 @ 24, grass 0.71 @ 4, conif LT5 0.57 @ 3, sedge 0.5 @ 5, shrb 0.21 @ 3.

Ecology: Steep south-facing upper slopes, on very shallow and well-drained soils. *Abies lasiocarpa* regen is often present.

Metrics: slope 35-42°, vdp 163-232m, vdr 898-1079m, east 24-80, south 81-98, conv 58-67, tpp 73-94, solar 79-91, wet 1-2

Map class: H61–Spreading phlox & common juniper dry meadow

Rel to C09: Similar, but adding an equal number of plots split from JUNCOM-(PHLDIF) and shedding plots to [088] EUCPAU-(PHAHAS-CASMIN) and [089] FESROE-(PHLDIF-ARECAP).

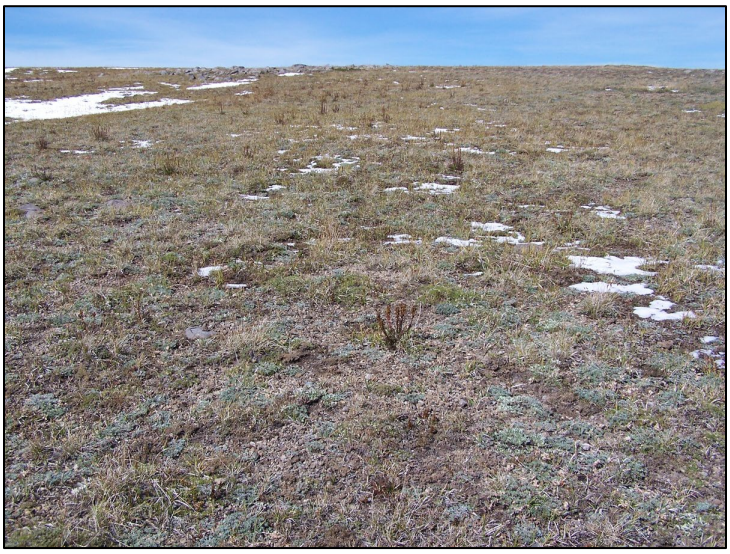
Similar: MO:[095] JUNCOM-(PHLDIF), NO:[088] EUCPAU-(PHAHAS-CASMIN), O:[089] FESROE-(PHLDIF-ARECAP), NO:[093] HERMAX-(THAOCC-SAUAME), MN:[102] PAXMYR/PHLDIF, NO:[168] SAXBRO-(DOULAE-SEDUM), MNO:[103] PENDAV/RACOMITRIUM, MNO:[100] LUEPEC-(CARSPE), MO:[065] ARCUVA-JUNCOM, MN:[090] FESVIR-EUC(LED,ENG). Also see: [084] DASFLO-(PHLDIF) (drier upper subalpine and alpine), [092] FESVIR-PHLDIF-ARECAP (prominent graminoids), [105] PHLDIF-LUPSEL-(PEDCON) (alpine).

▶ [**088**] Agoseris* Anemone occidentalis+** 2 Castilleja miniata* Cirsium edule+** Epilobium** Eucephalus paucicapitatus*** 4 Hieracium albiflorum* Phacelia* Spiraea splendens** 2 Valeriana sitchensis* 2 [**keep**] C-GT5* Carex phaeocephala+** Douglasia laevigata* Eriophyllum lanatum* Gentiana calycosa* Juniperus communis** Micranthes tolmiei+*** Paxistima myrsinites* Penstemon procerus+* Phlox diffusa*
▶ [**089**] Anemone occidentalis+ 2 Eremogone capillaris*** 5 Festuca roemeri** [**keep**] Artemisia 2 Douglasia laevigata** Eriophyllum lanatum* Gentiana calycosa** Juniperus communis 5 Lupinus latifolius* Micranthes tolmiei+** Paxistima myrsinites** Penstemon procerus+* Silene parryi* 2
▶ [**093**] Bromus sitchensis 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Hydrophyllum fendleri 2 Thalictrum occidentale* 2 [**keep**] Carex phaeocephala+** 2 Douglasia laevigata** Eriophyllum lanatum* Gentiana calycosa* Juniperus communis*** 2 Lomatium martindalei*** Micranthes tolmiei+** Penstemon procerus+** Phlox diffusa*** 2 Silene parryi*
▶ [**095**] Antennaria lanata+* Eremogone capillaris* Festuca brachyphylla* Juncus parryi+* Luzula hitchcockii+*** Pinus albicaulis* Sedum lanceolatum+** [**keep**] C-GT5* Artemisia* 2 Eriophyllum lanatum* Paxistima myrsinites* Phacelia*
▶ [**102**] SHRB* Antennaria lanata+* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Eremogone capillaris** Erythronium montanum+ 2 Festuca viridula*** 2 Hieracium scouleri+*** Juncus parryi+** Lewisia*** Lomatium brandegeei+*** Paxistima myrsinites* 2 Sedum lanceolatum+*** Selaginella wallacei+ 2 [**keep**] Artemisia 2 Bistorta bistortoides** Carex phaeocephala+** 2 Douglasia laevigata** Eriophyllum lanatum** 2 Gentiana calycosa** Juniperus communis* 2 Lomatium martindalei* Micranthes tolmiei+* Phacelia** Silene parryi 2

Floristics (14 plots, MORA 2, NOCA 1, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phlox diffusa 12	
60-80			Juniperus communis 24, Lupinus latifolius 3, Achillea millefolium 3	
40-60	Abies lasiocarpa 2		Eriophyllum lanatum 4, Silene parryi 4, Lomatium martindalei 2	
25-40			Artemisia 15, Erysimum arenicola 3, Phacelia 3, Penstemon procerus+ 2, Bistorta bistortoides 2, Douglasia laevigata 2, Gentiana calycosa 1, Paxistima myrsinites 1, Micranthes tolmiei+ 1	moss 11, Carex phaeocephala+ 5, Carex spectabilis+ 4, Poa cusickii+ 1, Trisetum 1
10-25	Pseudotsuga menziesii 4, Callitropsis nootkatensis 2	Vaccinium membranaceum 1	Delphinium 11, Allium 6, Chamaenerion angustifolium 4, Vaccinium deliciosum 4, Solidago multiradiata 3, Silene douglasii 2, Castilleja miniata 2, Sedum divergens 1, Erigeron 1, Valeriana sitchensis 1	Festuca roemeri 8, Festuca brachyphylla 1

{105} Phlox diffusa, Lupinus lepidus, Pedicularis contorta*
Spreading phlox, Donner Lake lupine & coiled-beak lousewort* herbaceous vegetation
PHLDIF-LUPSEL-(PEDCON)



Range: Alpine. **MORA**-10: **ne*** (se) 1970-2130m.

Struct: Semi-closed canopy forb-dominated vegetation with substantial sedges. Avg vasc cover 57: forb 42, sedge 0.88 @ 7, grass 0.63 @ 11, shrb 0.38 @ 4, conif LT5 0.25 @ 2, dwf shrb 0.13 @ 2.

Ecology: Gentle slopes with westerly aspects, on well-drained pumice-based substrates.

Metrics: slope 8-19°, vdp 48-230m, vdr 689-859m, east 2-24, south 51-87, conv 48-64, tpp 45-92, solar 76-86, wet 3

Map class: H64–Alpine lupine pumice vegetation

Rel to C09: Same, but adding some oddball plots from FESVIR-LUPARC and from the difficult-to-distinguish LUPSEL-(ERIAUR-MINOBT).

Similar: MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[059] ANTLAN-(OREALP-VACDEL), NO:[093] HERMAX-(THAOCC-SAUAME), NO:[088] EUCPAU-(PHAHAS-CASMIN), O:[089] FESROE-(PHLDIF-ARECAP), MN:[090] FESVIR-EUC(LED,ENG), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[100] LUEPEC-(CARSPE), MO:[095] JUNCOM-(PHLDIF), MNO:[217] VALSIT-VERVIR, MO: [084] DASFLO-(PHLDIF).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+* 2 Bistorta bistortoides** Juncus parryi+* 2 Phyllodoce empetriformis* Potentilla flabellifolia+* 2 Vaccinium deliciosum** 2 [**keep**] Artemisia 2 Carex spectabilis+* Cherleria/Sabulina 2 Festuca viridula 5 Lupinus lepidus*** 2 Pedicularis contorta+* Phlox diffusa* Solidago multiradiata 2

▶ [**084**] SHRUB* Anemone occidentalis+** Dasiphora fruticosa* Micranthes tolmiei+** Phacelia** Silene acaulis 2 Smelowskia** Solidago multiradiata* [**keep**] Artemisia 2 Carex spectabilis+*** 2 Cherleria/Sabulina 2 Festuca viridula 2 Oreostemma alpigenum** 2 Pedicularis contorta+***. Note: [084] is floristically quite similar but may not take as well to pumice substrates.

▶ [**088**] Bistorta bistortoides* Castilleja miniata** 2 Eucephalus paucicapitatus** 2 Lomatium martindalei** Lupinus latifolius* Phacelia** Silene parryi* Spiraea splendens 2 Vaccinium membranaceum 2 Valeriana sitchensis** 2 [**keep**] Carex spectabilis+* Cherleria/Sabulina 2 Festuca viridula 2 Lupinus lepidus*** 2 Oreostemma alpigenum*** 2 Pedicularis contorta+*** Solidago multiradiata 2

▶ [**089**] Allium 2 Anemone occidentalis+ 2 Eremogone capillaris* 2 Festuca roemeri*** 2 Juncus parryi+ 2 [**keep**] SHRB 2 Artemisia 2 Carex spectabilis+* Dasiphora fruticosa 2 Erigeron 2 Festuca viridula 2 Lupinus lepidus* Oreostemma alpigenum* Pedicularis contorta+*** 2

▶ [**093**] Bromus sitchensis 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Hydrophyllum fendleri 2 Thalictrum occidentale** 2 [**keep**] Carex spectabilis+* Festuca viridula 2 Lupinus lepidus*** 2 Oreostemma alpigenum*** 2 Pedicularis contorta+*** Phlox diffusa*** 2 Solidago multiradiata 2

▶ [**104**] Bistorta bistortoides* Douglasia laevigata* Eriophyllum lanatum* 2 Juniperus communis* 2 Lomatium martindalei* Lupinus latifolius* Penstemon procerus+* Phacelia* Poa cusickii+* Silene parryi* 2 [**keep**] Carex spectabilis+* Cherleria/Sabulina 2 Dasiphora fruticosa 2 Festuca viridula 2 Lupinus lepidus*** 2 Oreostemma alpigenum** Pedicularis contorta+*** 2

Floristics (8 plots, MORA 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Lupinus lepidus 11	
80-95			Phlox diffusa 17, Pedicularis contorta+ 4	Carex spectabilis+ 6
60-80			Oreostemma alpigenum 6	
40-60			Artemisia 5, Erigeron 3	
25-40	Abies lasiocarpa 1	Dasiphora fruticosa 4	Solidago multiradiata 5, Cherleria/Sabulina 5, Achillea millefolium 3, Aconogonon davisiae 1, Potentilla flabellifolia+ 1, Veronica cusickii+ 0	Festuca viridula 14, Danthonia 4
10-25	Pinus albicaulis 1, Picea engelmannii 1		Lupinus latifolius 5, Eremogone capillaris 1, Phyllodoce empetriformis 1, Campanula rotundifolia+ 1, Juniperus communis 1	Carex phaeocephala+ 5, Carex nigricans+ 2

{106} Phyllodoce empetriformis, Vaccinium deliciosum, Cassiope mertensiana*
Pink mountain-heather, Cascade blueberry & white mountain-heather* dwarf shrubland
PHYEMP-VACDEL-(CASMER)



Range: Subalpine and lower alpine zones. **MORA**-46: **nw**-**sw**-**se** (ne) 1680-1810m. **NOCA**-56: **nw**-**ne**-**cw**-**s** (ce) 1570-1780m. **OLYM**-35: **nc**-**ne**-**sc**-**se** 1450-1540m.

Struct: Closed canopy dwarf shrubland with substantial forbs & conifer regen. Avg vasc cover 97: dwf shrb 75, forb 12, conif LT5 0.92 @ 5, sedge 0.55 @ 4, conif GT5 0.24 @ 2.

Ecology: Fairly gentle slopes, on well-drained soils, most abundant in moist regions and less frequent in rain shadows (e.g., ne MORA and OLYM, se NOCA). Typically occurs in areas without recent disturbance, in mosaic with [206] TSUMER-ABILAS/VACDEL-PHYEMP and [208] TSUMER/PHYEMP-VACDEL tree islands and woodlands. *Tsuga mertensiana* and *Abies lasiocarpa* regen are usually present.

Metrics: slope 10-25°, vdp 22-137m, vdr 658-973m, east 21-92, south 11-75, conv 47-58, tpp 49-81, solar 59-78, wet 2-3

Map class: S48–Subalpine heather shrubland

Rel to C09: Same.

Similar: MNO:[077] CASMER-PHYEMP, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[100] LUEPEC-(CARSPE), MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MNO:[208] TSUMER/PHYEMP-VACDEL, MNO:[059] ANTLAN-(OREALP-VACDEL), N:[108] PHYGLA-(CASMER), MNO:[028] ABILAS/VACDEL-VALSIT, MN:[071] CARNIG-CARLEN-(CALCAN), MN:[073] CARNIG-KALMIC-(VACDEL). Also see: [209] VACDEL-FESVIR, [213] VACMEM/XERTEN

▶ [**077**] Diphasiastrum sitchense+* Luzula piperi+** Micranthes tolmiei+** [**keep**] C-LT5 2 C-GT5*** SHRB** TSHRB* Abies lasiocarpa* Bistorta bistortoides* Callitropsis nootkatensis* Erigeron* Erythronium montanum+*** Lupinus latifolius* Potentilla flabellifolia+*** Sorbus sitchensis* Tsuga mertensiana* 2 Vaccinium deliciosum 11. Note: [077] is typically in an alpine setting. Although *Vaccinium deliciosum* may be prominent, it is typically dwarfed.
▶ [**100**] Agrostis*** Anaphalis margaritacea*** Arnica mollis+*** Athyrium distentifolium** Erythranthe lewisii+*** Juncus mertensianus+** Luzula piperi+** Micranthes odontoloma+** Senecio triangularis+** Trisetum*** [**keep**] C-LT5 2 C-GT5* TSHRB* VASC VEG 46 Bistorta bistortoides* Callitropsis nootkatensis* Cassiope mertensiana 2 Erythronium montanum+*** Lupinus latifolius* Phyllodoce empetriformis 7 Potentilla flabellifolia+* Sorbus sitchensis** Tsuga mertensiana* 2 Vaccinium deliciosum* 3
▶ [**107**] Anemone occidentalis+ 2 Bistorta bistortoides* 2 Castilleja parviflora+** Erigeron 3 Lupinus latifolius** 5 Valeriana sitchensis* [**keep**] C-GT5* Arnica latifolia+*** Callitropsis nootkatensis* Carex nigricans+* Cassiope mertensiana* Diphasiastrum sitchense+* Juncus parryi+* Tsuga mertensiana* Vahlodea atropurpurea*
▶ [**206**] C-GT5* 4 SHRB* 3 TSHRB* Abies amabilis 2 Abies lasiocarpa* 4 Callitropsis nootkatensis* 2 Rhododendron albiflorum*** 2 Sorbus sitchensis* Tsuga mertensiana 7 Vaccinium membranaceum* [**keep**] Antennaria lanata+** Carex nigricans+** Carex spectabilis+* Cassiope mertensiana* Erigeron* Hieracium triste* Potentilla flabellifolia+* Vahlodea atropurpurea*. Note: [206] may have conifer canopy composed of regen if it is dense enough to establish a coherent upper layer. May include dwarf shrub patches of less than 10m.
▶ [**208**] C-GT5* 5 SHRB* 3 TSHRB* Abies amabilis** 2 Callitropsis nootkatensis* 2 Rhododendron albiflorum*** 2 Sorbus sitchensis* Tsuga mertensiana 7 Vaccinium membranaceum** 2 [**keep**] Abies lasiocarpa* Antennaria lanata+*** Bistorta bistortoides** Carex nigricans+** Carex spectabilis+** Cassiope mertensiana* Erigeron* Hieracium triste* Lupinus latifolius*. Note: [208] may have conifer canopy composed of regen if it is dense enough to establish a coherent upper layer. May include dwarf shrub patches of less than 10m.

Floristics (51 plots, MORA 16, NOCA 21, OLYM 14): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phyllodoce empetriformis 37, Vaccinium deliciosum 23, Cassiope mertensiana 15	
60-80	Tsuga mertensiana 4, Abies lasiocarpa 2		Luetkea pectinata 5	
40-60	Callitropsis nootkatensis 1		Erythronium montanum+ 3	moss 7
25-40		Sorbus sitchensis 1	Lupinus latifolius 3, Antennaria lanata+ 2, Erigeron 2, Bistorta bistortoides 1, Hieracium triste 1	Carex spectabilis+ 4, Carex nigricans+ 3, Vahlodea atropurpurea 1
10-25		Vaccinium membranaceum 1	Potentilla flabellifolia+ 3, Valeriana sitchensis 3, Gentiana calycosa 3, Pedicularis ornithorhynchos 2, Arnica latifolia+ 2, Castilleja parviflora+ 1	lichen 5, Diphasiastrum sitchense+ 3, Juncus parryi+ 1

{107} Phyllodoce empetriformis, Vaccinium deliciosum*, Lupinus latifolius
Pink mountain-heather, Cascade blueberry* & subalpine lupine dwarf shrubland
PHYEMP-(VACDEL)/LUPARC



Range: Subalpine and lower alpine zones. **MORA**-57: **nw**-**ne**-**sw***-**se*** 1690-1820m. **NOCA**-6: **nw**-**ne** 1660-1830m. **OLYM**-11: **nc**-**ne**-**sc**-**se** 1490-1700m.

Struct: Semi-open dwarf shrubland with dense forbs and prominent conifer regen. Avg vasc cover 93: dwf shrb 46, forb 34, conif LT5 0.87 @ 4, sedge 0.68 @ 9, rush 0.34 @ 3, grass 0.29 @ 5, shrb 0.18 @ 3.

Ecology: Fairly gentle slopes, on rocky soils. *Abies lasiocarpa* regen is usually present, often with *Tsuga mertensiana*.

Metrics: slope 9-27°, vdp 13-108m, vdr 487-769m, east 9-69, south 37-85, conv 47-59, tpp 53-79, solar 63-84, wet 2-4

Map class: S48–Subalpine heather shrubland

Rel to C09: Same, but incorporating many plots from the ambiguous type VACDEL.

Similar: MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[100] LUEPEC-(CARSPE), MN:[216] VALSIT-LIGGRA, MNO:[215] VALSIT-CARSPE, MNO:[077] CASMER-PHYEMP, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[217] VALSIT-VERVIR, MNO:[075] CARSPE-CARNIG-(POTFLA). Also see: [209] VACDEL-FESVIR, [213] VACMEM/XERTEN

▶ [**059**] Antennaria lanata+** 5 Eremogone capillaris*** Juncus parryi+** 4 Oreostemma alpigenum*** 8 Phlox diffusa 2 Potentilla flabellifolia+* Veronica cusickii+* [**keep**] C-LT5* 2 Abies lasiocarpa* 2 Cassiope mertensiana* Erythronium montanum+** Lupinus latifolius* Phyllodoce empetriformis* 5 Tsuga mertensiana*** Valeriana sitchensis*

▶ [**076**] Achillea millefolium* Agoseris** Arnica latifolia+** Carex spectabilis+ 15 Cirsium edule+** Phleum alpinum*** Phlox diffusa* Poa cusickii+** Silene parryi** Spiraea splendens* Veronica cusickii+* [**keep**] Abies lasiocarpa* Cassiope mertensiana** 3 Erythronium montanum+* Phyllodoce empetriformis* 6 Tsuga mertensiana** Vaccinium deliciosum* 7 Valeriana sitchensis 3

▶ [**100**] Agrostis** Anaphalis margaritacea** Epilobium*** Erythranthe lewisii+** Luzula piperi+** Micranthes odontoloma+** Poa cusickii+** Ranunculus eschscholtzii+** Senecio triangularis+** Trisetum** [**keep**] Bistorta bistortoides* 2 Cassiope mertensiana 2 Castilleja parviflora+* Erigeron 2 Erythronium montanum+** Lupinus latifolius* Vaccinium deliciosum* 3 Valeriana sitchensis* 2

▶ [**106**] C-GT5* Arnica latifolia+*** Callitropsis nootkatensis* Carex nigricans+* Cassiope mertensiana* Diphasiastrum sitchense+* Juncus parryi+* Tsuga mertensiana* Vahlodea atropurpurea* [**keep**] Anemone occidentalis+ 2 Bistorta bistortoides* 2 Castilleja parviflora+** Erigeron 3 Lupinus latifolius** 5 Valeriana sitchensis*

▶ [**216**] Agoseris*** Castilleja miniata* Eucephalus ledophyllus+* Festuca viridula** Ligusticum** 3 Luzula hitchcockii+* Pedicularis bracteosa* Poa cusickii+*** Polemonium pulcherrimum*** Veratrum viride* [**keep**] Cassiope mertensiana*** 2 Luetkea pectinata* Phyllodoce empetriformis* 4 Tsuga mertensiana*

Floristics (38 plots, MORA 26, NOCA 4, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phyllodoce empetriformis 20	
80-95			Vaccinium deliciosum 23, Lupinus latifolius 15	
60-80	Abies lasiocarpa 3			
40-60	Tsuga mertensiana 2		Cassiope mertensiana 9, Valeriana sitchensis 7, Bistorta bistortoides 5, Luetkea pectinata 4, Erythronium montanum+ 3, Castilleja parviflora+ 2	Carex spectabilis+ 9
25-40			Erigeron 6, Potentilla flabellifolia+ 4, Anemone occidentalis+ 3	
10-25	Callitropsis nootkatensis 2	Spiraea splendens 5, Sorbus sitchensis 1	Xerophyllum tenax 5, Veronica cusickii+ 4, Pedicularis contorta+ 4, Pedicularis racemosa 3, Antennaria lanata+ 3, Veratrum viride 3, Hieracium triste 2, Ligusticum 2, Gentiana calycosa 2, Pedicularis ornithorhynchos 2	Carex nigricans+ 6, Festuca viridula 4, lichen 4, Vahlodea atropurpurea 3, moss 2, Luzula hitchcockii+ 2

{108} Phyllodoce glanduliflora, Cassiope mertensiana*
Yellow & white* mountain-heather dwarf shrubland
PHYGLA-(CASMER)



Range: Alpine. **NOCA**-7: (nw-ne-cw-s) 2100-2190m.

Struct: Semi-open dwarf shrubland with substantial forbs. Avg vasc cover 56: dwf shrb 41, forb 10, grass 0.71 @ 3, rush 0.71 @ 1, sedge 0.57 @ 3, conif LT5 0.57 @ 1.

Ecology: Upper slopes and ridgetops with southwesterly aspects, on well-drained shallow soils. A few small *Pinus albicaulis* are often present.

Metrics: slope 24-32°, vdp 67-373m, vdr 1254-1418m, east 4-33, south 69-97, conv 57-86, tpp 81-99, solar 78-90, wet 2

Map class: S49–Alpine heather shrubland

Rel to C09: Same.

Similar: MN:[086] EMPNIG-LUPSEL, MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MO:[095] JUNCOM-(PHLDIF), MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[077] CASMER-PHYEMP, MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[103] PENDAV/RACOMITRIUM, MNO:[106] PHYEMP-VACDEL-(CASMER).
Also see: [063] ARCUVA-(DASFLO)

▶ [**059**] Anemone occidentalis+ 2 Juncus parryi+ 2 Oreostemma alpigenum* 2 Potentilla flabellifolia+** 2 Vaccinium deliciosum* 2 [**keep**] Cassiope mertensiana 5 Empetrum nigrum* Juniperus communis 2 Luzula piperi+** Penstemon procerus+*** Phyllodoce glanduliflora*** 2 Poa cusickii+ 2

▶ [**086**] C-LT5 2 Artemisia* Cherleria/Sabulina* 2 Empetrum nigrum 15 Lupinus lepidus*** 2 Oreostemma alpigenum* Pedicularis contorta+* Phleum alpinum* Salix nivalis+* 2 [**keep**] Antennaria lanata+ 2 Luzula piperi+* Micranthes tolmiei+* Penstemon procerus+* Phyllodoce glanduliflora* Pinus albicaulis** Poa cusickii+* 2 Vaccinium cespitosum 2

▶ [**095**] Achillea millefolium*** Eremogone capillaris 2 Juncus parryi+ 2 Juniperus communis* 9 Phlox diffusa* 3 [**keep**] Carex spectabilis+* Cassiope mertensiana*** 2 Empetrum nigrum*** 2 Erigeron* Luetkea pectinata* Lupinus latifolius 3 Luzula piperi+** Phyllodoce empetriformis* 2 Phyllodoce glanduliflora** 2

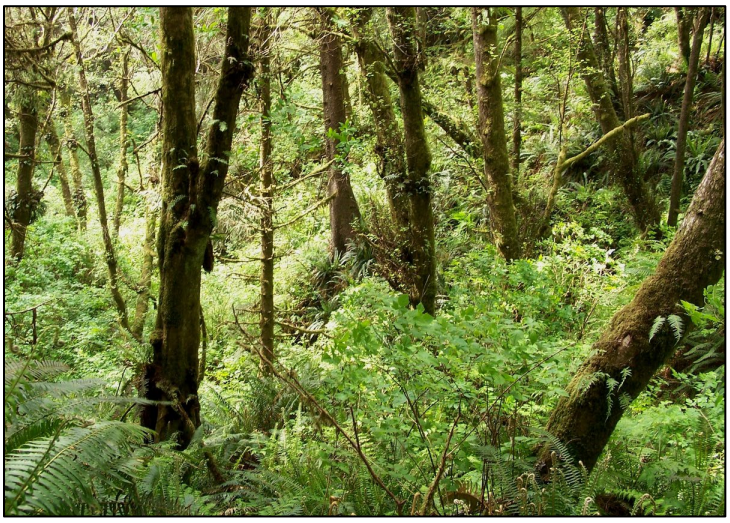
▶ [**100**] SHRB* Athyrium distentifolium* Carex spectabilis+ 3 Cryptogramma acrostichoides* Epilobium* Hieracium triste* Juncus mertensianus+* Juncus parryi+* Luetkea pectinata 4 Tsuga mertensiana* [**keep**] Bistorta bistortoides** Cassiope mertensiana 2 Empetrum nigrum* 2 Eremogone capillaris*** Gentiana calycosa*** Juniperus communis** 2 Pedicularis ornithorhynchos*** Phyllodoce glanduliflora*** 3 Pinus albicaulis** Poa cusickii+ 2 Sibbaldia procumbens*** Vaccinium cespitosum***

▶ [**104**] C-GT5* Achillea millefolium** Artemisia 2 Carex phaeocephala+* 2 Douglasia laevigata* Eriophyllum lanatum* 2 Juniperus communis 9 Lomatium martindalei* Lupinus latifolius* Paxistima myrsinites* Phacelia* Phlox diffusa* 3 Silene parryi* [**keep**] Cassiope mertensiana 2 Empetrum nigrum*** 2 Luetkea pectinata** Lupinus latifolius 5 Luzula piperi+*** Penstemon procerus+* Phyllodoce empetriformis** 2 Phyllodoce glanduliflora*** 2

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Phyllodoce glanduliflora 21	
60-80			Empetrum nigrum 9, Phyllodoce empetriformis 5, Luetkea pectinata 2, Penstemon procerus+ 1	lichen 8, Luzula piperi+ 1
40-60	Pinus albicaulis 0		Cassiope mertensiana 11, Juniperus communis 6, Antennaria lanata+ 3, Phlox diffusa 2, Erigeron 1, Bistorta bistortoides 1, Micranthes tolmiei+ 0	Poa cusickii+ 4, Carex spectabilis+ 2
25-40	Abies lasiocarpa 2		Lupinus latifolius 10, Vaccinium cespitosum 3, Pedicularis ornithorhynchos 2, Vaccinium deliciosum 1, Eremogone capillaris 0, Sibbaldia procumbens 0, Gentiana calycosa 0	Juncus parryi+ 1, Festuca brachyphylla 0, Vahlodea atropurpurea 0
10-25			Eriogonum pyrolifolium 2	Diphasiastrum sitchense+ 2, Carex nigricans+ 1

{109} Picea sitchensis, Alnus rubra*, Rubus spectabilis, Polystichum munitum
Sitka spruce, red alder*, salmonberry & sword fern forest
PICSIT-(ALNRUB)/RUBSPE/POLMUN



Range: Outer coastal zone. **OLYM**-16: **sw*** (nw) 10-60m.

Struct: Semi-open mixed broadleaf-conifer forest with substantial conifer regen, dense shrubs & ferns, and substantial forbs. Avg vasc cover 163: shrb 43, fern 39, brdlf tree 23, conif tree 22, forb 15, conif regen 0.83 @ 14, tall shrb 0.42 @ 10, brdlf regen 0.33 @ 7, grass 0.17 @ 5.

Ecology: Gentle slopes, usually facing the Pacific, on poorly drained or sub-irrigated soils. Often on older coastal bluff slope failures; may develop from [049] ALNRUB-PICSIT/POLMUN-(HERMAX). Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Picea sitchensis*.

Metrics: slope 4-21°, vdp 1-27m, vdr 11-49m, east 4-43, south 26-89, conv 49-53, tpp 49-60, solar 54-61, wet 4-5

Map class: B32–Coastal red alder forest

Rel to C09: Similar, incorporating some plots from ALNRUB/POLMUN and ALNRUB/RUBSPE.

Similar: MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX), O:[115] PICSIT-TSUHET/POLMUN, MNO:[048] ALNRUB/OPLHOR-RUBSPE, O:[047] ALNRUB/ELYGLA, MNO:[046] ALNRUB/ATHFIL-LYSAME, MO:[054] ALNRUB/STACHA-TOLMEN, O:[110] PICSIT/RUBSPE/CAROBN-LYSAME, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL. Also see: [111] PICSIT-THUPLI/MAIDIL

▶ [**047**] Acer circinatum 2 Bromus sitchensis 2 Elymus*** 2 Poa cusickii+ 2 Ranunculus repens+*** 2 Rubus ursinus*** Stachys cooleyae** [**keep**] C-GT5* Athyrium filix-femina* Dryopteris*** Gaultheria shallon 2 Maianthemum dilatatum* Polystichum munitum 10 Sambucus racemosa** 2 Struthiopteris spicant*** 2 Tsuga heterophylla* 6

▶ [**048**] B-LT5* Abies amabilis*** 2 Acer circinatum 2 Gymnocarpium dryopteris** Oplopanax horridus*** 2 Petasites frigidus** Pseudotsuga menziesii** 2 Ribes bracteosum+ 2 Thuja plicata** Tiarella trifoliata** Vaccinium parvifolium* [**keep**] Gaultheria shallon 2 Maianthemum dilatatum 2 Picea sitchensis*** 2 Polystichum munitum 8 Struthiopteris spicant 2

▶ [**049**] B-LT5* Achillea millefolium*** Anaphalis margaritacea*** 2 Angelica 3 Equisetum arvense+** Gaultheria shallon* Heracleum maximum*** 2 Lonicera involucrata 2 [**keep**] C-LT5 7 Athyrium filix-femina* Claytonia sibirica+* Dryopteris* 2 Struthiopteris spicant** Tsuga heterophylla**

▶ [**050**] TSHRB* Acer circinatum*** 2 Acer macrophyllum*** 2 Elymus 2 Oxalis oregana** Ranunculus repens+*** 2 Tiarella trifoliata 2 [**keep**] Athyrium filix-femina* Dryopteris* Gaultheria shallon** 2 Lysichiton americanus** Maianthemum dilatatum* Sambucus racemosa 4 Struthiopteris spicant* 2 Vaccinium ovatum**

▶ [**115**] Gaultheria shallon* Lonicera involucrata* Luzula hitchcockii+* Moneses uniflora* Pteridium aquilinum* Thuja plicata* 3 Trillium ovatum* Vaccinium parvifolium* Vicia* [**keep**] B-LT5* B-GT5* TSHRB* Alnus rubra* Athyrium filix-femina 2 Dryopteris 2 Lysichiton americanus* Mitella*** Rubus spectabilis 8 Sambucus racemosa** 2

Floristics (12 plots, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 26, Picea sitchensis 17, Tsuga heterophylla 17	Rubus spectabilis 36		Polystichum munitum 29
60-80				Struthiopteris spicant 6, Athyrium filix-femina 5
40-60		Sambucus racemosa 10	Maianthemum dilatatum 5, Claytonia sibirica+ 3	Dryopteris 4, moss 4
25-40		Gaultheria shallon 12, Vaccinium ovatum 2	Lysichiton americanus 2, Galium 2, Mitella 1	
10-25		Vaccinium ovalifolium 8, Rhododendron menziesii 3, Vaccinium parvifolium 2	Oxalis oregana 34, Circaea alpina 6, Stellaria 1, Cardamine 1, Streptopus amplexifolius 1	Carex deweyana+ 2, Luzula parviflora 1

{110} Picea sitchensis, Rubus spectabilis, Carex obnupta, Lysichiton americanus
Sitka spruce, salmonberry, slough sedge & skunk-cabbage forest
PICSIT/RUBSPE/CAROBN-LYSAME



Range: Coastal zone, in wetlands. **OLYM**-4: **sw** 10-30m.

Struct: Conifer woodland with substantial conifer regen, dense shrubs, and abundant forbs, sedges & ferns. Avg vasc cover 151: shrb 47, conif tree 33, forb 28, fern 17, conif regen 5, sedge 0.75 @ 23, brdlf tree 0.5 @ 3, tall shrb 0.5 @ 2, brdlf regen 0.25 @ 5.

Ecology: Swampy wetlands on nearly flat terraces or floodplains of low-gradient rivers and streams. Soils are poorly drained and typically seasonally flooded. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 2-6°, vdp 1-9m, vdr 5-22m, east 19-54, south 49-95, conv 47-50, tpp 45-52, solar 55-61, wet 5-6

Map class: C00–Sitka spruce, western hemlock, salal & sword fern forest

Rel to C09: Expanded, incorporating two plots from TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL. The core NCCN plots seem different than described: *Athyrium filix-femina* is reliably present while *Carex obnupta* is occasionally absent.

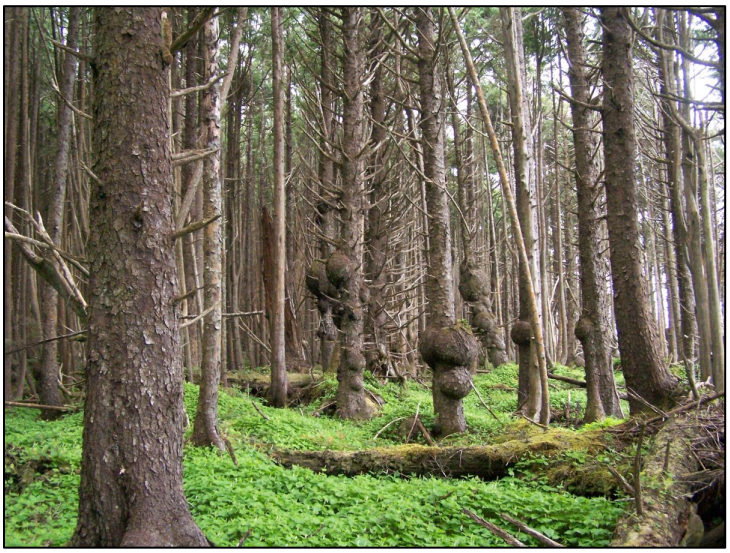
Similar: O:[115] PICSIT-TSUHET/POLMUN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MNO:[046] ALNRUB/ATHFIL-LYSAME, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN.

▶ [**109**] B-GT5* 5 TSHRB 3 Alnus rubra* 8 Dryopteris 2 Polystichum munitum* 11 Sambucus racemosa 3 [**keep**] Carex obnupta+*** 2 Gaultheria shallon* Lonicera involucrata 2 Lysichiton americanus* 4 Osmorhiza 2 Rhododendron menziesii* Tiarella trifoliata 2 Vaccinium parvifolium**
▶ [**114**] C-LT5 8 Polystichum munitum* Tsuga heterophylla 24 Vaccinium ovalifolium* [**keep**] FORB 6 TSHRB** Athyrium filix-femina* 2 Carex obnupta+*** 2 Claytonia sibirica+** Dryopteris* Lonicera involucrata** 2 Lysichiton americanus* 4 Maianthemum dilatatum* Sambucus racemosa*** Tiarella trifoliata 2
▶ [**115**] B-GT5 4 Polystichum munitum* 11 Vaccinium ovatum* 2 [**keep**] FORB 11 Athyrium filix-femina 2 Carex obnupta+** 10 Lysichiton americanus*** 2 Osmorhiza 2 Rhododendron menziesii* Rubus spectabilis 8
▶ [**189**] Oxalis oregana* 2 Sphagnum 2 Tsuga heterophylla 25 [**keep**] TSHRB* Carex obnupta+*** 2 Claytonia sibirica+* Lonicera involucrata*** 2 Lysichiton americanus* 6 Osmorhiza 2 Sambucus racemosa* Tiarella trifoliata 2
▶ [**191**] C-LT5 9 Oxalis oregana** 2 Rubus pedatus 2 Tiarella trifoliata* Tsuga heterophylla 26 Vaccinium ovalifolium* 8 Vaccinium parvifolium 6 [**keep**] Athyrium filix-femina* Carex obnupta+*** 2 Gaultheria shallon* Lonicera involucrata 2 Lysichiton americanus*** 2 Picea sitchensis 8 Thuja plicata 2

Floristics (4 plots, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Picea sitchensis 24	Rubus spectabilis 26, Gaultheria shallon 12, Vaccinium parvifolium 4	Lysichiton americanus 18	Athyrium filix-femina 8
80-95				
60-80	Tsuga heterophylla 16	Rhododendron menziesii 2	Maianthemum dilatatum 7	moss 28, Carex obnupta+ 23, Struthiopteris spicant 7
40-60	Alnus rubra 5	Lonicera involucrata 6, Sambucus racemosa 2	Claytonia sibirica+ 2	Polystichum munitum 7, Dryopteris 1
25-40	Thuja plicata 7	Vaccinium ovalifolium 5, Rubus nutkanus 0	Tiarella trifoliata 5, Osmorhiza 5, Oenanthe sarmentosa 1, Galium 1, Mitella 1	liverwort 3, Bromus sitchensis 1, Luzula parviflora 1

{111} Picea sitchensis, Thuja plicata, Maianthemum dilatatum
Sitka spruce, redcedar & wild lily-of-the-valley forest
PICSIT-THUPLI/MAIDIL



Range: Outer coastal zone. **OLYM**-3: **sw**, 0-20m.

Struct: Closed conifer forest with little to no regen, over very dense forbs, substantial shrubs, and prominent ferns. Avg vasc cover 147: conif tree 70, forb 67, shrb 6, fern 3, tall shrb 0.33 @ 2.

Ecology: Nearly flat, west-sloping uplands above coastal cliffs, on well-drained soils. Occasionally on sand and gravel behind young tree thickets and driftwood piles on beaches.

Metrics: slope 1-4°, vdp 1-4m, vdr 5-8m, east 0-1, south 52-59, conv 50-51, tpp 49-50, solar 58-59, wet 6-7

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: New name for PICSIT/MAIDIL, to clarify affinity with other *Thuja plicata*-containing stands at the coast.

Similar: O:[115] PICSIT-TSUHET/POLMUN, O:[112] PICSIT-THUPLI/VACOVAT, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[110] PICSIT/RUBSPE/CAROBN-LYSAME, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY.

▶ [**112**] B-GT5 2 C-LT5** 2 SHRB 11 Gaultheria shallon 2 Polystichum munitum 2 Tsuga heterophylla 12 Vaccinium ovalifolium 2 Vaccinium ovatum 8 [**keep**] FORB 3 Lonicera involucrata*** Maianthemum dilatatum** 2 Picea sitchensis 15 Polystichum munitum*
▶ [**113**] C-LT5* 2 TSHRB* Acer circinatum* 2 Acer macrophyllum 2 Oxalis oregana* 2 Polystichum munitum 3 Pseudotsuga menziesii 2 Rubus spectabilis* Tiarella trifoliata* Vaccinium parvifolium* [**keep**] Gaultheria shallon* Lonicera involucrata*** Lysichiton americanus** Maianthemum dilatatum 9 Thuja plicata* Vaccinium ovatum*** 2
▶ [**115**] B-GT5* 2 C-LT5* 2 Alnus rubra* 2 Athyrium filix-femina* Galium* Gaultheria shallon 2 Polystichum munitum 3 Rubus spectabilis* 2 Struthiopteris spicant* Vaccinium ovalifolium 2 Vaccinium parvifolium* [**keep**] FORB 12 Lonicera involucrata* Lysichiton americanus*** 2 Maianthemum dilatatum 5 Thuja plicata* Vaccinium ovatum*
▶ [**188**] C-LT5** 2 Abies amabilis 2 Polystichum munitum 2 Struthiopteris spicant* Tsuga heterophylla 12 Vaccinium ovalifolium* Vaccinium parvifolium** [**keep**] FORB 8 Lysichiton americanus 2 Maianthemum dilatatum* 2 Picea sitchensis 5 Thuja plicata* Vaccinium ovatum*** 2
▶ [**199**] C-LT5** 2 SHRB 11 TSHRB 3 Cornus unalaschkensis** Gaultheria shallon 2 Malus fusca 2 Rhododendron menziesii** 2 Struthiopteris spicant* Vaccinium ovalifolium** 2 Vaccinium ovatum 8 [**keep**] FORB 29 Lonicera involucrata*** Maianthemum dilatatum 5 Picea sitchensis 12 Polystichum munitum**

Floristics (3 plots, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Picea sitchensis 57, Tsuga heterophylla 7, Thuja plicata 6	Vaccinium ovatum 5	Maianthemum dilatatum 65	moss 85, Polystichum munitum 1
60-80		Gaultheria shallon 1, Lonicera involucrata 1	Lysichiton americanus 3	
25-40		Oemleria cerasiformis 2		Struthiopteris spicant 3, Pteridium aquilinum 1, lichen 1

{112} Picea sitchensis, Thuja plicata, Vaccinium ovatum
Sitka spruce, redcedar & evergreen huckleberry forest
PICSIT-THUPLI/VACOVAT



Range: Outer coastal zone. **OLYM**-18: **nw-sw*** 10-40m.

Struct: Semi-open conifer forest with substantial conifer regen, dense shrubs, and substantial ferns. Avg vasc cover 127: conif tree 52, shrb 48, conif regen 15, fern 0.92 @ 11, forb 0.58 @ 2, brdlf tree 0.42 @ 4.

Ecology: Nearly flat, west-sloping uplands, on stabilized dunes or as tree islands on unstabilized dunes. Regen dominated by *Tsuga heterophylla*, frequently with smaller amounts of *Thuja plicata*.

Metrics: slope 0-4°, vdp 1-7m, vdr 13-32m, east 0-17, south 45-71, conv 49-52, tpp 49-56, solar 58-59, wet 5-7

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: Evolved from combination of PICSIT/VACOVA and THUPLI-TSUHET/VACOVA plots with significant amounts of *Picea sitchensis*.

Similar: O:[178] THUPLI-TSUHET/VACOVAT, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[115] PICSIT-TSUHET/POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[176] THUPLI-TSUHET/LYSAME/SPHAGN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI.

▶ [**115**] FORB* 3 Alnus rubra 5 Athyrium filix-femina* Claytonia sibirica+** Dryopteris* Galium*** Luzula parviflora** Maianthemum dilatatum*** Picea sitchensis 15 Polystichum munitum* 17 [**keep**] SHRB 22 Thuja plicata* Vaccinium ovatum* 6
▶ [**178**] FORB 3 TSHRB** 2 Cornus unalaschkensis** Maianthemum dilatatum* 2 Rhododendron menziesii* Rubus spectabilis 3 [**keep**] B-GT5** Alnus rubra*** Picea sitchensis** 4 Polystichum munitum** 2
▶ [**188**] Abies amabilis** 2 Athyrium filix-femina* Dryopteris* Moneses uniflora* Oxalis oregana** Polystichum munitum* Rubus pedatus** Streptopus amplexifolius** Trillium ovatum** Vaccinium ovalifolium* [**keep**] SHRB 11 Gaultheria shallon* 2 Picea sitchensis 4 Thuja plicata* Vaccinium ovatum*** 2
▶ [**199**] FORB* 3 TSHRB 2 Carex obnupta+ 2 Cornus unalaschkensis*** Lysichiton americanus* 3 Maianthemum dilatatum** Malus fusca 2 Rhododendron menziesii* Vaccinium ovalifolium* 6 [**keep**] B-GT5* Alnus rubra* Polystichum munitum 4 Vaccinium ovatum*
▶ [**202**] FORB 3 Maianthemum dilatatum*** 2 Rhododendron menziesii* Rubus spectabilis* 3 Vaccinium ovalifolium* [**keep**] B-GT5* 2 Alnus rubra* 2

Floristics (12 plots, OLYM 12): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 39, Picea sitchensis 9	Vaccinium ovatum 30, Gaultheria shallon 13		
80-95	Thuja plicata 20			moss 38, Struthiopteris spicant 6
40-60	Alnus rubra 3	Vaccinium parvifolium 3, Rubus spectabilis 2	Lysichiton americanus 1	
25-40		Vaccinium ovalifolium 4, Rhododendron menziesii 3		Polystichum munitum 11
10-25				Athyrium filix-femina 6

{113} Picea sitchensis, Tsuga heterophylla, Acer circinatum, Oxalis oregana, Polystichum munitum
Sitka spruce, western hemlock, vine maple, Oregon wood-sorrel & sword fern forest
PICSIT-TSUHET/ACECIR/OXAORE-POLMUN



Range: Lowland zone. **OLYM**-41: **nc*-sw-sc*** (nw-se) 160-270m.

Struct: Semi-open conifer forest (44-65m) with abundant conifer regen, dense forbs, and abundant ferns, shrubs & tall shrubs. Avg vasc cover 168: conif tree 48, forb 37, fern 27, conif regen 17, shrb 0.94 @ 19, tall shrb 0.88 @ 18, brdlf tree 0.39 @ 8, brdlf regen 0.18 @ 7, grass 0.18 @ 6.

Ecology: Very gentle upland slopes on toeslopes and high terraces of major rivers. Moist but well-drained soils. Regen dominated by *Tsuga heterophylla*, frequently with codominant *Picea sitchensis*.

Metrics: slope 1-11°, vdp 1-5m, vdr 2-31m, east 22-70, south 22-96, conv 47-51, tpp 16-40, solar 59-66, wet 3-7

Map class: C03–Sitka spruce, western hemlock & wood-sorrel forest

Rel to C09: New name for PICSIT-TSUHET/POLMUN-OXAORE, to clarify that *Acer circinatum* is usually abundant in the understory in the NCCN plots.

Similar: O:[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[115] PICSIT-TSUHET/POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN.

▶ [**115**] Alnus rubra 4 Dryopteris* Galium* Gaultheria shallon** 2 Struthiopteris spicant* Vaccinium ovatum*** 2 [**keep**] C-LT5* FORB 11 TSHRB* Acer circinatum*** 2 Acer macrophyllum 3 Oxalis oregana* Pseudotsuga menziesii 2 Rubus pedatus 2 Tiarella trifoliata* Vaccinium parvifolium 3

▶ [**188**] Abies amabilis*** Dryopteris* Gaultheria shallon** Moneses uniflora*** Streptopus amplexifolius*** Struthiopteris spicant* Trillium ovatum** [**keep**] TSHRB** 2 Acer circinatum** 2 Acer macrophyllum 2 Oxalis oregana* 2 Picea sitchensis 5 Pseudotsuga menziesii 2 Tiarella trifoliata*

▶ [**190**] Frangula purshiana* Gaultheria shallon** Oplopanax horridus 2 Prosartes** Rhododendron menziesii*** Thuja plicata* Vaccinium ovalifolium* [**keep**] B-GT5* 2 TSHRB 7 Acer circinatum* 5 Acer macrophyllum* 3 Alnus rubra* Luzula parviflora** Picea sitchensis* 8 Rubus pedatus* 2

▶ [**191**] Cornus unalaschkensis* Dryopteris* Frangula purshiana* Gaultheria shallon** 2 Moneses uniflora*** Rhododendron menziesii** 4 Sambucus racemosa*** Struthiopteris spicant* [**keep**] B-GT5* 3 TSHRB 5 Acer circinatum* 3 Acer macrophyllum* 3 Alnus rubra* Picea sitchensis* 8 Thuja plicata* 2 Tiarella trifoliata 4

▶ [**193**] Cornus unalaschkensis* Pseudotsuga menziesii* Rhododendron menziesii*** Vaccinium ovalifolium* [**keep**] B-GT5* 2 TSHRB 6 Acer circinatum 8 Acer macrophyllum* 2 Alnus rubra* Athyrium filix-femina* Luzula parviflora*

Floristics (33 plots, OLYM 33): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 30, Picea sitchensis 27			Polystichum munitum 20
80-95		Acer circinatum 18, Vaccinium parvifolium 8	Oxalis oregana 19	moss 30
60-80		Rubus spectabilis 8	Tiarella trifoliata 8	
40-60		Vaccinium ovalifolium 10	Maianthemum dilatatum 5	Struthiopteris spicant 4, Athyrium filix-femina 3
25-40	Thuja plicata 12, Acer macrophyllum 11, Pseudotsuga menziesii 10, Alnus rubra 3		Rubus pedatus 6	Luzula parviflora 2
10-25		Frangula purshiana 3	Achlys triphylla 10, Cornus unalaschkensis 8, Rubus ursinus 3, Galium 2	Pteridium aquilinum 7, Gymnocarpium dryopteris 4

{114} Picea sitchensis, Tsuga heterophylla, Gaultheria shallon, Polystichum munitum
Sitka spruce, western hemlock, salal & sword fern forest
PICSIT-TSUHET/GAUSHA/POLMUN



Range: Outer coastal zone. **OLYM**-39: **nw-sw*** 30-90m.

Struct: Semi-open conifer forest with abundant conifer regen, very dense shrubs, and abundant ferns. Avg vasc cover 145: shrb 57, conif tree 50, conif regen 19, fern 16, forb 0.75 @ 3.

Ecology: Very gentle slopes, on well-drained soils. Frequently on or near coastal bluffs. Regen dominated by *Tsuga heterophylla*; *Picea sitchensis* usually absent in regen.

Metrics: slope 1-9°, vdp 5-33m, vdr 32-80m, east 4-43, south 53-86, conv 50-53, tpp 53-70, solar 58-61, wet 4-7

Map class: C00–Sitka spruce, western hemlock, salal & sword fern forest

Rel to C09: Evolved from PICSIT/GAUSHA; in NCCN plots *Picea sitchensis* is generally subordinate, perhaps reflecting logging history.

Similar: O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[115] PICSIT-TSUHET/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[110] PICSIT/RUBSPE/CAROBN-LYSAME, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME.

▶ [**115**] B-GT5* 3 Alnus rubra 3 Claytonia sibirica+*** Dryopteris** Galium** Luzula parviflora*** Maianthemum dilatatum* Polystichum munitum 16 Vaccinium ovatum* [**keep**] C-LT5* SHRB 23 Gaultheria shallon 15 Rhododendron menziesii* Vaccinium ovalifolium* Vaccinium parvifolium 3

▶ [**188**] Abies amabilis*** 2 Athyrium filix-femina* Dryopteris* Moneses uniflora* Oxalis oregana* Rubus pedatus*** Streptopus amplexifolius* Thuja plicata* [**keep**] SHRB 11 Gaultheria shallon* 2 Picea sitchensis 5 Rhododendron menziesii* 2 Rubus spectabilis* 3 Vaccinium ovalifolium 4

▶ [**189**] B-GT5 2 FORB 6 Alnus rubra 3 Dryopteris* Luzula parviflora** Maianthemum dilatatum* Oxalis oregana** 5 Rubus spectabilis 13 Sphagnum*** 2 [**keep**] Picea sitchensis 8 Trillium ovatum*

▶ [**191**] FORB 6 TSHRB** Athyrium filix-femina 2 Cornus unalaschkensis*** 2 Dryopteris* Frangula purshiana** Luzula parviflora** Maianthemum dilatatum* Oxalis oregana** 5 Rubus pedatus*** 2 Tiarella trifoliata** [**keep**] Gaultheria shallon* 8 Picea sitchensis* 7 Rhododendron menziesii*

▶ [**200**] B-LT5* TSHRB** Cornus unalaschkensis*** Frangula purshiana** Gymnocarpium dryopteris*** Maianthemum dilatatum* Maianthemum stellatum* Moneses uniflora* Rubus pedatus*** Sphagnum*** Struthiopteris spicant 9 Thuja plicata** Vaccinium ovatum* [**keep**] Picea sitchensis* 8 Polystichum munitum** 2

Floristics (36 plots, OLYM 36): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 51, Picea sitchensis 17	Gaultheria shallon 34		Polystichum munitum 10, Struthiopteris spicant 6
80-95		Rubus spectabilis 9, Vaccinium parvifolium 6, Rhododendron menziesii 4		
60-80		Vaccinium ovalifolium 10		moss 22
25-40	Alnus rubra 1		Maianthemum dilatatum 3, Lysichiton americanus 2	Athyrium filix-femina 1
10-25	Thuja plicata 13	Vaccinium ovatum 2	Prosartes 1, Streptopus amplexifolius 1	

{115} Picea sitchensis, Tsuga heterophylla, Polystichum munitum
Sitka spruce, western hemlock & sword fern forest
PICSIT-TSUHET/POLMUN



Range: Outer coastal zone. **OLYM**-22: **nw-sw*** 20-70m.

Struct: Closed conifer forest (37m) with substantial conifer regen, dense ferns, and substantial shrubs & forbs. Avg vasc cover 143: conif tree 65, fern 43, shrb 15, forb 7, conif regen 0.6 @ 9, rush 0.5 @ 1, brdlf tree 0.45 @ 10, sedge 0.15 @ 16, tall shrb 0.15 @ 5.

Ecology: Very gentle slopes with westerly aspects and gently rolling topography, on well-drained soils. Usually near coastal bluffs but at some remove from the Pacific. Regen dominated by *Tsuga heterophylla*, often with codominant *Picea sitchensis*.

Metrics: slope 5-11°, vdp 5-32m, vdr 19-59m, east 2-24, south 51-83, conv 50-54, tpp 52-70, solar 57-62, wet 3-5

Map class: C00–Sitka spruce, western hemlock, salal & sword fern forest

Rel to C09: Same, but in the NCCN plots *Oxalis oregana* is sometimes abundant, not always "absent or low in cover."

Similar: MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[110] PICSIT/RUBSPE/CAROBN-LYSAME, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[112] PICSIT-THUPLI/VACOVAT, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN.

▶ [**109**] B-LT5* B-GT5* TSHRB* Alnus rubra* Athyrium filix-femina 2 Dryopteris 2 Lysichiton americanus* Mitella*** Rubus spectabilis 8 Sambucus racemosa** 2 [**keep**] Gaultheria shallon* Lonicera involucrata* Luzula hitchcockii+* Moneses uniflora* Pteridium aquilinum* Thuja plicata* 3 Trillium ovatum* Vaccinium parvifolium* Vicia*
▶ [**113**] C-LT5* FORB 11 TSHRB* Acer circinatum*** 2 Acer macrophyllum 3 Oxalis oregana* Pseudotsuga menziesii 2 Rubus pedatus 2 Tiarella trifoliata* Vaccinium parvifolium 3 [**keep**] Alnus rubra 4 Dryopteris* Galium* Gaultheria shallon** 2 Struthiopteris spicant* Vaccinium ovatum*** 2
▶ [**114**] C-LT5* SHRB 23 Gaultheria shallon 15 Rhododendron menziesii* Vaccinium ovalifolium* Vaccinium parvifolium 3 [**keep**] B-GT5* 3 Alnus rubra 3 Claytonia sibirica+*** Dryopteris** Galium** Luzula parviflora*** Maianthemum dilatatum* Polystichum munitum 16 Vaccinium ovatum*
▶ [**188**] Abies amabilis*** 2 Vaccinium ovalifolium* Vaccinium parvifolium* [**keep**] Galium* Gaultheria shallon 2 Luzula parviflora* Maianthemum dilatatum* Picea sitchensis 5 Polystichum munitum 10 Vaccinium ovatum* 2
▶ [**191**] FORB 10 TSHRB* Athyrium filix-femina 2 Oxalis oregana* Rhododendron menziesii 3 Rubus pedatus*** 2 Tiarella trifoliata* Vaccinium ovalifolium* 8 Vaccinium parvifolium 3 [**keep**] B-GT5* 3 Alnus rubra* 5 Galium** Picea sitchensis* 8 Polystichum munitum 13 Thuja plicata 2 Vaccinium ovatum* 2

Floristics (20 plots, OLYM 20): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Picea sitchensis 44, Tsuga heterophylla 26			Polystichum munitum 39, moss 17
80-95				Struthiopteris spicant 3
60-80		Gaultheria shallon 9, Rubus spectabilis 5	Maianthemum dilatatum 2	
40-60	Alnus rubra 10	Vaccinium ovatum 3, Vaccinium parvifolium 2	Galium 1	Athyrium filix-femina 1, Dryopteris 1
25-40	Thuja plicata 8	Vaccinium ovalifolium 5, Rhododendron menziesii 2	Claytonia sibirica+ 3, Moneses uniflora 0	Luzula parviflora 1
10-25		Lonicera involucrata 2	Oxalis oregana 11, Tiarella trifoliata 4, Prosartes 2, Clintonia uniflora 1, Stellaria 1, Streptopus amplexifolius 1, Vicia 1, Trillium ovatum 1, Neottia 1	Carex obnupta+ 6, Pteridium aquilinum 2, lichen 2, liverwort 1, Polypodium glycyrrhiza 1

{116} Pinus albicaulis, Abies lasiocarpa, Vaccinium scoparium, Luzula hitchcockii
Whitebark pine, subalpine fir, grouse whortleberry & smooth woodrush woodland
PINALB-(ABILAS)/VACSCO/LUZGLA



Range: Upper subalpine zone. **NOCA**-13: **s*** 2030-2150m.

Struct: Conifer woodland, often tree islands, with substantial conifer regen, dense dwarf shrubs, abundant forbs, and substantial shrubs & grasses. Avg vasc cover 109: dwf shrb 32, conif tree 25, forb 19, conif regen 13, shrb 12, grass 5, rush 0.71 @ 3.

Ecology: Fairly steep slopes with southwesterly aspects. Regen codominated by *Pinus albicaulis* and *Abies lasiocarpa*.

Metrics: slope 27-33°, vdp 110-188m, vdr 1246-1351m, east 10-23, south 79-92, conv 47-61, tpp 65-83, solar 82-89, wet 2-3

Map class: C25–N Casc subalpine fir & whitebark pine wdlnd

Rel to C09: Same, although in NCCN plots *Festuca viridula* replaces *Luzula hitchcockii* as the dominant graminoid.

Similar: N:[117] PINALB/FESVIR-ARECAP, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MN:[118] PINALB/JUNCOM, N:[097] LARLYA/LUZGLA, MN:[214] VACSCO-FESVIR-ARECAP, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, MN:[102] PAXMYR/PHLDIF, MNO:[030] ABILAS/VACMEM/LUPARC, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), MN:[031] ABILAS/VACSCO-VALSIT. Also see: [018] ABILAS-PICENG/VACMEM/VACSCO-ARNLAT

▶ [**021**] Arctostaphylos uva-ursi+* 2 Arnica mollis+* Calamagrostis rubescens+* 2 Ceanothus velutinus* Chamaenerion angustifolium* Eucephalus ledophyllus+* 2 Paxistima myrsinites 7 Pseudotsuga menziesii 2 Rhododendron albiflorum* [**keep**] Antennaria lanata+* Erigeron** Festuca viridula 2 Juncus parryi+*** Larix lyallii 2 Pedicularis racemosa 2 Phlox diffusa* Senecio integerrimus* Vaccinium scoparium+* 7
▶ [**097**] Anemone occidentalis+* Antennaria lanata+ 2 Arnica latifolia+* Cassiope mertensiana* Larix lyallii* Luetkea pectinata* 2 Luzula hitchcockii+ 2 Phyllodoce empetriformis* Picea engelmannii 2 Vaccinium deliciosum* 3 Valeriana sitchensis* Veratrum viride* [**keep**] SHRB* Achillea millefolium*** Agoseris* Castilleja miniata* Lomatium brandegeei+* Paxistima myrsinites** 2 Penstemon procerus+* Pinus albicaulis 8 Sedum lanceolatum+* Vaccinium membranaceum*
▶ [**117**] Arnica mollis+* Eriogonum umbellatum* Erythronium montanum+* 2 Hieracium albiflorum* Lewisia** Picea engelmannii 2 Salix scouleriana 2 Sorbus sitchensis* [**keep**] Erigeron* Larix lyallii 2 Pedicularis racemosa 2 Penstemon procerus+* Vaccinium scoparium+*** 2
▶ [**118**] Arctostaphylos uva-ursi+ 2 Juniperus communis* Lewisia** Tsuga mertensiana** 2 Vaccinium deliciosum 3 [**keep**] Agoseris*** Antennaria lanata+* Erigeron* Larix lyallii 2 Lupinus latifolius* 2 Pedicularis racemosa 2 Vaccinium scoparium+** 4
▶ [**214**] Anemone occidentalis+*** Arnica latifolia+ 2 Hieracium albiflorum* Hieracium triste 2 Luetkea pectinata* 2 Packera 2 Poa cusickii+* Potentilla flabellifolia+*** Sedum lanceolatum+ 2 Silene parryi* Trisetum* [**keep**] C-LT5 4 C-GT5** 2 SHRB* 3 Abies lasiocarpa 2 Castilleja miniata* Larix lyallii 2 Lomatium brandegeei+*** Paxistima myrsinites* Pedicularis racemosa 2 Penstemon procerus+* Pinus albicaulis 2 Vaccinium membranaceum**

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus albicaulis 19, Abies lasiocarpa 15	Vaccinium membranaceum 6	Vaccinium scoparium+ 25, Paxistima myrsinites 4, Lupinus latifolius 3, Eremogone capillaris 3, Erigeron 2	Festuca viridula 5
80-95			Penstemon procerus+ 2, Senecio integerrimus 1	
60-80			Phlox diffusa 2, Lomatium brandegeei+ 2, Antennaria lanata+ 1, Castilleja miniata 0, Agoseris 0	Juncus parryi+ 2
40-60	Larix lyallii 5, Picea engelmannii 1		Juniperus communis 3, Hieracium triste 1, Arnica cordifolia 1, Achillea millefolium 1, Hieracium scouleri+ 0, Sedum lanceolatum+ 0	Luzula hitchcockii+ 1
25-40	Pseudotsuga menziesii 1	Salix scouleriana 1	Pedicularis racemosa 4, Eriogonum pyrolifolium 2, Ligusticum 1, Phyllodoce empetriformis 1, Arctostaphylos uva-ursi+ 1, Veronica cusickii+ 1, Pedicularis bracteosa 1, Packera 1	Carex geyeri+ 2
10-25		Rhododendron groenlandicum 40, Rhododendron albiflorum 1, Dasiphora fruticosa 1	Vaccinium cespitosum 5, Chamaenerion angustifolium 3, Vaccinium deliciosum 2, Osmorhiza 1, Arnica latifolia+ 1, Viola orbiculata+ 1, Anaphalis margaritacea 1, Fragaria virginiana 1, Phacelia 1	Trisetum 1, moss 1

{117} Pinus albicaulis, Festuca viridula, Eremogone capillaris
Whitebark pine, green fescue & mountain sandwort woodland
PINALB/FESVIR-ARECAP



Range: Upper subalpine zone. **NOCA**-12: **s*** 1930-2150m.

Struct: Open conifer woodland or tree islands (short stature), with substantial conifer regen, abundant forbs, and substantial grasses, shrubs & dwarf shrubs. Avg vasc cover 80: forb 21, conif tree 15, conif regen 14, grass 10, dwf shrb 8, shrb 0.75 @ 9, rush 0.75 @ 4, tall shrb 0.38 @ 2.

Ecology: South-facing upper slopes in parklands. Regen codominated by *Pinus albicaulis* and *Abies lasiocarpa*.

Metrics: slope 19-28°, vdp 146-223m, vdr 930-1397m, east 24-61, south 87-99, conv 58-69, tpp 68-88, solar 86-93, wet 2-3

Map class: C25–N Casc subalpine fir & whitebark pine wdlnd

Rel to C09: Evolved from PINALB/FESVIR.

Similar: N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MN:[118] PINALB/JUNCOM, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MN:[102] PAXMYR/PHLDIF, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, MNO:[030] ABILAS/VACMEM/LUPARC, N:[097] LARLYA/LUZGLA, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), MN:[092] FESVIR-PHLDIF-ARECAP, MN:[214] VACSCO-FESVIR-ARECAP.

▶ [**019**] Carex spectabilis+ 2 Eucephalus ledophyllus+* Ligusticum* Lupinus latifolius 3 Polemonium pulcherrimum* Rainiera stricta 2 Vaccinium scoparium+ 2 Valeriana sitchensis** 2 [**keep**] SHRB* 3 Eremogone capillaris*** 2 Erythronium montanum+ 2 Juncus parryi+** 2 Lomatium brandegeei+** Paxistima myrsinites* Picea engelmannii 2 Sedum lanceolatum+** Senecio integerrimus** Vaccinium membranaceum** 2

▶ [**021**] Arctostaphylos uva-ursi+ 2 Arnica cordifolia*** Calamagrostis rubescens+** 2 Carex geyeri+* Ceanothus velutinus* Chamaenerion angustifolium* Eucephalus ledophyllus+* Pseudotsuga menziesii 2 Rhododendron albiflorum* Vaccinium scoparium+* 2 [**keep**] Achillea millefolium* Antennaria lanata+* Erigeron* Eriogonum pyrolifolium** Erythronium montanum+ 2 Festuca viridula 2 Juncus parryi+*** 2 Phlox diffusa* 2 Picea engelmannii 2 Senecio integerrimus*

▶ [**102**] Arctostaphylos uva-ursi+ 2 Castilleja miniata* Heuchera cylindrica* Lewisia 2 Vaccinium deliciosum* 2 [**keep**] C-LT5 4 C-GT5* 4 Abies lasiocarpa 4 Eriogonum pyrolifolium*** Hieracium triste* Larix lyallii** Luzula hitchcockii+* Packera** Picea engelmannii 2 Pinus albicaulis* 2 Salix scouleriana 2

▶ [**116**] Erigeron* Larix lyallii 2 Pedicularis racemosa 2 Penstemon procerus+* Vaccinium scoparium+*** 2 [**keep**] Arnica mollis+* Eriogonum umbellatum* Erythronium montanum+* 2 Hieracium albiflorum* Lewisia** Picea engelmannii 2 Salix scouleriana 2 Sorbus sitchensis*

▶ [**118**] Arctostaphylos uva-ursi+ 2 Arnica cordifolia** Carex geyeri+** Juniperus communis** Penstemon procerus+** Phyllodoce empetriformis** Tsuga mertensiana*** 2 Vaccinium deliciosum* 2 [**keep**] Achillea millefolium*** Agoseris*** Arnica mollis+*** Eremogone capillaris 2 Erythronium montanum+* Festuca viridula 5 Hieracium scouleri+* Hieracium triste** Juncus parryi+ 2 Lupinus latifolius* Packera* Picea engelmannii 2 Salix scouleriana* 2 Veronica cusickii+***

Floristics (8 plots, NOCA 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus albicaulis 16, Abies lasiocarpa 11		Eremogone capillaris 5, Lupinus latifolius 2	Festuca viridula 10
80-95			Achillea millefolium 1	
60-80		Vaccinium membranaceum 9	Paxistima myrsinites 10, Phlox diffusa 5, Lomatium brandegeei+ 2, Senecio integerrimus 2, Hieracium scouleri+ 1, Sedum lanceolatum+ 0	Juncus parryi+ 4
40-60			Erigeron 2, Arctostaphylos uva-ursi+ 1, Eriogonum pyrolifolium 1, Antennaria lanata+ 0, Castilleja miniata 0	
25-40	Picea engelmannii 5, Pseudotsuga menziesii 1, Larix lyallii 0	Salix scouleriana 3, Sorbus sitchensis 0	Erythronium montanum+ 4, Penstemon procerus+ 2, Hieracium albiflorum 2, Veronica cusickii+ 2, Agoseris 2, Eriogonum umbellatum 1, Packera 1, Arnica mollis+ 1, Vaccinium cespitosum 1, Lewisia 0, Juniperus communis 0, Hieracium triste 0, Pedicularis racemosa 0, Pedicularis bracteosa 0	Luzula hitchcockii+ 1
10-25			Eucephalus ledophyllus+ 2, Vaccinium scoparium+ 1, Vaccinium deliciosum 1	Selaginella wallacei+ 10, Poa cusickii+ 1

{118} Pinus albicaulis, Juniperus communis*
Whitebark pine & common juniper* woodland
PINALB/JUNCOM



Range: Upper subalpine zone. **MORA**-2: (ne) 2070-2080m. **NOCA**-17: **s*** (ne-ce) 1960-2180m. Primarily east of the Cascade crest.

Struct: Open conifer woodland (short stature) with abundant conifer regen, substantial dwarf shrubs & forbs, and prominent grasses. Avg vasc cover 65: conif regen 25, dwf shrb 13, conif tree 13, forb 7, grass 0.93 @ 3, rush 0.8 @ 1, shrb 0.67 @ 5.

Ecology: Steep and rocky upper slopes and ridgetops with southwesterly aspects. Regen codominated by *Abies lasiocarpa* and *Pinus albicaulis*. Despite the association name, *A. lasiocarpa* is typically dominant in NCCN plots; some plots have only trace amounts of *P. albicaulis*, but are clear best floristic fits here.

Metrics: slope 33-39°, vdp 165-389m, vdr 1028-1341m, east 10-36, south 76-97, conv 60-79, tpp 79-96, solar 79-93, wet 1-2

Map class: C25–N Casc subalpine fir & whitebark pine wdlnd

Rel to C09: Same, though *Abies lasiocarpa* codominates in NCCN plots and there is more *Paxistima myrsinites* than *Juniperus communis*.

Similar: N:[117] PINALB/FESVIR-ARECAP, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, M:[019] ABILAS-(PINALB)/FESVIR-LUPARC, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, MN:[102] PAXMYR/PHLDIF, MNO:[030] ABILAS/VACMEM/LUPARC, N:[097] LARLYA/LUZGLA, O:[024] ABILAS/POLPUL-PEDRAC, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR.

▶ [**019**] Carex spectabilis+ 2 Eucephalus ledophyllus+** 2 Ligusticum*** Lupinus latifolius* 2 Polemonium pulcherrimum*** Rainiera stricta 2 Valeriana sitchensis* 2 [**keep**] SHRB* Arctostaphylos uva-ursi+ 2 Eremogone capillaris*** Juncus parryi+** Juniperus communis* Lewisia** Lomatium brandegeei+** Paxistima myrsinites** Penstemon procerus+** Sedum lanceolatum+** Tsuga mertensiana 2 Vaccinium deliciosum 2 Vaccinium membranaceum** 2

▶ [**020**] Achillea millefolium* Callitropsis nootkatensis** 2 Lupinus latifolius 2 Micranthes tolmiei+** [**keep**] C-GT5* SHRB* 2 Arctostaphylos uva-ursi+ 2 Eremogone capillaris*** Festuca viridula** Juncus parryi+* Lewisia*** Lomatium brandegeei+*** Paxistima myrsinites* 3 Penstemon procerus+* Pinus albicaulis* 4 Sedum lanceolatum+** Vaccinium deliciosum 2 Vaccinium membranaceum* 2

▶ [**021**] SHRB 9 Agoseris*** Arnica mollis+*** Calamagrostis rubescens+** 2 Ceanothus velutinus*** Eucephalus ledophyllus+* 2 Lupinus latifolius* Pseudotsuga menziesii* 2 Rhododendron albiflorum*** Salix scouleriana* Vaccinium membranaceum 9 Vaccinium scoparium+* [**keep**] Juncus parryi+*** Juniperus communis* Lewisia** Penstemon procerus+* Phlox diffusa* Tsuga mertensiana 2 Vaccinium deliciosum 2

▶ [**116**] Agoseris*** Antennaria lanata+* Erigeron* Larix lyallii 2 Lupinus latifolius* 2 Pedicularis racemosa 2 Vaccinium scoparium+** 4 [**keep**] Arctostaphylos uva-ursi+ 2 Juniperus communis* Lewisia** Tsuga mertensiana** 2 Vaccinium deliciosum 3

▶ [**117**] Achillea millefolium*** Agoseris*** Arnica mollis+*** Eremogone capillaris 2 Erythronium montanum+* Festuca viridula 5 Hieracium scouleri+* Hieracium triste** Juncus parryi+ 2 Lupinus latifolius* Packera* Picea engelmannii 2 Salix scouleriana* 2 Veronica cusickii+*** [**keep**] Arctostaphylos uva-ursi+ 2 Arnica cordifolia** Carex geyeri+** Juniperus communis** Penstemon procerus+** Phyllodoce empetriformis** Tsuga mertensiana*** 2 Vaccinium deliciosum* 2

Floristics (15 plots, NOCA 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 21, Pinus albicaulis 14			
80-95			Paxistima myrsinites 6, Phlox diffusa 2, Juniperus communis 2, Penstemon procerus+ 1, Eremogone capillaris 1	
60-80		Vaccinium membranaceum 5	Lewisia 0, Lomatium brandegeei+ 0, Sedum lanceolatum+ 0	Festuca viridula 3, Juncus parryi+ 1
40-60	Tsuga mertensiana 3		Vaccinium deliciosum 7, Senecio integerrimus 0, Lupinus latifolius 0, Eriogonum umbellatum 0, Castilleja miniata 0	Luzula hitchcockii+ 0
25-40	Larix lyallii 1, Picea engelmannii 1		Arctostaphylos uva-ursi+ 7, Phyllodoce empetriformis 1, Arnica cordifolia 0, Eriogonum pyrolifolium 0, Antennaria lanata+ 0, Chamaenerion angustifolium 0, Erigeron 0	moss 3, Carex geyeri+ 1, Poa cusickii+ 0
10-25	Pseudotsuga menziesii 1		Vaccinium scoparium+ 2, Hieracium scouleri+ 1, Valeriana sitchensis 1, Pedicularis racemosa 1, Achillea millefolium 1, Eucephalus ledophyllus+ 1	Selaginella wallacei+ 1

{119} Pinus contorta, Paxistima myrsinites, Calamagrostis rubescens
Lodgepole pine, Oregon-box & pinegrass forest
PINCON/PAXMYR/CALRUB



Range: Lower montane and lowland zones. **NOCA**-6: **ne** (s) 690-940m.

Struct: Conifer woodland with substantial conifer regen, abundant dwarf shrubs, and substantial grasses & shrubs. Avg vasc cover 78: dwf shrb 22, grass 10, conif regen 8, shrb 5, forb 3, conif tree 0.83 @ 32, tall shrb 0.83 @ 4, fern 0.33 @ 3.

Ecology: Fairly gentle slopes. Regen usually dominated by scant *Pseudotsuga menziesii*, but younger stands may have substantial short *Pinus contorta*.

Metrics: slope 15-20°, vdp 14-95m, vdr 177-357m, east 9-48, south 43-99, conv 48-60, tpp 26-61, solar 58-75, wet 3

Map class: C15–Lodgepole pine & Douglas-fir woodland

Rel to C09: Same, adding plots from PSEMEN/PAXMYR-SPIBET.

Similar: MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[143] PSEMEN-PINCON/ARCNEV, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[121] PINCON/VACMEM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, N:[061] ARCNEV-PAXMYR/CALRUB, O:[023] ABILAS-(PINCON)/LUPARC, N:[145] PSEMEN-PINPON/ARCNEV, N:[142] PSEMEN/PAXMYR-SPIBET, MNO:[103] PENDAV/RACOMITRIUM.

▶ [**064**] Achillea millefolium* 2 Amelanchier alnifolia* Arctostaphylos uva-ursi+ 6 Collinsia parviflora* Cryptogramma acrostichoides* Fragaria virginiana*** Holodiscus discolor 2 Luzula hitchcockii+* Penstemon procerus+ 2 Selaginella wallacei+* 2 Woodsia*** [**keep**] C-LT5* C-GT5 5 SHRB* Calamagrostis rubescens+** Ceanothus velutinus*** 2 Paxistima myrsinites 2 Pinus contorta* 4 Pseudotsuga menziesii 4 Salix scouleriana* Spiraea lucida 2

▶ [**078**] SHRB 9 Acer macrophyllum* Amelanchier alnifolia 2 Antennaria racemosa+* Cacaliopsis nardosmia* Ceanothus velutinus 8 Chamaenerion angustifolium 2 Collomia* Eucephalus ledophyllus+* Prunus emarginata 2 Salix scouleriana 3 Sorbus scopulina* [**keep**] C-GT5 6 Arctostaphylos uva-ursi+* Berberis nervosa* Chimaphila umbellata** Erythronium montanum+* Lysimachia latifolia** Pinus contorta** 6 Pseudotsuga menziesii 5 Racomitrium*** 2 Rosa* Shepherdia canadensis**

▶ [**121**] SHRB 9 Abies lasiocarpa*** 2 Alnus viridis 2 Amelanchier alnifolia 2 Arctostaphylos uva-ursi+ 6 Vaccinium membranaceum* 5 [**keep**] Achillea millefolium* Ceanothus velutinus* 2 Chamaenerion angustifolium* Erythronium montanum+* Holodiscus discolor** Lupinus latifolius* Lysimachia latifolia* Rosa* Rubus nutkanus* Shepherdia canadensis*

▶ [**143**] Abies lasiocarpa*** 2 Arctostaphylos uva-ursi+ 6 Pinus monticola** 2 Sorbus scopulina** Vaccinium membranaceum* [**keep**] Achillea millefolium** Berberis nervosa* Ceanothus velutinus* Holodiscus discolor** Lysimachia latifolia** Racomitrium* Rosa* Rubus nutkanus** Shepherdia canadensis** Spiraea lucida* 3

▶ [**144**] Arctostaphylos uva-ursi+ 6 Festuca occidentalis+* Holodiscus discolor 2 Pinus monticola* Thuja plicata* Tsuga heterophylla 2 [**keep**] Achillea millefolium* Calamagrostis rubescens+* Ceanothus velutinus*** 2 Chamaenerion angustifolium* Erythronium montanum+* Hieracium scouleri+** Lysimachia latifolia* Paxistima myrsinites 4 Rubus nutkanus** Salix scouleriana* Shepherdia canadensis* Spiraea lucida 2

Floristics (6 plots, NOCA 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus contorta 23		Paxistima myrsinites 12, Arctostaphylos uva-ursi+ 4	Calamagrostis rubescens+ 9
80-95	Pseudotsuga menziesii 13	Salix scouleriana 2	Spiraea lucida 7	
60-80		Ceanothus velutinus 4		moss 12
40-60		Holodiscus discolor 0	Hieracium albiflorum 1	Racomitrium 14
25-40		Vaccinium membranaceum 2, Rubus nutkanus 1, Shepherdia canadensis 1, Rosa 0, Amelanchier alnifolia 0	Berberis nervosa 2, Apocynum androsaemifolium 1, Chimaphila umbellata 1, Erythronium montanum+ 0, Lysimachia latifolia 0, Lupinus latifolius 0, Chamaenerion angustifolium 0, Hieracium scouleri+ 0, Achillea millefolium 0	
10-25	Pinus ponderosa 2, Tsuga heterophylla 1	Acer circinatum 8, Gaultheria shallon 5, Prunus emarginata 1	Lomatium nudicaule+ 10, Castilleja hispida 1, Moehringia macrophylla 1	Pteridium aquilinum 5, Danthonia 2, Carex geyeri+ 1

{120} Pinus contorta, Pseudotsuga menziesii, Gaultheria shallon
Lodgepole pine, Douglas-fir & salal forest
PINCON-PSEMEN/GAUSHA



Range: Lowland zone. **NOCA**-16: **ne*** (nw-cw-ce) 480-700m. **OLYM**-13: **ne-se** (sc) 600-660m.

Struct: Open conifer forest (19-21m) with substantial conifer regen, very dense shrubs, and substantial dwarf shrubs. Avg vasc cover 123: shrb 58, conif tree 40, conif regen 15, dwf shrb 0.8 @ 6, forb 0.76 @ 3, fern 0.32 @ 7, grass 0.12 @ 2.

Ecology: Gentle slopes, on dry, shallow and nutrient-poor soil. These are mid-seral forests in fire-prone rain shadow landscapes; they may represent a persistent fire-maintained stage of [137] PSEMEN/GAUSHA-MAHNER. Standing dead *Pinus contorta* can be abundant. Regen a mix of *Pseudotsuga menziesii*, *Pinus monticola*, and smaller amounts of *Pinus contorta* and *Tsuga heterophylla*.

Metrics: slope 5-17°, vdp 14-97m, vdr 93-190m, east 7-48, south 36-87, conv 51-60, tpp 41-59, solar 60-68, wet 3-4

Map class: C15–Lodgepole pine & Douglas-fir woodland

Rel to C09: Same.

Similar: MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, MNO:[137] PSEMEN/GAUSHA-MAHNER, N:[143] PSEMEN-PINCON/ARCNEV, N:[119] PINCON/PAXMYR/CALRUB, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER.

▶ [**119**] Achillea millefolium** Calamagrostis rubescens+** 5 Ceanothus velutinus*** 2 Chamaenerion angustifolium** Erythronium montanum+** Hieracium scouleri+** Holodiscus discolor* Lysimachia latifolia* Paxistima myrsinites 2 Rubus nutkanus* Shepherdia canadensis** Spiraea lucida 2 [**keep**] SHRB 9 Gaultheria shallon* 9 Pinus monticola* 2 Tsuga heterophylla* 2 Vaccinium parvifolium*
▶ [**137**] Acer glabrum** 2 Achlys triphylla*** Berberis nervosa* 4 Chimaphila menziesii** Festuca occidentalis+*** Goodyera oblongifolia*** Linnaea borealis* Lysimachia latifolia** Polystichum munitum 2 Pseudotsuga menziesii 26 Rosa* Taxus brevifolia*** 2 [**keep**] Pinus contorta*** 3 Pteridium aquilinum 3.
▶ [**143**] TSHRB* Abies lasiocarpa*** 2 Amelanchier alnifolia* Arctostaphylos uva-ursi+* 8 Calamagrostis rubescens+** Hieracium scouleri+*** Paxistima myrsinites* 2 Salix scouleriana* Vaccinium membranaceum* [**keep**] SHRB 11 Gaultheria shallon*** 2 Pinus monticola 5 Pteridium aquilinum 2 Tsuga heterophylla** 2 Vaccinium parvifolium**
▶ [**144**] Amelanchier alnifolia* Arctostaphylos uva-ursi+* 7 Calamagrostis rubescens+* Cryptogramma acrostichoides** Festuca occidentalis+** Goodyera oblongifolia*** Hieracium albiflorum* Holodiscus discolor* 2 Penstemon procerus+** Racomitrium* [**keep**] SHRB 13 Gaultheria shallon* 7 Pinus monticola 2 Pyrola picta* Vaccinium parvifolium*
▶ [**158**] TSHRB* 3 Acer circinatum 2 Linnaea borealis 2 Rhododendron macrophyllum*** 2 Tsuga heterophylla* 8 Vaccinium parvifolium 3 [**keep**] Pinus contorta** 2

Floristics (25 plots, NOCA 14, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus contorta 28, Pseudotsuga menziesii 17	Gaultheria shallon 54		
80-95				moss 16
60-80				lichen 18
40-60	Pinus monticola 13, Tsuga heterophylla 5	Vaccinium membranaceum 4, Vaccinium parvifolium 2	Spiraea lucida 1, Paxistima myrsinites 1, Pyrola picta 1	
25-40		Salix scouleriana 1	Arctostaphylos uva-ursi+ 4, Berberis nervosa 2, Hieracium albiflorum 1, Chimaphila umbellata 1	Pteridium aquilinum 8
10-25	Thuja plicata 6	Rosa 2, Acer circinatum 1	Gaultheria ovatifolia 4, Lupinus latifolius 4, Apocynum androsaemifolium 1, Linnaea borealis 1	Racomitrium 7

{121} Pinus contorta, Vaccinium membranaceum
Lodgepole pine & big huckleberry woodland
PINCON/VACMEM



Range: Lower and upper montane zones. **NOCA**-9: **s*** (ce) 940-1530m.

Struct: Conifer woodland with substantial conifer regen, dense shrubs, abundant dwarf shrubs, and substantial tall shrubs. Avg vasc cover 105: shrb 33, conif tree 25, dwf shrb 23, conif regen 9, tall shrb 8, grass 5, forb 2.

Ecology: Seral forests on gentle slopes, on dry and rocky soils. May develop into [026] ABILAS-(PSEMEN)/VACMEM/CALRUB. There may be many standing dead *Pinus contorta*. Regen usually dominated by *Abies lasiocarpa* with smaller amounts of *Pseudotsuga menziesii*; younger stands may have substantial short *Pinus contorta*.

Metrics: slope 3-27°, vdp 6-47m, vdr 62-576m, east 1-48, south 48-75, conv 46-56, tpp 12-33, solar 60-65, wet 3-4

Map class: C15–Lodgepole pine & Douglas-fir woodland

Rel to C09: Same.

Similar: N:[143] PSEMEN-PINCON/ARCNEV, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[161] PSEMEN/VACMEM, N:[119] PINCON/PAXMYR/CALRUB, O:[023] ABILAS-(PINCON)/LUPARC, MNO:[030] ABILAS/VACMEM/LUPARC, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), N:[078] CEAVEL-(SPIBET)/CALRUB, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR.

▶ [**026**] FORB 4 Abies amabilis*** 2 Abies lasiocarpa 9 Arnica cordifolia*** Eucephalus ledophyllus+*** Goodyera oblongifolia** Moehringia macrophylla*** Orthilia secunda* Pedicularis racemosa* Picea engelmannii* 2 Pinus monticola* [**keep**] Amelanchier alnifolia 2 Arctostaphylos uva-ursi+ 6 Pinus contorta** 4 Racomitrium 2 Salix scouleriana*
▶ [**119**] Achillea millefolium* Ceanothus velutinus* 2 Chamaenerion angustifolium* Erythronium montanum+* Holodiscus discolor** Lupinus latifolius* Lysimachia latifolia* Rosa* Rubus nutkanus* Shepherdia canadensis* [**keep**] SHRB 9 Abies lasiocarpa*** 2 Alnus viridis 2 Amelanchier alnifolia 2 Arctostaphylos uva-ursi+ 6 Vaccinium membranaceum* 5
▶ [**143**] Carex geyeri+* Juniperus communis* Lupinus latifolius* Pinus monticola 2 [**keep**] SHRB 11 TSHRB 3 Alnus viridis** 2 Amelanchier alnifolia 2 Orthilia secunda** Rubus lasiococcus*** Vaccinium membranaceum 11
▶ [**144**] Cryptogramma acrostichoides* Festuca occidentalis+* Gaultheria shallon* 2 Holodiscus discolor* 2 Linnaea borealis* Penstemon procerus+* Pseudotsuga menziesii 13 Rosa* Spiraea lucida* Thuja plicata* Tsuga heterophylla* 2 [**keep**] SHRB 12 TSHRB 4 Abies lasiocarpa** Alnus viridis* 2 Amelanchier alnifolia 2 Calamagrostis rubescens+* Hieracium scouleri+** Lomatium brandegeei+** Paxistima myrsinites 4 Pedicularis racemosa* Rubus lasiococcus*** Salix scouleriana* Sorbus scopulina* Vaccinium membranaceum 6
▶ [**161**] FORB 4 Abies amabilis** Acer glabrum 2 Adenocaulon bicolor 2 Chamaenerion angustifolium** Clintonia uniflora* Eucephalus ledophyllus+** Goodyera oblongifolia* Maianthemum racemosum*** Osmorhiza* Pseudotsuga menziesii 13 Pteridium aquilinum* Rhododendron albiflorum 2 Rosa* Rubus nutkanus* 2 [**keep**] Alnus viridis 2 Arctostaphylos uva-ursi+* 4 Hieracium scouleri+*** Lomatium brandegeei+* Pinus contorta* 3 Racomitrium*** 2

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pinus contorta 21	Vaccinium membranaceum 32, Salix scouleriana 3	Paxistima myrsinites 8	
80-95	Pseudotsuga menziesii 8, Abies lasiocarpa 6			Calamagrostis rubescens+ 5
60-80		Amelanchier alnifolia 5		
40-60		Sorbus scopulina 2	Arctostaphylos uva-ursi+ 21, Rubus lasiococcus 2, Chimaphila umbellata 1, Hieracium albiflorum 0	lichen 12
25-40	Pinus monticola 1	Alnus viridis 4	Spiraea lucida 4, Lomatium brandegeei+ 1, Orthilia secunda 1, Pedicularis racemosa 1, Hieracium scouleri+ 1	Racomitrium 6
10-25	Abies grandis 4	Rhododendron albiflorum 1, Ceanothus velutinus 1	Linnaea borealis 10, Phyllodoce empetriformis 1, Apocynum androsaemifolium 1	moss 20

{122} Populus trichocarpa, Acer macrophyllum, Acer circinatum, Polystichum munitum
Cottonwood, bigleaf maple, vine maple & sword fern forest
POPBAL-ACEMAC/ACECIR/POLMUN



Range: Lowland zone. **NOCA**-5: (nw-cw) 110-140m. Primarily along the Skagit River.

Struct: Closed broadleaf forest with substantial conifer regen, abundant ferns, tall shrubs & shrubs, and substantial forbs. Avg vasc cover 167: brdlf tree 62, fern 30, tall shrb 24, shrb 17, conif tree 13, forb 13, conif regen 0.8 @ 8, dwf shrb 0.8 @ 2.

Ecology: Seral forests recovering from past logging, found at NOCA on nearly flat sites on riparian terraces. Regen usually dominated by *Tsuga heterophylla* with smaller amounts of *Thuja plicata*.

Metrics: slope 0-4°, vdp 1-2m, vdr 2-4m, east 34-56, south 5-63, conv 48-50, tpp 11-14, solar 54-56, wet 8-9

Map class: B33–Upland red alder, bigleaf maple & conifer forest

Rel to C09: A new assn created by NOCA field crews, joined by one plot each originally assigned to ACEMAC/POLMUN-TOLMEN, BETPAP-(THUPLI)/ACECIR/MAHNER and PSEMEN-PINPON-POPBAL/ACECIR.

Similar: MNO:[044] ACEMAC/RUBSPE/TOLMEN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, NO:[041] ACEMAC/POLMUN-TOLMEN, O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, N:[126] POPBAL/CORSER, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL.

▶ [**041**] B-LT5 2 Adiantum aleuticum 2 Bromus vulgaris+* Carex deweyana+* Claytonia sibirica+* Dactylis glomerata* 2 Equisetum arvense+ 2 Galium* 2 Geranium robertianum* Hydrophyllum tenuipes* Stachys cooleyae 2 Viola glabella+* [**keep**] SHRB 8 Athyrium filix-femina* Gymnocarpium dryopteris*** Oemleria cerasiformis** 2 Populus trichocarpa** Ribes lacustre*** Sambucus racemosa*** Symphoricarpos albus* Thuja plicata* Tsuga heterophylla* 4
▶ [**042**] Frangula purshiana 2 Vaccinium parvifolium* [**keep**] SHRB 5 Athyrium filix-femina* Gymnocarpium dryopteris*** Oemleria cerasiformis** Populus trichocarpa** Ribes lacustre* Rubus spectabilis* Sambucus racemosa* Symphoricarpos albus*** 2 Tolmiea menziesii*
▶ [**044**] B-LT5* 2 Carex deweyana+ 2 Claytonia sibirica+* Elymus 2 Galium* Rubus spectabilis 11 Sambucus racemosa 2 Viola glabella+** 2 [**keep**] Corylus cornuta** Dryopteris* Lysimachia latifolia** Oemleria cerasiformis* 2 Polystichum munitum 9 Populus trichocarpa** 8 Ribes lacustre** Rubus ursinus* Symphoricarpos albus*** 2
▶ [**052**] B-LT5 2 Acer glabrum* Adiantum aleuticum* Alnus rubra 17 Asarum caudatum* Claytonia sibirica+* 2 Dicentra formosa* Galium* Mitella* 2 Oplopanax horridus* Sambucus racemosa 2 Vaccinium parvifolium* [**keep**] Oemleria cerasiformis*** 2 Populus trichocarpa*** 2 Symphoricarpos albus*** 2 Thuja plicata*
▶ [**124**] Abies amabilis* 2 Abies grandis 2 Asarum caudatum* Cornus stolonifera/occidentalis 2 Galium* Maianthemum stellatum* 2 Oplopanax horridus* 2 Osmorhiza* Rosa* Tiarella trifoliata* Viola glabella+** [**keep**] Acer macrophyllum** 2 Oemleria cerasiformis*** 2 Polystichum munitum 11 Symphoricarpos albus** 2 Tolmiea menziesii 2

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Populus trichocarpa 28, Acer macrophyllum 18, Alnus rubra 10, Tsuga heterophylla 10, Thuja plicata 7	Acer circinatum 19, Symphoricarpos albus 7, Rubus spectabilis 7, Oemleria cerasiformis 4		Polystichum munitum 23, moss 9
80-95		Ribes lacustre 3, Sambucus racemosa 1	Tolmiea menziesii 9, Circaea alpina 6, Lactuca 0	Athyrium filix-femina 6, Gymnocarpium dryopteris 1
60-80		Corylus cornuta 1	Rubus ursinus 2, Lysimachia latifolia 1	Dryopteris 2
40-60	Pseudotsuga menziesii 6	Rubus nutkanus 2		
10-25	Betula papyrifera 30		Berberis nervosa 2, Claytonia sibirica+ 1	

{123} Populus trichocarpa, Alnus rubra, Carex obnupta
Cottonwood, red alder & slough sedge forest
POPBAL-ALNRUB/CAROBN



Range: Lowland and coastal zones, on valley bottoms. **OLYM**-4: **sw** (se) 30-220m.

Struct: Open broadleaf forest (33-48m) with substantial mixed conifer-broadleaf regen, dense grasses & forbs, and abundant sedges & shrubs. Avg vasc cover 166: grass 39, forb 37, brdlf tree 36, shrb 16, sedge 0.75 @ 27, conif tree 0.75 @ 10, conif regen 0.75 @ 6, fern 0.75 @ 3, brdlf regen 0.5 @ 4, rush 0.5 @ 2, dwf shrb 0.25 @ 3.

Ecology: Nearly flat sites on floodplains and riparian terraces with highly variable water table depth, on rich soils. Regen dominated by *Picea sitchensis*, often with smaller amounts of *Alnus rubra*.

Metrics: slope 1-2°, vdp 1-4m, vdr 1-4m, east 11-95, south 47-61, conv 48-50, tpp 11-17, solar 58-59, wet 8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same.

Similar: O:[047] ALNRUB/ELYGLA, O:[127] POPBAL-PICSIT-(ACEMAC)/OXAORE, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, MO:[054] ALNRUB/STACHA-TOLMEN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[125] POPBAL-(ALNRUB)/SALSIT, MNO:[046] ALNRUB/ATHFIL-LYSAME, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, O:[049] ALNRUB-PICSIT/POLMUN-(HERMAX).

▶ [**047**] Acer circinatum 2 Bromus sitchensis 2 Claytonia sibirica+* 2 Galium 2 Rubus ursinus* Stachys cooleyae* Tolmiea menziesii 2 [**keep**] Carex deweyana+ 2 Carex obnupta+*** 2 Cirsium arvense+*** Fragaria vesca 2 Oxalis oregana* Populus trichocarpa* Rumex acetosella+*** Rumex occidentalis 2 Veratrum viride 2
▶ [**050**] TSHRB* 2 Acer circinatum* 2 Circaea alpina 2 Oxalis oregana 4 Polystichum munitum 4 Tolmiea menziesii 2 Tsuga heterophylla* [**keep**] Agrostis** 2 Carex obnupta+* Cirsium arvense+*** Fragaria vesca 2 Lactuca* Plantago lanceolata** Populus trichocarpa*** 2 Rubus laciniatus** Rumex acetosella+*** Senecio triangularis+** Symphoricarpos albus** 2 Veratrum viride 2
▶ [**051**] TSHRB 2 Acer circinatum* 2 Acer macrophyllum 5 Bromus vulgaris+ 2 Rubus laciniatus 2 Stachys cooleyae 2 [**keep**] Carex deweyana+ 2 Cirsium arvense+** Fragaria vesca 2 Plantago lanceolata* Poa cusickii+ 2 Populus trichocarpa* 2 Rumex occidentalis 2 Senecio triangularis+* Symphoricarpos albus*
▶ [**054**] Athyrium filix-femina 2 Circaea alpina* 2 Claytonia sibirica+* 2 Stachys cooleyae* 2 Tolmiea menziesii* 2 [**keep**] Agrostis* 5 Carex deweyana+ 4 Carex obnupta+* 2 Cirsium arvense+* Elymus* Fragaria vesca 2 Plantago lanceolata** Populus trichocarpa*** 2 Rubus laciniatus* Rumex acetosella+** Senecio triangularis+** Symphoricarpos albus**
▶ [**127**] TSHRB* 2 Acer circinatum** 2 Acer macrophyllum* 5 Bromus vulgaris+ 2 Claytonia sibirica+ 2 Polystichum munitum 4 Tolmiea menziesii* [**keep**] Agrostis 10 Carex obnupta+* Cirsium arvense+*** Elymus* 7 Fragaria vesca 2 Lactuca* Plantago lanceolata** Rumex occidentalis 2 Senecio triangularis+** Symphoricarpos albus* 2

Floristics (4 plots, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Alnus rubra 19, Populus trichocarpa 18	Rubus spectabilis 12	Ranunculus repens+ 13	
60-80	Picea sitchensis 15		Rumex acetosella+ 3, Oxalis oregana 2, Cirsium arvense+ 2	Elymus 25, Carex obnupta+ 20, moss 9, Polystichum munitum 2
40-60		Symphoricarpos albus 6, Rubus laciniatus 1	Plantago lanceolata 2, Senecio triangularis+ 1, Lactuca 1	Agrostis 32
25-40	Acer macrophyllum 3, Tsuga heterophylla 2	Rubus leucodermis 3, Frangula purshiana 0	Rumex occidentalis 13, Fragaria vesca 10, Veratrum viride 5, Trifolium repens+ 3, Rubus ursinus 3, Achillea millefolium 2, Stachys cooleyae 1, Galium 1, Mitella 1, Prunella vulgaris 1, Nemophila parviflora 1, Montia 1, Oenanthe sarmentosa 1, Stellaria 1, Tolmiea menziesii 1, Circaea alpina 1, Claytonia sibirica+ 1	Carex deweyana+ 20, Poa cusickii+ 15, Luzula parviflora 2, Juncus mertensianus+ 1, Athyrium filix-femina 1

{124} Populus trichocarpa, Alnus rubra, Ribes lacustre, Athyrium filix-femina, Galium
Cottonwood, red alder, swamp currant, lady fern & bedstraw forest
POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM



Range: Lowland zone, on valley bottoms. **MORA**-2: (sw) 750-760m. **NOCA**-7: **nw**-**ne** (cw-ce) 580-690m.

Struct: Mostly closed mixed broadleaf-conifer forest (28-30m) with substantial conifer regen, abundant forbs, and substantial shrubs, tall shrubs & ferns. Avg vasc cover 148: brdlf tree 47, forb 23, shrb 19, conif tree 17, conif regen 13, tall shrb 0.89 @ 12, fern 0.89 @ 11, brdlf regen 0.56 @ 3, grass 0.56 @ 1, dwf shrb 0.44 @ 9, sedge 0.11 @ 2.

Ecology: Nearly flat sites on floodplains, on well-drained alluvium. Long-term persistence may be dependent on periodic flooding. *Alnus rubra* typically in subcanopy; regen co-dominated by *Thuja plicata* and *Tsuga heterophylla*.

Metrics: slope 1-6°, vdp 1-1m, vdr 1-8m, east 21-76, south 37-91, conv 40-47, tpp 6-43, solar 54-61, wet 7-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Evolved from POPBAL-ALNRUB/RUBSPE, a name created by NOCA field crews. Also incorporates some plots from POPBAL/CORSER and one each from several other C09 types.

Similar: MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME, N:[126] POPBAL/CORSER, MNO:[048] ALNRUB/OPLHOR-RUBSPE, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[044] ACEMAC/RUBSPE/TOLMEN, O:[047] ALNRUB/ELYGLA, MN:[201] TSUHET-THUPLI/LYSAME-ATHFIL.

▶ [**046**] Carex deweyana+* 4 Epilobium* Equisetum hyemale+* Lonicera involucrata* Lysichiton americanus* 2 Maianthemum dilatatum 2 Scirpus microcarpus** 2 Spiraea douglasii* Stachys cooleyae** Struthiopteris spicant 2 Vaccinium parvifolium* Viburnum edule* [**keep**] Acer circinatum* 2 Circaea alpina 2 Maianthemum stellatum** 2 Osmorhiza* Polystichum munitum* Populus trichocarpa** 5 Pseudotsuga menziesii 2 Ribes lacustre* Rubus nutkanus*** Sambucus racemosa*
▶ [**048**] B-LT5 5 Achlys triphylla* Claytonia sibirica+ 5 Corydalis* Heracleum maximum 2 Ribes bracteosum+ 2 Rubus spectabilis 6 Stachys cooleyae* 2 Struthiopteris spicant* Vaccinium ovalifolium* Vaccinium parvifolium* [**keep**] Acer circinatum* Circaea alpina 2 Cornus stolonifera/occidentalis 2 Equisetum arvense+ 2 Galium* Lactuca** Maianthemum stellatum* 2 Osmorhiza* Populus trichocarpa*** 2 Ribes lacustre* Rosa* Rubus nutkanus*
▶ [**052**] Acer circinatum 11 Acer macrophyllum* 2 Adiantum aleuticum* Claytonia sibirica+* Mertensia paniculata* Mitella 2 Polypodium glycyrrhiza* Rubus leucodermis* Rubus spectabilis 6 Stachys cooleyae* Stellaria* Tolmiea menziesii* 2 Vaccinium parvifolium* [**keep**] Abies amabilis 2 Abies grandis 2 Cornus stolonifera/occidentalis 2 Equisetum arvense+ 2 Gymnocarpium dryopteris* Maianthemum stellatum* Osmorhiza** Populus trichocarpa*** 2 Ribes lacustre* Rosa** Rubus nutkanus* Thuja plicata* Viola glabella+*
▶ [**053**] Circaea alpina* Glyceria 2 Ribes bracteosum+* 2 Rubus spectabilis 7 Tolmiea menziesii* 2 Urtica dioica 2 [**keep**] Abies grandis 5 Acer circinatum* Acer glabrum*** Actaea rubra** Amelanchier alnifolia*** Aruncus dioicus* Asarum caudatum** Circaea alpina 5 Lactuca* Osmorhiza* Populus trichocarpa 10 Pseudotsuga menziesii** 2 Ribes lacustre 2 Rosa*
▶ [**126**] TSHRB 20 Abies lasiocarpa** 2 Alnus viridis** Clintonia uniflora** Cornus stolonifera/occidentalis* 12 Lonicera involucrata 2 Paxistima myrsinites* Ribes bracteosum+* Salix sitchensis+** 2 Symphoricarpos albus 2 Thalictrum occidentale** [**keep**] C-LT5 4 Abies amabilis 2 Abies grandis 5 Alnus rubra*** Circaea alpina 4 Gymnocarpium dryopteris** Lactuca* Polystichum munitum* 2 Ribes lacustre** Rosa* Thuja plicata* Tiarella trifoliata* Tsuga heterophylla 3 Viola glabella+***

Floristics (9 plots, MORA 2, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Populus trichocarpa 25, Alnus rubra 23, Thuja plicata 8			
80-95		Rubus spectabilis 4		Athyrium filix-femina 3
60-80	Tsuga heterophylla 8	Ribes lacustre 5, Sambucus racemosa 5, Rubus nutkanus 5	Viola glabella+ 2, Galium 2, Tiarella trifoliata 1, Osmorhiza 0	
40-60	Abies amabilis 11, Pseudotsuga menziesii 8	Acer circinatum 7, Cornus stolonifera/occidentalis 7, Oplopanax horridus 5, Rosa 0	Maianthemum stellatum 7, Dicentra formosa 3, Lactuca 1, Asarum caudatum 1	Polystichum munitum 7, moss 4, Dryopteris 3, Gymnocarpium dryopteris 2
25-40	Abies grandis 21	Acer glabrum 1, Amelanchier alnifolia 0	Circaea alpina 14, Claytonia sibirica+ 3, Aruncus dioicus 0, Actaea rubra 0	Equisetum arvense+ 5
10-25	Pinus monticola 3, Picea engelmannii 2	Gaultheria shallon 16, Vaccinium parvifolium 3	Pyrola asarifolia+ 31, Rubus ursinus 16, Moehringia macrophylla 5, Linnaea borealis 2, Streptopus streptopoides 2	Carex deweyana+ 2

{125} Populus trichocarpa, Alnus rubra*, Salix sitchensis
Cottonwood, red alder* & Sitka willow disturbed forest
POPBAL-(ALNRUB)/SALSIT



Range: Lowland zone, on valley bottoms. **MORA**-1: (sw) 620-630m. **NOCA**-6: **s** (nw-cw-ce) 390-570m. **OLYM**-6: **sw-se** (nw-sc) 40-510m.

Struct: Open tall shrubland or successional forest with substantial grasses & forbs. Avg vasc cover 54: brdlf LT5 15, grass 8, forb 8, tall shrb 0.89 @ 24, conif LT5 0.56 @ 1, dwf shrb 0.11 @ 5, brdlf GT5 0.11 @ 3, conif GT5 0.11 @ 2, sedge 0.11 @ 2.

Ecology: Nearly flat sites on alluvial bars. An early recovery stage from severe flooding, developing later into a variety of deciduous floodplain forest types. A sparse emergent canopy may persist from the prior stand. Woody plants may be scant at very recent flooded sites. Herbaceous plants include invasive exotics and early-colonizing native species, some washed down from higher elevations. Regen codominated by *Alnus rubra* and *Populus trichocarpa*.

Metrics: slope 0-3°, vdp 1-1m, vdr 1-1m, east 15-64, south 7-57, conv 46-50, tpp 6-14, solar 55-60, wet 8-9

Map class: B30–Successional gravel bar shrubland

Rel to C09: Split from SALSIT/EQUARV-PETFRI, adding plots from the NOCA field call POPBAL-(SALSIT-ALNRUB).

Similar: MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[166] SALSIT-(CORSER)/URTDIO, N:[126] POPBAL/CORSER, MNO:[046] ALNRUB/ATHFIL-LYSAME, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, O:[047] ALNRUB/ELYGLA, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[103] PENDAV/RACOMITRIUM, MNO:[070] CARAQU-(MENTRI-EQUISETUM).

▶ [**046**] B-GT5** 6 C-LT5 2 C-GT5** SHRB* 2 Athyrium filix-femina*** 2 Carex deweyana+ 2 Cornus stolonifera/occidentalis** Galium*** Lysichiton americanus*** 2 Oplopanax horridus 2 Rubus spectabilis* Thuja plicata*** Tsuga heterophylla* Viola glabella+** 2 [**keep**] Achillea millefolium* Artemisia* Chamaenerion latifolium** Hypochaeris radicata* 2 Montia* Phacelia* Plantago lanceolata* Populus trichocarpa* 5 Rubus nutkanus* Rumex acetosella+*

▶ [**124**] B-GT5** 6 C-LT5 2 C-GT5** 4 SHRB 2 Abies amabilis 2 Abies grandis 2 Athyrium filix-femina*** Circaea alpina 2 Galium*** Osmorhiza** Ribes lacustre*** Rubus spectabilis* Sambucus racemosa** Thuja plicata*** 2 Tiarella trifoliata** Tsuga heterophylla* 2 Viola glabella+** [**keep**] B-LT5 5 Achillea millefolium* Artemisia* Chamaenerion latifolium** Hypochaeris radicata* 2 Montia* Phacelia* Plantago lanceolata* Rumex acetosella+* Salix sitchensis+** 2

▶ [**126**] B-GT5** 5 C-GT5* SHRB* 2 Acer circinatum*** Acer glabrum** Alnus viridis* Athyrium filix-femina** Cornus stolonifera/occidentalis*** 2 Dicentra formosa 2 Galium** Maianthemum stellatum** 2 Ribes bracteosum+** Rubus spectabilis* 2 Symphoricarpos albus 2 Thuja plicata** [**keep**] B-LT5 5 Achillea millefolium** Alnus rubra* Anaphalis margaritacea** Chamaenerion latifolium** Fragaria virginiana* Hypochaeris radicata** 2 Montia** Phacelia** Plantago lanceolata** Rumex acetosella+**

▶ [**166**] SHRB 2 Abies lasiocarpa 2 Aruncus dioicus** Athyrium filix-femina*** Chamaenerion angustifolium** Cornus stolonifera/occidentalis** 2 Dicentra formosa** Galium** Heracleum maximum** Hydrophyllum fendleri** Ribes bracteosum+*** 2 Rubus spectabilis 2 Sambucus racemosa 2 Tolmiea menziesii*** [**keep**] B-LT5*** 2 Alnus rubra** 3 Artemisia* Fragaria virginiana*** Hypochaeris radicata*** 2 Montia*** Phacelia*** Plantago lanceolata*** Populus trichocarpa* 3 Pseudotsuga menziesii*** Rumex acetosella+***

▶ [**167**] SHRB* 2 Athyrium filix-femina** Carex aquatilis+** 2 Cornus stolonifera/occidentalis** 2 Equisetum arvense+ 2 Lysichiton americanus** 2 Spiraea douglasii*** 2 [**keep**] Achillea millefolium*** Alnus rubra 5 Artemisia*** Chamaenerion latifolium*** Fragaria virginiana*** Hypochaeris radicata*** 2 Montia*** Phacelia*** Plantago lanceolata*** Populus trichocarpa 4 Pseudotsuga menziesii*** Rumex acetosella+***

Floristics (9 plots, NOCA 5, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95		Salix sitchensis+ 22		
60-80	Alnus rubra 12, Populus trichocarpa 10			
40-60			Chamaenerion latifolium 2	moss 15
25-40	Pseudotsuga menziesii 0	Rubus nutkanus 0	Hypochaeris radicata 6, Rumex acetosella+ 2, Plantago lanceolata 2, Fragaria virginiana 2, Montia 1, Phacelia 0, Artemisia 0, Anaphalis margaritacea 0, Achillea millefolium 0	Equisetum arvense+ 1
10-25	Picea sitchensis 2	Alnus viridis 5, Alnus incana 2	Rubus ursinus 5, Cirsium arvense+ 3, Sedum oreganum 1, Eriophyllum lanatum 1, Trifolium repens+ 1	Agrostis 18, Holcus lanatus 2, Scirpus microcarpus 2, Poa cusickii+ 2, Calamagrostis canadensis+ 1

{126} Populus trichocarpa, Cornus stolonifera/occidentalis
Cottonwood & red-osier dogwood forest
POPBAL/CORSER



Range: Lowland and lower montane zones, on valley bottoms. **NOCA**-13: **ne**-**s** (cw-ce) 500-880m.

Struct: Broadleaf woodland with prominent mixed conifer-broadleaf regen, dense tall shrubs, and substantial shrubs & forbs. Avg vasc cover 111: tall shrb 49, brdlf tree 25, shrb 14, forb 11, conif regen 0.82 @ 3, fern 0.82 @ 2, conif tree 0.73 @ 7, brdlf regen 0.55 @ 3, grass 0.55 @ 0.

Ecology: Very gentle slopes on terraces in broad valleys with meandering streams, on deep loamy soils often over gravels. Regen a variable mix of *Abies lasiocarpa*, *Populus trichocarpa*, *Thuja plicata*, *Acer macrophyllum* and/or other species.

Metrics: slope 2-7°, vdp 1-1m, vdr 1-36m, east 50-94, south 17-79, conv 42-48, tpp 6-14, solar 54-60, wet 7-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same.

Similar: MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), N:[034] ACER-CORSER/(PTEAQU), MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[125] POPBAL-(ALNRUB)/SALSIT, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, MNO:[053] ALNRUB/RUBSPE/TOLMEN-ATHFIL, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL.

▶ [**034**] Acer circinatum 8 Acer glabrum 6 Heracleum maximum* Hydrophyllum fendleri* 2 Maianthemum racemosum* Pteridium aquilinum 2 Ribes lacustre* Salix scouleriana* Trillium ovatum* Viola glabella+* [**keep**] B-LT5* B-GT5* 4 C-LT5** Abies amabilis** Abies grandis** Abies lasiocarpa* 2 Asarum caudatum** Circaea alpina* Clintonia uniflora* Osmorhiza** Populus trichocarpa*** 2 Rubus spectabilis 3 Salix sitchensis+** 2 Symphoricarpos albus 2 Thalictrum occidentale*
▶ [**124**] C-LT5 4 Abies amabilis 2 Abies grandis 5 Alnus rubra*** Circaea alpina 4 Gymnocarpium dryopteris** Lactuca* Polystichum munitum* 2 Ribes lacustre** Rosa* Thuja plicata* Tiarella trifoliata* Tsuga heterophylla 3 Viola glabella+*** [**keep**] TSHRB 20 Abies lasiocarpa** 2 Alnus viridis** Clintonia uniflora** Cornus stolonifera/occidentalis* 12 Lonicera involucrata 2 Paxistima myrsinites* Ribes bracteosum+* Salix sitchensis+** 2 Symphoricarpos albus 2 Thalictrum occidentale**
▶ [**125**] B-LT5 5 Achillea millefolium** Alnus rubra* Anaphalis margaritacea** Chamaenerion latifolium** Fragaria virginiana* Hypochaeris radicata** 2 Montia** Phacelia** Plantago lanceolata** Rumex acetosella+** [**keep**] B-GT5** 5 C-GT5* SHRB* 2 Acer circinatum*** Acer glabrum** Alnus viridis* Athyrium filix-femina** Cornus stolonifera/occidentalis*** 2 Dicentra formosa 2 Galium** Maianthemum stellatum** 2 Ribes bracteosum+** Rubus spectabilis* 2 Symphoricarpos albus 2 Thuja plicata**
▶ [**166**] Anaphalis margaritacea* Aruncus dioicus** Chamaenerion angustifolium* 2 Heracleum maximum** Hydrophyllum fendleri* 2 Salix sitchensis+* 16 Sambucus racemosa 3 Stachys cooleyae* Tolmiea menziesii* Urtica dioica 2 Viola glabella+* [**keep**] B-LT5* B-GT5** 4 Abies grandis*** Acer circinatum* Asarum caudatum*** Clintonia uniflora* Maianthemum stellatum** Oplopanax horridus* Paxistima myrsinites* Picea engelmannii 2 Populus trichocarpa** 4 Symphoricarpos albus 2 Thuja plicata** Tsuga heterophylla***

Floristics (11 plots, NOCA 11): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Etc
95-100	Populus trichocarpa 22			
80-95		Cornus stolonifera/occidentalis 37		
60-80		Acer circinatum 5, Alnus viridis 3, Rubus nutkanus 2		Athyrium filix-femina 3
40-60	Thuja plicata 3, Tsuga heterophylla 2, Abies amabilis 1	Rubus spectabilis 10, Salix sitchensis+ 9, Acer glabrum 4, Ribes bracteosum+ 4, Sambucus racemosa 2, Oplopanax horridus 2	Maianthemum stellatum 7, Galium 0	
25-40	Abies lasiocarpa 4, Picea engelmannii 3, Abies grandis 3	Symphoricarpos albus 5, Lonicera involucrata 4, Amelanchier alnifolia 2, Viburnum edule 1	Dicentra formosa 8, Circaea alpina 2, Thalictrum occidentale 1, Urtica dioica 1, Maianthemum racemosum 1, Paxistima myrsinites 1, Clintonia uniflora 1, Tiarella trifoliata 0, Claytonia sibirica+ 0, Osmorhiza 0, Asarum caudatum 0, Lactuca 0	moss 6, Pteridium aquilinum 0
10-25	Acer macrophyllum 13, Alnus rubra 10, Pseudotsuga menziesii 3	Rosa 4, Ribes lacustre 4	Tolmiea menziesii 3, Prosartes 2	

{127} Populus trichocarpa, Picea sitchensis, Acer macrophyllum*, Oxalis oregana
Cottonwood, Sitka spruce, bigleaf maple* & Oregon wood-sorrel forest
POPBAL-PICSIT-(ACEMAC)/OXAORE



Range: Lowland and coastal zones, on valley bottoms. **OLYM**-8: **sw*-sc** 60-100m.

Struct: Closed broadleaf forest (39-47m) with substantial mixed conifer-broadleaf regen, dense forbs, abundant ferns & grasses, and substantial tall shrubs & shrubs. Avg vasc cover 176: brdlf tree 59, forb 40, fern 22, grass 18, tall shrb 12, conif tree 0.88 @ 9, shrb 0.88 @ 7, conif regen 0.88 @ 5, brdlf regen 0.63 @ 5, sedge 0.5 @ 5, dwf shrb 0.13 @ 3.

Ecology: Nearly flat alluvial terraces of major rivers which experience infrequent flooding. These are mid-seral stands, with *Populus trichocarpa* typically emergent over a subcanopy of *Acer macrophyllum* and *Picea sitchensis*. Conifer dominance increases over time; *Tsuga heterophylla* can be important in older stands. Regen *Picea sitchensis*, usually codominant with *Acer macrophyllum*, *Tsuga heterophylla* and/or *Alnus rubra*. Elk browsing is often heavy, especially on *Rubus spectabilis*.

Metrics: slope 0-3°, vdp 1-3m, vdr 2-4m, east 13-71, south 33-82, conv 48-50, tpp 19-25, solar 58-60, wet 7-8

Map class: B31–Broadleaf riparian & swamp forest

Rel to C09: Same.

Similar: O:[040] ACEMAC-PICSIT/ACECIR/OXAORE-POLMUN, O:[047] ALNRUB/ELYGLA, O:[123] POPBAL-ALNRUB/CAROBN, MO:[050] ALNRUB-PICSIT/RUBSPE/OXAORE-POLMUN, MO:[054] ALNRUB/STACHA-TOLMEN, O:[051] ALNRUB/RUBSPE/CAROBN-LYSAME, NO:[041] ACEMAC/POLMUN-TOLMEN, MNO:[052] ALNRUB/RUBSPE/POLMUN-CLASIB, MNO:[044] ACEMAC/RUBSPE/TOLMEN, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM.

▶ [**040**] Athyrium filix-femina** Claytonia sibirica+* Frangula purshiana* Galium* Luzula parviflora** Mitella*** Polypodium glycyrrhiza*** Rubus ursinus* Stellaria* Tiarella trifoliata 3 Vaccinium parvifolium*** [**keep**] B-LT5* 2 Bromus vulgaris+ 2 Populus trichocarpa* 2 Ranunculus repens+ 4 Rumex acetosella+**

▶ [**047**] SHRB 11 Bromus sitchensis** 2 Elymus* Galium* Heracleum maximum* Poa cusickii+* Pseudotsuga menziesii* Rosa* Rubus spectabilis 10 Rubus ursinus** Salix sitchensis+* [**keep**] Acer circinatum* Acer macrophyllum** Carex deweyana+ 2 Oxalis oregana** Polystichum munitum 9 Populus trichocarpa* 8 Tolmiea menziesii*

▶ [**050**] Luzula parviflora 2 Sambucus racemosa* Tsuga heterophylla* Vaccinium parvifolium* 2 [**keep**] Acer macrophyllum 11 Agrostis 2 Bromus vulgaris+ 2 Populus trichocarpa*** 2 Ranunculus repens+* Tolmiea menziesii*

▶ [**054**] Abies grandis* 2 Athyrium filix-femina 3 Circaea alpina* Claytonia sibirica+* Equisetum arvense+* Mitella* 2 Rumex occidentalis 2 Stachys cooleyae 2 Vaccinium parvifolium* [**keep**] TSHRB* Acer circinatum 4 Acer macrophyllum 10 Bromus vulgaris+ 3 Polystichum munitum 10 Populus trichocarpa*** 2

▶ [**123**] Agrostis 10 Carex obnupta+* Cirsium arvense+*** Elymus* 7 Fragaria vesca 2 Lactuca* Plantago lanceolata** Rumex occidentalis 2 Senecio triangularis+** Symphoricarpos albus* 2 [**keep**] TSHRB* 2 Acer circinatum** 2 Acer macrophyllum* 5 Bromus vulgaris+ 2 Claytonia sibirica+ 2 Polystichum munitum 4 Tolmiea menziesii*

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Populus trichocarpa 18, Picea sitchensis 10		Ranunculus repens+ 16, Oxalis oregana 10, Tolmiea menziesii 5	Polystichum munitum 22
80-95	Acer macrophyllum 30, Alnus rubra 20	Acer circinatum 11, Rubus spectabilis 7		
60-80			Stachys cooleyae 1	moss 9
40-60	Tsuga heterophylla 5			
25-40		Rubus laciniatus 1	Claytonia sibirica+ 7, Circaea alpina 4, Galium 2, Tiarella trifoliata 2, Prunella vulgaris 2, Rumex acetosella+ 1, Rumex occidentalis 1	Bromus vulgaris+ 22, Agrostis 6, Carex deweyana+ 5, Elymus 4, Athyrium filix-femina 2
10-25	Thuja plicata 3	Frangula purshiana 13, Sambucus racemosa 1	Rubus ursinus 3, Erythranthe 3, Hydrophyllum tenuipes 3, Cardamine 3, Lactuca 2, Viola glabella+ 1, Stellaria 1, Osmorhiza 1	Poa cusickii+ 40, Carex obnupta+ 5, Dryopteris 1, Melica subulata+ 1, Struthiopteris spicant 1, Luzula parviflora 1

{128} Populus tremuloides, Cornus nuttallii
Quaking aspen & Pacific dogwood forest
POPTRE/CORNUT



Range: Lowland zone. **NOCA**-1: (s) 350-360m.

Struct: Closed broadleaf forest with substantial broadleaf regen, forbs & shrubs, and substantial ferns. Avg vasc cover 181: brdlf tree 116, forb 16, brdlf regen 13, shrb 13, conif tree 9, fern 6, tall shrb 4, conif regen 4.

Ecology: The single plot is on a very gentle northeast-facing slope just above a river. Regen dominated by *Populus tremuloides*, with smaller amounts of *Thuja plicata* and other species.

Metrics: slope 4°, vdp 1m, vdr 1m, east 80, south 10, conv 42, tpp 27, solar 53, wet 8

Map class: B34–Bigleaf maple & Doug-fir debris apron forest

Rel to C09: Same.

Similar: N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[129] POPTRE-PAXMYR_SHRUB, NO:[041] ACEMAC/POLMUN-TOLMEN, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, MN:[038] (ACEMAC)/ACECIR-PAXMYR, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, N:[126] POPBAL/CORSER, MNO:[162] RUBPAR/PTEAQU-CHAANG.

Floristics (1 plot, NOCA 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Populus tremuloides 83, Cornus nuttallii 30, Acer macrophyllum 13, Abies grandis 9, Thuja plicata 4, Populus trichocarpa 3	Rubus nutkanus 8, Symphoricarpos albus 3, Acer circinatum 3, Berberis aquifolium 1, Amelanchier alnifolia 1, Rosa 1	Trillium ovatum 3, Clintonia uniflora 3, Viola glabella+ 3, Actaea rubra 1, Adenocaulon bicolor 1, Asarum caudatum 1, Prosartes 1, Pyrola asarifolia+ 1, Galium 1, Osmorhiza 1	Pteridium aquilinum 3, Athyrium filix-femina 3

{129} Populus tremuloides, Paxistima myrsinites
Quaking aspen & Oregon-box shrubland
POPTRE-PAXMYR_SHRUB



Range: Lower montane. **NOCA**-5: **ne-s** 750-1060m.

Struct: Semi-open stunted broadleaf trees with substantial tall shrubs and prominent dwarf shrubs. Avg vasc cover 62: brdlf LT5 37, tall shrb 11, dwf shrb 4, fern 1, shrb 0, conif GT5 0.6 @ 3, conif LT5 0.6 @ 1, brdlf GT5 0.4 @ 14.

Ecology: Fairly steep south-facing lower talus slopes and alluvial terraces.

Metrics: slope 27-33°, vdp 4-25m, vdr 51-182m, east 55-65, south 97-100, conv 37-40, tpp 14-36, solar 68-77, wet 3

Map class: S45–Vine maple shrubland

Rel to C09: New name for POPTRE SHRUB, for clarification.

Similar: MNO:[036] ACECIR-(HOLDIS), MN:[038] (ACEMAC)/ACECIR-PAXMYR, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[103] PENDAV/RACOMITRIUM, MNO:[035] ACECIR/GALIUM-(POLMUN), N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[104] PHLDIF-(LOMMAR-CARPHA), N:[078] CEAVEL-(SPIBET)/CALRUB, MNO:[162] RUBPAR/PTEAQU-CHAANG.
Also see: [128] POPTRE/CORNUT

▶ [**035**] FORB* 2 SHRB 2 TSHRB 19 Acer circinatum 21 Acer glabrum 2 Alnus viridis* 2 Clintonia uniflora 2 Galium* Maianthemum stellatum* Polystichum munitum* Rubus nutkanus* 2 Sambucus racemosa* Viola glabella+* [**keep**] B-LT5** 9 B-GT5 3 Amelanchier alnifolia 2 Paxistima myrsinites* Populus tremuloides*** 2 Pseudotsuga menziesii 2 Sorbus scopulina 2
▶ [**036**] Frangula purshiana 2 Tsuga heterophylla 2 Xerophyllum tenax** 2 [**keep**] B-LT5* 4 Amelanchier alnifolia 2 Populus tremuloides*** 2 Sorbus scopulina 2
▶ [**038**] C-LT5 2 FORB* 2 SHRB 2 TSHRB 19 Abies grandis 2 Acer circinatum 19 Acer glabrum* 2 Acer macrophyllum* 7 Corylus cornuta* 2 Maianthemum racemosum* [**keep**] Populus tremuloides*** 10
▶ [**093**] FORB* 2 Bromus sitchensis 2 Carex spectabilis+ 2 Cirsium edule+** Elymus 2 Heracleum maximum** 2 Thalictrum occidentale* 2 [**keep**] B-LT5*** B-GT5*** 2 C-GT5* SHRB* TSHRB* 3 Acer circinatum** 5 Amelanchier alnifolia** 2 Cryptogramma acrostichoides*** Paxistima myrsinites** Populus tremuloides*** Pseudotsuga menziesii*** 2 Rubus leucodermis** Sorbus scopulina**
▶ [**103**] FORB* 2 Arctostaphylos uva-ursi+* 2 Lomatium martindalei 2 Luzula hitchcockii+* Montia* Penstemon procerus+* 2 Racomitrium* 2 Selaginella wallacei+ 2 [**keep**] B-LT5* 2 B-GT5 2 SHRB* TSHRB* 2 Acer circinatum 2 Amelanchier alnifolia 2 Paxistima myrsinites* Populus tremuloides*** 2 Pseudotsuga menziesii 2 Sorbus scopulina 2

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Populus tremuloides 41		Paxistima myrsinites 4	moss 13
80-95				
60-80		Acer circinatum 12		Cryptogramma acrostichoides 0
40-60	Pseudotsuga menziesii 5, Abies lasiocarpa 1	Sorbus scopulina 5, Amelanchier alnifolia 4, Rubus leucodermis 1		lichen 10
25-40				
10-25	Acer macrophyllum 4	Prunus virginiana 1		Pteridium aquilinum 6, Carex geyeri+ 1

{130} Prunus emarginata, Amelanchier alnifolia, Ceanothus velutinus, Maianthemum racemosum*
Bitter cherry, western serviceberry, snowbrush & Solomon's plume* shrubland
PRUEMA-AMEALN-CEAVEL/MAIRAC



Range: Lower montane. **NOCA**-17: **s*** 990-1140m.

Struct: Semi-closed canopy tall shrubland with abundant shrubs, forbs & dwarf shrubs, and substantial grasses. Avg vasc cover 139: tall shrb 57, shrb 30, forb 21, dwf shrb 0.93 @ 17, grass 0.87 @ 5, conif GT5 0.6 @ 6, conif LT5 0.53 @ 1, fern 0.4 @ 7, brdlf LT5 0.27 @ 8, brdlf GT5 0.27 @ 3.

Ecology: South-facing slopes in avalanche chutes or on debris cones; not in riparian settings. May represent a stage in fire recovery but also can occupy small openings in [142] PSEMEN/PAXMYR-SPIBET forest. Scattered surviving mature *Pseudotsuga menziesii* or *Abies lasiocarpa* may be present, along with some regen of those species.

Metrics: slope 16-31°, vdp 3-19m, vdr 45-156m, east 37-64, south 95-100, conv 46-49, tpp 22-39, solar 71-83, wet 3-4

Map class: S46–Snowbrush & Scouler's willow shrubland

Rel to C09: Split from CEAVEL to distinguish from [078] CEAVEL-(SPIBET)/CALRUB and [165] SALSCO-SORSCO-AMEALN/PAXMYR.

Similar: N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[161] PSEMEN/VACMEM, MN:[038] (ACEMAC)/ACECIR-PAXMYR, MNO:[162] RUBPAR/PTEAQU-CHAANG, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[138] PSEMEN/HOLDIS/CALRUB, NO:[093] HERMAX-(THAOCC-SAUAME).

▶ [**078**] C-LT5 2 Arctostaphylos uva-ursi+*** 2 Carex geyeri+* Castilleja hispida* Collomia** Hieracium albiflorum** Moehringia macrophylla* Pinus ponderosa** Vaccinium membranaceum* [**keep**] TSHRB 21 Acer glabrum* 3 Amelanchier alnifolia* Eucephalus ledophyllus+* Maianthemum racemosum** Prosartes*** Prunus emarginata* Rosa 2 Rubus nutkanus 2 Sorbus scopulina* Symphoricarpos albus*** 2 Thalictrum occidentale* 2

▶ [**134**] B-LT5* 12 B-GT5* 4 C-LT5 2 Acer macrophyllum* Adenocaulon bicolor*** Alnus viridis 2 Chimaphila umbellata*** Clintonia uniflora*** 2 Cornus nuttallii*** 2 Lilium* Pinus monticola 2 Prosartes* Pseudotsuga menziesii 7 Pteridium aquilinum* Rosa* Trillium ovatum*** [**keep**] Calamagrostis rubescens+ 2 Ceanothus velutinus* 3 Chamaenerion angustifolium* Elymus** Eucephalus ledophyllus+* 2 Prunus emarginata*** 2 Symphoricarpos albus* 2 Thalictrum occidentale**

▶ [**142**] C-GT5 11 Abies lasiocarpa 2 Acer circinatum 2 Adenocaulon bicolor 2 Arnica cordifolia*** Bromus vulgaris+* Cacaliopsis nardosmia 3 Chimaphila umbellata*** Erythronium montanum+*** Galium* Goodyera oblongifolia*** Hieracium albiflorum*** Moehringia macrophylla* Osmorhiza* Platanthera*** Pseudotsuga menziesii 8 [**keep**] B-LT5 3 SHRB 4 TSHRB 18 Ceanothus velutinus* 2 Prunus emarginata 2 Rosa 2 Rubus nutkanus 3 Salix scouleriana* Symphoricarpos albus* 2

▶ [**161**] C-LT5* 2 C-GT5* 11 Abies lasiocarpa* 2 Adenocaulon bicolor 2 Chimaphila umbellata*** Goodyera oblongifolia*** Hieracium albiflorum*** Linnaea borealis 2 Orthilia secunda*** Pinus monticola** Pseudotsuga menziesii 8 Rhododendron albiflorum 2 Rubus lasiococcus** Vaccinium membranaceum** [**keep**] B-LT5 2 TSHRB 17 Acer macrophyllum 2 Ceanothus velutinus*** 2 Prunus emarginata** 2 Salix scouleriana 4 Symphoricarpos albus*** 2

▶ [**165**] C-LT5 2 Abies amabilis* Acer circinatum** 2 Callitropsis nootkatensis** Hieracium albiflorum* Moehringia macrophylla* Rubus nutkanus* Taxus brevifolia* Vaccinium membranaceum** Viola glabella+** [**keep**] Berberis aquifolium** Cacaliopsis nardosmia*** Ceanothus velutinus* 6 Hieracium scouleri+** Osmorhiza** Prosartes* Prunus emarginata* 6 Rosa* Spiraea lucida* Symphoricarpos albus*

Floristics (15 plots, NOCA 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Ceanothus velutinus 16, Amelanchier alnifolia 15		
80-95		Prunus emarginata 18, Acer glabrum 11	Paxistima myrsinites 14, Maianthemum racemosum 4	
60-80	Pseudotsuga menziesii 5	Salix scouleriana 16, Sorbus scopulina 6, Symphoricarpos albus 6	Spiraea lucida 5, Eucephalus ledophyllus+ 4, Chamaenerion angustifolium 3	
40-60	Abies lasiocarpa 1	Rubus nutkanus 16, Berberis aquifolium 1	Thalictrum occidentale 4, Prosartes 4	Calamagrostis rubescens+ 6, Elymus 2
25-40	Acer macrophyllum 8	Rosa 5	Cacaliopsis nardosmia 2, Osmorhiza 1, Lilium 1, Achillea millefolium 1, Hieracium scouleri+ 0	
10-25	Picea engelmannii 2	Frangula purshiana 10, Holodiscus discolor 4, Sambucus nigra 1, Cornus stolonifera/occidentalis 1	Thalictrum venulosum 26, Moehringia lateriflora 3, Galium 1, Lupinus latifolius 1, Lomatium brandegeei+ 1, Moehringia macrophylla 1	Pteridium aquilinum 12, Festuca occidentalis+ 2, Carex geyeri+ 1, Cryptogramma acrostichoides 1

{131} Pseudoroegneria spicata, Selaginella wallacei
Bluebunch wheatgrass & spikemoss herbaceous vegetation
PSESPI/SELWAL



Range: Lowland zone, on balds. **NOCA**-5: **ne** (s) 570-670m.

Struct: Semi-closed canopy grassland with abundant forbs and prominent shrubs & conifer regen. Avg vasc cover 71: grass 39, forb 17, shrb 4, conif LT5 3, conif GT5 2, tall shrb 0.8 @ 3, fern 0.8 @ 2, dwf shrb 0.8 @ 2.

Ecology: Dry balds on fairly steep slopes with southerly aspects. Embedded in forests and woodlands dominated by *Pseudotsuga menziesii* and *Pinus ponderosa*. Small *Pseudotsuga menziesii* are usually present. Mosses, particularly *Racomitrium canescens*, are abundant on exposed rock.

Metrics: slope 27-31°, vdp 10-56m, vdr 27-83m, east 19-56, south 69-100, conv 42-45, tpp 26-47, solar 62-71, wet 3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: New abbreviation for PSESPI, to agree with full name.

Similar: N:[062] ARCNEV/PSESPI, N:[061] ARCNEV-PAXMYR/CALRUB, MNO:[103] PENDAV/RACOMITRIUM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, MNO:[218] ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM, NO:[093] HERMAX-(THAOCC-SAUAME), N:[078] CEAVEL-(SPIBET)/CALRUB, MNO:[104] PHLDIF-(LOMMAR-CARPHA), N:[146] PSEMEN-PINPON/CALRUB, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC. Also see: [083] DANINT/RACOMITRIUM

▶ [**061**] Arctostaphylos uva-ursi+ 4 Calamagrostis rubescens+ 2 Eriogonum umbellatum* Hieracium scouleri+* Lewisia* Paxistima myrsinites* 2 [**keep**] Anticlea/Toxicoscordion*** Berberis aquifolium*** Bromus vulgaris+** 2 Cerastium arvense** Eriophyllum lanatum*** Fragaria virginiana*** Fritillaria affinis** Koeleria macrantha 2 Lomatium nudicaule+*** Philadelphus lewisii** 2 Pinus ponderosa 2 Pseudoroegneria spicata 10 Vicia**

▶ [**062**] Arctostaphylos uva-ursi+ 4 Bromus tectorum+ 2 Calamagrostis rubescens+ 2 Ceanothus velutinus** Pinus ponderosa* Racomitrium 8 [**keep**] C-LT5 2 Allium** Anticlea/Toxicoscordion 2 Berberis aquifolium** Bromus vulgaris+** 2 Castilleja miniata** Cerastium arvense*** Eriophyllum lanatum** Fragaria virginiana* Fritillaria affinis* Philadelphus lewisii*** 2 Pinus ponderosa 2 Vicia***

▶ [**064**] Arctostaphylos uva-ursi+ 4 Cryptogramma acrostichoides* Danthonia* Holodiscus discolor 2 Luzula hitchcockii+* Paxistima myrsinites* Penstemon procerus+* 2 Racomitrium* 9 Selaginella wallacei+* 2 Spiraea lucida* Woodsia* [**keep**] Allium* Anticlea/Toxicoscordion* 2 Aspidotis densa* Bromus vulgaris+* 2 Castilleja miniata* Cerastium arvense* Fritillaria affinis** Philadelphus lewisii* 2 Pinus ponderosa 2 Pseudoroegneria spicata*** 2 Vicia*

▶ [**103**] Cryptogramma acrostichoides* Lomatium martindalei 2 Luzula hitchcockii+* Penstemon procerus+* 2 Racomitrium* 9 Selaginella wallacei+ 2 [**keep**] SHRB 2 Anticlea/Toxicoscordion*** Aspidotis densa** Berberis aquifolium*** Bromus vulgaris+** 2 Castilleja miniata** Eriophyllum lanatum* Fragaria virginiana* Koeleria macrantha 2 Lomatium nudicaule+* Philadelphus lewisii** 2 Pinus ponderosa 2 Pseudoroegneria spicata 2 Vicia**

▶ [**218**] Calamagrostis rubescens+ 2 Festuca roemeri 2 Racomitrium* 9 Selaginella wallacei+*** 2 [**keep**] C-LT5 2 C-GT5* Aspidotis densa* Bromus vulgaris+* Castilleja miniata* Philadelphus lewisii* 2 Pinus ponderosa 2 Pseudoroegneria spicata*** 2 Vicia*

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 2		Anticlea/Toxicoscordion 3, Achillea millefolium 3	Pseudoroegneria spicata 27
80-95		Amelanchier alnifolia 2, Berberis aquifolium 1, Holodiscus discolor 1	Lomatium nudicaule+ 2, Eriophyllum lanatum 2, Fragaria virginiana 0, Fritillaria affinis 0	moss 25
60-80		Philadelphus lewisii 3	Arctostaphylos uva-ursi+ 2, Cerastium arvense 1, Allium 0, Vicia 0, Castilleja miniata 0	Bromus vulgaris+ 7, Aspidotis densa 2
40-60	Pinus ponderosa 6, Juniperus scopulorum 1	Rosa 1, Ceanothus sanguineus 1	Drymocallis glandulosa+ 1, Balsamorhiza sagittata 1, Epilobium 1, Antennaria lanata+ 1, Arabis 1, Paxistima myrsinites 0, Hieracium scouleri+ 0	Koeleria macrantha 8, Achnatherum 2, Calamagrostis rubescens+ 1, Aira caryophyllea 0
10-25	Pinus contorta 1	Salix scouleriana 4, Prunus virginiana 1	Montia 4, Apocynum androsaemifolium 3, Sedum spathulifolium 2, Penstemon serrulatus+ 2, Delphinium 1, Polygonum douglasii+ 1, Collomia 1, Collinsia parviflora 1, Micranthes tolmiei+ 1, Sedum lanceolatum+ 1, Prunella vulgaris 1	Deschampsia 9, Racomitrium 5, Agrostis 4, Cryptogramma acrostichoides 4, Bromus tectorum+ 1, Poa cusickii+ 1

{132} Pseudotsuga menziesii, Abies grandis*, Acer circinatum, Paxistima myrsinites
Douglas-fir, grand fir*, vine maple & Oregon-box forest
PSEMEN-(ABIGRA)/ACECIR-PAXMYR



Range: Lowland zone. **NOCA**-5: **s** (ne) 660-1020m.

Struct: Mostly closed conifer forest with substantial conifer regen, abundant tall shrubs, and substantial forbs. Avg vasc cover 113: conif tree 54, tall shrb 28, forb 11, conif regen 11, dwf shrb 4, shrb 2, fern 0.8 @ 0, brdlf tree 0.6 @ 3, brdlf regen 0.6 @ 1.

Ecology: Gentle south-facing slopes with westerly tendencies, on well-drained soils frequently derived from glacial, alluvial or debris flow material. The canopy abundance of *Abies grandis* is higher in older stands. Near the Cascade crest at NOCA, *Abies amabilis* may replace *Abies grandis*. On moist sites, the herbaceous layer is well-developed; in dense stands, it is sparse or absent. Regen a variable mix of *Thuja plicata*, *Acer macrophyllum*, *Pseudotsuga menziesii*, *Abies grandis* and/or other species.

Metrics: slope 11-19°, vdp 3-40m, vdr 25-326m, east 15-24, south 86-93, conv 48-50, tpp 9-56, solar 62-69, wet 3-5

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Same name, but the C09 type was very heterogeneous and most plots in this assn were split from PSEMEN-(TSUHET)/ACECIR-PAXMYR. Very likely a different concept.

Similar: N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, N:[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR, N:[133] PSEMEN/ACECIR/MAHNER, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MO:[140] PSEMEN/MAHNER/ACHTRI, N:[161] PSEMEN/VACMEM, N:[069] BETPAP-(THUPLI)/ACECIR/MAHNER, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER.

▶ [**133**] SHRB 3 Amelanchier alnifolia* Berberis nervosa* 4 Chimaphila umbellata* Corylus cornuta* 2 Holodiscus discolor* 2 Linnaea borealis* Lonicera ciliosa* Lysimachia latifolia** [**keep**] Abies amabilis 2 Acer macrophyllum* Adenocaulon bicolor* Clintonia uniflora** 2 Maianthemum racemosum* Maianthemum stellatum** Oplopanax horridus*** Prosartes 2 Pteridium aquilinum* Rubus nutkanus* Thuja plicata 11 Trillium ovatum*** Viola glabella+***

▶ [**140**] Achlys triphylla** 2 Berberis nervosa* 4 Hieracium albiflorum* Linnaea borealis* 2 Pteridium aquilinum 2 Rubus lasiococcus* Rubus ursinus* Tsuga heterophylla* Vaccinium parvifolium* Viola orbiculata+* Xerophyllum tenax* 2 [**keep**] B-LT5*** B-GT5*** Abies amabilis 2 Acer circinatum 13 Acer macrophyllum*** 2 Adenocaulon bicolor* Clintonia uniflora* Maianthemum racemosum*** Oplopanax horridus*** Prosartes** 2 Rubus nutkanus*** Spiraea lucida*** Thuja plicata*** 2 Viola glabella+**

▶ [**149**] SHRB 3 Abies grandis* Amelanchier alnifolia* Berberis nervosa* Chimaphila umbellata* Cornus nuttallii 2 Corylus cornuta* 2 Hieracium albiflorum* Linnaea borealis* Lonicera ciliosa* Paxistima myrsinites 5 Tsuga heterophylla* Vaccinium membranaceum 2 Vaccinium parvifolium 2 [**keep**] B-LT5* Abies amabilis 3 Acer macrophyllum*** 2 Adenocaulon bicolor* Maianthemum stellatum* Oplopanax horridus*** Prosartes 2 Trillium ovatum* Viola glabella+*

▶ [**157**] SHRB 3 Berberis nervosa* Chimaphila umbellata* Gaultheria ovatifolia* Hieracium albiflorum* Linnaea borealis* 2 Tsuga heterophylla* Vaccinium membranaceum 2 Vaccinium parvifolium* [**keep**] B-LT5* B-GT5** TSHRB 11 Acer circinatum 13 Acer macrophyllum** 2 Adenocaulon bicolor** Clintonia uniflora* Maianthemum racemosum** Maianthemum stellatum* Oplopanax horridus** Prosartes** 2 Rubus nutkanus*** Trillium ovatum*** Viola glabella+**

▶ [**175**] SHRB 3 Actaea rubra* Athyrium filix-femina** 2 Cornus stolonifera/occidentalis* 2 Dicentra formosa* Galium* Gymnocarpium dryopteris*** Maianthemum stellatum 2 Oplopanax horridus 2 Osmorhiza* Picea engelmannii 2 Ribes lacustre** Rubus spectabilis* Tiarella trifoliata* [**keep**] B-LT5** Acer macrophyllum* 2 Goodyera oblongifolia* Paxistima myrsinites* 2 Pteridium aquilinum* Rosa* Spiraea lucida** Tsuga heterophylla 4

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 20	Rubus nutkanus 0	Clintonia uniflora 5, Paxistima myrsinites 3, Goodyera oblongifolia 0	
80-95	Thuja plicata 30	Acer circinatum 34, Rosa 0	Prosartes 5, Viola glabella+ 1, Maianthemum stellatum 0	Pteridium aquilinum 0
60-80	Acer macrophyllum 4	Oplopanax horridus 1, Vaccinium membranaceum 1	Adenocaulon bicolor 0, Spiraea lucida 0, Trillium ovatum 0, Maianthemum racemosum 0	
40-60	Tsuga heterophylla 10, Abies amabilis 9, Pinus monticola 1	Acer glabrum 2	Chimaphila umbellata 2, Asarum caudatum 1, Orthilia secunda 1, Pyrola asarifolia+ 0	
10-25	Abies grandis 65	Alnus viridis 2, Viburnum edule 1	Berberis nervosa 2, Osmorhiza 1	moss 5

{133} Pseudotsuga menziesii, Acer circinatum, Berberis nervosa
Douglas-fir, vine maple & dwarf Oregon-grape forest
PSEMEN/ACECIR/MAHNER



Range: Lowland zone. **NOCA**-34: **ne*-ce** 570-770m.

Struct: Semi-open conifer forest with substantial conifer regen, dense tall shrubs, abundant dwarf shrubs, and substantial shrubs. Avg vasc cover 131: conif tree 50, tall shrb 34, dwf shrb 27, shrb 7, forb 4, conif regen 0.9 @ 6, grass 0.68 @ 1, fern 0.55 @ 1.

Ecology: Slopes, on rocky soils, with evidence of past fire usually apparent. May represent a persistent early seral stage of [155] PSEMEN-TSUHET/MAHNER, with little to no *Tsuga heterophylla* and more dry site species. Regen dominated by *Pseudotsuga menziesii*, often with *Thuja plicata* and/or *Tsuga heterophylla*. Litter and mosses cover the ground surface.

Metrics: slope 16-30°, vdp 2-49m, vdr 97-225m, east 7-78, south 56-100, conv 46-52, tpp 32-50, solar 59-75, wet 3-4

Map class: C07–North Cascades dry Douglas-fir forest

Rel to C09: Same

Similar: N:[141] PSEMEN/MAHNER/CALRUB, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MO:[140] PSEMEN/MAHNER/ACHTRI, N:[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, N:[138] PSEMEN/HOLDIS/CALRUB, N:[069] BETPAP-(THUPLI)/ACECIR/MAHNER, MO:[151] PSEMEN-TSUHET/ACHTRI, N:[068] BETPAP-PSEMEN/ACECIR/PAXMYR.

▶ [**132**] Abies amabilis 2 Acer macrophyllum* Adenocaulon bicolor* Clintonia uniflora** 2 Maianthemum racemosum* Maianthemum stellatum** Oplopanax horridus*** Prosartes 2 Pteridium aquilinum* Rubus nutkanus* Thuja plicata 11 Trillium ovatum*** Viola glabella+*** [**keep**] SHRB 3 Amelanchier alnifolia* Berberis nervosa* 4 Chimaphila umbellata* Corylus cornuta* 2 Holodiscus discolor* 2 Linnaea borealis* Lonicera ciliosa* Lysimachia latifolia**

▶ [**139**] FORB 7 Acer glabrum 6 Achlys triphylla*** 2 Adenocaulon bicolor* Bromus vulgaris+* Campanula scouleri*** Festuca occidentalis+* Holodiscus discolor 5 Lathyrus nevadensis** Lathyrus polyphyllus 2 Linnaea borealis 4 Polystichum munitum* Symphoricarpos albus* Symphoricarpos mollis* Vicia** [**keep**] TSHRB 16 Acer circinatum*** 2 Acer glabrum* Amelanchier alnifolia* Corylus cornuta*** 2 Lonicera ciliosa* Paxistima myrsinites** 2 Spiraea lucida*** Thuja plicata*

▶ [**140**] FORB 7 Abies amabilis* Abies procera 2 Achlys triphylla*** 2 Gaultheria ovatifolia*** Maianthemum stellatum* Pteridium aquilinum* 2 Rubus lasiococcus*** Rubus ursinus* Viola orbiculata+*** Viola sempervirens*** Xerophyllum tenax*** 2 [**keep**] TSHRB 12 Acer circinatum 12 Acer glabrum* Amelanchier alnifolia* Corylus cornuta* 2 Goodyera oblongifolia* Holodiscus discolor* 2 Lonicera ciliosa*** Lysimachia latifolia* Paxistima myrsinites 2 Rosa* Spiraea lucida** Thuja plicata** 2

▶ [**141**] Arctostaphylos uva-ursi+* 2 Arnica cordifolia*** Berberis aquifolium 2 Calamagrostis rubescens+* 2 Calypso bulbosa* Hieracium albiflorum* Lactuca* Lilium*** Moehringia macrophylla* Neottia* Pinus contorta* Symphoricarpos albus 3 Vaccinium membranaceum 2 [**keep**] B-GT5* TSHRB 13 Acer circinatum 7 Betula papyrifera* Corylus cornuta* Galium* Prosartes** Pteridium aquilinum* Rubus nutkanus* Vaccinium parvifolium*

▶ [**149**] Abies grandis** 3 Clintonia uniflora*** Cornus nuttallii** 2 Maianthemum racemosum* Orthilia secunda* Pinus monticola* Salix scouleriana** Sorbus scopulina* Taxus brevifolia* Tsuga heterophylla 6 Vaccinium membranaceum 2 Vaccinium ovalifolium*** Vaccinium parvifolium 2 [**keep**] Berberis nervosa 6 Lysimachia latifolia***

Floristics (31 plots, NOCA 31): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 49	Acer circinatum 28	Berberis nervosa 20	
80-95		Rosa 2, Amelanchier alnifolia 1	Chimaphila umbellata 3, Lysimachia latifolia 2	moss 37
60-80		Acer glabrum 4, Corylus cornuta 3, Lonicera ciliosa 1	Paxistima myrsinites 5, Goodyera oblongifolia 0	
40-60	Thuja plicata 7, Tsuga heterophylla 4	Holodiscus discolor 3, Berberis aquifolium 1, Vaccinium membranaceum 1	Linnaea borealis 2, Prosartes 1, Spiraea lucida 0	
25-40	Acer macrophyllum 2, Betula papyrifera 2	Vaccinium parvifolium 1, Rubus nutkanus 1	Osmorhiza 1, Orthilia secunda 0, Hieracium albiflorum 0, Galium 0, Fragaria virginiana 0, Chimaphila menziesii 0	Calamagrostis rubescens+ 1, Polystichum munitum 1, Pteridium aquilinum 1, Festuca occidentalis+ 0
10-25	Abies grandis 2, Taxus brevifolia 1	Symphoricarpos albus 2, Ribes lacustre 1, Prunus emarginata 1	Adenocaulon bicolor 2, Lactuca 1, Moehringia macrophylla 1, Rubus ursinus 1, Pedicularis racemosa 1, Neottia 1	

{134} Pseudotsuga menziesii, Acer macrophyllum, Acer glabrum, Paxistima myrsinites, Maianthemum racemosum
Douglas-fir, bigleaf maple, Rocky Mountain maple, Oregon-box & Solomon's plume woodland
PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC



Range: Lowland zone. **NOCA**-7: **s*** 680-790m.

Struct: Mixed conifer-broadleaf woodland with abundant broadleaf regen, dense tall shrubs, and substantial dwarf shrubs, shrubs & forbs. Avg vasc cover 139: tall shrb 39, brdlf regen 25, conif tree 15, dwf shrb 14, shrb 14, brdlf tree 13, forb 12, fern 0.86 @ 2, conif regen 0.71 @ 4, grass 0.71 @ 2.

Ecology: Fairly gentle slopes, in avalanche chutes and on debris aprons. Regen dominated by *Acer macrophyllum*, often with smaller amounts of *Pseudotsuga menziesii*.

Metrics: slope 13-22°, vdp 1-22m, vdr 100-157m, east 2-44, south 39-73, conv 47-51, tpp 30-47, solar 56-64, wet 4-5

Map class: B34–Bigleaf maple & Doug-fir debris apron forest

Rel to C09: Created through reclustering a complex of ambiguous types containing *Acer* spp. and *Salix* spp.

Similar: N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, N:[161] PSEMEN/VACMEM, N:[147] PSEMEN-(PINPON)/SYMALB, MN:[038] (ACEMAC)/ACECIR-PAXMYR, N:[130] PRUEMA-AMEALN-CEAVEL/MAIRAC, N:[142] PSEMEN/PAXMYR-SPIBET, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC.

▶ [**039**] B-GT5 21 Acer circinatum* Asarum caudatum* Athyrium filix-femina 2 Circaea alpina* Cornus stolonifera/occidentalis* 2 Galium* Maianthemum stellatum 5 Oplopanax horridus* 2 Sambucus racemosa** Thalictrum occidentale** Viola glabella+* [**keep**] Acer glabrum* Adenocaulon bicolor*** Amelanchier alnifolia** 2 Berberis aquifolium*** Calamagrostis rubescens+* Chimaphila umbellata** Cornus nuttallii* 2 Lilium** Paxistima myrsinites 2 Pseudotsuga menziesii 5 Rosa 2 Sorbus scopulina** Spiraea lucida*
▶ [**043**] Abies grandis* 2 Asarum caudatum* 2 Elymus** Lactuca* Lonicera ciliosa* Moehringia macrophylla* Osmorhiza* Philadelphus lewisii* Pinus ponderosa 2 Populus trichocarpa 2 Rubus ursinus* Sambucus nigra* Symphoricarpos albus 2 [**keep**] Abies lasiocarpa** Acer glabrum** 2 Alnus viridis 2 Clintonia uniflora* Lilium* Maianthemum stellatum* Paxistima myrsinites 3 Pinus monticola* Rosa 2 Salix scouleriana** 5 Sorbus scopulina*** Taxus brevifolia** Vaccinium membranaceum**. Note: [043] is in drier sites, typically post-fire.
▶ [**147**] Achnatherum* Adenocaulon bicolor 2 Anaphalis margaritacea* Artemisia* Berberis aquifolium 2 Bromus tectorum+* 2 Elymus** 2 Holodiscus discolor*** Pinus ponderosa* Rubus leucodermis* Symphoricarpos albus* 2 [**keep**] TSHRB 11 Acer glabrum* Adenocaulon bicolor* Alnus viridis 2 Clintonia uniflora* 2 Maianthemum racemosum** Paxistima myrsinites 2 Prosartes* Pteridium aquilinum** Rubus nutkanus 2 Salix scouleriana* 2 Sorbus scopulina** Trillium ovatum*
▶ [**161**] Abies lasiocarpa* 2 Adenocaulon bicolor 2 Goodyera oblongifolia* Linnaea borealis 2 Orthilia secunda* Pedicularis racemosa* Rhododendron albiflorum 2 Rubus lasiococcus** Vaccinium membranaceum* 3 [**keep**] B-LT5*** 2 B-GT5** 2 TSHRB 16 Acer macrophyllum*** 2 Alnus viridis 2 Cornus nuttallii 2 Prosartes* Rosa 3 Salix scouleriana 4
▶ [**165**] Chamaenerion angustifolium* Prunus emarginata 2 Thalictrum occidentale** [**keep**] B-LT5* 9 B-GT5* 4 C-GT5 6 Acer macrophyllum* Adenocaulon bicolor*** Berberis aquifolium** Clintonia uniflora* 2 Cornus nuttallii 2 Maianthemum stellatum 2 Pinus monticola 2 Prosartes* Pseudotsuga menziesii 5 Pteridium aquilinum* Rosa** Spiraea lucida* Trillium ovatum***

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Acer macrophyllum 21 (may be shrubby), Pseudotsuga menziesii 15	Acer glabrum 17	Paxistima myrsinites 13, Prosartes 3	
80-95		Rosa 8, Amelanchier alnifolia 6, Sorbus scopulina 3	Maianthemum racemosum 3	Pteridium aquilinum 2
60-80		Salix scouleriana 11, Berberis aquifolium 0	Clintonia uniflora 6, Spiraea lucida 1, Adenocaulon bicolor 1, Trillium ovatum 0	
40-60	Cornus nuttallii 31, Pinus monticola 4, Thuja plicata 2, Abies lasiocarpa 1, Taxus brevifolia 0	Rubus nutkanus 10, Vaccinium membranaceum 2	Maianthemum stellatum 3, Hieracium albiflorum 1, Berberis nervosa 0, Chimaphila umbellata 0, Lilium 0, Galium 0	Calamagrostis rubescens+ 2
25-40	Pinus ponderosa 1	Alnus viridis 4, Ceanothus velutinus 2, Symphoricarpos albus 0	Eucephalus ledophyllus+ 1, Osmorhiza 1, Chamaenerion angustifolium 0, Actaea rubra 0, Goodyera oblongifolia 0, Orthilia secunda 0	Bromus vulgaris+ 1
10-25	Callitropsis nootkatensis 1	Acer circinatum 33	Canadanthus modestus 1	Festuca occidentalis+ 1

{135} Pseudotsuga menziesii, Acer macrophyllum*, Gaultheria shallon, Holodiscus discolor
Douglas-fir, bigleaf maple*, salal & oceanspray forest
PSEMEN-(ACEMAC)/GAUSHA-HOLDIS



Range: Lowland zone. **OLYM**-8: **nc*** (ne) 290-430m.

Struct: Semi-open mixed conifer-broadleaf forest (34-46m) with substantial conifer regen, very dense shrubs, and substantial ferns & dwarf shrubs. Avg vasc cover 155: shrb 60, conif tree 37, dwf shrb 11, conif regen 9, brdlf tree 0.88 @ 18, fern 0.75 @ 15, tall shrb 0.63 @ 8, forb 0.63 @ 4, brdlf regen 0.5 @ 4, grass 0.38 @ 3.

Ecology: South-facing slopes, on fairly shallow soils often derived from glacial outwash and till. May develop into [152] PSEMEN-TSUHET/GAUSHA-HOLDIS. Regen dominated by *Tsuga heterophylla*, frequently with codominant *Abies grandis*.

Metrics: slope 21-32°, vdp 11-66m, vdr 112-223m, east 26-73, south 88-96, conv 45-59, tpp 51-57, solar 70-75, wet 3

Map class: C08–Olympic dry Douglas-fir forest

Rel to C09: New name for PSEMEN/GAUSHA-HOLDIS; *Acer macrophyllum* is very significant in most NCCN plots.

Similar: O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, MNO:[137] PSEMEN/GAUSHA-MAHNER, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, N:[147] PSEMEN-(PINPON)/SYMALB, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, O:[158] PSEMEN-TSUHET/RHOMAC, MO:[140] PSEMEN/MAHNER/ACHTRI, MO:[151] PSEMEN-TSUHET/ACHTRI.

▶ [**043**] B-LT5* Acer circinatum 9 Adenocaulon bicolor* Cornus nuttallii* Elymus** Galium* Osmorhiza** Paxistima myrsinites** Pinus ponderosa 2 Populus trichocarpa 2 Prosartes** Pteridium aquilinum* Rubus nutkanus** 2 Symphoricarpos albus* 6 [**keep**] Arbutus menziesii 2 Berberis nervosa* 2 Gaultheria shallon*** 2 Holodiscus discolor* Polystichum munitum*** 2 Tsuga heterophylla*** 2
▶ [**136**] FORB 7 Achlys triphylla* Berberis nervosa 12 Bromus vulgaris+* Galium* Goodyera oblongifolia* Lactuca*** Lathyrus polyphyllus 2 Lysimachia latifolia* Osmorhiza* Prosartes* Thuja plicata 2 Vicia** Viola sempervirens* [**keep**] SHRB 16 TSHRB* 3 Alnus rubra 2 Amelanchier alnifolia 2 Arbutus menziesii*** 2 Gaultheria shallon* 12 Holodiscus discolor* Prunus emarginata 2
▶ [**137**] Acer glabrum** 2 Chimaphila umbellata* Festuca occidentalis+* Pinus monticola* 2 Pteridium aquilinum* Taxus brevifolia 2 Vaccinium parvifolium* [**keep**] B-GT5** 2 Abies grandis 2 Acer macrophyllum*** 2 Arbutus menziesii 2 Holodiscus discolor** 2 Prunus emarginata 2
▶ [**139**] FORB 7 Acer glabrum* 2 Achlys triphylla* Berberis nervosa 12 Campanula scouleri* Chimaphila umbellata* Festuca occidentalis+* Lathyrus nevadensis* Lathyrus polyphyllus 2 Lysimachia latifolia* Osmorhiza* Symphoricarpos mollis* Vicia* [**keep**] B-LT5* B-GT5* 7 Acer circinatum*** 2 Acer macrophyllum* Alnus rubra*** 2 Arbutus menziesii* 2 Gaultheria shallon** 5 Luzula hitchcockii+*** Polystichum munitum 6 Prunus emarginata* Rubus ursinus* Tiarella trifoliata* Tsuga heterophylla*
▶ [**152**] Achlys triphylla* Chimaphila menziesii* 2 Lysimachia latifolia 2 Pinus monticola* 2 Pyrola asarifolia+* Tsuga heterophylla 9 [**keep**] B-GT5* 7 TSHRB* Abies grandis*** 2 Acer circinatum 2 Acer macrophyllum** 4 Alnus rubra 2 Prunus emarginata 2 Rubus ursinus*. Note: [152] may occur on cooler, moister sites.

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 37	Gaultheria shallon 48, Holodiscus discolor 9		
80-95	Acer macrophyllum 15, Tsuga heterophylla 5		Berberis nervosa 8	
60-80	Abies grandis 6	Rosa 3	Rubus ursinus 2	Polystichum munitum 13, moss 5
40-60	Arbutus menziesii 6		Linnaea borealis 4	
25-40	Alnus rubra 4	Acer circinatum 5, Prunus emarginata 5, Symphoricarpos albus 4, Amelanchier alnifolia 3	Achlys triphylla 3, Chimaphila umbellata 2, Goodyera oblongifolia 1, Adenocaulon bicolor 1, Tiarella trifoliata 1, Hieracium albiflorum 1, Galium 1, Lysimachia latifolia 0	Bromus vulgaris+ 3, Festuca occidentalis+ 2, Luzula hitchcockii+ 1
10-25	Cornus nuttallii 5, Thuja plicata 1, Taxus brevifolia 1	Malus fusca 3, Frangula purshiana 3, Symphoricarpos mollis 1, Lonicera ciliosa 1, Vaccinium parvifolium 1	Arctostaphylos uva-ursi+ 3, Campanula scouleri 1, Fragaria virginiana 1, Chimaphila menziesii 1, Moehringia macrophylla 1	Pteridium aquilinum 5, Athyrium filix-femina 1, liverwort 1, Polypodium hesperium+ 1, Racomitrium 1

{136} Pseudotsuga menziesii, Acer macrophyllum, Berberis nervosa, Achlys triphylla, Polystichum munitum
Douglas-fir, bigleaf maple, dwarf Oregon-grape, vanillaleaf & sword fern forest
PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN



Range: Lowland zone. **MORA**-1: (sw) 610-620m. **OLYM**-16: **ne*** (nc) 190-420m.

Struct: Closed mixed conifer-broadleaf forest (42-50m) with substantial conifer regen, dense ferns, dense dwarf shrubs, abundant forbs, and substantial shrubs. Avg vasc cover 192: conif tree 60, fern 38, dwf shrb 36, brdlf tree 21, forb 19, shrb 9, grass 0.87 @ 3, conif regen 0.73 @ 7, brdlf regen 0.47 @ 3, tall shrb 0.2 @ 2.

Ecology: Seral forests on fairly gentle midslopes, on nutrient-rich coarse loamy soils. May develop into [159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN. Regen codominated by *Tsuga heterophylla*, *Abies grandis* and/or *Acer macrophyllum*.

Metrics: slope 12-31°, vdp 13-32m, vdr 44-216m, east 12-99, south 41-86, conv 47-53, tpp 28-42, solar 56-70, wet 2-3

Map class: C08–Olympic dry Douglas-fir forest

Rel to C09: Evolved from PSEMEN/GAUSHA-MAHNER/POLMUN, joined by plots called to ACEMAC-(PSEMEN)/POLMUN and other C09 types. Concept may differ; *Gaultheria shallon* is frequently absent and *Tsuga heterophylla* is frequently prominent.

Similar: MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, O:[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, N:[133] PSEMEN/ACECIR/MAHNER, N:[141] PSEMEN/MAHNER/CALRUB. Also see: [153] PSEMEN-TSUHET/GAUSHA-MAHNER, [156] PSEMEN-TSUHET/MAHNER/POLMUN.

▶ [**042**] TSHRB* 4 Acer circinatum** Alnus rubra* 2 Athyrium filix-femina 3 Betula papyrifera** 2 Circaea alpina* 2 Claytonia sibirica+* Dryopteris** Pteridium aquilinum* Rubus nutkanus* Thuja plicata* Tolmiea menziesii** 2 [**keep**] Abies grandis*** 2 Achlys triphylla*** 2 Adenocaulon bicolor* Berberis nervosa* 4 Bromus vulgaris+* Festuca occidentalis+** Gaultheria shallon 2 Goodyera oblongifolia*** Holodiscus discolor** Linnaea borealis** 2 Rosa*

▶ [**135**] SHRB 16 TSHRB* 3 Alnus rubra 2 Amelanchier alnifolia 2 Arbutus menziesii*** 2 Gaultheria shallon* 12 Holodiscus discolor* Prunus emarginata 2 [**keep**] FORB 7 Achlys triphylla* Berberis nervosa 12 Bromus vulgaris+* Galium* Goodyera oblongifolia* Lactuca*** Lathyrus polyphyllus 2 Lysimachia latifolia* Osmorhiza* Prosartes* Thuja plicata 2 Vicia** Viola sempervirens*

▶ [**139**] TSHRB* 3 Acer glabrum*** 2 Amelanchier alnifolia** Chimaphila umbellata* Hieracium albiflorum* Holodiscus discolor 7 Symphoricarpos albus* Symphoricarpos mollis* [**keep**] B-GT5* 8 Acer macrophyllum* 7 Adenocaulon bicolor* Galium* Lactuca*** Polystichum munitum* 6 Rubus ursinus* Thuja plicata 3

▶ [**140**] TSHRB* 3 Abies procera 2 Acer circinatum** Chimaphila umbellata* Hieracium albiflorum* Paxistima myrsinites** Pteridium aquilinum* Rubus lasiococcus** Vaccinium membranaceum** Vaccinium parvifolium* Viola orbiculata+* Xerophyllum tenax** 2 [**keep**] B-GT5*** 2 Abies grandis 2 Acer macrophyllum*** 2 Adenocaulon bicolor** Galium* Holodiscus discolor 2 Lactuca** Lysimachia latifolia* Polystichum munitum** 2 Thuja plicata 2

▶ [**151**] TSHRB* 3 Abies amabilis* Acer circinatum* 6 Chimaphila umbellata* Clintonia uniflora** Cornus unalaschkensis** Tiarella trifoliata* 2 Tsuga heterophylla 12 Vaccinium parvifolium* [**keep**] B-GT5** 2* Acer macrophyllum*** 2 Berberis nervosa 13 Galium** Gaultheria shallon 3 Holodiscus discolor 2 Polystichum munitum* 5

Floristics (15 plots, MORA 1, OLYM 14): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 54, Acer macrophyllum 23		Berberis nervosa 29	Polystichum munitum 36
80-95			Achlys triphylla 7, Galium 2, Lysimachia latifolia 1	moss 35
60-80	Tsuga heterophylla 8	Rosa 4	Linnaea borealis 8, Rubus ursinus 2, Adenocaulon bicolor 2, Lactuca 2, Goodyera oblongifolia 1	Bromus vulgaris+ 2
40-60	Abies grandis 7	Holodiscus discolor 4	Prosartes 1, Osmorhiza 1, Vicia 1, Viola sempervirens 1	Festuca occidentalis+ 2
25-40	Thuja plicata 7	Gaultheria shallon 7, Vaccinium parvifolium 2	Lathyrus polyphyllus 3, Campanula scouleri 1	
10-25		Symphoricarpos albus 2, Symphoricarpos mollis 2	Lathyrus nevadensis 2, Chimaphila umbellata 2, Anemone deltoidea+ 2	Adiantum aleuticum 4, Pteridium aquilinum 2, Athyrium filix-femina 2

{137} Pseudotsuga menziesii, Gaultheria shallon, Berberis nervosa*
Douglas-fir, salal & dwarf Oregon-grape* forest
PSEMEN/GAUSHA-MAHNER



Range: Lowland zone. **MORA**-5: **se** (sw) 640-800m. **NOCA**-1: (cw) 650-660m. **OLYM**-22: **nc*-ne*** (se) 660-850m.

Struct: Semi-open conifer forest (28-38m) with substantial conifer regen, dense shrubs, abundant dwarf shrubs, and substantial forbs. Avg vasc cover 146: conif tree 52, shrb 49, dwf shrb 19, forb 7, conif regen 0.86 @ 15, grass 0.68 @ 1, fern 0.64 @ 3, tall shrb 0.59 @ 5.

Ecology: Fairly steep slopes with southwesterly aspects, on shallow stony soils. May develop from [120] PINCON-PSEMEN/GAUSHA in the absence of fire. Regen a variable mix of *Tsuga heterophylla* and *Pseudotsuga menziesii*.

Metrics: slope 24-35°, vdp 31-83m, vdr 182-321m, east 7-40, south 70-94, conv 48-57, tpp 36-53, solar 65-77, wet 2-3

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Evolved from PSEMEN/GAUSHA-VACPAR, adding plots from PSEMEN-(PINCON)/ARCUVA/RACCAN, PSEMEN-TSUHET/GAUSHA-VACPAR and PSEMEN-TSUHET/GAUSHA-MAHNER.

Similar: O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, O:[158] PSEMEN-TSUHET/RHOMAC, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, O:[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS, NO:[120] PINCON-PSEMEN/GAUSHA.

▶ [**139**] B-GT5* 2 Abies grandis* 2 Acer glabrum 5 Acer macrophyllum** 2 Adenocaulon bicolor* Bromus vulgaris+* Galium** Holodiscus discolor** 2 Lathyrus nevadensis*** Lathyrus polyphyllus 2 Osmorhiza** Symphoricarpos mollis** Vicia*** [**keep**] Acer circinatum** Arctostaphylos columbiana** Gaultheria shallon** 5 Pinus monticola** 2 Pteridium aquilinum* Tsuga heterophylla* Vaccinium parvifolium*
▶ [**152**] B-GT5 2 Arbutus menziesii 2 Holodiscus discolor*** 2 Lysimachia latifolia 2 Tsuga heterophylla 11 [**keep**] TSHRB* Acer glabrum*** 2 Festuca occidentalis+* Hieracium albiflorum* Linnaea borealis* Pteridium aquilinum** Taxus brevifolia** 2 Vaccinium parvifolium**
▶ [**153**] Abies amabilis*** 2 Acer circinatum* Neottia** Pyrola asarifolia+** Thuja plicata* 3 Tsuga heterophylla 12 [**keep**] Acer glabrum* 2 Amelanchier alnifolia* Arctostaphylos columbiana*** Arctostaphylos uva-ursi+* Campanula scouleri*** Festuca occidentalis+** Hieracium albiflorum** Lysimachia latifolia* Pinus monticola 2 Pyrola picta* Symphoricarpos albus*** Taxus brevifolia 3
▶ [**154**] Abies amabilis** Neottia* Rhododendron menziesii* Thuja plicata* 3 Tsuga heterophylla 12 Vaccinium ovalifolium** Vaccinium parvifolium* [**keep**] FORB 3 TSHRB* Acer glabrum*** 2 Achlys triphylla** Berberis nervosa 3 Festuca occidentalis+*** Hieracium albiflorum** Lysimachia latifolia* Rosa** Taxus brevifolia 2
▶ [**158**] TSHRB 8 Pteridium aquilinum 3 Rhododendron macrophyllum*** 2 Tsuga heterophylla 12 Tsuga mertensiana 2 Vaccinium parvifolium 2 [**keep**] Acer glabrum* 2 Achlys triphylla* Festuca occidentalis+** Hieracium albiflorum* Lysimachia latifolia* Polystichum munitum 2 Rosa* Taxus brevifolia 2

Floristics (22 plots, MORA 3, NOCA 1, OLYM 18): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 54	Gaultheria shallon 45		
80-95	Tsuga heterophylla 7		Berberis nervosa 13, Chimaphila umbellata 3	moss 23
60-80		Rosa 2	Linnaea borealis 3	Festuca occidentalis+ 1
40-60		Acer glabrum 3, Vaccinium parvifolium 1	Achlys triphylla 3, Lysimachia latifolia 1, Hieracium albiflorum 1	
25-40	Taxus brevifolia 10, Pinus monticola 4		Chimaphila menziesii 1, Goodyera oblongifolia 1	Polystichum munitum 4, Pteridium aquilinum 2
10-25	Thuja plicata 2, Arbutus menziesii 1	Acer circinatum 5, Arctostaphylos columbiana 3, Symphoricarpos albus 3, Holodiscus discolor 1	Arctostaphylos uva-ursi+ 10, Xerophyllum tenax 4, Viola sempervirens 2, Pyrola picta 1, Collomia 1, Campanula scouleri 1, Rubus ursinus 1, Paxistima myrsinites 1, Spiraea lucida 1	lichen 2, Bromus vulgaris+ 1

{138} Pseudotsuga menziesii, Holodiscus discolor, Calamagrostis rubescens
Douglas-fir, oceanspray & pinegrass forest
PSEMEN/HOLDIS/CALRUB



Range: Lowland and lower montane zones. **NOCA**-9: **ne*** (ce-s) 620-980m.

Struct: Open conifer forest with substantial conifer regen, abundant shrubs, and substantial tall shrubs, grasses, dwarf shrubs & forbs. Avg vasc cover 107: conif tree 38, shrb 20, tall shrb 14, grass 10, dwf shrb 8, forb 7, conif regen 0.89 @ 9, sedge 0.11 @ 2.

Ecology: Fairly steep south-facing slopes, on rocky and typically moss-covered soil. Regen dominated by *Pseudotsuga menziesii*.

Metrics: slope 26-31°, vdp 36-96m, vdr 96-438m, east 13-51, south 83-99, conv 47-56, tpp 29-55, solar 64-80, wet 3

Map class: C07–North Cascades dry Douglas-fir forest

Rel to C09: Same, shedding two plots to [146] PSEMEN-PINPON/CALRUB.

Similar: N:[141] PSEMEN/MAHNER/CALRUB, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[133] PSEMEN/ACECIR/MAHNER, N:[147] PSEMEN-(PINPON)/SYMALB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[146] PSEMEN-PINPON/CALRUB, N:[161] PSEMEN/VACMEM, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[145] PSEMEN-PINPON/ARCNEV, MO:[140] PSEMEN/MAHNER/ACHTRI.

▶ [**133**] Acer circinatum* 13 Berberis nervosa 2 Chimaphila umbellata* Corylus cornuta* 2 Linnaea borealis** Thuja plicata* 2 Tsuga heterophylla** 2 [**keep**] Achillea millefolium*** Antennaria racemosa+** Arctostaphylos uva-ursi+** 2 Arnica cordifolia*** Calamagrostis rubescens+ 2 Ceanothus velutinus** Collomia** Holodiscus discolor 5 Lilium** Pinus ponderosa** 2 Platanthera*** Spiraea lucida 2 Vicia**
▶ [**139**] Acer macrophyllum* Achlys triphylla** 2 Adenocaulon bicolor* Berberis nervosa 2 Bromus vulgaris+* Campanula scouleri* Lathyrus polyphyllus 2 Linnaea borealis** 2 Polystichum munitum* Symphoricarpos mollis* Tsuga heterophylla* 2 [**keep**] Acer circinatum 2 Amelanchier alnifolia* 2 Calamagrostis rubescens+*** 2 Paxistima myrsinites** Pinus ponderosa 2 Spiraea lucida*** 2
▶ [**141**] Acer macrophyllum* Berberis nervosa 2 Calypso bulbosa* Chimaphila umbellata* Lactuca* Linnaea borealis*** 2 Neottia* Pinus contorta* Symphoricarpos albus 2 Thuja plicata* 2 Tsuga heterophylla* Vaccinium membranaceum 2 [**keep**] Achillea millefolium* Ceanothus velutinus** Chamaenerion angustifolium* Heuchera micrantha* Lomatium brandegeei+* Penstemon serrulatus+* Pinus ponderosa** 2 Ribes acerifolium+* Salix scouleriana* Vicia*
▶ [**142**] FORB 12 Abies lasiocarpa 2 Bromus vulgaris+* Cacaliopsis nardosmia** 2 Chamaenerion angustifolium* Erythronium montanum+** Eucephalus ledophyllus+*** Galium* Maianthemum racemosum* 2 Osmorhiza* Paxistima myrsinites 4 Sorbus scopulina** [**keep**] C-LT5 3 SHRB 4 Arctostaphylos uva-ursi+ 2 Berberis aquifolium*** Festuca occidentalis+* Fragaria virginiana* Holodiscus discolor*** 2 Lonicera ciliosa*** Lysimachia latifolia*** Pinus ponderosa 3 Rosa** 2
▶ [**147**] B-LT5*** B-GT5*** Acer macrophyllum*** 2 Adenocaulon bicolor 4 Cornus nuttallii 2 Elymus** 2 Pinus ponderosa* Rubus leucodermis** Symphoricarpos albus 2 [**keep**] Acer circinatum 2 Acer glabrum* Arctostaphylos uva-ursi+ 2 Calamagrostis rubescens+* Festuca occidentalis+* Fragaria virginiana** Goodyera oblongifolia* Lonicera ciliosa* Lysimachia latifolia** Moehringia macrophylla*

Floristics (9 plots, NOCA 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 42	Holodiscus discolor 10, Rosa 5, Amelanchier alnifolia 4	Spiraea lucida 3, Paxistima myrsinites 3	Calamagrostis rubescens+ 9
80-95		Acer glabrum 5, Berberis aquifolium 2, Lonicera ciliosa 2	Lysimachia latifolia 2, Hieracium albiflorum 0	moss 11
60-80			Fragaria virginiana 3, Berberis nervosa 1, Arnica cordifolia 1, Moehringia macrophylla 1, Goodyera oblongifolia 0	Festuca occidentalis+ 1
40-60		Acer circinatum 8, Prunus emarginata 3, Symphoricarpos albus 1, Salix scouleriana 0	Arctostaphylos uva-ursi+ 3, Chimaphila umbellata 1, Platanthera 0, Achillea millefolium 0	
25-40	Pinus ponderosa 12	Corylus cornuta 1, Ceanothus velutinus 0, Vaccinium membranaceum 0	Antennaria racemosa+ 0, Vicia 0, Collomia 0, Lilium 0	
10-25	Pinus contorta 1	Sambucus racemosa 1, Sorbus scopulina 1	Adenocaulon bicolor 2, Lathyrus nevadensis 2, Heuchera micrantha 1, Prosartes 1, Corallorhiza 1, Hieracium scouleri+ 1, Montia 1, Maianthemum racemosum 1	Danthonia 3, Carex geyeri+ 2, Bromus vulgaris+ 1

{139} Pseudotsuga menziesii, Holodiscus discolor, Rosa gymnocarpa, Festuca occidentalis*
Douglas-fir, oceanspray, baldhip rose & western fescue* forest
PSEMEN/HOLDIS-ROSGYM/FESOCC



Range: Lowland and lower montane zones. **MORA**-1: (se) 780-790m. **OLYM**-28: **nc-ne*** 410-930m.

Struct: Mostly closed conifer forest (31-40m) with substantial conifer regen, dense dwarf shrubs, and abundant shrubs & forbs. Avg vasc cover 155: conif tree 57, dwf shrb 36, shrb 21, forb 20, grass 0.89 @ 3, conif regen 0.81 @ 8, tall shrb 0.67 @ 11, fern 0.67 @ 4, brdlf tree 0.33 @ 5, brdlf regen 0.19 @ 2.

Ecology: Fairly steep slopes with southerly aspects, on well-drained shallow soils. Despite the association name, *Berberis nervosa* is the most abundant shrub in the NCCN plots. Regen a variable mix of *Pseudotsuga menziesii*, *Tsuga heterophylla* and/or *Abies grandis*.

Metrics: slope 21-37°, vdp 24-110m, vdr 161-612m, east 12-86, south 76-94, conv 48-60, tpp 38-64, solar 57-77, wet 2-3

Map class: C08–Olympic dry Douglas-fir forest

Rel to C09: Similar, adding plots from PSEMEN/MAHNER/ACHTRI.

Similar: N:[141] PSEMEN/MAHNER/CALRUB, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, N:[133] PSEMEN/ACECIR/MAHNER, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[137] PSEMEN/GAUSHA-MAHNER, N:[138] PSEMEN/HOLDIS/CALRUB, MO:[151] PSEMEN-TSUHET/ACHTRI, O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, O:[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS. Also see: [025] ABILAS-PSEMEN/MAHNER.

▶ [**133**] TSHRB 16 Acer circinatum*** 2 Acer glabrum* Amelanchier alnifolia* Corylus cornuta*** 2 Lonicera ciliosa* Paxistima myrsinites** 2 Spiraea lucida*** Thuja plicata* [**keep**] FORB 7 Acer glabrum 6 Achlys triphylla*** 2 Adenocaulon bicolor* Bromus vulgaris+* Campanula scouleri*** Festuca occidentalis+* Holodiscus discolor 5 Lathyrus nevadensis** Lathyrus polyphyllus 2 Linnaea borealis 4 Polystichum munitum* Symphoricarpos albus* Symphoricarpos mollis* Vicia**
▶ [**136**] B-GT5* 8 Acer macrophyllum* 7 Adenocaulon bicolor* Galium* Lactuca*** Polystichum munitum* 6 Rubus ursinus* Thuja plicata 3 [**keep**] TSHRB* 3 Acer glabrum*** 2 Amelanchier alnifolia** Chimaphila umbellata* Hieracium albiflorum* Holodiscus discolor 7 Symphoricarpos albus* Symphoricarpos mollis*
▶ [**137**] Acer circinatum** Arctostaphylos columbiana** Gaultheria shallon** 5 Pinus monticola** 2 Pteridium aquilinum* Tsuga heterophylla* Vaccinium parvifolium* [**keep**] B-GT5* 2 Abies grandis* 2 Acer glabrum 5 Acer macrophyllum** 2 Adenocaulon bicolor* Bromus vulgaris+* Galium** Holodiscus discolor** 2 Lathyrus nevadensis*** Lathyrus polyphyllus 2 Osmorhiza** Symphoricarpos mollis** Vicia***
▶ [**140**] Abies amabilis** Abies procera 2 Acer circinatum*** 2 Gaultheria ovatifolia*** Maianthemum stellatum** Pteridium aquilinum** Rubus lasiococcus** Vaccinium membranaceum*** Vaccinium parvifolium* Viola orbiculata+*** Xerophyllum tenax*** 2 [**keep**] B-GT5 2 SHRB 7 Abies grandis 2 Acer glabrum 4 Acer macrophyllum** Adenocaulon bicolor* Bromus vulgaris+* Campanula scouleri* Festuca occidentalis+* Holodiscus discolor** 2 Lathyrus polyphyllus 2 Polystichum munitum* Rosa* 2 Symphoricarpos albus* Symphoricarpos mollis*
▶ [**141**] Acer circinatum*** 2 Amelanchier alnifolia* Berberis aquifolium 2 Calamagrostis rubescens+*** 2 Goodyera oblongifolia* Hieracium albiflorum* Lonicera ciliosa* Paxistima myrsinites** Spiraea lucida*** Symphoricarpos albus 4 Vaccinium membranaceum 2 [**keep**] B-GT5* 2 Abies grandis** 2 Acer glabrum 6 Achlys triphylla** 2 Adenocaulon bicolor** Bromus vulgaris+* Campanula scouleri** Galium* Lathyrus polyphyllus 2 Polystichum munitum* 2 Symphoricarpos mollis*

Floristics (27 plots, MORA 1, OLYM 26): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 57	Rosa 5	Berberis nervosa 27	
80-95		Holodiscus discolor 14		
60-80			Achlys triphylla 6, Chimaphila umbellata 4, Lysimachia latifolia 2	moss 46, Festuca occidentalis+ 2
40-60	Tsuga heterophylla 5, Acer macrophyllum 4	Symphoricarpos albus 2, Symphoricarpos mollis 2, Amelanchier alnifolia 1	Linnaea borealis 10, Hieracium albiflorum 3, Campanula scouleri 2, Adenocaulon bicolor 1, Goodyera oblongifolia 1	Polystichum munitum 4, Bromus vulgaris+ 2
25-40	Abies grandis 4	Acer glabrum 14, Berberis aquifolium 1	Lathyrus polyphyllus 7, Lathyrus nevadensis 2, Galium 2, Osmorhiza 2, Moehringia macrophylla 2, Rubus ursinus 1, Chimaphila menziesii 1, Vicia 1	
10-25	Taxus brevifolia 14, Thuja plicata 2	Gaultheria shallon 2, Vaccinium parvifolium 2, Ribes lacustre 2	Sedum spathulifolium 9, Lupinus latifolius 6, Arctostaphylos uva-ursi+ 4, Penstemon serrulatus+ 2, Fragaria vesca 2, Lactuca 2, Maianthemum racemosum 2	lichen 3, Pteridium aquilinum 2, Melica subulata+ 2

{140} Pseudotsuga menziesii, Berberis nervosa, Achlys triphylla
Douglas-fir, dwarf Oregon-grape & vanillaleaf forest
PSEMEN/MAHNER/ACHTRI



Range: Lower montane. **MORA**-20: **se*** (ne) 810-1060m. **OLYM**-1: (nc) 230-240m.

Struct: Mostly closed conifer forest (25-34m) with substantial conifer regen, abundant dwarf shrubs & forbs, and substantial tall shrubs & ferns. Avg vasc cover 132: conif tree 64, dwf shrb 24, forb 20, conif regen 8, tall shrb 7, shrb 0.93 @ 4, fern 0.87 @ 5.

Ecology: Seral forests on fairly steep slopes with southerly aspects. Evidence of past fire or windthrow is usually apparent. May develop into [151] PSEMEN-TSUHET/ACHTRI. Regen a variable mix of *Tsuga heterophylla* and *Pseudotsuga menziesii*.

Metrics: slope 26-35°, vdp 31-79m, vdr 63-240m, east 16-69, south 77-97, conv 47-55, tpp 34-52, solar 68-85, wet 2-3

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Similar, shedding plots to [139] PSEMEN/HOLDIS-ROSGYM/FESOCC and adding from PSEMEN-TSUHET/MAHNER, PSEMEN/ACECIR/MAHNER and PSEMEN/ACHTRI. In NCCN plots *Pteridium aquilinum* is as frequent as *Berberis nervosa*, and more so than *Achlys triphylla*.

Similar: MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, N:[133] PSEMEN/ACECIR/MAHNER, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[137] PSEMEN/GAUSHA-MAHNER, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, N:[141] PSEMEN/MAHNER/CALRUB, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, O:[158] PSEMEN-TSUHET/RHOMAC.

▶ [**003**] Abies amabilis* 2 Chimaphila umbellata 2 Clintonia uniflora* Orthilia secunda** Polystichum munitum* 2 Tsuga heterophylla 13 Vaccinium ovalifolium*** [**keep**] Amelanchier alnifolia** Berberis nervosa 7 Gaultheria ovatifolia* Hieracium albiflorum** Lysimachia latifolia* Paxistima myrsinites*** Pteridium aquilinum*** Rubus ursinus* Viola orbiculata+* Viola sempervirens* Xerophyllum tenax* 3
▶ [**133**] TSHRB 12 Acer circinatum 12 Acer glabrum* Amelanchier alnifolia* Corylus cornuta* 2 Goodyera oblongifolia* Holodiscus discolor* 2 Lonicera ciliosa*** Lysimachia latifolia* Paxistima myrsinites 2 Rosa* Spiraea lucida** Thuja plicata** 2 [**keep**] FORB 7 Abies amabilis* Abies procera 2 Achlys triphylla*** 2 Gaultheria ovatifolia*** Maianthemum stellatum* Pteridium aquilinum* 2 Rubus lasiococcus*** Rubus ursinus* Viola orbiculata+*** Viola sempervirens*** Xerophyllum tenax*** 2
▶ [**139**] B-GT5 2 SHRB 7 Abies grandis 2 Acer glabrum 4 Acer macrophyllum** Adenocaulon bicolor* Bromus vulgaris+* Campanula scouleri* Festuca occidentalis+* Holodiscus discolor** 2 Lathyrus polyphyllus 2 Polystichum munitum* Rosa* 2 Symphoricarpos albus* Symphoricarpos mollis* [**keep**] Abies amabilis** Abies procera 2 Acer circinatum*** 2 Gaultheria ovatifolia*** Maianthemum stellatum** Pteridium aquilinum** Rubus lasiococcus** Vaccinium membranaceum*** Vaccinium parvifolium* Viola orbiculata+*** Xerophyllum tenax*** 2
▶ [**151**] Abies grandis* 2 Adenocaulon bicolor* Clintonia uniflora* Polystichum munitum* Rosa 2 Thuja plicata** 2 Tiarella trifoliata* Tsuga heterophylla 13 [**keep**] Amelanchier alnifolia* Gaultheria ovatifolia** Hieracium albiflorum*** Paxistima myrsinites* Pteridium aquilinum* 2 Rubus lasiococcus* Rubus ursinus* Vaccinium membranaceum* Viola orbiculata+*** Xerophyllum tenax* 2. Note: [151] is in moister sites.
▶ [**157**] Pinus monticola* Thuja plicata** 2 Tsuga heterophylla 12 Vaccinium membranaceum* 2 [**keep**] FORB 7 Abies procera 2 Achlys triphylla*** 2 Berberis nervosa 4 Rubus ursinus** Xerophyllum tenax 2

Floristics (15 plots, MORA 14, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 62			
80-95	Tsuga heterophylla 8	Acer circinatum 8, Vaccinium parvifolium 2	Berberis nervosa 19, Achlys triphylla 6, Rubus ursinus 2	moss 21, Pteridium aquilinum 5
60-80			Linnaea borealis 5, Hieracium albiflorum 2, Chimaphila umbellata 1	
40-60	Abies amabilis 1	Amelanchier alnifolia 2, Rosa 1, Vaccinium membranaceum 1	Xerophyllum tenax 9, Lysimachia latifolia 3, Rubus lasiococcus 1, Viola sempervirens 1, Gaultheria ovatifolia 1, Paxistima myrsinites 1, Maianthemum stellatum 1, Viola orbiculata+ 1, Chimaphila menziesii 1	
25-40	Abies procera 3	Sorbus sitchensis 1	Cornus unalaschkensis 2, Goodyera oblongifolia 1, Neottia 1, Penstemon serrulatus+ 1, Moehringia macrophylla 1	
10-25	Pinus monticola 2, Taxus brevifolia 2	Gaultheria shallon 2, Acer glabrum 2	Tiarella trifoliata 2, Lupinus latifolius 2, Fragaria virginiana 2	lichen 2

{141} Pseudotsuga menziesii, Berberis nervosa, Calamagrostis rubescens
Douglas-fir, dwarf Oregon-grape & pinegrass forest
PSEMEN/MAHNER/CALRUB



Range: Lowland zone. **NOCA**-14: **ne*** (ce) 560-750m.

Struct: Semi-open conifer forest with substantial conifer regen, abundant shrubs & dwarf shrubs, and substantial tall shrubs, forbs & grasses. Avg vasc cover 132: conif tree 51, shrb 25, dwf shrb 24, conif regen 8, tall shrb 8, forb 7, grass 7, brdlf regen 0.21 @ 4.

Ecology: Fairly gentle slopes with southerly aspects. Evidence of past fire is usually apparent. Regen dominated by *Pseudotsuga menziesii*.

Metrics: slope 14-30°, vdp 13-34m, vdr 64-283m, east 21-68, south 70-98, conv 48-54, tpp 23-51, solar 62-71, wet 3-4

Map class: C07–North Cascades dry Douglas-fir forest

Rel to C09: Similar, gaining plots from PSEMEN/VACMEM and PSEMEN-(PINPON)/SYMALB.

Similar: N:[133] PSEMEN/ACECIR/MAHNER, N:[138] PSEMEN/HOLDIS/CALRUB, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[161] PSEMEN/VACMEM, N:[142] PSEMEN/PAXMYR-SPIBET, MO:[151] PSEMEN-TSUHET/ACHTRI, N:[143] PSEMEN-PINCON/ARCNEV.

▶ [**133**] B-GT5* TSHRB 13 Acer circinatum 7 Betula papyrifera* Corylus cornuta* Galium* Prosartes** Pteridium aquilinum* Rubus nutkanus* Vaccinium parvifolium* [**keep**] Arctostaphylos uva-ursi+* 2 Arnica cordifolia*** Berberis aquifolium 2 Calamagrostis rubescens+* 2 Calypso bulbosa* Hieracium albiflorum* Lactuca* Lilium*** Moehringia macrophylla* Neottia* Pinus contorta* Symphoricarpos albus 3 Vaccinium membranaceum 2
▶ [**138**] Achillea millefolium* Ceanothus velutinus** Chamaenerion angustifolium* Heuchera micrantha* Lomatium brandegeei+* Penstemon serrulatus+* Pinus ponderosa** 2 Ribes acerifolium+* Salix scouleriana* Vicia* [**keep**] Acer macrophyllum* Berberis nervosa 2 Calypso bulbosa* Chimaphila umbellata* Lactuca* Linnaea borealis*** 2 Neottia* Pinus contorta* Symphoricarpos albus 2 Thuja plicata* 2 Tsuga heterophylla* Vaccinium membranaceum 2
▶ [**139**] B-GT5* 2 Abies grandis** 2 Acer glabrum 6 Achlys triphylla** 2 Adenocaulon bicolor** Bromus vulgaris+* Campanula scouleri** Galium* Lathyrus polyphyllus 2 Polystichum munitum* 2 Symphoricarpos mollis* [**keep**] Acer circinatum*** 2 Amelanchier alnifolia* Berberis aquifolium 2 Calamagrostis rubescens+*** 2 Goodyera oblongifolia* Hieracium albiflorum* Lonicera ciliosa* Paxistima myrsinites** Spiraea lucida*** Symphoricarpos albus 4 Vaccinium membranaceum 2
▶ [**140**] Abies procera 2 Achlys triphylla*** 2 Pteridium aquilinum*** 2 Rubus ursinus* Tsuga heterophylla* Vaccinium parvifolium** Xerophyllum tenax 2 [**keep**] SHRB 7 Amelanchier alnifolia* Arctostaphylos uva-ursi+ 2 Berberis aquifolium 2 Calamagrostis rubescens+*** Goodyera oblongifolia* Holodiscus discolor** Lonicera ciliosa*** Lysimachia latifolia* Rosa* Spiraea lucida*** Symphoricarpos albus 2 Thuja plicata 2 Vaccinium membranaceum 2
▶ [**157**] Gaultheria ovatifolia** Pinus monticola** Pyrola asarifolia+** Thuja plicata* Tsuga heterophylla* 8 Vaccinium membranaceum* Vaccinium parvifolium* [**keep**] Acer glabrum 2 Amelanchier alnifolia* Berberis aquifolium*** 2 Berberis nervosa 4 Calamagrostis rubescens+** Festuca occidentalis+* Fragaria virginiana** Holodiscus discolor** Lonicera ciliosa*** Lysimachia latifolia** Moehringia macrophylla** Rosa 2 Spiraea lucida* Symphoricarpos albus 2

Floristics (14 plots, NOCA 14): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 55	Lonicera ciliosa 2	Berberis nervosa 13	moss 37
80-95		Rosa 3, Amelanchier alnifolia 2	Spiraea lucida 3, Lysimachia latifolia 2, Chimaphila umbellata 2, Paxistima myrsinites 2, Hieracium albiflorum 1, Goodyera oblongifolia 0	Calamagrostis rubescens+ 5
60-80		Holodiscus discolor 4, Acer circinatum 4	Linnaea borealis 5	Festuca occidentalis+ 2
40-60		Vaccinium membranaceum 17, Berberis aquifolium 5, Acer glabrum 4	Fragaria virginiana 1, Arnica cordifolia 1, Moehringia macrophylla 0, Calypso bulbosa 0	
25-40	Thuja plicata 6, Tsuga heterophylla 5, Acer macrophyllum 3, Pinus contorta 1	Symphoricarpos albus 15, Corylus cornuta 3	Arctostaphylos uva-ursi+ 8, Lactuca 0, Lilium 0, Neottia 0	
10-25		Gaultheria shallon 2, Prunus emarginata 1, Salix scouleriana 1	Lupinus latifolius 6, Orthilia secunda 1, Collomia 1, Rubus ursinus 1, Chimaphila menziesii 1, Pyrola picta 1, Platanthera 1	lichen 3, Elymus 2, Polypodium hesperium+ 1, Cryptogramma acrostichoides 1

{142} Pseudotsuga menziesii, Paxistima myrsinites, Spiraea lucida
Douglas-fir, Oregon-box & white spirea forest/woodland
PSEMEN/PAXMYR-SPIBET



Range: Lower montane and lowland zones. **NOCA**-9: **s*** 900-1110m.

Struct: Open conifer forest with scant mixed conifer-broadleaf regen, abundant forbs & dwarf shrubs, and substantial tall shrubs. Avg vasc cover 104: conif tree 35, forb 29, dwf shrb 20, tall shrb 10, grass 5, shrb 0.71 @ 2, conif regen 0.71 @ 2, fern 0.57 @ 2.

Ecology: Dry south-facing midslopes and upper slopes. Evidence of past fire is usually present. Often contains larger gaps with post-fire tall shrublands, e.g. [**078**], [**130**], [**165**]. Regen usually dominated by *Pseudotsuga menziesii*.

Metrics: slope 14-31°, vdp 12-118m, vdr 59-228m, east 37-66, south 95-99, conv 48-58, tpp 21-58, solar 72-83, wet 3-4

Map class: C16–North Casc Doug-fir & subalpine fir woodland

Rel to C09: Same, but shedding plots to [146] PSEMEN-PINPON/CALRUB, [119] PINCON/PAXMYR/CALRUB, [130] PRUEMA-AMEALN-CEAVEL/MAIRAC and [145] PSEMEN-PINPON/ARCNEV.

Similar: N:[161] PSEMEN/VACMEM, N:[146] PSEMEN-PINPON/CALRUB, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, N:[141] PSEMEN/MAHNER/CALRUB, N:[138] PSEMEN/HOLDIS/CALRUB, N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[143] PSEMEN-PINCON/ARCNEV, N:[130] PRUEMA-AMEALN-CEAVEL/MAIRAC. Also see: [145] PSEMEN-PINPON/ARCNEV.

▶ [**026**] C-LT5 3 SHRB 4 Abies amabilis* Abies lasiocarpa* 8 Arctostaphylos uva-ursi+ 2 Linnaea borealis 2 Orthilia secunda* Pedicularis racemosa* Pinus monticola* Rubus lasiococcus* 2 Salix scouleriana* Vaccinium membranaceum* 3 [**keep**] FORB 15 Acer circinatum 2 Acer glabrum* Adenocaulon bicolor 2 Bromus vulgaris+* Cacaliopsis nardosmia* 7 Erythronium montanum+* Galium** Lilium* Maianthemum racemosum* 2 Platanthera*** Prunus emarginata** Spiraea lucida*

▶ [**078**] SHRB 4 Arctostaphylos uva-ursi+* 2 Calamagrostis rubescens+ 6 Carex geyeri+* Ceanothus velutinus* 2 Chamaenerion angustifolium 2 Collomia* Holodiscus discolor* Prunus emarginata 2 Salix scouleriana* [**keep**] C-GT5 6 FORB 13 Adenocaulon bicolor 2 Bromus vulgaris+*** Cacaliopsis nardosmia 2 Chimaphila umbellata*** Erythronium montanum+* Galium** Goodyera oblongifolia*** Lilium** Maianthemum racemosum* 2 Osmorhiza** Platanthera*** Pseudotsuga menziesii 6 Sorbus scopulina*

▶ [**141**] SHRB 4 Arctostaphylos uva-ursi+ 2 Berberis aquifolium* Berberis nervosa* 2 Festuca occidentalis+* Fragaria virginiana* Holodiscus discolor** Linnaea borealis** Lonicera ciliosa** Lysimachia latifolia** Rosa* Symphoricarpos albus 2 Thuja plicata 2 Vaccinium membranaceum 2 [**keep**] FORB 11 Abies lasiocarpa 2 Adenocaulon bicolor 2 Bromus vulgaris+* Cacaliopsis nardosmia** 2 Chamaenerion angustifolium*** Erythronium montanum+** Eucephalus ledophyllus+*** Galium* Maianthemum racemosum** 2 Paxistima myrsinites 3 Platanthera* Prunus emarginata* Sorbus scopulina***

▶ [**146**] Achillea millefolium* Anaphalis margaritacea* Antennaria racemosa+* Arctostaphylos uva-ursi+* Balsamorhiza sagittata* Berberis aquifolium* Bromus tectorum+* Calamagrostis rubescens+ 7 Collomia* Elymus 2 Holodiscus discolor 2 Pinus ponderosa* 3 Pseudoroegneria spicata* 2 [**keep**] FORB 11 Abies lasiocarpa 2 Acer circinatum 2 Acer glabrum* Amelanchier alnifolia 2 Bromus vulgaris+** Cacaliopsis nardosmia 3 Chimaphila umbellata** Erythronium montanum+*** Eucephalus ledophyllus+*** Goodyera oblongifolia** Lilium** Maianthemum racemosum** 2 Prunus emarginata** Sorbus scopulina**

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 32	Sorbus scopulina 2	Paxistima myrsinites 14, Spiraea lucida 6, Maianthemum racemosum 3	
80-95		Amelanchier alnifolia 4	Moehringia macrophylla 2, Eucephalus ledophyllus+ 1, Goodyera oblongifolia 0	Calamagrostis rubescens+ 4
60-80		Acer glabrum 2, Prunus emarginata 0	Chamaenerion angustifolium 1, Arnica cordifolia 0	moss 3
40-60	Abies lasiocarpa 5	Acer circinatum 3, Vaccinium membranaceum 1, Ceanothus velutinus 0	Cacaliopsis nardosmia 30, Adenocaulon bicolor 5, Osmorhiza 1, Prosartes 1, Chimaphila umbellata 1, Hieracium albiflorum 1, Thalictrum occidentale 0, Erythronium montanum+ 0, Hieracium scouleri+ 0, Galium 0, Lilium 0, Platanthera 0	Pteridium aquilinum 2, Bromus vulgaris+ 2, Elymus 1
25-40	Acer macrophyllum 2, Picea engelmannii 2, Pinus contorta 2, Pinus ponderosa 2	Rubus nutkanus 2, Symphoricarpos albus 1	Maianthemum stellatum 3, Clintonia uniflora 3, Lomatium brandegeei+ 0, Apocynum androsaemifolium 0, Pedicularis bracteosa 0	
10-25		Salix scouleriana 12, Rosa 1	Pedicularis racemosa 1	Carex geyeri+ 1

{143} Pseudotsuga menziesii, Pinus contorta, Arctostaphylos nevadensis
Douglas-fir, lodgepole pine & pinemat manzanita woodland
PSEMEN-PINCON/ARCNEV



Range: Lower montane. **NOCA**-13: **ne-s*** 850-1180m.

Struct: Conifer woodland with substantial conifer regen, dense dwarf shrubs, and substantial grasses & shrubs. Avg vasc cover 87: dwf shrb 40, conif tree 22, conif regen 9, grass 6, shrb 6, forb 3, tall shrb 0.9 @ 2.

Ecology: Fairly gentle west-facing slopes, on very rocky soils. Trees are slow-growing. Regen dominated by *Pseudotsuga menziesii*, frequently with smaller amounts of *Abies lasiocarpa* and/or *Pinus contorta*.

Metrics: slope 13-20°, vdp 20-106m, vdr 138-311m, east 1-16, south 54-86, conv 50-57, tpp 23-63, solar 60-69, wet 3-4

Map class: C15–Lodgepole pine & Douglas-fir woodland

Rel to C09: Same, shedding a few plots to [144] PSEMEN-(PINCON)/ARCUVA/RACCAN. Concept may differ; NCCN plots are strongly west-facing and contain no *Tsuga heterophylla*.

Similar: MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[121] PINCON/VACMEM, N:[119] PINCON/PAXMYR/CALRUB, N:[161] PSEMEN/VACMEM, N:[061] ARCNEV-PAXMYR/CALRUB, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, O:[023] ABILAS-(PINCON)/LUPARC, O:[022] ABILAS-(PINCON)/JUNCOM-LOMMAR, N:[142] PSEMEN/PAXMYR-SPIBET, N:[145] PSEMEN-PINPON/ARCNEV.

▶ [**061**] Achillea millefolium** Cryptogramma acrostichoides* Eremogone capillaris* Eriogonum umbellatum** Penstemon serrulatus+** Pinus ponderosa* Pseudoroegneria spicata** 2 [**keep**] C-LT5 2 C-GT5* 4 SHRB 2 Abies lasiocarpa* Chimaphila umbellata*** Hieracium albiflorum** Pinus contorta** 3 Pinus monticola* 2 Pseudotsuga menziesii 3 Salix scouleriana* Sorbus scopulina* Spiraea lucida* Vaccinium membranaceum* 2
▶ [**119**] Achillea millefolium** Berberis nervosa* Ceanothus velutinus* Holodiscus discolor** Lysimachia latifolia** Racomitrium* Rosa* Rubus nutkanus** Shepherdia canadensis** Spiraea lucida* 3 [**keep**] Abies lasiocarpa*** 2 Arctostaphylos uva-ursi+ 6 Pinus monticola** 2 Sorbus scopulina** Vaccinium membranaceum*
▶ [**121**] SHRB 11 TSHRB 3 Alnus viridis** 2 Amelanchier alnifolia 2 Orthilia secunda** Rubus lasiococcus*** Vaccinium membranaceum 11 [**keep**] Carex geyeri+* Juniperus communis* Lupinus latifolius* Pinus monticola 2
▶ [**144**] Berberis nervosa* Festuca occidentalis+* Gaultheria shallon* 2 Holodiscus discolor 2 Linnaea borealis* Penstemon procerus+* Racomitrium* Rosa* Tsuga heterophylla* 2 [**keep**] Abies lasiocarpa** Calamagrostis rubescens+* Hieracium scouleri+*** Salix scouleriana*
▶ [**161**] FORB 4 TSHRB 3 Abies amabilis* Acer glabrum** 2 Adenocaulon bicolor 2 Chamaenerion angustifolium* Chimaphila umbellata* Eucephalus ledophyllus+** Goodyera oblongifolia* Linnaea borealis 5 Maianthemum racemosum** Orthilia secunda*** Pedicularis racemosa* Rhododendron albiflorum 2 Rubus lasiococcus** Rubus nutkanus 2 [**keep**] Arctostaphylos uva-ursi+** 4 Hieracium scouleri+*** Pinus contorta* 3

Floristics (10 plots, NOCA 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 14, Pinus contorta 10		Arctostaphylos uva-ursi+ 31, Paxistima myrsinites 6	
80-95		Vaccinium membranaceum 6, Salix scouleriana 1		Calamagrostis rubescens+ 6
60-80	Abies lasiocarpa 4	Amelanchier alnifolia 1	Hieracium scouleri+ 0	moss 18
40-60	Pinus monticola 3	Sorbus scopulina 0	Spiraea lucida 2, Hieracium albiflorum 1, Chimaphila umbellata 0	lichen 11
25-40			Apocynum androsaemifolium 1, Lupinus latifolius 0, Juniperus communis 0	Carex geyeri+ 1
10-25	Thuja plicata 4, Abies amabilis 2, Picea engelmannii 2, Pinus ponderosa 1, Taxus brevifolia 1	Ceanothus velutinus 2, Rosa 1	Vaccinium cespitosum 8, Vaccinium scoparium+ 4, Lewisia 3, Linnaea borealis 3, Antennaria racemosa+ 2, Lomatium brandegeei+ 1, Neottia 1, Chamaenerion angustifolium 1, Eremogone capillaris 1, Phlox diffusa 1	Racomitrium 12, Festuca viridula 3, Danthonia 1, Juncus parryi+ 1

{144} Pseudotsuga menziesii, Pinus contorta*, Arctostaphylos uva-ursi, Racomitrium canescens
Douglas-fir, lodgepole pine*, kinnikinnick & racomitrium forest/woodland
PSEMEN-(PINCON)/ARCUVA/RACCAN



Range: Lowland zone at NOCA, lower montane zone at OLYM. **MORA**-2: (ne-sw) 890-1070m. **NOCA**-26: **ne*-ce*** (cw) 550-740m. **OLYM**-5: **ne** 1180-1290m.

Struct: Open conifer forest (18-24m) with substantial conifer regen, dense mosses, abundant dwarf shrubs, and substantial shrubs & forbs. Avg vasc cover 92: conif tree 37, dwf shrb 27, forb 6, conif regen 0.93 @ 10, shrb 0.93 @ 7, grass 0.76 @ 3, tall shrb 0.72 @ 3, fern 0.48 @ 3.

Ecology: Very well-drained shallow soils on rocky slopes and ridgetops (NOCA and OLYM), or on gently sloping lahars and lava flows (MORA). Regen dominated by *Pseudotsuga menziesii*, frequently with smaller amounts of *Pinus contorta*. Lahar occurrences have *Arctostaphylos nevadensis* instead of *A. uva-ursi*, and *Pleurozium schreberi* or *Hylocomium splendens* the dominant moss.

Metrics: slope 7-29°, vdp 19-137m, vdr 119-392m, east 9-67, south 69-97, conv 50-62, tpp 41-66, solar 65-75, wet 2-4

Map class: C15–Lodgepole pine & Douglas-fir woodland

Rel to C09: Same.

Similar: N:[143] PSEMEN-PINCON/ARCNEV, N:[119] PINCON/PAXMYR/CALRUB, NO:[120] PINCON-PSEMEN/GAUSHA, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, N:[141] PSEMEN/MAHNER/CALRUB, N:[121] PINCON/VACMEM, N:[161] PSEMEN/VACMEM, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[142] PSEMEN/PAXMYR-SPIBET, N:[061] ARCNEV-PAXMYR/CALRUB.

▶ [**119**] Achillea millefolium* Calamagrostis rubescens+* Ceanothus velutinus*** 2 Chamaenerion angustifolium* Erythronium montanum+* Hieracium scouleri+** Lysimachia latifolia* Paxistima myrsinites 4 Rubus nutkanus** Salix scouleriana* Shepherdia canadensis* Spiraea lucida 2 [**keep**] Arctostaphylos uva-ursi+ 6 Festuca occidentalis+* Holodiscus discolor 2 Pinus monticola* Thuja plicata* Tsuga heterophylla 2
▶ [**120**] SHRB 13 Gaultheria shallon* 7 Pinus monticola 2 Pyrola picta* Vaccinium parvifolium* [**keep**] Amelanchier alnifolia* Arctostaphylos uva-ursi+* 7 Calamagrostis rubescens+* Cryptogramma acrostichoides** Festuca occidentalis+** Goodyera oblongifolia*** Hieracium albiflorum* Holodiscus discolor* 2 Penstemon procerus+** Racomitrium*
▶ [**141**] SHRB 11 Acer circinatum** Acer glabrum* Arnica cordifolia*** Berberis aquifolium** Berberis nervosa 3 Calypso bulbosa** Corylus cornuta 2 Fragaria virginiana* Goodyera oblongifolia* Lonicera ciliosa** Lysimachia latifolia** Moehringia macrophylla* Symphoricarpos albus 2 Thuja plicata 2 Vaccinium membranaceum 5 [**keep**] Arctostaphylos uva-ursi+* Pinus contorta* 2 Racomitrium*** 2
▶ [**143**] Abies lasiocarpa** Calamagrostis rubescens+* Hieracium scouleri+*** Salix scouleriana* [**keep**] Berberis nervosa* Festuca occidentalis+* Gaultheria shallon* 2 Holodiscus discolor 2 Linnaea borealis* Penstemon procerus+* Racomitrium* Rosa* Tsuga heterophylla* 2
▶ [**157**] Abies amabilis*** Acer circinatum* Gaultheria ovatifolia* Goodyera oblongifolia* Linnaea borealis* Orthilia secunda* Pyrola asarifolia+** Thuja plicata* 3 Tsuga heterophylla* Vaccinium parvifolium* [**keep**] Arctostaphylos uva-ursi+* 4 Calamagrostis rubescens+* Festuca occidentalis+* Gaultheria shallon* 2 Penstemon procerus+*** Pinus contorta* 2 Racomitrium*** 2 Salix scouleriana* Spiraea lucida*

Floristics (29 plots, MORA 1, NOCA 23, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 26		Arctostaphylos uva-ursi+ 20	
80-95	Pinus contorta 17		Paxistima myrsinites 3	moss 26
60-80		Vaccinium membranaceum 3	Chimaphila umbellata 2, Spiraea lucida 1, Hieracium albiflorum 1	lichen 10
40-60		Gaultheria shallon 4, Rosa 2, Amelanchier alnifolia 1, Salix scouleriana 1	Linnaea borealis 2, Berberis nervosa 2	Racomitrium 15, Festuca occidentalis+ 1
25-40	Tsuga heterophylla 9, Thuja plicata 2, Pinus monticola 1	Holodiscus discolor 3, Vaccinium parvifolium 1	Penstemon procerus+ 1, Goodyera oblongifolia 1	Calamagrostis rubescens+ 4, Cryptogramma acrostichoides 0
10-25	Abies lasiocarpa 4	Acer circinatum 5, Arctostaphylos columbiana 4, Acer glabrum 1	Lupinus latifolius 5, Lysimachia latifolia 2, Penstemon serrulatus+ 2, Campanula scouleri 2, Gaultheria ovatifolia 2, Juniperus communis 1, Fragaria virginiana 1, Moehringia macrophylla 1, Allotropa virgata 1, Pyrola picta 1, Orthilia secunda 1, Neottia 1, Apocynum androsaemifolium 1, Micranthes tolmiei+ 1	Pteridium aquilinum 14, Luzula hitchcockii+ 1

{145} Pseudotsuga menziesii, Pinus ponderosa, Arctostaphylos nevadensis
Douglas-fir, ponderosa pine & pinemat manzanita woodland
PSEMEN-PINPON/ARCNEV



Range: Lowland zone. **NOCA**-19: **s*** (ne) 480-830m.

Struct: Conifer woodland with prominent conifer regen, dense dwarf shrubs and abundant grasses. Avg vasc cover 89: dwf shrb 32, conif tree 28, grass 16, conif regen 4, forb 3, shrb 0.95 @ 2, tall shrb 0.89 @ 2, fern 0.68 @ 1, sedge 0.16 @ 2.

Ecology: Fairly gentle rocky slopes and ridgetops. Regen dominated by *Pseudotsuga menziesii*, usually with smaller amounts of *Pinus ponderosa*.

Metrics: slope 11-33°, vdp 8-101m, vdr 15-199m, east 14-88, south 51-96, conv 46-57, tpp 13-48, solar 55-73, wet 2-4

Map class: C09–Ponderosa pine & Douglas-fir woodland

Rel to C09: Same.

Similar: N:[146] PSEMEN-PINPON/CALRUB, N:[061] ARCNEV-PAXMYR/CALRUB, N:[062] ARCNEV/PSESPI, N:[143] PSEMEN-PINCON/ARCNEV, N:[078] CEAVEL-(SPIBET)/CALRUB, MNO:[144] PSEMEN-(PINCON)/ARCUVA/RACCAN, N:[119] PINCON/PAXMYR/CALRUB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[138] PSEMEN/HOLDIS/CALRUB, N:[147] PSEMEN-(PINPON)/SYMALB.

▶ [**061**] Abies lasiocarpa** Antennaria lanata+** Danthonia** Eremogone capillaris*** Eriogonum umbellatum*** Festuca viridula** Juncus parryi+** Lewisia* Phlox diffusa** Woodsia* [**keep**] C-GT5* 4 Ceanothus velutinus* Pinus ponderosa 2 Pseudotsuga menziesii 3 Spiraea lucida**
▶ [**062**] Achillea millefolium* Anticlea/Toxicoscordion*** Aspidotis densa* Balsamorhiza sagittata* Carex geyeri+* Lomatium nudicaule+* Penstemon serrulatus+ 2 Pseudoroegneria spicata* 7 [**keep**] C-GT5 5 Acer glabrum* Apocynum androsaemifolium* Canadanthus modestus* Cystopteris fragilis* Hieracium albiflorum* Moehringia macrophylla** Paxistima myrsinites 3 Pinus contorta* 2 Pinus ponderosa 3 Pseudotsuga menziesii 2 Sedum lanceolatum+* Spiraea lucida* 2 Symphoricarpos albus*
▶ [**078**] B-LT5* SHRB 4 TSHRB 3 Abies lasiocarpa** Amelanchier alnifolia 2 Cacaliopsis nardosmia** Castilleja hispida* Ceanothus velutinus 3 Chamaenerion angustifolium 2 Collomia* Eremogone capillaris** Eucephalus ledophyllus+* Prunus emarginata 2 Pteridium aquilinum** Rubus nutkanus* Salix scouleriana 3 Thalictrum occidentale** Vaccinium membranaceum* [**keep**] C-GT5 6 Achnatherum* Arctostaphylos uva-ursi+* 9 Cryptogramma acrostichoides* Heuchera cylindrica*** Hieracium scouleri+* Myriopteris gracillima* Pinus contorta* Pinus ponderosa* 2 Pseudoroegneria spicata* Pseudotsuga menziesii 5 Racomitrium**
▶ [**143**] Abies lasiocarpa*** 2 Chimaphila umbellata*** Pinus contorta* Pinus monticola*** 2 Salix scouleriana* Sorbus scopulina* Vaccinium membranaceum** 2 [**keep**] Achillea millefolium* Ceanothus velutinus* Cryptogramma acrostichoides* Holodiscus discolor* Penstemon serrulatus+* Pinus ponderosa** 2 Pseudoroegneria spicata** 2 Spiraea lucida*
▶ [**146**] B-LT5* SHRB 3 Acer macrophyllum* Anaphalis margaritacea** Balsamorhiza sagittata* Bromus tectorum+* Chamaenerion angustifolium* Collomia* Elymus* 2 Holodiscus discolor 2 Salix scouleriana 2 [**keep**] Achnatherum* Arctostaphylos uva-ursi+* 6 Cryptogramma acrostichoides* Heuchera cylindrica* Holodiscus discolor* Myriopteris gracillima* Pinus contorta*** 2 Racomitrium***

Floristics (19 plots, NOCA 19): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 21, Pinus ponderosa 10		Arctostaphylos uva-ursi+ 21	
80-95			Paxistima myrsinites 9, Hieracium scouleri+ 1	Calamagrostis rubescens+ 16
60-80		Ceanothus velutinus 2, Amelanchier alnifolia 1	Spiraea lucida 4	moss 12
40-60		Salix scouleriana 2, Holodiscus discolor 1	Achillea millefolium 1, Penstemon serrulatus+ 0	Pseudoroegneria spicata 4, Cryptogramma acrostichoides 0
25-40	Pinus contorta 4		Heuchera cylindrica 1, Antennaria racemosa+ 1, Moehringia macrophylla 0	Achnatherum 0
10-25	Acer macrophyllum 1	Prunus emarginata 1, Lonicera ciliosa 1, Vaccinium membranaceum 1	Balsamorhiza sagittata 3, Lomatium brandegeei+ 1, Montia 1, Erigeron 1, Arnica cordifolia 1, Goodyera oblongifolia 1	Racomitrium 14, lichen 3, Selaginella wallacei+ 2, Carex geyeri+ 2, Polystichum lonchitis 2, Bromus tectorum+ 1, Vulpia 1

{146} Pseudotsuga menziesii, Pinus ponderosa, Calamagrostis rubescens
Douglas-fir, ponderosa pine & pinegrass forest/woodland
PSEMEN-PINPON/CALRUB



Range: Lowland zone. **NOCA**-37: **s*** (ne) 480-1040m.

Struct: Conifer woodland with prominent mixed conifer-broadleaf regen, abundant grasses, and substantial dwarf shrubs, shrubs & forbs. Avg vasc cover 95: conif tree 34, grass 30, forb 7, conif regen 3, dwf shrb 0.94 @ 10, shrb 0.91 @ 8, tall shrb 0.91 @ 3, fern 0.53 @ 0, brdlf regen 0.44 @ 2, sedge 0.25 @ 3, brdlf tree 0.13 @ 3.

Ecology: Benches, midslopes and upper slopes with southerly aspects, on well-drained gravelly soils. Regen dom by *Pseudotsuga menziesii*, often with small amounts of *Pinus ponderosa*. Herb layer in recently burned stands may be scattered graminoids.

Metrics: slope 15-31°, vdp 9-70m, vdr 45-189m, east 10-69, south 62-97, conv 48-56, tpp 30-50, solar 60-76, wet 3-4

Map class: C09–Ponderosa pine & Douglas-fir woodland

Rel to C09: Similar, gaining plots from PSEMEN/PAXMYR-SPIBET and PSEMEN/HOLDIS/CALRUB.

Similar: N:[145] PSEMEN-PINPON/ARCNEV, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[061] ARCNEV-PAXMYR/CALRUB, N:[147] PSEMEN-(PINPON)/SYMALB, N:[062] ARCNEV/PSESPI, N:[138] PSEMEN/HOLDIS/CALRUB, N:[143] PSEMEN-PINCON/ARCNEV, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[119] PINCON/PAXMYR/CALRUB. Also see: [161] PSEMEN/VACMEM.

▶ [**061**] Abies lasiocarpa* Arctostaphylos uva-ursi+ 6 Danthonia** Eremogone capillaris*** Festuca viridula** Juncus parryi+** Lewisia** Myriopteris gracillima** Phlox diffusa** Racomitrium*** 2 Senecio integerrimus** [**keep**] B-LT5** C-GT5 4 SHRB 3 Acer macrophyllum** Apocynum androsaemifolium* Arnica cordifolia* Berberis aquifolium* Bromus tectorum+* Ceanothus velutinus* Collomia** Elymus* 2 Hieracium albiflorum* Holodiscus discolor 2 Pinus ponderosa 2 Pseudotsuga menziesii 3 Salix scouleriana 2 Spiraea lucida*

▶ [**078**] SHRB 14 TSHRB 5 Abies lasiocarpa* Acer glabrum* Amelanchier alnifolia 2 Cacaliopsis nardosmia* Castilleja hispida** Ceanothus velutinus 6 Eremogone capillaris*** Eucephalus ledophyllus+** Lomatium brandegeei+* Prunus emarginata* 2 Thalictrum occidentale*** Vaccinium membranaceum** [**keep**] C-GT5* 6 Apocynum androsaemifolium* Arnica cordifolia* Balsamorhiza sagittata** Bromus tectorum+* Elymus* 2 Hieracium scouleri+* Holodiscus discolor 3 Pinus ponderosa* 2 Platanthera** Polystichum lonchitis** Pseudoroegneria spicata* Pseudotsuga menziesii 6

▶ [**142**] FORB 11 Abies lasiocarpa 2 Acer circinatum 2 Acer glabrum* Amelanchier alnifolia 2 Bromus vulgaris+** Cacaliopsis nardosmia 3 Chimaphila umbellata** Erythronium montanum+*** Eucephalus ledophyllus+*** Goodyera oblongifolia** Lilium** Maianthemum racemosum** 2 Prunus emarginata** Sorbus scopulina** [**keep**] Achillea millefolium* Anaphalis margaritacea* Antennaria racemosa+* Arctostaphylos uva-ursi+* Balsamorhiza sagittata* Berberis aquifolium* Bromus tectorum+* Calamagrostis rubescens+ 7 Collomia* Elymus 2 Holodiscus discolor 2 Pinus ponderosa* 3 Pseudoroegneria spicata* 2

▶ [**145**] Achnatherum* Arctostaphylos uva-ursi+* 6 Cryptogramma acrostichoides* Heuchera cylindrica* Holodiscus discolor* Myriopteris gracillima* Pinus contorta*** 2 Racomitrium*** [**keep**] B-LT5* SHRB 3 Acer macrophyllum* Anaphalis margaritacea** Balsamorhiza sagittata* Bromus tectorum+* Chamaenerion angustifolium* Collomia* Elymus* 2 Holodiscus discolor 2 Salix scouleriana 2

▶ [**147**] B-GT5** Acer glabrum 3 Achnatherum* Adenocaulon bicolor 3 Artemisia* Berberis aquifolium* 2 Cornus nuttallii* 2 Holodiscus discolor* Rosa* Rubus leucodermis* Rubus nutkanus* Symphoricarpos albus* 2 Thuja plicata*** [**keep**] Apocynum androsaemifolium* Arctostaphylos uva-ursi+* 2 Balsamorhiza sagittata* Calamagrostis rubescens+* 6 Ceanothus velutinus* Collomia* Hieracium scouleri+* Paxistima myrsinites 2 Pseudoroegneria spicata* 2 Salix scouleriana* 2

Floristics (32 plots, NOCA 32): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 29			Calamagrostis rubescens+ 23
80-95	Pinus ponderosa 9		Paxistima myrsinites 5, Hieracium scouleri+ 1	
60-80		Ceanothus velutinus 3, Amelanchier alnifolia 1	Spiraea lucida 5	
40-60	Acer macrophyllum 3		Arctostaphylos uva-ursi+ 4, Chamaenerion angustifolium 3, Achillea millefolium 0	Pseudoroegneria spicata 7, moss 6
25-40		Holodiscus discolor 7, Salix scouleriana 5, Berberis aquifolium 0	Antennaria racemosa+ 2, Balsamorhiza sagittata 1, Apocynum androsaemifolium 1, Arnica cordifolia 1, Hieracium albiflorum 1, Penstemon serrulatus+ 0, Collomia 0, Anaphalis margaritacea 0	Elymus 5, Bromus tectorum+ 3, Carex geyeri+ 3
10-25		Rosa 2, Acer glabrum 2, Sorbus scopulina 2	Lactuca 2, Drymocallis glandulosa+ 2	

{147} Pseudotsuga menziesii, Pinus ponderosa*, Symphoricarpos albus
Douglas-fir, ponderosa pine* & snowberry forest
PSEMEN-(PINPON)/SYMALB



Range: Lowland zone, on or near valley bottoms. **NOCA**-4: (s) 370-450m. Mainly near the lower Stehekin River.

Struct: Open conifer forest with substantial mixed broadleaf-conifer regen, dense shrubs, abundant grasses, and substantial forbs & tall shrubs. Avg vasc cover 122: shrb 38, conif tree 37, forb 7, tall shrb 7, brdlf tree 7, brdlf regen 6, conif regen 4, dwf shrb 4, grass 0.75 @ 17.

Ecology: Very gentle toeslopes and well-drained valley bottoms. Regen dominated by *Pseudotsuga menziesii* and/or *Acer macrophyllum*. Shrub canopy can be reduced under dense tree canopy or due to grazing or repeated fire, resulting in greater relative importance of *Calamagrostis rubescens*.

Metrics: slope 3-15°, vdp 1-6m, vdr 1-36m, east 46-84, south 17-66, conv 47-50, tpp 32-49, solar 49-58, wet 5-7

Map class: C09–Ponderosa pine & Douglas-fir woodland

Rel to C09: Similar, but shedding plots to [043] ACEMAC-PSEMEN/SYMALB/OSMBER and [141] PSEMEN/MAHNER/CALRUB, and gaining from PSEMEN-(ABIGRA)/ACECIR-PAXMYR and PSEMEN/HOLDIS/CALRUB. The concept may be different; NCCN plots contain significant *Acer macrophyllum*.

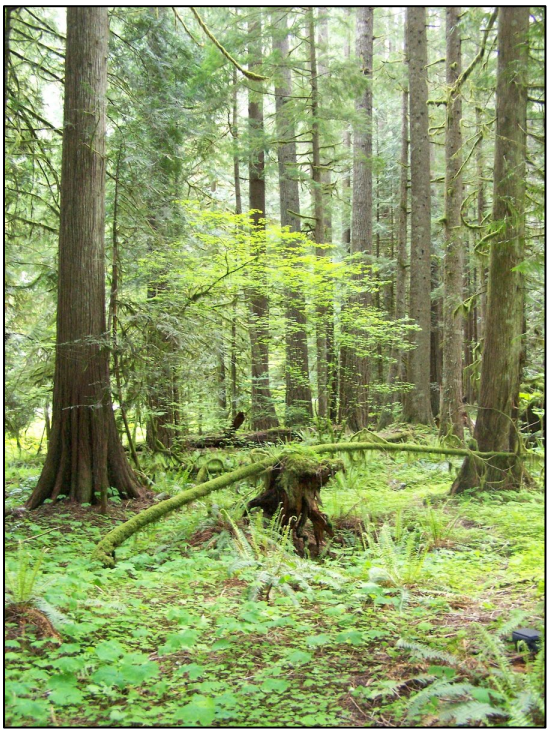
Similar: N:[043] ACEMAC-PSEMEN/SYMALB/OSMBER, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, N:[138] PSEMEN/HOLDIS/CALRUB, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[146] PSEMEN-PINPON/CALRUB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, N:[141] PSEMEN/MAHNER/CALRUB, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN, N:[078] CEAVEL-(SPIBET)/CALRUB.

▶ [**043**] Abies grandis 2 Acer circinatum 2 Adenocaulon bicolor* Galium* Populus trichocarpa 2 Prosartes* Pteridium aquilinum** 2 Rubus nutkanus 2 [**keep**] Acer glabrum 2 Achnatherum*** Adenocaulon bicolor 4 Anaphalis margaritacea* Artemisia*** Berberis aquifolium* Bromus tectorum+*** 2 Calamagrostis rubescens+* Hieracium albiflorum* Holodiscus discolor* Pinus ponderosa* Rosa 2 Rubus leucodermis*
▶ [**134**] TSHRB 11 Acer glabrum* Adenocaulon bicolor* Alnus viridis 2 Clintonia uniflora* 2 Maianthemum racemosum** Paxistima myrsinites 2 Prosartes* Pteridium aquilinum** Rubus nutkanus 2 Salix scouleriana* 2 Sorbus scopulina** Trillium ovatum* [**keep**] Achnatherum* Adenocaulon bicolor 2 Anaphalis margaritacea* Artemisia* Berberis aquifolium 2 Bromus tectorum+* 2 Elymus** 2 Holodiscus discolor*** Pinus ponderosa* Rubus leucodermis* Symphoricarpos albus* 2
▶ [**138**] Acer circinatum 2 Acer glabrum* Arctostaphylos uva-ursi+ 2 Calamagrostis rubescens+* Festuca occidentalis+* Fragaria virginiana** Goodyera oblongifolia* Lonicera ciliosa* Lysimachia latifolia** Moehringia macrophylla* [**keep**] B-LT5*** B-GT5*** Acer macrophyllum*** 2 Adenocaulon bicolor 4 Cornus nuttallii 2 Elymus** 2 Pinus ponderosa* Rubus leucodermis** Symphoricarpos albus 2
▶ [**139**] Achlys triphylla* 2 Berberis nervosa* 2 Bromus vulgaris+* Campanula scouleri* Festuca occidentalis+* Lathyrus polyphyllus 2 Linnaea borealis* 2 Lysimachia latifolia* Polystichum munitum* Symphoricarpos mollis* Tsuga heterophylla* 2 [**keep**] Achnatherum*** Adenocaulon bicolor 2 Anaphalis margaritacea*** Artemisia*** Berberis aquifolium 2 Bromus tectorum+*** 2 Calamagrostis rubescens+*** Cornus nuttallii*** 2 Paxistima myrsinites** Pinus ponderosa*** Rubus leucodermis*** Spiraea lucida*** Symphoricarpos albus 4
▶ [**146**] Apocynum androsaemifolium* Arctostaphylos uva-ursi+* 2 Balsamorhiza sagittata* Calamagrostis rubescens+* 6 Ceanothus velutinus* Collomia* Hieracium scouleri+* Paxistima myrsinites 2 Pseudoroegneria spicata* 2 Salix scouleriana* 2 [**keep**] B-GT5** Acer glabrum 3 Achnatherum* Adenocaulon bicolor 3 Artemisia* Berberis aquifolium* 2 Cornus nuttallii* 2 Holodiscus discolor* Rosa* Rubus leucodermis* Rubus nutkanus* Symphoricarpos albus* 2 Thuja plicata***

Floristics (4 plots, NOCA 4): at 10–40% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 35, Acer macrophyllum 9, Pinus ponderosa 4	Berberis aquifolium 6, Amelanchier alnifolia 4, Holodiscus discolor 4	Spiraea lucida 2, Paxistima myrsinites 0	
60-80		Symphoricarpos albus 32, Rosa 5, Rubus leucodermis 1		Elymus 9
40-60	Cornus nuttallii 8, Thuja plicata 2	Rubus nutkanus 0	Hieracium albiflorum 1, Osmorhiza 1, Artemisia 0, Anaphalis margaritacea 0	Bromus tectorum+ 6, Calamagrostis rubescens+ 4, Achnatherum 1
25-40	Abies grandis 1	Acer glabrum 10, Philadelphus lewisii 1, Sambucus nigra 1	Adenocaulon bicolor 15, Moehringia macrophylla 3, Lactuca 2, Chimaphila umbellata 2, Lomatium nudicaule+ 1, Prosartes 1, Berberis nervosa 1, Hieracium scouleri+ 1	moss 8, Polystichum lonchitis 1, Dactylis glomerata 1, Festuca occidentalis+ 1

{148} Pseudotsuga menziesii, Thuja plicata, Acer circinatum, Oxalis oregana, Polystichum munitum
Douglas-fir, redcedar, vine maple, Oregon wood-sorrel & sword fern forest
PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN



Range: Lowland zone, on valley bottoms. **MORA**-6: **sw*** 620-670m. **OLYM**-3: (nc-sc-se) 340-390m.

Struct: Closed conifer forest (51-61m) with substantial conifer regen, very dense forbs, dense ferns, abundant tall shrubs, and substantial shrubs. Avg vasc cover 206: conif tree 71, forb 62, fern 34, shrb 5, tall shrb 0.88 @ 21, conif regen 0.75 @ 11, dwf shrb 0.38 @ 14, brdlf tree 0.25 @ 6.

Ecology: Very gentle lower slopes and valley bottoms with moist but well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 2-7°, vdp 2-3m, vdr 2-26m, east 10-50, south 15-81, conv 45-50, tpp 21-34, solar 64-67, wet 5-7

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Evolved from PSEMEN-TSUHET/POLMUN-OXAORE, gaining plots from TSUHET/POLMUN-OXAORE and TSUHET-PSEMEN/VACALA/OXAORE.

Similar: MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MN:[201] TSUHET-THUPLI/LYSAME-ATHFIL, N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, MO:[151] PSEMEN-TSUHET/ACHTRI.

▶ [**156**] Abies amabilis* 2 Chimaphila menziesii* Chimaphila umbellata* 2 Clintonia uniflora* Gaultheria shallon* Linnaea borealis** 2 Struthiopteris spicant* Taxus brevifolia* 2 Trillium ovatum* Viola sempervirens* [**keep**] B-GT5 2 FORB 15 Acer circinatum* Achlys triphylla 6 Adenocaulon bicolor** Gymnocarpium dryopteris 6 Maianthemum stellatum 2 Oxalis oregana*** 2 Picea sitchensis 2
▶ [**177**] SHRB 8 Abies amabilis** 2 Actaea rubra** Alnus rubra 2 Asarum caudatum** Clintonia uniflora*** 2 Dryopteris** Maianthemum stellatum* Oplopanax horridus 4 Prosartes* Ribes lacustre* Sambucus racemosa* Streptopus lanceolatus 2 Trillium ovatum* [**keep**] Achlys triphylla** Berberis nervosa 4 Gymnocarpium dryopteris 8 Oxalis oregana*** Picea sitchensis 2 Pseudotsuga menziesii*
▶ [**195**] B-LT5 2 B-GT5* Abies amabilis* 2 Acer macrophyllum* Adiantum aleuticum 2 Alnus rubra* 2 Athyrium filix-femina 3 Dryopteris** Lactuca* Sambucus racemosa* Streptopus amplexifolius* Struthiopteris spicant* Tiarella trifoliata* 4 Trillium ovatum* [**keep**] Abies grandis 7 Berberis nervosa 5 Gymnocarpium dryopteris 10 Oxalis oregana*** 6 Picea sitchensis 2
▶ [**196**] Abies amabilis* Clintonia uniflora** Cornus unalaschkensis* 3 Linnaea borealis** 2 Maianthemum dilatatum 2 Maianthemum stellatum* Rubus pedatus* Taxus brevifolia* 2 Tiarella trifoliata* 4 Trillium ovatum* Viola sempervirens* [**keep**] TSHRB 9 Berberis nervosa 5 Circaea alpina 2 Gymnocarpium dryopteris 12 Oxalis oregana*** 2
▶ [**198**] SHRB 8 Abies amabilis** 2 Clintonia uniflora** Cornus unalaschkensis* Gaultheria shallon** Maianthemum dilatatum** Rhododendron menziesii 2 Rubus pedatus* Struthiopteris spicant*** 2 Vaccinium ovalifolium* 4 Vaccinium parvifolium 2 [**keep**] Abies grandis 2 Achlys triphylla 9 Adenocaulon bicolor** Berberis nervosa* Circaea alpina* Galium** Goodyera oblongifolia** Gymnocarpium dryopteris* 11 Hydrophyllum tenuipes*** Oplopanax horridus** Oxalis oregana** 13 Thuja plicata 13 Viola glabella+***

Floristics (8 plots, MORA 5, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Thuja plicata 34, Pseudotsuga menziesii 17		Oxalis oregana 34	Polystichum munitum 13
80-95	Tsuga heterophylla 26	Acer circinatum 21	Achlys triphylla 22	
60-80		Rubus spectabilis 3	Adenocaulon bicolor 1	Gymnocarpium dryopteris 29
40-60		Oplopanax horridus 2, Vaccinium parvifolium 2	Tiarella trifoliata 2, Galium 1, Goodyera oblongifolia 1	moss 31, Athyrium filix-femina 2
25-40	Abies grandis 23, Picea sitchensis 4, Acer macrophyllum 2	Vaccinium ovalifolium 2, Rhododendron menziesii 1	Berberis nervosa 14, Maianthemum stellatum 4, Circaea alpina 3, Hydrophyllum tenuipes 1, Viola glabella+ 1, Anemone deltoidea+ 1, Osmorhiza 1, Prosartes 1	
10-25	Populus trichocarpa 8	Sambucus racemosa 3, Ribes lacustre 3, Rosa 1	Rubus pedatus 5, Mitella 3, Tolmiea menziesii 2, Cornus unalaschkensis 2, Lysimachia latifolia 1, Corallorhiza 1, Trillium ovatum 1	Pteridium aquilinum 15

{149} Pseudotsuga menziesii, Tsuga heterophylla*, Acer circinatum, Paxistima myrsinites
Douglas-fir, western hemlock*, vine maple & Oregon-box forest
PSEMEN-(TSUHET)/ACECIR-PAXMYR



Range: Lowland zone. **NOCA**-9: **ne*** (ce-s) 630-720m.

Struct: Semi-open conifer forest with substantial conifer regen, dense tall shrubs, abundant dwarf shrubs, and substantial shrubs & forbs. Avg vasc cover 156: conif tree 52, tall shrb 39, dwf shrb 26, conif regen 15, shrb 12, forb 7, fern 0.89 @ 1, brdlf tree 0.33 @ 8, brdlf regen 0.22 @ 11, grass 0.11 @ 2.

Ecology: Mesic toeslopes and benches, on well-drained soil. *Pseudotsuga menziesii* has decreasing dominance in older stands. Regen dominated by *Tsuga heterophylla*, usually with codominant *Thuja plicata* and *Abies grandis*.

Metrics: slope 19-30°, vdp 3-12m, vdr 18-112m, east 26-67, south 7-97, conv 43-47, tpp 23-31, solar 43-72, wet 3-4

Map class: C07–North Cascades dry Douglas-fir forest

Rel to C09: Similar, though many plots were shed to [155] PSEMEN-TSUHET/MAHNER, [132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR and [157] PSEMEN-TSUHET/PAXMYR/LINBOR.

Similar: N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, N:[133] PSEMEN/ACECIR/MAHNER, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[155] PSEMEN-TSUHET/MAHNER, N:[069] BETPAP-(THUPLI)/ACECIR/MAHNER, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MO:[140] PSEMEN/MAHNER/ACHTRI.

▶ [**132**] B-LT5* Abies amabilis 3 Acer macrophyllum*** 2 Adenocaulon bicolor* Maianthemum stellatum* Oplopanax horridus*** Prosartes 2 Trillium ovatum* Viola glabella+* [**keep**] SHRB 3 Abies grandis* Amelanchier alnifolia* Berberis nervosa* Chimaphila umbellata* Cornus nuttallii 2 Corylus cornuta* 2 Hieracium albiflorum* Linnaea borealis* Lonicera ciliosa* Paxistima myrsinites 5 Tsuga heterophylla* Vaccinium membranaceum 2 Vaccinium parvifolium 2

▶ [**133**] Berberis nervosa 6 Lysimachia latifolia*** [**keep**] Abies grandis** 3 Clintonia uniflora*** Cornus nuttallii** 2 Maianthemum racemosum* Orthilia secunda* Pinus monticola* Salix scouleriana** Sorbus scopulina* Taxus brevifolia* Tsuga heterophylla 6 Vaccinium membranaceum 2 Vaccinium ovalifolium*** Vaccinium parvifolium 2

▶ [**155**] Chimaphila menziesii* Lysimachia latifolia** Vaccinium parvifolium* [**keep**] B-GT5 2 TSHRB 12 Abies grandis** Acer circinatum 12 Cornus nuttallii*** 2 Corylus cornuta** 2 Galium** Hieracium albiflorum** Maianthemum racemosum** Paxistima myrsinites 6 Prosartes** Rubus nutkanus*** Salix scouleriana*** Sorbus scopulina** Vaccinium parvifolium 2

▶ [**157**] Gaultheria ovatifolia** Pinus monticola* Pyrola asarifolia+* [**keep**] TSHRB 12 Abies grandis*** 2 Acer glabrum* Amelanchier alnifolia* Clintonia uniflora* Cornus nuttallii 2 Corylus cornuta** 2 Lonicera ciliosa** Maianthemum racemosum*** Paxistima myrsinites 6 Rosa* Rubus nutkanus*** Spiraea lucida* Vaccinium parvifolium 3

▶ [**196**] Achlys triphylla** 2 Cornus unalaschkensis 2 Gymnocarpium dryopteris** 2 Oplopanax horridus** Polystichum munitum* 2 Tiarella trifoliata** 2 Trillium ovatum* Vaccinium parvifolium* [**keep**] TSHRB 10 Acer glabrum*** Amelanchier alnifolia*** Chimaphila umbellata** Cornus nuttallii 2 Corylus cornuta*** 2 Lonicera ciliosa*** Maianthemum racemosum** Orthilia secunda** Paxistima myrsinites*** 2 Pinus monticola 2 Spiraea lucida*** Vaccinium membranaceum** 2

Floristics (9 plots, NOCA 9): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 23, Thuja plicata 16, Tsuga heterophylla 15	Acer circinatum 31, Rosa 1	Paxistima myrsinites 17	
80-95	Abies grandis 11	Amelanchier alnifolia 2	Berberis nervosa 3, Chimaphila umbellata 2, Spiraea lucida 1, Goodyera oblongifolia 1	
60-80		Vaccinium membranaceum 7, Rubus nutkanus 1	Linnaea borealis 5, Clintonia uniflora 3, Maianthemum racemosum 1, Orthilia secunda 1	
40-60	Taxus brevifolia 2	Corylus cornuta 6, Acer glabrum 3, Lonicera ciliosa 1, Sorbus scopulina 1	Hieracium albiflorum 1, Pyrola picta 0, Prosartes 0	Pteridium aquilinum 1, Polystichum munitum 0
25-40	Cornus nuttallii 15, Pinus monticola 5	Vaccinium parvifolium 15, Salix scouleriana 2, Vaccinium ovalifolium 0	Galium 0	moss 11
10-25	Abies amabilis 2	Alnus viridis 3, Sorbus sitchensis 3, Holodiscus discolor 3	Asarum caudatum 2	Racomitrium 60, lichen 2

{150} Pseudotsuga menziesii, Tsuga heterophylla, Acer circinatum*, Polystichum munitum
Douglas-fir, western hemlock, vine maple* & sword fern forest
PSEMEN-TSUHET/(ACECIR)/POLMUN



Range: Lowland zone. **MORA**-5: **nw**-**sw** 710-750m. **NOCA**-5: **nw** (cw) 320-370m. **OLYM**-16: **nc***-**sc** (ne-se) 290-500m.

Struct: Mostly closed conifer forest (53-64m) with abundant conifer regen, abundant ferns, and substantial tall shrubs & shrubs. Avg vasc cover 115: conif tree 56, fern 22, conif regen 17, forb 4, shrb 0.9 @ 6, dwf shrb 0.85 @ 4, tall shrb 0.8 @ 7, brdlf tree 0.55 @ 4.

Ecology: Toeslopes and midslopes, on moist but well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 13-32°, vdp 1-18m, vdr 15-103m, east 19-64, south 48-97, conv 39-51, tpp 18-35, solar 55-71, wet 3-4

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Similar, gaining plots from PSEMEN-(TSUHET)/dep and PSEMEN-TSUHET/MAHNER-POLMUN.

Similar: MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR. Also see: [069] BETPAP-(THUPLI)/ACECIR/MAHNER, [140] PSEMEN/MAHNER/ACHTRI, [155] PSEMEN-TSUHET/MAHNER, [159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN.

▶ [**151**] FORB 7 Abies amabilis* Achlys triphylla* 2 Berberis nervosa 2 Chimaphila umbellata** Clintonia uniflora* Cornus unalaschkensis** Rosa* Viola sempervirens* [**keep**] B-GT5** 2 Acer macrophyllum*** Polystichum munitum* 5 Rubus ursinus* Thuja plicata*
▶ [**156**] Abies amabilis* 2 Achlys triphylla 2 Berberis nervosa* 3 Chimaphila menziesii* Chimaphila umbellata*** 2 Clintonia uniflora** Goodyera oblongifolia* Maianthemum stellatum* Prosartes* Taxus brevifolia* Trillium ovatum* [**keep**] B-GT5** 2 Acer macrophyllum* Alnus rubra* Lysimachia latifolia* Pteridium aquilinum*** 2 Rubus ursinus*
▶ [**192**] Chimaphila menziesii** Chimaphila umbellata*** Goodyera oblongifolia* Orthilia secunda** [**keep**] B-GT5** TSHRB* 3 Acer circinatum* 3 Acer macrophyllum*** Achlys triphylla** Gaultheria shallon* Linnaea borealis 2 Lysimachia latifolia** Polystichum munitum* 2 Rubus ursinus** Tiarella trifoliata 2 Vaccinium parvifolium 2
▶ [**196**] FORB 8 Abies amabilis* 2 Achlys triphylla 2 Clintonia uniflora*** Cornus unalaschkensis** Gymnocarpium dryopteris*** Linnaea borealis 7 Maianthemum dilatatum 2 Maianthemum stellatum** Oplopanax horridus** Rubus pedatus*** Rubus spectabilis 2 Tiarella trifoliata* Trillium ovatum* [**keep**] B-GT5** TSHRB* Acer circinatum* Acer macrophyllum** Berberis nervosa* Gaultheria shallon* Lysimachia latifolia* Polystichum munitum 10 Rubus ursinus**
▶ [**198**] FORB 7 Abies amabilis* 2 Achlys triphylla 2 Clintonia uniflora** Cornus unalaschkensis** Maianthemum dilatatum*** Rubus pedatus*** Rubus spectabilis* 2 Struthiopteris spicant* 2 Tiarella trifoliata* Vaccinium ovalifolium* 5 [**keep**] B-GT5* Berberis nervosa* Galium* Goodyera oblongifolia* Lysimachia latifolia* Rubus ursinus* Trillium ovatum*

Floristics (20 plots, NOCA 5, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 44, Pseudotsuga menziesii 23			moss 52, Polystichum munitum 20
80-95		Vaccinium parvifolium 3		
60-80	Thuja plicata 8	Acer circinatum 6		
40-60	Acer macrophyllum 3	Gaultheria shallon 2	Linnaea borealis 4, Tiarella trifoliata 3, Berberis nervosa 1, Achlys triphylla 1, Lysimachia latifolia 1, Rubus ursinus 1	
25-40	Alnus rubra 2	Vaccinium ovalifolium 3	Galium 1, Trillium ovatum 0, Goodyera oblongifolia 0	Pteridium aquilinum 3, Athyrium filix-femina 2, Struthiopteris spicant 0, Dryopteris 0
10-25	Taxus brevifolia 7, Betula papyrifera 3, Abies amabilis 1	Ribes lacustre 2, Rosa 2, Acer glabrum 2, Rhododendron menziesii 1, Sambucus racemosa 1, Rubus nutkanus 1, Oplopanax horridus 1	Pyrola asarifolia+ 2, Chimaphila menziesii 1, Maianthemum racemosum 1, Viola glabella+ 1	

{151} Pseudotsuga menziesii, Tsuga heterophylla, Achlys triphylla
Douglas-fir, western hemlock & vanillaleaf forest
PSEMEN-TSUHET/ACHTRI



Range: Lowland zone. **MORA**-46: **sw**-**se*** (ne) 660-880m. **OLYM**-24: **nc**-**ne**-**se** (sc) 560-1020m.

Struct: Mostly closed conifer forest (40-53m) with abundant conifer regen, abundant forbs, and substantial dwarf shrubs & shrubs. Avg vasc cover 137: conif tree 63, forb 25, conif regen 0.94 @ 16, dwf shrb 0.94 @ 15, shrb 0.94 @ 7, fern 0.69 @ 3, tall shrb 0.67 @ 14, grass 0.22 @ 2.

Ecology: Fairly gentle toeslopes and midslopes, on moist but well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 10-26°, vdp 3-29m, vdr 31-127m, east 7-85, south 31-86, conv 46-51, tpp 17-45, solar 56-72, wet 2-4

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Similar, gaining many plots from PSEMEN-TSUHET/MAHNER and a few from a host of other C09 types.

Similar: MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN. Also see: [155] PSEMEN-TSUHET/MAHNER.

▶ [**003**] Abies amabilis* 5 Orthilia secunda* Rubus lasiococcus** Vaccinium ovalifolium* [**keep**] Abies grandis* 2 Gaultheria shallon*** Lysimachia latifolia* Rosa* Thuja plicata 3 Viola sempervirens**
▶ [**140**] Amelanchier alnifolia* Gaultheria ovatifolia** Hieracium albiflorum*** Paxistima myrsinites* Pteridium aquilinum* 2 Rubus lasiococcus* Rubus ursinus* Vaccinium membranaceum* Viola orbiculata+*** Xerophyllum tenax* 2 [**keep**] Abies grandis* 2 Adenocaulon bicolor* Clintonia uniflora* Polystichum munitum* Rosa 2 Thuja plicata** 2 Tiarella trifoliata* Tsuga heterophylla 13
▶ [**150**] B-GT5** 2 Acer macrophyllum*** Polystichum munitum* 5 Rubus ursinus* Thuja plicata* [**keep**] FORB 7 Abies amabilis* Achlys triphylla* 2 Berberis nervosa 2 Chimaphila umbellata** Clintonia uniflora* Cornus unalaschkensis** Rosa* Viola sempervirens*
▶ [**157**] Chimaphila umbellata* Gaultheria ovatifolia** Goodyera oblongifolia* Hieracium albiflorum** Paxistima myrsinites** 2 Pinus monticola** Pyrola asarifolia+** Thuja plicata* Vaccinium membranaceum* [**keep**] FORB 7 Abies grandis 2 Achlys triphylla*** 2 Berberis nervosa 4 Rosa 2 Tiarella trifoliata 2
▶ [**196**] Clintonia uniflora* Cornus unalaschkensis 3 Gymnocarpium dryopteris*** Maianthemum dilatatum 2 Oplopanax horridus*** Polystichum munitum* Rubus spectabilis 2 Thuja plicata* Tiarella trifoliata* Trillium ovatum* [**keep**] Amelanchier alnifolia*** Berberis nervosa* Chimaphila menziesii* Chimaphila umbellata** Orthilia secunda* Pteridium aquilinum* Rosa* Rubus ursinus* Symphoricarpos albus*** Vaccinium membranaceum*

Floristics (36 plots, MORA 14, OLYM 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 40, Tsuga heterophylla 29		Achlys triphylla 14	
80-95			Berberis nervosa 8	moss 37
60-80		Vaccinium parvifolium 2	Linnaea borealis 7	
40-60	Abies amabilis 3	Acer circinatum 16, Rosa 4	Chimaphila umbellata 3, Clintonia uniflora 2, Viola sempervirens 2, Cornus unalaschkensis 2	Polystichum munitum 3
25-40	Abies grandis 9, Thuja plicata 8	Gaultheria shallon 2	Tiarella trifoliata 4, Adenocaulon bicolor 2, Lysimachia latifolia 2, Maianthemum stellatum 1, Neottia 1, Chimaphila menziesii 1, Goodyera oblongifolia 1	
10-25	Taxus brevifolia 8	Vaccinium ovalifolium 5, Vaccinium membranaceum 4, Acer glabrum 3, Symphoricarpos albus 2, Ribes lacustre 1, Rubus nutkanus 1, Amelanchier alnifolia 1	Streptopus lanceolatus 2, Osmorhiza 1, Rubus ursinus 1, Orthilia secunda 1, Prosartes 1, Pyrola picta 1, Streptopus amplexifolius 1, Campanula scouleri 1, Trillium ovatum 1	Gymnocarpium dryopteris 3, Pteridium aquilinum 1, Athyrium filix-femina 1

{152} Pseudotsuga menziesii, Tsuga heterophylla, Gaultheria shallon, Holodiscus discolor
Douglas-fir, western hemlock, salal & oceanspray forest
PSEMEN-TSUHET/GAUSHA-HOLDIS



Range: Lowland zone. **OLYM**-8: **ne*** (nc) 500-700m.

Struct: Semi-open conifer forest (28-34m) with abundant conifer regen, very dense shrubs, and substantial dwarf shrubs & forbs. Avg vasc cover 152: shrb 59, conif tree 47, dwf shrb 15, conif regen 0.88 @ 20, forb 0.88 @ 7, fern 0.5 @ 7, brdlf tree 0.38 @ 4, tall shrb 0.25 @ 5, grass 0.25 @ 5, brdlf regen 0.13 @ 5.

Ecology: Fairly gentle midslopes and upper slopes with southerly aspects, on shallow well-drained soils. Regen usually dominated by *Tsuga heterophylla*, often with codominant *Pseudotsuga menziesii*.

Metrics: slope 10-31°, vdp 82-125m, vdr 300-424m, east 20-52, south 63-91, conv 51-61, tpp 63-68, solar 57-73, wet 2-3

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Same.

Similar: MNO:[137] PSEMEN/GAUSHA-MAHNER, O:[135] PSEMEN-(ACEMAC)/GAUSHA-HOLDIS, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, O:[158] PSEMEN-TSUHET/RHOMAC, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MO:[140] PSEMEN/MAHNER/ACHTRI, MO:[136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN.

▶ [**135**] B-GT5* 7 TSHRB* Abies grandis*** 2 Acer circinatum 2 Acer macrophyllum** 4 Alnus rubra 2 Prunus emarginata 2 Rubus ursinus* [**keep**] Achlys triphylla* Chimaphila menziesii* 2 Lysimachia latifolia 2 Pinus monticola* 2 Pyrola asarifolia+* Tsuga heterophylla 9
▶ [**137**] TSHRB* Acer glabrum*** 2 Festuca occidentalis+* Hieracium albiflorum* Linnaea borealis* Pteridium aquilinum** Taxus brevifolia** 2 Vaccinium parvifolium** [**keep**] B-GT5 2 Arbutus menziesii 2 Holodiscus discolor*** 2 Lysimachia latifolia 2 Tsuga heterophylla 11
▶ [**139**] TSHRB* Abies grandis 2 Acer glabrum** 2 Acer macrophyllum* Adenocaulon bicolor*** Amelanchier alnifolia* Berberis nervosa 12 Campanula scouleri*** Festuca occidentalis+* Galium** Lathyrus polyphyllus 2 Lysimachia latifolia* Osmorhiza** Symphoricarpos mollis*** [**keep**] Arbutus menziesii 2 Chimaphila menziesii 2 Gaultheria shallon*** 5 Pinus monticola 2 Tsuga heterophylla* 9
▶ [**153**] TSHRB* Abies amabilis 2 Acer circinatum* 2 Linnaea borealis* Neottia* Pteridium aquilinum* Taxus brevifolia* Thuja plicata* 4 Vaccinium parvifolium* [**keep**] B-GT5* Arbutus menziesii*** 2 Arctostaphylos uva-ursi+ 2 Chimaphila menziesii 2 Holodiscus discolor*** 2 Rosa* 2
▶ [**154**] Thuja plicata 4 Vaccinium parvifolium* [**keep**] Achlys triphylla* Arbutus menziesii 2 Berberis nervosa 3 Chimaphila menziesii 2 Holodiscus discolor*** 3 Rosa* 2

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 42	Gaultheria shallon 48, Holodiscus discolor 8	Berberis nervosa 8	
80-95	Tsuga heterophylla 24	Rosa 4		moss 28
60-80			Achlys triphylla 4	
40-60			Chimaphila umbellata 4	Polystichum munitum 6
25-40	Arbutus menziesii 5, Pinus monticola 3, Thuja plicata 3	Symphoricarpos albus 0	Arctostaphylos uva-ursi+ 6, Linnaea borealis 4, Chimaphila menziesii 4, Lysimachia latifolia 4, Rubus ursinus 3, Pyrola asarifolia+ 1, Goodyera oblongifolia 0	Festuca occidentalis+ 3
10-25	Pinus contorta 3, Acer macrophyllum 2	Amelanchier alnifolia 10, Vaccinium parvifolium 2	Hieracium albiflorum 3	Athyrium filix-femina 3, Bromus vulgaris+ 2

{153} Pseudotsuga menziesii, Tsuga heterophylla, Gaultheria shallon, Berberis nervosa
Douglas-fir, western hemlock, salal & dwarf Oregon-grape forest
PSEMEN-TSUHET/GAUSHA-MAHNER



Range: Lowland zone, lower montane zone on west side of MORA. **MORA**-38: **nw**-**sw**-**se*** (ne) 680-990m. **NOCA**-9: **cw** (nw-ne-ce) 440-610m. **OLYM**-21: **nc**-**ne*** (sc-se) 660-930m.

Struct: Mostly closed conifer forest (34-43m) with abundant conifer regen, dense shrubs, and abundant dwarf shrubs. Avg vasc cover 148: conif tree 63, shrb 39, dwf shrb 20, conif regen 16, forb 0.95 @ 5, tall shrb 0.66 @ 7, fern 0.63 @ 2, grass 0.11 @ 3.

Ecology: Slopes, on well-drained soils. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Thuja plicata*.

Metrics: slope 18-33°, vdp 11-55m, vdr 70-248m, east 2-72, south 40-92, conv 46-54, tpp 24-52, solar 56-75, wet 2-3

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Similar, gaining plots from PSEMEN-TSUHET/MAHNER and several other C09 types.

Similar: MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[137] PSEMEN/GAUSHA-MAHNER, NO:[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN.

▶ [**137**] Acer glabrum* 2 Amelanchier alnifolia* Arctostaphylos columbiana*** Arctostaphylos uva-ursi+* Campanula scouleri*** Festuca occidentalis+** Hieracium albiflorum** Lysimachia latifolia* Pinus monticola 2 Pyrola picta* Symphoricarpos albus*** Taxus brevifolia 3 [**keep**] Abies amabilis*** 2 Acer circinatum* Neottia** Pyrola asarifolia+** Thuja plicata* 3 Tsuga heterophylla 12
▶ [**154**] Corallorhiza*** Pinus monticola 2 [**keep**] TSHRB* 3 Acer circinatum* 4 Achlys triphylla** Berberis nervosa 3 Polystichum munitum* Pyrola asarifolia+*** Rosa** Taxus brevifolia*
▶ [**158**] Pinus monticola 2 Pteridium aquilinum 2 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2 Vaccinium parvifolium 3 [**keep**] Abies amabilis 2 Achlys triphylla* Polystichum munitum* Taxus brevifolia*
▶ [**159**] B-LT5* 2 B-GT5* 2 Acer glabrum 2 Acer macrophyllum* 2 Arbutus menziesii*** Holodiscus discolor* Polystichum munitum* 3 [**keep**] Abies amabilis** 2 Acer circinatum* Chimaphila menziesii* Chimaphila umbellata*** Goodyera oblongifolia* Neottia** Pteridium aquilinum** Pyrola asarifolia+** Rosa** Taxus brevifolia*
▶ [**197**] Callitropsis nootkatensis* Corallorhiza** Cornus unalaschkensis** Maianthemum dilatatum*** Orthilia secunda* Rhododendron menziesii* 2 Rubus spectabilis** Struthiopteris spicant* Vaccinium ovalifolium** 2 Vaccinium parvifolium 3 [**keep**] Achlys triphylla*** Berberis nervosa* 4 Chimaphila umbellata* Rosa* Taxus brevifolia*

Floristics (38 plots, MORA 12, NOCA 8, OLYM 18): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 38, Pseudotsuga menziesii 31	Gaultheria shallon 36	Berberis nervosa 15	
80-95				moss 40
60-80	Thuja plicata 12	Vaccinium parvifolium 2	Linnaea borealis 5, Chimaphila umbellata 1	
40-60	Taxus brevifolia 2	Acer circinatum 8, Rosa 1	Achlys triphylla 3, Chimaphila menziesii 1, Goodyera oblongifolia 0	
25-40	Abies amabilis 3		Rubus ursinus 1, Neottia 0, Pyrola asarifolia+ 0	Polystichum munitum 2, Pteridium aquilinum 1
10-25	Acer macrophyllum 1, Abies grandis 1, Pinus monticola 1	Vaccinium membranaceum 4, Amelanchier alnifolia 1, Vaccinium ovalifolium 1, Acer glabrum 1	Cornus unalaschkensis 7, Xerophyllum tenax 4, Trillium ovatum 2, Viola sempervirens 1, Spiraea lucida 1, Paxistima myrsinites 1, Calypso bulbosa 1, Clintonia uniflora 1	

{154} Pseudotsuga menziesii, Tsuga heterophylla, Gaultheria shallon, Vaccinium parvifolium*
Douglas-fir, western hemlock, salal & red huckleberry* forest
PSEMEN-TSUHET/GAUSHA-VACPAR



Range: Lowland and lower montane zones. **MORA**-16: **nw-sw-se** (ne) 610-990m. **NOCA**-18: **nw-cw** (ne-ce) 170-630m. **OLYM**-62: **nc-ne-se** (sc) 570-850m.

Struct: Semi-open conifer forest (28-38m) with abundant conifer regen, dense shrubs, and prominent dwarf shrubs. Avg vasc cover 130: conif tree 53, shrb 48, conif regen 20, dwf shrb 5, forb 0.83 @ 2, fern 0.44 @ 2, tall shrb 0.29 @ 2, brdlf tree 0.16 @ 3.

Ecology: Fairly gentle slopes, on moderately dry and well-drained soils. Regen dominated by *Tsuga heterophylla*, often with smaller but substantial amounts of *Thuja plicata*.

Metrics: slope 13-31°, vdp 12-82m, vdr 65-306m, east 8-69, south 26-89, conv 48-55, tpp 25-58, solar 53-70, wet 2-4

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Same.

Similar: MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MNO:[137] PSEMEN/GAUSHA-MAHNER, NO:[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN, O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN).

▶ [**137**] FORB 3 TSHRB* Acer glabrum*** 2 Achlys triphylla** Berberis nervosa 3 Festuca occidentalis+*** Hieracium albiflorum** Lysimachia latifolia* Rosa** Taxus brevifolia 2 [**keep**] Abies amabilis** Neottia* Rhododendron menziesii* Thuja plicata* 3 Tsuga heterophylla 12 Vaccinium ovalifolium** Vaccinium parvifolium*
▶ [**153**] TSHRB* 3 Acer circinatum* 4 Achlys triphylla** Berberis nervosa 3 Polystichum munitum* Pyrola asarifolia+*** Rosa** Taxus brevifolia* [**keep**] Corallorhiza*** Pinus monticola 2
▶ [**158**] TSHRB* 4 Acer circinatum 4 Pteridium aquilinum 3 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2 [**keep**] –
▶ [**159**] B-LT5* 2 B-GT5* TSHRB* 4 Acer glabrum** 2 Acer macrophyllum*** 2 Achlys triphylla* Arbutus menziesii*** Berberis nervosa 3 Holodiscus discolor** Polystichum munitum** 4 Rubus ursinus* [**keep**] Abies amabilis* Chimaphila menziesii* Chimaphila umbellata** Neottia* Pinus monticola* 2 Pteridium aquilinum*
▶ [**197**] TSHRB* 3 Acer circinatum* 4 Cornus unalaschkensis*** Rhododendron menziesii 2 Vaccinium ovalifolium** 3 [**keep**] Berberis nervosa* Chimaphila umbellata* Neottia* Pinus monticola** 2

Floristics (70 plots, MORA 5, NOCA 14, OLYM 51): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 38, Pseudotsuga menziesii 25	Gaultheria shallon 44		moss 44
80-95		Vaccinium parvifolium 4		
60-80	Thuja plicata 12		Linnaea borealis 2, Chimaphila umbellata 2, Berberis nervosa 2	
25-40	Pinus monticola 4, Abies amabilis 2		Chimaphila menziesii 1, Neottia 0, Goodyera oblongifolia 0	Pteridium aquilinum 2
10-25	Alnus rubra 4, Taxus brevifolia 1	Acer circinatum 2, Vaccinium ovalifolium 2, Rhododendron menziesii 1, Vaccinium membranaceum 1	Xerophyllum tenax 2, Rubus ursinus 1, Pyrola picta 1	Polystichum munitum 2

{155} Pseudotsuga menziesii, Tsuga heterophylla, Berberis nervosa
Douglas-fir, western hemlock & dwarf Oregon-grape forest
PSEMEN-TSUHET/MAHNER



Range: Lowland zone. **MORA**-20: **ne**-**sw**-**se** 680-830m. **NOCA**-67: **ne***-**cw**-**ce** 620-810m. **OLYM**-3: (ne-sc-se) 780-880m.

Struct: Closed conifer forest (38-49m) with abundant conifer regen, abundant dwarf shrubs, and substantial tall shrubs. Avg vasc cover 120: conif tree 69, conif regen 20, dwf shrb 17, forb 4, shrb 4, tall shrb 0.84 @ 7.

Ecology: Even-aged seral forests on fairly gentle slopes, on well-drained shallow soils. Regen codominated by *Tsuga heterophylla* and *Thuja plicata*. Understory consisting mainly of shade-tolerant dwarf shrubs.

Metrics: slope 13-26°, vdp 3-32m, vdr 50-233m, east 10-88, south 27-83, conv 46-51, tpp 25-49, solar 53-66, wet 3-4

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Similar; plots were shed to [151] PSEMEN-TSUHET/ACHTRI and [192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN).

Similar: MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, O:[158] PSEMEN-TSUHET/RHOMAC, N:[149] PSEMEN-(TSUHET)/ACECIR-PAXMYR. Also see: [069] BETPAP-(THUPLI)/ACECIR/MAHNER.

▶ [**151**] FORB 8 Achlys triphylla*** 2 Rosa 2 Tiarella trifoliata 2 [**keep**] Chimaphila menziesii* Chimaphila umbellata* Goodyera oblongifolia* Paxistima myrsinites** 2 Pyrola asarifolia+** Pyrola picta* Taxus brevifolia* Thuja plicata* Vaccinium membranaceum*
▶ [**156**] Achlys triphylla** 2 Galium*** Gaultheria shallon* Polystichum munitum* 2 Struthiopteris spicant** Tiarella trifoliata* Trillium ovatum** Vaccinium ovalifolium* [**keep**] Acer circinatum* Chimaphila menziesii* Chimaphila umbellata* Linnaea borealis* Paxistima myrsinites** 2 Pyrola picta*** Rosa* Taxus brevifolia* Vaccinium membranaceum**
▶ [**157**] Abies amabilis* Arctostaphylos uva-ursi+** Gaultheria ovatifolia* Hieracium albiflorum** Lupinus latifolius*** Neottia* Pinus monticola* Pteridium aquilinum* Sorbus scopulina* Spiraea lucida* Vaccinium membranaceum 3 [**keep**] Acer circinatum* Berberis nervosa 4 Chimaphila menziesii* Lysimachia latifolia* Polystichum munitum* Taxus brevifolia*
▶ [**192**] Corallorhiza* Trillium ovatum* Vaccinium ovalifolium* [**keep**] TSHRB* 3 Acer circinatum* 3 Berberis nervosa 3 Chimaphila umbellata* Goodyera oblongifolia* Linnaea borealis* Paxistima myrsinites* 2 Rosa*** Taxus brevifolia* Vaccinium membranaceum*
▶ [**196**] FORB 8 Achlys triphylla** 2 Athyrium filix-femina*** Galium*** Gymnocarpium dryopteris*** 2 Maianthemum stellatum* Oplopanax horridus*** Polystichum munitum 2 Rubus pedatus*** Rubus spectabilis*** 2 Tiarella trifoliata** 2 Trillium ovatum** [**keep**] TSHRB* Acer circinatum* Berberis nervosa* Chimaphila menziesii* Chimaphila umbellata** Goodyera oblongifolia* Paxistima myrsinites** 2 Pyrola picta** Rosa* Taxus brevifolia* Vaccinium membranaceum**

Floristics (55 plots, MORA 2, NOCA 50, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 39, Pseudotsuga menziesii 26, Thuja plicata 21		Berberis nervosa 10	moss 48
80-95		Vaccinium parvifolium 1	Linnaea borealis 3, Chimaphila umbellata 2, Goodyera oblongifolia 1	
60-80	Taxus brevifolia 3	Acer circinatum 7, Vaccinium membranaceum 2	Paxistima myrsinites 4	
40-60		Rosa 1	Lysimachia latifolia 2, Orthilia secunda 1, Chimaphila menziesii 1, Pyrola picta 1, Pyrola asarifolia+ 0	
25-40		Amelanchier alnifolia 1	Cornus unalaschkensis 2, Clintonia uniflora 2	Polystichum munitum 1
10-25	Abies grandis 4, Abies amabilis 3, Pinus monticola 2	Vaccinium ovalifolium 3, Gaultheria shallon 1, Rhododendron menziesii 1, Acer glabrum 1	Maianthemum stellatum 2, Gaultheria ovatifolia 2, Spiraea lucida 1	Pteridium aquilinum 1

{156} Pseudotsuga menziesii, Tsuga heterophylla, Berberis nervosa, Polystichum munitum
Douglas-fir, western hemlock, dwarf Oregon-grape & sword fern forest
PSEMEN-TSUHET/MAHNER/POLMUN



Range: Lowland zone. **MORA**-15: **nw**-**sw** (ne) 720-890m. **NOCA**-2: (ne-cw) 700-720m. **OLYM**-17: **nc**-**ne**-**se** (sc) 330-590m.

Struct: Closed conifer forest (45-59m) with abundant conifer regen, abundant dwarf shrubs, and substantial ferns & forbs. Avg vasc cover 165: conif tree 82, conif regen 29, dwf shrb 19, fern 13, forb 8, shrb 5, tall shrb 0.55 @ 15.

Ecology: Seral forests on toeslopes, benches and midslopes, on moist well-drained soils. Regen dominated by *Tsuga heterophylla*, often with smaller but substantial amounts of *Thuja plicata*.

Metrics: slope 19-35°, vdp 5-29m, vdr 36-139m, east 27-92, south 12-88, conv 42-51, tpp 22-51, solar 45-70, wet 2-3

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Similar; plots were shed to [150] PSEMEN-TSUHET/(ACECIR)/POLMUN and gained from PSEMEN-TSUHET/MAHNER, TSUHET-ABIAMA-PSEMEN/MAHNER and TSUHET-PSEMEN/MAHNER-CHIMEN.

Similar: MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[155] PSEMEN-TSUHET/MAHNER, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, NO:[159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN. Also see: [136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN.

▶ [**150**] B-GT5** 2 Acer macrophyllum* Alnus rubra* Lysimachia latifolia* Pteridium aquilinum*** 2 Rubus ursinus* [**keep**] Abies amabilis* 2 Achlys triphylla 2 Berberis nervosa* 3 Chimaphila menziesii* Chimaphila umbellata*** 2 Clintonia uniflora** Goodyera oblongifolia* Maianthemum stellatum* Prosartes* Taxus brevifolia* Trillium ovatum*

▶ [**151**] Abies grandis** Achlys triphylla* 6 Adenocaulon bicolor** Cornus unalaschkensis* Orthilia secunda* Pteridium aquilinum** Rosa* 2 Vaccinium membranaceum* Viola sempervirens* [**keep**] Asarum caudatum*** Galium* Goodyera oblongifolia* Oplopanax horridus* Polystichum munitum* 5 Struthiopteris spicant* Thuja plicata* Trillium ovatum* Vaccinium ovalifolium* Viola glabella+*

▶ [**155**] Acer circinatum* Chimaphila menziesii* Chimaphila umbellata* Linnaea borealis* Paxistima myrsinites** 2 Pyrola picta*** Rosa* Taxus brevifolia* Vaccinium membranaceum** [**keep**] Achlys triphylla** 2 Galium*** Gaultheria shallon* Polystichum munitum* 2 Struthiopteris spicant** Tiarella trifoliata* Trillium ovatum** Vaccinium ovalifolium*

▶ [**192**] Chimaphila menziesii* Chimaphila umbellata* Corallorhiza* Orthilia secunda** Paxistima myrsinites* Pyrola picta** Vaccinium membranaceum* [**keep**] FORB 3 TSHRB 3 Acer circinatum 3 Achlys triphylla*** Berberis nervosa 3 Chimaphila umbellata 2 Galium*** Gymnocarpium dryopteris* Linnaea borealis 2 Maianthemum stellatum* Oplopanax horridus** Polystichum munitum 2 Prosartes** Rubus ursinus* Struthiopteris spicant** Tiarella trifoliata* Viola glabella+**

▶ [**196**] FORB 13 Adenocaulon bicolor*** Athyrium filix-femina* Clintonia uniflora* Cornus unalaschkensis* Gymnocarpium dryopteris** Linnaea borealis 7 Maianthemum dilatatum 2 Maianthemum stellatum* 2 Oplopanax horridus** Rubus pedatus** Rubus spectabilis* 2 Tiarella trifoliata* 5 [**keep**] Berberis nervosa** 5 Chimaphila umbellata 2

Floristics (22 plots, MORA 8, NOCA 1, OLYM 13): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 57		Berberis nervosa 15	Polystichum munitum 12
80-95	Pseudotsuga menziesii 30, Thuja plicata 23	Vaccinium parvifolium 3		moss 39
60-80			Trillium ovatum 1	
40-60		Acer circinatum 17, Gaultheria shallon 1	Linnaea borealis 5, Achlys triphylla 4, Tiarella trifoliata 3, Goodyera oblongifolia 1	
25-40	Taxus brevifolia 4, Abies amabilis 3	Vaccinium ovalifolium 2	Chimaphila umbellata 3, Prosartes 1, Maianthemum stellatum 1, Galium 1, Viola sempervirens 1, Clintonia uniflora 1, Chimaphila menziesii 1	Struthiopteris spicant 2
10-25		Oplopanax horridus 1, Ribes lacustre 1, Rubus spectabilis 1, Rosa 1	Lysimachia latifolia 3, Cornus unalaschkensis 3, Viola glabella+ 1, Neottia 1, Asarum caudatum 1, Streptopus lanceolatus 1, Moneses uniflora 1, Rubus ursinus 1	Gymnocarpium dryopteris 3, Athyrium filix-femina 1, Dryopteris 1

{157} Pseudotsuga menziesii, Tsuga heterophylla, Paxistima myrsinites, Linnaea borealis
Douglas-fir, western hemlock, Oregon-box & twinflower forest
PSEMEN-TSUHET/PAXMYR/LINBOR



Range: Lower montane and lowland zones. **MORA**-2: (ne-sw) 940-1220m. **NOCA**-19: **ne*-ce** (nw) 650-1060m. **OLYM**-2: (nc-se) 990-1060m.

Struct: Semi-open conifer forest (24-27m) with substantial conifer regen, dense mosses, and substantial dwarf shrubs & shrubs. Avg vasc cover 100: conif tree 53, conif regen 15, dwf shrb 11, shrb 10, forb 4, tall shrb 0.71 @ 7, fern 0.43 @ 2.

Ecology: Fairly steep slopes with southerly aspects, on dry rocky soils. Evidence of past fires is often apparent. Regen dominated by *Tsuga heterophylla*, frequently with smaller amounts of *Thuja plicata* and *Pseudotsuga menziesii*.

Metrics: slope 10-35°, vdp 3-124m, vdr 71-378m, east 11-83, south 62-93, conv 45-54, tpp 26-57, solar 59-73, wet 3-4

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Expanded, incorporating many plots from PSEMEN-(THUPLI-ABIGRA)/VACMEM, PSEMEN-(TSUHET)/ACECIR-PAXMYR, PSEMEN-TSUHET/MAHNER and other C09 types. Concept likely differs.

Similar: MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[155] PSEMEN-TSUHET/MAHNER, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, N:[141] PSEMEN/MAHNER/CALRUB, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER. Also see: [144] PSEMEN-(PINCON)/ARCUVA/RACCAN.

▶ [**004**] Abies amabilis* 5 Abies lasiocarpa* 2 Achlys triphylla** 2 Callitropsis nootkatensis* 2 Clintonia uniflora* Orthilia secunda* Sorbus sitchensis* Tiarella trifoliata* [**keep**] Berberis nervosa* Gaultheria ovatifolia* Hieracium albiflorum*** Linnaea borealis* Pinus monticola* Pyrola asarifolia+* Thuja plicata* 4 Vaccinium parvifolium***
▶ [**140**] FORB 7 Abies procera 2 Achlys triphylla*** 2 Berberis nervosa 4 Rubus ursinus** Xerophyllum tenax 2 [**keep**] Pinus monticola* Thuja plicata** 2 Tsuga heterophylla 12 Vaccinium membranaceum* 2
▶ [**151**] FORB 7 Abies grandis 2 Achlys triphylla*** 2 Berberis nervosa 4 Rosa 2 Tiarella trifoliata 2 [**keep**] Chimaphila umbellata* Gaultheria ovatifolia** Goodyera oblongifolia* Hieracium albiflorum** Paxistima myrsinites** 2 Pinus monticola** Pyrola asarifolia+** Thuja plicata* Vaccinium membranaceum*
▶ [**155**] Acer circinatum* Berberis nervosa 4 Chimaphila menziesii* Lysimachia latifolia* Polystichum munitum* Taxus brevifolia* [**keep**] Abies amabilis* Arctostaphylos uva-ursi+** Gaultheria ovatifolia* Hieracium albiflorum** Lupinus latifolius*** Neottia* Pinus monticola* Pteridium aquilinum* Sorbus scopulina* Spiraea lucida* Vaccinium membranaceum 3
▶ [**192**] Chimaphila menziesii* Polystichum munitum* Taxus brevifolia* Trillium ovatum** Vaccinium ovalifolium* [**keep**] SHRB 3 TSHRB 3 Acer circinatum 3 Amelanchier alnifolia*** Arctostaphylos uva-ursi+** Gaultheria ovatifolia** Hieracium albiflorum*** Linnaea borealis 2 Lupinus latifolius*** Paxistima myrsinites 2 Pinus monticola*** Rosa** Sorbus scopulina** Spiraea lucida*** Vaccinium membranaceum* 2

Floristics (21 plots, MORA 1, NOCA 18, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 34			moss 38
80-95	Tsuga heterophylla 26	Vaccinium membranaceum 8	Linnaea borealis 4, Chimaphila umbellata 2	
60-80	Thuja plicata 11, Pinus monticola 1		Paxistima myrsinites 3, Berberis nervosa 2, Goodyera oblongifolia 0	
40-60	Abies amabilis 3	Acer circinatum 8, Vaccinium parvifolium 2, Rosa 1	Gaultheria ovatifolia 1, Orthilia secunda 1, Pyrola asarifolia+ 1, Hieracium albiflorum 0	
25-40		Sorbus scopulina 1, Amelanchier alnifolia 1	Arctostaphylos uva-ursi+ 2, Neottia 1, Chimaphila menziesii 1, Spiraea lucida 0, Lupinus latifolius 0, Pyrola picta 0	Pteridium aquilinum 3
10-25	Tsuga mertensiana 1, Pinus contorta 1	Rhododendron menziesii 2, Acer glabrum 1	Clintonia uniflora 2, Cornus unalaschkensis 2, Maianthemum stellatum 1, Pedicularis racemosa 1, Rubus lasiococcus 1	lichen 2, Calamagrostis rubescens+ 2

{158} Pseudotsuga menziesii, Tsuga heterophylla, Rhododendron macrophyllum
Douglas-fir, western hemlock & Pacific rhododendron forest
PSEMEN-TSUHET/RHOMAC



Range: Lowland zone. **OLYM**-10: **se*** (ne) 510-690m.

Struct: Mostly closed conifer forest (25-38m) with substantial conifer regen, dense shrubs & tall shrubs, and substantial dwarf shrubs. Avg vasc cover 149: conif tree 61, shrb 38, tall shrb 0.88 @ 31, conif regen 0.88 @ 12, forb 0.88 @ 4, dwf shrb 0.75 @ 11, fern 0.25 @ 8.

Ecology: Fairly gentle midslopes and benches, on dry shallow soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 6-26°, vdp 6-68m, vdr 30-103m, east 57-93, south 37-96, conv 43-52, tpp 10-26, solar 58-69, wet 2-4

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Same.

Similar: MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MNO:[137] PSEMEN/GAUSHA-MAHNER, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, O:[152] PSEMEN-TSUHET/GAUSHA-HOLDIS. Also see: [159] PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN.

▶ [**137**] Acer glabrum* 2 Achlys triphylla* Festuca occidentalis+** Hieracium albiflorum* Lysimachia latifolia* Polystichum munitum 2 Rosa* Taxus brevifolia 2 [**keep**] TSHRB 8 Pteridium aquilinum 3 Rhododendron macrophyllum*** 2 Tsuga heterophylla 12 Tsuga mertensiana 2 Vaccinium parvifolium 2

▶ [**150**] B-GT5** 2 Acer circinatum* Acer macrophyllum* Achlys triphylla* Lysimachia latifolia* Polystichum munitum** 2 Rubus ursinus* Tiarella trifoliata 2 [**keep**] SHRB 10 TSHRB 11 Berberis nervosa 2 Chimaphila umbellata*** Gaultheria shallon* 3 Pinus monticola 2 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2

▶ [**153**] Abies amabilis 2 Achlys triphylla* Polystichum munitum* Taxus brevifolia* [**keep**] Pinus monticola 2 Pteridium aquilinum 2 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2 Vaccinium parvifolium 3

▶ [**154**] – [**keep**] TSHRB* 4 Acer circinatum 4 Pteridium aquilinum 3 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2

▶ [**197**] Cornus unalaschkensis* Rhododendron menziesii* Vaccinium ovalifolium* 5 [**keep**] TSHRB 13 Pinus monticola 2 Pteridium aquilinum 2 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2

Floristics (8 plots, OLYM 8): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 45	Gaultheria shallon 27		moss 43
80-95	Pseudotsuga menziesii 22	Rhododendron macrophyllum 28		
60-80		Vaccinium parvifolium 8	Berberis nervosa 5, Linnaea borealis 5, Chimaphila umbellata 1	
40-60	Thuja plicata 7			
25-40	Tsuga mertensiana 7, Pinus monticola 5, Abies amabilis 0	Acer circinatum 8, Vaccinium ovalifolium 3, Rosa 1	Xerophyllum tenax 4, Neottia 1, Clintonia uniflora 1, Chimaphila menziesii 1, Goodyera oblongifolia 0	lichen 10, Pteridium aquilinum 8
10-25		Rhododendron albiflorum 15, Vaccinium membranaceum 5, Rhododendron menziesii 3, Sorbus sitchensis 1	Arctostaphylos uva-ursi+ 5, Gaultheria ovatifolia 3, Cornus unalaschkensis 3, Viola sempervirens 1, Corallorhiza 1, Monotropa 1, Tiarella trifoliata 1, Trillium ovatum 1, Orthilia secunda 1	liverwort 1

{159} Pseudotsuga menziesii, Tsuga heterophylla, Thuja plicata, Gaultheria shallon, Polystichum munitum
Douglas-fir, western hemlock, redcedar, salal & sword fern forest
PSEMEN-TSUHET-THUPLI/GAUSHA/POLMUN



Range: Lowland zone. **NOCA**-1: (nw-cw) 170-180m. **OLYM**-12: **nc*-ne** (sc) 240-470m.

Struct: Semi-open conifer forest (46-56m) with abundant conifer regen, dense shrubs, and substantial dwarf shrubs & ferns. Avg vasc cover 141: conif tree 52, shrb 34, conif regen 23, dwf shrb 9, fern 8, forb 0.73 @ 4, tall shrb 0.55 @ 14, brdlf regen 0.45 @ 7, brdlf tree 0.45 @ 4.

Ecology: Mesic sites on lower slopes and midslopes. May develop from [136] PSEMEN-ACEMAC/MAHNER/ACHTRI-POLMUN. Regen codominated by *Thuja plicata* and *Tsuga heterophylla*.

Metrics: slope 11-40°, vdp 2-20m, vdr 56-211m, east 23-81, south 27-92, conv 39-51, tpp 39-52, solar 47-75, wet 2-5

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Evolved from PSEMEN-TSUHET/GAUSHA/POLMUN, incorporating some plots from PSEMEN-TSUHET/GAUSHA-MAHNER, PSEMEN-TSUHET/GAUSHA-VACPAR and TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL.

Similar: MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MNO:[137] PSEMEN/GAUSHA-MAHNER, MNO:[155] PSEMEN-TSUHET/MAHNER, MO:[151] PSEMEN-TSUHET/ACHTRI.

▶ [**150**] Acer circinatum* Alnus rubra* Athyrium filix-femina** Dryopteris* Galium** Lysimachia latifolia* Pteridium aquilinum* 2 Struthiopteris spicant** Tiarella trifoliata* Vaccinium ovalifolium** 2 [**keep**] B-LT5* 2 SHRB 10 Acer glabrum* 3 Arbutus menziesii*** Berberis nervosa* 2 Gaultheria shallon* 3 Holodiscus discolor*
▶ [**153**] Abies amabilis** 2 Acer circinatum* Chimaphila menziesii* Chimaphila umbellata*** Goodyera oblongifolia* Neottia** Pteridium aquilinum** Pyrola asarifolia+** Rosa** Taxus brevifolia* [**keep**] B-LT5* 2 B-GT5* 2 Acer glabrum 2 Acer macrophyllum* 2 Arbutus menziesii*** Holodiscus discolor* Polystichum munitum* 3
▶ [**154**] Abies amabilis* Chimaphila menziesii* Chimaphila umbellata** Neottia* Pinus monticola* 2 Pteridium aquilinum* [**keep**] B-LT5* 2 B-GT5* TSHRB* 4 Acer glabrum** 2 Acer macrophyllum*** 2 Achlys triphylla* Arbutus menziesii*** Berberis nervosa 3 Holodiscus discolor** Polystichum munitum** 4 Rubus ursinus*
▶ [**156**] Abies amabilis** 2 Chimaphila umbellata* 2 Clintonia uniflora* Galium** Goodyera oblongifolia* Maianthemum stellatum* Struthiopteris spicant** Trillium ovatum* Vaccinium ovalifolium** Viola sempervirens* [**keep**] B-LT5* 2 B-GT5* 2 SHRB 9 Acer glabrum* 5 Acer macrophyllum** 3 Arbutus menziesii*** Gaultheria shallon* 3 Holodiscus discolor***
▶ [**196**] FORB 7 Abies amabilis** Achlys triphylla 3 Athyrium filix-femina** Clintonia uniflora** Cornus unalaschkensis* Galium** Gymnocarpium dryopteris*** 2 Maianthemum dilatatum 2 Maianthemum stellatum*** Oplopanax horridus*** Rubus spectabilis 2 Tiarella trifoliata** 4 Trillium ovatum* [**keep**] B-LT5* 3 B-GT5** SHRB 15 Acer glabrum*** 2 Acer macrophyllum** 2 Arbutus menziesii*** Berberis nervosa* Gaultheria shallon** 6 Holodiscus discolor*** Rubus ursinus*

Floristics (11 plots, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 26, Pseudotsuga menziesii 25, Thuja plicata 22	Gaultheria shallon 30	Berberis nervosa 6	moss 31, Polystichum munitum 8
80-95		Vaccinium parvifolium 3		
40-60	Acer macrophyllum 8		Linnaea borealis 7, Achlys triphylla 2	
25-40	Arbutus menziesii 3	Acer glabrum 12, Holodiscus discolor 1	Rubus ursinus 0	
10-25		Acer circinatum 25	Tiarella trifoliata 3, Trillium ovatum 2, Lysimachia latifolia 1	

{160} Pseudotsuga menziesii, Tsuga heterophylla, Vaccinium ovalifolium, Xerophyllum tenax
Douglas-fir, western hemlock, Alaska blueberry & beargrass forest
PSEMEN-TSUHET/VACALA/XERTEN



Range: Transitional between lower and upper montane zones. **MORA**-28: **nw-sw*-se** 1130-1290m. **OLYM**-1: (nc) 950-960m.

Struct: Mostly closed conifer forest (26-35m) with substantial conifer regen, abundant forbs, and substantial shrubs & dwarf shrubs. Avg vasc cover 112: conif tree 63, forb 17, shrb 0.92 @ 10, dwf shrb 0.92 @ 9, conif regen 0.85 @ 14, tall shrb 0.23 @ 8.

Ecology: Midslopes, upper slopes and ridgetops with southerly aspects, on shallow rocky soils. Regen dominated by *Tsuga heterophylla* and/or *Abies amabilis*. Shrub layer is occasionally absent.

Metrics: slope 15-32°, vdp 41-126m, vdr 181-355m, east 13-54, south 60-97, conv 52-60, tpp 43-73, solar 68-85, wet 2-3

Map class: C14–Silver fir, big huckleberry & beargrass forest

Rel to C09: Similar, shedding some plots to [181] TSUHET-ABIAMA-PSEMEN/GAUSHA.

Similar: MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[004] ABIAMA-PSEMEN/VACMEM, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[007] ABIAMA-TSUHET/ORTSEC, MO:[140] PSEMEN/MAHNER/ACHTRI, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER. Also see: [181] TSUHET-ABIAMA-PSEMEN/GAUSHA.

▶ [**002**] Abies lasiocarpa** 2 Abies procera* 6 Rhododendron albiflorum*** 2 Rubus lasiococcus* Tsuga mertensiana* 2 Vaccinium membranaceum 2 [**keep**] Acer circinatum** Berberis nervosa** Gaultheria ovatifolia* Gaultheria shallon*** 2 Linnaea borealis* Rhododendron menziesii 2 Thuja plicata** Vaccinium parvifolium*
▶ [**003**] TSHRB* Acer circinatum* Achlys triphylla** Chimaphila umbellata* Clintonia uniflora** Cornus unalaschkensis* Polystichum munitum** 2 Rosa** Tiarella trifoliata** 2 [**keep**] Callitropsis nootkatensis* Gaultheria ovatifolia* Gaultheria shallon** 2 Pinus monticola*** 2 Rhododendron menziesii** 2 Vaccinium ovalifolium 2 Xerophyllum tenax** 3
▶ [**004**] TSHRB* Abies lasiocarpa* 2 Achlys triphylla* 3 Chimaphila umbellata* Clintonia uniflora* 2 Orthilia secunda* Paxistima myrsinites* Sorbus sitchensis* Tiarella trifoliata* Vaccinium membranaceum 2 [**keep**] Gaultheria shallon 2 Linnaea borealis* Pinus monticola 2 Vaccinium ovalifolium* 2 Vaccinium parvifolium*** Xerophyllum tenax** 3
▶ [**151**] TSHRB* Abies grandis 2 Acer circinatum* Achlys triphylla*** 3 Berberis nervosa* Cornus unalaschkensis* Polystichum munitum*** Rosa*** 2 Tiarella trifoliata 2 Viola sempervirens*** [**keep**] Abies amabilis* 5 Callitropsis nootkatensis** 3 Gaultheria ovatifolia*** Pinus monticola** Rhododendron menziesii** 2 Vaccinium membranaceum* Vaccinium ovalifolium* Xerophyllum tenax*** 2
▶ [**157**] TSHRB* Amelanchier alnifolia** Chimaphila umbellata* Hieracium albiflorum* Neottia* Paxistima myrsinites* 2 Pteridium aquilinum* Pyrola asarifolia+* Pyrola picta** Rosa** Thuja plicata* Vaccinium membranaceum 2 [**keep**] FORB 7 Abies amabilis 5 Callitropsis nootkatensis 2 Gaultheria shallon 2 Vaccinium ovalifolium 2 Xerophyllum tenax*** 2

Floristics (13 plots, MORA 12, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Etc
95-100	Tsuga heterophylla 36, Pseudotsuga menziesii 22		Xerophyllum tenax 15	
80-95	Abies amabilis 12			
60-80		Vaccinium ovalifolium 6, Vaccinium membranaceum 1	Linnaea borealis 3	moss 18
40-60	Callitropsis nootkatensis 6	Vaccinium parvifolium 2	Berberis nervosa 7	
25-40	Pinus monticola 4	Gaultheria shallon 5, Rhododendron menziesii 4	Gaultheria ovatifolia 3, Orthilia secunda 1, Goodyera oblongifolia 0	
10-25	Thuja plicata 6, Abies procera 4	Acer circinatum 8	Chimaphila umbellata 6, Pedicularis racemosa 3, Cornus unalaschkensis 2, Chimaphila menziesii 1, Hieracium albiflorum 1, Paxistima myrsinites 1, Corallorhiza 1	

{161} Pseudotsuga menziesii, Vaccinium membranaceum
Douglas-fir & big huckleberry forest
PSEMEN/VACMEM



Range: Lower and upper montane zones. **NOCA**-21: **s*** 990-1370m.

Struct: Open conifer forest (tall stature) with prominent conifer regen, abundant dwarf shrubs & shrubs, and substantial forbs, tall shrubs & grasses. Avg vasc cover 114: conif tree 37, dwf shrb 23, shrb 22, forb 12, tall shrb 10, conif regen 5, grass 0.81 @ 5, fern 0.62 @ 2.

Ecology: Post-fire seral forests on slopes with westerly aspects, on well-drained soils. Regen a variable mix of *Pseudotsuga menziesii*, *Pinus monticola*, *Abies lasiocarpa* and/or other species.

Metrics: slope 20-32°, vdp 29-83m, vdr 93-368m, east 4-25, south 13-83, conv 48-53, tpp 30-48, solar 42-69, wet 3

Map class: C16–North Casc Doug-fir & subalpine fir woodland

Rel to C09: Similar, shedding plots to [026] ABILAS-(PSEMEN)/VACMEM/CALRUB and [141] PSEMEN/MAHNER/CALRUB and gaining from PSEMEN-(ABIGRA)/ACECIR-PAXMYR.

Similar: N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, N:[142] PSEMEN/PAXMYR-SPIBET, N:[143] PSEMEN-PINCON/ARCNEV, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, MNO:[030] ABILAS/VACMEM/LUPARC, N:[121] PINCON/VACMEM, N:[141] PSEMEN/MAHNER/CALRUB, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR. Also see: [146] PSEMEN-PINPON/CALRUB.

▶ [**026**] Abies lasiocarpa 7 Hieracium scouleri+*** Lomatium brandegeei+** Lupinus latifolius* [**keep**] Acer glabrum* Adenocaulon bicolor** 2 Clintonia uniflora* Galium** Maianthemum racemosum* Pyrola picta*** Rhododendron albiflorum 2 Rosa** Rubus nutkanus* 3 Spiraea lucida* Taxus brevifolia*. Note: [026] is at higher elevations.
▶ [**142**] Acer circinatum* Arnica cordifolia* Cacaliopsis nardosmia* 2 Ceanothus velutinus* Elymus* Erythronium montanum+*** Hieracium scouleri+*** Moehringia macrophylla* Platanthera* Prunus emarginata* [**keep**] SHRB 4 Abies amabilis* Abies lasiocarpa* Linnaea borealis 2 Orthilia secunda* Pedicularis racemosa* Pinus monticola* 2 Rhododendron albiflorum 2 Rubus lasiococcus** Rubus nutkanus 3 Salix scouleriana* Vaccinium membranaceum* 2
▶ [**143**] Arctostaphylos uva-ursi+** 4 Hieracium scouleri+*** Pinus contorta* 3 [**keep**] FORB 4 TSHRB 3 Abies amabilis* Acer glabrum** 2 Adenocaulon bicolor 2 Chamaenerion angustifolium* Chimaphila umbellata* Eucephalus ledophyllus+** Goodyera oblongifolia* Linnaea borealis 5 Maianthemum racemosum** Orthilia secunda*** Pedicularis racemosa* Rhododendron albiflorum 2 Rubus lasiococcus** Rubus nutkanus 2
▶ [**157**] C-LT5 7 Acer circinatum** 3 Berberis nervosa* Gaultheria ovatifolia* Linnaea borealis* Thuja plicata* 2 Tsuga heterophylla* 3 Vaccinium parvifolium** [**keep**] Abies lasiocarpa** 2 Acer glabrum* 2 Calamagrostis rubescens+* Chamaenerion angustifolium*** Eucephalus ledophyllus+*** Lilium*** Linnaea borealis 6 Maianthemum racemosum** Osmorhiza*** Rhododendron albiflorum 2 Rubus nutkanus* 2 Salix scouleriana**
▶ [**165**] TSHRB 18 Acer circinatum* 4 Amelanchier alnifolia 5 Callitropsis nootkatensis** Ceanothus velutinus** 2 Cryptogramma acrostichoides* Holodiscus discolor** Prunus emarginata* 2 Rubus nutkanus* Salix scouleriana 4 Symphoricarpos albus** Thalictrum occidentale* Viola glabella+* [**keep**] C-GT5 7 Adenocaulon bicolor 2 Calamagrostis rubescens+* Chimaphila umbellata** Goodyera oblongifolia*** Hieracium albiflorum* Linnaea borealis 2 Orthilia secunda** Pedicularis racemosa*** Pinus monticola** Pseudotsuga menziesii 6 Rhododendron albiflorum 2 Rubus lasiococcus** Spiraea lucida* Vaccinium membranaceum* 6

Floristics (21 plots, NOCA 21): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Pseudotsuga menziesii 32	Vaccinium membranaceum 16	Paxistima myrsinites 11	
80-95	Abies lasiocarpa 4	Sorbus scopulina 3	Chimaphila umbellata 2, Goodyera oblongifolia 0	
60-80	Pinus monticola 3	Acer glabrum 6, Amelanchier alnifolia 3, Salix scouleriana 2	Rubus lasiococcus 3, Spiraea lucida 3, Maianthemum racemosum 2, Orthilia secunda 1, Hieracium albiflorum 1	Calamagrostis rubescens+ 5
40-60	Abies amabilis 1		Linnaea borealis 16, Chamaenerion angustifolium 2, Eucephalus ledophyllus+ 1, Osmorhiza 0, Pedicularis racemosa 0	Pteridium aquilinum 2
25-40	Picea engelmannii 2, Tsuga heterophylla 2, Taxus brevifolia 1, Thuja plicata 1	Rubus nutkanus 8, Rhododendron albiflorum 4, Rosa 2, Alnus viridis 1, Ribes acerifolium+ 1	Adenocaulon bicolor 4, Clintonia uniflora 2, Berberis nervosa 1, Pyrola asarifolia+ 1, Arnica cordifolia 1, Moehringia macrophylla 0, Galium 0, Lilium 0, Pyrola picta 0	moss 8, Bromus vulgaris+ 3
10-25	Pinus contorta 2		Arctostaphylos uva-ursi+ 2, Thalictrum occidentale 2, Lupinus latifolius 1, Prosartes 1	

{162} Rubus nutkanus, Pteridium aquilinum, Chamaenerion angustifolium
Thimbleberry, bracken fern & fireweed shrubland
RUBPAR/PTEAQU-CHAANG



Range: Ranging upward and downward from the lower montane zone. **MORA**-3: **sw** (nw) 1450-1500m. **NOCA**-15: **cw-ce-s*** (nw-ne) 700-1150m. **OLYM**-7: **ne-se** (nc) 730-1150m.

Struct: Semi-open patchy shrubland with dense forbs, abundant ferns, and substantial tall shrubs. Avg vasc cover 127: forb 47, shrb 45, fern 0.86 @ 30, tall shrb 0.86 @ 7, grass 0.81 @ 3, conif LT5 0.29 @ 2, conif GT5 0.24 @ 2, brdlf LT5 0.19 @ 3, sedge 0.19 @ 2.

Ecology: Fairly gentle slopes with southerly aspects, on dry and rocky soils. On avalanche tracks and dry streambeds, and sometimes in large forest openings on lower slopes. At NOCA, may be found at the margins or runout zones of avalanche-initiated tall shrublands.

Metrics: slope 13-26°, vdp 1-6m, vdr 19-177m, east 34-84, south 70-97, conv 40-44, tpp 8-20, solar 61-75, wet 3-5

Map class: S44–Thimbleberry shrubland, tall forbs & bracken

Rel to C09: Evolved from RUBPAR/CHAANG, incorporating plots from RUBPAR-RUBSPE and PTEAQU.

Similar: NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[058] ALNVIR-(SAMRAC)/THAOCC, N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), N:[165] SALSCO-SORSCO-AMEALN/PAXMYR, MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MN:[071] CARNIG-CARLEN-(CALCAN).

▶ [**039**] B-LT5* 5 B-GT5*** 2 Acer circinatum 3 Acer glabrum 3 Acer macrophyllum** 6 Actaea rubra** Asarum caudatum** Circaea alpina* Cornus stolonifera/occidentalis* Maianthemum racemosum* Oplopanax horridus** 2 Osmorhiza* Paxistima myrsinites* Salix scouleriana 3 Thuja plicata** [**keep**] Alnus viridis* Bromus vulgaris+* Chamaenerion angustifolium* Elymus* Heracleum maximum* 3 Hydrophyllum fendleri* Melica smithii* Pteridium aquilinum 8 Rubus nutkanus 12 Salix sitchensis+* Thalictrum occidentale 4 Urtica dioica* 2
▶ [**058**] TSHRB 14 Abies amabilis* Abies lasiocarpa* Alnus viridis* 6 Aruncus dioicus 2 Callitropsis nootkatensis 2 Claytonia sibirica+** 2 Cryptogramma acrostichoides* Mitella* Osmorhiza* Ribes acerifolium+** Sambucus racemosa 2 Sorbus sitchensis* Vaccinium membranaceum* [**keep**] SHRB 14 Chamaenerion angustifolium* 2 Pteridium aquilinum*** 2 Rubus nutkanus* 7 Thalictrum occidentale 5 Urtica dioica 4
▶ [**093**] Abies lasiocarpa* Achillea millefolium* Artemisia 3 Bromus sitchensis* Callitropsis nootkatensis 2 Carex spectabilis+* 3 Cirsium edule+* Elymus 4 Erigeron** Lupinus latifolius** 2 Veratrum viride* [**keep**] SHRB* 13 TSHRB* 3 Acer glabrum*** Chamaenerion angustifolium* Galium** Hydrophyllum fendleri* Melica smithii*** Pteridium aquilinum** Rubus nutkanus** 5 Salix sitchensis+ 2 Sambucus racemosa* Urtica dioica* Viola glabella+*
▶ [**166**] B-GT5** TSHRB 14 Abies amabilis** Abies lasiocarpa 2 Aruncus dioicus* Athyrium filix-femina* Circaea alpina* Cornus stolonifera/occidentalis* 9 Equisetum arvense+** Ribes bracteosum+*** 2 Rubus spectabilis* Salix sitchensis+* 7 Sambucus racemosa 2 Tolmiea menziesii* [**keep**] SHRB 16 Chamaenerion angustifolium* Heracleum maximum 3 Pteridium aquilinum*** 5 Rubus nutkanus* 5 Thalictrum occidentale 3
▶ [**167**] B-GT5** C-GT5* TSHRB 13 Athyrium filix-femina* Carex aquatilis+*** 2 Cornus stolonifera/occidentalis* 8 Equisetum arvense+** 2 Lysichiton americanus*** 2 Salix sitchensis+* 7 Spiraea douglasii** [**keep**] Chamaenerion angustifolium*** 2 Heracleum maximum** 2 Hydrophyllum fendleri*** Pteridium aquilinum** 2 Rubus nutkanus** 2 Thalictrum occidentale*** 2

Floristics (21 plots, NOCA 15, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Rubus nutkanus 42		
80-95				Pteridium aquilinum 27
60-80			Heracleum maximum 12, Thalictrum occidentale 12, Chamaenerion angustifolium 10, Hydrophyllum fendleri 5	
40-60			Urtica dioica 9, Galium 2	
25-40		Salix sitchensis+ 4, Alnus viridis 3, Acer glabrum 2, Acer circinatum 2, Sambucus racemosa 1	Viola glabella+ 2	Elymus 2, Bromus vulgaris+ 1, Melica smithii 1
10-25	Acer macrophyllum 3, Pseudotsuga menziesii 2	Sorbus scopulina 10, Rosa 5, Rubus spectabilis 5	Eucephalus ledophyllus+ 10, Maianthemum stellatum 7, Prosartes 7, Veratrum viride 4, Maianthemum racemosum 4, Dicentra formosa 3, Canadanthus modestus 3, Stachys cooleyae 2, Tolmiea menziesii 2, Artemisia 2	Athyrium filix-femina 23, Carex spectabilis+ 2

{163} Salix commutata, Carex spp., Leptarrhena pyrolifolia*
Undergreen willow, sedge & leatherleaf saxifrage* shrubland
SALCOM/CAREX-(LEPPYR)



Range: Subalpine zone, in wetlands. **MORA**-3: **ne** (sw) 1590-1640m. **NOCA**-3: **s** (ce) 1330-1500m. **OLYM**-26: **nc**-**ne***-**sc**-**se** 1460-1660m.

Struct: Semi-open patchy shrubland with dense forbs, abundant sedges, and prominent conifer regen. Avg vasc cover 109: shrb 46, forb 31, sedge 17, conif LT5 0.82 @ 3, dwf shrb 0.68 @ 5, grass 0.68 @ 3, rush 0.32 @ 3, tall shrb 0.14 @ 3.

Ecology: Very gentle slopes in or adjacent to basins, on saturated organic soils. Meandering braided channels are usually found throughout. *Abies lasiocarpa* regen is frequently present. Wet herbaceous openings of [071] CARNIG-CARLEN-(CALCAN) or [072] CAREX-CALLEP-(LEPPYR) may be interspersed. Adjacent forests are typically dominated by *Abies lasiocarpa*, *A. amabilis* or *Tsuga mertensiana*.

Metrics: slope 2-14°, vdp 1-10m, vdr 601-811m, east 21-80, south 13-79, conv 41-48, tpp 23-48, solar 64-72, wet 3-6

Map class: S41W–Subalpine willow wetland

Rel to C09: Split from SALCOM to distinguish from [164] SALCOM/VALSIT, and adding some plots from CAR(AQD,NIG)-CALLEP and LEPPYR.

Similar: MNO:[164] SALCOM/VALSIT, MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[072] CAREX-CALLEP-(LEPPYR), MN:[073] CARNIG-KALMIC-(VACDEL), MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[100] LUEPEC-(CARSPE), MNO:[059] ANTLAN-(OREALP-VACDEL), NO:[093] HERMAX-(THAOCC-SAUAME), MN:[079] CHALAT-(OXYDIG-VALSIT), O:[024] ABILAS/POLPUL-PEDRAC.

▶ [**071**] Agrostis* Calamagrostis canadensis+*** 2 Carex kelloggii+* 19 Danthonia* 3 Eriophorum angustifolium* 12 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla*** Potentilla flabellifolia+* Spiraea splendens* 2 [**keep**] C-LT5* SHRB 12 Abies lasiocarpa* Arnica latifolia+** Bistorta bistortoides** Caltha* Carex spectabilis+ 2 Equisetum arvense+* Leptarrhena pyrolifolia 4 Parnassia fimbriata* 2 Pedicularis groenlandica* Phyllodoce empetriformis 3 Salix commutata+* 8
▶ [**072**] Cassiope mertensiana* Dodecatheon* Erigeron* Micranthes odontoloma+* Petasites frigidus 2 Potentilla flabellifolia+* 3 Spiraea splendens* Vaccinium deliciosum* Veratrum viride*** Veronica cusickii+* [**keep**] C-LT5 2 C-GT5* SHRB 3 Carex kelloggii+* 3 Gentiana calycosa 2 Parnassia fimbriata* Platanthera** Poa cusickii+* Salix commutata+* 2 Triantha occidentalis*
▶ [**073**] Danthonia 3 Kalmia microphylla*** 2 Larix lyallii*** Potentilla flabellifolia+* Sphagnum 2 Tauschia stricklandii 2 Vaccinium cespitosum 2 Vaccinium deliciosum* [**keep**] SHRB 9 Carex aquatilis+* 2 Dodecatheon 2 Equisetum arvense+* 2 Leptarrhena pyrolifolia* 2 Parnassia fimbriata* Pedicularis groenlandica* Salix commutata+ 6
▶ [**075**] Bistorta bistortoides* Carex spectabilis+* 8 Castilleja parviflora+* Erigeron* Hieracium triste** Luetkea pectinata* 2 Oreostemma alpigenum 2 Potentilla flabellifolia+* 3 Spiraea splendens* Vaccinium deliciosum* [**keep**] C-LT5* SHRB 4 Caltha* Carex aquatilis+ 2 Dodecatheon 2 Equisetum arvense+*** 3 Leptarrhena pyrolifolia* Pedicularis groenlandica 2 Salix commutata+* 6
▶ [**164**] TSHRB* Agrostis* Mitella*** Potentilla flabellifolia+* 3 Senecio triangularis+*** 2 Spiraea splendens* 2 Valeriana sitchensis** 3 Veratrum viride* 2 Viola glabella+** [**keep**] Caltha* 3 Carex aquatilis+*** 2 Carex nigricans+** 5 Equisetum arvense+* Leptarrhena pyrolifolia* 2 Parnassia fimbriata* Phyllodoce empetriformis 2

Floristics (22 plots, NOCA 3, OLYM 19): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Salix commutata+ 46		
80-95				moss 22
60-80	Abies lasiocarpa 3		Leptarrhena pyrolifolia 10, Caltha 8, Pedicularis groenlandica 3	Carex nigricans+ 11, Equisetum arvense+ 8
40-60			Phyllodoce empetriformis 5, Parnassia fimbriata 3	Carex aquatilis+ 9
25-40			Gentiana calycosa 6, Dodecatheon 3, Arnica latifolia+ 3, Lupinus latifolius 2, Bistorta bistortoides 2, Potentilla flabellifolia+ 2, Veronica cusickii+ 1	Carex kelloggii+ 12, Carex spectabilis+ 5, Poa cusickii+ 2, Juncus parryi+ 2
10-25	Callitropsis nootkatensis 3, Tsuga mertensiana 1	Alnus viridis 1	Anticlea occidentalis 7, Triantha occidentalis 7, Vaccinium deliciosum 3, Erigeron 2, Platanthera 2, Petasites frigidus 2, Arnica mollis+ 1, Epilobium 1, Erythranthe lewisii+ 1, Micranthes odontoloma+ 1, Cassiope mertensiana 1, Luetkea pectinata 1, Erythronium montanum+ 1, Erythranthe 1	Juncus mertensianus+ 3, Agrostis 2, Phleum alpinum 2

{164} Salix commutata, Valeriana sitchensis*
Undergreen willow & Sitka valerian* shrubland
SALCOM/VALSIT



Range: Subalpine zone, in wetlands. **MORA**-5: **ne** (sw-se) 1530-1710m. **NOCA**-5: (cw-ce-s) 1480-1580m. **OLYM**-9: **ne***-**se** 1440-1680m.

Struct: Closed canopy shrubland with dense forbs and substantial grasses. Avg vasc cover 126: shrb 70, forb 39, grass 0.81 @ 5, conif LT5 0.56 @ 5, dwf shrb 0.38 @ 4, sedge 0.31 @ 14, tall shrb 0.31 @ 8, conif GT5 0.19 @ 2.

Ecology: Very gentle seepy slopes, toeslopes and debris aprons on rocky substrates and moist soils, often where perennial streams and subsurface snowmelt drain into alluvial fans and flats. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 2-10°, vdp 1-4m, vdr 471-769m, east 28-92, south 16-88, conv 39-42, tpp 12-34, solar 60-72, wet 4-6

Map class: S41W–Subalpine willow wetland

Rel to C09: Split from SALCOM to distinguish from [163] SALCOM/CAREX-(LEPPYR).

Similar: MNO:[163] SALCOM/CAREX-(LEPPYR), MN:[071] CARNIG-CARLEN-(CALCAN), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[217] VALSIT-VERVIR, MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[075] CARSPE-CARNIG-(POTFLA), MNO:[215] VALSIT-CARSPE, MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[033] ABILAS/VERVIR, MN:[216] VALSIT-LIGGRA.

▶ [**071**] Calamagrostis canadensis+* Carex aquatilis+*** 2 Carex kelloggii+* 19 Carex nigricans+** 6 Danthonia* 3 Eriophorum angustifolium*** 2 Gentiana calycosa* Juncus mertensianus+* Kalmia microphylla*** [**keep**] C-LT5 2 SHRB 12 TSHRB 2 Abies lasiocarpa 2 Mitella*** Phleum alpinum* Salix commutata+* 9 Senecio triangularis+* 2 Valeriana sitchensis** 2 Viola glabella+*** 2

▶ [**079**] TSHRB* Athyrium distentifolium*** 2 Chamaenerion latifolium** 2 Epilobium* Luetkea pectinata*** 2 Oxyria digyna** 2 [**keep**] C-LT5 2 SHRB* 3 TSHRB 3 Abies lasiocarpa* 2 Equisetum arvense+** Gentiana calycosa 2 Mitella** Pedicularis groenlandica** Phleum alpinum* Potentilla flabellifolia+* 2 Salix commutata+** 2 Spiraea splendens 2 Viola glabella+**

▶ [**093**] Achillea millefolium* Artemisia 2 Bromus sitchensis** 2 Carex spectabilis+* Chamaenerion angustifolium* Cirsium edule+** Elymus** 2 Heracleum maximum* Hydrophyllum fendleri 2 Thalictrum occidentale* 2 [**keep**] SHRB 14 TSHRB 3 Agrostis** Equisetum arvense+* Leptarrhena pyrolifolia*** Mitella*** 2 Pedicularis groenlandica** Phyllodoce empetriformis** Potentilla flabellifolia+*** 2 Salix commutata+*** 2 Spiraea splendens*** 2 Valeriana sitchensis 4 Veronica cusickii+**

▶ [**163**] Caltha* 3 Carex aquatilis+*** 2 Carex nigricans+** 5 Equisetum arvense+* Leptarrhena pyrolifolia* 2 Parnassia fimbriata* Phyllodoce empetriformis 2 [**keep**] TSHRB* Agrostis* Mitella*** Potentilla flabellifolia+* 3 Senecio triangularis+*** 2 Spiraea splendens* 2 Valeriana sitchensis** 3 Veratrum viride* 2 Viola glabella+**. Note: [163] is in poorly drained flatter sites, with more organic matter and soil development.

▶ [**217**] Carex spectabilis+* Lupinus latifolius* 3 Veratrum viride* 6 [**keep**] SHRB* 18 Equisetum arvense+ 2 Erythranthe lewisii+ 2 Gentiana calycosa 2 Mitella 2 Salix commutata+*** 2

Floristics (16 plots, MORA 2, NOCA 5, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Salix commutata+ 64		
60-80			Valeriana sitchensis 11, Potentilla flabellifolia+ 6	
40-60	Abies lasiocarpa 4		Veronica cusickii+ 1	moss 27
25-40		Spiraea splendens 18	Senecio triangularis+ 7, Gentiana calycosa 6, Viola glabella+ 4, Veratrum viride 3, Mitella 3, Erythranthe lewisii+ 3, Erigeron 2, Lupinus latifolius 2, Phyllodoce empetriformis 2, Pedicularis groenlandica 1, Leptarrhena pyrolifolia 1	Equisetum arvense+ 3, Phleum alpinum 2, Agrostis 2
10-25	Callitropsis nootkatensis 4, Tsuga mertensiana 2, Abies amabilis 2	Sorbus sitchensis 2, Alnus viridis 2, Ribes acerifolium+ 2, Vaccinium membranaceum 1	Achillea millefolium 12, Polemonium pulcherrimum 10, Vaccinium deliciosum 7, Micranthes odontoloma+ 7, Bistorta bistortoides 6, Symphyotrichum foliaceum 5, Epilobium 5, Heracleum maximum 4, Chamaenerion angustifolium 4, Arnica latifolia+ 2, Antennaria lanata+ 2, Caltha 2, Hieracium triste 2, Osmorhiza 2, Thalictrum occidentale 1, Triantha occidentalis 1, Pedicularis bracteosa 1, Parnassia fimbriata 1, Galium 1, Dodecatheon 1	Carex spectabilis+ 16, Carex kelloggii+ 12, Calamagrostis canadensis+ 4, Danthonia 2, Poa cusickii+ 1, Athyrium filix-femina 1, Juncus parryi+ 1

{165} Salix scouleriana, Sorbus scopulina, Amelanchier alnifolia, Paxistima myrsinites
Fire willow, Cascades mountain-ash, western serviceberry & Oregon-box shrubland
SALSCO-SORSCO-AMEALN/PAXMYR



Range: Lower montane. **NOCA**-21: **s*** (ne) 880-1140m.

Struct: Closed canopy tall shrubland with substantial dwarf shrubs, shrubs, forbs & conifer regen. Avg vasc cover 113: tall shrb 66, dwf shrb 14, shrb 12, forb 8, conif LT5 0.85 @ 6, conif GT5 0.6 @ 4, grass 0.55 @ 3, fern 0.5 @ 3, brdlf LT5 0.2 @ 5, brdlf GT5 0.2 @ 2, sedge 0.1 @ 3.

Ecology: Seral shrublands on fairly gentle slopes with southerly aspects, recovering from fires or other stand-replacing events. Regen usually dominated by *Abies lasiocarpa*, often with codominant *Pseudotsuga menziesii*.

Metrics: slope 17-23°, vdp 1-8m, vdr 43-190m, east 13-60, south 77-98, conv 43-47, tpp 12-26, solar 64-76, wet 4

Map class: S46–Snowbrush & Scouler's willow shrubland

Rel to C09: Created based on SALIX-ACEGLA, a name developed by NOCA field crews. Also incorporates plots from ambiguous C09 types such as CEAVEL, ACECIR, etc.

Similar: N:[130] PRUEMA-AMEALN-CEAVEL/MAIRAC, N:[078] CEAVEL-(SPIBET)/CALRUB, N:[161] PSEMEN/VACMEM, MN:[038] (ACEMAC)/ACECIR-PAXMYR, N:[134] PSEMEN-ACEMAC/ACEGLA/PAXMYR-MAIRAC, N:[142] PSEMEN/PAXMYR-SPIBET, MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[035] ACECIR/GALIUM-(POLMUN), N:[039] ACEMAC/ACER-RUBPAR/MAIANTHEMUM. Also see: [043] ACEMAC-PSEMEN/SYMALB/OSMBER, [173] SYMALB-MALFUS.

▶ [**038**] B-LT5* 8 B-GT5 4 Abies grandis 2 Acer circinatum* Acer macrophyllum* 12 Corylus cornuta*** 2 [**keep**] Abies lasiocarpa* Amelanchier alnifolia 3 Ceanothus velutinus*** 2 Chamaenerion angustifolium* Eucephalus ledophyllus+*** Rubus nutkanus* Salix scouleriana* 4 Sorbus scopulina* 3 Thalictrum occidentale* Vaccinium membranaceum** 2 Viola glabella+*

▶ [**078**] SHRB 19 Arctostaphylos uva-ursi+** 2 Cacaliopsis nardosmia** Calamagrostis rubescens+* 4 Carex geyeri+** Castilleja hispida*** Ceanothus velutinus 7 Chamaenerion angustifolium 2 Collomia*** Hieracium scouleri+** Lupinus latifolius** Pinus ponderosa*** Spiraea lucida** [**keep**] TSHRB 22 Abies lasiocarpa* Acer circinatum 8 Acer glabrum* 4 Amelanchier alnifolia* Maianthemum racemosum* Rubus nutkanus* 2 Sorbus scopulina* 3 Thalictrum occidentale* Viola glabella+***

▶ [**130**] Berberis aquifolium** Cacaliopsis nardosmia*** Ceanothus velutinus* 6 Hieracium scouleri+** Osmorhiza** Prosartes* Prunus emarginata* 6 Rosa* Spiraea lucida* Symphoricarpos albus* [**keep**] C-LT5 2 Abies amabilis* Acer circinatum** 2 Callitropsis nootkatensis** Hieracium albiflorum* Moehringia macrophylla* Rubus nutkanus* Taxus brevifolia* Vaccinium membranaceum** Viola glabella+**

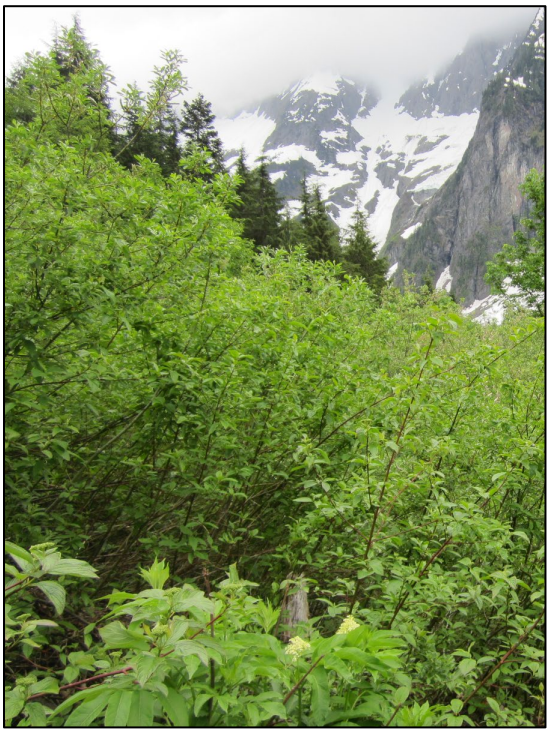
▶ [**134**] B-LT5* 9 B-GT5* 4 C-GT5 6 Acer macrophyllum* Adenocaulon bicolor*** Berberis aquifolium** Clintonia uniflora* 2 Cornus nuttallii 2 Maianthemum stellatum 2 Pinus monticola 2 Prosartes* Pseudotsuga menziesii 5 Pteridium aquilinum* Rosa** Spiraea lucida* Trillium ovatum*** [**keep**] Chamaenerion angustifolium* Prunus emarginata 2 Thalictrum occidentale**

▶ [**161**] C-GT5 7 Adenocaulon bicolor 2 Calamagrostis rubescens+* Chimaphila umbellata** Goodyera oblongifolia*** Hieracium albiflorum* Linnaea borealis 2 Orthilia secunda** Pedicularis racemosa*** Pinus monticola** Pseudotsuga menziesii 6 Rhododendron albiflorum 2 Rubus lasiococcus** Spiraea lucida* Vaccinium membranaceum* 6 [**keep**] TSHRB 18 Acer circinatum* 4 Amelanchier alnifolia 5 Callitropsis nootkatensis** Ceanothus velutinus** 2 Cryptogramma acrostichoides* Holodiscus discolor** Prunus emarginata* 2 Rubus nutkanus* Salix scouleriana 4 Symphoricarpos albus** Thalictrum occidentale* Viola glabella+*

Floristics (20 plots, NOCA 20): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Amelanchier alnifolia 10	Paxistima myrsinites 14	
80-95		Acer glabrum 19, Sorbus scopulina 8		
60-80	Pseudotsuga menziesii 3, Abies lasiocarpa 3	Salix scouleriana 24, Rubus nutkanus 7	Thalictrum occidentale 3, Chamaenerion angustifolium 1, Maianthemum racemosum 1	
40-60		Ceanothus velutinus 4, Prunus emarginata 4, Vaccinium membranaceum 3	Eucephalus ledophyllus+ 1, Viola glabella+ 1	
25-40	Callitropsis nootkatensis 0	Acer circinatum 31, Symphoricarpos albus 2, Holodiscus discolor 0	Moehringia macrophylla 0, Galium 0	Pteridium aquilinum 4, Calamagrostis rubescens+ 2, Cryptogramma acrostichoides 1
10-25	Taxus brevifolia 17, Acer macrophyllum 8, Picea engelmannii 2, Populus trichocarpa 2	Spiraea douglasii 26, Salix sitchensis+ 11, Sorbus sitchensis 4, Symphoricarpos mollis 2, Alnus viridis 2	Prosartes 3, Spiraea lucida 2, Erythronium montanum+ 2	moss 4

{166} Salix sitchensis, Cornus stolonifera/occidentalis*, Urtica dioica*
Sitka willow, red-osier dogwood* & stinging nettle* shrubland
SALSIT-(CORSER)/URTDIO



Range: Lower montane zone, on or near valley bottoms. **MORA**-1: (nw) 1210-1220m. **NOCA**-13: **ne**-**cw**-**s** 750-1220m. **OLYM**-9: **se** (ne-sc) 770-1100m.

Struct: Closed canopy tall shrubland with abundant forbs and substantial shrubs. Avg vasc cover 115: tall shrb 75, forb 23, shrb 0.89 @ 10, grass 0.67 @ 3, fern 0.56 @ 3, conif GT5 0.33 @ 4, brdlf GT5 0.22 @ 2, sedge 0.11 @ 4.

Ecology: Very gentle slopes in areas of rock deposition in and just above riparian zones and in avalanche runouts. Flooding may occur but sites are not typically inundated or swampy.

Metrics: slope 3-15°, vdp 1-2m, vdr 23-268m, east 23-78, south 49-94, conv 39-43, tpp 6-14, solar 56-64, wet 4-7

Map class: S42–Sitka willow riparian shrubland

Rel to C09: Split from SALSIT/EQUARV-PETFRI to distinguish from riparian forest regen; adding some plots from CORSER and SALSIT which fit better together.

Similar: MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[125] POPBAL-(ALNRUB)/SALSIT, MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), N:[126] POPBAL/CORSER, MNO:[035] ACECIR/GALIUM-(POLMUN), MNO:[162] RUBPAR/PTEAQU-CHAANG, NO:[093] HERMAX-(THAOCC-SAUAME), N:[034] ACER-CORSER/(PTEAQU), MNO:[055] ALNVIR-OPLHOR. Also see: [082] CUPNOO-(VACMEM)/PAXMYR.

▶ [**057**] Alnus viridis* 14 Athyrium filix-femina* 4 Claytonia sibirica+* Mitella** 2 Sambucus racemosa* Sorbus sitchensis* Streptopus lanceolatus*** 2 Vaccinium membranaceum*** 2 Veratrum viride** Viola glabella+* [**keep**] Chamaenerion angustifolium* 2 Cornus stolonifera/occidentalis*** 2 Heracleum maximum* Hydrophyllum fendleri* Ribes bracteosum+* Salix sitchensis+** 11 Thalictrum occidentale* Tolmiea menziesii* Urtica dioica*

▶ [**058**] C-LT5* Alnus viridis* 14 Aruncus dioicus 2 Callitropsis nootkatensis* 2 Claytonia sibirica+* Maianthemum stellatum* Prosartes* 2 Ribes acerifolium+** Ribes lacustre** Sambucus racemosa* Veratrum viride* 2 Viola glabella+* [**keep**] Chamaenerion angustifolium* 2 Cornus stolonifera/occidentalis*** 2 Ribes bracteosum+*** Rubus spectabilis* Salix sitchensis+* 5 Tolmiea menziesii** Urtica dioica*

▶ [**125**] B-LT5*** 2 Alnus rubra** 3 Artemisia* Fragaria virginiana*** Hypochaeris radicata*** 2 Montia*** Phacelia*** Plantago lanceolata*** Populus trichocarpa* 3 Pseudotsuga menziesii*** Rumex acetosella+*** [**keep**] SHRB 2 Abies lasiocarpa 2 Aruncus dioicus** Athyrium filix-femina*** Chamaenerion angustifolium** Cornus stolonifera/occidentalis** 2 Dicentra formosa** Galium** Heracleum maximum** Hydrophyllum fendleri** Ribes bracteosum+*** 2 Rubus spectabilis 2 Sambucus racemosa 2 Tolmiea menziesii***

▶ [**126**] B-LT5* B-GT5** 4 Abies grandis*** Acer circinatum* Asarum caudatum*** Clintonia uniflora* Maianthemum stellatum** Oplopanax horridus* Paxistima myrsinites* Picea engelmannii 2 Populus trichocarpa** 4 Symphoricarpos albus 2 Thuja plicata** Tsuga heterophylla*** [**keep**] Anaphalis margaritacea* Aruncus dioicus** Chamaenerion angustifolium* 2 Heracleum maximum** Hydrophyllum fendleri* 2 Salix sitchensis+* 16 Sambucus racemosa 3 Stachys cooleyae* Tolmiea menziesii* Urtica dioica 2 Viola glabella+*

▶ [**167**] B-LT5 2 Carex aquatilis+* 2 Lysichiton americanus** 2 Spiraea douglasii*** 2 [**keep**] Abies lasiocarpa 2 Aruncus dioicus** Chamaenerion angustifolium** 2 Circaea alpina 2 Dicentra formosa** Galium* Heracleum maximum* Hydrophyllum fendleri** 2 Ribes bracteosum+* Thalictrum occidentale** Tolmiea menziesii*** 2 Urtica dioica*

Floristics (18 plots, NOCA 12, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Salix sitchensis+ 52		
40-60		Alnus viridis 8, Ribes bracteosum+ 6, Rubus spectabilis 6, Rubus nutkanus 2	Urtica dioica 4, Chamaenerion angustifolium 3, Tolmiea menziesii 3, Galium 3, Heracleum maximum 2, Thalictrum occidentale 2	Athyrium filix-femina 2
25-40	Abies lasiocarpa 5	Cornus stolonifera/occidentalis 38, Sambucus racemosa 7	Hydrophyllum fendleri 5, Circaea alpina 4, Dicentra formosa 3, Stachys cooleyae 3, Viola glabella+ 2, Aruncus dioicus 1, Anaphalis margaritacea 0	
10-25	Populus trichocarpa 2, Alnus rubra 2, Callitropsis nootkatensis 2, Abies amabilis 1, Tsuga mertensiana 1	Acer circinatum 6, Lonicera involucrata 5, Acer glabrum 5, Sorbus scopulina 3, Sorbus sitchensis 2, Oplopanax horridus 1	Eucephalus ledophyllus+ 6, Streptopus amplexifolius 5, Erythranthe 5, Valeriana sitchensis 5, Epilobium 3, Erythronium montanum+ 3, Claytonia sibirica+ 2, Aquilegia formosa 2, Chamaenerion latifolium 2, Achillea millefolium 2, Lupinus latifolius 1, Veratrum viride 1, Maianthemum racemosum 1, Micranthes odontoloma+ 1, Prosartes 1	moss 8, Equisetum arvense+ 5, Pteridium aquilinum 3, Bromus vulgaris+ 2, Gymnocarpium dryopteris 1

{167} Salix sitchensis, Spiraea douglasii*, Carex aquatilis*, Lysichiton americanus*
Sitka willow, rose spirea*, water sedge* & skunk-cabbage* shrubland
SALSIT-(SPIDOU)/CARAQU-(LYSAME)



Range: Lowland and inner coastal zones, lower montane in nw MORA, in wetlands. **MORA**-5: **nw-se** 910-1190m. **NOCA**-21: **ne*-ce** (cw) 490-860m. **OLYM**-5: (nw-sw-sc-se) 10-660m. Very prominent in the Big Beaver valley at NOCA.

Struct: Semi-closed canopy tall shrubland with abundant shrubs and substantial forbs. Avg vasc cover 128: tall shrb 58, shrb 24, forb 0.9 @ 14, sedge 0.62 @ 36, grass 0.57 @ 5, fern 0.57 @ 2, conif GT5 0.43 @ 3, brdlf GT5 0.38 @ 4, brdlf LT5 0.33 @ 12, conif LT5 0.24 @ 2.

Ecology: Perpetually inundated areas in swamps, fens and freshwater marshes, and on shores of slow-moving streams.

Metrics: slope 0-4°, vdp 1-1m, vdr 1-125m, east 19-59, south 1-84, conv 43-49, tpp 9-18, solar 55-63, wet 7-9

Map class: S40W–Low elevation shrub-dominated wetland

Rel to C09: Created by merging SAL(HOO,SIT)-SPIDOU with plots from SPIDOU/CARAQD, SALSIT, CORSER, SPIDOU and several other ambiguous types.

Similar: MNO:[166] SALSIT-(CORSER)/URTDIO, MNO:[070] CARAQU-(MENTRI-EQUISETUM), MNO:[125] POPBAL-(ALNRUB)/SALSIT, N:[126] POPBAL/CORSER, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, NO:[093] HERMAX-(THAOCC-SAUAME), MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[057] ALNVIR-RUBSPE/ATHFIL-(VIOGLA), MNO:[162] RUBPAR/PTEAQU-CHAANG, MNO:[046] ALNRUB/ATHFIL-LYSAME.

▶ [**058**] Abies lasiocarpa*** Alnus viridis 15 Claytonia sibirica+** Galium* Heracleum maximum* 2 Hydrophyllum fendleri** Osmorhiza** Prosartes** 2 Rubus nutkanus 2 Sambucus racemosa** Thalictrum occidentale** Viola glabella+* 2 [**keep**] Carex aquatilis+*** 2 Cornus stolonifera/occidentalis*** 2 Lysichiton americanus*** 2 Salix sitchensis+* 5 Spiraea douglasii*** 2
▶ [**070**] Equisetum hyemale+ 4 Erythranthe* Juncus mertensianus+* Menyanthes trifoliata* Nuphar polysepala* Platanthera* Scirpus microcarpus* [**keep**] B-LT5 2 B-GT5* C-GT5* TSHRB* 5 Alnus viridis 2 Athyrium filix-femina* Cornus stolonifera/occidentalis* 2 Equisetum arvense+ 2 Lysichiton americanus* 2 Rubus spectabilis*** Salix sitchensis+* 4 Spiraea douglasii*
▶ [**125**] Achillea millefolium*** Alnus rubra 5 Artemisia*** Chamaenerion latifolium*** Fragaria virginiana*** Hypochaeris radicata*** 2 Montia*** Phacelia*** Plantago lanceolata*** Populus trichocarpa 4 Pseudotsuga menziesii*** Rumex acetosella+*** [**keep**] SHRB* 2 Athyrium filix-femina** Carex aquatilis+** 2 Cornus stolonifera/occidentalis** 2 Equisetum arvense+ 2 Lysichiton americanus** 2 Spiraea douglasii*** 2
▶ [**126**] B-GT5 6 Abies lasiocarpa*** Acer glabrum** Asarum caudatum*** Clintonia uniflora*** Dicentra formosa*** 2 Galium** Maianthemum stellatum** 2 Osmorhiza*** Paxistima myrsinites*** Populus trichocarpa 4 Rubus spectabilis 4 Symphoricarpos albus 2 Thalictrum occidentale*** [**keep**] B-LT5 4 Alnus viridis 4 Carex aquatilis+*** 2 Lysichiton americanus** 2 Salix sitchensis+* 15 Spiraea douglasii*** 2
▶ [**166**] Abies lasiocarpa 2 Aruncus dioicus** Chamaenerion angustifolium** 2 Circaea alpina 2 Dicentra formosa** Galium* Heracleum maximum* Hydrophyllum fendleri** 2 Ribes bracteosum+* Thalictrum occidentale** Tolmiea menziesii*** 2 Urtica dioica* [**keep**] B-LT5 2 Carex aquatilis+* 2 Lysichiton americanus** 2 Spiraea douglasii*** 2

Floristics (21 plots, MORA 1, NOCA 18, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Salix sitchensis+ 42		
60-80		Spiraea douglasii 21		
40-60		Cornus stolonifera/occidentalis 21	Lysichiton americanus 11	Carex aquatilis+ 29, Athyrium filix-femina 3
25-40		Alnus viridis 9, Rubus spectabilis 3, Rosa 2		Equisetum arvense+ 8, moss 8
10-25	Alnus rubra 3, Callitropsis nootkatensis 3, Populus trichocarpa 2, Thuja plicata 2, Tsuga heterophylla 2	Lonicera involucrata 4, Malus fusca 3, Rhododendron menziesii 1	Pyrola asarifolia+ 1	Scirpus microcarpus 24, Calamagrostis canadensis+ 2, Equisetum hyemale+ 2, Glyceria 2

{168} Saxifraga austromontana/vespertina, Douglasia laevigata*, Sedum*
Yellowdot saxifrage, cliff primrose* & stonecrop* herbaceous vegetation
SAXBRO-(DOULAE-SEDUM)



Range: Alpine zone, on exposed rocks. **NOCA**-1: (s) 2250-2260m. **OLYM**-7: **ne**-**sc** (nc) 1710-1930m.

Struct: Open forb-dominated vegetation with scant grasses. Avg vasc cover 16: forb 14, grass 0.75 @ 0, dwf shrb 0.5 @ 1, rush 0.5 @ 0, fern 0.5 @ 0.

Ecology: Fairly steep slopes on high rocky ridges, frequently with exposed bedrock and scree.

Metrics: slope 30-35°, vdp 199-319m, vdr 1099-1258m, east 2-54, south 35-79, conv 62-75, tpp 81-99, solar 54-76, wet 1

Map class: H62–Alpine sparse herbaceous vegetation

Rel to C09: Evolved from SAXBRO SPARSE, gaining some plots from LUIHYP.

Similar: O:[085] ELMRAC-EPIANA, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[100] LUEPEC-(CARSPE), MNO:[169] SAXTOL-LUZPIP-(CARNIG), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[103] PENDAV/RACOMITRIUM, NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[059] ANTLAN-(OREALP-VACDEL), NO:[088] EUCPAU-(PHAHAS-CASMIN), MO:[095] JUNCOM-(PHLDIF).

▶ [**079**] TSHRB** Athyrium distentifolium*** 2 Chamaenerion latifolium*** 2 Erythranthe lewisii+** Luetkea pectinata* 3 Oxyria digyna 2 Senecio triangularis+** Valeriana sitchensis*** 2 Veratrum viride** Veronica cusickii+* [**keep**] Antennaria lanata+*** Carex phaeocephala+*** Douglasia laevigata*** Juniperus communis*** Luina hypoleuca*** 2 Micranthes tolmiei+** Penstemon procerus+* Phacelia*** Phlox diffusa** Sedum oreganum**

▶ [**085**] Arnica latifolia+ 2 Athyrium distentifolium** Elmera racemosa** 2 Epilobium* Hieracium triste* Polystichum lonchitis* Senecio triangularis+* Valeriana sitchensis* [**keep**] Achillea millefolium* Antennaria lanata+* Carex phaeocephala+** Douglasia laevigata* Juniperus communis** Luina hypoleuca** 2 Micranthes tolmiei+** Penstemon procerus+** Phlox diffusa** Sedum oreganum*

▶ [**100**] C-LT5* Abies lasiocarpa* Carex spectabilis+* 2 Cassiope mertensiana** Erigeron* Hieracium triste** Juncus parryi+* Luetkea pectinata* 3 Luzula piperi+* Phyllodoce empetriformis* 2 [**keep**] Achillea millefolium* Antennaria lanata+* Carex phaeocephala+** Douglasia laevigata*** Juniperus communis* Luina hypoleuca* 2 Micranthes tolmiei+* 2 Oxyria digyna** Phacelia*** Sedum oreganum***

▶ [**104**] C-LT5* C-GT5* VASC VEG 26 Abies lasiocarpa* Artemisia 2 Bistorta bistortoides* Carex phaeocephala+ 2 Eriophyllum lanatum** 2 Juniperus communis* 2 Lomatium martindalei* Lupinus latifolius* Phlox diffusa* 4 [**keep**] Antennaria lanata+** Cryptogramma acrostichoides*** Epilobium** Juncus parryi+* Luina hypoleuca** 2 Micranthes tolmiei+* 2 Oxyria digyna** Sedum oreganum*

▶ [**169**] Carex nigricans+** 2 Cassiope mertensiana** Juncus parryi+* Luetkea pectinata* Luzula piperi+* 2 Phyllodoce empetriformis* [**keep**] Achillea millefolium*** Antennaria lanata+** Douglasia laevigata*** Juniperus communis*** Luina hypoleuca*** 2 Penstemon procerus+*** Phacelia*** Phlox diffusa** Poa cusickii+** Sedum oreganum***

Floristics (8 plots, NOCA 1, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Micranthes tolmiei+ 5	
60-80			Douglasia laevigata 2, Antennaria lanata+ 0, Achillea millefolium 0	
40-60			Phacelia 1, Sedum oreganum 1	Cryptogramma acrostichoides 0
25-40			Luina hypoleuca 5, Phlox diffusa 2, Luetkea pectinata 2, Penstemon procerus+ 1, Silene parryi 1, Tonestus lyallii 1, Gentiana calycosa 1, Epilobium 0, Juniperus communis 0, Oxyria digyna 0, Agoseris 0, Elmera racemosa 0, Phyllodoce empetriformis 0	moss 1, Carex phaeocephala+ 1, Festuca brachyphylla 1, Poa cusickii+ 0, Trisetum 0, Juncus parryi+ 0
10-25		Dasiphora fruticosa 1	Sedum divergens 5, Paxistima myrsinites 3, Allium 3, Polemonium elegans+ 3, Arnica latifolia+ 1, Anemone occidentalis+ 1, Lomatium martindalei 1, Eucephalus paucicapitatus 1, Solidago multiradiata 1, Phyllodoce glanduliflora 1, Chamaenerion angustifolium 1	Selaginella wallacei+ 3

{169} Micranthes tolmiei, Luzula piperi, Carex nigricans*
Tolmie's saxifrage, Piper's woodrush & black alpine sedge* herbaceous vegetation
SAXTOL-LUZPIP-(CARNIG)



Range: Alpine zone, on exposed rocks. **MORA**-10: **ne**-**se** (nw-sw) 1880-2030m. **NOCA**-29: **nw***-**ne**-**cw** (s) 1740-1880m. **OLYM**-7: **ne** (sc) 1390-1800m.

Struct: Open mixed herbaceous vegetation with substantial forbs and prominent rushes, dwarf shrubs and/or sedges. Avg vasc cover 21: forb 9, rush 4, dwf shrb 0.88 @ 4, sedge 0.78 @ 4.

Ecology: Nearly perennial snowbeds on fairly gentle slopes of bedrock and talus. May occur on north-facing slopes in the subalpine zone but on benches, flats and warmer aspects in the alpine. Mossy seeps are sometimes present.

Metrics: slope 13-27°, vdp 27-245m, vdr 767-1116m, east 13-92, south 13-60, conv 47-61, tpp 51-87, solar 54-75, wet 3

Map class: H62–Alpine sparse herbaceous vegetation

Rel to C09: Evolved from SAXTOL-(LUZPIP) SPARSE, incorporating some sparse plots from ATHAME-CRYACR and CASMER-PHYEMP.

Similar: **MNO:**[100] LUEPEC-(CARSPE), **NO:**[168] SAXBRO-(DOULAE-SEDUM), **MNO:**[074] CARNIG-LUEPEC, **MN:**[079] CHALAT-(OXYDIG-VALSIT), **MNO:**[059] ANTLAN-(OREALP-VACDEL), **MN:**[071] CARNIG-CARLEN-(CALCAN), **MNO:**[067] ATHAME-CRYACR, **MNO:**[103] PENDAV/RACOMITRIUM, **O:**[085] ELMRAC-EPIANA, **MNO:**[104] PHLDIF-(LOMMAR-CARPHA).

▶ [**059**] Anemone occidentalis+ 2 Antennaria lanata+*** 2 Oreostemma alpigenum*** 2 Potentilla flabellifolia+*** 2 Vaccinium deliciosum* 2 [**keep**] Luetkea pectinata* Luzula piperi+** Micranthes tolmiei+*** 2

▶ [**074**] VASC VEG 32 Bistorta bistortoides* Carex nigricans+* 6 Carex spectabilis+* 3 Castilleja parviflora+* Erigeron* Erythronium montanum+*** Potentilla flabellifolia+*** Vaccinium deliciosum* [**keep**] Luzula piperi+* Micranthes tolmiei+* 2. Note: [074] is in flatter areas with more soil development.

▶ [**079**] FORB 15 SHRB*** TSHRB*** Arnica latifolia+ 2 Aruncus dioicus*** Athyrium distentifolium* Chamaenerion latifolium*** 2 Epilobium* Erythranthe lewisii+*** Luetkea pectinata 5 Oxyria digyna** 2 Senecio triangularis+*** Valeriana sitchensis*** 2 Veratrum viride** Veronica cusickii+** [**keep**] Carex nigricans+* Cassiope mertensiana* Juncus parryi+* Luzula piperi+* 2 Micranthes tolmiei+** Phyllodoce empetriformis*

▶ [**100**] SHRB*** Agrostis* Anaphalis margaritacea*** Carex spectabilis+ 3 Diphasiastrum sitchense+* Erigeron* Erythranthe lewisii+* Luetkea pectinata 5 Poa cusickii+** Ranunculus eschscholtzii+*** Senecio triangularis+*** Trisetum*** Veronica cusickii+** [**keep**] Luzula piperi+ 2 Micranthes tolmiei+* 2

▶ [**168**] Achillea millefolium*** Antennaria lanata+** Douglasia laevigata*** Juniperus communis*** Luina hypoleuca*** 2 Penstemon procerus+*** Phacelia*** Phlox diffusa** Poa cusickii+** Sedum oreganum*** [**keep**] Carex nigricans+** 2 Cassiope mertensiana** Juncus parryi+* Luetkea pectinata* Luzula piperi+* 2 Phyllodoce empetriformis*. Note: [168] has cushion plants and is on drier exposed rock outcrops.

Floristics (40 plots, MORA 4, NOCA 29, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Micranthes tolmiei+ 6, Luetkea pectinata 3	
80-95			Phyllodoce empetriformis 3	Luzula piperi+ 3
60-80			Cassiope mertensiana 1	moss 8, Carex nigricans+ 3, Juncus parryi+ 2
25-40				Carex spectabilis+ 2, Athyrium distentifolium 2, Juncus mertensianus+ 2, Vahlodea atropurpurea 1

{170} Sorbus sitchensis, Vaccinium deliciosum, Phyllodoce empetriformis
Sitka mountain-ash, Cascade blueberry & pink mountain-heather shrubland
SORSIT/VACDEL-PHYEMP



Range: Upper montane and lower subalpine zones. **NOCA-11**: **cw*-ce** (ne-s) 1520-1630m.

Struct: Open tall shrubland with dense dwarf shrubs, substantial forbs & shrubs, and prominent conifer regen. Avg vasc cover 87: dwf shrb 47, tall shrb 15, forb 15, shrb 7, conif LT5 2, rush 0, grass 0.

Ecology: Slopes with southerly aspects, near debris avalanches, on old talus and on valley or cirque walls. Often in *Tsuga mertensiana* parkland. Regen dominated by *Tsuga mertensiana* with small amounts of *Callitropsis nootkatensis*.

Metrics: slope 23-30°, vdp 12-167m, vdr 689-1168m, east 28-71, south 66-98, conv 44-59, tpp 32-64, solar 64-84, wet 2-4

Map class: S47–Successional huckleberry shrubland

Rel to C09: Split from SORSIT/PHYEMP-VACDEL to distinguish from [171] SORSIT-VACMEM/VALSIT, adding a plot from VACDEL.

Similar: MNO:[171] SORSIT-VACMEM/VALSIT, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[172] SPISPL/CARSPE, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[208] TSUMER/PHYEMP-VACDEL, MNO:[033] ABILAS/VERVIR, MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS.

▶ [**028**] C-LT5 4 C-GT5* 2 Abies amabilis 2 Abies lasiocarpa 2 Luetkea pectinata 2 Luzula hitchcockii+* Rubus lasiococcus 2 Tsuga mertensiana 3 [**keep**] TSHRB 5 Bistorta bistortoides* Callitropsis nootkatensis* Chamaenerion angustifolium* Juncus parryi+* Sorbus sitchensis 5 Spiraea splendens** Vahlodea atropurpurea***
▶ [**107**] Carex spectabilis+* 2 Cassiope mertensiana 2 Castilleja parviflora+* Erigeron 2 Lupinus latifolius 6 Potentilla flabellifolia+ 2 [**keep**] SHRB* TSHRB* 2 Arnica latifolia+*** Callitropsis nootkatensis* Rubus lasiococcus*** Sorbus sitchensis* 2 Tsuga mertensiana* Vaccinium membranaceum*** Vahlodea atropurpurea** Valeriana sitchensis* Veratrum viride*
▶ [**171**] SHRB 12 Arnica latifolia+ 2 Carex spectabilis+** 2 Eucephalus ledophyllus+*** 2 Ribes acerifolium+* Thalictrum occidentale* 2 Vaccinium membranaceum 7 [**keep**] Bistorta bistortoides* Callitropsis nootkatensis* Phyllodoce empetriformis* 3 Rubus lasiococcus* Tsuga mertensiana* Vahlodea atropurpurea**
▶ [**172**] SHRB 12 Arnica latifolia+ 2 Carex spectabilis+*** 2 Erigeron 2 Eucephalus ledophyllus+ 2 Spiraea splendens 5 [**keep**] Arnica latifolia+* Bistorta bistortoides* Callitropsis nootkatensis* Phyllodoce empetriformis* 3 Rubus lasiococcus** Tsuga mertensiana* Vahlodea atropurpurea**
▶ [**206**] C-LT5 4 C-GT5* 2 Abies amabilis 2 Abies lasiocarpa 2 Cassiope mertensiana* 2 Erythronium montanum+* Tsuga mertensiana 3 Xerophyllum tenax 2 [**keep**] TSHRB 4 Arctostaphylos uva-ursi+** Arnica latifolia+* Castilleja miniata*** Chamaenerion angustifolium*** Hieracium albiflorum*** Luzula parviflora*** Pedicularis bracteosa*** Rubus lasiococcus** Sorbus sitchensis 4 Spiraea splendens*** Veratrum viride**

Floristics (5 plots, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga mertensiana 2, Callitropsis nootkatensis 0	Sorbus sitchensis 15, Vaccinium membranaceum 4	Vaccinium deliciosum 38, Phyllodoce empetriformis 9, Lupinus latifolius 3, Valeriana sitchensis 3, Bistorta bistortoides 2, Veratrum viride 1, Rubus lasiococcus 1, Arnica latifolia+ 1	moss 6, Vahlodea atropurpurea 0
80-95	Abies lasiocarpa 0	Spiraea splendens 3	Chamaenerion angustifolium 1	Juncus parryi+ 0
60-80		Rhododendron albiflorum 1	Luetkea pectinata 1	
40-60	Abies amabilis 0		Pedicularis bracteosa 2, Castilleja miniata 1, Gaultheria ovatifolia 1, Hieracium triste 0, Hieracium albiflorum 0, Arctostaphylos uva-ursi+ 0	Luzula parviflora 0
10-25		Alnus viridis 1	Erythronium montanum+ 3, Pedicularis racemosa 1	Racomitrium 10, Pteridium aquilinum 3

{171} Sorbus sitchensis, Vaccinium membranaceum, Valeriana sitchensis
Sitka mountain-ash, big huckleberry & Sitka valerian shrubland
SORSIT-VACMEM/VALSIT



Range: Upper montane and lower subalpine zones. **MORA**-7: **ne**-**se** (sw) 1490-1660m. **NOCA**-7: **ne**-**ce**-**s** 1450-1650m. **OLYM**-1: (se) 1320-1330m.

Struct: Semi-closed canopy tall shrubland with dense forbs, substantial dwarf shrubs & sedges, and prominent conifer regen. Avg vasc cover 109: forb 32, shrb 28, tall shrb 26, dwf shrb 0.9 @ 15, conif LT5 0.9 @ 3, sedge 0.8 @ 5, grass 0.6 @ 2, rush 0.2 @ 3.

Ecology: Slopes with southerly aspects. *Abies lasiocarpa* regen is usually present.

Metrics: slope 21-32°, vdp 4-76m, vdr 415-652m, east 15-97, south 58-85, conv 43-51, tpp 22-57, solar 62-77, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Created by merging like plots from SORSIT/PHYEMP-VACDEL, VACMEM, and VACMEM/VACDEL.

Similar: MNO:[172] SPISPL/CARSPE, MNO:[030] ABILAS/VACMEM/LUPARC, MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MNO:[033] ABILAS/VERVIR, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[217] VALSIT-VERVIR, MO:[213] VACMEM/XERTEN, N:[170] SORSIT/VACDEL-PHYEMP, MNO:[032] ABILAS/VALSIT, MNO:[215] VALSIT-CARSPE.

▶ [**028**] C-LT5 6 C-GT5* 3 Abies amabilis* 2 Abies lasiocarpa 6 Erythronium montanum+* 2 Luetkea pectinata* Luzula hitchcockii+* 2 Pedicularis racemosa* Phyllodoce empetriformis* Rubus lasiococcus* Tsuga mertensiana 2 [**keep**] TSHRB 5 Carex spectabilis+* Chamaenerion angustifolium* Eucephalus ledophyllus+* 2 Ribes acerifolium+* Sorbus sitchensis 5 Thalictrum occidentale*** 2
▶ [**030**] C-LT5 5 C-GT5* 3 Abies lasiocarpa 6 Callitropsis nootkatensis 3 Hieracium albiflorum** Paxistima myrsinites*** 2 Polemonium pulcherrimum* Rubus lasiococcus* Tsuga mertensiana 2 [**keep**] Carex spectabilis+* Eucephalus ledophyllus+* Ribes acerifolium+* Sorbus sitchensis* 11 Thalictrum occidentale** 2 Vaccinium deliciosum** 6 Valeriana sitchensis* Veratrum viride* 2
▶ [**033**] C-GT5* 3 Abies amabilis*** 2 Abies lasiocarpa 5 Bistorta bistortoides* Erigeron* Luzula hitchcockii+* 2 Mitella* 2 Picea engelmannii 2 Polemonium pulcherrimum* Rhododendron albiflorum* Senecio triangularis+* [**keep**] TSHRB* Carex spectabilis+*** 2 Eucephalus ledophyllus+* Sorbus sitchensis* 12 Vaccinium deliciosum* 7 Vaccinium membranaceum 6
▶ [**172**] Bistorta bistortoides 3 Erigeron 2 Spiraea splendens* 8 [**keep**] TSHRB 12 Abies lasiocarpa* Arnica latifolia+* Eucephalus ledophyllus+* Pedicularis bracteosa** Ribes acerifolium+*** Sorbus sitchensis 11 Thalictrum occidentale** 2 Tsuga mertensiana*
▶ [**212**] Anaphalis margaritacea* Artemisia 2 Bistorta bistortoides* Castilleja miniata* Eucephalus paucicapitatus** 2 Gentiana calycosa** Hieracium albiflorum** Juniperus communis 2 Lomatium martindalei* Paxistima myrsinites 2 Penstemon serrulatus+* Silene parryi** Xerophyllum tenax* 2 [**keep**] Arnica latifolia+* 2 Carex spectabilis+* Eucephalus ledophyllus+* 3 Ribes acerifolium+*** Sorbus sitchensis* Thalictrum occidentale 2 Vaccinium deliciosum* 6 Veratrum viride*

Floristics (10 plots, MORA 2, NOCA 7, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Sorbus sitchensis 25, Vaccinium membranaceum 22	Valeriana sitchensis 8	
80-95	Abies lasiocarpa 3		Vaccinium deliciosum 15, Eucephalus ledophyllus+ 7, Veratrum viride 3	Carex spectabilis+ 5
60-80		Ribes acerifolium+ 3	Thalictrum occidentale 4, Arnica latifolia+ 3, Lupinus latifolius 2, Chamaenerion angustifolium 2	
40-60	Tsuga mertensiana 1	Spiraea splendens 5	Phlox diffusa 1, Pedicularis bracteosa 1	
25-40	Callitropsis nootkatensis 2		Rubus lasiococcus 2, Ligusticum 2, Erythronium montanum+ 1, Mitella 1, Erigeron 1, Viola glabella+ 0	Festuca viridula 2, Elymus 0
10-25		Spiraea douglasii 13, Rhododendron albiflorum 10, Rubus spectabilis 3, Alnus viridis 3, Ribes bracteosum+ 1, Salix commutata+ 1, Rubus nutkanus 1, Sorbus scopulina 1	Vaccinium scoparium+ 5, Spiraea lucida 5, Luetkea pectinata 5, Viola orbiculata+ 2, Anaphalis margaritacea 2, Bistorta bistortoides 2, Moehringia macrophylla 2, Phyllodoce empetriformis 2, Potentilla flabellifolia+ 1, Achillea millefolium 1, Senecio triangularis+ 1, Polygonum douglasii+ 1, Symphyotrichum foliaceum 1, Fragaria virginiana 1, Penstemon procerus+ 1, Pedicularis racemosa 1	Juncus parryi+ 4, Carex geyeri+ 2, Melica subulata+ 2, Luzula hitchcockii+ 1, Polystichum lonchitis 1, Pteridium aquilinum 1, Poa cusickii+ 1

{172} Spiraea splendens, Carex spectabilis
Mountain spirea & showy sedge shrubland
SPISPL/CARSPE



Range: Subalpine and upper montane zones. **MORA**-1: (se) 1420-1430m. **NOCA**-4: (ne-cw-s) 1470-1600m. **OLYM**-5: **se*** 1480-1510m.

Struct: Open shrubland with abundant forbs, dwarf shrubs & sedges, and substantial tall shrubs. Avg vasc cover 104: shrb 32, forb 25, dwf shrb 0.9 @ 25, sedge 0.9 @ 16, tall shrb 0.8 @ 8, conif LT5 0.6 @ 3, grass 0.6 @ 3.

Ecology: Fairly steep south-facing slopes. Some *Abies lasiocarpa* regen is often present.

Metrics: slope 27-37°, vdp 46-87m, vdr 767-911m, east 24-67, south 86-99, conv 40-54, tpp 54-70, solar 72-86, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Created by merging like plots from heterogeneous types including SPISPL, VACMEM/VACDEL and SORSIT/PHYEMP-VACDEL.

Similar: MNO:[215] VALSIT-CARSPE, MNO:[171] SORSIT-VACMEM/VALSIT, MNO:[217] VALSIT-VERVIR, MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MNO:[076] CARSPE-(LUPARC-POLBIS), MO:[213] VACMEM/XERTEN, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MN:[216] VALSIT-LIGGRA, NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[030] ABILAS/VACMEM/LUPARC.

▶ [**076**] Achillea millefolium* Castilleja parviflora+* Hieracium triste* Luetkea pectinata** 2 Lupinus latifolius 9 Phleum alpinum* Potentilla flabellifolia+* 2 Veronica cusickii+** [**keep**] SHRB* 4 TSHRB** 2 Chamaenerion angustifolium*** Sorbus sitchensis*** 2 Spiraea splendens* 3 Vaccinium deliciosum 7 Vaccinium membranaceum** 2 Valeriana sitchensis* 3 Veratrum viride*
▶ [**171**] TSHRB 12 Abies lasiocarpa* Arnica latifolia+* Eucephalus ledophyllus+* Pedicularis bracteosa** Ribes acerifolium+*** Sorbus sitchensis 11 Thalictrum occidentale** 2 Tsuga mertensiana* [**keep**] Bistorta bistortoides 3 Erigeron 2 Spiraea splendens* 8
▶ [**212**] C-GT5 2 Abies lasiocarpa* 2 Anaphalis margaritacea** Eucephalus paucicapitatus*** 2 Gentiana calycosa** Hieracium albiflorum* Juniperus communis 2 Paxistima myrsinites 2 Penstemon serrulatus+* Phlox diffusa* Silene parryi** Vaccinium membranaceum 16 [**keep**] Arnica latifolia+ 2 Carex spectabilis+* 6 Eucephalus ledophyllus+ 2 Vaccinium deliciosum* 6 Veratrum viride*
▶ [**215**] Anemone occidentalis+** 2 Aquilegia formosa* Calamagrostis canadensis+* Chamaenerion angustifolium 2 Cirsium edule+* Elymus* Hieracium triste* Luetkea pectinata** Pedicularis bracteosa*** Potentilla flabellifolia+* 2 Thalictrum occidentale** 2 [**keep**] SHRB* 3 TSHRB* 3 Chamaenerion angustifolium* Sorbus sitchensis* 2 Spiraea splendens** 4 Vaccinium deliciosum* 10 Vaccinium membranaceum** 2
▶ [**217**] Luzula hitchcockii+* Potentilla flabellifolia+* 2 Senecio triangularis+** 2 Veratrum viride 4 [**keep**] SHRB* 15 TSHRB* Chamaenerion angustifolium* Sorbus sitchensis* 4 Spiraea splendens*** 10 Vaccinium deliciosum* 8

Floristics (10 plots, MORA 1, NOCA 4, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Spiraea splendens 24		
80-95		Sorbus sitchensis 7	Vaccinium deliciosum 24, Valeriana sitchensis 7, Veratrum viride 2, Chamaenerion angustifolium 1	Carex spectabilis+ 14
60-80		Vaccinium membranaceum 10	Lupinus latifolius 6	
40-60	Abies lasiocarpa 1		Bistorta bistortoides 7, Erigeron 3	
25-40	Callitropsis nootkatensis 2		Eucephalus ledophyllus+ 6, Arnica latifolia+ 3, Phyllodoce empetriformis 2	
10-25	Tsuga mertensiana 2, Pinus monticola 1, Abies amabilis 1	Rhododendron albiflorum 15, Sorbus scopulina 2	Xerophyllum tenax 7, Ligusticum 6, Rubus lasiococcus 5, Mitella 3, Viola glabella+ 3, Erythronium montanum+ 2, Hieracium albiflorum 1, Polemonium pulcherrimum 1, Penstemon serrulatus+ 1, Cirsium edule+ 1, Osmorhiza 1, Phlox diffusa 1, Potentilla flabellifolia+ 1, Penstemon procerus+ 1	Carex phaeocephala+ 10, Racomitrium 8, moss 3, Polystichum lonchitis 3, Poa cusickii+ 3, Juncus parryi+ 1

{173} Symphoricarpos albus, Malus fusca
Snowberry & crabapple shrubland
SYMALB-MALFUS



Range: Lower montane. **OLYM**-8: **ne*** (nc) 1100-1170m.

Struct: Open tall shrubland with very dense shrubs, abundant forbs, substantial grasses, and prominent conifer regen. Avg vasc cover 118: shrb 61, forb 27, grass 9, tall shrb 0.86 @ 14, sedge 0.86 @ 5, conif LT5 0.86 @ 4, dwf shrb 0.43 @ 2.

Ecology: Fairly gentle east-facing slopes with southerly tendencies, in avalanche tracks and debris aprons below chutes. Surrounding forests are dominated by *Pseudotsuga menziesii* and *Abies lasiocarpa*, and *P. menziesii* regen is typically present.

Metrics: slope 18-22°, vdp 1-4m, vdr 65-214m, east 85-98, south 65-86, conv 43-46, tpp 11-13, solar 62-70, wet 2-4

Map class: S44–Thimbleberry shrubland, tall forbs & bracken

Rel to C09: Same.

Similar: NO:[093] HERMAX-(THAOCC-SAUAME), MO:[139] PSEMEN/HOLDIS-ROSGYM/FESOCC, MNO:[162] RUBPAR/PTEAQU-CHAANG, N:[147] PSEMEN-(PINPON)/SYMALB, N:[138] PSEMEN/HOLDIS/CALRUB, N:[078] CEAVEL-(SPIBET)/CALRUB, MNO:[058] ALNVIR-(SAMRAC)/THAOCC, MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[103] PENDAV/RACOMITRIUM, N:[130] PRUEMA-AMEALN-CEAVEL/MAIRAC. Also see: [038] (ACEMAC)/ACECIR-PAXMYR, [165] SALSCO-SORSCO-AMEALN/PAXMYR.

▶ [**093**] Bistorta bistortoides* Callitropsis nootkatensis* Carex spectabilis+* 2 Cirsium edule+* Delphinium* Erigeron* Hydrophyllum fendleri* 2 Lupinus latifolius* 2 Thalictrum occidentale 5 Valeriana sitchensis* Veratrum viride* 2 [**keep**] C-LT5* SHRB* 14 TSHRB* 3 Amelanchier alnifolia 2 Berberis aquifolium 2 Carex phaeocephala+*** Holodiscus discolor*** 2 Malus fusca 2 Prunus emarginata 2 Pseudotsuga menziesii*** Rosa*** Symphoricarpos albus***
▶ [**138**] C-GT5** 2 Acer circinatum 2 Calamagrostis rubescens+*** 2 Festuca occidentalis+** Fragaria virginiana* Goodyera oblongifolia** Hieracium albiflorum*** Lonicera ciliosa*** Lysimachia latifolia*** Moehringia macrophylla** Paxistima myrsinites*** Pinus ponderosa 2 Pseudotsuga menziesii 6 Spiraea lucida*** 2 [**keep**] Achillea millefolium* 2 Alnus viridis 2 Artemisia** Carex phaeocephala+*** Cerastium arvense 2 Heracleum maximum*** Symphoricarpos albus 2 Thalictrum occidentale** Urtica dioica 2
▶ [**139**] C-GT5* 2 Achlys triphylla** 2 Berberis nervosa* Chimaphila umbellata** Festuca occidentalis+** Goodyera oblongifolia* Lathyrus polyphyllus 2 Linnaea borealis* 2 Lysimachia latifolia** Polystichum munitum* Pseudotsuga menziesii 6 Tsuga heterophylla 2 [**keep**] Achillea millefolium*** Alnus viridis 2 Amelanchier alnifolia 2 Artemisia*** Berberis aquifolium 2 Carex phaeocephala+*** Cerastium arvense 2 Heracleum maximum*** Symphoricarpos albus* 4 Thalictrum occidentale**
▶ [**147**] B-LT5*** 2 B-GT5*** 2 C-GT5* 2 Acer macrophyllum*** 2 Adenocaulon bicolor 2 Berberis aquifolium* Bromus tectorum+ 2 Cornus nuttallii 2 Paxistima myrsinites*** Pinus ponderosa*** Pseudotsuga menziesii 6 Spiraea lucida*** [**keep**] Achillea millefolium* 2 Alnus viridis 2 Carex phaeocephala+* Cerastium arvense 2 Heracleum maximum** Prunus emarginata 2 Urtica dioica 2
▶ [**162**] Chamaenerion angustifolium* 2 Hydrophyllum fendleri** 2 Pteridium aquilinum** 2 Rubus nutkanus* 6 Thalictrum occidentale 5 [**keep**] C-LT5* Achillea millefolium** Amelanchier alnifolia 2 Berberis aquifolium 2 Carex phaeocephala+*** Cerastium arvense 2 Holodiscus discolor*** 2 Pseudotsuga menziesii* Rosa* Symphoricarpos albus** 3

Floristics (7 plots, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Symphoricarpos albus 42, Holodiscus discolor 10	Achillea millefolium 7, Heracleum maximum 4	
80-95	Pseudotsuga menziesii 3	Rosa 5		
60-80				Carex phaeocephala+ 5
40-60	Abies lasiocarpa 1	Berberis aquifolium 8, Amelanchier alnifolia 8, Rubus nutkanus 3, Acer glabrum 3	Cerastium arvense 7, Artemisia 4, Thalictrum occidentale 3	Elymus 5
25-40		Alnus viridis 8, Prunus emarginata 7, Malus fusca 6, Sambucus racemosa 0	Urtica dioica 7, Phacelia 3, Campanula rotundifolia+ 2, Galium 2, Vicia 1, Arabis 1, Sedum divergens 1, Chamaenerion angustifolium 1	Bromus sitchensis 5, Poa pratensis 5, Bromus vulgaris+ 4
10-25	Abies grandis 1	Ribes bracteosum+ 1	Fragaria virginiana 8, Berberis nervosa 5, Castilleja miniata 3, Prosartes 3, Cirsium edule+ 3, Lathyrus nevadensis 2, Angelica 1, Fragaria vesca 1, Castilleja hispida 1, Juniperus communis 1, Allium 1, Arctostaphylos uva-ursi+ 1, Polygonum douglasii+ 1	Festuca brachyphylla 10, moss 5, Carex nigricans+ 3, Racomitrium 3, Phleum alpinum 1

{174} Thuja plicata, Rhododendron groenlandicum, Carex obnupta, Sphagnum
Redcedar, bog Labrador-tea, slough sedge & sphagnum shrubland
THUPLI/LEDGRO/CAROBN/SPHAGN



Range: Coastal zone, in wetlands. **OLYM**-21: **nw*** 20-50m.

Struct: Open stunted conifers and/or conifer regen, with dense shrubs, abundant dwarf shrubs, sedges & ferns, and substantial forbs. Avg vasc cover 147: shrb 39, dwf shrb 29, sedge 26, fern 18, conif LT5 15, forb 0.93 @ 10, conif GT5 0.73 @ 12, rush 0.13 @ 2.

Ecology: Bogs or poor fens with acidic, nutrient-poor peat soils, occurring in depressions on flats and adjacent to lakes and ponds. Water table typically near the surface, but sites may dry out in late summer. Hummocks are frequently present. *Thuja plicata* and *Tsuga heterophylla* codominate the short tree layer; the association is successional to [176] THUPLI-TSUHET/LYSAME/SPHAGN. Earlier phases are herbaceous and dominated by *Carex obnupta*.

Metrics: slope 0-2°, vdp 1-4m, vdr 22-46m, east 9-86, south 15-80, conv 48-50, tpp 53-66, solar 58-60, wet 6-7

Map class: C02–Redcedar, Labrador-tea, slough sedge & sphagnum bog

Rel to C09: Created to resolve spatial scale issues, from plots labeled as TSUHET-(THUPLI)/LEDGRO/SPHAGN, LEDGRO-KALMIC/SPHAGN and CAROBN.

Similar: O:[176] THUPLI-TSUHET/LYSAME/SPHAGN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[046] ALNRUB/ATHFIL-LYSAME, MN:[071] CARNIG-CARLEN-(CALCAN), MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME.

▶ [**046**] B-LT5* B-GT5*** 2 TSHRB* 3 Alnus rubra** 2 Athyrium filix-femina** 2 Carex deweyana+** 2 Cornus stolonifera/occidentalis** Galium*** Lysichiton americanus* 5 Rubus spectabilis*** Scirpus microcarpus** Viola glabella+** 2 [**keep**] Carex obnupta+* Empetrum nigrum 2 Kalmia microphylla** 2 Pteridium aquilinum** 2 Rhododendron groenlandicum** 2 Sphagnum** 2 Struthiopteris spicant*
▶ [**071**] Agrostis** Carex kelloggii+*** 2 Carex nigricans+*** 2 Danthonia 2 Erigeron 2 Eriophorum angustifolium 2 Gentiana calycosa*** Juncus mertensianus+* Leptarrhena pyrolifolia** Phyllodoce empetriformis*** Potentilla flabellifolia+*** Salix commutata+*** Spiraea splendens*** [**keep**] C-LT5* 2 C-GT5*** Carex obnupta+*** 2 Empetrum nigrum 2 Eriophorum chamissonis 2 Gaultheria shallon*** Kalmia microphylla* Linnaea borealis*** Pteridium aquilinum*** 2 Rhododendron groenlandicum*** 2 Sphagnum* Struthiopteris spicant*** Thuja plicata*** Tsuga heterophylla***
▶ [**176**] TSHRB* 2 Frangula purshiana 2 Juncus mertensianus+ 3 Lysichiton americanus* Malus fusca 3 Rhododendron menziesii*** 2 Vaccinium ovalifolium 2 [**keep**] Empetrum nigrum 2 Eriophorum chamissonis 2 Kalmia microphylla** 2 Pteridium aquilinum* 2 Rhododendron groenlandicum** 2
▶ [**188**] C-GT5 20 Abies amabilis 2 Polystichum munitum*** 2 Tsuga heterophylla 17 Vaccinium ovalifolium* Vaccinium parvifolium** [**keep**] Carex obnupta+** 2 Empetrum nigrum 2 Kalmia microphylla** 2 Pteridium aquilinum** Rhododendron groenlandicum** 2 Sphagnum** 2 Thuja plicata*
▶ [**196**] Acer circinatum 2 Achlys triphylla** 2 Clintonia uniflora** Gymnocarpium dryopteris** 2 Oplopanax horridus** Polystichum munitum** Pseudotsuga menziesii** 2 Tiarella trifoliata*** 2 Trillium ovatum** Vaccinium parvifolium* [**keep**] Carex obnupta+*** 2 Empetrum nigrum 2 Kalmia microphylla*** 2 Rhododendron groenlandicum*** 2 Sphagnum*** 2 Struthiopteris spicant*

Floristics (15 plots, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Thuja plicata 12	Rhododendron groenlandicum 32		Sphagnum 54
80-95	Tsuga heterophylla 10		Kalmia microphylla 19	Carex obnupta+ 23, Pteridium aquilinum 14, Struthiopteris spicant 9
60-80	Picea sitchensis 3	Gaultheria shallon 6	Cornus unalaschkensis 3, Linnaea borealis 2	
40-60		Vaccinium ovatum 5	Empetrum nigrum 16, Vaccinium oxycoccos 7, Lysichiton americanus 3, Drosera rotundifolia 2, Maianthemum dilatatum 1	
25-40		Malus fusca 2, Spiraea douglasii 1	Sanguisorba 11, Gentiana douglasiana 2	Eriophorum chamissonis 13, moss 6
10-25		Vaccinium ovalifolium 1	Gentiana sceptrum 8, Lysimachia europaea 2	Carex aquatilis+ 16, Calamagrostis canadensis+ 2, Juncus mertensianus+ 2

{175} Thuja plicata, Pseudotsuga menziesii*, Picea engelmannii*, Oplopanax horridus, Maianthemum stellatum, Athyrium filix-femina
Redcedar, Douglas-fir*, Engelmann spruce*, devil's club, star-flowered Solomon's seal & lady fern forest
THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL



Range: Lowland zone. **NOCA**-8: **ne-s** 670-860m.

Struct: Semi-open conifer forest with prominent conifer regen, abundant forbs, tall shrubs & shrubs, and substantial ferns. Avg vasc cover 142: conif tree 52, forb 29, shrb 16, fern 14, conif regen 4, tall shrb 0.86 @ 28, brdlf tree 0.57 @ 4, grass 0.57 @ 0.

Ecology: Occurring in small patches on very gentle slopes on toeslope seepages, wet streambank terraces, and lower benches with high water tables. Regen usually dominated by *Thuja plicata*, frequently with small amounts of *Tsuga heterophylla* and/or *Abies amabilis*.

Metrics: slope 2-9°, vdp 1-8m, vdr 3-49m, east 40-88, south 50-86, conv 40-48, tpp 7-21, solar 54-61, wet 5-8

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Created from plots labeled as ABIAMA-TSUHET/OPLHOR, TSUHET-(PSEMEN)/TIATRI-GYMDRY and TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN which fit better together.

Similar: MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), N:[132] PSEMEN-(ABIGRA)/ACECIR-PAXMYR, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[006] ABIAMA-TSUHET/OPLHOR, N:[126] POPBAL/CORSER, MN:[201] TSUHET-THUPLI/LYSAME-ATHFIL, MO:[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, MNO:[046] ALNRUB/ATHFIL-LYSAME.

▶ [**124**] B-GT5 7 Abies grandis 7 Alnus rubra*** 2 Circaea alpina 2 Polystichum munitum 2 Populus trichocarpa* 8 [**keep**] Alnus viridis 2 Athyrium filix-femina 5 Clintonia uniflora*** Picea engelmannii 3 Prosartes*** Thuja plicata 14 Tiarella trifoliata 2
▶ [**132**] B-LT5** Acer macrophyllum* 2 Goodyera oblongifolia* Paxistima myrsinites* 2 Pteridium aquilinum* Rosa* Spiraea lucida** Tsuga heterophylla 4 [**keep**] SHRB 3 Actaea rubra* Athyrium filix-femina** 2 Cornus stolonifera/occidentalis* 2 Dicentra formosa* Galium* Gymnocarpium dryopteris*** Maianthemum stellatum 2 Oplopanax horridus 2 Osmorhiza* Picea engelmannii 2 Ribes lacustre** Rubus spectabilis* Tiarella trifoliata*
▶ [**177**] Alnus rubra 2 Dryopteris* Gymnocarpium dryopteris 2 Polystichum munitum* 2 Streptopus lanceolatus 2 Tsuga heterophylla 5 [**keep**] Abies lasiocarpa*** 2 Alnus viridis** Aruncus dioicus*** Dicentra formosa* Paxistima myrsinites* Picea engelmannii* Populus trichocarpa* Prosartes 2 Rubus nutkanus* Thalictrum occidentale*** Vaccinium membranaceum*
▶ [**195**] B-LT5* 2 Acer macrophyllum* Achlys triphylla* 2 Adiantum aleuticum 2 Alnus rubra* 2 Polystichum munitum* 2 Struthiopteris spicant* Tsuga heterophylla 5 Vaccinium ovalifolium* Vaccinium parvifolium* [**keep**] Acer glabrum 2 Alnus viridis 2 Cornus stolonifera/occidentalis*** 2 Dicentra formosa* Maianthemum racemosum*** Maianthemum stellatum* 3 Osmorhiza** Picea engelmannii 2 Prosartes* Ribes lacustre* Rubus nutkanus* Vaccinium membranaceum** Viola glabella+*
▶ [**196**] Achlys triphylla* 2 Cornus unalaschkensis* 2 Gymnocarpium dryopteris 2 Linnaea borealis* Polystichum munitum* 2 Rubus pedatus* Tsuga heterophylla 5 Vaccinium ovalifolium* Vaccinium parvifolium* Viola sempervirens* [**keep**] B-GT5* Acer glabrum*** Alnus viridis*** 2 Athyrium filix-femina 3 Cornus stolonifera/occidentalis*** 2 Dicentra formosa** Maianthemum racemosum* Picea engelmannii 2 Populus trichocarpa*** 2 Prosartes* Rubus nutkanus** Vaccinium membranaceum* Viola glabella+*

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Thuja plicata 39	Rubus nutkanus 3	Maianthemum stellatum 8, Tiarella trifoliata 5, Prosartes 4, Clintonia uniflora 3, Viola glabella+ 1	Gymnocarpium dryopteris 1
80-95	Pseudotsuga menziesii 7, Tsuga heterophylla 3	Oplopanax horridus 11		Athyrium filix-femina 13
60-80	Abies amabilis 7	Ribes lacustre 1	Osmorhiza 1, Galium 1	
40-60	Populus trichocarpa 5	Acer circinatum 28, Cornus stolonifera/occidentalis 6, Alnus viridis 5, Acer glabrum 4, Rubus spectabilis 3, Vaccinium membranaceum 1	Trillium ovatum 2, Circaea alpina 1, Dicentra formosa 1, Actaea rubra 1, Asarum caudatum 1, Maianthemum racemosum 1, Streptopus amplexifolius 1, Adenocaulon bicolor 1, Goodyera oblongifolia 0	moss 6
25-40	Picea engelmannii 8, Abies lasiocarpa 3	Sambucus racemosa 1, Amelanchier alnifolia 1, Rosa 1, Rhododendron menziesii 0	Lysimachia latifolia 2, Streptopus lanceolatus 1, Aruncus dioicus 1, Thalictrum occidentale 1, Claytonia sibirica+ 1, Paxistima myrsinites 0, Neottia 0	Dryopteris 2, Pteridium aquilinum 2, Adiantum aleuticum 1
10-25	Abies grandis 4, Taxus brevifolia 3, Pinus monticola 2		Lactuca 3, Linnaea borealis 3, Moehringia macrophylla 2	

{176} Thuja plicata, Tsuga heterophylla, Lysichiton americanus, Sphagnum
Redcedar, western hemlock, skunk-cabbage & sphagnum woodland
THUPLI-TSUHET/LYSAME/SPHAGN



Range: Coastal zone, in wetlands. **OLYM**-6: **sw*** (nw) 40-70m.

Struct: Conifer woodland of uneven height, with abundant conifer regen, dense sedges, abundant shrubs, and substantial forbs, tall shrubs & ferns. Avg vasc cover 134: sedge 31, shrb 26, conif tree 22, forb 13, tall shrb 11, fern 8, dwf shrb 3, conif regen 0.83 @ 17, rush 0.67 @ 10.

Ecology: Wooded poor fens or bogs in basins or on very gentle slopes. Soils are generally saturated and composed of a mixture of fibrous *Sphagnum* and woody peat, with shrubs rooted in woody debris. Regen codominated by *Tsuga heterophylla* and *Thuja plicata*.

Metrics: slope 0-2°, vdp 1-5m, vdr 32-41m, east 15-23, south 15-63, conv 49-51, tpp 42-46, solar 57-59, wet 5-7

Map class: C02–Redcedar, Labrador-tea, slough sedge & sphagnum bog

Rel to C09: Same, adding one plot each from MALFUS and PICSIT/RUBSPE/CAROBN-LYSAME.

Similar: MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[174] THUPLI/LEDGRO/CAROBN/SPHAGN, O:[178] THUPLI-TSUHET/VACOVAT, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, O:[112] PICSIT-THUPLI/VACOVAT, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[046] ALNRUB/ATHFIL-LYSAME, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN.

▶ [**174**] Empetrum nigrum 2 Eriophorum chamissonis 2 Kalmia microphylla** 2 Pteridium aquilinum* 2 Rhododendron groenlandicum** 2 [**keep**] TSHRB* 2 Frangula purshiana 2 Juncus mertensianus+ 3 Lysichiton americanus* Malus fusca 3 Rhododendron menziesii*** 2 Vaccinium ovalifolium 2

▶ [**178**] Rubus spectabilis 3 Vaccinium ovatum 13 Vaccinium parvifolium* 2 [**keep**] TSHRB* Carex obnupta+** 4 Cornus unalaschkensis* Frangula purshiana* Juncus mertensianus+*** 2 Linnaea borealis** Lysichiton americanus* Malus fusca* Picea sitchensis* Sphagnum** 2 Spiraea douglasii 2

▶ [**199**] Vaccinium ovalifolium 6 Vaccinium ovatum 12 Vaccinium parvifolium* 2 [**keep**] TSHRB* Carex obnupta+* 6 Frangula purshiana* Juncus mertensianus+*** 2 Linnaea borealis* Sphagnum* 8 Spiraea douglasii 2. Note: [199] has a more continuous and vigorous tree canopy, and less peaty soils.

▶ [**200**] SHRB 39 Rubus spectabilis 3 Tsuga heterophylla 22 Vaccinium ovalifolium 7 Vaccinium parvifolium* 2 [**keep**] TSHRB* Carex obnupta+*** 2 Cornus unalaschkensis* Juncus mertensianus+ 2 Linnaea borealis*** Lysichiton americanus* 2 Malus fusca 2 Sphagnum* Spiraea douglasii 2

▶ [**202**] Polystichum munitum* 2 Rubus spectabilis* 3 Vaccinium parvifolium* 2 [**keep**] TSHRB*** 2 Carex obnupta+*** 2 Cornus unalaschkensis** Frangula purshiana 2 Juncus mertensianus+ 2 Linnaea borealis*** Lysichiton americanus* Malus fusca 2 Sphagnum*** 2

Floristics (6 plots, OLYM 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 14	Gaultheria shallon 12, Rhododendron menziesii 4	Lysichiton americanus 6, Cornus unalaschkensis 3, Linnaea borealis 3	Carex obnupta+ 31, Sphagnum 25, Struthiopteris spicant 7
80-95	Thuja plicata 21			
60-80	Picea sitchensis 5	Malus fusca 10, Vaccinium ovatum 8, Frangula purshiana 7, Vaccinium ovalifolium 4		Juncus mertensianus+ 10
40-60			Maianthemum dilatatum 4	moss 18
25-40	Taxus brevifolia 2	Spiraea douglasii 4, Rubus spectabilis 2		
10-25		Vaccinium parvifolium 1	Trautvetteria caroliniensis 5, Gentiana sceptrum 2, Stellaria 1, Lysimachia europaea 1	Equisetum arvense+ 3, Athyrium filix-femina 2, Dryopteris 1, Pteridium aquilinum 1

{177} Thuja plicata, Tsuga heterophylla, Pseudotsuga menziesii*, Oplopanax horridus, Tiarella trifoliata, Polystichum munitum*
Redcedar, western hemlock, Douglas-fir*, devil's club, foamflower & sword fern* forest
THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN)



Range: Lowland zone, on or near valley bottoms. **MORA**-7: **nw-sw** (se) 580-670m. **NOCA**-20: **nw-ne*-cw** (ce-s) 550-690m. **OLYM**-2: **ne** 180-400m.

Struct: Mostly closed conifer forest (53-55m) with substantial conifer regen, dense forbs, and abundant shrubs, ferns & tall shrubs. Avg vasc cover 174: conif tree 58, forb 34, shrb 24, fern 20, tall shrb 20, conif regen 0.91 @ 15, dwf shrb 0.39 @ 3, brdlf tree 0.35 @ 10.

Ecology: Very gentle lower slopes, terraces or depressions, frequently associated with springs, seeps, or streams. Soils are sub-irrigated and poorly drained. Regen dominated by *Tsuga heterophylla*, frequently with smaller amounts of *Thuja plicata*.

Metrics: slope 3-13°, vdp 1-5m, vdr 2-30m, east 12-82, south 35-95, conv 43-50, tpp 10-22, solar 56-66, wet 4-7

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Split from TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN.

Similar: N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MN:[201] TSUHET-THUPLI/LYSAME-ATHFIL, MO:[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, MNO:[006] ABIAMA-TSUHET/OPLHOR, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN.

▶ [**148**] Achlys triphylla** Berberis nervosa 4 Gymnocarpium dryopteris 8 Oxalis oregana*** Picea sitchensis 2 Pseudotsuga menziesii* [**keep**] SHRB 8 Abies amabilis** 2 Actaea rubra** Alnus rubra 2 Asarum caudatum** Clintonia uniflora*** 2 Dryopteris** Maianthemum stellatum* Oplopanax horridus 4 Prosartes* Ribes lacustre* Sambucus racemosa* Streptopus lanceolatus 2 Trillium ovatum*
▶ [**175**] Abies lasiocarpa*** 2 Alnus viridis** Aruncus dioicus*** Dicentra formosa* Paxistima myrsinites* Picea engelmannii* Populus trichocarpa* Prosartes 2 Rubus nutkanus* Thalictrum occidentale*** Vaccinium membranaceum* [**keep**] Alnus rubra 2 Dryopteris* Gymnocarpium dryopteris 2 Polystichum munitum* 2 Streptopus lanceolatus 2 Tsuga heterophylla 5
▶ [**195**] B-LT5* 2 B-GT5* Acer macrophyllum* 2 Achlys triphylla* Adiantum aleuticum 2 Alnus rubra* Polystichum munitum 10 Pseudotsuga menziesii* Rubus ursinus** Struthiopteris spicant* Vaccinium ovalifolium* [**keep**] Actaea rubra* Asarum caudatum* Circaea alpina* Clintonia uniflora* 2 Goodyera oblongifolia* Maianthemum racemosum*** Maianthemum stellatum* 3 Oplopanax horridus 8 Prosartes* Ribes lacustre* Sambucus racemosa 2 Streptopus lanceolatus 2 Viola glabella+*
▶ [**196**] Achlys triphylla** Cornus unalaschkensis* 2 Linnaea borealis** 4 Maianthemum dilatatum 2 Pseudotsuga menziesii* 12 Rubus pedatus* Taxus brevifolia** 2 Vaccinium parvifolium* Viola sempervirens** [**keep**] TSHRB* Acer circinatum* Actaea rubra** Asarum caudatum* Athyrium filix-femina* 3 Circaea alpina*** 2 Dryopteris** Galium* Oplopanax horridus 5 Prosartes* Rubus nutkanus 2 Rubus spectabilis* Sambucus racemosa*** 2
▶ [**201**] Abies grandis* Anemone deltoidea+* Equisetum arvense+* 2 Equisetum hyemale+*** Luzula parviflora* Lysichiton americanus*** 2 Oxalis oregana* Populus trichocarpa* Scirpus microcarpus*** Tellima grandiflora* [**keep**] SHRB 8 Abies amabilis* Actaea rubra* Asarum caudatum* Circaea alpina 2 Clintonia uniflora* 2 Dryopteris* Maianthemum stellatum 2 Oplopanax horridus 4 Prosartes* Pseudotsuga menziesii* 2 Ribes lacustre* Sambucus racemosa* Trillium ovatum*

Floristics (23 plots, MORA 4, NOCA 18, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 33, Thuja plicata 30	Oplopanax horridus 17		
80-95		Acer circinatum 18	Tiarella trifoliata 9	Athyrium filix-femina 7, Gymnocarpium dryopteris 5
60-80		Rubus spectabilis 3	Maianthemum stellatum 5, Clintonia uniflora 5, Circaea alpina 5, Asarum caudatum 2, Prosartes 1, Galium 1, Trillium ovatum 1	moss 26, Polystichum munitum 6, Dryopteris 4
40-60	Pseudotsuga menziesii 8, Abies amabilis 4	Sambucus racemosa 4, Vaccinium parvifolium 2, Ribes lacustre 1	Viola glabella+ 1, Actaea rubra 1	
25-40	Alnus rubra 9	Rubus nutkanus 4, Acer glabrum 2, Rosa 1, Rhododendron menziesii 0	Streptopus lanceolatus 4, Berberis nervosa 2, Maianthemum racemosum 1, Claytonia sibirica+ 1, Lactuca 1, Adenocaulon bicolor 1, Goodyera oblongifolia 0, Osmorhiza 0	
10-25	Abies grandis 17, Populus trichocarpa 9	Cornus stolonifera/occidentalis 7, Vaccinium ovalifolium 4, Vaccinium membranaceum 2	Achlys triphylla 17, Tolmiea menziesii 5, Rubus pedatus 3, Linnaea borealis 2, Lysimachia latifolia 2	Struthiopteris spicant 9

{178} Thuja plicata, Tsuga heterophylla, Vaccinium ovatum
Redcedar, western hemlock & evergreen huckleberry forest
THUPLI-TSUHET/VACOVAT



Range: Coastal zone. **OLYM**-75: **nw*-sw*** 20-50m.

Struct: Open conifer forest with substantial conifer regen, unbroken shrubs, and substantial ferns & forbs. Avg vasc cover 153: shrb 77, conif tree 42, conif regen 15, fern 12, forb 0.85 @ 6, tall shrb 0.4 @ 5, dwf shrb 0.13 @ 2.

Ecology: Flats, concavities and very gentle slopes on coastal terraces. Often damaged by windstorms. Regen dominated by *Tsuga heterophylla*, usually with smaller but substantial amounts of *Thuja plicata*. Diverse mosses.

Metrics: slope 0-4°, vdp 2-13m, vdr 18-39m, east 5-57, south 12-76, conv 50-51, tpp 50-69, solar 57-59, wet 4-7

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: Evolved with clarifying abbreviation change from THUPLI-TSUHET/VACOVA, excluding plots that were better fits with [112] PICSIT-THUPLI/VACOVAT and [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, adding some plots from TSUHET-THUPLI-(ABIAMA)/GAUSHA/BLESPI.

Similar: MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[112] PICSIT-THUPLI/VACOVAT, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[176] THUPLI-TSUHET/LYSAME/SPHAGN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN.

▶ [**112**] B-GT5** Alnus rubra*** Picea sitchensis** 4 Polystichum munitum** 2 [**keep**] FORB 3 TSHRB** 2 Cornus unalaschkensis** Maianthemum dilatatum* 2 Rhododendron menziesii* Rubus spectabilis 3
▶ [**176**] TSHRB* Carex obnupta+** 4 Cornus unalaschkensis* Frangula purshiana* Juncus mertensianus+*** 2 Linnaea borealis** Lysichiton americanus* Malus fusca* Picea sitchensis* Sphagnum** 2 Spiraea douglasii 2 [**keep**] Rubus spectabilis 3 Vaccinium ovatum 13 Vaccinium parvifolium* 2
▶ [**199**] FORB 9 Alnus rubra* Athyrium filix-femina*** Carex obnupta+* Lysichiton americanus* 5 Oplopanax horridus*** Picea sitchensis* Polystichum munitum* Rubus pedatus* Sphagnum* Tiarella trifoliata** [**keep**] Vaccinium ovatum*
▶ [**200**] B-LT5*** Alnus rubra* Gymnocarpium dryopteris*** Maianthemum dilatatum* Maianthemum stellatum*** Moneses uniflora** Oxalis oregana*** Rubus pedatus* Rubus spectabilis* Tiarella trifoliata* Vaccinium ovalifolium 12 [**keep**] Lysichiton americanus 2 Vaccinium ovatum* 5
▶ [**202**] Maianthemum dilatatum* Picea sitchensis** Polystichum munitum*** 2 Rubus spectabilis* [**keep**] TSHRB*** 2 Cornus unalaschkensis** Vaccinium ovatum 18

Floristics (53 plots, OLYM 53): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 30, Thuja plicata 26	Vaccinium ovatum 38, Gaultheria shallon 25		Struthiopteris spicant 11
80-95				moss 25
60-80		Rhododendron menziesii 5		
40-60		Vaccinium ovalifolium 8, Vaccinium parvifolium 5	Lysichiton americanus 3, Cornus unalaschkensis 2	
25-40		Rubus spectabilis 9	Maianthemum dilatatum 5	
10-25	Picea sitchensis 3	Malus fusca 6, Frangula purshiana 3	Linnaea borealis 2, Neottia 1	liverwort 4, lichen 2, Sphagnum 1

{179} Trichophorum cespitosum, Dodecatheon jeffreyi
Tufted bulrush & mountain shooting-star herbaceous vegetation
TRICAE-DODJEF



Range: Lower and upper montane zones, in wetlands. **MORA**-4: **nw** 1210-1390m. **OLYM**-1: (nc) 1290-1300m.

Struct: Closed canopy mixed herbaceous vegetation with very dense forbs, very dense sedges, and substantial grasses. Avg vasc cover 132: forb 63, sedge 60, grass 7, dwf shrb 0.57 @ 3, rush 0.29 @ 2.

Ecology: Bogs and fens on very gentle south-facing slopes, with organic soils typically saturated year-round. Usually surrounded by closed forest.

Metrics: slope 1-13°, vdp 0-8m, vdr 405-449m, east 43-51, south 93-100, conv 42-47, tpp 12-24, solar 70-73, wet 3-7

Map class: H51W–Subalpine herbaceous wetland

Rel to C09: Evolved from TRICAE, incorporating a plot from CARUTR and two plots called at the alliance level.

Similar: MN:[071] CARNIG-CARLEN-(CALCAN), NO:[093] HERMAX-(THAOCC-SAUAME), MNO:[070] CARAQU-(MENTRI-EQUISETUM), MNO:[217] VALSIT-VERVIR, MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[100] LUEPEC-(CARSPE), MNO:[104] PHLDIF-(LOMMAR-CARPHA), MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[167] SALSIT-(SPIDOU)/CARAQU-(LYSAME), NO:[088] EUCPAU-(PHAHAS-CASMIN). Also see: [073] CARNIG-KALMIC-(VACDEL) (prominent ericaceous shrubs).

▶ [**070**] B-LT5* C-LT5* SHRB* 2 TSHRB* Equisetum hyemale+* 2 Menyanthes trifoliata* 2 Salix sitchensis+* Scirpus microcarpus* 2 Spiraea douglasii* 2 Thuja plicata* [**keep**] Carex kelloggii+** Carex nigricans+ 2 Dodecatheon*** 2 Eriophorum angustifolium*** Microseris*** Pedicularis groenlandica** Platanthera* Symphyotrichum foliaceum*** 2 Triantha occidentalis*** 2 Trichophorum cespitosum*** 2 Vahlodea atropurpurea***

▶ [**071**] C-LT5* SHRB* 2 Abies lasiocarpa* Calamagrostis canadensis+ 2 Danthonia 2 Erigeron 2 Eriophorum angustifolium 7 Gentiana calycosa* Leptarrhena pyrolifolia* Phyllodoce empetriformis* Potentilla flabellifolia+* Salix commutata+* Spiraea splendens* 2 [**keep**] Dodecatheon* 3 Eriophorum angustifolium* Hypericum* Lysimachia europaea** Microseris*** Platanthera* Symphyotrichum foliaceum* 2 Triantha occidentalis 2 Trichophorum cespitosum*** 2 Vahlodea atropurpurea* 2 Viola glabella+**

▶ [**079**] TSHRB* Athyrium distentifolium** 2 Chamaenerion latifolium** 2 Epilobium** Erythranthe lewisii+* Luetkea pectinata** 2 Oxyria digyna* 2 Valeriana sitchensis** 2 Veronica cusickii+* [**keep**] Carex kelloggii+*** Dodecatheon*** 2 Eriophorum angustifolium*** Microseris*** Pedicularis groenlandica*** Platanthera*** Sphagnum 2 Symphyotrichum foliaceum*** 2 Triantha occidentalis*** 2 Trichophorum cespitosum*** 2 Vahlodea atropurpurea*

▶ [**093**] C-LT5* SHRB* TSHRB* Achillea millefolium* Bromus sitchensis* 2 Carex spectabilis+* 2 Chamaenerion angustifolium* Cirsium edule+** Elymus* 2 Heracleum maximum** 2 Thalictrum occidentale** 2 [**keep**] Carex kelloggii+*** Carex nigricans+ 2 Dodecatheon*** 2 Eriophorum angustifolium*** Microseris*** Pedicularis groenlandica*** Platanthera*** Sphagnum 2 Symphyotrichum foliaceum*** Triantha occidentalis*** 2 Trichophorum cespitosum*** 2 Vahlodea atropurpurea***

▶ [**217**] SHRB 2 Carex spectabilis+* 2 Lupinus latifolius* 2 Potentilla flabellifolia+ 2 Valeriana sitchensis* 2 Veratrum viride* 2 [**keep**] Carex aquatilis+ 2 Carex kelloggii+** Dodecatheon** 3 Eriophorum angustifolium*** Kalmia microphylla*** Lysimachia europaea*** Microseris*** Platanthera** Sphagnum*** 2 Triantha occidentalis*** 2 Trichophorum cespitosum*** 2

Floristics (7 plots, MORA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100				Trichophorum cespitosum 28, Eriophorum angustifolium 4
80-95			Dodecatheon 23, Microseris 4	
60-80			Symphyotrichum foliaceum 21, Triantha occidentalis 19, Platanthera 2, Pedicularis groenlandica 2	Carex kelloggii+ 15, Vahlodea atropurpurea 7
40-60			Hypericum 6, Kalmia microphylla 3, Lysimachia europaea 2, Viola glabella+ 2, Pinguicula vulgaris 1	Sphagnum 23, Carex aquatilis+ 18, moss 17
25-40			Caltha 3, Senecio triangularis+ 1	Carex nigricans+ 20, Agrostis 2, Juncus mertensianus+ 2, Equisetum arvense+ 2
10-25		Spiraea splendens 1	Bistorta bistortoides 3, Erigeron 1	Deschampsia 13

{180} Tsuga heterophylla, Abies amabilis, Struthiopteris spicant, Tiarella trifoliata, Polystichum munitum
Western hemlock, Pacific silver fir, deer fern, foamflower & sword fern forest
TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN



Range: Lower montane and lowland zones. **MORA**-3: **nw** 730-920m. **NOCA**-1: (cw) 540-550m. **OLYM**-11: **nc-sc*** (se) 470-650m.

Struct: Mostly closed conifer forest (47-53m) with abundant conifer regen, dense ferns, abundant shrubs, and substantial forbs. Avg vasc cover 142: conif tree 59, fern 32, shrb 17, forb 14, conif regen 0.92 @ 19.

Ecology: Moist slopes, on fairly well-drained but possibly sub-irrigated soils. Topographic position varies widely. Sites have lower snowpack than is typical for *Abies amabilis* forests. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Abies amabilis*.

Metrics: slope 15-31°, vdp 5-81m, vdr 58-250m, east 37-89, south 19-83, conv 45-58, tpp 23-49, solar 46-62, wet 3-4

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Similar, adding plots called to ABIAMA-TSUHET/RUBPED-TIATRI, TSUHET-(PSEMEN)/VACALA/POLMUN and TSUHET-ABIAMA/VACALA/TIATRI.

Similar: MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[006] ABIAMA-TSUHET/OPLHOR, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI. Also see: [008] ABIAMA-TSUHET-(PSEMEN)/VACALA.

▶ [**009**] Acer circinatum* Goodyera oblongifolia* Gymnocarpium dryopteris* Linnaea borealis* 2 Maianthemum stellatum* Oplopanax horridus* Orthilia secunda* Rhododendron menziesii* Streptopus lanceolatus* Trillium ovatum* [**keep**] Achlys triphylla* Luzula parviflora*** Maianthemum dilatatum* Polystichum munitum* 4 Struthiopteris spicant* Vaccinium parvifolium 3
▶ [**010**] TSHRB* 3 Acer circinatum*** 2 Alnus rubra*** Circaea alpina** 2 Gymnocarpium dryopteris* Oplopanax horridus 2 Ribes bracteosum+*** 2 Rubus pedatus* Rubus spectabilis 6 Tolmiea menziesii** Viola glabella+*** [**keep**] Luzula parviflora* Mitella** Polystichum munitum 4 Prosartes** Pseudotsuga menziesii* Streptopus streptopoides** Struthiopteris spicant* Vaccinium parvifolium*
▶ [**184**] Boykinia 2 Clintonia uniflora* Maianthemum dilatatum 4 Oplopanax horridus 2 Rhododendron menziesii** 2 Rubus pedatus* Vaccinium ovalifolium 9 [**keep**] TSHRB* Dryopteris*** Polystichum munitum* 4 Pseudotsuga menziesii 5 Sambucus racemosa**
▶ [**185**] TSHRB 3 Acer circinatum 2 Achlys triphylla* Cornus unalaschkensis* 2 Gymnocarpium dryopteris* Oxalis oregana*** 2 Pseudotsuga menziesii* Rhododendron menziesii 2 Vaccinium ovalifolium 9 [**keep**] Athyrium filix-femina* Rubus spectabilis* 2 Struthiopteris spicant 4 Vaccinium parvifolium 3
▶ [**187**] Clintonia uniflora* Gymnocarpium dryopteris* Oplopanax horridus 2 Rhododendron menziesii 2 Streptopus lanceolatus* Vaccinium ovalifolium 9 [**keep**] Dryopteris* Luzula parviflora*** Polystichum munitum* 9 Pseudotsuga menziesii* Sambucus racemosa* Struthiopteris spicant* Thuja plicata**

Floristics (12 plots, MORA 1, NOCA 1, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 52, Abies amabilis 18	Vaccinium parvifolium 9	Tiarella trifoliata 5	Polystichum munitum 19
80-95		Vaccinium ovalifolium 5		Struthiopteris spicant 9
60-80		Rubus spectabilis 4		moss 18, Athyrium filix-femina 4
40-60	Thuja plicata 7		Achlys triphylla 5, Rubus pedatus 3, Clintonia uniflora 2	Dryopteris 2
25-40	Pseudotsuga menziesii 11	Sambucus racemosa 2, Oplopanax horridus 0	Maianthemum dilatatum 2, Streptopus streptopoides 1, Cornus unalaschkensis 1	Gymnocarpium dryopteris 2, Luzula parviflora 1
10-25			Mitella 3, Streptopus lanceolatus 2, Rubus ursinus 2, Claytonia sibirica+ 1, Prosartes 1, Galium 1	

{181} Tsuga heterophylla, Abies amabilis, Pseudotsuga menziesii, Gaultheria shallon
Western hemlock, silver fir, Douglas-fir & salal forest
TSUHET-ABIAMA-PSEMEN/GAUSHA



Range: Lowland zone, transitional to lower montane zone. **MORA**-19: **sw*-se** (nw) 770-930m. **NOCA**-1: (nw) 840-850m. **OLYM**-12: **nc-se** 620-940m.

Struct: Closed conifer forest (31-43m) with dense conifer regen, dense shrubs, and prominent dwarf shrubs & forbs. Avg vasc cover 150: conif tree 71, shrb 38, conif regen 32, dwf shrb 0.83 @ 5, forb 0.83 @ 4, fern 0.39 @ 3, tall shrb 0.22 @ 3.

Ecology: Fairly gentle slopes, on well-drained soils. Sites are drier than is typical for *Abies amabilis* forests. Regen codominated by *Tsuga heterophylla* and *Abies amabilis*, often with smaller amounts of *Thuja plicata*.

Metrics: slope 9-26°, vdp 15-90m, vdr 36-315m, east 7-84, south 24-82, conv 48-57, tpp 29-53, solar 59-73, wet 2-3

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Similar, shedding plots to [153] PSEMEN-TSUHET/GAUSHA-MAHNER and gaining plots called to PSEMEN-TSUHET/GAUSHA-MAHNER, PSEMEN-TSUHET/VACALA/XERTEN, ABIAMA-TSUHET/RUBPED-TIATRI and PSEMEN-TSUHET/GAUSHA-VACPAR.

Similar: MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MNO:[007] ABIAMA-TSUHET/ORTSEC, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER. Also see: [160] PSEMEN-TSUHET/VACALA/XERTEN.

▶ [**003**] FORB 6 TSHRB* 5 Acer circinatum* 5 Achlys triphylla* 2 Chimaphila umbellata 2 Clintonia uniflora* Orthilia secunda* Rosa** Rubus lasiococcus* Tiarella trifoliata* [**keep**] SHRB 6 Gaultheria shallon*** 2 Thuja plicata* 3 Vaccinium ovalifolium 3 Vaccinium parvifolium 3
▶ [**007**] Orthilia secunda* [**keep**] SHRB 4 Gaultheria shallon*** 2 Vaccinium membranaceum 2 Vaccinium ovalifolium 2 Vaccinium parvifolium 2
▶ [**182**] TSHRB* Chimaphila menziesii* Clintonia uniflora* Cornus unalaschkensis* 2 Goodyera oblongifolia* Orthilia secunda** Paxistima myrsinites** Pyrola asarifolia+** Taxus brevifolia* 2 [**keep**] SHRB 15 Gaultheria shallon** 4 Maianthemum dilatatum*** Neottia* Vaccinium parvifolium 4
▶ [**183**] Clintonia uniflora* Cornus unalaschkensis* 2 Linnaea borealis 4 Orthilia secunda** Polystichum munitum* Tiarella trifoliata* [**keep**] Berberis nervosa* Gaultheria shallon* 4 Maianthemum dilatatum***
▶ [**197**] TSHRB* Acer circinatum* Cornus unalaschkensis* 2 Rhododendron menziesii* 2 [**keep**] Abies amabilis* 5 Chimaphila umbellata* Neottia*

Floristics (18 plots, MORA 6, NOCA 1, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 48, Abies amabilis 27, Pseudotsuga menziesii 17			
80-95	Thuja plicata 12	Gaultheria shallon 21, Vaccinium parvifolium 8		moss 43
60-80		Vaccinium ovalifolium 13	Linnaea borealis 3	
40-60			Berberis nervosa 3, Chimaphila umbellata 1, Neottia 1	
25-40		Vaccinium membranaceum 4	Cornus unalaschkensis 1, Clintonia uniflora 1, Maianthemum dilatatum 1, Goodyera oblongifolia 1, Trillium ovatum 0	Polystichum munitum 2
10-25	Taxus brevifolia 1	Acer circinatum 3, Oplopanax horridus 2, Rhododendron menziesii 1	Xerophyllum tenax 8, Tiarella trifoliata 2, Pyrola picta 1, Lysichiton americanus 1, Viola glabella+ 1, Achlys triphylla 1, Viola sempervirens 1, Rubus pedatus 1	Struthiopteris spicant 3, Athyrium filix-femina 1

{182} Tsuga heterophylla, Abies amabilis, Pseudotsuga menziesii, Berberis nervosa
Western hemlock, silver fir, Douglas-fir & dwarf Oregon-grape forest
TSUHET-ABIAMA-PSEMEN/MAHNER



Range: Lower montane zone, transitional to lowland zone. **MORA**-27: **ne**-**sw**-**se** (nw) 820-1080m. **NOCA**-19: **nw**-**ne**-**cw**-**ce** 740-960m. **OLYM**-3: **se** (ne) 920-960m.

Struct: Mostly closed conifer forest (32-40m) with abundant conifer regen and substantial dwarf shrubs, shrubs & forbs. Avg vasc cover 123: conif tree 65, conif regen 27, dwf shrb 12, shrb 9, forb 6, tall shrb 0.47 @ 6, fern 0.32 @ 2.

Ecology: Lower slopes and midslopes, on well drained soils. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*, frequently with smaller amounts of *Thuja plicata*.

Metrics: slope 15-34°, vdp 3-32m, vdr 41-168m, east 18-80, south 44-95, conv 43-50, tpp 20-42, solar 55-74, wet 3-4

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Expanded, incorporating many plots from TSUHET-ABIAMA-(PSEMEN)/VACALA, ABIAMA-(TSUHET)/VACMEM-VACALA, TSUHET-ABIAMA/VACALA/RUBPED, TSUHET-PSEMEN/MAHNER-CHIMEN and others. Concept appears unchanged.

Similar: MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[007] ABIAMA-TSUHET/ORTSEC, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[181] TSUHET-ABIAMA-PSEMEN/GAUSHA, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[004] ABIAMA-PSEMEN/VACMEM, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED.

▶ [**007**] – [**keep**] FORB 2 SHRB 3 TSHRB* 2 Acer circinatum* 2 Achlys triphylla*** Berberis nervosa* 2 Clintonia uniflora* Cornus unalaschkensis* Gaultheria shallon* Linnaea borealis 2 Pyrola asarifolia+* Rubus pedatus* Taxus brevifolia* 3 Trillium ovatum* Vaccinium ovalifolium 2
▶ [**009**] FORB 9 Athyrium filix-femina*** 2 Dryopteris* Gymnocarpium dryopteris* 2 Oplopanax horridus* Polystichum munitum* Rubus pedatus* 2 Rubus spectabilis* Struthiopteris spicant* Tiarella trifoliata* 2 [**keep**] TSHRB 2 Acer circinatum 2 Berberis nervosa** Chimaphila menziesii* Chimaphila umbellata** Goodyera oblongifolia* Linnaea borealis* Orthilia secunda* Pseudotsuga menziesii* Pyrola asarifolia+** Taxus brevifolia* 2 Vaccinium membranaceum**
▶ [**181**] SHRB 15 Gaultheria shallon** 4 Maianthemum dilatatum*** Neottia* Vaccinium parvifolium 4 [**keep**] TSHRB* Chimaphila menziesii* Clintonia uniflora* Cornus unalaschkensis* 2 Goodyera oblongifolia* Orthilia secunda** Paxistima myrsinites** Pyrola asarifolia+** Taxus brevifolia* 2
▶ [**183**] SHRB 14 Athyrium filix-femina** Lysimachia latifolia* Polystichum munitum* Tiarella trifoliata* Vaccinium ovalifolium 9 Vaccinium parvifolium 3 [**keep**] Berberis nervosa* Chimaphila umbellata* Goodyera oblongifolia* Pyrola asarifolia+*** Taxus brevifolia**
▶ [**196**] Achlys triphylla* 2 Athyrium filix-femina*** Galium** Gymnocarpium dryopteris* 2 Maianthemum stellatum* Oplopanax horridus* Polystichum munitum* 2 Rubus spectabilis 2 Tiarella trifoliata* 2 Trillium ovatum* [**keep**] Abies amabilis 7 Berberis nervosa* Chimaphila menziesii* Chimaphila umbellata** Corallorhiza*** Gaultheria ovatifolia** Orthilia secunda* Paxistima myrsinites** Pyrola asarifolia+** Vaccinium membranaceum** Vaccinium ovalifolium*

Floristics (38 plots, MORA 16, NOCA 19, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 40, Abies amabilis 27			moss 44
80-95	Thuja plicata 15	Vaccinium ovalifolium 6, Vaccinium parvifolium 2	Berberis nervosa 6, Linnaea borealis 3, Chimaphila umbellata 2	
60-80	Pseudotsuga menziesii 9, Taxus brevifolia 6		Cornus unalaschkensis 3, Pyrola asarifolia+ 1, Goodyera oblongifolia 0	
40-60		Vaccinium membranaceum 2	Paxistima myrsinites 2, Clintonia uniflora 1, Orthilia secunda 1, Chimaphila menziesii 0	
25-40		Acer circinatum 7, Rhododendron menziesii 2	Gaultheria ovatifolia 1, Rubus pedatus 1, Rubus lasiococcus 1, Corallorhiza 0	
10-25	Callitropsis nootkatensis 5, Pinus monticola 1	Gaultheria shallon 2, Amelanchier alnifolia 1, Rosa 1, Rubus spectabilis 1	Maianthemum stellatum 1, Achlys triphylla 1, Rubus ursinus 1, Tiarella trifoliata 1, Viola orbiculata+ 1, Neottia 1	Struthiopteris spicant 3, Polystichum munitum 1

{183} Tsuga heterophylla, Abies amabilis, Pseudotsuga menziesii*, Vaccinium ovalifolium, Linnaea borealis
Western hemlock, silver fir, Douglas-fir*, Alaska blueberry & twinflower forest
TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR



Range: Lower montane zone, transitional to lowland zone. **MORA**-15: **nw**-**sw** (ne-se) 930-1140m. **NOCA**-8: **nw**-**cw** (ne) 580-810m. **OLYM**-17: **nc**-**se** (ne-sc) 600-830m.

Struct: Mostly closed conifer forest (40-50m) with abundant conifer regen, abundant shrubs, and substantial dwarf shrubs & forbs. Avg vasc cover 139: conif tree 64, shrb 29, conif regen 26, forb 8, dwf shrb 0.94 @ 10, fern 0.65 @ 2, tall shrb 0.29 @ 4.

Ecology: Toeslopes, benches and fairly gentle midslopes, on well-drained, moist soils. Mid-successional, with *Abies amabilis* often beginning to enter canopy. Regen dominated by *Tsuga heterophylla*, usually with smaller but substantial amounts of *Abies amabilis*.

Metrics: slope 11-29°, vdp 2-21m, vdr 21-153m, east 12-55, south 10-91, conv 42-50, tpp 15-31, solar 45-70, wet 3-4

Map class: C11–Mesic silver fir & western hemlock forest

Rel to C09: Split from TSUHET-(PSEMEN)/VACALA/CORUNA to represent plots which contained substantial *Abies amabilis*, though apart from that the concept seems similar. Several plots were gained from TSUHET-ABIAMA-(PSEMEN)/VACALA.

Similar: MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MNO:[181] TSUHET-ABIAMA-PSEMEN/GAUSHA, MO:[003] ABIAMA-PSEMEN/ACHTRI, MNO:[007] ABIAMA-TSUHET/ORTSEC, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA. Also see: [186] TSUHET-ABIAMA/VACALA/RUBPED, [187] TSUHET-ABIAMA/VACALA/TIATRI.

▶ [**003**] TSHRB* 7 Acer circinatum* 6 Achlys triphylla* Berberis nervosa* Rosa*** Rubus lasiococcus* Tiarella trifoliata 2 Vaccinium membranaceum* [**keep**] SHRB 6 Cornus unalaschkensis* Gaultheria shallon** Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant** Thuja plicata* 3 Vaccinium ovalifolium* 3 Vaccinium parvifolium 3
▶ [**007**] Orthilia secunda* Paxistima myrsinites* Pyrola asarifolia+* Vaccinium membranaceum* [**keep**] FORB 3 SHRB 4 TSHRB 2 Achlys triphylla*** Berberis nervosa 2 Clintonia uniflora* Cornus unalaschkensis* 2 Gaultheria shallon** Linnaea borealis 2 Neottia* Polystichum munitum* Rubus pedatus* Struthiopteris spicant* Tiarella trifoliata* Trillium ovatum* Vaccinium ovalifolium 2 Vaccinium parvifolium 2
▶ [**181**] Berberis nervosa* Gaultheria shallon* 4 Maianthemum dilatatum*** [**keep**] Clintonia uniflora* Cornus unalaschkensis* 2 Linnaea borealis 4 Orthilia secunda** Polystichum munitum* Tiarella trifoliata*
▶ [**182**] Berberis nervosa* Chimaphila umbellata* Goodyera oblongifolia* Pyrola asarifolia+*** Taxus brevifolia** [**keep**] SHRB 14 Athyrium filix-femina** Lysimachia latifolia* Polystichum munitum* Tiarella trifoliata* Vaccinium ovalifolium 9 Vaccinium parvifolium 3
▶ [**196**] Adenocaulon bicolor*** Asarum caudatum*** Galium*** Gymnocarpium dryopteris** 2 Maianthemum dilatatum*** 2 Maianthemum stellatum** Oplopanax horridus* Polystichum munitum 2 Prosartes** Rosa*** Rubus spectabilis* 2 Tiarella trifoliata 3 [**keep**] Abies amabilis* 6 Chimaphila menziesii* Chimaphila umbellata** Cornus unalaschkensis* Orthilia secunda* Vaccinium ovalifolium* 3

Floristics (31 plots, MORA 7, NOCA 7, OLYM 17): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 51	Vaccinium ovalifolium 19, Vaccinium parvifolium 8		moss 48
80-95	Pseudotsuga menziesii 20, Abies amabilis 13		Linnaea borealis 8	
60-80	Thuja plicata 12		Cornus unalaschkensis 4, Clintonia uniflora 2	
40-60			Chimaphila umbellata 2, Tiarella trifoliata 2	Polystichum munitum 1
25-40		Acer circinatum 3, Gaultheria shallon 2, Rhododendron menziesii 1	Berberis nervosa 4, Achlys triphylla 3, Neottia 1, Trillium ovatum 1, Orthilia secunda 1, Chimaphila menziesii 1, Rubus pedatus 1, Goodyera oblongifolia 0	Struthiopteris spicant 1
10-25	Taxus brevifolia 2	Oplopanax horridus 4, Vaccinium membranaceum 2	Streptopus lanceolatus 1, Lysimachia latifolia 1, Paxistima myrsinites 1	Athyrium filix-femina 1, Gymnocarpium dryopteris 1

{184} Tsuga heterophylla, Abies amabilis, Thuja plicata*, Vaccinium ovalifolium, Struthiopteris spicant
Western hemlock, silver fir, redcedar*, Alaska blueberry & deer fern forest
TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI



Range: Lower montane zone, transitional to lowland zone. **MORA**-8: **nw**-**sw** (ne-se) 890-1110m. **NOCA**-1: (nw) 950-960m. **OLYM**-10: **sc** (se) 310-640m.

Struct: Closed conifer forest (42-47m) with abundant conifer regen, dense shrubs, abundant forbs, and substantial ferns. Avg vasc cover 169: conif tree 65, shrb 45, forb 28, fern 13, conif regen 0.92 @ 16, dwf shrb 0.25 @ 9.

Ecology: Fairly gentle slopes, on moist but nutrient-poor soils. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*.

Metrics: slope 10-25°, vdp 1-20m, vdr 19-231m, east 49-88, south 14-54, conv 38-47, tpp 12-26, solar 46-60, wet 3-4

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Similar, adding plots from TSUHET-ABIAMA/VACALA/RUBPED and TSUHET-ABIAMA/VACALA/TIATRI.

Similar: MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[006] ABIAMA-TSUHET/OPLHOR, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI.

▶ [**009**] TSHRB* Acer circinatum* Dryopteris** Gymnocarpium dryopteris* Linnaea borealis* Sambucus racemosa* [**keep**] SHRB 12 Boykinia*** 2 Gaultheria shallon** Maianthemum dilatatum* 2 Rhododendron menziesii* 2 Struthiopteris spicant* Vaccinium ovalifolium 6 Vaccinium parvifolium 3
▶ [**180**] TSHRB* Dryopteris*** Polystichum munitum* 4 Pseudotsuga menziesii 5 Sambucus racemosa** [**keep**] Boykinia 2 Clintonia uniflora* Maianthemum dilatatum 4 Oplopanax horridus 2 Rhododendron menziesii** 2 Rubus pedatus* Vaccinium ovalifolium 9
▶ [**185**] Acer circinatum 2 Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 4 Pseudotsuga menziesii 5 [**keep**] Boykinia* 2 Clintonia uniflora* Gaultheria shallon* Maianthemum dilatatum 3 Struthiopteris spicant 4 Vaccinium parvifolium 3
▶ [**186**] TSHRB* Acer circinatum* 2 Dryopteris* Linnaea borealis* Vaccinium membranaceum* [**keep**] Athyrium filix-femina* Boykinia*** 2 Gaultheria shallon** Maianthemum dilatatum*** 2 Oplopanax horridus* 2 Polystichum munitum* Struthiopteris spicant* 2 Thuja plicata* Tiarella trifoliata* Vaccinium parvifolium*
▶ [**187**] TSHRB* Achlys triphylla* Gymnocarpium dryopteris* Streptopus lanceolatus* [**keep**] Boykinia** Gaultheria shallon*** Pseudotsuga menziesii* Struthiopteris spicant* Thuja plicata* 6

Floristics (12 plots, MORA 2, NOCA 1, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 41, Abies amabilis 29	Vaccinium ovalifolium 28		Struthiopteris spicant 10
80-95		Vaccinium parvifolium 9	Clintonia uniflora 7, Rubus pedatus 6, Tiarella trifoliata 3	moss 31
60-80	Thuja plicata 13	Rhododendron menziesii 5		
40-60	Pseudotsuga menziesii 3	Oplopanax horridus 4, Rubus spectabilis 3	Cornus unalaschkensis 4	Athyrium filix-femina 3, Polystichum munitum 2
25-40		Gaultheria shallon 2	Maianthemum dilatatum 9, Achlys triphylla 6, Boykinia 4, Streptopus lanceolatus 3, Prosartes 0, Streptopus streptopoides 0	Gymnocarpium dryopteris 3, liverwort 2
10-25			Linnaea borealis 12, Rubus lasiococcus 6, Circaea alpina 4, Maianthemum stellatum 2, Trillium ovatum 1, Rubus ursinus 1, Goodyera oblongifolia 1	

{185} Tsuga heterophylla, Abies amabilis, Vaccinium ovalifolium, Oxalis oregana, Polystichum munitum
Western hemlock, silver fir, Alaska blueberry, Oregon wood-sorrel & sword fern forest
TSUHET-ABIAMA/VACALA/OXAORE-POLMUN



Range: Lowland zone, transitional to lower montane zone. **OLYM**-6: **se*** (nc-sc) 410-530m.

Struct: Closed conifer forest (48-65m) with abundant conifer regen, dense forbs, and abundant shrubs & ferns. Avg vasc cover 171: conif tree 66, forb 37, shrb 28, conif regen 18, fern 17, tall shrb 0.4 @ 9, dwf shrb 0.2 @ 10.

Ecology: Lower slopes and midslopes with southeasterly aspects, on deep, moist and well-drained soils. Regen dominated by *Tsuga heterophylla*, usually with codominant *Abies amabilis*.

Metrics: slope 11-36°, vdp 6-13m, vdr 35-58m, east 69-86, south 67-93, conv 44-50, tpp 16-23, solar 63-69, wet 2-3

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Evolved from TSUHET-ABIAMA/OXAORE-BLESPI. The NCCN plots did not correspond well to the original description, lacking *Gaultheria shallon*, *Rubus spectabilis* and *Maianthemum dilatatum*. A plot labeled as PSEMEN-TSUHET/POLMUN-OXAORE was incorporated.

Similar: MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MO:[003] ABIAMA-PSEMEN/ACHTRI, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY.

▶ [**009**] Athyrium filix-femina* Dryopteris* Maianthemum stellatum* Rubus spectabilis* Trillium ovatum* [**keep**] TSHRB 2 Acer circinatum 2 Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 4 Rhododendron menziesii 2 Vaccinium ovalifolium 6
▶ [**184**] Boykinia* 2 Clintonia uniflora* Gaultheria shallon* Maianthemum dilatatum 3 Struthiopteris spicant 4 Vaccinium parvifolium 3 [**keep**] Acer circinatum 2 Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 4 Pseudotsuga menziesii 5
▶ [**186**] Vaccinium parvifolium 2 [**keep**] Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 2
▶ [**187**] Athyrium filix-femina* Clintonia uniflora* Rubus spectabilis* 2 Streptopus lanceolatus* Vaccinium parvifolium 2 [**keep**] TSHRB 4 Cornus unalaschkensis* 5 Oxalis oregana*** 5 Polystichum munitum* Pseudotsuga menziesii**
▶ [**198**] Gaultheria shallon** Picea sitchensis 2 Rubus spectabilis* 2 Vaccinium parvifolium 2 [**keep**] Abies amabilis* 8 Gymnocarpium dryopteris** Oxalis oregana***

Floristics (5 plots, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 44, Abies amabilis 24		Oxalis oregana 17, Achlys triphylla 3	
80-95	Pseudotsuga menziesii 14	Vaccinium ovalifolium 25, Vaccinium parvifolium 2	Cornus unalaschkensis 9	moss 25, Polystichum munitum 14, Gymnocarpium dryopteris 4
60-80			Rubus pedatus 5, Tiarella trifoliata 4	Struthiopteris spicant 3
40-60	Thuja plicata 10	Acer circinatum 8, Rhododendron menziesii 8, Oplopanax horridus 3	Clintonia uniflora 4	
10-25		Rubus nutkanus 8, Rosa 5, Sambucus racemosa 3	Linnaea borealis 10, Lysimachia latifolia 5, Maianthemum dilatatum 2, Streptopus lanceolatus 2	Athyrium filix-femina 5, Adiantum aleuticum 2

{186} Tsuga heterophylla, Abies amabilis, Vaccinium ovalifolium, Rubus pedatus
Western hemlock, silver fir, Alaska blueberry & trailing raspberry forest
TSUHET-ABIAMA/VACALA/RUBPED



Range: Lower montane zone, lowland zone in ne NOCA. **MORA**-26: **nw**-**ne**-**sw**-**se** 980-1190m. **NOCA**-11: **nw**-**ne** (cw-ce) 620-820m. **OLYM**-23: **nc**-**sc**-**se** 640-840m.

Struct: Mostly closed conifer forest (38-49m) with abundant conifer regen, dense shrubs, and abundant forbs. Avg vasc cover 144: conif tree 61, shrb 38, conif regen 23, forb 17, fern 0.55 @ 3, dwf shrb 0.43 @ 3, tall shrb 0.35 @ 9.

Ecology: Toeslopes, benches, and fairly gentle midslopes, on well-drained soils. Regen codominated by *Abies amabilis* and *Tsuga heterophylla*.

Metrics: slope 7-22°, vdp 1-21m, vdr 12-260m, east 11-86, south 15-73, conv 44-50, tpp 10-40, solar 53-65, wet 3-5

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Expanded, incorporating plots from TSUHET-ABIAMA-(PSEMEN)/VACALA, TSUHET-ABIAMA/VACALA/TIATRI and ABIAMA/MENFER. Concept appears unchanged.

Similar: MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[187] TSUHET-ABIAMA/VACALA/TIATRI, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[182] TSUHET-ABIAMA-PSEMEN/MAHNER, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN.

▶ [**008**] Chimaphila menziesii*** Orthilia secunda* [**keep**] FORB 7 TSHRB 3 Acer circinatum 4 Achlys triphylla* Athyrium filix-femina* Clintonia uniflora* Cornus unalaschkensis* Gymnocarpium dryopteris* Rhododendron menziesii 2 Rubus pedatus* 2 Rubus spectabilis*** Streptopus lanceolatus*** Tiarella trifoliata**

▶ [**009**] Athyrium filix-femina* Dryopteris** Gymnocarpium dryopteris* Oplopanax horridus** Polystichum munitum** Rubus spectabilis* Struthiopteris spicant* 2 Thuja plicata* Tiarella trifoliata* [**keep**] SHRB 12 TSHRB 2 Acer circinatum 2 Rhododendron menziesii 2 Rubus lasiococcus* Vaccinium membranaceum** Vaccinium ovalifolium 6 Vaccinium parvifolium 3

▶ [**184**] Athyrium filix-femina* Boykinia*** 2 Gaultheria shallon** Maianthemum dilatatum*** 2 Oplopanax horridus* 2 Polystichum munitum* Struthiopteris spicant* 2 Thuja plicata* Tiarella trifoliata* Vaccinium parvifolium* [**keep**] TSHRB* Acer circinatum* 2 Dryopteris* Linnaea borealis* Vaccinium membranaceum*

▶ [**185**] Achlys triphylla* Oxalis oregana*** 2 Polystichum munitum 2 [**keep**] Vaccinium parvifolium 2

▶ [**187**] Achlys triphylla* Athyrium filix-femina* 2 Gymnocarpium dryopteris* Maianthemum dilatatum*** 2 Oplopanax horridus* Polystichum munitum 2 Rubus spectabilis* Streptopus lanceolatus* Struthiopteris spicant 2 Tiarella trifoliata* 2 [**keep**] TSHRB 4 Cornus unalaschkensis* Linnaea borealis* Pseudotsuga menziesii* Thuja plicata*

Floristics (40 plots, MORA 10, NOCA 9, OLYM 21): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 39, Tsuga heterophylla 38	Vaccinium ovalifolium 32		moss 39
80-95			Rubus pedatus 4	
60-80			Cornus unalaschkensis 5, Clintonia uniflora 5	
40-60		Vaccinium parvifolium 6, Rhododendron menziesii 4	Linnaea borealis 3, Tiarella trifoliata 2	
25-40	Pseudotsuga menziesii 7, Thuja plicata 6	Acer circinatum 11, Rubus spectabilis 2	Achlys triphylla 3, Streptopus lanceolatus 1	Gymnocarpium dryopteris 2, Struthiopteris spicant 1, Athyrium filix-femina 1
10-25	Callitropsis nootkatensis 2, Taxus brevifolia 1	Vaccinium membranaceum 2, Sambucus racemosa 1, Oplopanax horridus 1	Streptopus streptopoides 5, Maianthemum stellatum 4, Rubus lasiococcus 2, Streptopus amplexifolius 2, Neottia 1, Corallorhiza 1, Orthilia secunda 1	Dryopteris 1, Polystichum munitum 1

{187} Tsuga heterophylla, Abies amabilis, Vaccinium ovalifolium, Tiarella trifoliata
Western hemlock, silver fir, Alaska blueberry & foamflower forest
TSUHET-ABIAMA/VACALA/TIATRI



Range: Lower montane. **MORA**-9: **nw**-**se** (ne-sw) 870-1250m. **NOCA**-4: **nw** (ne-cw) 570-810m. **OLYM**-24: **sc**-**se*** (nc) 630-940m.

Struct: Mostly closed conifer forest (44-49m) with abundant conifer regen, dense shrubs, abundant forbs, and substantial ferns. Avg vasc cover 157: conif tree 58, shrb 35, forb 28, fern 13, conif regen 0.92 @ 22, tall shrb 0.44 @ 3, dwf shrb 0.17 @ 2.

Ecology: Gentle lower slopes, on moist soils. Regen codominated by *Tsuga heterophylla* and *Abies amabilis*.

Metrics: slope 8-29°, vdp 1-15m, vdr 15-243m, east 19-77, south 5-59, conv 38-48, tpp 9-26, solar 40-61, wet 2-4

Map class: C10–Moist silver fir, w hemlock & foamflower forest

Rel to C09: Expanded, gaining plots from ABIAMA-(PSEMEN)/ACHTRI-TIATRI, TSUHET-ABIAMA/VACALA/RUBPED and ABIAMA-TSUHET/OPLHOR. Concept appears unchanged.

Similar: MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MNO:[186] TSUHET-ABIAMA/VACALA/RUBPED, NO:[010] ABIAMA-TSUHET/RUBSPE/TIATRI-ATHFIL, MNO:[006] ABIAMA-TSUHET/OPLHOR, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MNO:[008] ABIAMA-TSUHET-(PSEMEN)/VACALA, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI. Also see: [183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR.

▶ [**006**] Claytonia sibirica+* Corydalis** Galium* Maianthemum stellatum* Oplopanax horridus 6 Ribes lacustre** Rubus nutkanus* Sambucus racemosa* Thuja plicata* 6 Tolmiea menziesii*** Viola glabella+** [**keep**] Achlys triphylla* Maianthemum dilatatum** 2 Rhododendron menziesii 2 Vaccinium ovalifolium 8
▶ [**009**] Cornus unalaschkensis* Dryopteris* Linnaea borealis*** Polystichum munitum* Pseudotsuga menziesii*** Thuja plicata*** [**keep**] SHRB 12 Achlys triphylla** Callitropsis nootkatensis* Maianthemum dilatatum* 2 Rhododendron menziesii 2 Rubus lasiococcus* Sorbus sitchensis*** Vaccinium membranaceum* Vaccinium ovalifolium 6 Vaccinium parvifolium 3 Veratrum viride**
▶ [**010**] TSHRB 4 Acer circinatum* Alnus rubra*** 2 Circaea alpina** 2 Galium* Polystichum munitum* Ribes bracteosum+* Rubus spectabilis 9 Sambucus racemosa* Thuja plicata* Tolmiea menziesii*** 2 Viola glabella+* 2 [**keep**] Callitropsis nootkatensis* Clintonia uniflora* Neottia* Prosartes* Rhododendron menziesii* Streptopus lanceolatus* 2 Streptopus streptopoides*
▶ [**184**] Boykinia** Gaultheria shallon*** Pseudotsuga menziesii* Struthiopteris spicant* Thuja plicata* 6 [**keep**] TSHRB* Achlys triphylla* Gymnocarpium dryopteris* Streptopus lanceolatus*
▶ [**186**] TSHRB 4 Cornus unalaschkensis* Linnaea borealis* Pseudotsuga menziesii* Thuja plicata* [**keep**] Achlys triphylla* Athyrium filix-femina* 2 Gymnocarpium dryopteris* Maianthemum dilatatum*** 2 Oplopanax horridus* Polystichum munitum 2 Rubus spectabilis* Streptopus lanceolatus* Struthiopteris spicant 2 Tiarella trifoliata* 2

Floristics (36 plots, MORA 8, NOCA 4, OLYM 24): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 41, Tsuga heterophylla 32	Vaccinium ovalifolium 23	Tiarella trifoliata 6	
80-95			Clintonia uniflora 4	moss 29
60-80		Vaccinium parvifolium 6, Rubus spectabilis 5	Achlys triphylla 7, Rubus pedatus 6, Streptopus lanceolatus 3	Athyrium filix-femina 6, Gymnocarpium dryopteris 5
40-60		Oplopanax horridus 3, Rhododendron menziesii 3		Struthiopteris spicant 6
25-40			Maianthemum dilatatum 4, Cornus unalaschkensis 3, Trillium ovatum 0	Polystichum munitum 6
10-25	Tsuga mertensiana 12, Callitropsis nootkatensis 9, Pseudotsuga menziesii 5, Thuja plicata 4	Acer circinatum 6, Vaccinium membranaceum 4, Sambucus racemosa 2, Sorbus sitchensis 1	Prosartes 4, Streptopus streptopoides 3, Orthilia secunda 2, Veratrum viride 1, Streptopus amplexifolius 1, Rubus lasiococcus 1, Neottia 1	Dryopteris 4

{188} Tsuga heterophylla, Picea sitchensis, Polystichum munitum, Struthiopteris spicant
Western hemlock, Sitka spruce, sword fern & deer fern forest
TSUHET-PICSIT/POLMUN-BLESPI



Range: Lowland zone. **MORA**-3: (nw) 550-630m. **OLYM**-4: **nc** (sc-se) 230-320m.

Struct: Mostly closed conifer forest (38-43m) with substantial conifer regen, and substantial ferns & shrubs. Avg vasc over 87: conif tree 55, fern 10, conif regen 10, shrb 6, forb 4, brdlf tree 0.17 @ 11.

Ecology: Fairly gentle lower slopes and midslopes. *Tsuga heterophylla* canopy is often derived from the understory of a former stand. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 8-28°, vdp 3-20m, vdr 12-86m, east 46-62, south 3-97, conv 44-50, tpp 14-50, solar 47-70, wet 2-5

Map class: C03–Sitka spruce, western hemlock & wood-sorrel forest

Rel to C09: Split from PSEMEN-(TSUHET)/dep, adding single plots from several other C09 types.

Similar: O:[115] PICSIT-TSUHET/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MNO:[184] TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI.

▶ [**009**] FORB 7 TSHRB* Abies amabilis* 6 Clintonia uniflora* Cornus unalaschkensis* Gymnocarpium dryopteris** 2 Linnaea borealis* 2 Oplopanax horridus* Pseudotsuga menziesii* 2 Rubus pedatus* 2 Tiarella trifoliata* [**keep**] Picea sitchensis*** Struthiopteris spicant*
▶ [**115**] Galium* Gaultheria shallon 2 Luzula parviflora* Maianthemum dilatatum* Picea sitchensis 5 Polystichum munitum 10 Vaccinium ovatum* 2 [**keep**] Abies amabilis*** 2 Vaccinium ovalifolium* Vaccinium parvifolium*
▶ [**191**] SHRB 11 TSHRB*** Maianthemum dilatatum** Oxalis oregana* 2 Rhododendron menziesii 2 Rubus pedatus 2 Rubus spectabilis* Tiarella trifoliata** Vaccinium ovalifolium 5 Vaccinium parvifolium 5 [**keep**] Abies amabilis* Streptopus amplexifolius*** Thuja plicata*** 2 Trillium ovatum***
▶ [**194**] TSHRB 2 Acer circinatum 2 Berberis nervosa 2 Gymnocarpium dryopteris** 2 Oplopanax horridus** Pseudotsuga menziesii*** 2 Tiarella trifoliata* [**keep**] Picea sitchensis***
▶ [**198**] TSHRB** 2 Acer circinatum** 2 Achlys triphylla*** 2 Cornus unalaschkensis 2 Pseudotsuga menziesii*** 2 Rubus spectabilis* Thuja plicata* Tiarella trifoliata* Vaccinium ovalifolium 4 [**keep**] Moneses uniflora* Picea sitchensis* Streptopus amplexifolius*** Trillium ovatum*

Floristics (6 plots, MORA 2, OLYM 4): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 55, Picea sitchensis 3	Vaccinium parvifolium 3		Struthiopteris spicant 4
80-95		Vaccinium ovalifolium 3		Polystichum munitum 6
60-80				moss 51, Athyrium filix-femina 1
40-60	Abies amabilis 3	Gaultheria shallon 1		
25-40	Thuja plicata 14	Rubus spectabilis 2	Rubus pedatus 1, Moneses uniflora 1, Trillium ovatum 1, Streptopus amplexifolius 1, Oxalis oregana 0	Dryopteris 3
10-25	Alnus rubra 10, Acer macrophyllum 1, Taxus brevifolia 1	Rhododendron menziesii 1	Tiarella trifoliata 5, Clintonia uniflora 5, Boykinia 3, Dicentra formosa 3, Lysichiton americanus 1, Linnaea borealis 1, Goodyera oblongifolia 1, Corallorhiza 1, Streptopus lanceolatus 1	

{189} Tsuga heterophylla, Picea sitchensis*, Rubus spectabilis, Gaultheria shallon, Polystichum munitum
Western hemlock, Sitka spruce*, salmonberry, salal & sword fern forest
TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN



Range: Coastal zone. **OLYM**-22: **sw*** (nw-sc) 40-80m.

Struct: Semi-open conifer forest (42-44m) with substantial conifer regen, very dense shrubs, abundant ferns, and substantial forbs. Avg vasc cover 171: shrb 61, conif tree 53, fern 27, forb 0.94 @ 15, conif regen 0.94 @ 11, brdlf tree 0.38 @ 6, brdlf regen 0.19 @ 10, tall shrb 0.19 @ 5.

Ecology: Very gentle slopes, on deep, moist and well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 3-11°, vdp 3-27m, vdr 35-64m, east 15-59, south 13-77, conv 49-51, tpp 50-69, solar 53-59, wet 4-6

Map class: C00–Sitka spruce, western hemlock, salal & sword fern forest

Rel to C09: Evolved from TSUHET/GAUSHA/POLMUN-BLESPI, incorporating an equal number of plots from PSEMEN-(ALNRUB-TSUHET)/RUBSPE, as well as plots labeled as PICSIT-(ALNRUB)/RUBSPE/POLMUN, PICSIT/GAUSHA and PICSIT-TSUHET/POLMUN-OXAORE. Likely a different concept; *Rubus spectabilis* is very significant in NCCN plots.

Similar: O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[110] PICSIT/RUBSPE/CAROBN-LYSAME, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[115] PICSIT-TSUHET/POLMUN, O:[109] PICSIT-(ALNRUB)/RUBSPE/POLMUN, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI.

▶ [**110**] TSHRB* Carex obnupta+*** 2 Claytonia sibirica+* Lonicera involucrata*** 2 Lysichiton americanus* 6 Osmorhiza 2 Sambucus racemosa* Tiarella trifoliata 2 [**keep**] Oxalis oregana* 2 Sphagnum 2 Tsuga heterophylla 25
▶ [**114**] Picea sitchensis 8 Trillium ovatum* [**keep**] B-GT5 2 FORB 6 Alnus rubra 3 Dryopteris* Luzula parviflora** Maianthemum dilatatum* Oxalis oregana** 5 Rubus spectabilis 13 Sphagnum*** 2
▶ [**190**] TSHRB* Frangula purshiana** Oplopanax horridus 2 Oxalis oregana* Prosartes* Pseudotsuga menziesii*** 2 Thuja plicata* 5 Tiarella trifoliata** 2 Vaccinium ovalifolium* [**keep**] B-GT5* 2 Alnus rubra* 2 Dryopteris* Gaultheria shallon* 4 Luzula parviflora* Lysichiton americanus* 2 Sphagnum* 2
▶ [**191**] TSHRB* Cornus unalaschkensis** 2 Frangula purshiana** Oxalis oregana* Rubus pedatus*** 2 Tiarella trifoliata** [**keep**] B-GT5* Alnus rubra* 5 Gaultheria shallon* 8 Lysichiton americanus 2 Rhododendron menziesii*
▶ [**200**] Thuja plicata* 5 Vaccinium ovalifolium 13 [**keep**] B-GT5 2 Lysichiton americanus 2 Polystichum munitum** 2 Rubus spectabilis 13

Floristics (16 plots, OLYM 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 59	Gaultheria shallon 19, Vaccinium parvifolium 7		
80-95		Rubus spectabilis 28		Polystichum munitum 18, Struthiopteris spicant 9
60-80	Picea sitchensis 5	Rhododendron menziesii 4		moss 24
40-60		Vaccinium ovalifolium 8	Oxalis oregana 15, Maianthemum dilatatum 9	Athyrium filix-femina 3
25-40	Alnus rubra 11		Lysichiton americanus 4	Sphagnum 4, liverwort 2, Dryopteris 1, Luzula parviflora 1
10-25	Thuja plicata 3	Sambucus racemosa 4, Vaccinium ovatum 1	Claytonia sibirica+ 2, Moneses uniflora 1, Streptopus amplexifolius 1, Tiarella trifoliata 1	lichen 1, Gymnocarpium dryopteris 1

{190} Tsuga heterophylla, Picea sitchensis*, Rubus spectabilis, Oxalis oregana, Polystichum munitum
Western hemlock, Sitka spruce*, salmonberry, Oregon wood-sorrel & sword fern forest
TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN



Range: Lowland and coastal zones. **OLYM**-11: **nc**-**sc** (nw-sw) 20-320m.

Struct: Semi-open conifer forest (58-67m) with substantial conifer regen, dense shrubs & forbs, and abundant ferns. Avg vasc cover 168: conif tree 48, shrb 44, forb 35, fern 25, conif regen 13, tall shrb 0.6 @ 4, brdlf regen 0.1 @ 2.

Ecology: Very gentle lower slopes and midslopes, sometimes on valley bottoms, on deep, moist and well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 1-14°, vdp 1-13m, vdr 6-90m, east 21-84, south 14-89, conv 45-51, tpp 37-51, solar 57-65, wet 3-8

Map class: C03–Sitka spruce, western hemlock & wood-sorrel forest

Rel to C09: Split from TSUHET/POLMUN-OXAORE to distinguish from [191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, and incorporating plots from PSEMEN-(ALNRUB-TSUHET)/RUBSPE, TSUHET/VACALA/OXAORE and TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN.

Similar: O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MO:[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI.

▶ [**113**] B-GT5* 2 TSHRB 7 Acer circinatum* 5 Acer macrophyllum* 3 Alnus rubra* Luzula parviflora** Picea sitchensis* 8 Rubus pedatus* 2 [**keep**] Frangula purshiana* Gaultheria shallon** Oplopanax horridus 2 Prosartes** Rhododendron menziesii*** Thuja plicata* Vaccinium ovalifolium*

▶ [**188**] Abies amabilis*** 2 Dryopteris* Moneses uniflora* Picea sitchensis* Rubus pedatus* Streptopus amplexifolius* [**keep**] FORB 8 SHRB 11 TSHRB** Frangula purshiana* Maianthemum dilatatum* 2 Oxalis oregana* 2 Prosartes* Pseudotsuga menziesii* 2 Rhododendron menziesii* Rubus spectabilis* 4 Tiarella trifoliata* Vaccinium parvifolium 5

▶ [**189**] B-GT5* 2 Alnus rubra* 2 Dryopteris* Gaultheria shallon* 4 Luzula parviflora* Lysichiton americanus* 2 Sphagnum* 2 [**keep**] TSHRB* Frangula purshiana** Oplopanax horridus 2 Oxalis oregana* Prosartes* Pseudotsuga menziesii*** 2 Thuja plicata* 5 Tiarella trifoliata** 2 Vaccinium ovalifolium*

▶ [**191**] Cornus unalaschkensis** 2 Dryopteris** Luzula parviflora** Moneses uniflora* Rubus pedatus* 2 Sambucus racemosa* [**keep**] Athyrium filix-femina* Oplopanax horridus 2 Prosartes** Pseudotsuga menziesii* Thuja plicata*** 2

▶ [**198**] Abies amabilis** 2 Acer circinatum* 5 Achlys triphylla* Clintonia uniflora* Cornus unalaschkensis** 2 Pseudotsuga menziesii* Rubus pedatus* 2 [**keep**] Frangula purshiana** Maianthemum dilatatum 4 Oplopanax horridus 2 Oxalis oregana** Prosartes*** Rhododendron menziesii* Rubus spectabilis 7

Floristics (10 plots, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 48	Rubus spectabilis 18, Vaccinium ovalifolium 8	Oxalis oregana 20	Polystichum munitum 14
80-95			Tiarella trifoliata 7	Struthiopteris spicant 9
60-80	Thuja plicata 11	Vaccinium parvifolium 19, Rhododendron menziesii 7	Maianthemum dilatatum 8	Athyrium filix-femina 4
40-60	Pseudotsuga menziesii 7, Picea sitchensis 5	Frangula purshiana 3, Gaultheria shallon 2	Prosartes 1	moss 19
25-40		Oplopanax horridus 5, Acer circinatum 3		
10-25	Abies grandis 2, Acer macrophyllum 2, Alnus rubra 1		Mitella 5, Galium 5, Viola sempervirens 5, Circaea alpina 5, Corydalis 5, Achlys triphylla 3, Adenocaulon bicolor 2, Hydrophyllum tenuipes 2, Trillium ovatum 1, Clintonia uniflora 1, Tolmiea menziesii 1, Rubus pedatus 1, Boykinia 1, Linnaea borealis 1, Neottia 1	Pteridium aquilinum 4, liverwort 1

{191} Tsuga heterophylla, Picea sitchensis*, Vaccinium ovalifolium, Oxalis oregana, Struthiopteris spicant
Western hemlock, Sitka spruce*, Alaska blueberry, Oregon wood-sorrel & deer fern forest
TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI



Range: Lowland and inner coastal zones. **OLYM**-13: **nw-nc-se** (sw-se) 120-250m.

Struct: Semi-open conifer forest (33-45m) with abundant conifer regen, dense shrubs, and abundant forbs & ferns. Avg vasc cover 167: conif tree 48, shrb 47, forb 26, fern 20, conif regen 0.91 @ 25, tall shrb 0.64 @ 3.

Ecology: Nearly flat toeslopes and benches, on deep and well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 0-5°, vdp 1-5m, vdr 6-50m, east 25-51, south 5-82, conv 50-51, tpp 33-49, solar 58-61, wet 5-8

Map class: C03–Sitka spruce, western hemlock & wood-sorrel forest

Rel to C09: Evolved from TSUHET/VACALA/OXAORE, incorporating an equal number of plots from TSUHET/POLMUN/OXAORE, as well as plots from PICSIT-TSUHET/POLMUN-OXAORE and other C09 types.

Similar: O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, O:[115] PICSIT-TSUHET/POLMUN, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE, MNO:[180] TSUHET-ABIAMA/BLESPI-TIATRI-POLMUN.

▶ [**113**] B-GT5* 3 TSHRB 5 Acer circinatum* 3 Acer macrophyllum* 3 Alnus rubra* Picea sitchensis* 8 Thuja plicata* 2 Tiarella trifoliata 4 [**keep**] Cornus unalaschkensis* Dryopteris* Frangula purshiana* Gaultheria shallon** 2 Moneses uniflora*** Rhododendron menziesii** 4 Sambucus racemosa*** Struthiopteris spicant*

▶ [**188**] Abies amabilis* Streptopus amplexifolius*** Thuja plicata*** 2 Trillium ovatum*** [**keep**] SHRB 11 TSHRB*** Maianthemum dilatatum** Oxalis oregana* 2 Rhododendron menziesii 2 Rubus pedatus 2 Rubus spectabilis* Tiarella trifoliata** Vaccinium ovalifolium 5 Vaccinium parvifolium 5

▶ [**189**] B-GT5* Alnus rubra* 5 Gaultheria shallon* 8 Lysichiton americanus 2 Rhododendron menziesii* [**keep**] TSHRB* Cornus unalaschkensis** 2 Frangula purshiana** Oxalis oregana* Rubus pedatus*** 2 Tiarella trifoliata**

▶ [**190**] Athyrium filix-femina* Oplopanax horridus 2 Prosartes** Pseudotsuga menziesii* Thuja plicata*** 2 [**keep**] Cornus unalaschkensis** 2 Dryopteris** Luzula parviflora** Moneses uniflora* Rubus pedatus* 2 Sambucus racemosa*

▶ [**198**] TSHRB 5 Acer circinatum 2 Achlys triphylla** Pseudotsuga menziesii* 7 Thuja plicata*** 2 [**keep**] Frangula purshiana** Luzula parviflora** Maianthemum dilatatum* Moneses uniflora* Oxalis oregana** Sambucus racemosa**

Floristics (11 plots, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 66			Struthiopteris spicant 6
80-95		Vaccinium ovalifolium 22, Vaccinium parvifolium 16, Rubus spectabilis 9	Oxalis oregana 11, Maianthemum dilatatum 5, Tiarella trifoliata 2	Polystichum munitum 8
40-60	Picea sitchensis 5	Gaultheria shallon 5, Frangula purshiana 2	Rubus pedatus 9	
25-40		Rhododendron menziesii 8, Sambucus racemosa 2, Acer circinatum 1	Cornus unalaschkensis 3, Moneses uniflora 0	moss 22, Athyrium filix-femina 5, Dryopteris 1, Luzula parviflora 1
10-25	Abies amabilis 7, Pseudotsuga menziesii 4		Clintonia uniflora 9	Pteridium aquilinum 22, Gymnocarpium dryopteris 1

{192} Tsuga heterophylla, Pseudotsuga menziesii, Berberis nervosa*, Chimaphila menziesii*
Western hemlock, Douglas-fir, dwarf Oregon-grape* & pipsissewa* forest
TSUHET-PSEMEN/(MAHNER)/(CHIMEN)



Range: Lowland zone, ranging into the lower montane zone at NOCA. **MORA**-60: **nw**-**ne**-**sw***-**se** 740-1090m. **NOCA**-36: **nw**-**ne**-**cw**-**ce** 710-940m. **OLYM**-30: **nc**-**ne** (sc-se) 500-820m.

Struct: Closed conifer forest (34-51m) with abundant conifer regen and prominent dwarf shrubs. Avg vasc cover 95: conif tree 72, dwf shrb 3, forb 0.94 @ 2, conif regen 0.92 @ 16, shrb 0.86 @ 2.

Ecology: Seral stands on fairly gentle midslopes, on well-drained and often shallow soils. Drier and cooler conditions than are typical for *Tsuga heterophylla* forests. Regen dominated by *Tsuga heterophylla*, frequently with smaller but significant amounts of *Thuja plicata*.

Metrics: slope 15-29°, vdp 5-51m, vdr 43-232m, east 5-74, south 28-93, conv 46-54, tpp 28-53, solar 52-73, wet 2-3

Map class: C05–Western hemlock, Doug-fir & sword fern forest

Rel to C09: Evolved from TSUHET-PSEMEN/MAHNER-CHIMEN, shedding plots to [007] ABIAMA-TSUHET/ORTSEC and gaining many plots from the catch-all PSEMEN-(TSUHET)/dep and from PSEMEN-TSUHET/MAHNER.

Similar: MNO:[155] PSEMEN-TSUHET/MAHNER, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[157] PSEMEN-TSUHET/PAXMYR/LINBOR, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[007] ABIAMA-TSUHET/ORTSEC.

▶ [**150**] B-GT5** TSHRB* 3 Acer circinatum* 3 Acer macrophyllum*** Achlys triphylla** Gaultheria shallon* Linnaea borealis 2 Lysimachia latifolia** Polystichum munitum* 2 Rubus ursinus** Tiarella trifoliata 2 Vaccinium parvifolium 2 [**keep**] Chimaphila menziesii** Chimaphila umbellata*** Goodyera oblongifolia* Orthilia secunda**

▶ [**151**] FORB 3 TSHRB* 3 Acer circinatum 3 Achlys triphylla*** 2 Berberis nervosa 3 Linnaea borealis* 2 Rosa*** Tiarella trifoliata 2 [**keep**] Chimaphila menziesii* Thuja plicata*

▶ [**155**] TSHRB* 3 Acer circinatum* 3 Berberis nervosa 3 Chimaphila umbellata* Goodyera oblongifolia* Linnaea borealis* Paxistima myrsinites* 2 Rosa*** Taxus brevifolia* Vaccinium membranaceum* [**keep**] Corallorhiza* Trillium ovatum* Vaccinium ovalifolium*

▶ [**156**] FORB 3 TSHRB 3 Acer circinatum 3 Achlys triphylla*** Berberis nervosa 3 Chimaphila umbellata 2 Galium*** Gymnocarpium dryopteris* Linnaea borealis 2 Maianthemum stellatum* Oplopanax horridus** Polystichum munitum 2 Prosartes** Rubus ursinus* Struthiopteris spicant** Tiarella trifoliata* Viola glabella+** [**keep**] Chimaphila menziesii* Chimaphila umbellata* Corallorhiza* Orthilia secunda** Paxistima myrsinites* Pyrola picta** Vaccinium membranaceum*

▶ [**157**] SHRB 3 TSHRB 3 Acer circinatum 3 Amelanchier alnifolia*** Arctostaphylos uva-ursi+** Gaultheria ovatifolia** Hieracium albiflorum*** Linnaea borealis 2 Lupinus latifolius*** Paxistima myrsinites 2 Pinus monticola*** Rosa** Sorbus scopulina** Spiraea lucida*** Vaccinium membranaceum* 2 [**keep**] Chimaphila menziesii* Polystichum munitum* Taxus brevifolia* Trillium ovatum** Vaccinium ovalifolium*

Floristics (72 plots, MORA 15, NOCA 31, OLYM 26): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 46, Pseudotsuga menziesii 29			moss 42
80-95	Thuja plicata 13			
60-80		Vaccinium parvifolium 1	Berberis nervosa 2, Chimaphila menziesii 1	
40-60			Linnaea borealis 1, Chimaphila umbellata 1, Goodyera oblongifolia 0, Orthilia secunda 0	
25-40	Abies amabilis 3	Acer circinatum 2, Gaultheria shallon 2, Vaccinium ovalifolium 1	Corallorhiza 1, Pyrola picta 0	Polystichum munitum 1
10-25	Taxus brevifolia 3		Clintonia uniflora 1, Viola sempervirens 1, Paxistima myrsinites 1, Tiarella trifoliata 1, Cornus unalaschkensis 1	

{193} Tsuga heterophylla, Pseudotsuga menziesii, Picea sitchensis, Vaccinium ovalifolium, Oxalis oregana
Western hemlock, Douglas-fir, Sitka spruce, Alaska blueberry & Oregon wood-sorrel forest
TSUHET-PSEMEN-PICSIT/VACALA/OXAORE



Range: Lowland zone. **OLYM**-10: **nc-sc*** 250-340m. May occur in the Carbon or Nisqually River valleys at MORA.

Struct: Semi-open conifer forest (60-72m) with substantial conifer regen, dense forbs & shrubs, and substantial ferns. Avg vasc cover 148: conif tree 50, forb 34, shrb 33, fern 14, conif regen 13, tall shrb 0.78 @ 3, dwf shrb 0.22 @ 2, rush 0.11 @ 5.

Ecology: Very gentle south-facing slopes. Regen dominated by *Tsuga heterophylla*, usually with codominant *Picea sitchensis*.

Metrics: slope 3-10°, vdp 3-9m, vdr 11-32m, east 20-57, south 80-97, conv 46-51, tpp 13-32, solar 60-67, wet 3-4

Map class: C03–Sitka spruce, western hemlock & wood-sorrel forest

Rel to C09: Evolved from TSUHET-PSEMEN/VACALA/OXAORE, gaining plots from PICSIT-TSUHET/POLMUN-OXAORE, TSUHET/POLMUN-OXAORE and TSUHET/VACALA/OXAORE.

Similar: MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, O:[113] PICSIT-TSUHET/ACECIR/OXAORE-POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI.

▶ [**113**] B-GT5* 2 TSHRB 6 Acer circinatum 8 Acer macrophyllum* 2 Alnus rubra* Athyrium filix-femina* Luzula parviflora* [**keep**] Cornus unalaschkensis* Pseudotsuga menziesii* Rhododendron menziesii*** Vaccinium ovalifolium*
▶ [**190**] Athyrium filix-femina* Frangula purshiana** 2 Gaultheria shallon* Oplopanax horridus 2 Prosartes** Rubus spectabilis* Struthiopteris spicant* [**keep**] Achlys triphylla 4 Cornus unalaschkensis*** 2 Gymnocarpium dryopteris 2 Picea sitchensis* Pseudotsuga menziesii* Rubus pedatus* 2
▶ [**191**] Frangula purshiana** Gaultheria shallon* 2 Rubus spectabilis* Struthiopteris spicant* [**keep**] Acer circinatum* 2 Gymnocarpium dryopteris 2 Picea sitchensis* Pseudotsuga menziesii** 7 Thuja plicata*** 2
▶ [**196**] Abies amabilis* 2 Achlys triphylla* Berberis nervosa 2 Clintonia uniflora* Galium* Goodyera oblongifolia* Gymnocarpium dryopteris* Linnaea borealis* 4 Maianthemum stellatum** 2 Oplopanax horridus** Taxus brevifolia 2 Trillium ovatum** [**keep**] SHRB 15 Oxalis oregana*** 2 Picea sitchensis** Pteridium aquilinum 3 Struthiopteris spicant 3 Vaccinium ovalifolium* 3
▶ [**198**] TSHRB 5 Abies amabilis*** 2 Achlys triphylla* Clintonia uniflora* Gaultheria shallon* [**keep**] Oxalis oregana*** Picea sitchensis** 5

Floristics (9 plots, OLYM 9): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 31, Pseudotsuga menziesii 19, Picea sitchensis 10	Vaccinium ovalifolium 18, Vaccinium parvifolium 9	Oxalis oregana 13, Tiarella trifoliata 7	
60-80			Maianthemum dilatatum 5	moss 26, Polystichum munitum 11
40-60	Thuja plicata 6	Rubus spectabilis 7, Acer circinatum 5, Rhododendron menziesii 5	Cornus unalaschkensis 7, Rubus pedatus 4	
25-40			Achlys triphylla 8	Pteridium aquilinum 8, Struthiopteris spicant 7, Gymnocarpium dryopteris 3
10-25	Alnus rubra 1		Lysimachia latifolia 5, Viola sempervirens 5, Lysichiton americanus 2, Linnaea borealis 2, Clintonia uniflora 2	Luzula parviflora 5, Athyrium filix-femina 3, Dryopteris 1

{194} Tsuga heterophylla, Pseudotsuga menziesii, Polystichum munitum, Struthiopteris spicant
Western hemlock, Douglas-fir, sword fern & deer fern forest
TSUHET-PSEMEN/POLMUN-BLESPI



Range: Lowland zone. **MORA**-9: **nw*** (sw) 670-880m. **OLYM**-3: **nc** 390-490m.

Struct: Mostly closed conifer forest (53-63m) with substantial conifer regen, abundant ferns, and substantial forbs & shrubs. Avg vasc cover 113: conif tree 64, fern 24, conif regen 12, forb 0.88 @ 6, shrb 0.88 @ 6, dwf shrb 0.38 @ 4, tall shrb 0.38 @ 4.

Ecology: Seral stands on fairly gentle lower slopes in major river valleys, often with slides or other disturbances found nearby. *Tsuga heterophylla* canopy likely derived from the understory of a former stand; regen also dominated by *T. heterophylla*. The understory is often sparse and species-poor.

Metrics: slope 6-31°, vdp 1-13m, vdr 3-53m, east 5-92, south 27-68, conv 41-48, tpp 17-32, solar 57-63, wet 3-5

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Split from TSUHET/POLMUN-BLESPI, incorporating a greater number of plots from TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL and plots from three other C09 types.

Similar: MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[192] TSUHET-PSEMEN/(MAHNER)/(CHIMEN), MO:[003] ABIAMA-PSEMEN/ACHTRI, MO:[160] PSEMEN-TSUHET/VACALA/XERTEN.

▶ [**150**] B-GT5** 2 TSHRB* Acer circinatum* Acer macrophyllum** Linnaea borealis** 2 Lysimachia latifolia** Pteridium aquilinum 2 Rubus ursinus** Thuja plicata* [**keep**] Abies amabilis 2 Berberis nervosa 2 Clintonia uniflora** Gymnocarpium dryopteris*** Oplopanax horridus** Streptopus amplexifolius*** Struthiopteris spicant* 2
▶ [**156**] TSHRB 6 Acer circinatum 6 Achlys triphylla 2 Berberis nervosa* 7 Goodyera oblongifolia* Linnaea borealis*** 2 Taxus brevifolia 2 Thuja plicata* [**keep**] Gymnocarpium dryopteris* Oplopanax horridus* Struthiopteris spicant* 4
▶ [**195**] B-LT5** 2 B-GT5*** TSHRB* Acer circinatum* Acer macrophyllum*** Achlys triphylla 2 Adiantum aleuticum 2 Alnus rubra** 2 Athyrium filix-femina* 2 Dryopteris*** Galium* Rubus spectabilis* 2 Sambucus racemosa** Thuja plicata* [**keep**] Berberis nervosa* Gaultheria shallon* Maianthemum dilatatum* Rhododendron menziesii* Struthiopteris spicant* 3 Viola sempervirens*
▶ [**196**] FORB 11 Achlys triphylla 2 Adenocaulon bicolor* Cornus unalaschkensis** 2 Linnaea borealis*** 2 Lysimachia latifolia* Maianthemum stellatum*** Prosartes* Ribes lacustre* Rosa* Rubus spectabilis 2 Streptopus lanceolatus* Taxus brevifolia 2 Thuja plicata* [**keep**] Struthiopteris spicant* 3
▶ [**198**] SHRB 9 Achlys triphylla* 2 Athyrium filix-femina 2 Cornus unalaschkensis*** 2 Rubus spectabilis* 2 Thuja plicata* Vaccinium ovalifolium* 3 [**keep**] Berberis nervosa* Gymnocarpium dryopteris* Oplopanax horridus*** Streptopus amplexifolius*** Trillium ovatum*

Floristics (8 plots, MORA 5, OLYM 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 57, Pseudotsuga menziesii 14			Polystichum munitum 11, Struthiopteris spicant 8
80-95		Vaccinium parvifolium 2		
60-80		Oplopanax horridus 2	Tiarella trifoliata 4	Gymnocarpium dryopteris 6
40-60				moss 45
25-40	Thuja plicata 10, Abies amabilis 3	Acer circinatum 4, Vaccinium ovalifolium 2, Rubus spectabilis 1, Rhododendron menziesii 1, Gaultheria shallon 0	Berberis nervosa 4, Clintonia uniflora 2, Galium 2, Achlys triphylla 1, Streptopus amplexifolius 1, Goodyera oblongifolia 1, Viola sempervirens 1, Trillium ovatum 0, Maianthemum dilatatum 0	Athyrium filix-femina 1
10-25	Taxus brevifolia 1	Rubus nutkanus 5	Rubus pedatus 2, Claytonia sibirica+ 1, Aruncus dioicus 1, Corallorhiza 1	Polypodium glycyrrhiza 1

{195} Tsuga heterophylla, Pseudotsuga menziesii*, Thuja plicata*, Polystichum munitum, Athyrium filix-femina
Western hemlock, Douglas-fir*, redcedar*, sword fern & lady fern forest
TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL



Range: Lowland zone. **MORA**-7: **nw**-**sw** 570-780m. **NOCA**-8: **nw**-**cw** (ne-ce-s) 480-660m. **OLYM**-11: **sc**-**se** (nc-ne) 400-550m.

Struct: Semi-open conifer forest (50-60m) with substantial conifer regen, dense ferns, abundant forbs, and substantial shrubs & tall shrubs. Avg vasc cover 159: conif tree 51, fern 40, forb 22, conif regen 15, shrb 13, tall shrb 0.91 @ 9, brdlf tree 0.61 @ 6, brdlf regen 0.48 @ 6, dwf shrb 0.48 @ 5, grass 0.13 @ 3.

Ecology: Fairly gentle slopes, on deep and moist soils; riverine terraces, toeslopes and lower slopes. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Thuja plicata*.

Metrics: slope 5-29°, vdp 1-8m, vdr 3-78m, east 10-87, south 23-85, conv 39-49, tpp 13-24, solar 53-65, wet 3-6

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Similar, shedding plots to [194] TSUHET-PSEMEN/POLMUN-BLESPI and [042] ACEMAC-(PSEMEN)/POLMUN.

Similar: MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MO:[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[042] ACEMAC-(PSEMEN)/POLMUN, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, MNO:[044] ACEMAC/RUBSPE/TOLMEN.

▶ [**148**] Abies grandis 7 Berberis nervosa 5 Gymnocarpium dryopteris 10 Oxalis oregana*** 6 Picea sitchensis 2 [**keep**] B-LT5 2 B-GT5* Abies amabilis* 2 Acer macrophyllum* Adiantum aleuticum 2 Alnus rubra* 2 Athyrium filix-femina 3 Dryopteris** Lactuca* Sambucus racemosa* Streptopus amplexifolius* Struthiopteris spicant* Tiarella trifoliata* 4 Trillium ovatum*

▶ [**156**] Berberis nervosa** 5 Chimaphila umbellata 2 Goodyera oblongifolia* Linnaea borealis* Trillium ovatum* [**keep**] B-LT5** 2 B-GT5** 2 Acer circinatum* Acer macrophyllum*** Adiantum aleuticum 2 Alnus rubra*** 2 Athyrium filix-femina** 2 Dryopteris* Gymnocarpium dryopteris* Oplopanax horridus* Rubus spectabilis** 2 Sambucus racemosa** Tiarella trifoliata* 5

▶ [**177**] Actaea rubra* Asarum caudatum* Circaea alpina* Clintonia uniflora* 2 Goodyera oblongifolia* Maianthemum racemosum*** Maianthemum stellatum* 3 Oplopanax horridus 8 Prosartes* Ribes lacustre* Sambucus racemosa 2 Streptopus lanceolatus 2 Viola glabella+* [**keep**] B-LT5* 2 B-GT5* Acer macrophyllum* 2 Achlys triphylla* Adiantum aleuticum 2 Alnus rubra* Polystichum munitum 10 Pseudotsuga menziesii* Rubus ursinus** Struthiopteris spicant* Vaccinium ovalifolium*

▶ [**196**] Clintonia uniflora* Cornus unalaschkensis* 2 Goodyera oblongifolia* Linnaea borealis* Maianthemum dilatatum 2 Maianthemum stellatum* Rubus pedatus* Taxus brevifolia* 2 Trillium ovatum* Viola sempervirens* [**keep**] B-LT5* 3 B-GT5*** TSHRB* Acer circinatum* Acer macrophyllum*** 2 Adiantum aleuticum 2 Alnus rubra* Athyrium filix-femina* 3 Dryopteris* Polystichum munitum 10 Rubus spectabilis* Sambucus racemosa*

▶ [**198**] Achlys triphylla* Cornus unalaschkensis** 2 Gaultheria shallon* Maianthemum dilatatum* Picea sitchensis** 2 Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant 2 Vaccinium ovalifolium* 5 [**keep**] B-LT5* B-GT5* Acer macrophyllum* Adiantum aleuticum 2 Alnus rubra* Athyrium filix-femina* Dryopteris* Galium** Gymnocarpium dryopteris* Oplopanax horridus** 2 Sambucus racemosa***

Floristics (23 plots, MORA 5, NOCA 8, OLYM 10): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 35, Thuja plicata 18		Tiarella trifoliata 10	Polystichum munitum 23
80-95	Pseudotsuga menziesii 11	Acer circinatum 9		Athyrium filix-femina 10, Gymnocarpium dryopteris 6
60-80	Acer macrophyllum 5	Rubus spectabilis 7, Oplopanax horridus 5		moss 20
40-60	Alnus rubra 6	Vaccinium ovalifolium 3, Vaccinium parvifolium 3, Sambucus racemosa 1	Achlys triphylla 8, Galium 2	Dryopteris 3
25-40	Abies amabilis 8		Maianthemum stellatum 2, Streptopus amplexifolius 1, Rubus ursinus 1, Lactuca 1, Clintonia uniflora 1, Trillium ovatum 1, Prosartes 0	Adiantum aleuticum 12, Struthiopteris spicant 1
10-25	Abies grandis 4, Taxus brevifolia 1	Rubus nutkanus 3, Ribes lacustre 1, Gaultheria shallon 1	Tolmiea menziesii 9, Linnaea borealis 6, Circaea alpina 4, Berberis nervosa 3, Rubus pedatus 2, Lysimachia latifolia 1, Goodyera oblongifolia 1, Viola glabella+ 1, Adenocaulon bicolor 1, Claytonia sibirica+ 1	Luzula parviflora 2

{196} Tsuga heterophylla, Pseudotsuga menziesii*, Tiarella trifoliata, Gymnocarpium dryopteris
Western hemlock, Douglas-fir*, foamflower & western oak fern forest
TSUHET-(PSEMEN)/TIATRI-GYMDRY



Range: Lowland zone, on or near valley bottoms. **MORA**-22: **nw*-ne-sw** (se) 600-890m. **NOCA**-6: **ne** (cw) 590-750m. **OLYM**-11: **nc-ne-se** (sc) 530-660m.

Struct: Closed conifer forest (50-66m) with abundant conifer regen, dense forbs, and substantial ferns & shrubs. Avg vasc cover 156: conif tree 71, forb 32, conif regen 17, fern 13, shrb 10, dwf shrb 0.71 @ 15, tall shrb 0.46 @ 6.

Ecology: Very gentle slopes, on sub-irrigated soils; valley bottoms, riverine terraces and toeslopes. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Thuja plicata* and/or *Abies amabilis*.

Metrics: slope 2-12°, vdp 1-4m, vdr 2-37m, east 10-61, south 15-92, conv 42-49, tpp 14-28, solar 59-65, wet 4-7

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Expanded, adding plots from TSUHET-PSEMEN-(THUPLI)/OPLHOR/POLMUN and PSEMEN-TSUHET/ACHTRI.

Similar: MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MO:[151] PSEMEN-TSUHET/ACHTRI, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[155] PSEMEN-TSUHET/MAHNER, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[009] ABIAMA-TSUHET/RUBPED-TIATRI.

▶ [**151**] Amelanchier alnifolia*** Berberis nervosa* Chimaphila menziesii* Chimaphila umbellata** Orthilia secunda* Pteridium aquilinum* Rosa* Rubus ursinus* Symphoricarpos albus*** Vaccinium membranaceum* [**keep**] Clintonia uniflora* Cornus unalaschkensis 3 Gymnocarpium dryopteris*** Maianthemum dilatatum 2 Oplopanax horridus*** Polystichum munitum* Rubus spectabilis 2 Thuja plicata* Tiarella trifoliata* Trillium ovatum*

▶ [**156**] Berberis nervosa** 5 Chimaphila umbellata 2 [**keep**] FORB 13 Adenocaulon bicolor*** Athyrium filix-femina* Clintonia uniflora* Cornus unalaschkensis* Gymnocarpium dryopteris** Linnaea borealis 7 Maianthemum dilatatum 2 Maianthemum stellatum* 2 Oplopanax horridus** Rubus pedatus** Rubus spectabilis* 2 Tiarella trifoliata* 5

▶ [**177**] TSHRB* Acer circinatum* Actaea rubra** Asarum caudatum* Athyrium filix-femina* 3 Circaea alpina*** 2 Dryopteris** Galium* Oplopanax horridus 5 Prosartes* Rubus nutkanus 2 Rubus spectabilis* Sambucus racemosa*** 2 [**keep**] Achlys triphylla** Cornus unalaschkensis* 2 Linnaea borealis** 4 Maianthemum dilatatum 2 Pseudotsuga menziesii* 12 Rubus pedatus* Taxus brevifolia** 2 Vaccinium parvifolium* Viola sempervirens**

▶ [**195**] B-LT5* 3 B-GT5*** TSHRB* Acer circinatum* Acer macrophyllum*** 2 Adiantum aleuticum 2 Alnus rubra* Athyrium filix-femina* 3 Dryopteris* Polystichum munitum 10 Rubus spectabilis* Sambucus racemosa* [**keep**] Clintonia uniflora* Cornus unalaschkensis* 2 Goodyera oblongifolia* Linnaea borealis* Maianthemum dilatatum 2 Maianthemum stellatum* Rubus pedatus* Taxus brevifolia* 2 Trillium ovatum* Viola sempervirens*

▶ [**198**] B-GT5* Acer circinatum* Acer macrophyllum* Gaultheria shallon* Oxalis oregana*** Picea sitchensis* Rubus spectabilis* Rubus ursinus* Struthiopteris spicant* Vaccinium ovalifolium* 3 [**keep**] Galium** Goodyera oblongifolia* Gymnocarpium dryopteris* Linnaea borealis 5 Maianthemum stellatum** Oplopanax horridus*** Taxus brevifolia* 2 Trillium ovatum*** Viola sempervirens***

Floristics (28 plots, MORA 12, NOCA 5, OLYM 11): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 39, Pseudotsuga menziesii 25		Tiarella trifoliata 10	moss 39
80-95	Thuja plicata 21			Polystichum munitum 7
60-80		Vaccinium parvifolium 4, Oplopanax horridus 3	Linnaea borealis 16, Achlys triphylla 8, Clintonia uniflora 3, Trillium ovatum 1	Gymnocarpium dryopteris 7
40-60	Abies amabilis 4		Cornus unalaschkensis 8, Maianthemum stellatum 3, Galium 1	Athyrium filix-femina 2
25-40	Taxus brevifolia 5	Acer circinatum 7, Rubus spectabilis 6, Vaccinium ovalifolium 2, Rosa 1, Ribes lacustre 1	Maianthemum dilatatum 4, Berberis nervosa 3, Streptopus lanceolatus 3, Asarum caudatum 2, Lysimachia latifolia 2, Rubus pedatus 2, Viola sempervirens 2, Adenocaulon bicolor 1, Prosartes 1, Goodyera oblongifolia 0	Struthiopteris spicant 2
10-25	Abies grandis 15, Alnus rubra 3	Gaultheria shallon 3, Rhododendron menziesii 3, Sambucus racemosa 1, Rubus nutkanus 1	Streptopus amplexifolius 1, Viola orbiculata+ 1, Viola glabella+ 1, Neottia 1, Circaea alpina 1, Osmorhiza 1	Dryopteris 1

{197} Tsuga heterophylla, Pseudotsuga menziesii*, Vaccinium ovalifolium, Berberis nervosa, Gaultheria shallon*
Western hemlock, Douglas-fir*, Alaska blueberry, dwarf Oregon-grape & salal* forest
TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)



Range: Lowland zone. **MORA**-3: **se** (sw) 680-980m. **NOCA**-6: **nw** (ne-cw-ce) 410-670m. **OLYM**-7: **nc**-**sc** (se) 310-790m.

Struct: Closed conifer forest (38-52m) with abundant conifer regen, dense shrubs, and substantial forbs. Avg vasc cover 147: conif tree 66, shrb 50, conif regen 17, forb 5, dwf shrb 0.69 @ 5, tall shrb 0.54 @ 8, fern 0.38 @ 4.

Ecology: Fairly gentle slopes with southwesterly aspects, on well-drained soils. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Thuja plicata*.

Metrics: slope 15-25°, vdp 3-46m, vdr 55-198m, east 17-40, south 61-97, conv 46-53, tpp 17-54, solar 58-75, wet 2-4

Map class: C06–Western hemlock, Douglas-fir & salal forest

Rel to C09: Similar, shedding plots to [155] PSEMEN-TSUHET/MAHNER, and adding plots from TSUHET-(PSEMEN)/VACALA/CORUNA.

Similar: O:[158] PSEMEN-TSUHET/RHOMAC, MNO:[154] PSEMEN-TSUHET/GAUSHA-VACPAR, MNO:[153] PSEMEN-TSUHET/GAUSHA-MAHNER, MNO:[181] TSUHET-ABIAMA-PSEMEN/GAUSHA, MO:[198] TSUHET-(PSEMEN)/VACALA/POLMUN, MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MO:[151] PSEMEN-TSUHET/ACHTRI.

▶ [**153**] Achlys triphylla*** Berberis nervosa* 4 Chimaphila umbellata* Rosa* Taxus brevifolia* [**keep**] Callitropsis nootkatensis* Corallorhiza** Cornus unalaschkensis** Maianthemum dilatatum*** Orthilia secunda* Rhododendron menziesii* 2 Rubus spectabilis** Struthiopteris spicant* Vaccinium ovalifolium** 2 Vaccinium parvifolium 3
▶ [**154**] Berberis nervosa* Chimaphila umbellata* Neottia* Pinus monticola** 2 [**keep**] TSHRB* 3 Acer circinatum* 4 Cornus unalaschkensis*** Rhododendron menziesii 2 Vaccinium ovalifolium** 3
▶ [**158**] TSHRB 13 Pinus monticola 2 Pteridium aquilinum 2 Rhododendron macrophyllum*** 2 Tsuga mertensiana 2 [**keep**] Cornus unalaschkensis* Rhododendron menziesii* Vaccinium ovalifolium* 5
▶ [**181**] Abies amabilis* 5 Chimaphila umbellata* Neottia* [**keep**] TSHRB* Acer circinatum* Cornus unalaschkensis* 2 Rhododendron menziesii* 2
▶ [**198**] Achlys triphylla*** 2 Athyrium filix-femina** 2 Clintonia uniflora* Polystichum munitum* Rubus pedatus** 2 Rubus spectabilis* 2 Struthiopteris spicant* Tiarella trifoliata** 2 [**keep**] Berberis nervosa* Chimaphila menziesii** Chimaphila umbellata** Gaultheria shallon* 5 Goodyera oblongifolia** Vaccinium membranaceum**

Floristics (13 plots, NOCA 6, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 52, Pseudotsuga menziesii 20	Gaultheria shallon 19, Vaccinium ovalifolium 17, Vaccinium parvifolium 10		moss 58
80-95	Thuja plicata 10			
60-80			Cornus unalaschkensis 5	
40-60		Acer circinatum 8, Rhododendron menziesii 5	Linnaea borealis 3, Goodyera oblongifolia 1	
25-40	Abies amabilis 3		Berberis nervosa 2	
10-25	Callitropsis nootkatensis 3, Taxus brevifolia 1	Vaccinium membranaceum 2, Rubus spectabilis 1, Rosa 1	Xerophyllum tenax 3, Maianthemum dilatatum 2, Clintonia uniflora 2, Chimaphila umbellata 2, Chimaphila menziesii 1, Rubus ursinus 1, Orthilia secunda 1, Pyrola asarifolia+ 1, Corallorhiza 1, Trillium ovatum 1, Neottia 1	Polystichum munitum 5, Struthiopteris spicant 2, Pteridium aquilinum 1

{198} Tsuga heterophylla, Pseudotsuga menziesii*, Vaccinium ovalifolium, Polystichum munitum
Western hemlock, Douglas-fir*, Alaska blueberry & sword fern forest
TSUHET-(PSEMEN)/VACALA/POLMUN



Range: Lowland zone. **MORA**-1: (se) 670-680m. **OLYM**-20: **nc-sc*-se*** 270-470m.

Struct: Mostly closed conifer forest (42-63m) with abundant conifer regen, and abundant shrubs, forbs & ferns. Avg vasc cover 152: conif tree 59, shrb 26, conif regen 20, forb 20, fern 17, tall shrb 0.69 @ 11, dwf shrb 0.56 @ 4, brdlf tree 0.19 @ 3, brdlf regen 0.13 @ 3.

Ecology: Benches, toeslopes and lower slopes, on well-drained soils. Regen dominated by *Tsuga heterophylla*.

Metrics: slope 14-36°, vdp 7-36m, vdr 29-77m, east 30-93, south 57-96, conv 39-51, tpp 17-43, solar 57-72, wet 2-3

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Expanded, adding plots from TSUHET-(PSEMEN)/VACALA/CORUNA.

Similar: MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MNO:[150] PSEMEN-TSUHET/(ACECIR)/POLMUN, O:[193] TSUHET-PSEMEN-PICSIT/VACALA/OXAORE, MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, O:[185] TSUHET-ABIAMA/VACALA/OXAORE-POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MO:[194] TSUHET-PSEMEN/POLMUN-BLESPI, MNO:[156] PSEMEN-TSUHET/MAHNER/POLMUN, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), MNO:[183] TSUHET-ABIAMA-(PSEMEN)/VACALA/LINBOR.

▶ [**150**] B-GT5* Berberis nervosa* Galium* Goodyera oblongifolia* Lysimachia latifolia* Rubus ursinus* Trillium ovatum* [**keep**] FORB 7 Abies amabilis* 2 Achlys triphylla 2 Clintonia uniflora** Cornus unalaschkensis** Maianthemum dilatatum*** Rubus pedatus*** Rubus spectabilis* 2 Struthiopteris spicant* 2 Tiarella trifoliata* Vaccinium ovalifolium* 5
▶ [**185**] Abies amabilis* 8 Gymnocarpium dryopteris** Oxalis oregana*** [**keep**] Gaultheria shallon** Picea sitchensis 2 Rubus spectabilis* 2 Vaccinium parvifolium 2
▶ [**193**] Oxalis oregana*** Picea sitchensis** 5 [**keep**] TSHRB 5 Abies amabilis*** 2 Achlys triphylla* Clintonia uniflora* Gaultheria shallon*
▶ [**195**] B-LT5* B-GT5* Acer macrophyllum* Adiantum aleuticum 2 Alnus rubra* Athyrium filix-femina* Dryopteris* Galium** Gymnocarpium dryopteris* Oplopanax horridus** 2 Sambucus racemosa*** [**keep**] Achlys triphylla* Cornus unalaschkensis** 2 Gaultheria shallon* Maianthemum dilatatum* Picea sitchensis** 2 Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant 2 Vaccinium ovalifolium* 5
▶ [**196**] Galium** Goodyera oblongifolia* Gymnocarpium dryopteris* Linnaea borealis 5 Maianthemum stellatum** Oplopanax horridus*** Taxus brevifolia* 2 Trillium ovatum*** Viola sempervirens*** [**keep**] B-GT5* Acer circinatum* Acer macrophyllum* Gaultheria shallon* Oxalis oregana*** Picea sitchensis* Rubus spectabilis* Rubus ursinus* Struthiopteris spicant* Vaccinium ovalifolium* 3

Floristics (16 plots, OLYM 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 53	Vaccinium ovalifolium 14		
80-95	Pseudotsuga menziesii 19	Vaccinium parvifolium 7	Tiarella trifoliata 6	moss 40, Polystichum munitum 11
60-80	Thuja plicata 8	Acer circinatum 11, Rubus spectabilis 5	Achlys triphylla 6	Struthiopteris spicant 5
40-60	Abies amabilis 4	Gaultheria shallon 3	Cornus unalaschkensis 6, Rubus pedatus 4, Clintonia uniflora 3, Maianthemum dilatatum 2	Athyrium filix-femina 4
25-40	Picea sitchensis 3, Acer macrophyllum 2	Rhododendron menziesii 4	Linnaea borealis 3, Lysimachia latifolia 2	
10-25	Alnus rubra 3	Rosa 5, Rubus nutkanus 2	Oxalis oregana 8, Berberis nervosa 4, Rubus ursinus 3, Adenocaulon bicolor 2, Streptopus lanceolatus 2	Gymnocarpium dryopteris 7, Pteridium aquilinum 6, Dryopteris 1

{199} Tsuga heterophylla, Thuja plicata, Gaultheria shallon, Lysichiton americanus
Western hemlock, redcedar, salal & skunk-cabbage forest
TSUHET-THUPLI/GAUSHA/LYSAME



Range: Coastal and lowland zones, in wetlands. **MORA**-2: (nw-sw) 570-640m. **OLYM**-15: **nw-sw*** (ne) 20-50m.

Struct: Open conifer forest (37-40m) with abundant conifer regen, very dense shrubs, abundant forbs, and substantial ferns. Avg vasc cover 148: shrb 57, conif tree 41, forb 18, fern 0.94 @ 9, conif regen 0.88 @ 17, tall shrb 0.41 @ 13, sedge 0.35 @ 3, dwf shrb 0.18 @ 2, brdlf tree 0.12 @ 5, brdlf regen 0.12 @ 2.

Ecology: West-sloping flats, on poorly drained organic soils of muck, woody debris and peat. Low spots between debris are generally saturated and seasonally flooded. When present, *Picea sitchensis* is found in the canopy. Regen dominated by *Tsuga heterophylla*, often with codominant *Thuja plicata*.

Metrics: slope 0-4°, vdp 1-6m, vdr 16-33m, east 0-16, south 39-73, conv 50-51, tpp 42-54, solar 58-60, wet 4-7

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: Expanded, adding plots from THUPLI-TSUHET/VACOVA and PICSIT/GAUSHA and shedding plots to [178] THUPLI-TSUHET/VACOVAT and [202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI. The concept appears similar, although the NCCN plots do not have *Abies amabilis*.

Similar: MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, O:[178] THUPLI-TSUHET/VACOVAT, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[112] PICSIT-THUPLI/VACOVAT, O:[176] THUPLI-TSUHET/LYSAME/SPHAGN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN.

▶ [**112**] B-GT5* Alnus rubra* Polystichum munitum 4 Vaccinium ovatum* [**keep**] FORB* 3 TSHRB 2 Carex obnupta+ 2 Cornus unalaschkensis*** Lysichiton americanus* 3 Maianthemum dilatatum** Malus fusca 2 Rhododendron menziesii* Vaccinium ovalifolium* 6
▶ [**176**] TSHRB* Carex obnupta+* 6 Frangula purshiana* Juncus mertensianus+*** 2 Linnaea borealis* Sphagnum* 8 Spiraea douglasii 2 [**keep**] Vaccinium ovalifolium 6 Vaccinium ovatum 12 Vaccinium parvifolium* 2
▶ [**178**] Vaccinium ovatum* [**keep**] FORB 9 Alnus rubra* Athyrium filix-femina*** Carex obnupta+* Lysichiton americanus* 5 Oplopanax horridus*** Picea sitchensis* Polystichum munitum* Rubus pedatus* Sphagnum* Tiarella trifoliata**
▶ [**200**] Frangula purshiana* Moneses uniflora*** [**keep**] Carex obnupta+ 2 Cornus unalaschkensis* Lysichiton americanus* 2 Malus fusca 2 Vaccinium ovatum 5
▶ [**202**] Polystichum munitum* [**keep**] FORB 9 TSHRB*** 2 Carex obnupta+** 2 Cornus unalaschkensis** Lysichiton americanus* 4 Malus fusca*** 2

Floristics (17 plots, MORA 2, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 31	Gaultheria shallon 20	Lysichiton americanus 12	
80-95	Thuja plicata 21			moss 30, Struthiopteris spicant 8
60-80	Picea sitchensis 6	Vaccinium ovalifolium 13, Rhododendron menziesii 6	Maianthemum dilatatum 3, Cornus unalaschkensis 2	
40-60		Vaccinium ovatum 29, Malus fusca 10, Vaccinium parvifolium 5, Rubus spectabilis 4		
25-40				Carex obnupta+ 3
10-25	Alnus rubra 5	Frangula purshiana 4, Oplopanax horridus 2	Rubus pedatus 2, Linnaea borealis 2, Neottia 1, Galium 1, Tiarella trifoliata 1, Clintonia uniflora 1, Streptopus amplexifolius 1, Trillium ovatum 1	Sphagnum 5, Polystichum munitum 3, Pteridium aquilinum 2, Athyrium filix-femina 1

{200} Tsuga heterophylla, Thuja plicata, Gaultheria shallon, Vaccinium parvifolium, Struthiopteris spicant
Western hemlock, redcedar, salal, red huckleberry & deer fern forest
TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI



Range: Coastal and lowland zones. **OLYM**-5: **sw** (sc) 50-80m.

Struct: Semi-open conifer forest (40m) with substantial conifer regen, unbroken shrubs, abundant ferns, and substantial forbs. Avg vasc cover 169: shrb 77, conif tree 47, fern 18, conif regen 15, forb 7, tall shrb 0.4 @ 7, brdlf regen 0.2 @ 10.

Ecology: Very gentle slopes with westerly aspects, on well-drained soils; rolling plains and ridgetops. Regen dominated by *Tsuga heterophylla*, often with smaller amounts of *Thuja plicata*.

Metrics: slope 0-11°, vdp 5-46m, vdr 36-65m, east 24-40, south 14-93, conv 50-55, tpp 64-75, solar 58-62, wet 4-8

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: Evolved from TSUHET-(ABIAMA)/GAUSHA/BLESPI, incorporating plots from THUPLI-TSUHET/VACOVA and TSUHET/GAUSHA/POLMUN-BLESPI. Concept likely differs; *Abies amabilis* is absent in NCCN plots.

Similar: MO:[202] TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI, MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[178] THUPLI-TSUHET/VACOVAT, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[112] PICSIT-THUPLI/VACOVAT, MNO:[197] TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA).

▶ [**178**] Lysichiton americanus 2 Vaccinium ovatum* 5 [**keep**] B-LT5*** Alnus rubra* Gymnocarpium dryopteris*** Maianthemum dilatatum* Maianthemum stellatum*** Moneses uniflora** Oxalis oregana*** Rubus pedatus* Rubus spectabilis* Tiarella trifoliata* Vaccinium ovalifolium 12
▶ [**189**] B-GT5 2 Lysichiton americanus 2 Polystichum munitum** 2 Rubus spectabilis 13 [**keep**] Thuja plicata* 5 Vaccinium ovalifolium 13
▶ [**191**] FORB 11 Athyrium filix-femina 2 Cornus unalaschkensis 2 Oxalis oregana* Polystichum munitum** 2 Tiarella trifoliata* [**keep**] Frangula purshiana 3 Gaultheria shallon* 8 Rhododendron menziesii* Thuja plicata*** 2
▶ [**199**] Carex obnupta+ 2 Cornus unalaschkensis* Lysichiton americanus* 2 Malus fusca 2 Vaccinium ovatum 5 [**keep**] Frangula purshiana* Moneses uniflora***
▶ [**202**] Picea sitchensis* Polystichum munitum* 2 Vaccinium ovatum 4 [**keep**] TSHRB*** 2 Frangula purshiana*** 2 Moneses uniflora*

Floristics (5 plots, OLYM 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 47, Thuja plicata 13	Gaultheria shallon 34, Vaccinium parvifolium 9, Rhododendron menziesii 8		Struthiopteris spicant 18
80-95		Vaccinium ovalifolium 26	Maianthemum dilatatum 6	
60-80		Rubus spectabilis 8		moss 17
40-60	Picea sitchensis 5	Frangula purshiana 6, Vaccinium ovatum 3	Moneses uniflora 1	
10-25	Alnus rubra 10		Oxalis oregana 5, Rubus pedatus 3, Maianthemum stellatum 1, Lysichiton americanus 1, Cornus unalaschkensis 1, Tiarella trifoliata 1	Sphagnum 8, Gymnocarpium dryopteris 1

{201} Tsuga heterophylla, Thuja plicata, Lysichiton americanus, Athyrium filix-femina
Western hemlock, redcedar, skunk-cabbage & lady fern forest
TSUHET-THUPLI/LYSAME-ATHFIL



Range: Lowland zone, in wetlands. **MORA**-5: **sw** (nw) 650-660m. **NOCA**-5: **ne** 600-640m.

Struct: Semi-open conifer forest (34-37m) with abundant conifer regen, very dense forbs, abundant ferns, and substantial tall shrubs. Avg vasc cover 158: forb 56, conif tree 41, fern 23, shrb 5, brdlf tree 5, conif regen 0.8 @ 17, tall shrb 0.8 @ 14, sedge 0.4 @ 2.

Ecology: South-sloping flats, on poorly drained soils of muck and woody peat. Raised areas formed by large woody debris may have mineral soil; low spots between are seasonally flooded and saturated throughout the growing season. Regen dominated by *Tsuga heterophylla*, often with smaller but substantial amounts of *Thuja plicata*.

Metrics: slope 1-5°, vdp 1-2m, vdr 1-4m, east 25-62, south 86-98, conv 45-50, tpp 8-26, solar 59-67, wet 6-7

Map class: C04–Moist w hemlock, Doug-fir & foamflower forest

Rel to C09: Evolved from TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL, shedding two plots to [110] PICSIT/RUBSPE/CAROBN-LYSAME but otherwise with few changes. However, the concept differs: in NCCN plots, *Picea engelmannii* is occasionally prominent (not *P. sitchensis*), *Alnus rubra* is not prominent, *Abies amabilis* rarely occurs, and *Rubus spectabilis* is not generally prominent.

Similar: MNO:[177] THUPLI-TSUHET-(PSEMEN)/OPLHOR/TIATRI-(POLMUN), MNO:[195] TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, MNO:[046] ALNRUB/ATHFIL-LYSAME, MNO:[196] TSUHET-(PSEMEN)/TIATRI-GYMDRY, MN:[124] POPBAL-ALNRUB/RIBLAC/ATHFIL-GALIUM, N:[175] THUPLI-(PSEMEN-PICENG)/OPLHOR/MAISTE-ATHFIL, MO:[148] PSEMEN-THUPLI/ACECIR/OXAORE-POLMUN, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, MNO:[006] ABIAMA-TSUHET/OPLHOR.

▶ [**046**] B-LT5* 2 B-GT5 8 Alnus rubra* 5 Carex deweyana+* 2 Cornus stolonifera/occidentalis* Epilobium* Gaultheria shallon* 2 Lonicera involucrata* Maianthemum dilatatum 2 Rosa* Viburnum edule* Viola glabella+ 2 [**keep**] Abies grandis* Acer circinatum* 2 Gymnocarpium dryopteris* 2 Oplopanax horridus* Oxalis oregana*** 2 Polystichum munitum* 5 Populus trichocarpa* Rhododendron menziesii* Streptopus amplexifolius* Tsuga heterophylla 11

▶ [**124**] B-LT5* B-GT5 8 Abies amabilis 2 Alnus rubra* 5 Circaea alpina 2 Dicentra formosa* Dryopteris* Lactuca* Maianthemum stellatum 2 Osmorhiza* Pseudotsuga menziesii* 2 Ribes lacustre* Rosa* Rubus nutkanus** Sambucus racemosa** [**keep**] Abies grandis* Equisetum hyemale+*** Gymnocarpium dryopteris 4 Lysichiton americanus* 2 Oxalis oregana*** 2 Rhododendron menziesii* Streptopus amplexifolius* Struthiopteris spicant 2 Tiarella trifoliata 2 Vaccinium parvifolium*

▶ [**177**] SHRB 8 Abies amabilis* Actaea rubra* Asarum caudatum* Circaea alpina 2 Clintonia uniflora* 2 Dryopteris* Maianthemum stellatum 2 Oplopanax horridus 4 Prosartes* Pseudotsuga menziesii* 2 Ribes lacustre* Sambucus racemosa* Trillium ovatum* [**keep**] Abies grandis* Anemone deltoidea+* Equisetum arvense+* 2 Equisetum hyemale+*** Luzula parviflora* Lysichiton americanus*** 2 Oxalis oregana* Populus trichocarpa* Scirpus microcarpus*** Tellima grandiflora*

▶ [**195**] B-LT5* 2 Abies amabilis 2 Acer macrophyllum* 2 Achlys triphylla 2 Adiantum aleuticum 2 Dryopteris* Pseudotsuga menziesii* 2 Sambucus racemosa* [**keep**] Abies grandis* Equisetum arvense+ 2 Equisetum hyemale+*** Lysichiton americanus*** 2 Oxalis oregana* 5 Populus trichocarpa* Rhododendron menziesii* Struthiopteris spicant 3 Viola glabella+*

▶ [**196**] Achlys triphylla 2 Linnaea borealis* 2 Maianthemum dilatatum 2 Pseudotsuga menziesii** 2 Taxus brevifolia 2 Trillium ovatum* [**keep**] B-GT5** Abies grandis* Acer circinatum* Equisetum arvense+ 2 Equisetum hyemale+*** Lysichiton americanus*** 9 Oxalis oregana*** 2 Populus trichocarpa*** 2 Rhododendron menziesii* Rubus spectabilis* Streptopus amplexifolius* Struthiopteris spicant 3 Viola glabella+*

Floristics (5 plots, MORA 3, NOCA 2): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 28, Thuja plicata 17	Oplopanax horridus 2	Lysichiton americanus 29	Athyrium filix-femina 4
80-95	Abies grandis 8	Acer circinatum 12, Rubus spectabilis 2	Tiarella trifoliata 4	Gymnocarpium dryopteris 10
60-80	Populus trichocarpa 6	Vaccinium parvifolium 1, Rhododendron menziesii 1	Oxalis oregana 24, Streptopus amplexifolius 1, Viola glabella+ 1	moss 33, Polystichum munitum 11, Equisetum hyemale+ 1
40-60	Alnus rubra 3		Neottia 2, Anemone deltoidea+ 2, Tellima grandiflora 2, Galium 2, Circaea alpina 1, Achlys triphylla 1, Adenocaulon bicolor 1, Clintonia uniflora 1, Maianthemum dilatatum 1, Maianthemum stellatum 1	Struthiopteris spicant 12, Equisetum arvense+ 4, Scirpus microcarpus 2, Luzula parviflora 1
10-25	Picea engelmannii 11	Alnus viridis 4, Cornus stolonifera/occidentalis 4	Lysimachia latifolia 4, Cornus unalaschkensis 2	

{202} Tsuga heterophylla, Thuja plicata, Picea sitchensis, Gaultheria shallon, Struthiopteris spicant
Western hemlock, redcedar, Douglas-fir, salal & deer fern forest
TSUHET-THUPLI-PICSIT/GAUSHA/BLESPI



Range: Coastal and lowland zones. **MORA**-1: (nw) 540-550m. **OLYM**-17: **nw-sw*** 30-50m.

Struct: Semi-open conifer forest (52m) with abundant conifer regen, very dense shrubs, abundant ferns, and substantial forbs. Avg vasc cover 149: shrb 58, conif tree 48, conif regen 22, fern 16, forb 0.75 @ 6.

Ecology: Very gentle slopes with westerly aspects, on well-drained soils; on gentle or rolling topography. Regen dominated by *Tsuga heterophylla*, usually with smaller but substantial amounts of *Thuja plicata*.

Metrics: slope 2-9°, vdp 5-13m, vdr 24-36m, east 15-37, south 48-95, conv 50-53, tpp 47-57, solar 57-61, wet 4-7

Map class: C01–Redcedar, western hemlock, salal & evergreen huckleberry forest

Rel to C09: Created from similar plots mostly split from THUPLI-TSUHET/VACOVA and PICSIT/GAUSHA.

Similar: MO:[199] TSUHET-THUPLI/GAUSHA/LYSAME, O:[200] TSUHET-THUPLI/GAUSHA-VACPAR/BLESPI, O:[112] PICSIT-THUPLI/VACOVAT, O:[178] THUPLI-TSUHET/VACOVAT, O:[114] PICSIT-TSUHET/GAUSHA/POLMUN, O:[189] TSUHET-(PICSIT)/RUBSPE-GAUSHA/POLMUN, MO:[188] TSUHET-PICSIT/POLMUN-BLESPI, O:[115] PICSIT-TSUHET/POLMUN, O:[191] TSUHET-(PICSIT)/VACALA/OXAORE-BLESPI, O:[190] TSUHET-(PICSIT)/RUBSPE/OXAORE-POLMUN.

▶ [**112**] B-GT5* 2 Alnus rubra* 2 [**keep**] FORB 3 Maianthemum dilatatum*** 2 Rhododendron menziesii* Rubus spectabilis* 3 Vaccinium ovalifolium*
▶ [**114**] Athyrium filix-femina* Polystichum munitum* [**keep**] Thuja plicata*** Vaccinium ovatum*** 3
▶ [**178**] TSHRB*** 2 Cornus unalaschkensis** Vaccinium ovatum 18 [**keep**] Maianthemum dilatatum* Picea sitchensis** Polystichum munitum*** 2 Rubus spectabilis*
▶ [**199**] FORB 9 TSHRB*** 2 Carex obnupta+** 2 Cornus unalaschkensis** Lysichiton americanus* 4 Malus fusca*** 2 [**keep**] Polystichum munitum*
▶ [**200**] TSHRB*** 2 Frangula purshiana*** 2 Moneses uniflora* [**keep**] Picea sitchensis* Polystichum munitum* 2 Vaccinium ovatum 4

Floristics (16 plots, OLYM 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga heterophylla 41, Thuja plicata 22, Picea sitchensis 6	Gaultheria shallon 26		Struthiopteris spicant 12
80-95		Vaccinium ovalifolium 10, Rhododendron menziesii 6		
60-80		Vaccinium ovatum 11, Rubus spectabilis 9, Vaccinium parvifolium 4	Maianthemum dilatatum 4	moss 32
40-60			Lysichiton americanus 3	Polystichum munitum 8
25-40	Alnus rubra 1			
10-25			Moneses uniflora 1	

{203} Tsuga mertensiana, Abies amabilis, Callitropsis nootkatensis, Vaccinium ovalifolium, Rubus pedatus*, Erythronium montanum*
Mountain hemlock, silver fir, Alaska-cedar, Alaska blueberry, trailing raspberry* & avalanche lily* forest
TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON)



Range: Upper montane. **MORA**-24: **nw*-sw-se** 1300-1440m. **NOCA**-8: **nw** (ne) 920-1300m. **OLYM**-33: **nc-sc*-se** 1020-1190m.

Struct: Semi-open conifer forest (26-36m) with abundant conifer regen, dense shrubs, and abundant forbs. Avg vasc cover 142: conif tree 49, shrb 47, conif regen 24, forb 17, fern 0.55 @ 5, dwf shrb 0.31 @ 6.

Ecology: Fairly gentle slopes, on well-drained soils, in a variety of topographic positions. Regen dominated by *Abies amabilis*, with smaller but substantial amounts of *Tsuga mertensiana* and/or *Callitropsis nootkatensis*.

Metrics: slope 13-29°, vdp 7-67m, vdr 395-704m, east 28-91, south 14-80, conv 43-55, tpp 27-62, solar 47-72, wet 2-4

Map class: C12–Silver fir, hemlock & Alaska blueberry forest

Rel to C09: Evolved from TSUMER-ABIAMA/VACALA/RUBPED with the addition of plots from TSUMER-ABIAMA/RHOALB and several other C09 types. The NCCN plots may present a slightly different concept: *Callitropsis nootkatensis* is usually abundant, and *Tiarella trifoliata* and *Streptopus lanceolatus* are prominent fairly often.

Similar: MNO:[011] ABIAMA-TSUMER/MENFER, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[012] ABIAMA-TSUMER/VACMEM, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[001] ABIAMA-CUPNOO-TSUHET/VACALA, MO:[005] ABIAMA/RHOALB, MNO:[208] TSUMER/PHYEMP-VACDEL, MO:[002] ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN.

▶ [**011**] Orthilia secunda*** Rhododendron menziesii* Vaccinium membranaceum* [**keep**] Achlys triphylla** Alnus viridis** Arnica latifolia+** Athyrium filix-femina* Erythronium montanum+* Neottia** Phyllodoce empetriformis* Rubus pedatus 2 Streptopus streptopoides** Struthiopteris spicant* 2 Valeriana sitchensis*
▶ [**012**] Abies lasiocarpa*** Luetkea pectinata* Lupinus latifolius** Luzula hitchcockii+** Orthilia secunda* Paxistima myrsinites** Vaccinium deliciosum** Vaccinium membranaceum* Vahlodea atropurpurea** Veratrum viride* [**keep**] Callitropsis nootkatensis* 6 Clintonia uniflora* Erythronium montanum+* Neottia** Rhododendron albiflorum 3 Rubus pedatus* Struthiopteris spicant** 2 Tiarella trifoliata* Tsuga heterophylla* Vaccinium ovalifolium** 8
▶ [**013**] Abies procera*** 2 Luzula parviflora** Mitella* Rubus lasiococcus* Streptopus lanceolatus* 3 Valeriana sitchensis* Veratrum viride* Xerophyllum tenax* [**keep**] SHRB 16 Callitropsis nootkatensis* 5 Rhododendron albiflorum 3 Rubus pedatus* Struthiopteris spicant 2 Tsuga heterophylla 2 Vaccinium ovalifolium* 2
▶ [**014**] Abies lasiocarpa*** Orthilia secunda* Paxistima myrsinites*** Picea engelmannii*** 2 Rubus lasiococcus* 3 Streptopus lanceolatus* Tiarella trifoliata* Vaccinium membranaceum* Valeriana sitchensis* [**keep**] Callitropsis nootkatensis* Erythronium montanum+* 4 Rhododendron albiflorum 4 Struthiopteris spicant** 2 Tsuga mertensiana 5 Vaccinium ovalifolium* 6
▶ [**204**] Abies lasiocarpa*** 2 Orthilia secunda* Rhododendron albiflorum* Rubus lasiococcus* 3 Vaccinium membranaceum* Valeriana sitchensis* [**keep**] Callitropsis nootkatensis* Clintonia uniflora** Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant** 2 Tsuga heterophylla** Vaccinium ovalifolium* 11

Floristics (42 plots, MORA 8, NOCA 7, OLYM 27): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 36, Tsuga mertensiana 24	Vaccinium ovalifolium 34		
80-95	Callitropsis nootkatensis 12			
60-80			Rubus pedatus 5	moss 17
40-60		Vaccinium membranaceum 11, Rhododendron albiflorum 10, Rhododendron menziesii 4	Erythronium montanum+ 10	Struthiopteris spicant 4
25-40	Tsuga heterophylla 10	Sorbus sitchensis 1	Tiarella trifoliata 3, Valeriana sitchensis 2, Clintonia uniflora 2, Rubus lasiococcus 2, Streptopus lanceolatus 2, Neottia 0	
10-25		Vaccinium parvifolium 9, Rubus spectabilis 4, Alnus viridis 1	Phyllodoce empetriformis 5, Achlys triphylla 5, Xerophyllum tenax 3, Cornus unalaschkensis 3, Arnica latifolia+ 1, Streptopus streptopoides 1, Veratrum viride 1, Orthilia secunda 1	Athyrium filix-femina 3, Gymnocarpium dryopteris 2

{204} Tsuga mertensiana, Abies amabilis, Rhododendron albiflorum
Mountain hemlock, silver fir & Cascade azalea forest
TSUMER-ABIAMA/RHOALB



Range: Upper montane zone, transitional to subalpine zone. **MORA**-66: **nw**-**ne**-**sw**-**se** 1490-1610m. **NOCA**-52: **nw**-**ne**-**ce**-**s** (cw) 1510-1650m. **OLYM**-29: **nc**-**ne**-**sc**-**se** 1300-1490m.

Struct: Semi-open conifer forest (20-30m) with abundant conifer regen, dense shrubs, and abundant forbs. Avg vasc cover 127: conif tree 46, shrb 40, conif regen 18, forb 16, dwf shrb 0.61 @ 7, tall shrb 0.51 @ 4, fern 0.18 @ 2.

Ecology: Midslopes, upper slopes and ridgetops, on well-drained soils. Regen dominated by *Abies amabilis*, with smaller but substantial amounts of *Tsuga mertensiana*.

Metrics: slope 17-30°, vdp 14-129m, vdr 494-736m, east 14-82, south 5-65, conv 46-56, tpp 36-69, solar 46-69, wet 2-3

Map class: C13–Mountain hemlock, silver fir & Cascade azalea forest

Rel to C09: Expanded, incorporating the majority of the plots labeled as ABIAMA/RHOALB.

Similar: MNO:[012] ABIAMA-TSUMER/VACMEM, MO:[005] ABIAMA/RHOALB, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[014] ABIAMA/VACMEM/RUBLAS, MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[208] TSUMER/PHYEMP-VACDEL, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN, MNO:[011] ABIAMA-TSUMER/MENFER, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN. Also see: [206] TSUMER-ABILAS/VACDEL-PHYEMP.

▶ [**005**] Abies procera** Carex spectabilis+* Corallorhiza** Goodyera oblongifolia** Monotropa*** Neottia* Tsuga heterophylla* Viola orbiculata+* [**keep**] TSHRB 2 Phyllodoce empetriformis 2 Sorbus sitchensis 2 Tsuga mertensiana 4 Vaccinium deliciosum* 2 Valeriana sitchensis*
▶ [**012**] Clintonia uniflora* Goodyera oblongifolia* Tsuga heterophylla* Vahlodea atropurpurea* [**keep**] Abies lasiocarpa* Arnica latifolia+* Gymnocarpium dryopteris* Neottia* Phyllodoce empetriformis* Picea engelmannii*** Rhododendron albiflorum* 3 Rhododendron menziesii 3 Valeriana sitchensis* Viola glabella+** Viola orbiculata+*
▶ [**013**] Abies procera*** Clintonia uniflora* Erythronium montanum+* Luzula parviflora*** Mitella* Streptopus lanceolatus* Tiarella trifoliata* Xerophyllum tenax* [**keep**] SHRB 16 TSHRB 2 Abies lasiocarpa* 2 Phyllodoce empetriformis* 2 Rhododendron albiflorum* 4 Sorbus sitchensis 2 Vaccinium deliciosum 2
▶ [**014**] Clintonia uniflora** Goodyera oblongifolia* Orthilia secunda* Paxistima myrsinites* Picea engelmannii* Ribes lacustre** Rubus pedatus* Streptopus lanceolatus* Tiarella trifoliata* Tsuga heterophylla** [**keep**] Abies lasiocarpa* 4 Erythronium montanum+* 4 Phyllodoce empetriformis*** Rhododendron albiflorum* 4 Tsuga mertensiana 5 Vaccinium deliciosum** 2 Veratrum viride*
▶ [**203**] Callitropsis nootkatensis* Clintonia uniflora** Rhododendron menziesii* Rubus pedatus* Struthiopteris spicant** 2 Tsuga heterophylla** Vaccinium ovalifolium* 11 [**keep**] Abies lasiocarpa*** 2 Orthilia secunda* Rhododendron albiflorum* Rubus lasiococcus* 3 Vaccinium membranaceum* Valeriana sitchensis*

Floristics (79 plots, MORA 17, NOCA 40, OLYM 22): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies amabilis 33, Tsuga mertensiana 20	Rhododendron albiflorum 22, Vaccinium membranaceum 15		
60-80			Rubus lasiococcus 6	
40-60	Abies lasiocarpa 10, Callitropsis nootkatensis 8	Sorbus sitchensis 3	Phyllodoce empetriformis 4, Valeriana sitchensis 3, Orthilia secunda 1	moss 10
25-40		Rhododendron menziesii 8	Erythronium montanum+ 11, Vaccinium deliciosum 7, Rubus pedatus 2, Tiarella trifoliata 2, Arnica latifolia+ 1, Veratrum viride 1	
10-25	Picea engelmannii 5, Pseudotsuga menziesii 3	Vaccinium ovalifolium 6, Alnus viridis 3	Xerophyllum tenax 8, Streptopus lanceolatus 2, Luetkea pectinata 2, Viola glabella+ 2, Neottia 2, Lupinus latifolius 1, Viola orbiculata+ 1, Paxistima myrsinites 1	Gymnocarpium dryopteris 3, Luzula hitchcockii+ 2

{205} Tsuga mertensiana, Abies lasiocarpa, Phyllodoce empetriformis*
Mountain hemlock, subalpine fir & pink mountain-heather* shrubland
TSUMER-ABILAS/PHYEMP_KRUMM



Range: Alpine. **MORA**-4: **nw** 1800-1890m. **NOCA**-10: **nw**-**ce** (ne-cw-s) 1870-2050m. **OLYM**-14: **nc**-**ne**-**sc**-**se** 1580-1880m.

Struct: Closed canopy stunted conifers with substantial dwarf shrubs & forbs. Avg vasc cover 95: conif LT5 73, forb 5, dwf shrb 0.92 @ 15, shrb 0.31 @ 5, conif GT5 0.15 @ 3.

Ecology: Variably steep upper slopes and ridgetops.

Metrics: slope 24-46°, vdp 56-309m, vdr 823-1192m, east 10-74, south 17-82, conv 50-68, tpp 63-93, solar 39-74, wet 1-2

Map class: C26–Conifer krummholz & treed cliff

Rel to C09: Evolved from KRUMM TSUMER, incorporating about half the plots labeled as KRUMM ABILAS.

Similar: MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[020] ABILAS-(PINALB)/JUNCOM_KRUMM, O:[029] ABILAS/VACMEM/ERYMON, O:[024] ABILAS/POLPUL-PEDRAC, MNO:[030] ABILAS/VACMEM/LUPARC, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MNO:[033] ABILAS/VERVIR, MNO:[032] ABILAS/VALSIT, N:[098] LARLYA/VACDEL.

▶ [**020**] C-GT5* Achillea millefolium* Callitropsis nootkatensis 12 Juniperus communis** 2 Paxistima myrsinites* Phlox diffusa* [**keep**] SHRB 2 Cassiope mertensiana** Luetkea pectinata* Phyllodoce empetriformis* 2 Tsuga mertensiana*** 5 Vaccinium deliciosum* 2
▶ [**024**] C-GT5** 5 FORB 9 Bistorta bistortoides** 2 Carex spectabilis+* 2 Luzula hitchcockii+ 2 Pedicularis racemosa** 2 Polemonium pulcherrimum*** 2 Valeriana sitchensis* [**keep**] C-LT5 14 Cassiope mertensiana* 2 Luetkea pectinata* Phyllodoce empetriformis* 2 Tsuga mertensiana** 2 Vaccinium deliciosum** 2
▶ [**028**] C-GT5** 5 FORB 9 SHRB* TSHRB* Abies amabilis 2 Arnica latifolia+** Erythronium montanum+*** 2 Lupinus latifolius* Luzula hitchcockii+* Rubus lasiococcus*** 2 Sorbus sitchensis* Vaccinium deliciosum 11 Vaccinium membranaceum* Valeriana sitchensis* 2 Veratrum viride* [**keep**] C-LT5 27 Callitropsis nootkatensis* Cassiope mertensiana*** Castilleja parviflora+* Penstemon procerus+** Phyllodoce glanduliflora** Silene parryi**
▶ [**029**] C-GT5* 5 FORB 9 SHRB* Erythronium montanum+*** 2 Rubus lasiococcus 2 Sorbus sitchensis 2 Vaccinium membranaceum* Valeriana sitchensis 2 Xerophyllum tenax 2 [**keep**] C-LT5 23 Cassiope mertensiana* 2 Phyllodoce empetriformis** 2 Vaccinium deliciosum 3
▶ [**206**] C-GT5** 5 SHRB* TSHRB* Abies amabilis 2 Callitropsis nootkatensis* Erythronium montanum+*** 2 Phyllodoce empetriformis 10 Sorbus sitchensis* Vaccinium deliciosum 10 Vaccinium membranaceum* Xerophyllum tenax 2 [**keep**] C-LT5 32 Achillea millefolium*** Castilleja parviflora+** Penstemon procerus+** Phlox diffusa* Phyllodoce glanduliflora*** Silene parryi***

Floristics (13 plots, MORA 1, NOCA 5, OLYM 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 41, Tsuga mertensiana 28			
60-80			Vaccinium deliciosum 7, Phyllodoce empetriformis 6, Luetkea pectinata 3	
40-60	Callitropsis nootkatensis 8		Cassiope mertensiana 7	moss 6
25-40			Lupinus latifolius 4, Penstemon procerus+ 1	
10-25	Abies amabilis 1	Vaccinium membranaceum 4, Rhododendron albiflorum 4, Ribes acerifolium+ 1	Phyllodoce glanduliflora 5, Empetrum nigrum 2, Phlox diffusa 1, Paxistima myrsinites 1, Valeriana sitchensis 1, Micranthes tolmiei+ 1, Solidago multiradiata 1, Erigeron 1, Juniperus communis 1	lichen 4, Juncus parryi+ 2, Luzula hitchcockii+ 1, Carex spectabilis+ 1

{206} Tsuga mertensiana, Abies lasiocarpa, Vaccinium deliciosum, Phyllodoce empetriformis
Mountain hemlock, subalpine fir, Cascade blueberry & pink mountain-heather woodland
TSUMER-ABILAS/VACDEL-PHYEMP



Range: Subalpine. **MORA**-32: **nw*-sw*-se** (ne) 1620-1780m. **NOCA**-17: **nw-ne-cw** (s) 1620-1800m. **OLYM**-27: **nc*-ne-sc** (se) 1350-1590m.

Struct: Conifer woodland (5-13m), usually in a mosaic of treed and shrub-dominated patches, with abundant conifer regen, very dense dwarf shrubs, and substantial forbs. Avg vasc cover 120: dwf shrb 52, conif tree 25, conif regen 0.95 @ 21, forb 0.95 @ 15, shrb 0.67 @ 12, tall shrb 0.62 @ 2, sedge 0.21 @ 2.

Ecology: Slopes in parklands. Unlike [208] TSUMER/PHYEMP-VACDEL, occurs in rain shadows (e.g., ne MORA and OLYM, se NOCA), but much more abundant in moister regions. Regen codominated by *Tsuga mertensiana* and *Abies amabilis*, with smaller amounts of *Callitropsis nootkatensis*. *Vaccinium membranaceum* and *Rhododendron albiflorum* occur primarily under tree canopy.

Metrics: slope 17-32°, vdp 15-119m, vdr 613-927m, east 19-93, south 12-76, conv 46-55, tpp 40-76, solar 53-76, wet 2-3

Map class: C21–Mountain hemlock, subalpine fir & heather woodland

Rel to C09: Similar, incorporating a fair number of plots labeled as TSUMER/PHYEMP-VACDEL, ABILAS/VACDEL and several other C09 types.

Similar: MNO:[208] TSUMER/PHYEMP-VACDEL, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[205] TSUMER-ABILAS/PHYEMP_KRUMM, MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[107] PHYEMP-(VACDEL)/LUPARC, N:[098] LARLYA/VACDEL, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN, O:[029] ABILAS/VACMEM/ERYMON, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[030] ABILAS/VACMEM/LUPARC.

▶ [**028**] Arnica latifolia+** Lupinus latifolius* Luzula hitchcockii+** 2 Pedicularis racemosa** Rubus lasiococcus* 2 Valeriana sitchensis* 2 Veratrum viride* 2 [**keep**] Callitropsis nootkatensis** Cassiope mertensiana*** Phyllodoce empetriformis 8
▶ [**106**] Antennaria lanata+** Carex nigricans+** Carex spectabilis+* Cassiope mertensiana* Erigeron* Hieracium triste* Potentilla flabellifolia+* Vahlodea atropurpurea* [**keep**] C-GT5* 4 SHRB* 3 TSHRB* Abies amabilis 2 Abies lasiocarpa* 4 Callitropsis nootkatensis* 2 Rhododendron albiflorum*** 2 Sorbus sitchensis* Tsuga mertensiana 7 Vaccinium membranaceum*
▶ [**107**] Bistorta bistortoides* 2 Carex spectabilis+* 2 Castilleja parviflora+*** Erigeron 2 Lupinus latifolius* Potentilla flabellifolia+ 2 Valeriana sitchensis* 2 [**keep**] C-LT5 7 C-GT5*** 4 SHRB* 5 TSHRB* Abies amabilis 2 Abies lasiocarpa 5 Callitropsis nootkatensis* Rhododendron albiflorum 2 Sorbus sitchensis* Tsuga mertensiana* 3 Vaccinium membranaceum*** 2
▶ [**205**] C-LT5 32 Achillea millefolium*** Castilleja parviflora+** Penstemon procerus+** Phlox diffusa* Phyllodoce glanduliflora*** Silene parryi*** [**keep**] C-GT5** 5 SHRB* TSHRB* Abies amabilis 2 Callitropsis nootkatensis* Erythronium montanum+*** 2 Phyllodoce empetriformis 10 Sorbus sitchensis* Vaccinium deliciosum 10 Vaccinium membranaceum* Xerophyllum tenax 2
▶ [**208**] Abies amabilis* [**keep**] Abies lasiocarpa* 6 Lupinus latifolius 2

Floristics (39 plots, MORA 8, NOCA 15, OLYM 16): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga mertensiana 23, Abies lasiocarpa 15		Phyllodoce empetriformis 26, Vaccinium deliciosum 22	
60-80	Callitropsis nootkatensis 6	Sorbus sitchensis 2	Luetkea pectinata 3	
40-60		Vaccinium membranaceum 6	Cassiope mertensiana 9, Lupinus latifolius 6, Erythronium montanum+ 5	moss 7
25-40	Abies amabilis 6	Rhododendron albiflorum 7	Xerophyllum tenax 14	
10-25	Pinus albicaulis 1	Rhododendron menziesii 4	Rubus pedatus 2, Valeriana sitchensis 1, Rubus lasiococcus 1, Arnica latifolia+ 1, Bistorta bistortoides 1	Carex spectabilis+ 1, Luzula hitchcockii+ 1, Juncus parryi+ 1

{207} Tsuga mertensiana, Abies lasiocarpa, Vaccinium membranaceum, Xerophyllum tenax
Mountain hemlock, subalpine fir, big huckleberry & beargrass forest
TSUMER-ABILAS/VACMEM/XERTEN



Range: Upper montane and subalpine zones. **MORA**-2: (nw-sw) 1620-1740m. **OLYM**-4: **nc** (se) 1440-1480m.

Struct: Mostly closed conifer forest (14-17m), often as ribbons in subalpine parkland, with abundant conifer regen, abundant forbs & shrubs, and substantial dwarf shrubs. Avg vasc cover 142: conif tree 60, forb 30, conif regen 20, shrb 19, dwf shrb 11, tall shrb 0.67 @ 2, rush 0.67 @ 1, fern 0.33 @ 3.

Ecology: South-facing upper slopes and ridgetops, on shallow well-drained soils. Regen codominated by *Tsuga mertensiana*, *Abies lasiocarpa* and *A. amabilis*, frequently with small amounts of *Callitropsis nootkatensis*. Transitions above to [208] TSUMER/PHYEMP-VACDEL.

Metrics: slope 25-27°, vdp 30-130m, vdr 740-922m, east 30-44, south 94-99, conv 51-55, tpp 61-74, solar 84-89, wet 2-3

Map class: C21–Mountain hemlock, subalpine fir & heather woodland

Rel to C09: Split from TSUMER-ABIAMA/VACMEM/XERTEN to distinguish plots with codominant *Abies lasiocarpa*.

Similar: MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[028] ABILAS/VACDEL-VALSIT, O:[029] ABILAS/VACMEM/ERYMON, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[208] TSUMER/PHYEMP-VACDEL, MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MN:[031] ABILAS/VACSCO-VALSIT, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[032] ABILAS/VALSIT, MNO:[027] ABILAS/RHOALB/RUBLAS.

▶ [**016**] Lupinus latifolius* Pseudotsuga menziesii 2 Valeriana sitchensis 2 [**keep**] Carex geyeri+*** Heuchera micrantha*** 2 Lomatium martindalei*** Luzula hitchcockii+*** Moehringia macrophylla 2 Pinus albicaulis*** Polystichum munitum*** Salix nivalis+*** 2 Sedum divergens*** Sorbus sitchensis* Tsuga mertensiana 11 Vaccinium deliciosum**
▶ [**028**] Arnica latifolia+* Luetkea pectinata* 2 Lupinus latifolius* 2 Pedicularis racemosa* Phyllodoce empetriformis 2 Rubus lasiococcus 2 Valeriana sitchensis* 2 Veratrum viride* [**keep**] Callitropsis nootkatensis* Gaultheria ovatifolia*** 2 Heuchera micrantha*** Moehringia macrophylla* 2 Penstemon serrulatus+*** Pinus albicaulis* Polystichum munitum*** Salix nivalis+*** 2 Sedum divergens*** Tsuga mertensiana 17 Xerophyllum tenax** 9
▶ [**029**] Carex spectabilis+ 2 Luetkea pectinata 2 Rubus lasiococcus 2 Sorbus sitchensis 2 Valeriana sitchensis* 2 [**keep**] Abies amabilis*** 2 Gaultheria ovatifolia 2 Moehringia macrophylla 2 Tsuga mertensiana 19 Vaccinium deliciosum* 3 Xerophyllum tenax*
▶ [**204**] Phyllodoce empetriformis 2 Rhododendron albiflorum* 2 Rhododendron menziesii 2 Rubus lasiococcus 2 Valeriana sitchensis 2 [**keep**] Carex geyeri+*** Gaultheria ovatifolia 2 Heuchera micrantha*** 2 Hieracium albiflorum*** Lomatium martindalei*** Moehringia macrophylla*** 2 Penstemon serrulatus+** Pinus albicaulis** Polystichum munitum*** Salix nivalis+*** 2 Sedum divergens***
▶ [**208**] Cassiope mertensiana* 2 Luetkea pectinata* 2 Phyllodoce empetriformis* 2 Rhododendron albiflorum 2 [**keep**] Abies lasiocarpa 6 Heuchera micrantha*** 2 Hieracium albiflorum*** Lomatium martindalei*** Moehringia macrophylla*** 2 Paxistima myrsinites*** Polystichum munitum*** Rubus lasiococcus** Salix nivalis+*** 2 Sedum divergens*** Vaccinium scoparium+***

Floristics (3 plots, MORA 1, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga mertensiana 44, Abies lasiocarpa 18, Abies amabilis 14	Vaccinium membranaceum 19	Xerophyllum tenax 19, Vaccinium deliciosum 8	
60-80	Callitropsis nootkatensis 6	Sorbus sitchensis 2	Erythronium montanum+ 9, Rubus lasiococcus 1	Luzula hitchcockii+ 1
25-40	Pinus albicaulis 0		Gaultheria ovatifolia 3, Salix nivalis+ 3, Moehringia macrophylla 3, Heuchera micrantha 3, Vaccinium scoparium+ 1, Lomatium martindalei 1, Paxistima myrsinites 1, Penstemon serrulatus+ 1, Hieracium albiflorum 1, Sedum divergens 1, Rubus pedatus 1, Orthilia secunda 0, Phyllodoce empetriformis 0	Carex geyeri+ 1, Polystichum munitum 1, moss 1

{208} Tsuga mertensiana, Phyllodoce empetriformis, Vaccinium deliciosum
Mountain hemlock, pink mountain-heather & Cascade blueberry woodland
TSUMER/PHYEMP-VACDEL



Range: Subalpine. **MORA**-7: **nw*-sw** (se) 1600-1760m. **NOCA**-55: **nw-ne-cw** (s) 1550-1670m. **OLYM**-72: **nc-sc*-se** 1160-1400m.

Struct: Conifer woodland (13-20m) or mosaic of treed and shrub-dominated patches, with abundant conifer regen, very dense dwarf shrubs, and substantial forbs & shrubs. Avg vasc cover 121: dwf shrb 52, conif tree 26, conif regen 22, forb 11, shrb 0.89 @ 10, tall shrb 0.52 @ 2, sedge 0.13 @ 2.

Ecology: Slopes in parklands. Restricted to moist regions; absent in rain shadows, e.g. ne MORA and OLYM, se NOCA. Regen dominated by *Tsuga mertensiana*, usually with smaller but substantial amounts of *Abies amabilis* and *Callitropsis nootkatensis*.

Metrics: slope 16-31°, vdp 30-139m, vdr 748-921m, east 30-96, south 22-75, conv 47-57, tpp 52-80, solar 51-75, wet 2-3

Map class: C21–Mountain hemlock, subalpine fir & heather woodland

Rel to C09: Same, adding some plots labeled as TSUMER-ABILAS/VACDEL-PHYEMP but lacking significant *Abies lasiocarpa*.

Similar: MNO:[206] TSUMER-ABILAS/VACDEL-PHYEMP, MNO:[204] TSUMER-ABIAMA/RHOALB, MNO:[012] ABIAMA-TSUMER/VACMEM, MO:[207] TSUMER-ABILAS/VACMEM/XERTEN, MNO:[013] ABIAMA-TSUMER/VACMEM/ERYMON, MNO:[106] PHYEMP-VACDEL-(CASMER), MNO:[203] TSUMER-ABIAMA-CUPNOO/VACALA/RUBPED-(ERYMON), MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[014] ABIAMA/VACMEM/RUBLAS.

▶ [**012**] Abies amabilis 17 Orthilia secunda*** Rhododendron menziesii** Rubus lasiococcus** Rubus pedatus* Vaccinium membranaceum 10 [**keep**] Callitropsis nootkatensis* Cassiope mertensiana*** 2 Luetkea pectinata* Phyllodoce empetriformis* 6 Rhododendron albiflorum 3 Vaccinium deliciosum*

▶ [**013**] Abies amabilis 18 Abies procera*** 2 Clintonia uniflora*** 2 Erythronium montanum+ 7 Luzula parviflora*** Mitella* Orthilia secunda** Rhododendron menziesii** Rubus lasiococcus*** Streptopus lanceolatus*** Tiarella trifoliata*** 2 Valeriana sitchensis* [**keep**] Abies lasiocarpa 2 Callitropsis nootkatensis* Cassiope mertensiana** 2 Luetkea pectinata** 2 Phyllodoce empetriformis** 2 Vaccinium deliciosum** 2

▶ [**204**] SHRB 15 Abies amabilis 16 Abies lasiocarpa* Orthilia secunda*** Rhododendron albiflorum* 9 Rhododendron menziesii 3 Rubus lasiococcus** 3 Valeriana sitchensis* [**keep**] Callitropsis nootkatensis* Cassiope mertensiana*** Luetkea pectinata* Phyllodoce empetriformis* 6 Vaccinium deliciosum*

▶ [**206**] Abies lasiocarpa* 6 Lupinus latifolius 2 [**keep**] Abies amabilis*

▶ [**207**] Abies lasiocarpa 6 Heuchera micrantha*** 2 Hieracium albiflorum*** Lomatium martindalei*** Moehringia macrophylla*** 2 Paxistima myrsinites*** Polystichum munitum*** Rubus lasiococcus** Salix nivalis+*** 2 Sedum divergens*** Vaccinium scoparium+*** [**keep**] Cassiope mertensiana* 2 Luetkea pectinata* 2 Phyllodoce empetriformis* 2 Rhododendron albiflorum 2

Floristics (96 plots, MORA 2, NOCA 50, OLYM 44): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Tsuga mertensiana 30		Phyllodoce empetriformis 24, Vaccinium deliciosum 22	
80-95	Abies amabilis 11, Callitropsis nootkatensis 9			
60-80		Vaccinium membranaceum 7	Cassiope mertensiana 9, Luetkea pectinata 4	moss 10
40-60		Rhododendron albiflorum 6, Sorbus sitchensis 2		
25-40	Abies lasiocarpa 4		Xerophyllum tenax 12, Erythronium montanum+ 4, Arnica latifolia+ 2, Rubus pedatus 2	lichen 8, Vahlodea atropurpurea 0
10-25		Vaccinium ovalifolium 4	Valeriana sitchensis 4, Lupinus latifolius 1, Veratrum viride 1	Diphasiastrum sitchense+ 1

{209} Vaccinium deliciosum, Festuca viridula
Cascade blueberry & green fescue dwarf shrubland
VACDEL-FESVIR



Range: Subalpine. **MORA**-5: **sw** (nw-ne-se) 1700-1780m. **NOCA**-11: **s*** (ne) 1880-1990m.

Struct: Open dwarf shrubland with dense forbs, abundant grasses, and prominent conifer regen. Avg vasc cover 99: forb 39, dwf shrb 33, grass 18, conif LT5 0.88 @ 2, rush 0.75 @ 4, sedge 0.5 @ 3, shrb 0.38 @ 10.

Ecology: Upper slopes and ridgetops with southerly aspects. Evidence of past fire is often apparent. Usually adjacent to *Abies lasiocarpa* tree islands; *A. lasiocarpa* regen often present.

Metrics: slope 17-35°, vdp 133-267m, vdr 765-974m, east 22-85, south 69-93, conv 54-68, tpp 73-87, solar 76-88, wet 2-4

Map class: S47–Successional huckleberry shrubland

Rel to C09: Evolved from VACDEL/FESVIR; shedding plots to [090] FESVIR-EUC(LED,ENG) and [216] VALSIT-LIGGRA.

Similar: MN:[216] VALSIT-LIGGRA, MN:[090] FESVIR-EUC(LED,ENG), MN:[092] FESVIR-PHLDIF-ARECAP, MNO:[107] PHYEMP-(VACDEL)/LUPARC, MN:[102] PAXMYR/PHLDIF, MNO:[059] ANTLAN-(OREALP-VACDEL), MN:[214] VACSCO-FESVIR-ARECAP, M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), MNO:[076] CARSPE-(LUPARC-POLBIS), MNO:[215] VALSIT-CARSPE. Also see: [095] JUNCOM-(PHLDIF), [106] PHYEMP-VACDEL-(CASMER), [213] VACMEM/XERTEN.

▶ [**090**] Achillea millefolium* Arnica mollis+** Elymus* Eucephalus ledophyllus+* Hieracium scouleri+* Ligusticum* 2 Silene parryi** Thalictrum occidentale* 2 [**keep**] Anemone occidentalis+* Antennaria lanata+* Erythronium montanum+* Juncus parryi+* Luzula hitchcockii+* Phyllodoce empetriformis** Senecio integerrimus*** Spiraea splendens 2 Vaccinium deliciosum** 13 Valeriana sitchensis* Veronica cusickii+* 2

▶ [**092**] C-GT5* Arnica mollis+* 2 Hieracium triste* Juncus parryi+* Phlox diffusa* Potentilla flabellifolia+* Silene parryi* [**keep**] SHRB* 3 TSHRB** Arnica latifolia+* Carex spectabilis+** Chamaenerion angustifolium** Eucephalus ledophyllus+* 2 Phyllodoce empetriformis* Sorbus sitchensis** Spiraea splendens** 2 Vaccinium deliciosum* 5 Valeriana sitchensis*** Veratrum viride**

▶ [**102**] SHRB* Achillea millefolium* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Hieracium scouleri+*** Lewisia* Lomatium brandegeei+* Paxistima myrsinites* 3 Phlox diffusa* 6 Sedum lanceolatum+* Selaginella wallacei+ 2 Vaccinium membranaceum*** 2 [**keep**] Anemone occidentalis+** Erigeron* Erythronium montanum+* Lupinus latifolius 2 Luzula hitchcockii+* Phyllodoce empetriformis* 2 Senecio integerrimus* Spiraea splendens 2 Vaccinium deliciosum* 13 Valeriana sitchensis*** Veronica cusickii+** 2

▶ [**107**] Bistorta bistortoides* Cassiope mertensiana* 2 Castilleja parviflora+* Luetkea pectinata* Lupinus latifolius 7 Phyllodoce empetriformis 7 Potentilla flabellifolia+ 2 Tsuga mertensiana* [**keep**] Arnica latifolia+ 2 Castilleja miniata** Eremogone capillaris*** 2 Erigeron* Festuca viridula** 7 Juncus parryi+* Lomatium brandegeei+*** 2 Luzula hitchcockii+* Phlox diffusa** 2 Senecio integerrimus*** Veronica cusickii+*

▶ [**216**] Castilleja parviflora+ 2 Ligusticum* 2 Potentilla flabellifolia+** 2 Valeriana sitchensis 5 Veratrum viride 2 [**keep**] SHRB 2 Antennaria lanata+* Castilleja miniata* Eremogone capillaris*** 2 Erythronium montanum+* Juncus parryi+* 2 Lomatium brandegeei+*** 2 Phlox diffusa*** 2 Phyllodoce empetriformis* Senecio integerrimus** Spiraea splendens 2

Floristics (8 plots, MORA 1, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Vaccinium deliciosum 29, Erigeron 6, Lupinus latifolius 5	Festuca viridula 18
80-95			Senecio integerrimus 2	
60-80	Abies lasiocarpa 2		Eremogone capillaris 6, Phyllodoce empetriformis 5, Erythronium montanum+ 4, Valeriana sitchensis 3	
40-60			Lomatium brandegeei+ 4, Phlox diffusa 4, Veronica cusickii+ 4, Antennaria lanata+ 3, Anemone occidentalis+ 2, Castilleja miniata 0	Juncus parryi+ 4, Luzula hitchcockii+ 2
25-40	Pinus albicaulis 1	Spiraea splendens 15, Sorbus sitchensis 1	Eucephalus ledophyllus+ 9, Arnica latifolia+ 4, Paxistima myrsinites 2, Chamaenerion angustifolium 1, Agoseris 1, Pedicularis bracteosa 1, Veratrum viride 1, Ligusticum 0	Carex spectabilis+ 4, Poa cusickii+ 1
10-25			Penstemon procerus+ 12, Bistorta bistortoides 10, Gentiana calycosa 2, Claytonia lanceolata 2, Lewisia 2, Luetkea pectinata 2	Carex geyeri+ 1

{210} Vaccinium membranaceum, Paxistima myrsinites, Eremogone capillaris, Calamagrostis rubescens*
Big huckleberry, Oregon-box, mountain sandwort & pinegrass* shrubland
VACMEM/PAXMYR-ARECAP-(CALRUB)



Range: Upper montane and subalpine zones. **NOCA**-8: **ne-s** 1530-1870m.

Struct: Open shrubland with abundant forbs & dwarf shrubs, substantial grasses & tall shrubs, and prominent conifer regen. Avg vasc cover 100: shrb 29, forb 23, dwf shrb 18, grass 14, tall shrb 7, conif LT5 3, rush 0.86 @ 0, sedge 0.71 @ 8, conif GT5 0.43 @ 3.

Ecology: Fairly steep slopes with southwesterly aspects, on rocky and often exposed mineral soils. Evidence of past fire and animal browsing often seen. *Abies lasiocarpa* regen is usually present; its invasion may be a response to fire suppression. May represent a NOCA variant of [213] VACMEM/XERTEN, occurring outside the range of *Xerophyllum tenax*.

Metrics: slope 30-36°, vdp 182-274m, vdr 972-999m, east 11-31, south 79-94, conv 52-60, tpp 70-81, solar 79-87, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Created from similar plots in VACMEM/CALRUB, VACMEM/PHLDIF and VACMEM.

Similar: MN:[102] PAXMYR/PHLDIF, MNO:[030] ABILAS/VACMEM/LUPARC, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MO:[213] VACMEM/XERTEN, MN:[090] FESVIR-EUC(LED,ENG), MN:[211] VACMEM/PAXMYR-VACSCO-CARGEY, N:[117] PINALB/FESVIR-ARECAP, N:[026] ABILAS-(PSEMEN)/VACMEM/CALRUB, MNO:[104] PHLDIF-(LOMMAR-CARPHA).

▶ [**021**] C-LT5 4 C-GT5* 5 Abies lasiocarpa 4 Arctostaphylos uva-ursi+ 2 Arnica cordifolia** Arnica mollis+* Ceanothus velutinus** Pedicularis racemosa** Pinus albicaulis* 2 Rhododendron albiflorum** Sedum lanceolatum+* Vaccinium scoparium+** 2 [**keep**] TSHRB 2 Achillea millefolium* Amelanchier alnifolia 2 Carex geyeri+ 2 Carex spectabilis+ 2 Erythronium montanum+*** Festuca viridula 2 Hieracium albiflorum* Hydrophyllum capitatum*** Lilium*** Luzula hitchcockii+** Phlox diffusa* 2 Sorbus scopulina*

▶ [**030**] C-LT5 4 C-GT5* 5 Abies lasiocarpa 4 Arnica latifolia+** Callitropsis nootkatensis 2 Polemonium pulcherrimum* Rubus lasiococcus** 2 Sorbus sitchensis** 2 Valeriana sitchensis 2 [**keep**] Calamagrostis rubescens+** 5 Carex geyeri+* 2 Carex spectabilis+ 3 Eremogone capillaris** Festuca viridula* 3 Hieracium scouleri+ 2 Hydrophyllum capitatum*** Lomatium brandegeei+** Pedicularis bracteosa** Salix scouleriana** Senecio integerrimus* Sorbus scopulina*

▶ [**102**] Arctostaphylos uva-ursi+ 2 Castilleja miniata* Erythronium montanum+ 2 Juncus parryi+* 2 Juniperus communis* Lewisia** Sedum lanceolatum+* Selaginella wallacei+ 2 Vaccinium deliciosum* 2 [**keep**] SHRB 8 TSHRB* 2 Amelanchier alnifolia 2 Calamagrostis rubescens+* 4 Carex geyeri+* 2 Chamaenerion angustifolium* Hieracium albiflorum* 2 Hydrophyllum capitatum*** Lilium*** Luzula hitchcockii+* Pedicularis bracteosa* Salix scouleriana** Sorbus scopulina** Vaccinium membranaceum 8

▶ [**212**] Anaphalis margaritacea* Bistorta bistortoides* Eucephalus paucicapitatus** Gentiana calycosa* Juniperus communis 2 Penstemon serrulatus+* Rubus lasiococcus 2 Silene parryi* Sorbus sitchensis* 2 Spiraea splendens** 2 Valeriana sitchensis* Veratrum viride* Xerophyllum tenax 2 [**keep**] Achillea millefolium* Amelanchier alnifolia 2 Calamagrostis rubescens+** 2 Carex geyeri+** 2 Eremogone capillaris*** 2 Festuca viridula* 2 Hydrophyllum capitatum** Lomatium brandegeei+*** Salix scouleriana*** Senecio integerrimus** Sorbus scopulina*

Floristics (7 plots, NOCA 7): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 2		Paxistima myrsinites 17, Eremogone capillaris 4, Lupinus latifolius 1, Achillea millefolium 1	
80-95		Vaccinium membranaceum 33	Lomatium brandegeei+ 2	
60-80		Salix scouleriana 3	Phlox diffusa 6, Pedicularis bracteosa 0	Festuca viridula 5, Luzula hitchcockii+ 0
40-60	Pseudotsuga menziesii 2, Pinus albicaulis 0	Sorbus scopulina 1	Hieracium albiflorum 3, Hieracium scouleri+ 3, Eucephalus ledophyllus+ 3, Senecio integerrimus 2, Penstemon procerus+ 1, Chamaenerion angustifolium 1, Arctostaphylos uva-ursi+ 1, Castilleja miniata 0, Lilium 0, Hydrophyllum capitatum 0, Moehringia macrophylla 0, Erythronium montanum+ 0	Calamagrostis rubescens+ 16, Carex geyeri+ 6
25-40		Amelanchier alnifolia 15, Rosa 0	Thalictrum occidentale 3, Spiraea lucida 2, Valeriana sitchensis 1, Antennaria lanata+ 0, Sedum lanceolatum+ 0, Eriogonum umbellatum 0, Platanthera 0, Fragaria virginiana 0, Castilleja hispida 0, Agoseris 0, Claytonia lanceolata 0	Carex spectabilis+ 8
10-25	Callitropsis nootkatensis 1	Rubus nutkanus 2	Silene parryi 5, Viola glabella+ 1, Arnica mollis+ 1, Erigeron 1, Ligusticum 1	Elymus 1, Trisetum 1, Juncus parryi+ 1

{211} Vaccinium membranaceum, Paxistima myrsinites, Vaccinium scoparium, Carex geyeri
Big huckleberry, Oregon-box, grouse whortleberry & elk sedge shrubland
VACMEM/PAXMYR-VACSCO-CARGEY



Range: Subalpine. **MORA**-1: (ne) 1700-1710m. **NOCA**-3: (s) 1940-1970m.

Struct: Open shrubland with abundant dwarf shrubs, substantial forbs, sedges & grasses, and scant conifer regen. Avg vasc cover 83: shrb 34, dwf shrb 21, forb 10, sedge 7, grass 6, rush 4, conif LT5 0, tall shrb 0.75 @ 2, conif GT5 0.25 @ 2.

Ecology: Fairly steep west-facing slopes, on rocky and often exposed mineral soils. Evidence of past fire often seen. Historically burned by indigenous people to enhance berry production and slow tree invasion (Arnett and Crawford 2007). Some *Abies lasiocarpa* regen is usually present.

Metrics: slope 30-33°, vdp 122-171m, vdr 923-1011m, east 1-4, south 58-68, conv 49-55, tpp 54-69, solar 67-72, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Split from VACMEM, to distinguish from [212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS and [171] SORSIT-VACMEM/VALSIT.

Similar: N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), MNO:[030] ABILAS/VACMEM/LUPARC, MN:[214] VACSCO-FESVIR-ARECAP, N:[021] ABILAS-PINALB/PAXMYR-(CALRUB), MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MO:[213] VACMEM/XERTEN, MN:[102] PAXMYR/PHLDIF, N:[117] PINALB/FESVIR-ARECAP, N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MN:[090] FESVIR-EUC(LED,ENG).

▶ [**021**] C-LT5 2 C-GT5* 4 Abies lasiocarpa 2 Arctostaphylos uva-ursi+* 2 Arnica cordifolia* Arnica mollis+* Calamagrostis rubescens+* Ceanothus velutinus* Eucephalus ledophyllus+* 2 Hieracium scouleri+* Pedicularis bracteosa* Pedicularis racemosa* Pinus albicaulis 2 Pseudotsuga menziesii* 2 [**keep**] Achillea millefolium* Anaphalis margaritacea*** Carex geyeri+* 2 Chamaenerion angustifolium* Festuca viridula 2 Hieracium albiflorum* Luzula hitchcockii+* 2 Rainiera stricta 2 Ribes acerifolium+ 2 Vaccinium scoparium+*
▶ [**030**] C-LT5 2 C-GT5* 4 TSHRB 3 Abies lasiocarpa 2 Callitropsis nootkatensis 2 Phlox diffusa* Polemonium pulcherrimum* Rubus lasiococcus** 2 Sorbus sitchensis* 2 Valeriana sitchensis* 2 [**keep**] Achillea millefolium* Anaphalis margaritacea*** Carex geyeri+** 2 Eremogone capillaris* Festuca viridula* 3 Luzula hitchcockii+* Penstemon procerus+** Pinus albicaulis* Salix scouleriana*** Vaccinium scoparium+**
▶ [**210**] TSHRB 3 Amelanchier alnifolia 2 Calamagrostis rubescens+* 2 Carex spectabilis+ 2 Erythronium montanum+* Eucephalus ledophyllus+* Hieracium albiflorum 2 Hydrophyllum capitatum* Lilium* Pedicularis bracteosa* Phlox diffusa* 2 Sorbus scopulina* [**keep**] Anaphalis margaritacea*** Luzula hitchcockii+ 2 Rainiera stricta 2 Ribes acerifolium+ 2 Vaccinium scoparium+*** 2
▶ [**212**] C-LT5 2 TSHRB 3 Abies lasiocarpa 2 Bistorta bistortoides* Eucephalus paucicapitatus* Gentiana calycosa* Phlox diffusa* Rubus lasiococcus 2 Silene parryi* Sorbus sitchensis* 2 Spiraea splendens* 2 Valeriana sitchensis* Veratrum viride* Xerophyllum tenax 2 [**keep**] Achillea millefolium* Carex geyeri+*** 2 Eremogone capillaris*** Festuca viridula* 2 Luzula hitchcockii+* Paxistima myrsinites* 7 Penstemon procerus+** Pinus albicaulis* Ribes acerifolium+ 2 Salix scouleriana*** Vaccinium scoparium+*** 2
▶ [**214**] Agoseris* Anemone occidentalis+* Erigeron* Hieracium triste 2 Packera 2 Phlox diffusa* 2 Potentilla flabellifolia+* Sedum lanceolatum+ 2 Trisetum* Vaccinium scoparium+ 12 [**keep**] SHRB* 4 Achillea millefolium** Anaphalis margaritacea* Carex geyeri+* Chamaenerion angustifolium* Hieracium albiflorum* Paxistima myrsinites 3 Rainiera stricta 2 Ribes acerifolium+ 2 Vaccinium membranaceum** 5

Floristics (4 plots, MORA 1, NOCA 3): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100	Abies lasiocarpa 1	Vaccinium membranaceum 33	Paxistima myrsinites 14, Vaccinium scoparium+ 7, Chamaenerion angustifolium 2, Lupinus latifolius 2, Anaphalis margaritacea 1, Achillea millefolium 1, Hieracium albiflorum 1	Carex geyeri+ 7, Luzula hitchcockii+ 4
60-80	Pinus albicaulis 0	Salix scouleriana 2	Eremogone capillaris 2, Penstemon procerus+ 1	Festuca viridula 6
40-60		Rhododendron albiflorum 1	Hieracium triste 0, Lomatium brandegeei+ 0, Senecio integerrimus 0, Antennaria lanata+ 0	Poa cusickii+ 2
25-40	Larix lyallii 0, Callitropsis nootkatensis 0	Ribes acerifolium+ 3	Rainiera stricta 3, Penstemon serrulatus+ 1, Polemonium californicum 1, Castilleja miniata 1, Ligusticum 1, Epilobium 0, Arnica latifolia+ 0, Sedum lanceolatum+ 0, Erigeron 0	Racomitrium 1, Elymus 0, Juncus parryi+ 0

{212} Vaccinium membranaceum, Spiraea splendens*, Lupinus latifolius, Eucephalus paucicapitatus/ledophyllus
Big huckleberry, mountain spirea*, subalpine lupine & Olympic or Cascade aster shrubland
VACMEM-(SPISPL)/LUPARC-EUCEPHALUS



Range: Subalpine and upper montane zones. **MORA**-8: **se** (ne-sw) 1600-1650m. **OLYM**-14: **nc**-**sc** (ne-se) 1510-1610m.

Struct: Semi-closed canopy shrubland with abundant forbs and substantial conifer regen. Avg vasc cover 104: shrb 60, forb 24, conif LT5 5, dwf shrb 0.68 @ 6, tall shrb 0.63 @ 10, sedge 0.37 @ 5, conif GT5 0.32 @ 5.

Ecology: Fairly steep south-facing slopes, on dry, rocky and often exposed mineral soils. Evidence of past fire often seen. Historically burned by indigenous people to enhance berry production and slow tree invasion (Arnett and Crawford 2007). *Abies lasiocarpa* regen is usually present.

Metrics: slope 29-39°, vdp 43-193m, vdr 681-1024m, east 22-76, south 83-97, conv 47-56, tpp 55-87, solar 76-90, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Split from VACMEM, to distinguish from [171] SORSIT-VACMEM/VALSIT and [211] VACMEM/PAXMYR-VACSCO-CARGEY.

Similar: MNO:[030] ABILAS/VACMEM/LUPARC, MO:[213] VACMEM/XERTEN, MNO:[172] SPISPL/CARSPE, MNO:[171] SORSIT-VACMEM/VALSIT, MNO:[033] ABILAS/VERVIR, MNO:[032] ABILAS/VALSIT, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[217] VALSIT-VERVIR.

▶ [**030**] C-GT5* 8 Abies lasiocarpa 10 Arnica latifolia+* Paxistima myrsinites* Polemonium pulcherrimum** Rubus lasiococcus* [**keep**] Anaphalis margaritacea* Artemisia 2 Bistorta bistortoides* Eucephalus paucicapitatus** 2 Gentiana calycosa*** Silene parryi* Spiraea splendens** Valeriana sitchensis* Veratrum viride* Xerophyllum tenax** 2
▶ [**033**] C-GT5* Abies amabilis*** 2 Arnica latifolia+* Erigeron* Luzula hitchcockii+* 2 Mitella*** Picea engelmannii 2 Polemonium pulcherrimum** Rhododendron albiflorum* Senecio triangularis+* Thalictrum occidentale* Tsuga mertensiana* Valeriana sitchensis 5 Veratrum viride 2 [**keep**] SHRB 18 Anaphalis margaritacea* Eucephalus paucicapitatus** 2 Gentiana calycosa* Hieracium albiflorum** Juniperus communis 2 Paxistima myrsinites 2 Penstemon serrulatus+* Phlox diffusa* Silene parryi* Spiraea splendens* Vaccinium membranaceum 7 Xerophyllum tenax* 2
▶ [**171**] Arnica latifolia+* 2 Carex spectabilis+* Eucephalus ledophyllus+* 3 Ribes acerifolium+*** Sorbus sitchensis* Thalictrum occidentale 2 Vaccinium deliciosum* 6 Veratrum viride* [**keep**] Anaphalis margaritacea* Artemisia 2 Bistorta bistortoides* Castilleja miniata* Eucephalus paucicapitatus** 2 Gentiana calycosa** Hieracium albiflorum** Juniperus communis 2 Lomatium martindalei* Paxistima myrsinites 2 Penstemon serrulatus+* Silene parryi** Xerophyllum tenax* 2
▶ [**172**] Arnica latifolia+ 2 Carex spectabilis+* 6 Eucephalus ledophyllus+ 2 Vaccinium deliciosum* 6 Veratrum viride* [**keep**] C-GT5 2 Abies lasiocarpa* 2 Anaphalis margaritacea** Eucephalus paucicapitatus*** 2 Gentiana calycosa** Hieracium albiflorum* Juniperus communis 2 Paxistima myrsinites 2 Penstemon serrulatus+* Phlox diffusa* Silene parryi** Vaccinium membranaceum 16
▶ [**213**] Abies amabilis*** Bromus vulgaris+* 2 Fragaria virginiana* Phyllodoce empetriformis*** 2 Polygonum douglasii+* Pteridium aquilinum* 3 Rhododendron albiflorum** Tsuga mertensiana* Vaccinium scoparium+*** 2 Xerophyllum tenax* 8 [**keep**] TSHRB 4 Abies lasiocarpa 3 Artemisia 2 Bistorta bistortoides* Eucephalus paucicapitatus*** 2 Gentiana calycosa*** Paxistima myrsinites 2 Silene parryi*** Sorbus sitchensis 4 Spiraea splendens* Valeriana sitchensis* Veratrum viride*

Floristics (19 plots, MORA 5, OLYM 14): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Vaccinium membranaceum 51		
80-95	Abies lasiocarpa 6		Lupinus latifolius 2	
60-80		Spiraea splendens 12	Eucephalus paucicapitatus 4, Valeriana sitchensis 3, Hieracium albiflorum 1	
40-60		Sorbus sitchensis 11	Xerophyllum tenax 5, Phlox diffusa 3, Bistorta bistortoides 3, Anaphalis margaritacea 3, Chamaenerion angustifolium 2, Veratrum viride 1, Penstemon serrulatus+ 1, Silene parryi 1, Gentiana calycosa 0	
25-40	Callitropsis nootkatensis 2		Paxistima myrsinites 5, Rubus lasiococcus 5, Juniperus communis 4, Vaccinium deliciosum 4, Artemisia 3, Castilleja miniata 1, Lilium 1, Castilleja hispida 1, Pedicularis bracteosa 1, Lomatium martindalei 0, Moehringia macrophylla 0	Carex spectabilis+ 4, Juncus parryi+ 1
10-25	Tsuga mertensiana 2		Erigeron 3, Epilobium 2, Eucephalus ledophyllus+ 2	moss 2, Luzula parviflora 2, Racomitrium 2

{213} Vaccinium membranaceum, Xerophyllum tenax
Huckleberry & beargrass shrubland
VACMEM/XERTEN



Range: Upper montane and lower subalpine zones. **MORA**-22: **nw-se*** (ne-sw) 1460-1670m. **OLYM**-1: (se) 1400-1410m.

Struct: Open shrubland with dense forbs, substantial dwarf shrubs & grasses, and prominent conifer regen. Avg vasc cover 113: forb 48, shrb 33, dwf shrb 0.93 @ 11, conif LT5 0.86 @ 5, grass 0.79 @ 8, tall shrb 0.71 @ 3, fern 0.5 @ 9, sedge 0.5 @ 7, rush 0.29 @ 6, conif GT5 0.14 @ 3.

Ecology: South-facing upper slopes, with evidence of past fire commonly seen. *Abies lasiocarpa* regen is usually present, often with several other species.

Metrics: slope 22-33°, vdp 90-182m, vdr 602-703m, east 13-60, south 84-98, conv 53-63, tpp 69-88, solar 82-90, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Expanded, incorporating plots labeled as VACMEM, VACDEL and XERTEN.

Similar: MO:[212] VACMEM-(SPISPL)/LUPARC-EUCEPHALUS, MNO:[030] ABILAS/VACMEM/LUPARC, N:[210] VACMEM/PAXMYR-ARECAP-(CALRUB), MNO:[171] SORSIT-VACMEM/VALSIT, MNO:[016] ABILAS-(ABIAMA)/VACMEM/XERTEN, MNO:[032] ABILAS/VALSIT, MNO:[172] SPISPL/CARSPE, MNO:[027] ABILAS/RHOALB/RUBLAS, MNO:[028] ABILAS/VACDEL-VALSIT, MNO:[033] ABILAS/VERVIR. Also see: [106] PHYEMP-VACDEL-(CASMER), [107] PHYEMP-(VACDEL)/LUPARC, [209] VACDEL-FESVIR.

▶ [**016**] C-GT5** 5 Abies amabilis* 4 Abies lasiocarpa 3 Callitropsis nootkatensis* 2 Erythronium montanum+* 2 Goodyera oblongifolia** Orthilia secunda*** Pinus monticola** Tsuga mertensiana 2 [**keep**] Anaphalis margaritacea*** Bromus vulgaris+** 2 Carex spectabilis+*** 2 Castilleja miniata** Chamaenerion angustifolium** Elymus** 2 Fragaria virginiana*** Juncus parryi+ 2 Juniperus communis** Phlox diffusa** Polygonum douglasii+** Rhododendron albiflorum 2

▶ [**030**] C-GT5** 5 Abies lasiocarpa 4 Arnica latifolia+* Callitropsis nootkatensis 2 Erigeron** Luzula hitchcockii+* Paxistima myrsinites 3 Pedicularis racemosa** Polemonium pulcherrimum** Tsuga mertensiana 2 Valeriana sitchensis* 2 Viola orbiculata+** [**keep**] Anaphalis margaritacea* Bromus vulgaris+ 2 Elymus*** 2 Fragaria virginiana* Juniperus communis** Phyllodoce empetriformis* Polygonum douglasii+*** Pseudotsuga menziesii* Pteridium aquilinum* Rhododendron albiflorum* Xerophyllum tenax*** 2

▶ [**171**] TSHRB 5 Arnica latifolia+* Eucephalus ledophyllus+* 2 Ribes acerifolium+** Sorbus sitchensis* 4 Thalictrum occidentale*** 2 Vaccinium deliciosum* Valeriana sitchensis* 2 Veratrum viride* 2 [**keep**] Anaphalis margaritacea* Bromus vulgaris+ 2 Elymus 2 Fragaria virginiana* Hieracium albiflorum* Juniperus communis* Paxistima myrsinites** Penstemon serrulatus+* Phlox diffusa 2 Pseudotsuga menziesii** Pteridium aquilinum 2 Rhododendron albiflorum* Xerophyllum tenax*** 2

▶ [**210**] Amelanchier alnifolia 2 Calamagrostis rubescens+ 6 Carex geyeri+* Eremogone capillaris*** 2 Erythronium montanum+* Hieracium albiflorum 2 Hydrophyllum capitatum** Lomatium brandegeei+*** Luzula hitchcockii+** Paxistima myrsinites 3 Pedicularis bracteosa** Salix scouleriana** Senecio integerrimus** Sorbus scopulina** [**keep**] Anaphalis margaritacea* Callitropsis nootkatensis* Elymus* Juniperus communis* Penstemon serrulatus+* Pteridium aquilinum 2 Rhododendron albiflorum* 2 Rubus lasiococcus* Sorbus sitchensis* Tsuga mertensiana* Vaccinium deliciosum 2 Vaccinium scoparium+ 2 Xerophyllum tenax** 2

▶ [**212**] TSHRB 4 Abies lasiocarpa 3 Artemisia 2 Bistorta bistortoides* Eucephalus paucicapitatus*** 2 Gentiana calycosa*** Paxistima myrsinites 2 Silene parryi*** Sorbus sitchensis 4 Spiraea splendens* Valeriana sitchensis* Veratrum viride* [**keep**] Abies amabilis*** Bromus vulgaris+* 2 Fragaria virginiana* Phyllodoce empetriformis*** 2 Polygonum douglasii+* Pteridium aquilinum* 3 Rhododendron albiflorum** Tsuga mertensiana* Vaccinium scoparium+*** 2 Xerophyllum tenax* 8

Floristics (14 plots, MORA 13, OLYM 1): at 10–25% frequency, includes only species with cover ≥ 1.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100		Vaccinium membranaceum 29	Xerophyllum tenax 28	
80-95	Abies lasiocarpa 2		Lupinus latifolius 8	
40-60	Pseudotsuga menziesii 2, Callitropsis nootkatensis 1, Tsuga mertensiana 1	Rhododendron albiflorum 7, Sorbus sitchensis 2	Phlox diffusa 4, Fragaria virginiana 3, Rubus lasiococcus 2, Juniperus communis 2, Penstemon serrulatus+ 2, Paxistima myrsinites 2, Hieracium albiflorum 1, Anaphalis margaritacea 1	Carex spectabilis+ 5, Elymus 5
25-40	Abies amabilis 2		Vaccinium deliciosum 8, Vaccinium scoparium+ 7, Phyllodoce empetriformis 5, Polygonum douglasii+ 1, Castilleja miniata 1, Moehringia macrophylla 1, Chamaenerion angustifolium 1, Lilium 1	Pteridium aquilinum 12, Bromus vulgaris+ 7, Juncus parryi+ 5
10-25		Spiraea splendens 4	Arctostaphylos uva-ursi+ 5, Pedicularis contorta+ 4, Rumex acetosella+ 2, Arnica latifolia+ 2	Calamagrostis rubescens+ 3, Festuca viridula 2, Vahlodea atropurpurea 2

{214} Vaccinium scoparium, Festuca viridula, Eremogone capillaris
Grouse whortleberry, green fescue & mountain sandwort dwarf shrubland
VACSCO-FESVIR-ARECAP



Range: Subalpine. **MORA**-2: (ne-se) 1770-1790m. **NOCA**-5: **s*** 1970-2080m.

Struct: Semi-open dwarf shrubland with abundant forbs and substantial grasses. Avg vasc cover 87: dwf shrb 36, forb 29, grass 15, rush 0.67 @ 4, conif LT5 0.67 @ 2, sedge 0.33 @ 5, tall shrb 0.33 @ 3, shrb 0.33 @ 2.

Ecology: Upper slopes and ridgetops, with evidence of past fire commonly seen. Some regen of *Pinus albicaulis* and *Abies lasiocarpa* is usually present.

Metrics: slope 21-33°, vdp 114-215m, vdr 859-1090m, east 38-98, south 48-83, conv 54-68, tpp 66-81, solar 67-83, wet 2-3

Map class: S47–Successional huckleberry shrubland

Rel to C09: Evolved from VACSCO, incorporating some plots labeled as FESVIR-EUCLED but which fit poorly there.

Similar: MN:[092] FESVIR-PHLDIF-ARECAP, MN:[090] FESVIR-EUC(LED,ENG), MN:[102] PAXMYR/PHLDIF, M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), MN:[216] VALSIT-LIGGRA, N:[097] LARLYA/LUZGLA, MN:[209] VACDEL-FESVIR, MNO:[059] ANTLAN-(OREALP-VACDEL), N:[116] PINALB-(ABILAS)/VACSCO/LUZGLA, MNO:[104] PHLDIF-(LOMMAR-CARPHA).

▶ [**090**] SHRB 3 Achillea millefolium* Arnica mollis+* Carex spectabilis+* 2 Elymus* Eucephalus ledophyllus+** 2 Ligusticum 4 Lomatium brandegeei+* Thalictrum occidentale* 2 [**keep**] Antennaria lanata+* Chamaenerion angustifolium 2 Hieracium triste 2 Juncus parryi+* Larix lyallii*** Luzula hitchcockii+* Packera 2 Paxistima myrsinites* Pinus albicaulis* Potentilla flabellifolia+* Sedum lanceolatum+* 2 Senecio integerrimus* Vaccinium scoparium+*** 5
▶ [**091**] Antennaria lanata+ 2 Bistorta bistortoides* 2 Carex spectabilis+* 2 Oreostemma alpigenum* 2 Potentilla flabellifolia+* 2 [**keep**] Agoseris* Carex geyeri+ 2 Chamaenerion angustifolium 2 Eremogone capillaris* Hieracium triste 2 Larix lyallii** Paxistima myrsinites** Phlox diffusa* Pinus albicaulis*** Sedum lanceolatum+** 2 Senecio integerrimus*** Trisetum** Vaccinium scoparium+*** 2
▶ [**092**] Antennaria lanata+ 2 Arnica mollis+ 2 Castilleja miniata* Eremogone capillaris 3 Erythronium montanum+* 2 Juncus parryi+ 3 Lomatium brandegeei+* Phlox diffusa* [**keep**] TSHRB** Anaphalis margaritacea** Carex geyeri+* Chamaenerion angustifolium* 2 Hieracium albiflorum* Hieracium triste 2 Packera** 2 Paxistima myrsinites* Salix scouleriana** Sedum lanceolatum+*** 2 Trisetum** Vaccinium scoparium+*** 2
▶ [**102**] SHRB* Achillea millefolium* Arctostaphylos uva-ursi+ 2 Castilleja miniata* Erythronium montanum+ 2 Hieracium scouleri+* Juncus parryi+ 3 Lewisia** Lomatium brandegeei+*** Paxistima myrsinites* 3 Phlox diffusa* Vaccinium deliciosum 2 Vaccinium membranaceum* [**keep**] Agoseris* Anaphalis margaritacea** Anemone occidentalis+** Carex geyeri+ 2 Larix lyallii*** Ligusticum** Luetkea pectinata* Lupinus latifolius 2 Packera** 2 Potentilla flabellifolia+** Sedum lanceolatum+ 2 Trisetum** Vaccinium scoparium+** 5
▶ [**216**] Carex spectabilis+* 2 Erythronium montanum+ 2 Eucephalus ledophyllus+ 2 Ligusticum* Vaccinium deliciosum* 2 Valeriana sitchensis* Veratrum viride* 2 [**keep**] Carex geyeri+ 2 Chamaenerion angustifolium 2 Eremogone capillaris*** Juncus parryi+* Larix lyallii** Paxistima myrsinites** Phlox diffusa** 2 Pinus albicaulis*** Sedum lanceolatum+** 2 Senecio integerrimus** Trisetum* Vaccinium scoparium+** 2

Floristics (6 plots, MORA 1, NOCA 5): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Vaccinium scoparium+ 35, Lupinus latifolius 7	Festuca viridula 14
80-95			Erigeron 3, Eremogone capillaris 2	
60-80	Pinus albicaulis 1, Abies lasiocarpa 1		Senecio integerrimus 2	Juncus parryi+ 2
40-60	Larix lyallii 1		Phlox diffusa 5, Sedum lanceolatum+ 4, Paxistima myrsinites 2, Potentilla flabellifolia+ 1, Antennaria lanata+ 1, Anemone occidentalis+ 1, Agoseris 1	Luzula hitchcockii+ 3, Trisetum 1
25-40		Salix scouleriana 3	Chamaenerion angustifolium 4, Hieracium triste 4, Packera 4, Luetkea pectinata 4, Arnica latifolia+ 4, Ligusticum 2, Veronica cusickii+ 2, Silene parryi 1, Hieracium albiflorum 1, Penstemon procerus+ 0, Anaphalis margaritacea 0	Carex geyeri+ 4, Poa cusickii+ 1
10-25		Vaccinium membranaceum 3, Rhododendron albiflorum 1	Valeriana sitchensis 3, Phyllodoce empetriformis 2, Eriogonum pyrolifolium 1, Hieracium scouleri+ 1, Vaccinium deliciosum 1, Castilleja miniata 1, Achillea millefolium 1	Racomitrium 3

{215} Valeriana sitchensis, Carex spectabilis
Sitka valerian & showy sedge herbaceous vegetation
VALSIT-CARSPE



Range: Subalpine zone, ranging into the lower alpine esp at OLYM. **MORA**-14: **sw**-**se** (ne) 1590-1680m. **NOCA**-31: **nw**-**ne**-**cw**-**ce**-**s** 1530-1760m. **OLYM**-22: **ne**-**se*** (nc-sc) 1480-1710m.

Struct: Closed canopy mixed herbaceous vegetation with very dense forbs, dense sedges, and prominent grasses. Avg vasc cover 101: forb 59, sedge 33, grass 0.76 @ 4, conif LT5 0.57 @ 2, dwf shrb 0.53 @ 6, shrb 0.51 @ 2.

Ecology: Concavities on fairly gentle slopes with southerly aspects, on well-drained soils which are often influenced by upslope debris and avalanche chutes. Tree islands are typically adjacent; some *Abies lasiocarpa* regen is often present.

Metrics: slope 13-32°, vdp 2-79m, vdr 490-964m, east 9-63, south 60-98, conv 39-51, tpp 25-73, solar 62-87, wet 3-4

Map class: H53–Showy sedge & Sitka valerian meadow

Rel to C09: Expanded, incorporating plots from CARSPE-(LUPARC-POLBIS), VALSIT-VERVIR, VACDEL and some alliance-level calls.

Similar: MNO:[217] VALSIT-VERVIR, MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[216] VALSIT-LIGGRA, MNO:[172] SPISPL/CARSPE, NO:[093] HERMAX-(THAOCC-SAUAME), NO:[088] EUCPAU-(PHAHAS-CASMIN), MN:[079] CHALAT-(OXYDIG-VALSIT), MNO:[107] PHYEMP-(VACDEL)/LUPARC, MN:[090] FESVIR-EUC(LED,ENG), MNO:[059] ANTLAN-(OREALP-VACDEL). Also see: [067] ATHAME-CRYACR, [100] LUEPEC-(CARSPE), [164] SALCOM/VALSIT.

▶ [**076**] Achillea millefolium* Agoseris* Castilleja parviflora+* Phleum alpinum* Phlox diffusa* Veronica cusickii+* [**keep**] TSHRB* Chamaenerion angustifolium*** Erythronium montanum+* 2 Eucephalus ledophyllus+*** Pedicularis bracteosa*** Sorbus sitchensis*** Thalictrum occidentale 2 Valeriana sitchensis* 4 Veratrum viride*

▶ [**093**] Achillea millefolium* Angelica* Artemisia* 2 Bromus sitchensis* 3 Cirsium edule+* Delphinium*** Elymus* 2 Heracleum maximum** 3 Hydrophyllum fendleri** 2 Thalictrum occidentale* [**keep**] Anemone occidentalis+*** 2 Erythronium montanum+*** 2 Luetkea pectinata** Phyllodoce empetriformis** Potentilla flabellifolia+** 2 Sorbus sitchensis* Spiraea splendens** Vaccinium deliciosum*** 2 Vahlodea atropurpurea** Valeriana sitchensis* 4

▶ [**172**] SHRB* 3 TSHRB* 3 Chamaenerion angustifolium* Sorbus sitchensis* 2 Spiraea splendens** 4 Vaccinium deliciosum* 10 Vaccinium membranaceum** 2 [**keep**] Anemone occidentalis+** 2 Aquilegia formosa* Calamagrostis canadensis+* Chamaenerion angustifolium 2 Cirsium edule+* Elymus* Hieracium triste* Luetkea pectinata** Pedicularis bracteosa*** Potentilla flabellifolia+* 2 Thalictrum occidentale** 2

▶ [**216**] Abies lasiocarpa* Erigeron* Festuca viridula*** 6 Ligusticum** 3 Luzula hitchcockii+ 2 Potentilla flabellifolia+* [**keep**] SHRB* TSHRB* Arnica latifolia+* Carex spectabilis+* 16 Chamaenerion angustifolium* 2 Cirsium edule+* Sorbus sitchensis** Spiraea splendens* Thalictrum occidentale* Vahlodea atropurpurea**

▶ [**217**] SHRB 3 Abies amabilis* Claytonia lanceolata* Epilobium* Hydrophyllum fendleri* Luzula hitchcockii+** Osmorhiza* Senecio triangularis+* 3 Veratrum viride* 10 Viola glabella+* [**keep**] Anemone occidentalis+* Arnica latifolia+* Calamagrostis canadensis+* Castilleja miniata* Elymus* Eucephalus ledophyllus+* Hieracium triste*** Luetkea pectinata** Spiraea splendens* Thalictrum occidentale** 2

Floristics (51 plots, MORA 5, NOCA 26, OLYM 20): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Valeriana sitchensis 18	Carex spectabilis+ 32
60-80			Lupinus latifolius 8, Veratrum viride 7	
40-60	Abies lasiocarpa 1		Bistorta bistortoides 7, Vaccinium deliciosum 6, Chamaenerion angustifolium 5, Arnica latifolia+ 4, Potentilla flabellifolia+ 4	
25-40		Spiraea splendens 2, Sorbus sitchensis 1	Eucephalus ledophyllus+ 13, Thalictrum occidentale 7, Anemone occidentalis+ 6, Erythronium montanum+ 5, Erigeron 4, Phyllodoce empetriformis 2, Pedicularis bracteosa 1, Cirsium edule+ 1	Vahlodea atropurpurea 1
10-25	Callitropsis nootkatensis 2	Vaccinium membranaceum 1	Luetkea pectinata 9, Eucephalus paucicapitatus 4, Veronica cusickii+ 2, Ligusticum 2, Castilleja parviflora+ 2, Senecio triangularis+ 2, Heracleum maximum 2, Silene parryi 1, Castilleja miniata 1, Anaphalis margaritacea 1, Polemonium pulcherrimum 1, Viola glabella+ 1, Hieracium triste 1, Mitella 1, Achillea millefolium 1, Aquilegia formosa 1, Epilobium 1	Calamagrostis canadensis+ 7, Festuca viridula 4, Athyrium distentifolium 2, Elymus 1, Poa cusickii+ 1

{216} Valeriana sitchensis, Ligusticum grayi
Sitka valerian & Gray's lovage herbaceous vegetation
VALSIT-LIGGRA



Range: Subalpine. **MORA**-22: **ne-sw-se** 1590-1750m. **NOCA**-6: **s** 1610-1960m.

Struct: Closed canopy forb-dominated vegetation with substantial grasses and scant conifer regen. Avg vasc cover 97: forb 69, grass 0.94 @ 13, conif LT5 0.76 @ 2, dwf shrb 0.65 @ 11, sedge 0.53 @ 11, rush 0.35 @ 4.

Ecology: Fairly gentle slopes, sometimes in concavities. *Abies lasiocarpa* tree islands are typically nearby; some *A. lasiocarpa* regen frequently present.

Metrics: slope 6-25°, vdp 2-50m, vdr 484-753m, east 15-93, south 41-94, conv 45-53, tpp 25-72, solar 69-81, wet 3-5

Map class: H53–Showy sedge & Sitka valerian meadow

Rel to C09: Expanded, adding plots from FESVIR-EUCLED, FESVIR-LUPARC, VACDEL, VACDEL/FESVIR, VALSIT-VERVIR, and some herbaceous plots from patchy ABILAS/VACDEL occurrences.

Similar: MNO:[217] VALSIT-VERVIR, MN:[090] FESVIR-EUC(LED,ENG), MNO:[215] VALSIT-CARSPE, M:[091] FESVIR-LUPARC-(ANTLAN-POTFLA), MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[209] VACDEL-FESVIR, MNO:[059] ANTLAN-(OREALP-VACDEL), MNO:[107] PHYEMP-(VACDEL)/LUPARC, NO:[093] HERMAX-(THAOCC-SAUAME), MN:[079] CHALAT-(OXYDIG-VALSIT).

▶ [**076**] Bistorta bistortoides* Carex spectabilis+* 16 Cirsium edule+* Luetkea pectinata* Phlox diffusa* Silene parryi* Spiraea splendens* Vahlodea atropurpurea* [**keep**] Erythronium montanum+ 2 Festuca viridula*** Ligusticum*** Valeriana sitchensis* 4
▶ [**090**] SHRB 2 Achillea millefolium* Eremogone capillaris*** Eucephalus ledophyllus+* Phlox diffusa*** 2 Silene parryi* [**keep**] Bistorta bistortoides* Castilleja parviflora+* Epilobium* Gentiana calycosa** Luzula hitchcockii+ 2 Polemonium pulcherrimum* Potentilla flabellifolia+* Senecio triangularis+** Vaccinium deliciosum* Valeriana sitchensis* 5 Veratrum viride* 3 Veronica cusickii+ 2. Note: [090] is in drier locations and on open slopes rather than concavities.
▶ [**091**] Antennaria lanata+* 2 Bistorta bistortoides* Oreostemma alpigenum* 2 Veronica cusickii+* [**keep**] C-LT5* Abies lasiocarpa* Erigeron* Erythronium montanum+ 2 Eucephalus ledophyllus+ 3 Ligusticum* Vaccinium deliciosum 6 Valeriana sitchensis*** 2
▶ [**215**] SHRB* TSHRB* Arnica latifolia+* Carex spectabilis+* 16 Chamaenerion angustifolium* 2 Cirsium edule+* Sorbus sitchensis** Spiraea splendens* Thalictrum occidentale* Vahlodea atropurpurea** [**keep**] Abies lasiocarpa* Erigeron* Festuca viridula*** 6 Ligusticum** 3 Luzula hitchcockii+ 2 Potentilla flabellifolia+*
▶ [**217**] SHRB 2 TSHRB* 2 Bromus sitchensis* Cirsium edule+* Osmorhiza* Senecio triangularis+* Sorbus sitchensis* Vaccinium membranaceum* Vahlodea atropurpurea* Veratrum viride* 12 Viola glabella+*** [**keep**] C-LT5* Abies lasiocarpa* Erigeron* 4 Festuca viridula** Ligusticum* Potentilla flabellifolia+* Veronica cusickii+ 2

Floristics (17 plots, MORA 11, NOCA 6): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
80-95			Valeriana sitchensis 15, Lupinus latifolius 11, Ligusticum 9	Festuca viridula 12
60-80	Abies lasiocarpa 2		Erigeron 9, Potentilla flabellifolia+ 5	
40-60			Vaccinium deliciosum 11, Veratrum viride 8	Carex spectabilis+ 10
25-40			Eucephalus ledophyllus+ 13, Erythronium montanum+ 6, Bistorta bistortoides 6, Veronica cusickii+ 6, Anemone occidentalis+ 4, Castilleja parviflora+ 3, Phyllodoce empetriformis 2, Agoseris 1	Luzula hitchcockii+ 4, Poa cusickii+ 0
10-25	Callitropsis nootkatensis 1		Thalictrum occidentale 12, Arnica mollis+ 8, Pedicularis contorta+ 7, Arnica latifolia+ 6, Senecio triangularis+ 4, Luetkea pectinata 3, Pedicularis groenlandica 2, Oreostemma alpigenum 2, Pedicularis bracteosa 2, Symphyotrichum foliaceum 2, Aquilegia formosa 1, Castilleja miniata 1, Polemonium pulcherrimum 1, Achillea millefolium 1, Chamaenerion angustifolium 1, Claytonia lanceolata 1, Antennaria lanata+ 1, Hieracium triste 1	Calamagrostis canadensis+ 4, Bromus vulgaris+ 2, Phleum alpinum 1, Juncus parryi+ 1, Elymus 1

{217} Valeriana sitchensis, Veratrum viride
Sitka valerian & corn-lily herbaceous vegetation
VALSIT-VERVIR



Range: Lower subalpine. **MORA**-19: **ne**-**sw***-**se*** 1570-1690m. **NOCA**-5: **cw** (nw-s) 1400-1780m. **OLYM**-16: **nc**-**ne**-**se*** (sc) 1330-1530m.

Struct: Closed canopy forb-dominated vegetation with substantial sedges and/or grasses. Avg vasc cover 102: forb 74, sedge 0.76 @ 18, grass 0.7 @ 8, conif LT5 0.45 @ 3, dwf shrb 0.39 @ 5, shrb 0.33 @ 10, rush 0.33 @ 2, tall shrb 0.27 @ 3, fern 0.18 @ 2, conif GT5 0.12 @ 5.

Ecology: Fairly gentle slopes, on very moist sites such as seeps, stream drainages and avalanche tracks. Standing water may occur early in the growing season. Mineral soil may be exposed by animal activity.

Metrics: slope 8-33°, vdp 5-82m, vdr 485-839m, east 7-86, south 28-86, conv 41-54, tpp 31-67, solar 50-82, wet 2-4

Map class: H53–Showy sedge & Sitka valerian meadow

Rel to C09: Similar, shedding some plots to [215] VALSIT-CARSPE.

Similar: MNO:[215] VALSIT-CARSPE, MN:[216] VALSIT-LIGGRA, MNO:[076] CARSPE-(LUPARC-POLBIS), MN:[079] CHALAT-(OXYDIG-VALSIT), NO:[093] HERMAX-(THAOCC-SAUAME), NO:[088] EUCPAU-(PHAHAS-CASMIN), MNO:[172] SPISPL/CARSPE, MNO:[033] ABILAS/VERVIR, MN:[090] FESVIR-EUC(LED,ENG), MNO:[059] ANTLAN-(OREALP-VACDEL).

▶ [**076**] Abies lasiocarpa* Achillea millefolium** Castilleja parviflora+* Erigeron* Hieracium triste*** Luetkea pectinata*** Phleum alpinum* Spiraea splendens* Vaccinium deliciosum* Veronica cusickii+* [**keep**] SHRB 4 TSHRB* 2 Chamaenerion angustifolium* Epilobium* Luzula hitchcockii+* Senecio triangularis+*** Sorbus sitchensis** Vaccinium membranaceum* Valeriana sitchensis* 4 Veratrum viride* 5 Viola glabella+**
▶ [**079**] TSHRB* Athyrium distentifolium*** 2 Chamaenerion latifolium*** 2 Epilobium* Erythranthe lewisii+** Luetkea pectinata*** Oxyria digyna*** 2 Veronica cusickii+* [**keep**] C-LT5 2 SHRB 3 Bistorta bistortoides*** 2 Carex spectabilis+* Lupinus latifolius** Potentilla flabellifolia+ 2 Veratrum viride* 3
▶ [**093**] Achillea millefolium*** Artemisia 2 Cirsium edule+* Heracleum maximum** 8 Hydrophyllum fendleri 2 Thalictrum occidentale*** 2 [**keep**] Bistorta bistortoides* Lupinus latifolius* Luzula hitchcockii+*** Phyllodoce empetriformis** Potentilla flabellifolia+** 2 Senecio triangularis+* Sorbus sitchensis* Vaccinium deliciosum*** 2 Valeriana sitchensis* 4 Veratrum viride* 8
▶ [**215**] Anemone occidentalis+* Arnica latifolia+* Calamagrostis canadensis+* Castilleja miniata* Elymus* Eucephalus ledophyllus+* Hieracium triste*** Luetkea pectinata** Spiraea splendens* Thalictrum occidentale** 2 [**keep**] SHRB 3 Abies amabilis* Claytonia lanceolata* Epilobium* Hydrophyllum fendleri* Luzula hitchcockii+** Osmorhiza* Senecio triangularis+* 3 Veratrum viride* 10 Viola glabella+*
▶ [**216**] C-LT5* Abies lasiocarpa* Erigeron* 4 Festuca viridula** Ligusticum* Potentilla flabellifolia+* Veronica cusickii+ 2 [**keep**] SHRB 2 TSHRB* 2 Bromus sitchensis* Cirsium edule+* Osmorhiza* Senecio triangularis+* Sorbus sitchensis* Vaccinium membranaceum* Vahlodea atropurpurea* Veratrum viride* 12 Viola glabella+***

Floristics (33 plots, MORA 14, NOCA 4, OLYM 15): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Veratrum viride 24	
80-95			Valeriana sitchensis 19	
60-80			Lupinus latifolius 7	Carex spectabilis+ 18
40-60			Senecio triangularis+ 6, Bistorta bistortoides 4	
25-40		Sorbus sitchensis 2	Potentilla flabellifolia+ 7, Vaccinium deliciosum 5, Erigeron 2, Viola glabella+ 2, Phyllodoce empetriformis 2	Luzula hitchcockii+ 2
10-25	Callitropsis nootkatensis 5, Tsuga mertensiana 3, Abies amabilis 3, Abies lasiocarpa 1	Spiraea splendens 6, Vaccinium membranaceum 5	Eucephalus ledophyllus+ 13, Chamaenerion angustifolium 5, Heracleum maximum 5, Arnica latifolia+ 4, Ligusticum 4, Erythronium montanum+ 3, Pedicularis bracteosa 3, Aquilegia formosa 2, Epilobium 2, Claytonia lanceolata 2, Castilleja parviflora+ 1, Polemonium pulcherrimum 1, Cirsium edule+ 1, Hydrophyllum fendleri 1, Mitella 1, Veronica cusickii+ 1, Osmorhiza 1	moss 19, Festuca viridula 8, Bromus sitchensis 4, Poa cusickii+ 3, Phleum alpinum 2, Vahlodea atropurpurea 1

{218} Anticlea/Toxicoscordion, Festuca roemeri*, Koeleria macrantha*, Racomitrium spp.
Death camas, Roemer's fescue*, prairie junegrass* & racomitrium herbaceous vegetation
ZIGVEN-(FESROE-KOEMAC)/RACOMITRIUM



Range: Lowland zone, on balds. **MORA**-1: (se) 920-930m. **NOCA**-2: (ne-ce) 600-650m. **OLYM**-2: (ne) 760-800m.

Struct: Semi-closed canopy mixed herbaceous vegetation with abundant grasses & forbs, prominent shrubs, and very dense mosses, spikemosses & lichens. Avg vasc cover 69: grass 29, forb 27, shrb 0.8 @ 4, fern 0.6 @ 3, conif LT5 0.6 @ 1, dwf shrb 0.4 @ 2, conif GT5 0.2 @ 2.

Ecology: Very dry bedrock balds, south-facing and with westerly aspects, embedded in *Pseudotsuga menziesii* or *Pinus contorta* forests and woodlands. Small *P. menziesii* are frequently present.

Metrics: slope 23-32°, vdp 16-194m, vdr 160-596m, east 22-36, south 91-98, conv 43-74, tpp 36-61, solar 71-75, wet 1-3

Map class: H58–Bedrock balds & sparse veg forest openings

Rel to C09: Evolved from FESROE-CERARV-KOEMAC, shedding a plot to [064] ARCUVA-FRAVIR/RACOMITRIUM and gaining one from LOMMAR SPARSE.

Similar: MNO:[103] PENDAV/RACOMITRIUM, N:[064] ARCUVA-FRAVIR/RACOMITRIUM, N:[131] PSESPI/SELWAL, O:[089] FESROE-(PHLDIF-ARECAP), MNO:[104] PHLDIF-(LOMMAR-CARPHA), NO:[093] HERMAX-(THAOCC-SAUAME), N:[083] DANINT/RACOMITRIUM, O:[060] ARCCOL/RACOMITRIUM, N:[061] ARCNEV-PAXMYR/CALRUB, MN:[071] CARNIG-CARLEN-(CALCAN). Also see: [095] JUNCOM-(PHLDIF) (loose scree at higher elevations).

▶ [**064**] C-LT5 2 Arctostaphylos uva-ursi+* 3 Paxistima myrsinites*** Penstemon procerus+ 2 Spiraea lucida* [**keep**] Allium* Anticlea/Toxicoscordion* 2 Berberis aquifolium* 2 Eriophyllum lanatum* Festuca roemeri 2 Fritillaria affinis* Lomatium martindalei* Lomatium nudicaule+* Micranthes tolmiei+* Selaginella wallacei+*. Note: [064] is a dwarf shrub and forb-dominated bald.
▶ [**089**] C-LT5 2 Anemone occidentalis+ 2 Eremogone capillaris* 2 Festuca roemeri* Juncus parryi+ 2 Juniperus communis* Lupinus latifolius 2 Phlox diffusa** 2 [**keep**] SHRB 2 Anticlea/Toxicoscordion*** 2 Berberis aquifolium** 2 Calamagrostis rubescens+ 2 Cryptogramma acrostichoides** Fragaria virginiana** Fritillaria affinis** Koeleria macrantha 2 Lomatium nudicaule+* Micranthes tolmiei+** Pseudotsuga menziesii** Racomitrium*** 2 Selaginella wallacei+*. Note: [089] is in upper subalpine sites.
▶ [**103**] Arctostaphylos uva-ursi+ 2 Penstemon procerus+** 2 Selaginella wallacei+ 9 [**keep**] SHRB* 2 Achillea millefolium* Allium* Anticlea/Toxicoscordion*** 2 Berberis aquifolium*** 2 Calamagrostis rubescens+ 2 Eriophyllum lanatum* Festuca roemeri 4 Fragaria virginiana* Fritillaria affinis* Koeleria macrantha 2 Lomatium martindalei* Lomatium nudicaule+** Selaginella wallacei+*
▶ [**104**] Artemisia 2 Carex phaeocephala+ 2 Juniperus communis* 2 Lupinus latifolius* Phlox diffusa** 2 Silene parryi 2 [**keep**] SHRB* Allium* Anticlea/Toxicoscordion*** 2 Berberis aquifolium** Calamagrostis rubescens+ 2 Collinsia parviflora** Cryptogramma acrostichoides** Fragaria virginiana** Fritillaria affinis** Koeleria macrantha 2 Lomatium nudicaule+*** Racomitrium** 14 Selaginella wallacei+*** 2
▶ [**131**] C-LT5 2 C-GT5* Aspidotis densa* Bromus vulgaris+* Castilleja miniata* Philadelphus lewisii* 2 Pinus ponderosa 2 Pseudoroegneria spicata*** 2 Vicia* [**keep**] Calamagrostis rubescens+ 2 Festuca roemeri 2 Racomitrium* 9 Selaginella wallacei+*** 2

Floristics (5 plots, MORA 1, NOCA 2, OLYM 2): at 10–25% frequency, includes only species with cover ≥ 0.5%

Freq %	Trees	Shrubs	Forbs & dwarf shrubs	Graminoids, ferns, etc
95-100			Achillea millefolium 3	Racomitrium 58, Selaginella wallacei+ 6
80-95			Anticlea/Toxicoscordion 8, Lomatium nudicaule+ 2	
60-80	Pseudotsuga menziesii 1	Berberis aquifolium 4	Eriophyllum lanatum 4, Lomatium martindalei 3, Collinsia parviflora 2, Fritillaria affinis 2, Allium 2, Fragaria virginiana 2, Micranthes tolmiei+ 1	lichen 16, Cryptogramma acrostichoides 3, moss 2
40-60		Holodiscus discolor 3, Amelanchier alnifolia 1	Hemieva ranunculifolia 2, Arctostaphylos uva-ursi+ 2, Collomia 1, Cerastium arvense 1, Galium 1, Epilobium 1, Erythronium montanum+ 1	Festuca roemeri 24, Koeleria macrantha 20, Calamagrostis rubescens+ 6, Danthonia 2
10-25			Delphinium 5, Montia 4, Microseris 3, Fragaria vesca 2, Phacelia 1, Castilleja miniata 1, Agoseris 1, Silene parryi 1, Drymocallis glandulosa+ 1, Silene douglasii 1, Eremogone capillaris 1, Spiraea lucida 1, Sedum spathulifolium 1, Gayophytum 1, Madia 1, Lathyrus nevadensis 1, Lewisia 1	Vulpia 20, Bromus tectorum+ 8, Bromus vulgaris+ 3, Aira caryophyllea 3, Trisetum 1, Festuca occidentalis+ 1, Agrostis 1, Luzula hitchcockii+ 1

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Appendix A. Field photo sources

- [001] NOCA plot 312.1073
- [002] MORA plot CF.36
- [003] MORA plot 3.100
- [004] NOCA plot 140.0008
- [005] MORA plot CF.28
- [006] NOCA plot 508.0021
- [007] NOCA plot 192.0012
- [008] OLYM plot CF.52
- [009] MORA plot CF.19
- [010] OLYM plot CF.54
- [011] NOCA plot CF.68
- [012] NOCA plot 518.0473
- [013] OLYM plot 369.0001
- [014] NOCA plot 102.1773
- [015] NOCA plot 212.0004
- [016] OLYM plot 365.0011
- [017] NOCA plot 135.1575
- [018] NOCA plot 089.0005
- [019] MORA plot E12.1255
- [020] OLYM plot 680.0009
- [021] NOCA plot 073.0013
- [022] OLYM plot 767.1184
- [023] OLYM plot 743.1341
- [024] OLYM plot 714.5184
- [025] OLYM plot CF.63
- [026] NOCA plot 073.1864
- [027] OLYM plot 818.0003
- [028] MORA plot CF.34
- [029] OLYM plot CF.38
- [030] OLYM plot 817.0001
- [031] MORA plot MR.33
- [032] MORA plot CF.88
- [033] NOCA plot CF.410
- [034] NOCA plot 555.4444
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- [036] MORA plot L047.004
- [037] MORA plot S.30
- [038] NOCA plot 563.0021
- [039] NOCA plot 456.0001
- [040] OLYM plot DF.3
- [041] OLYM plot DF.14
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- [044] NOCA plot 410.0001
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- [046] NOCA plot 423.0004
- [047] OLYM plot 098.1939
- [048] OLYM plot 332.0004
- [049] OLYM plot ATOL.003
- [050] OLYM plot 158.0001
- [051] OLYM plot 142.0003
- [052] MORA plot DF.11
- [053] NOCA plot 225.0019
- [054] OLYM plot 600.0002
- [055] MORA plot C003.004
- [056] NOCA plot S.114
- [057] OLYM plot 364.5173
- [058] NOCA plot S.109
- [059] MORA plot G110.006
- [060] OLYM plot SH.3
- [061] NOCA plot 072.0024
- [062] NOCA plot 019.0003
- [063] MORA plot WR070.004
- [064] NOCA plot 370.0002
- [065] OLYM plot 269.0001
- [066] NOCA plot H.704
- [067] NOCA plot 125.0030
- [068] NOCA plot DF.115
- [069] NOCA plot 295.1108
- [070] NOCA plot 423.0008
- [071] NOCA plot 573.0101
- [072] OLYM plot 698.0004
- [073] NOCA plot 103.0029
- [074] NOCA plot 505.0020
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- [076] MORA plot WR074.004
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- [080] OLYM plot CF.143
- [081] OLYM plot 679.0003
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- [083] NOCA plot 335.H.1
- [084] OLYM plot 681.0011
- [085] OLYM plot 748.0001
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- [087] MORA plot WR070.002
- [088] OLYM plot 651.0010
- [089] OLYM plot 530.001
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- [092] NOCA plot 119.0001
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- [095] OLYM plot 590.0020
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- [104] OLYM plot 429.0017
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- [106] NOCA plot 329.0003
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- [108] NOCA plot 141.1476
- [109] OLYM plot A033.001
- [110] OLYM plot CF.100
- [111] OLYM plot CF.205
- [112] OLYM plot A036.004
- [113] OLYM plot 226.0003
- [114] OLYM plot A016.003
- [115] OLYM plot CF.114
- [116] NOCA plot 037.1990
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- [124] NOCA plot 566.0005
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- [127] OLYM plot DF.37
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- [132] NOCA plot 084.0005
- [133] NOCA plot 479.0664
- [134] NOCA plot 084.0006
- [135] OLYM plot 305.0003
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- [138] NOCA plot 581.0001
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- [141] NOCA plot 387.0777
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- [143] NOCA plot 096.0050
- [144] NOCA plot CF.2
- [145] NOCA plot 061.1893
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- [147] NOCA plot 061.0007
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- [155] NOCA plot 615.0013
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- [157] NOCA plot 368.0884
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- [159] OLYM plot 272.4309
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- [161] NOCA plot 131.1650
- [162] OLYM plot 794.0005
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- [166] NOCA plot 140.0001
- [167] NOCA plot 423.0011
- [168] OLYM plot 461.0020
- [169] NOCA plot 522.0022
- [170] NOCA plot 184.1299
- [171] NOCA plot 213.0022
- [172] OLYM plot 669.0007
- [173] OLYM plot 806.0002
- [174] OLYM plot 017.0001
- [175] NOCA plot 116.0002
- [176] OLYM plot 103.0002
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- [179] MORA plot H.11
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- [182] NOCA plot 572.0003
- [183] OLYM plot 402.1011
- [184] OLYM plot CF.98
- [185] OLYM plot 601.0003
- [186] OLYM plot 415.6799
- [187] OLYM plot 514.6341
- [188] OLYM plot 127.1930
- [189] OLYM plot A016.005
- [190] OLYM plot 412.3874
- [191] OLYM plot A012.005
- [192] OLYM plot 656.10
- [193] OLYM plot 294.0001
- [194] MORA plot CF.55
- [195] NOCA plot 412.0001
- [196] MORA plot 18.2
- [197] OLYM plot 298.4984
- [198] OLYM plot 537.0003
- [199] MORA plot 3.130
- [200] OLYM plot A026.008
- [201] MORA plot CF.62
- [202] OLYM plot A030.004
- [203] OLYM plot 384.3508
- [204] NOCA plot 135.1595
- [205] OLYM plot 521.0011
- [206] NOCA plot 185.1290
- [207] OLYM plot 554.0004
- [208] OLYM plot 297.1592
- [209] NOCA plot 089.0006
- [210] NOCA plot 548.0001
- [211] NOCA plot 045.0002
- [212] OLYM plot 429.0007
- [213] MORA plot 4.112
- [214] NOCA plot 038.DS.416
- [215] NOCA plot 127.0002
- [216] MORA plot CF.31
- [217] OLYM plot 366.0001
- [218] OLYM plot HB.2