

Garry Oak (*Quercus garryana*) Plant Communities in British Columbia: A Guide to Identification

2007



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in British Columbia: A Guide to Identification**

Wayne R. Erickson and Del Meidinger



Ministry of Forests and Range
Forest Science Program

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SCOPE

This field guide covers the native plant communities with a component of Garry oak (*Quercus garryana*) in British Columbia. It is a guide to identification of these communities, which can be applied to the woodlands, savannah, meadow, and rock outcrops within and near the zone of influence of oak canopy. The guide does not cover very specific occurrences, such as vernal pools, or the broader set of associated ecosystems that help form the Garry oak landscape. In the background work (Erickson 1996, 1998, 2002b) on which this guide is based, Garry oak ecosystems were interpreted as a climax conditioned by a natural disturbance regime. This would occur within a smaller geographic scale than that addressed by the provincial biogeoclimatic ecosystem classification (BEC). In the BEC context they are placed as seral in comparison to climax Douglas-fir forest on circum-mesic sites, and could possibly be considered as a disclimax. This guide does not focus on management, which is addressed only via rankings and comments under each plant community. We have provided both scientific and common names to meet the diverse interests of guide users.

HOW TO USE THE FIELD GUIDE

Follow these steps to use this field guide:

1. Use the flow charts to identify the plant association or plant association site.
2. Follow the colour key and page reference to the plant association section.
3. Use the flow charts at the start of each section to identify the plant association, subunits, or sites.
4. Read the selected description to confirm identity.
5. Record the plant association and community unit and relevant interpretations, refining as justified.

Steps 1–3 can be completed using the information found in Appendix 1. We suggest that the reader also review the descriptions.



Mount Galiano Garry oak landscape.



Reynolds Point Garry oaks.

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INTRODUCTION

Increasing awareness and concern about the decline of Garry oak plant communities have now attracted considerable interest from naturalists, the public, and the scientific community. These special ecosystems have now been identified as a focus for national recovery planning.

The Garry oak landscape corresponds to a rainshadow zone in the lee of the Olympic and Vancouver Island mountains with a mild, winter-wet, summer-dry modified Mediterranean climate. It is an area of inner coast and islands with elevations ranging from sea level to 550 m on ridge tops and mountains (Figure 1). Geologically, this region is complex, being composed of a folded and faulted sedimentary basin, metamorphic contact zones with exotic terranes, granitic intrusions, and both glacial and colluvial surface overlays. Soils have been organically enriched with Ah horizons and are often shallowly underlain by bedrock. Persistent exposure to insolation, wind, or seaspray is common. Periodic fire is thought to have typified the natural disturbance regime, as in other oak woodlands of the Pacific Northwest.

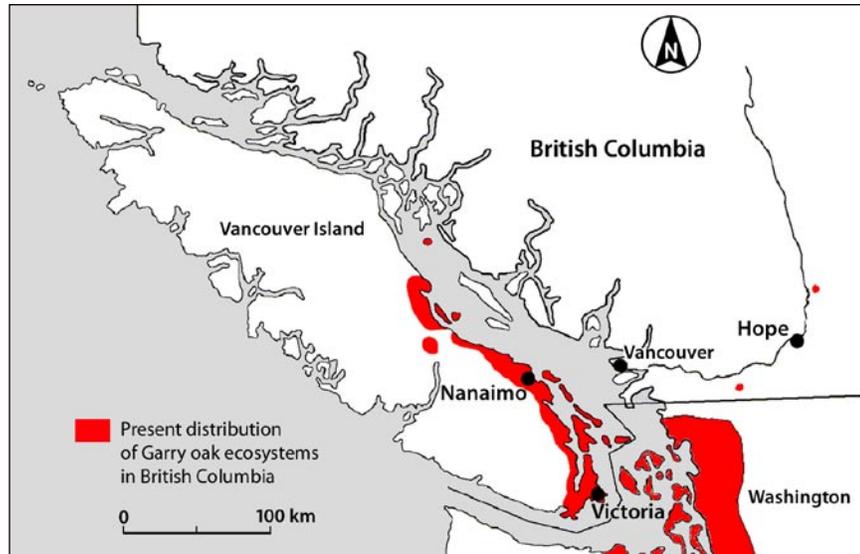
At a landscape scale, site-level moisture regime, elevation, and amount of surface bedrock (exposed or with shallow humus) have been identified as the most important variables in accounting for the plant community gradient (Erickson 1996). At the plant community scale, the most important distinguishing variables were site mineral soil exposure, soil coarse fragments, and geographic area, followed by topographic drainage, soil texture, depth to bedrock, percent downed wood, and elevation (Erickson 2002b). After grazing, lack of fire, and the cool wet climate following the late 1800s, shrubs and Douglas-fir (*Pseudotsuga menziesii*), which here are particularly represented by the community types Qgos-c10 and Qggc-c13, encroached considerably into circum-mesic sites of the Garry oak habitat.

An ecosystem guide should help to identify these plant communities and provide a focus for their appreciation and management. This guide describes native plant communities, which are dominated by and named for native plant species. It combines the detail developed by Erickson (1996, 1998) with a more generalized treatment, via the introduction of seven plant associations. Thus, many of the broad landscape and ecosystems are addressed along with the mosaic of small patch communities and subcommunities in the original work.

Text and tables give an overview of these types and communities, followed by flow charts for identification. The flow charts use differences in plant species composition in combination with landscape characteristics, physiognomy, and site features. A one-page description follows for each plant community, presented within the structure of its plant association. The order of the plant associations ranges generally from driest to wettest. Appendices give other relevant information such as a list of the invasive alien communities (equivalent to the first- and second-order disturbance communities from Erickson 1996, 1998). Note that a report with more detailed results and data is currently in preparation (Erickson [2007]).

Overview of Garry Oak Communities

Communities in this guide have Garry oak present at some level of cover, ranging from light, open, often shrubby cover to parkland savannah form, closed woodland, and even shrub thickets. This range takes us from the ex-



posed sea coast to isolated patches on the higher promontories. The isolation of these oaks is taken to be a remnant of biogeographic history in which these open ecosystems have retracted from a former wide distribution at the height of the post-glacial warm dry and warm wet eras. The relationship between community and environment has been complicated by this history, and is also influenced by the past fire management practices of indigenous First Nations people.

Fully developed Garry oak landscapes no longer remain, as most have been fragmented by development or conifer encroachment. Especially relevant is the loss throughout the lower Saanich Peninsula, formerly the centre of concentration for these ecosystems in British Columbia. Patterns of the communities are often therefore patchy, variable, and incomplete. Outstanding communities include the early season category, usually dominated by camas¹ (common camas [*C. quamash*] and great camas [*C. leichtlinii*] or those dominated by native grasses such as Roemer's [Idaho] fescue [*Festuca roemeri*, *F. idahoensis*] or blue wildrye [*Elymus glaucus*]). This guide does not cover either extreme without Garry oak: really wet (hygric to hydric) sites forming part of the landscape catena; or very dry open, treeless sites dominated by bryophytes. However, Garry oaks are typical in riparian edges, and an overview of pocket grasslands in the Garry oak landscape can be found elsewhere (Erickson 2003). Also a range of ecosystems, such as the larger open meadows, coastal bluffs, and vernal pools associated with the Garry oak landscape, are not covered here. Note that invasive alien plant communities (Appendix 4) dominate much of the remaining Garry oak landscape, making the native communities rare and even more isolated.

Related communities both inside and outside British Columbia were originally compared by Erickson (1996, 1998). Recently, Washington's Natural Heritage Program has published reports and fact sheets on plant associations for all of the Puget Trough bioregion, including woodlands and savannahs, "balds," and bluffs (Chappell 2006a, 2006b).

¹ Provincial standard common names and scientific names are used in this guide, but common names are emphasized. The reader can refer to the same basic material in Erickson (1996, 1998). Scientific taxonomy here has been updated for consistency with the Douglas et al. (1998–2002) series. Any exceptions are noted in the text.

ABOUT THIS GUIDE

This guide identifies and classifies stands or environmental sites into plant communities. Classification provides a common language for referring to sites, so that distribution, threats, and rarity can be discussed, along with the exchange of management experience. Classifications communicate ecological information and increase understanding, which allows managers and naturalists to become oriented more quickly to a new landscape. Thus the focus of management can be refined so efforts can be applied where they make the most difference.

The purpose of this guide is to standardize the use of plant communities in conservation and recovery of the Garry oak habitat, and thus to move toward an ecosystem approach. Standardized communities can provide a basis for mapping and inventory. The guide is also intended to provide targets for Garry oak habitat restoration, and could help identify reference communities, which are then monitored to detect long-term ecological trends.

Compared with previous work, this guide introduces the plant association as a new, simplified level. The seven plant associations presented here are subdivided into 16 plant community types and six subcommunities. Most are similar to those in Erickson (1996, 1998), with changes mainly in the level of classification. Categories are maintained for bedrock outcrop and colluvial, early and late season (phenological), grassy, and shrub thicket communities. Native communities from each of these categories are included in the one-page descriptions. Alien (non-native) species are designated with an asterisk (*) in these descriptions. Sections include: a general description of sites, soils, stands, and vegetative composition; a chart with geographic area against site moisture regime; comments including equivalent communities and succession to native or invasive alien communities; a chart with the relative importance value of the major understorey plant species; and a chart with management rankings (see also Appendix 8). More details on these topics, especially on management, are in previous work. Note that site moisture regime is generalized in the charts, so there may be occurrences outside the range shown. This guide can be updated and refined over time through use and testing, together with the incorporation of local knowledge on plant communities.

Plant Community Classification Levels

Three classification levels, with three parallel subdivisions, are used for the plant communities in this guide. Plant associations are the most general level, as they may represent amalgamations of communities; plant community types are intermediate; and plant subcommunities can be very specific for

Plant association	Outline of the Plant Community Classification		
Plant community type	Phenological plant community type	Native successional community type	Invasive alien community type
Plant subcommunity	Phenological plant subcommunity	Native successional subcommunity	Invasive alien subcommunity

one type of site and relative uniformity of species composition. Working definitions follow in the second table.

The phenological designation used here could mislead those used to other ecosystems, because this stage of spring is the time of peak growth in Garry oak ecosystems. Successional relationships are indicated in these tables for each plant association. Native successional communities still have their native plant composition and reflect the recovery stages that occur after small-scale disturbances. Invasive alien communities have lost this composition due to invasions of alien (non-native, introduced) species. They are listed but not described here. Erickson describes these communities within the first- and second-order disturbance communities in Erickson (1996, 1998).

Definitions of the Plant Community Classification Units	
Plant association	Major vegetation unit characterizing a habitat and forming part of a simplified recognizable sequence
Plant community type	A subunit with more specific ecological or geographic occurrence
Phenological plant community type	A subunit, usually with spring forbs, having a relatively short temporal identification window
Native successional plant community type	A subunit representing a segment of succession after minor disturbance and recovery
Invasive alien plant community type	A subunit that has been very disturbed and is dominated by invasive alien plants (invading, non-native species)
Plant subcommunity	A subunit with more specific ecological or geographic occurrence
Phenological plant subcommunity	A subunit, usually with spring forbs, having a relatively short temporal identification window
Native successional plant subcommunity	A subunit representing a segment of succession after minor disturbance and recovery
Invasive alien plant subcommunity	A subunit that has been very disturbed and is dominated by invasive alien plants (invading, non-native species)

Quantitative comparisons of similarities and differences heavily influence placement within these units (Appendix 5). The keys in Appendices 1 and 2 use a facultative, rather than a dichotomous, approach and therefore promote a “best-fit” solution. Erickson (2002b) concluded that a 1:1 relationship with environment was not possible and there would always be an element of unpredictability. Therefore, in the flow charts and keys, vegetation precedes environment. In the descriptions, the term “important” is used when a species has a cover class ≥ 3 (11%+), with lesser importance below this, and a minor or “present” designation for class 1 (0–1%). Each community has charts with relative importance values that combine constancy (across the plots) times mean cover (class mid-point) to give one index value.

**Management
Rankings**

In the descriptions, each plant community is given a management ranking in table form for eight sets of interpretations: preservation priority, regeneration potential, aesthetic appeal, susceptibility to disturbance, prescribed fire potential, threats, restoration potential, and restoration priority. The rankings are then assigned as a range between very low and very high (see Appendix 8). Each is a relative ranking within the interpretation category and the range of communities shown here plus the invasive alien communities of Garry oak habitat. These interpretations are brought in directly from Erickson (1996), where detailed discussions of each can be found. The interpretations vary from expert opinion, informed by observations from the sampling effort, to data-assisted interpretations.

Geographic Areas

Five geographic area categories were used to describe distribution: western shore (west of the Saanich Peninsula, out to East Sooke); Saanich Peninsula; southern Gulf Islands (Saltspring to Galiano and the islands south); northern Gulf Islands (north of this to Denman and Hornby islands); and Nanaimo–Duncan (north to Nanoose Bay and south to either the Saanich Peninsula or western shore areas).

**List of Garry Oak
Plant Associations**

- Garry oak – Grey rock-moss – Wallace’s selaginella plant association
- Garry oak – Broom-moss plant association
- Garry oak – Hairy honeysuckle plant association
- Garry oak – Roemer’s fescue plant association
- Garry oak – Common camas – Blue wildrye plant association
- Garry oak – Great camas – Blue wildrye plant association
- Garry oak – Oceanspray – Common snowberry plant association

This guide includes seven plant associations; 17 community types; and six subcommunities. This total is up from previous work (Erickson 1996, 1998) because of the addition of the plant association level. However, this addition also simplifies for applications that require a general approach (e.g., mapping at a scale that prevents detail). All full plant associations with their native communities are listed in Appendix 3. The other communities are listed and described within the coloured section for each plant association. A synopsis of the key to the plant association follows, along with flow charts covering both vegetation and sites (Appendix 1). Community designations below the plant association maintain the names and alphanumeric codes (via the last three digits) from the previous classification, for example, as highlighted: Qgbm-c11 Garry oak – Broom-moss – Small-leaved montia (*Quercus garryana* – *Dicranum scoparium* – *Montia parvifolia*) community type. The level of some communities and subcommunities has changed from previous work.

Synopsis of the Key to Garry Oak Plant Associations

Mostly native dominant species

Bedrock landscapes

Warm aspects²: grey rock-moss – Wallace’s selaginella

Cool aspects: broom-moss

Dry colluvial sites: hairy honeysuckle

Cool or wet sites

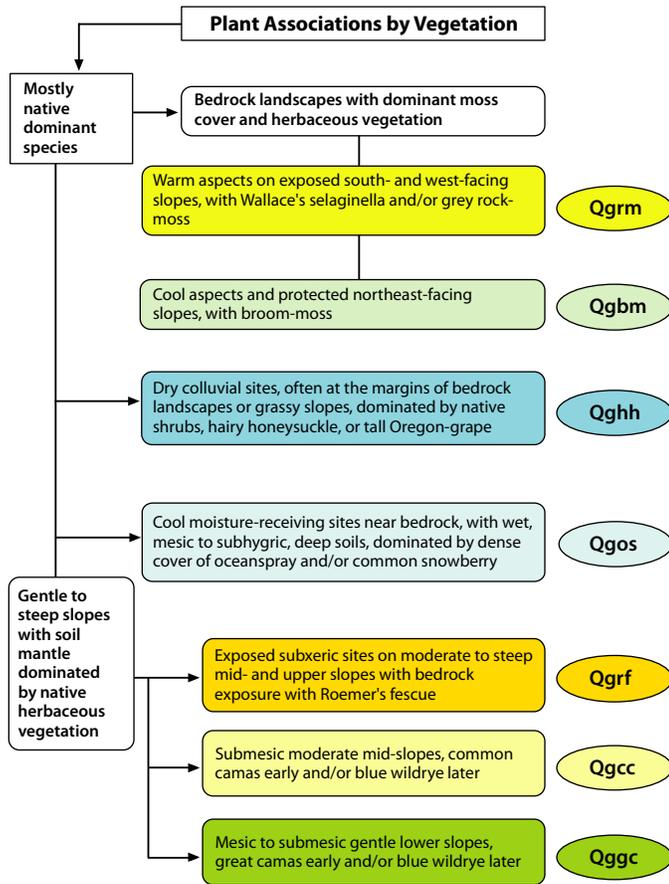
Dense cover of native shrubs, oceanspray – common snowberry

Gentle to steep slopes with native herbaceous vegetation

Exposed subxeric sites: Roemer’s fescue

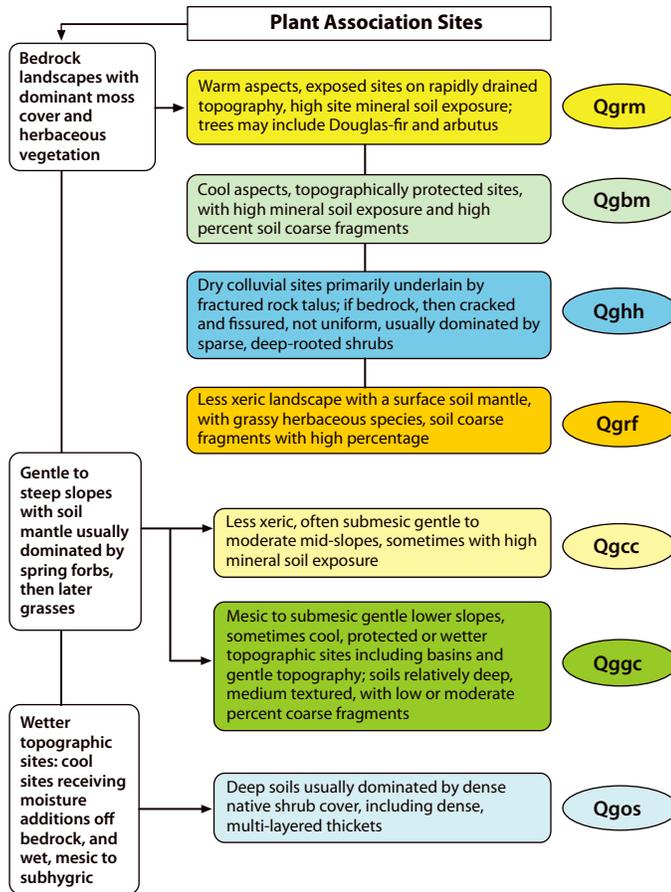
Moderate submesic sites: common camas – blue wildrye

Lower slope mesic sites: great camas – blue wildrye



Notes: Defining species have at least 11% cover. Early season is April 15 to May 15. Other details are in the text and the full keys at the back.

² “Garry oak” and “plant association” are left out of the synopsis for brevity.



Large Garry oak trunk, Elkington.



Garry oak canopy.

Qgrm

Garry oak – Grey rock-moss – Wallace’s selaginella

Quercus garryana – *Racomitrium canescens* – *Selaginella wallacei*—plant association

Key Features

- Bedrock landscapes or other rocky xeric landscapes
 - Exposed sites on rapidly drained topography, high site mineral soil exposure
- Warm aspects on south- and west-facing slopes
- Prominent moss cover and herbaceous vegetation
 - Trees if present may include Douglas-fir and arbutus
 - Grey rock-moss dominant: Wallace’s selaginella and/or grey rock-moss ≥ 11% cover, the other of which > 2% cover

This plant association may degrade into one of the following invasive alien communities (which are listed, but not described here):

- barren fescue*³ and/or grey rock-moss ≥ 11% cover, the other of which > 2% cover, Scotch broom* often ≥ 11% cover: Garry oak – Grey rock-moss – Barren fescue* (*Vulpia bromoides*) (c50, c3 in Erickson 1996, 1998)
- Scotch broom* and grey rock-moss ≥ 26% cover, > other species, cheatgrass often ≥ 11% cover: Garry oak – Scotch broom* – Grey rock-moss (c17, c22 in Erickson 1996, 1998).

Orchardgrass is limited on these severe sites. With the exceptions above, Scotch broom* cannot readily persist or remain highly dominant.

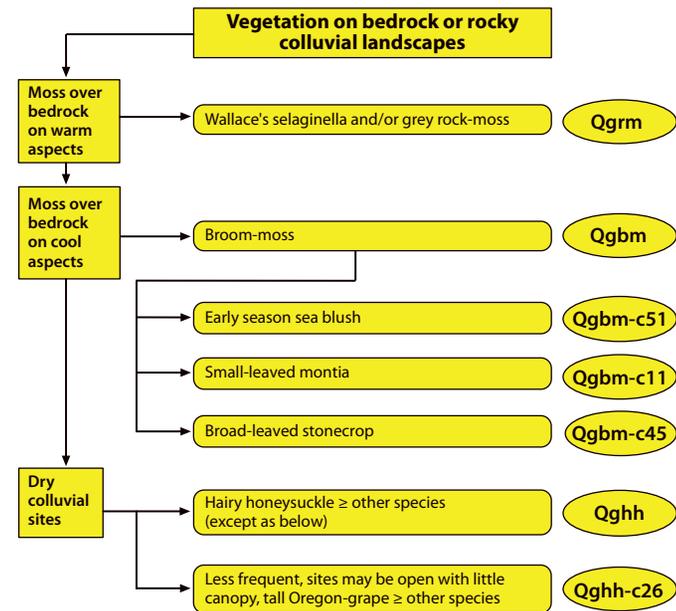
Plant community types	None ⁴	
Plant subcommunities	None	
Phenological stages	None	
Native successional stages	None	
Invasive alien subcommunities	Garry oak – Grey rock-moss – Barren fescue* c50 (includes Garry oak – Scotch broom* – Grey rock-moss – Annual fescue* – Hairgrass* c3)	Garry oak – Scotch broom* – Grey rock-moss c17 (includes Garry oak – Scotch broom* – Grey rock-moss – Cheatgrass* c22)

3 Asterisk is used to designate alien (exotic, non-native) species.

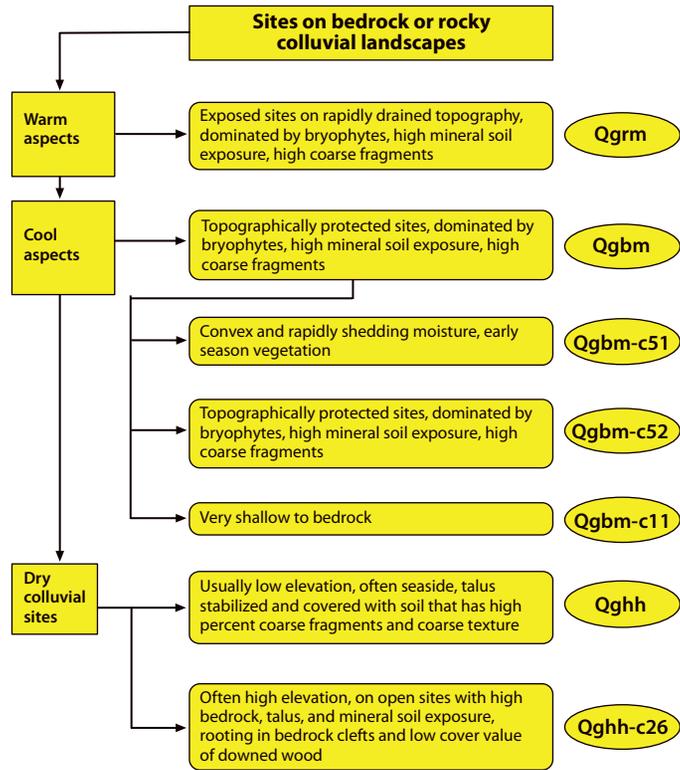
4 None in this context means none identified.

This plant association was recognized as a plant community (c46) in Erickson (1996, 1998). The combination and designation of the invasive alien (c50, c3; plus c17, c22) subcommunities are based on high Index of Similarity (IS) (Appendix 5) comparison results: IS > 1.36 and the IS value of c3 versus c17 (Erickson (1996).

Full keys are found in Appendices 1 and 2. Flow charts to bedrock landscape plant communities follow.



Notes: Defining species have at least 11% cover. Early season is April 15 to May 15. Other details are in the text and the full keys at the back.



Galiano Bluffs, Galiano Island.



Bodega Ridge, Galiano Island.



Typical grey rock-moss outcropping, Government House.

Qgrm

Garry oak – Grey rock-moss – Wallace’s selaginella

Quercus garryana – *Racomitrium canescens* – *Selaginella wallacei* —plant association

General Description

This plant association is infrequently distributed throughout the range with the exception of the northern Gulf Islands but its invasive alien subcommunities are widespread. The Garry oak – Grey rock-moss –



Wallace’s selaginella plant association occupies warm aspects of exposed (insolation and wind), rapidly drained topography, underlain by uniform bedrock. These sites have high site mineral soil exposure. They usually occur at high elevations on very xeric, very steep south-

west, sometimes convex, slopes. Plots have high coarse (conglomerate, sandstone) bedrock exposed or underlying shallow, rocky, sandy loam to loam textured, gravelly Orthic Regosols or (poorly developed) Orthic Dystric Brunisols. There is sometimes still a deep, dark Ah horizon with Rhizomull surface humus. Oaks of various diameters can be found in a tree or tall shrub canopy. Douglas-fir (*Pseudotsuga menziesii*) or arbutus (*Arbutus menziesii*) may be present, with lesser cover, on many sites in these layers. Moderately well-stocked oak saplings are found on most sites and on all sites for seedlings. Grey rock-moss (*Racomitrium canescens*⁵) and Wallace’s selaginella (*Selaginella wallacei*) are important on all sites;

California brome (*Bromus carinatus*) and blue wildrye (*Elymus glaucus*) are of lesser importance. Juniper haircap moss (*Polytrichum juniperinum*) is important on most sites, with many-flowered wood-rush (*Luzula multiflora*) and barren fescue*

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

5 The old spelling of this genus, Rhacomitrium, is used in the “relative importance” charts.

(*Vulpia bromoides*) less so. Yarrow (*Achillea millefolium*), small-flowered birds-foot trefoil (*Lotus micranthus*), and small-flowered blue-eyed Mary (*Collinsia parviflora*) are of lesser importance. Also present are woolly eriophyllum (*Eriophyllum lanatum*), early hairgrass* (*Aira praecox*), hawksbeard* (*Crepis* sp.), sheep sorrel* (*Rumex acetosella*), and goldenback fern (*Pentagramma triangularis*).

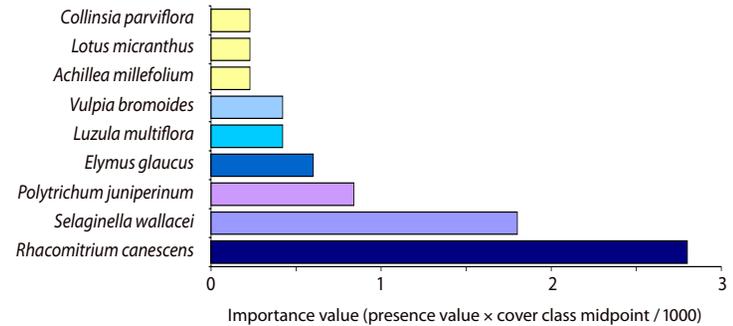
Comments

This plant association represents the most xeric plots in that survey. The same community occurs frequently on openings without Garry oak. This plant association is distinguished by very high bedrock exposure and high-elevation occurrence on very steep, convex, south- and west-facing slopes. With disturbance it is suggested to convert in sequence to the invasive alien grey rock-moss subcommunities (Garry oak – Grey rock-moss – Barren fescue* [c50] and Garry oak – Scotch

Management Ranking	
Preservation priority	Very high
Regeneration potential	High
Aesthetic appeal	High
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	Moderately high
Restoration potential	Moderately high
Restoration priority	High

broom* – Grey rock-moss [c17], which now include the previous c3 and c22 of Erickson 1996, 1998). Similar communities occur very frequently on openings without Garry oak. The succession above should reverse, as the Scotch broom* communities are not expected to persist on these severe sites.

Relative Importance Value of Major Species



Qgbm

Garry oak – Broom-moss

Quercus garryana – *Dicranum scoparium*—plant association

Key Features

- Bedrock landscapes
- Prominent moss cover and herbaceous vegetation
- Cool aspects and protected north- and east-facing slopes
- Broom-moss ≥ 11% cover

The Garry oak – Broom-moss plant association consists of three community types (below), including one designated as phenological (early season). The general plant association itself can sometimes be assigned as native successional when its occurrence results from the depletion of forbs by disturbance.

Plant community types	Garry oak – Broom-moss – Small-leaved montia Qgbm-c11 ⁶	Garry oak – Broom-moss – Broad-leaved stonecrop Qgbm-c45
Phenological community types	Garry oak – Broom-moss – Sea blush Qgbm-c51	
Native successional community types	None	
Plant subcommunities	None	
Invasive alien stages	None	

The Garry oak – Broom-moss plant association was recognized as the typic subcommunity (c52) of this group in Erickson (1996, 1998). Scientific names of the community types are as follows:

The Garry oak – Broom-moss – Small-leaved montia community type Qgbm-c11: *Quercus garryana* – *Dicranum scoparium* – *Montia parvifolia* community type.

⁶ Community designations below the plant association maintain the names and alphanumeric codes (via the last three digits) from Erickson (1996, 1998), for example, as highlighted: Qgbm-c11 Garry oak – Broom-moss – Small-leaved montia (*Quercus garryana* – *Dicranum scoparium* – *Montia parvifolia*) community type.

The Garry oak – Broom-moss – Sea blush community type Qgbm-c51: *Quercus garryana* – *Dicranum scoparium* – *Plectritis congesta* community type.

The Garry oak – Broom-moss – Broad-leaved stonecrop community type Qgbm-c45: *Quercus garryana* – *Dicranum scoparium* – *Sedum spathulifolium* community type.

Flow charts to the plant communities of bedrock landscapes are found under Qgrm (page 9). Full keys are found in Appendices 1 and 2.



Sea blush, Thetis Park Nature Sanctuary Association.



Small-leaved montia, View Royal Park.

Qgbm

Garry oak – Broom-moss

Quercus garryana – *Dicranum scoparium*—plant association

General Description

This plant association is infrequently distributed throughout the range, except on the main Gulf Islands. These are cool aspect, convex but topographically protected sites on uniform bedrock, with high values for



mineral soil exposure and coarse fragments within the soil. Some sites may be south facing, with insolation and wind exposure. They have been rated as subxeric to very xeric in their moisture regime.

Exposure of bedrock (mainly coarse sandstone or granite) and surface rocks

is often high. Where deeper, soils are classified as Orthic Sombric Brunisols, but they often have only a shallow Ah horizon and are Regosols. Rhizomull humus overlies dark Ah horizon. Surface soils are sandy loam to silt loam in texture and are chiefly gravelly with low percent coarse fragments. Trees are mostly of medium diameter⁷ and are found as a tree canopy. Regeneration

is moderately well-stocked saplings on all sites and lightly stocked seedlings on some sites. Broom-moss (*Dicranum scoparium*) is important on all sites. Species important on most sites include barren fescue* (*Vulpia bromoides*),

sweet vernalgrass* (*Anthoxanthum odoratum*), and grey rock-moss (*Racomitrium canescens*).

Common snowberry (*Symphoricarpos albus*), hairy honeysuckle (*Lonicera hispidula*), blue wildrye (*Elymus glaucus*), Roemer's fescue (*Festuca roemerii*), small-flowered birds-foot trefoil (*Lotus micranthus*), and cleavers⁸ (*Galium aparine*) are of lesser importance on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

⁷ See Appendix 8 for a description of diameter classes.

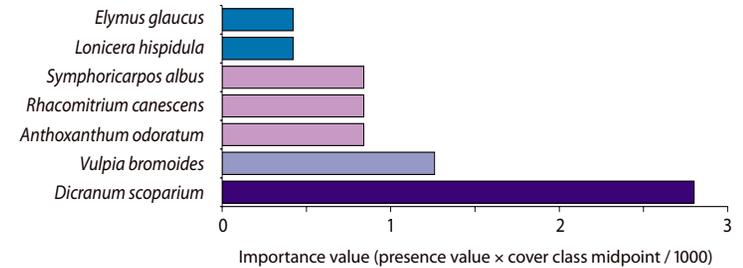
⁸ Cleavers is designated a native species in provincial standards for taxonomy. We recognize that some have interpreted it to be an alien species.

Comments

The Garry oak – Broom-moss plant association occurs on sites with convex surface shape, which partly distinguishes it, compared with other bedrock communities. Some occurrences are thought to derive from the Garry oak – Broom-moss – Broad-leaved stonecrop Qgbm-c45 community type as a result of disturbance.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	High
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	High
Restoration potential	High
Restoration priority	Moderate

Relative Importance Value of Major Species



Qgbm-c11 Garry oak – Broom-moss – Small-leaved montia

Quercus garryana – *Dicranum scoparium* – *Montia parvifolia*—community type

General Description

This community type occurs infrequently in all areas except the northern Gulf Islands. It occurs on cool aspects, very shallowly underlain by uniform bedrock. These are moderate to steep northwest-to-east slopes



at low to medium elevations. Moisture regime is xeric to very xeric. These sites can be exposed to insolation but not usually wind. All plots have high exposure of coarse (conglomerate, granitic gneiss) bedrock and surface rocks.

Soils are usually Orthic Regosols with surface Rhizomull humus over very shallow silty loam Ah horizons. Oaks are composed of a tall shrub canopy with small diameters. Seedlings, which are lightly stocked, are regenerating on most sites. Only some sites have saplings but these sites are moderately well stocked.

Small-leaved montia (*Montia parvifolia*), broom-moss (*Dicranum scoparium*), blue wildrye (*Elymus glaucus*), cleavers (*Galium aparine*), sweet vernalgrass* (*Anthoxanthum odoratum*), miner’s-lettuce (*Montia perfoliata*), and electrified cat’s-tail moss (*Rhytidiadelphus triquetrus*) are important on most or all sites. Common snow-berry (*Symphoricarpos albus*), silver hairgrass (*Aira caryophyllea*), northern holly fern (*Polystichum cf. lonchitis*), and California brome (*Bromus carinatus*) are of lesser importance.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

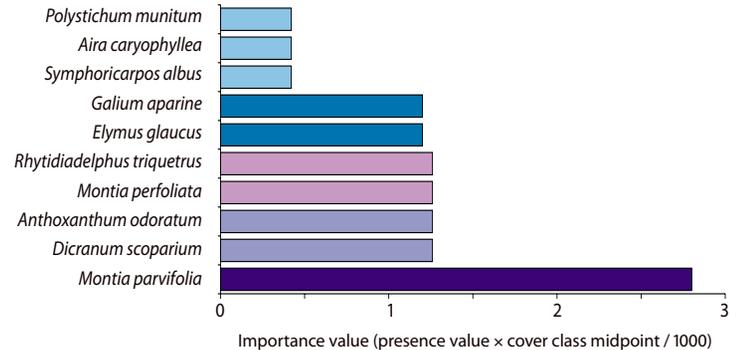
Comments

This community type also shows similarities to the wet shrubby Garry oak – Oceanspray – Common snowberry – Licorice fern plant community Qgos-c15. Within the bedrock grouping, this subcommunity is

distinguished by its residence on north-facing slopes, and by the silt loam texture of the shallow Ah horizon. Disturbance may lead to conversion into the Garry oak – Miner’s-lettuce community type, Qggc-c48.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	High
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	High
Restoration potential	Moderately high
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qgbm-c51 Garry oak – Broom-moss – Sea blush

Quercus garryana – *Dicranum scoparium* – *Plectritis congesta*—phenological community type

General Description

This community type occurs infrequently in the main Vancouver Island range of Garry oak ecosystems. Sites are on cool, convex, and rapidly shedding but protected aspects, shallowly underlain by uni-



form bedrock. These are steep north and east slopes at low to mid-elevations (< 100 m). Moisture regime is xeric to very xeric but includes permesic on rubble with seepage. All plots have high bedrock exposure, surface and soil coarse fragments, and gravelly shallow soils

(Orthic Humic Regosols) with Vermimull surfaces. There is still a relatively deep, fine-textured (loam to silt loam) Ah horizon (> 10–30 cm). Orthic Sombric Brunisols develop in deeper pockets. Oaks of various diameters grow in tree canopy form in these pockets. Most sites are moderately well stocked with saplings. All sites have seedling regeneration but stocking is light on average. Broom-moss (*Dicranum scoparium*), sea blush (*Plectritis congesta*), great camas (*Camassia leichtlinii*), miner’s-lettuce (*Montia perfoliata* = *Claytonia* new name), electrified cat’s-tail moss (*Rhytidiadelphus triquetrus*), and cleavers (*Galium aparine*) are important on all sites. Scotch broom* (*Cytisus scoparius*), sweet vernalgrass* (*Anthoxanthum odoratum*), Pacific snake-root (*Sanicula crassicaulis*), and broad-leaved stonecrop (*Sedum spathulifolium*) are of lesser importance on all sites. Common snow-berry (*Symphoricarpos albus*), trailing blackberry (*Rubus ursinus*), and sweet cicely (*Osmorhiza chilensis*) are present on all sites. With intermediate cover on most sites are oceanspray (*Holodiscus discolor*), California brome (*Bromus carinatus*), Alaska oniongrass (*Melica*

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygic					

subulata), Kentucky bluegrass* (*Poa pratensis*), orchardgrass* (*Dactylis glomerata*), barren fescue* (*Vulpia bromoides*), and small-leaved montia (*Montia parvifolia*), plus the following with minor cover: blue wildrye (*Elymus glaucus*), soft brome* (*Bromus hordeaceus*), barren brome* (*Bromus sterilis*), small-flowered alumroot (*Heuchera micrantha*), field chickweed (*Cerastium arvense*), northern holly fern (*Polystichum* cf. *lonchitis*), Menzies’ larkspur (*Delphinium menziesii*), white fawn lily (*Erythronium oregonum*), American vetch (*Vicia americana*), small-flowered blue-eyed Mary (*Collinsia parviflora*), dovefoot geranium* (*Geranium molle*), tiny vetch* (*Vicia hirsuta*), common vetch* (*Vicia sativa*), and common chickweed* (*Stellaria media*).

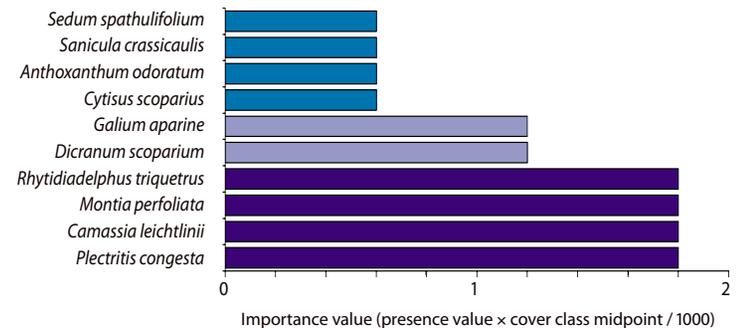
Comments

This community type was previously included both in the early season and bedrock outcrop community groups. It can be distinguished by

this early season occurrence on north-facing slopes, shallowness to bedrock, and association with fine-textured soils—loam to silt loam—with relatively deep Ah horizons. There may be a degree of resiliency in these settings, as suggested by the lack of successional role for this subcommunity (Erickson 1996, 1998).

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	High
Restoration potential	Moderately high
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qgbm-c45 Garry oak – Broom-moss – Broad-leaved stonecrop

Quercus garryana – *Dicranum scoparium* – *Sedum spathulifolium*— community type

General Description

This community type occurs infrequently throughout the area, except for the northern Gulf Islands. It occupies low-elevation sites with high coarse fragments in soil, which is very shallowly underlain by uniform



bedrock. The community is often restricted to the southern part of Vancouver Island, and is generally absent from areas accessible to deer grazing. These are moderate to steep, convex, southeast to southwest slopes. Moisture regime is assigned as xeric to very xeric. Though the broom-moss grouping has been conceptualized as cool aspect communities, these sites are exposed to near-maximum insolation and wind. All plots have high exposure of coarse (conglomerate, granitic gneiss) bedrock and surface

rocks. Soils are usually Orthic Regosols with surface Rhizomull humus over gravelly shallow loam-textured Ah horizons and high percent coarse fragments. Small-diameter oaks form a tall shrub canopy layer. Well-stocked saplings occur on all sites. Most sites have lightly to moderately well-stocked seedlings.

Broad-leaved stonecrop (*Sedum spathulifolium*) and common snowberry (*Symphoricarpos albus*) are important on all sites. On most sites broom-moss (*Dicranum scoparium*) is important and cleavers (*Galium aparine*) are less important.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

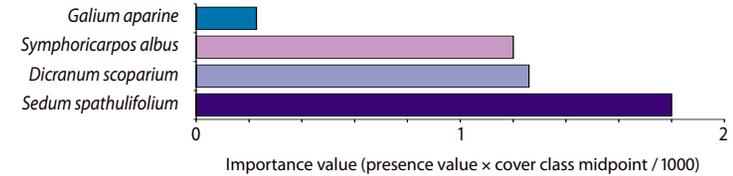
Comments

This community type is partly distinguished by its high coarse fragments, and by its occurrence on south-facing slopes, as well as features shared with the other bedrock outcrop communities. Disturbance may

lead to conversion into the Garry oak – Miner’s-lettuce Qggc-c48 community type or, in at least one case on Saltspring Island, to the Garry oak – Scotch broom* – Kentucky bluegrass* (c4 in Erickson 1996, 1998). However, Scotch broom* is not expected to persist on these severe sites.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	High
Restoration potential	Moderately high
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qghh

Garry oak – Hairy honeysuckle

Quercus garryana – *Lonicera hispidula*—plant association

Key Features

- Dry, colluvial sites, often at the margins of bedrock landscapes
- Primarily underlain by fractured rock (talus); if bedrock, then cracked and fissured, not uniform
- Frequent, with fairly uniform Garry oak canopy
- Dominated by sparse, deep-rooted native shrubs
- Hairy honeysuckle $\geq 11\%$ cover \geq other species (except as below)

Plant community types	Garry oak – Tall Oregon-grape Qghh-c26	
Plant subcommunities	None	
Phenological stages	c21 and c2 are late season communities	
Native successional stages	None	
Invasive alien community types	Garry oak – Barren brome (c23) Garry oak – Scotch broom* – Hedgehog dogtail* (c2)	Garry oak – Hedgehog dogtail* (c21)

This plant association is based on the c16a community in Erickson (1996, 1998), and represents a type of site with deep-rooted shrubs in a colluvial landscape. It can also occur on rocky mid-slopes in a grassy matrix.

The plant association and the community types above are distinct based on index of similarity results ($IS > 0.2$). The two invasive alien community types, c2 and c21, are late season in their phenology.

Flow charts to the plant communities of bedrock landscapes are found under Qgrm. Full keys are found in Appendices 1 and 2.



Stand, Nanoose Hill.



Hairy honeysuckle understorey.



Oregon-grape.

Qghh

Garry oak – Hairy honeysuckle

Quercus garryana – *Lonicera hispidula*—plant association

General Description

This plant association is locally frequent throughout the range. These are dry, colluvial sites, underlain by fractured rock (talus) or cracked and fissured (not uniform) bedrock. It is often found at the margins of



bedrock or other rocky xeric landscapes. Soils have a high percent coarse fragments and coarse texture (loamy sand to sandy loam). This community type is usually found on steep, low-elevation, south- to southwest-facing sites with moderately high cover of surface rock or

exposed (chiefly sandstone) bedrock. These sites are exposed to wind and insolation, and range from submesic to xeric. Soils are gravelly and classified as Orthic Sombric Brunisols or Orthic Humic Regosols (where shallow) and have Vermimull or Rhizomull humus, and dark, and sometimes brownish, Ah horizons. Oaks of various diameters occur as a tree or tall shrub canopy, often with high cover. Well-stocked saplings are regenerating on most sites; seedlings vary from lightly to moderately well stocked. Hairy honeysuckle (*Lonicera hispidula*) is important in this

sparse vegetation on all sites, along with cleavers (*Galium aparine*) and common vetch* (*Vicia sativa*) on most sites. Blue wildrye (*Elymus glaucus*), Pacific snakeroot (*Sanicula crassicaulis*), and tiny vetch* (*Vicia hirsuta*) are of lesser importance.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

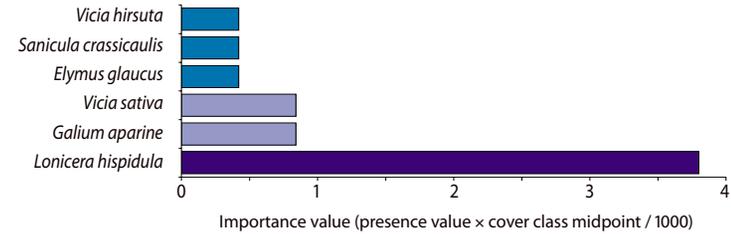
Comments

This plant association is related to rocky colluvial, talus sites. This talus is often stabilized and is found below the surface. The Garry oak – Hairy honeysuckle plant association often occurs near the sea-edge; it is partly distinguished by its high surface coarse fragments, coarse

soils, and occurrence at low elevations. With disturbance it is thought to potentially retrogress into Garry oak – Barren brome (c23).

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	Low
Threats	High
Restoration potential	High
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qghh-c26 Garry oak – Tall Oregon-grape

Quercus garryana – *Mahonia aquifolium*—community type

General Description

This community type occurs infrequently in all areas except the southern Gulf Islands. These dry, colluvial sites are underlain by fractured rock (talus) or cracked and fissured (not uniform) bedrock. It is often



found at the margins of exposed bedrock or other rocky xeric landscapes. Sites have high surface coarse fragments, mineral soil exposure, and low cover values of downed wood. They are usually found on steep, northwesterly aspects at high elevation. These sites are exposed to wind and

insolation, and are classified as subxeric to xeric. Soils are classified as Orthic Sombric Brunisols with Vermimull or Xeromull humus. Ah horizons are dark but brownish, and there are high subsurface coarse fragments. Oaks form a tree canopy but have small diameters. Regeneration is occurring on all sites for both saplings (moderately well stocked) and seedlings (light to moderate). Tall Oregon-grape (*Mahonia aquifolium*) is important on all sites. Blue wildrye (*Elymus glaucus*), California brome (*Bromus carinatus*), common vetch* (*Vicia sativa*), and barren brome* (*Bromus sterilis*) are of lesser importance on all sites; with hedgehog dogtail* (*Cynosurus echinatus*) on most sites. Yarrow (*Achillea millefolium*), field chickweed (*Cerastium arvense*), Pacific snakeroot (*Sanicula crassicaulis*), and cleavers (*Galium aparine*) are present on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

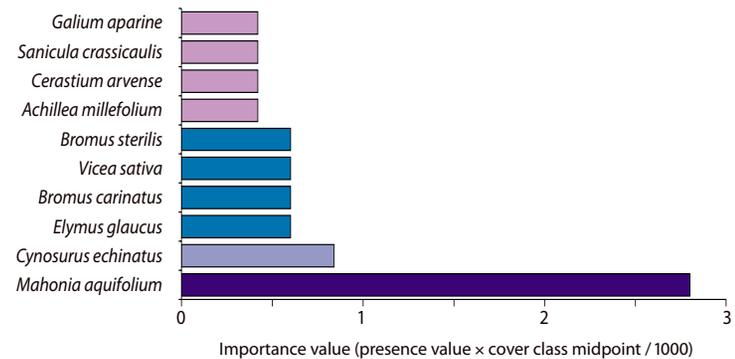
Comments

This community type occurs on very rocky, colluvial talus sites on more northwesterly slopes with very high surface coarse fragments, which partly distinguishes it. This community may degrade into the

invasive alien late season Garry oak – Hedgehog dogtail* (c21) or Garry oak – Barren brome* (c23) community types with disturbance.

Management Ranking	
Preservation priority	Very high
Regeneration potential	High
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	Low
Threats	Moderately high
Restoration potential	High
Restoration priority	High

Relative Importance Value of Major Species



Qgrf

Garry oak – Roemer’s fescue

Quercus garryana – *Festuca roemerii*⁹ – plant association

Key Features

- Gentle to steep slopes with soil mantle
- Often exposed subxeric sites on moderate to steep mid- and upper slopes with bedrock exposure
- Dominated by native herbaceous vegetation; Roemer’s fescue ≥ 11% cover

Plant community types	None	None
Plant sub-communities	Garry oak – Roemer’s fescue – Field chickweed Qgrf-c25 Krummholz Garry oak – Roemer’s fescue – American vetch Qgrf-c42	Garry oak – Roemer’s fescue – Small-headed clover Qgrf-c27
Phenological stages	c2 and c21 are late season	
Native successional stages	None	
Invasive alien community types ¹⁰	Garry oak – Hedgehog dogtail* (c21)	Garry oak – Scotch broom* – Hedgehog dogtail* (c2)

This plant association, based on the *Quercus garryana* – *Festuca idahoensis* typical subcommunity (c20) in Erickson (1996, 1998) has no community types but has three subcommunities.

Full keys are found in Appendices 1 and 2. Flow charts to bedrock landscapes with soil mantle plant communities follow:

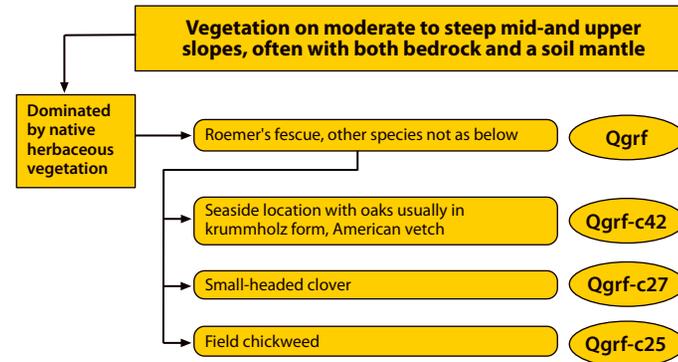


Roemer’s Fescue, above Eagle Ridge stand. On the right, Elkington.

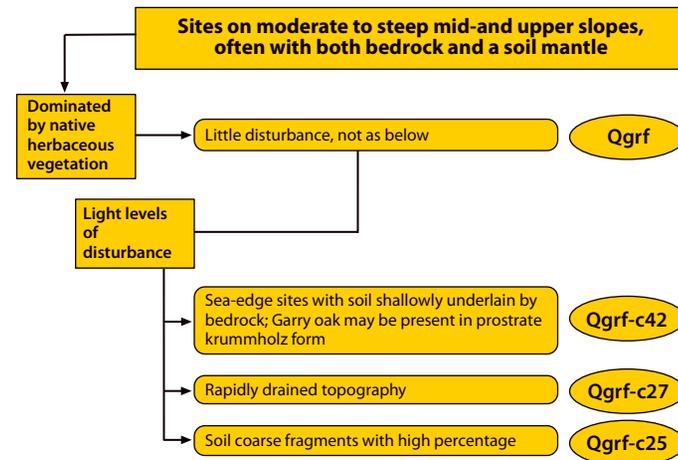


⁹ *Festuca idahoensis* is equivalent and is covered here under *F. roemerii*.

¹⁰ Invasive alien community types are named but not described here. See Erickson (1996, 1998).



Notes: Defining species have at least 11% cover. Other details are in the text and the full keys at the back.



Qgrf

Garry oak – Roemer’s fescue

Quercus garryana – *Festuca roemerii*¹¹—plant association

General Description

This plant association is locally frequent throughout the range on sites with a surface soil mantle within bedrock-influenced landscapes. It is often on lower-elevation, gentle south-sloping occurrences with coarse



(loamy sand to sandy loam), gravelly soils with high subsurface coarse fragments. Also encompassed are exposed subxeric, moderate to steep mid- and upper slopes with both bedrock (primarily sandstone) exposure. Sites are exposed to wind and insolation and are classified as submesic

to very xeric. Soils are generally Regosols or Orthic Sombric Brunisols with Vermimull or Rhizomull humus. Ah horizons are dark but often shallow.

Small- and medium-diameter oaks are found mostly in a tree canopy of high cover. Well-stocked saplings are regenerating on most sites, where seedlings vary from lightly to moderately stocked. Roemer’s fescue (*Festuca roemerii*) and Pacific snakeroot (*Sanicula crassicaulis*) are important on all sites; hairy honeysuckle (*Lonicera hispidula*) and blue wildrye (*Elymus glaucus*) on most sites. California brome (*Bromus carinatus*), Kentucky bluegrass* (*Poa pratensis*), and cleavers (*Galium aparine*) are of lesser importance on most sites and hairy cat’s-ear* (*Hypochaeris radicata*) is minor.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

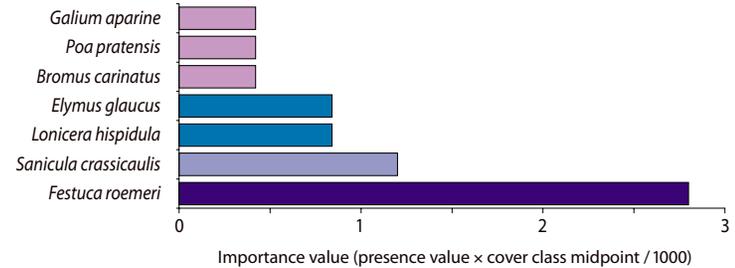
This plant association, the least disturbed in the group, has often been overlooked compared with the showy Garry oak meadows. Relatively coarse soils and low-elevation occurrence partly distinguish this plant

association. It may degrade into one of the subcommunities (Qgrf-c25, Qgrf-c27), or into an invasive alien community: Garry oak – Hedgehog dogtail* (c21) or Garry oak – Scotch broom* – Hedgehog dogtail* (c2), both of which are late season communities.

Grassy openings away from Garry oak canopy may have similar communities. Roemer’s fescue may be found with California oatgrass (*Danthonia californica*), or the latter may co-dominate with harvest brodiaea (*Brodiaea coronaria*). Rarely, xeric sites may include a Lemmon’s needlegrass (*Achnatherum lemmonii*) community (Erickson 2003).

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	Moderate
Threats	Moderately high
Restoration potential	High
Restoration priority	Moderately high

Relative Importance Value of Major Species



¹¹ *Festuca idahoensis* is equivalent and is covered here under *F. roemerii*.

Qgrf-c25 Garry oak – Roemer’s fescue – Field chickweed

Quercus garryana – *Festuca roemerii* – *Cerastium arvense* – subcommunity

General Description

This subcommunity occurs with moderate frequency at low elevations throughout the range with the exception of the Saanich Peninsula, often on exposed subxeric, moderate to steep mid- and upper slopes



with both bedrock (primarily sandstone) exposure and a soil mantle. Soil coarse fragments are high. There are also gentle south-slope occurrences. These sites have been classified as submesic to subxeric in their moisture regime. Soils can be Orthic Sombric Brunisols or Orthic Humic Re-

gosols with dark Ah horizons and Rhizomull or Vermimull humus. These sites usually have tall shrub oaks with small diameters. Saplings are present on most sites with light to moderate stocking. Seedlings are found on some sites with light stocking. Roemer’s fescue (*Festuca roemerii*) and field chickweed (*Cerastium arvense*) are important on all sites; yarrow (*Achillea millefolium*) is less important. California brome (*Bromus carinatus*), blue wild-rye (*Elymus glaucus*), and sweet vernalgrass* (*Anthoxanthum odoratum*) are important on most sites.

Cleavers (*Galium aparine*) and common vetch* (*Vicia sativa*) are of lesser importance. Sheep sorrel* (*Rumex acetosella*) may be present.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

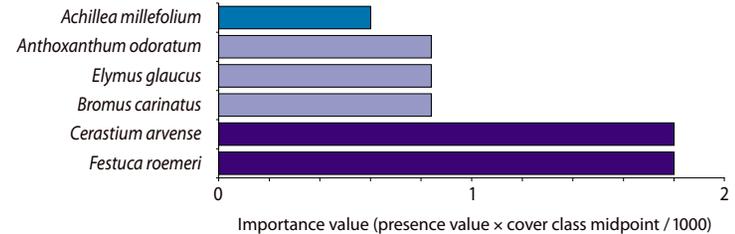
Comments

This subcommunity is partly distinguished by its primary occurrence at lower elevations. The Garry oak – Roemer’s fescue – Field chickweed subcommunity is suggested to be derived from the plant association via slight disturbance, and can degrade into the invasive alien community Garry oak – Hedgehog dogtail* (c21), which is usually associated

with the introduction of livestock. The abundance of this invasive alien community suggests that the Garry oak – Roemer’s fescue – Field chickweed subcommunity was formerly much more widespread than it is today.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	Moderate
Threats	Moderately high
Restoration potential	High
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qgrf-c27 Garry oak – Roemer’s fescue – Small-headed clover

Quercus garryana – *Festuca roemeri* – *Trifolium microcephalum*—subcommunity

General Description

This subcommunity is found infrequently only in the southern Gulf Islands, often at high elevations on exposed subxeric, moderate to steep mid- and upper slopes with both bedrock exposure and a surface mantle of coarse (loamy sand to loam) soils.



These subxeric, southwest-facing slopes are exposed to wind and insolation. All plots have moderately high exposure of coarse (sandstone, gneiss) bedrock or surface rocks. They have deep, dark, or slightly brownish Orthic Sombric Brunisols with Rhizomull humus. There are tree canopy oaks with high cover. Some sites have lightly stocked regeneration of both saplings and seedlings. Small-headed clover (*Trifolium microcephalum*) is important on all sites; Roemer’s fescue (*Festuca roemeri*), long-stoloned sedge (*Carex inops*), and barren brome* (*Bromus sterilis*) are important on most sites. Field chickweed (*Cerastium arvense*) and Wallace’s selaginella (*Selaginella wallacei*) are of lesser importance on all sites; cleavers (*Galium aparine*), hairy cat’s-ear* (*Hypochaeris radicata*), and grey rock-moss (*Racomitrium canescens*) on most sites. Blue wildrye (*Elymus glaucus*), silver hairgrass* (*Aira caryophyllea*), California brome (*Bromus carinatus*), sheep sorrel* (*Rumex acetosella*), and few-flowered clover (*Trifolium oliganthum*) may also be present.

These subxeric, southwest-facing slopes are exposed to wind and insolation. All plots have moderately high exposure of coarse (sandstone, gneiss) bedrock or surface rocks. They have deep, dark, or slightly brownish Orthic Sombric Brunisols with Rhizomull humus. There are tree canopy oaks with high cover. Some sites have lightly stocked regeneration of both saplings and seedlings. Small-headed clover (*Trifolium microcephalum*) is important on all sites; Roemer’s fescue (*Festuca roemeri*), long-stoloned sedge (*Carex inops*), and barren brome* (*Bromus sterilis*) are important on most sites. Field chickweed (*Cerastium arvense*) and Wallace’s selaginella (*Selaginella wallacei*) are of lesser importance on all sites; cleavers (*Galium aparine*), hairy cat’s-ear* (*Hypochaeris radicata*), and grey rock-moss (*Racomitrium canescens*) on most sites. Blue wildrye (*Elymus glaucus*), silver hairgrass* (*Aira caryophyllea*), California brome (*Bromus carinatus*), sheep sorrel* (*Rumex acetosella*), and few-flowered clover (*Trifolium oliganthum*) may also be present.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

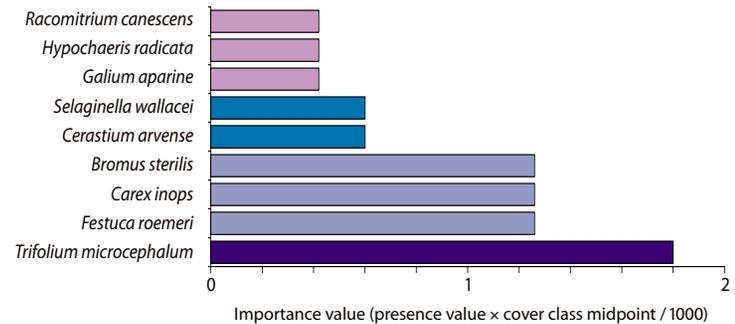
Comments

This subcommunity may have Junegrass (*Koeleria macrantha*) and/or California oatgrass (*Danthonia californica*) replacing fescue in certain areas. Relatively coarse soils, geographic separation, and occurrence at

higher elevations partly distinguish this subcommunity. It is related to the Garry oak – Grey rock-moss – Wallace’s selaginella plant association, Qgrm. This subcommunity may be derived from the plant association, Qgrf, via slight disturbance; it degrades into the Garry oak – Hedgehog dogtail* (c21) with continued disturbance associated with the introduction of livestock. The abundance of this invasive alien community suggests that the Garry oak – Roemer’s fescue – Small-headed clover subcommunity was formerly much more widespread than today.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Very low
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	Very high
Threats	Moderately high
Restoration potential	High
Restoration priority	High

Relative Importance Value of Major Species



Qgrf-c42 Krummholz Garry oak – Roemer’s fescue – American vetch

Quercus garryana – *Festuca roemerii* – *Vicia americana* — subcommunity

General Description

This seaside subcommunity is moderately frequent within all parts of the range except the Saanich Peninsula. It is found on gentle to moderate, often west-facing, convex slopes, which are shallowly under-



lain by bedrock. These sites are in the seaspray zone, and are exposed to wind and insolation. They have moderately high exposure of coarse (sandstone, granitic) bedrock or surface rocks and are classified as subxeric to xeric. Soils are usually Regosols with an Ah horizon, silt

loam texture, and moderately high coarse fragments. Oaks have krummholz form, being wind-trained and low, then grade into tall shrubs or low trees with distance away from the sea. They have small diameters. All sites are well stocked with saplings. Most sites have moderately well-stocked seedlings. American vetch (*Vicia americana*) is important on all sites, with Roemer’s fescue (*Festuca roemerii*) and common snow-berry (*Symphoricarpos albus*) important on most sites. Cleavers (*Galium aparine*) and common vetch* (*Vicia sativa*) are of lesser importance on all sites;

California brome (*Bromus carinatus*), Kentucky blue-grass* (*Poa pratensis*), Pacific snakeroot (*Sanicula crassicaulis*), and great camas (*Camassia leichtlinii*) on most sites. Field chickweed (*Cerastium arvense*) is present on all sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

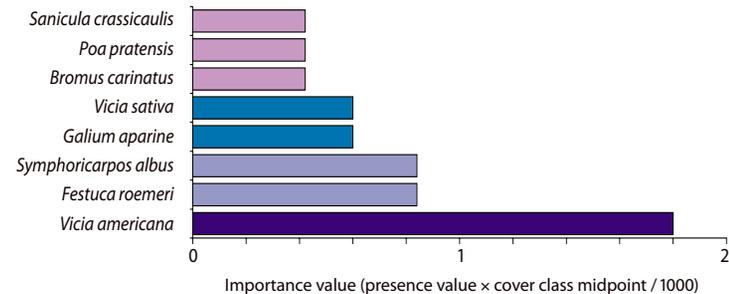
The term krummholz is used to describe this stunted form in the oaks of this subcommunity. They grow to a height of about 20 cm where

most exposed to the wind on the sea-edge. The oaks then grade upwards in a continuous mat, reaching about 2 m in height with distance away from the exposure to wind and saltspray. American vetch in this community sometimes has lower cover. A related Garry oak – American vetch parkland type was recognized from Galiano Island, but was dropped, being represented by only two plots. The type is thought to reflect reduced deer grazing pressure on the island. Reconnaissance notes also suggest that this parkland type is present at Yellow Point, Boathouse Harbour north, Deer Point, Flewitt Point, Water Tower Hill, and Summit Park on Vancouver Island. The krummholz sea-edge form

of oak also occurs without American vetch. A couple of these occurrences fall within the Garry oak – California brome plant community Qgcc-c43 and are attributed to light levels of disturbance. Increased levels may result in retrogression into the Garry oak – hedgehog dogtail* (c21).

Management Ranking	
Preservation priority	Very high
Regeneration potential	Very high
Aesthetic appeal	High
Susceptibility to disturbance	Very high
Prescribed fire potential	Avoid
Threats	High
Restoration potential	High
Restoration priority	High

Relative Importance Value of Major Species



Qgcc

Garry oak – Common camas – Blue wildrye

Quercus garryana – *Camassia quamash* – *Elymus glaucus*— plant association

Key Features

- Gentle to steep slopes
- Soil mantle dominated by native herbaceous vegetation
- Often submesic gentle to moderate mid-slopes
- Light to moderate shrub understorey, common camas (April 1 to May 15) and/ or blue wildrye (May 15 onwards) $\geq 11\%$ cover \geq other herb species
- Dominated in early season by herbaceous forb species or later by herbaceous grasses

The concept of the Garry oak – Common camas – Blue wildrye plant association is founded on the Garry oak – Common camas phenological plant community type and the Garry oak – Blue wildrye plant community type (Qgcc-c37a and Qgcc-c47, respectively) (Erickson 1996, 1998). This plant association overlaps (including invasive alien communities supported) with the Garry oak – Great camas – Blue wildrye plant association, but is separated to recognize the differences in dominant camas, moisture conditions, seasonality, and geographic occurrence.

This plant association consists of three plant community types, plus one native successional plant community type. Another community, the Garry oak – Miner’s-lettuce Qggc-c48, is described under the next plant association. There is a further subdivision into three phenological subcommunities and five invasive alien communities. The latter are named but not described here.

Plant community types	Garry oak – Blue wildrye Qgcc-c47	Garry oak – Long-stoloned sedge Qgcc-c14
Phenological plant community types	Garry oak – Common camas Qgcc-c37a	
Native successional community types	Garry oak – California brome Qgcc-c43	
Phenological plant subcommunities	Garry oak – Common camas – White fawn lily Qgcc-c35a Garry oak – Common camas – Western buttercup Qgcc-c37b	Garry oak – Common camas – Broad-leaved shootingstar Qgcc-c35b
Native successional subcommunities	Qgcc-c37a	Qgcc-c37b
Invasive alien community types (Erickson 1996, 1998)	Garry oak – Sweet vernalgrass* (c31a) Garry oak – Scotch broom* – Sweet vernalgrass* (c31b)	Garry oak – Scotch broom* – Kentucky bluegrass* (c4)
Invasive alien subcommunities (Erickson 1996, 1998)	Garry oak – Barren brome* (c23)	Garry oak – Kentucky bluegrass* – Common vetch* (c29a)

Notes

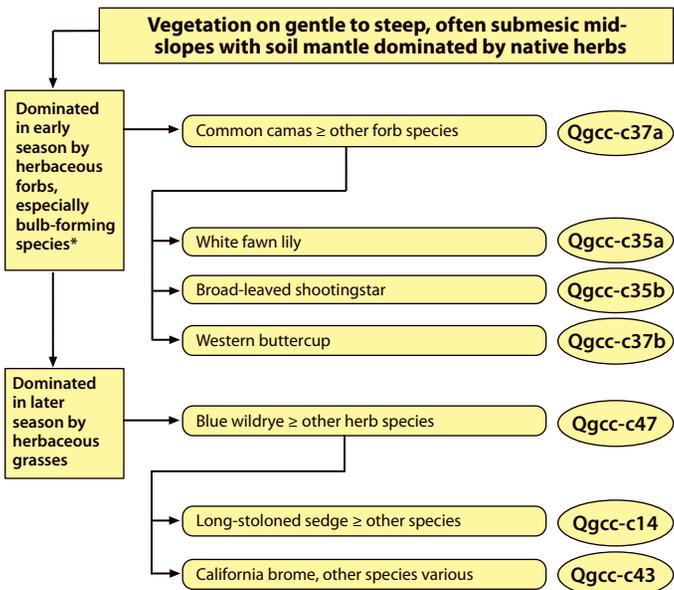
The early season communities here provide the flower shows for which the Garry oak habitat is famous in spring. The common camas communities develop fairly early in the spring (in April), about three weeks earlier than the great camas meadows. They then decline past flowering by mid-May or so. Common camas can be detected vegetatively into June. Very similar early season communities occur in openings without Garry oak (W. Erickson, 2003, unpublished data).

Scotch broom* and orchardgrass* generally can invade these communities when they occur on less severe sites.

For a detailed description of the Garry oak – common camas – blue wildrye plant association:

- **in early season**, see the Garry oak – Common camas community type, or
- **in late season**, see the Garry oak – Blue wildrye community type.

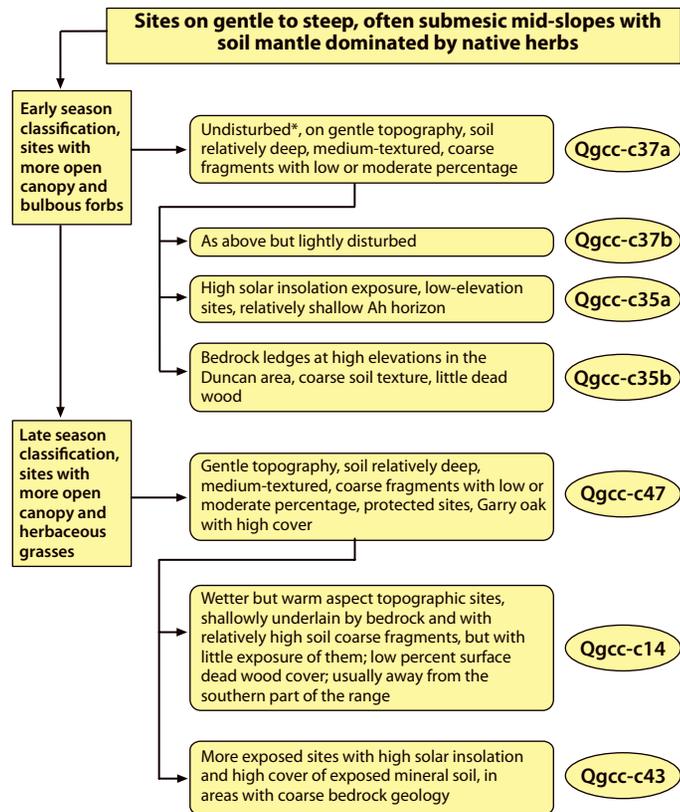
Full keys are found in Appendices 1 and 2. Flow charts to the plant communities follow (gentle to steep, often submesic mid-slopes with soil mantle dominated by native herbs).



* Defining species have at least 11% cover. Early season is April 15 to May 15. Other details are in the text and the full keys at the back.



Landscape, Mount Tzhouhalem.



* Qgcc may have high natural mineral soil exposure though.

Qgcc

Garry oak – Common camas – Blue wildrye

Quercus garryana – *Camassia quamash* – *Elymus glaucus*— plant association

General Description

Detailed descriptions for this plant association can be found with the two community types (Qgcc-c37a, Qgcc-c47) on which it is based.

They differ in phenological stage, with the former developing in spring



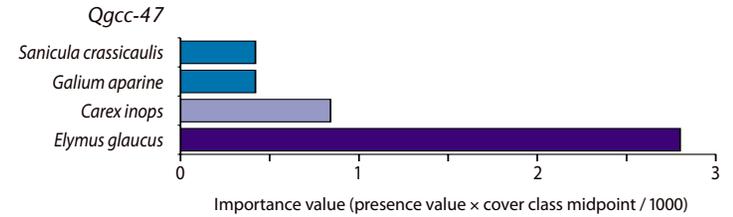
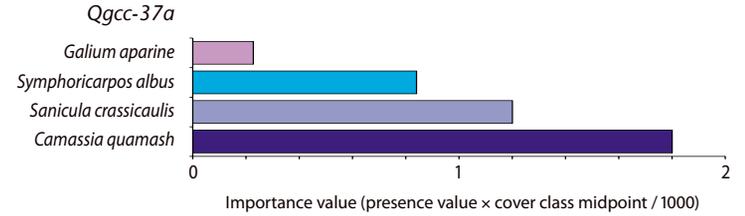
but giving way to the latter in late spring and summer. They differ also in that each is absent from one of the five geographic areas. Environment and soils vary, but community is best developed on gentle, relatively moist (mesic), south-facing slopes with deep fine-textured

soils. Soils are generally Orthic Sombric Brunisols with deep, dark Ah horizons and Vermimull or Rhizomull humus forms, and silt loam mineral soils. Sites usually have a tree canopy layer. In spring, common camas (*Camassia quamash*) is important on all sites; in summer, blue wildrye (*Elymus glaucus*) is important, along with long-stoloned sedge (*Carex inops*). Pacific snakeroot (*Sanicula crassicaulis*), cleavers (*Galium aparine*), and sometimes common snowberry (*Symphoricarpos albus*) are constant through these seasons, but of lesser importance.



Blue wildrye, Lone Tree Hill.

Relative Importance Value of Major Species



Elkington, shooting stars.

Qgcc-c37a Garry oak – Common camas

Quercus garryana – *Camassia quamash*—community type

General Description

This community type is moderately frequent within the Garry oak habitat.

Environment and soils vary, but the community is best developed on gentle, relatively moist (mesic) south-facing slopes with deep fine-



textured soils. Soils are generally Orthic Sombric Brunisols with deep (10–35 cm) dark (10YR2/1.5) Ah horizons, Vermimull or Rhizomull humus forms, and gravelly silt loams. Sites may also be concave or have moisture inflow, with a high percent mineral soil exposure of soils that are medium textured with low or moderate percent coarse fragments. Sites usually have a tree canopy layer of oaks of various diameters. Regeneration is present on most sites for saplings (moderately well stocked) and on some sites

for seedlings, which are lightly stocked.

Common camas (*Camassia quamash*) is important on all sites; Pacific snakeroot (*Sanicula crassicaulis*) is of lesser importance. Common snowberry (*Symphoricarpos albus*) is important on most sites; cleavers (*Galium aparine*) are of lesser importance.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

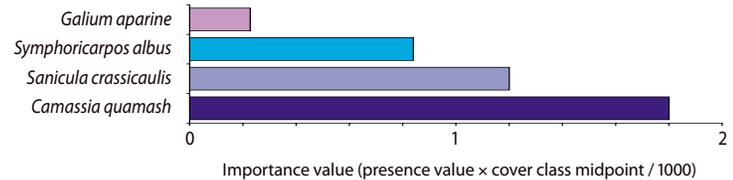
Comments

This community type is distinguished by occurrence on concave and other sites with moisture inflow and by deep Ah horizons from fine-textured (silt loam) soils. Common camas communities are best developed in the Duncan area and are absent from the southern Gulf Islands. Very similar communities are infrequent on openings without Garry oak (W. Erickson, 2002, unpublished data). This community type may be partly derived from related subcommunities through the

depletion of bulbs by grazing. Further disturbance could lead to the development of the Garry oak – Miner’s-lettuce community type Qggc-c48, which is described under the next plant association.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	High
Threats	High to very high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qgcc-c35a Garry oak – Common camas – White fawn lily

Quercus garryana – *Camassia quamash* – *Erythronium oregonum*—subcommunity

General Description

This subcommunity occurs infrequently within the Garry oak habitat on low-elevation sites with high solar insolation exposure and relatively shallow Ah horizons. Environment and soils vary, but this subcommunity develops best on gentle, mesic south-facing slopes. Generally, these are Orthic Sombric Brunisols and Regosols with dark (10YR2/1) Ah horizons and Vermimull humus forms, over sandy loam to silt loam soils. Sites have small-diameter tall shrub or tree canopy oaks. Regeneration is occurring on most sites. Saplings are moderately well to well stocked, but seedlings are mowed on some sites and average only lightly stocked. Common camas (*Camassia quamash*), white fawn lily (*Erythronium oregonum*), and common snowberry (*Symphoricarpos albus*) are important on all sites. Orchardgrass* (*Dactylis glomerata*) and tall Oregon-grape (*Mahonia aquifolium*) are important on most sites.



community develops best on gentle, mesic south-facing slopes. Generally, these are Orthic Sombric Brunisols and Regosols with dark (10YR2/1) Ah horizons and Vermimull humus forms, over sandy loam to silt loam soils. Sites have small-diameter tall shrub or tree canopy oaks. Regeneration is occurring on most sites. Saplings are moderately well to well stocked, but seedlings are mowed on some sites and average only lightly stocked. Common camas (*Camassia quamash*), white fawn lily (*Erythronium oregonum*), and common snowberry (*Symphoricarpos albus*) are important on all sites. Orchardgrass* (*Dactylis glomerata*) and tall Oregon-grape (*Mahonia aquifolium*) are important on most sites.

tion is occurring on most sites. Saplings are moderately well to well stocked, but seedlings are mowed on some sites and average only lightly stocked. Common camas (*Camassia quamash*), white fawn lily (*Erythronium oregonum*), and common snowberry (*Symphoricarpos albus*) are important on all sites. Orchardgrass* (*Dactylis glomerata*) and tall Oregon-grape (*Mahonia aquifolium*) are important on most sites.

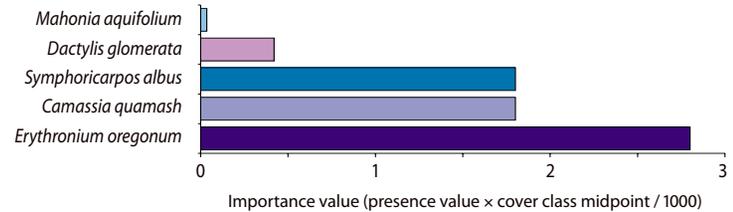
Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

This subcommunity is partly distinguished by its mesic ecological moisture regime, and by dark Ah soil horizons. The Garry oak – Common camas – White fawn lily subcommunity Qgcc-c35a is absent from the southern Gulf Islands and western shore. Some disturbance could derive the Garry oak – Common camas – Broad-leaved shootingstar subcommunity Qgcc-c35b; a greater degree of disturbance could lead to the Garry oak – Miner’s-lettuce community Qggc-c48, which is described under the next plant association.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderate
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	Very high
Threats	High to very high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qgcc-c35b Garry oak – Common camas – Broad-leaved shootingstar

Quercus garryana – *Camassia quamash* – *Dodecatheon hendersonii*—subcommunity

General Description

This subcommunity occurs infrequently within the Garry oak habitat in the Duncan area. It occurs on bedrock ledges at high elevations (170–275 m), which have coarse soil texture and little dead wood. They



are xeric to submesic (moderately high to very high bedrock exposure) and exposed. Generally, soils are Orthic Sombric Brunisols and Regosols, with dark (10YR2/1.5) Ah horizons and Vermimull humus forms. High surface coarse fragments lie over gravelly and very gravelly

loam soils, often shallow to bedrock. Sites have small-diameter tall shrub or tree canopy. Regeneration is present on some sites for saplings and on all sites for seedlings. Average stocking level is light for both saplings and seedlings. Common camas (*Camassia quamash*), broad-leaved shootingstar (*Dodecatheon hendersonii*), grey rock-moss (*Racomitrium canescens*), blue wildrye (*Elymus glaucus*), and juniper hair-cap moss (*Polytrichum juniperinum*) are important on all sites. Scotch broom* (*Cytisus scoparius*) is important on most sites. Of lesser importance on all sites are cleavers (*Galium aparine*), yarrow (*Achillea millefolium*), sheep sorrel* (*Rumex acetosella*), and common chickweed* (*Stellaria media*). Of lesser importance on most sites are common snowberry (*Symphoricarpos albus*), long-stoloned sedge (*Carex inops*), and broom-moss (*Dicranum scoparium*).

The following species are present on all sites: tall Oregon-grape (*Mahonia aquifolium*), California brome (*Bromus carinatus*), many-flowered woodrush (*Luzula multiflora*), sea blush (*Plectritis congesta*), Pacific snakeroot

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

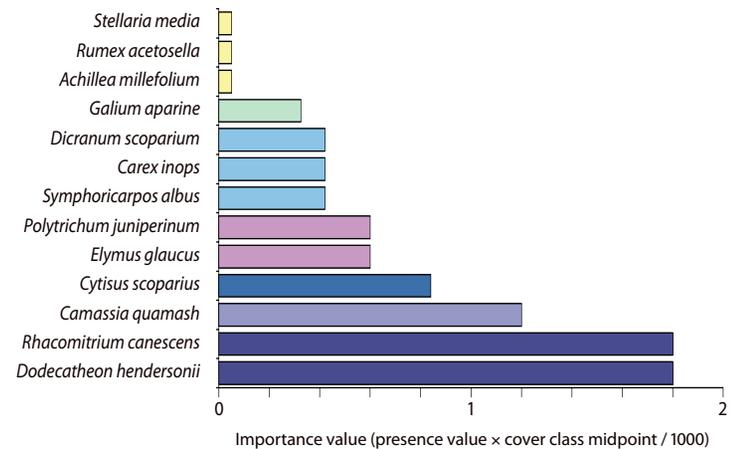
(*Sanicula crassicaulis*), harvest brodiaea (*Brodiaea coronaria*), spring gold (*Lomatium utriculatum*), small-flowered blue-eyed Mary (*Collinsia parviflora*), and few-flowered clover (*Trifolium oliganthum*).

Comments

This subcommunity is distinguished by its occurrence on bedrock ledges at high elevations in the Duncan area. Some disturbance could lead to the Garry oak – Common camas community type Qgcc-c37a; a greater degree could produce the Garry oak – Miner’s-lettuce native successional community type Qggc-c48, which is described under the next plant association.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Low
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	High
Threats	High
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qgcc-c37b Garry oak – Common camas – Western buttercup

Quercus garryana – *Common camas* – *Ranunculus occidentalis*—subcommunity

General Description

This subcommunity is moderately frequent in certain areas within the Garry oak habitat. It occurs on gently sloping but exposed southerly aspects. Sites range across a variety of elevations and have submesic



to subxeric moisture ratings. Bedrock is often exposed or occurs at moderate depths. Soils are silt loams classified as Orthic Sombric Brunisols with deep, dark (10YR2/1 to 1.5) Ah horizons and Orthi-rhizomull humus forms.

Sites mostly have a tree canopy layer with various diameters. Lightly to moderately well-stocked saplings are regenerating on most sites but no seedlings were observed. Common camas (*Camassia quamash*) and western buttercup (*Ranunculus occidentalis*) are important on all sites. Kentucky bluegrass* (*Poa pratensis*), orchardgrass* (*Dactylis glomerata*), and common vetch* (*Vicia sativa*) are of lesser importance on most or all sites. Common chickweed* (*Stellaria media*) may also be present.

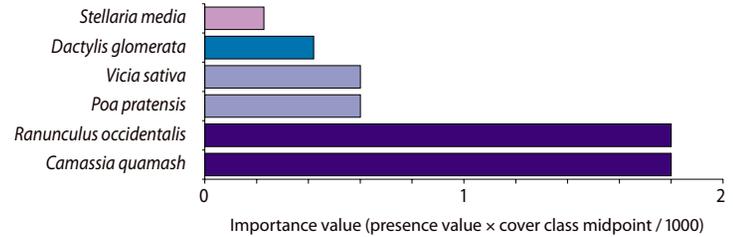
Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

This subcommunity is associated with a light level of disturbance and is partly distinguished by fine-textured (silt loam) and deep Ah horizon soil features. The Garry oak – Common camas – Western buttercup subcommunity is a deeper soil type than the two related subcommunities, but could be derived from them through the depletion of bulbs or forbs by grazing and mowing. Disturbance can convert this subcommunity type into the Garry oak – Miner’s-lettuce community Qggc-c48, which is described under the next plant association.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Very low
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	High
Threats	High to very high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qgcc-c47 Garry oak – Blue wildrye

Quercus garryana – *Elymus glaucus*—community type

General Description

This community type occurs frequently within the range, except the northern Gulf Islands. These are cool, protected, or wetter sites including basins and gentle topography. They have relatively deep, medium-textured soils with low or moderate percent coarse fragments. They are mainly mesic to submesic sites at medium to high elevation, often exposed to insolation, wind, steepness, bedrock, or surface rock, but receiving compensating seepage. Soils are usually gravelly Orthic Sombric



Brunisols with Rhizomull or Vermimull humus, dark to slightly brownish Ah horizon, loamy (sandy loam to silt loam) texture, and often have a high percent coarse fragments. Garry oaks are found in a high-cover tree canopy of various diameters. Most sites have moderately stocked saplings and light to moderately stocked seedling regeneration. Blue wildrye

(*Elymus glaucus*) is important in the sparse and uniform cover of all these sites; long-stolonated sedge (*Carex inops*) is important on most sites. Cleavers (*Galium aparine*) and Pacific snakeroot (*Sanicula crassicaulis*) are of lesser importance on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

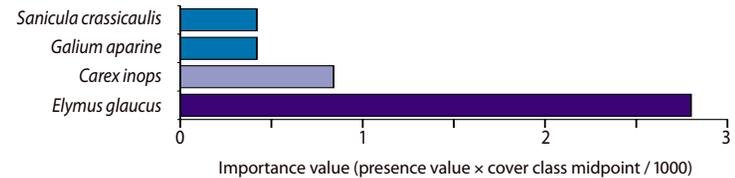
Comments

This community type is also designated Qggc-c47, as it is a key component of both this plant association and the next. It usually occurs on medium- to high-elevation sites, which partly distinguishes it. The Garry oak – Blue wildrye community type is sometimes found in a shrub type with common snowberry. This community type is suggested to have an important role as the origin of a number of native

successional (e.g., Qgcc-c43) and invasive alien communities, including the widespread sweet vernalgrass communities (c31a, c31b in Erickson 1996, 1998).

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	High
Threats	Moderately high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qgcc-c43 Garry oak – California brome

Quercus garryana – *Bromus carinatus*—native successional community type

General Description

This community type is moderately frequent throughout the range. These are more exposed sites with high solar insolation, coarse bed-rock geology, and high surface mineral soil and coarse fragments. They have a bifold distribution on south to southwest slopes, both on local



mountains and at low elevation near the sea. Moisture regime is usually subxeric to submesic, and there is some exposure to seaspray. Sites have Orthic Sombric Brunisols with Vermimull humus and deep, dark Ah horizons. The soils are mainly gravelly sandy loam to loam with

high coarse fragment content. Sites mainly have a tall shrub oak canopy of small to medium diameter. Saplings are well stocked on all sites. Seedlings are moderately to well stocked on most sites. California brome (*Bromus carinatus*), common vetch* (*Vicia sativa*), and cleavers (*Galium aparine*) are important on all sites. Great camas (*Camassia leichtlinii*) is of lesser importance. Barren brome* (*Bromus sterilis*) is important on most sites; barren fescue* (*Vulpia bromoides*) is of lesser importance. Blue wildrye (*Elymus glaucus*) is usually present.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

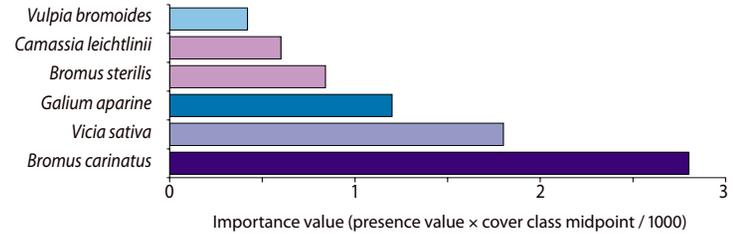
This community type is probably not as visually obvious as the others. A number of the plots were very near the sea, and the other two were post-burn on Mount Douglas in Victoria. This community type is partly distinguished by the sea-edge occurrences in wind-exposed

sites. High surface or subsurface coarse fragments may be another distinguishing factor. Garry oak – California brome native successional community type is suggested to result from the effects of light understorey disturbance on the Garry oak – Blue wildrye community type Qgcc-c47. Increasing this level of disturbance leads to the development of one of three invasive alien communities.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Very high
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	High†
Threats	Moderately high
Restoration potential	Very high
Restoration priority	High

† Avoid fire on sea-edge krummholz occurrences

Relative Importance Value of Major Species



Qgcc-c14 Garry oak – Long-stoloned sedge

Quercus garryana – *Carex inops*—community type

General Description

This community type is moderately frequent, but usually away from the southern part of the range. It occurs across a wide variety of sites, but characteristically on wetter but warm-aspect topographic sites,



which are shallowly underlain by bed-rock. They have a low percent of rocks and dead wood at the surface, but high soil coarse fragments. Sites range from xeric to permesic, on gentle to moderately steeply sloping south to east aspects. They have various exposures: wind, insolation,

or bedrock. Soils are Orthic Sombric Brunisols or Orthic Humic Regosols with Rhizomull or Vermimull humus, dark Ah horizons, and very gravelly silt loam texture. These are tree-layer oak canopies with high cover, which affects plant composition. Moderate stocking of saplings is present on some sites. Most sites have lightly stocked seedlings. Long-stoloned sedge (*Carex inops*) is important on all sites. Blue wild-rye (*Elymus glaucus*), western buttercup (*Ranunculus occidentalis*), cleavers (*Galium aparine*), and tiny vetch* (*Vicia hirsuta*) are of lesser importance on most sites. Common vetch* (*Vicia sativa*) is present on all sites; California oatgrass (*Danthonia californica*) and sheep sorrel* (*Rumex acetosella*) on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

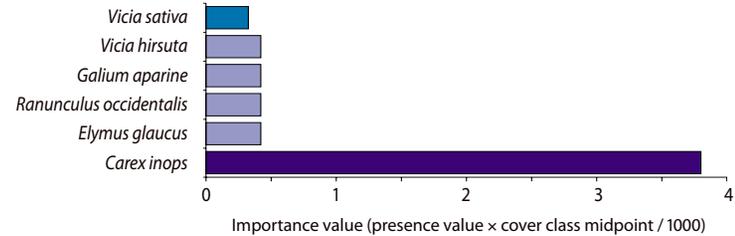
Comments

This community type is geographically clustered within its otherwise widespread distribution. Occurrence on silt loam soils may be one distinguishing factor. The Garry oak – Long-stoloned sedge community type is thought to occur on different types of sites than related communities, and its composition reflects the influence of more complete,

high-cover oak stands. This is an original community from which invasive alien communities (Garry oak – Kentucky bluegrass – Common vetch c29a and Garry oak – Scotch broom* – Kentucky bluegrass* c4) (Erickson 1996, 1998) have been derived under the influence of heavy disturbance.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	High
Threats	Moderately high
Restoration potential	Very high
Restoration priority	High

Relative Importance Value of Major Species



Qggc

Garry oak – Great camas – Blue wildrye

Quercus garryana – *Camassia leichtlinii* – *Elymus glaucus*— plant association

Key Features

- Mesic to submesic gentle lower slopes
- Light to moderate native shrub understorey, great camas (April 21 to May 15) and/ or blue wildrye (May 15 onwards) ≥ 11% cover ≥ other herb species
- Soils relatively deep, medium-textured, with low or moderate percent coarse fragments
- Light to moderate native shrub understorey
- Dominated in early season by herbaceous forb species or later by herbaceous grasses

The concept of the Garry oak – Great camas – Blue wildrye plant association is founded on the Garry oak – Great camas phenological plant community type Qggc-c36 and the Garry oak – Blue wildrye plant community type Qggc-c47 (Erickson 1996, 1998). This plant association overlaps with the Garry oak – Common camas – Blue wildrye plant association, including the invasive alien communities that are supported. It is separated to recognize the difference in the dominant camas, moisture conditions, seasonality, and geographic occurrence. This plant association consists of three plant community types, including one designated as a phenological plant community type. There are also two native successional plant community types, one of which occurs in the early season, and another encroaches on these communities. There is a further subdivision into five invasive alien community types and two invasive alien subcommunities. These latter communities are named but not described here.

Plant community types	Garry oak – Great camas Qggc-c36 (phenological) Garry oak – Alaska oniongrass Qggc-c13	Garry oak – Blue wildrye Qggc-c47
Native successional community types	Garry oak – Purple peavine Qggc-c41	Garry oak – Miner’s-lettuce Qggc-c48 (phenological)
Plant subcommunities	None	
Phenological stages	Qggc-c36	
Native successional subcommunities	None	
Invasive alien community types (Erickson 1996, 1998)	Garry oak – Scotch broom* – Blue wildrye (c6) Garry oak – Orchardgrass* – Redtop hairgrass* (c49)	Garry oak – Orchardgrass* – Tall oatgrass* (c30)
Invasive alien subcommunities (Erickson 1996, 1998)	Garry oak – Orchardgrass*(c28a and c28b)	Garry oak – Scotch broom* – Orchardgrass* (c5)

Notes

The early season communities above provide the flower shows for which the Garry oak habitat is famous in spring. The great camas community develops in the spring (in late April), about three weeks after the Garry oak – Common camas community type. The great camas communities generally decline past flowering by late May, but can be detected vegetatively into June. Very similar communities occur in openings without Garry oak (W. Erickson, 2002, unpublished data).

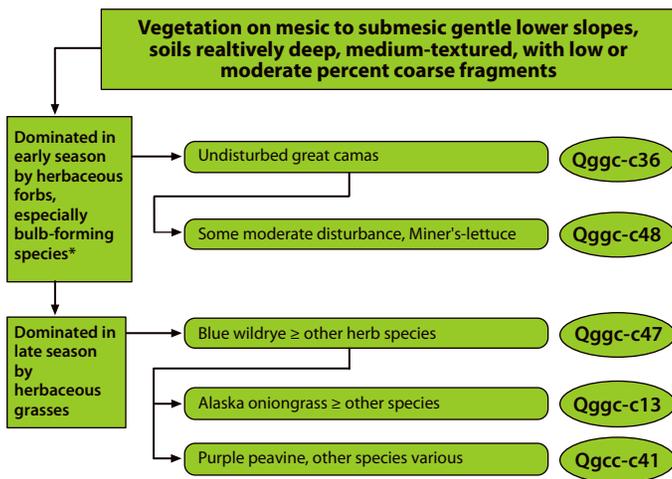
A native successional community type, Garry oak – (Douglas-fir) – Oceanspray – Snowberry – Electrified cat’s-tail moss Qgos-c10, encroaches on this mesic community from wetter sites of the Garry oak – Oceanspray – Common snowberry plant association. See Qgos-c10 for a description.

Scotch broom* and orchardgrass* are major invaders on the favourable sites occupied by these communities.

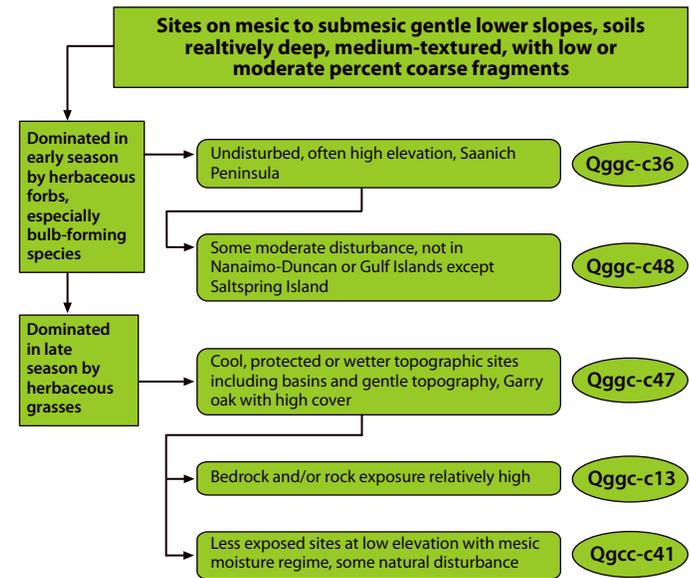
For a **description** of the Garry oak – Great camas – Blue wildrye plant association:

- **in early season**, see the Garry oak – great camas community type, or
- **in late season**, see the Garry oak – blue wildrye community type (found under the previous plant association).

Full keys are found in Appendices 1 and 2. Flow charts to the plant communities follow (mesic to submesic gentle lower slopes, soils relatively deep, medium textured, with low or moderate percent coarse fragments):



* Defining species have at least 11% cover. Early season is April 15 to May 15. Other details are in the text and the full keys at the back.



Great camas stand, Elkington.

Qggc

Garry oak – Great camas – Blue wildrye

Quercus garryana – *Camassia leichtlinii* – *Elymus glaucus*— plant association

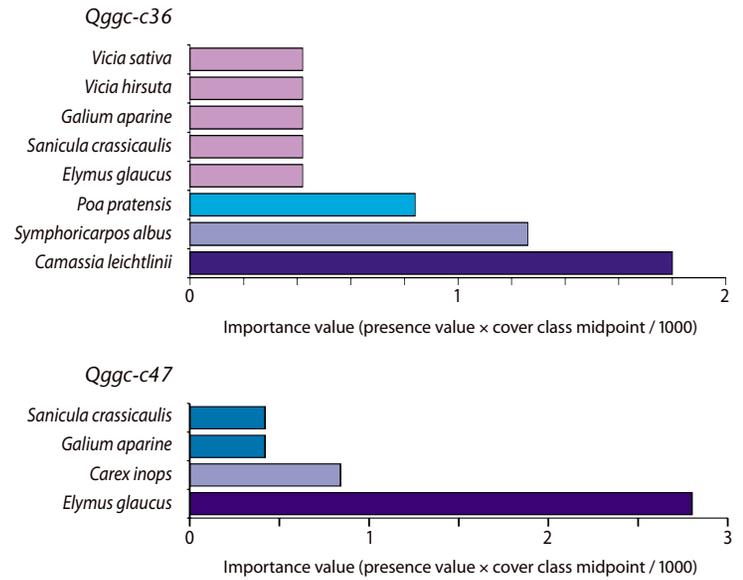
General Description

This plant association is described in detail in two community types (Qggc-c36, Qggc-c47) on which it is based. They differ in phenological stage, with the former developing in spring but giving way to the latter in late spring and summer. Both are absent from the northern Gulf Islands. Environment and soils vary, but the community is best developed on gentle, relatively moist (mesic to permesic) lower slopes with deep, fine-textured soils. Soils are generally Orthic Sombric Brunisols with deep, dark Ah horizons and Vermimull or Rhizomull humus forms, and silt loams mineral soils. Sites usually have a tree canopy layer. In spring, great camas (*Camassia leichtlinii*) is important on all sites. In summer, blue wildrye (*Elymus glaucus*) is important, along with long-stoloned sedge (*Carex inops*). Pacific snakeroot (*Sanicula crassicaulis*) and cleavers (*Galium aparine*) are constant through these seasons, but of lesser importance. The same goes for common snow-berry (*Symphoricarpos albus*), Kentucky bluegrass* (*Poa pratensis*), tiny vetch* (*Vicia hirsuta*), and common vetch* (*Vicia sativa*), which are present on some sites.



Great camas and grasses.

Relative Importance Value of Major Species



Qggc-c36 Garry oak – Great camas

Quercus garryana – *Camassia leichtlinii*—community type

General Description

This community type is common, being very frequent and widespread (with local exceptions) on gentle to steep, mesic to submesic lower slopes. It has a relatively deep and medium-textured (loam to silt loam)



soil mantle, with low or moderate percent coarse fragments. It often occurs on high-elevation Saanich Peninsula sites.

Environment and soils vary, but are best developed on relatively moist (permesic) slopes with exposed rock. Soils are generally Orthic Sombric Brunisols with deep

(10–35 cm) dark (10YR2/1) Ah horizons, Vermimull or Rhizomull humus forms, and gravelly to very gravelly textures. Most sites have a tree canopy of oaks with various diameters, and moderately well-stocked saplings and lightly stocked seedlings. Great camas (*Camassia leichtlinii*) is important on all sites. Species important on most sites include common snowberry

(*Symphoricarpos albus*) and Kentucky bluegrass* (*Poa pratensis*); blue wildrye (*Elymus glaucus*), Pacific snakeroot (*Sanicula crassicaulis*), cleavers (*Galium aparine*), tiny vetch* (*Vicia hirsuta*), and common vetch* (*Vicia sativa*) are of lesser importance.

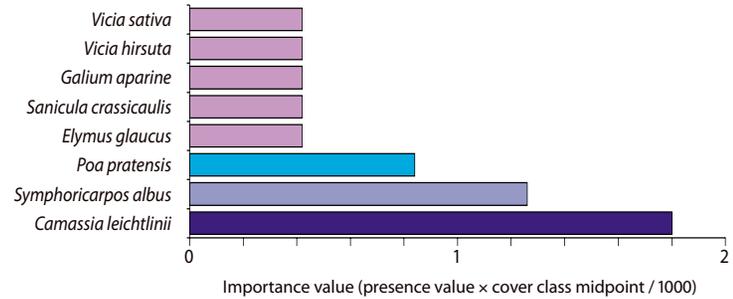
Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

This community type is distinguished in part by deep Ah horizons from fine-textured (loam to silt loam) soils and a core distribution on the Saanich Peninsula and western shore. Disturbance and native succession in this community can lead to the development of the Garry oak – Miner’s-lettuce community type Qggc-c48.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderate
Aesthetic appeal	Very high
Susceptibility to disturbance	Very high
Prescribed fire potential	High
Threats	High to very high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qggc-c48 Garry oak – Miner’s-lettuce

Quercus garryana – *Montia perfoliata*—native successional community type

General Description

This community type is derived from early season camas communities through a moderate level of disturbance and native succession. It is frequent on all the southern portions of the range of Garry oak ecosystems.



The Garry oak – Miner’s-lettuce community type occurs on gentle to steep slopes at various elevations across a wide range of microsites. They often have exposed coarse (granitic, gneiss) bedrock or surface rocks. Soils are usually Orthic Sombric Brunisols, composed of sandy

loam to silt loam, with a deep, dark Ah horizon and Vermimull or Rhizomull surface humus form. Either a tree canopy or a tall shrub canopy may form the tallest oak layer. These oaks mostly have small diameters. On most sites, saplings are regenerating with light to moderate stocking levels and seedlings are moderately well stocked.

Miner’s-lettuce (*Montia perfoliata*) is important on all sites. Scotch broom* (*Cytisus scoparius*) and cleavers (*Galium aparine*) are important on most sites. Blue wildrye (*Elymus glaucus*), barren brome* (*Bromus sterilis*), Kentucky

bluegrass* (*Poa pratensis*), Pacific snakeroot (*Sanicula crassicaulis*), great camas (*Camassia leichtlinii*), common chickweed* (*Stellaria media*), and California brome (*Bromus carinatus*) are less important on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

Comments

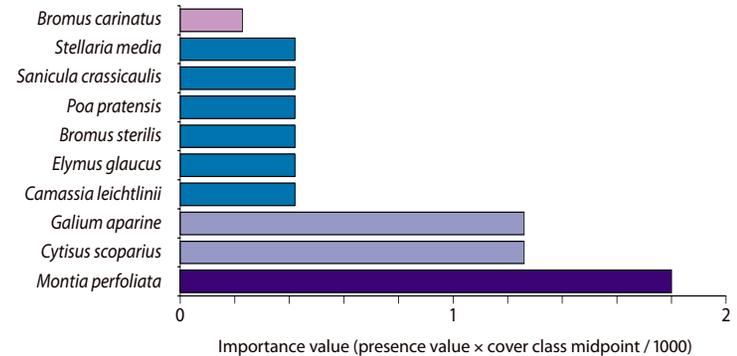
This community type is not as easily noticed as the other showy early season communities, from which it is derived. The presence of deep Ah horizons partly distinguishes this community. It results from mod-

erate disturbance to early season communities of this and the previous plant association.

Note: See the previous plant association for a description of the Garry oak – Blue wildrye (*Quercus garryana* – *Elymus glaucus*) community type Qggc-c47.

Management Ranking	
Preservation priority	High
Regeneration potential	Moderate
Aesthetic appeal	Low to moderate
Susceptibility to disturbance	Moderately high
Prescribed fire potential	Moderate
Threats	High
Restoration potential	Very high
Restoration priority	High

Relative Importance Value of Major Species



Qggc-c41 Garry oak – Purple peavine

Quercus garryana – *Lathyrus nevadensis*—native successional community type

General Description

This community type occurs infrequently within the range, except in the northern Gulf Islands. These are mainly less exposed sites at low elevation with mesic moisture regime and light levels of natural distur-



bance with recovery. The Garry oak – Purple peavine community occupies gentle slopes on southerly aspects (east- to west-facing) with moderate to high bedrock surface rock exposure. Soils are Orthic Sombric Brunisols with Vermimull or Rhizomull humus, a dark Ah

horizon, loam texture, and relatively low coarse fragment content. Garry oaks are found in a tree canopy of high cover and medium to large diameter. Regeneration consists of moderately stocked saplings on some sites and lightly stocked seedlings on most sites. Purple peavine (*Lathyrus nevadensis*), Pacific snakeroot (*Sanicula crassicaulis*), and orchardgrass* (*Dactylis glomerata*) are important on all sites; common snowberry (*Symphoricarpos albus*) and great camas (*Camassia leichtlinii*) on most sites. Bar-

ren fescue* (*Vulpia bromoides*), barren brome* (*Bromus sterilis*), Kentucky* bluegrass (*Poa pratensis*), common vetch* (*Vicia sativa*), and ribwort plantain* (*Plantago lanceolata*) are of lesser importance on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

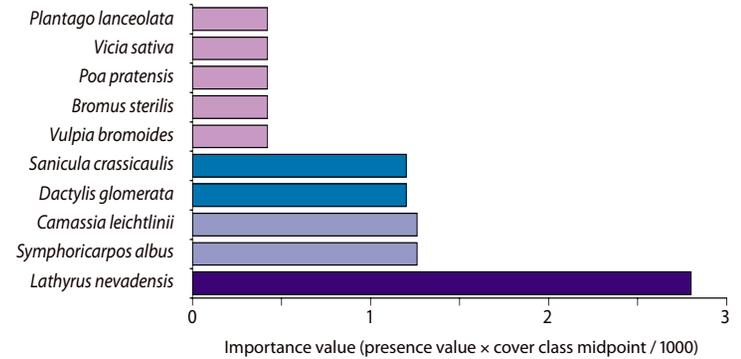
Comments

Most plots in this community type were classified in the parkland physiognomic type. Mesic ecological moisture regime, occurrence at low elevations and on concave sites, and low subsurface coarse fragments all contribute to distinguishing this community. It is suggested

to result from the effects of light understorey disturbance and native succession on the previous community (Qggc-c47). An increase in disturbance could lead to the development of the invasive alien orchardgrass communities. One plot from Galiano Island was a krummholz, sea-edge stand, suggesting that there is also a relationship with Qgrf-c42, the Krummholz Garry oak – Roemer’s fescue – American vetch subcommunity.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately low
Aesthetic appeal	Very high
Susceptibility to disturbance	High
Prescribed fire potential	Very high
Threats	Very high
Restoration potential	Very high
Restoration priority	Very high

Relative Importance Value of Major Species



Qggc-c13 Garry oak – Alaska oniongrass

Quercus garryana – *Melica subulata*—community type

General Description

This community type occurs frequently across the range, except in the northern Gulf Islands. There is a bifold distribution between high and low elevations. These are cool, protected, or wetter sites, including basins and gentle topography. They have relatively deep, medium-textured soils with low or moderate percent coarse fragments. Included are gentle to moderate slopes at all aspects, but which tend to be southerly. They often have concave surfaces, a wide range of moisture regimes (subxeric to permesic), or exposure to wind, insolation, bedrock, and surface rocks. Soils are usually Orthic Sombric Brunisols with Vermimull humus, a deep, dark Ah horizon, gravelly sandy loam to loam texture, and low percent coarse fragments. Stands are usually in tree canopy form, and Douglas-fir is often found with the oaks, which have small to medium diameters. Most sites are well stocked with saplings and lightly stocked with seedlings. These sites have rather low vegetation diversity. Alaska oniongrass (*Melica subulata*) and Pacific snakeroot (*Sanicula crassicaulis*) are important on all sites; blue wild-rye (*Elymus glaucus*) and cleavers (*Galium aparine*) are of lesser importance.



Kentucky bluegrass* (*Poa pratensis*), common vetch* (*Vicia sativa*) and miner’s-lettuce (*Montia perfoliata*) are of lesser importance on most sites.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

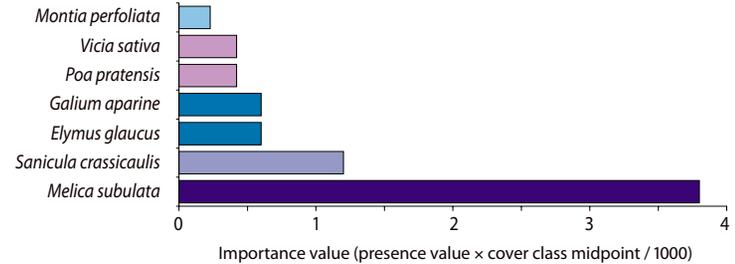
Comments

This community type is thought to occur on different types of sites than the several other late season grassy communities. Understorey composition may also reflect the influence of more complete, high-

cover stand conditions. The Garry oak – Alaska oniongrass community type Qggc-c13 is one of the original communities from which invasive alien orchardgrass communities (c5, c28a, c28, c30, c49 in Erickson 1996, 1998) are derived.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderately high
Aesthetic appeal	High
Susceptibility to disturbance	High
Prescribed fire potential	High
Threats	Moderately high
Restoration potential	Very high
Restoration priority	High

Relative Importance Value of Major Species



Qgos Garry oak – Oceanspray – Common snowberry

Quercus garryana – *Holodiscus discolor* – *Symphoricarpos albus*—plant association

Key Features

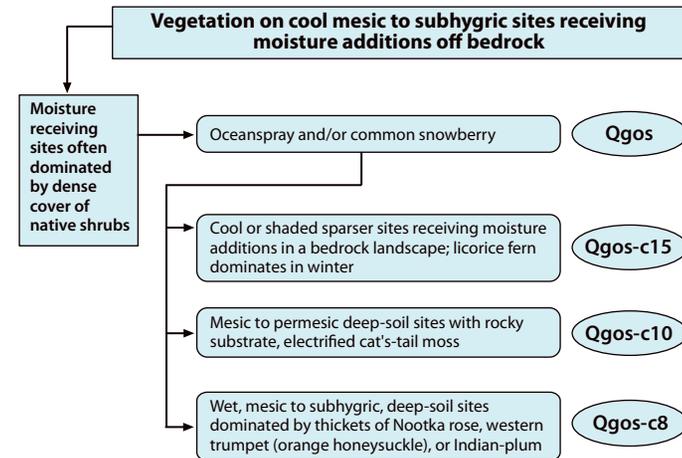
- Cool sites receiving moisture additions off bedrock
- Mesic to subhygric
- Deep-soil sites dominated by dense cover of native shrubs in thickets
- Oceanspray and/or common snowberry ≥ 11% cover

The Garry oak – Oceanspray – Common snowberry plant association is an amalgamation of four units (c8, c9, c10, c15) from Erickson (1996, 1998), one of which (c9) is eliminated here.

Plant community types	Garry oak – Nootka rose – Common snowberry Qgos-c8 Garry oak – Oceanspray – Common snowberry – Licorice fern Qgos-c15	Garry oak – (Douglas-fir) – Oceanspray – snowberry – Electrified cat's-tail moss Qgos-c10
Native successional community types	None	
Plant subcommunities	None	
Phenological stages	Qgos-c15 is partly a winter season community	
Native successional community types	None	
Invasive alien community types	None ¹²	

Full keys are found in Appendices 1 and 2. Flow charts to the plant communities follow (cool mesic to subhygric sites receiving moisture additions off bedrock).

¹² There is invasive alien vegetation, such as Himalayan blackberry, spurge-laurel, and English ivy, in these wetter areas but these highly disturbed stands were not sampled.



Notes: Defining species have at least 11% cover. Other details are in the text and the full keys at the back.



Western trumpet honeysuckle stand, Uplands.

Sites on cool mesic to subhygric sites receiving moisture additions off bedrock

Moisture-receiving sites often dominated by dense cover of native shrubs

Qgos

Cool, protected aspects receiving moisture additions in a bedrock landscape, but convex or strongly drained with relatively xeric moisture regime; shallowly underlain by coarse bedrock, which is often exposed along with surface rocks; dominant fern and/or bryophyte growth in winter, distinctive root-mat of humus

Qgos-c15

Cool, protected, mesic to permesic deep-soil sites, including basins and gentle topography, dominated by Douglas-fir and bryophytes, especially in winter (sometimes compensating moisture on rocky substrates with high exposure of rock or bedrock or relatively shallow soils with high coarse fragments)

Qgos-c10

Low-elevation, wet, mesic to subhygric, deep-soil sites in the Saanich Peninsula, western shore, and Nanaimo-Duncan; high cover of Garry oak, dense cover of native shrubs in thickets; generally absent from areas accessible to deer grazing (sometimes high cover of exposed mineral soil, compensating moisture on steep south- and southwestern-facing slopes; coarse, nutrient-poor bedrock)

Qgos-c8



Typical shrub thicket, University of Victoria.



Western trumpet honeysuckle.



Indian Plum.

Qgos

Garry oak – Oceanspray – Common snowberry

Quercus garryana – *Holodiscus discolor* – *Symphoricarpos albus*—plant association

General Description

These are cool, low-elevation, gentle, sometimes concave slopes that usually receive moisture influxes. They have deep soils and are dominated by a dense cover of native shrubs in thickets. Soil moisture regime tends toward subhygric. Some sites have moderately high surface dead wood and there may be exposure to wind, cool air, insolation, and seaspray. These soils are Orthic Sombric Brunisols with Vermimull humus, and deep, dark Ah horizons. The silt loam textures are distinctive—they have low percent coarse fragments and are without bedrock in the profile.

Oaks are found as a high-cover tree canopy of various diameters. Moderately to well-stocked saplings are regenerating on most sites. Seedling stocking is light and spotty. These sites appear as shrub thickets, and several shrubs species occupy both the low and tall shrub layers. Oceanspray (*Holodiscus discolor*), common snowberry (*Symphoricarpos albus*), and Nootka rose (*Rosa nutkana*) are important on most or all sites. The following are important on some sites: Indian-plum (*Oemleria cerasiformis*) in the low and tall shrub layer, western trumpet (*Lonicera ciliosa*), electrified cat’s-tail moss (*Rhytidiadelphus triquetrus*), spurge-laurel* (*Daphne laureola*), orchardgrass* (*Dactylis glomerata*), blue wildrye (*Elymus glaucus*), Kentucky* bluegrass (*Poa pratensis*), cleavers (*Galium aparine*), and common vetch* (*Vicia sativa*).

For more detail, see community types Qgos-c10 and Qgos-c8.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					



Oceanspray at Government House



Western trumpet honeysuckle, Thetis Lake Nature Sanctuary Association



Elkington, common snowberry stand

Qgos-c15 Garry oak – Oceanspray – Common snowberry – Licorice fern

Quercus garryana – *Holodiscus discolor* – *Symphoricarpos albus* – *Polypodium glycyrrhiza*—community type

General Description

This community type is frequent within the Saanich Peninsula, western shore, and Nanaimo–Duncan portions of the range. These cool protected aspects receive moisture additions in a bedrock landscape,



although convex and strongly drained with a relatively xeric moisture regime. They are shallowly underlain by coarse bedrock, which is often exposed along with surface rocks. Most distinctive is its dominant fern and bryophyte growth in winter and the root-mat of humus. This

community type occurs on moderate to moderately steep northwest to northeast aspects with trifold moisture regimes (chart). All plots have granitic bedrock or surface rocks. Soils are Orthic Regosols with Orthic Rhizomull humus, and a shallow Ah horizon over bedrock. Sites have a tree canopy of small-diameter oaks. Regeneration of moderately stocked saplings and lightly stocked seedlings occurs on most sites.

Oceanspray (*Holodiscus discolor*) and licorice fern (*Polypodium glycyrrhiza*) are important on most or all sites; common snowberry (*Symphoricarpos albus*) is less typical. Blue wildrye (*Elymus glaucus*) is of lesser importance on all sites. Great camas (*Camassia leichtlinii*) is important on most sites; Scotch broom* (*Cytisus scoparius*), cleavers (*Galium aparine*), and broom-moss (*Dicranum scoparium*) are of lesser importance.

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

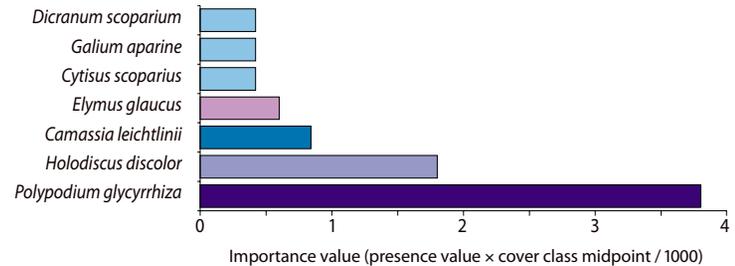
Comments

This community type is unique in that licorice fern grows over winter, dies back in mid-spring, and resumes growth again in late summer. This pattern is probably a good indicator both of the mildness of the coastal winters and of the winter-wet part of the modified Mediterranean climate. One distinguishing factor is the absence of this community type from the Gulf Islands, which may be controlled by greater deer grazing pressure. Another difference is its soil classification as Orthic Regosols (reflecting the shallow organic and Ah horizons over bedrock), the high surface exposure of granitic bedrock,

and the occurrence on north-facing slopes. Rooting structure and humus formation associated with licorice fern are unique. The Garry oak – Oceanspray – Common snowberry – Licorice fern community type Qgos-c15 also has vegetation affinities with the native broom-moss communities of cool bedrock outcrops.

Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderate
Aesthetic appeal	Moderately high
Susceptibility to disturbance	Very high
Prescribed fire potential	Low
Threats	High
Restoration potential	Very high
Restoration priority	Moderately high

Relative Importance Value of Major Species



Qgos-c10 Garry oak – Oceanspray – Common snowberry – Electrified cat’s-tail moss

Quercus garryana – *Holodiscus discolor* – *Symphoricarpos albus* – *Rhytidiadelphus triquetrus*—community type

General Description

The Garry oak – Oceanspray – Common snowberry – Electrified cat’s-tail moss community type occurs infrequently to moderately frequently on the Saanich Peninsula and the Nanaimo–Duncan areas.



These are cool, protected, mesic to permesic deep-soil sites with a rocky substrate. Sometimes there is compensating moisture, visible as seepage off toe slopes into basins or gentle topography from exposed rock or bedrock. Relatively shallow soils with high percent soil

coarse fragments are also found. Generally, sites were submesic to permesic, on gentle slopes with southerly aspects. Some had a concave surface shape. There is moderate to high exposure of coarse (granitic, gneiss) bedrock. Soils are Orthic Sombric Brunisols with Vermimull humus, a deep, dark Ah horizon, gravelly loam to silt loam texture, and high percent coarse fragments. There is a tree canopy of small-diameter oaks, which are accompanied on most sites by lesser cover of Douglas-fir. Garry oak regeneration of moderate to well-stocked saplings is present on most sites. Seedlings are lightly stocked on all sites. Oceanspray (*Holodiscus discolor*), common snowberry (*Symphoricarpos albus*), and electrified cat’s-tail moss (*Rhytidiadelphus triquetrus*) are important on all sites.

Pacific snakeroot (*Sanicula crassicaulis*), cleavers (*Galium aparine*), and long-stolonated sedge (*Carex inops*) are of lesser importance on all sites. Big-leaved sandwort (*Moehringia macrophylla*) is also present on all sites. White fawn lily (*Erythronium orego-*

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

num), tall Oregon-grape (*Mahonia aquifolium*), Scotch broom* (*Cytisus scoparius*), and California brome (*Bromus carinatus*) are of lesser importance on most sites. Blue wildrye (*Elymus glaucus*), orchardgrass* (*Dactylis glomerata*), American vetch (*Vicia americana*), chocolate lily (*Fritillaria affinis*), and common chickweed* (*Stellaria media*) are also present on most sites.

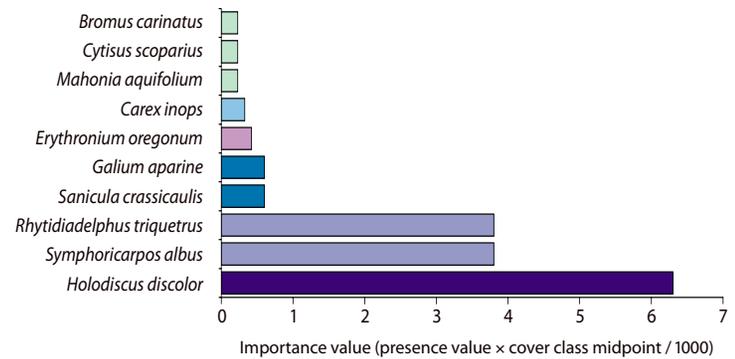
Comments

These sites are unique in their presence of seepage. They receive additional moisture from the surrounding landscape, as indicated by their toe slope position, concave or slightly concave surface, or observations of seepage. Some of these sites have shrub thickets. This community is partly distinguished by its absence from the Gulf Islands. This community also encroaches on drier mesic sites, where increasing Douglas-fir cover has led to increasing moss cover, reduced plant diversity, and even the loss of overtopped Garry oak.

Management Ranking	
Preservation priority	Very high
Regeneration potential	High
Aesthetic appeal	Moderate
Susceptibility to disturbance	High
Prescribed fire potential	Low†
Threats	High
Restoration potential	Very high
Restoration priority	Moderately high

† High for conversion to native herbaceous on drier sites.

Relative Importance Value of Major Species



Qgos-c8 Garry oak – Common snowberry – Nootka rose

Quercus garryana – *Symphoricarpos albus* – *Rosa nutkana*— community type

General Description

This community type combines two previous subcommunities: c8, Oceanspray – Common snowberry – Western trumpet, and c9, Garry oak – Common snowberry – Nootka rose – Indian-plum (Erickson 1996, 1998). The community type occurs frequently across the range with the exception of the northern (old c8) and southern Gulf Islands (old c9). These are wet, mesic to subhygric, deep-soil sites at low elevation dominated by high cover of Garry oak and dense cover of native



shrubs in thickets. This community type is generally absent from areas accessible to deer grazing. The soils are Orthic Sombric Brunisols with Vermimull humus, a deep, dark Ah horizon, and gravelly silt loam to loam texture. They have low percent coarse fragments and are without bedrock in the profile. Oaks are found as a tree canopy with various diameters. Moderately to well-stocked saplings are regenerating on most sites. Seedling stocking is light and spotty. These sites appear as shrub thickets, and several shrubs species occupy both the low and tall shrub layers. Common snowberry (*Symphoricarpos albus*) and Nootka rose (*Rosa nutkana*) are important on most or all sites, while orchardgrass* (*Dactylis glomerata*) is important on many sites. The following can be important on some sites: Indian-plum (*Oemleria cerasiformis*) in the low and tall shrub layers, western trumpet (*Lonicera ciliosa*), spurge-laurel* (*Daphne laureola*), blue wildrye (*Elymus glaucus*), Kentucky* bluegrass (*Poa pratensis*), cleavers (*Galium aparine*), and common vetch* (*Vicia sativa*).

Moisture regime	Northern Gulf Islands	Nanaimo-Duncan	Southern Gulf Islands	Saanich Peninsula	Western shore
very xeric					
subxeric					
mesic					
subhygric					

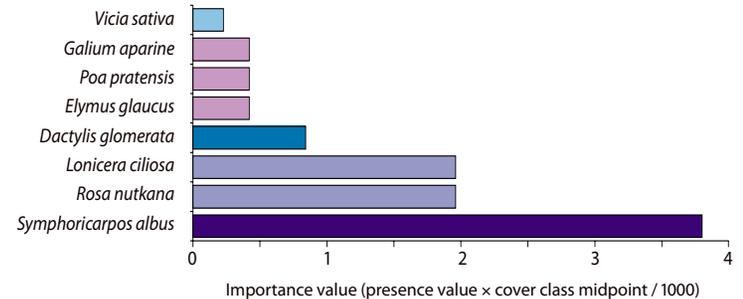
Comments

These sites are multi-layered shrub thickets, often found near the sea-edge. This community type is partly distinguished by its occurrence on gentle slopes at all aspects at low elevations and by deep, dark Ah horizons. Although the successional role for this community has not been articulated, its distribution and development seem to be inversely related to deer populations, and possibly also to past livestock use. This suggests tentinal for replacement by spurge-laurel (*Daphne laureola*), Himalayan blackberry, ivy, and other invasive species.

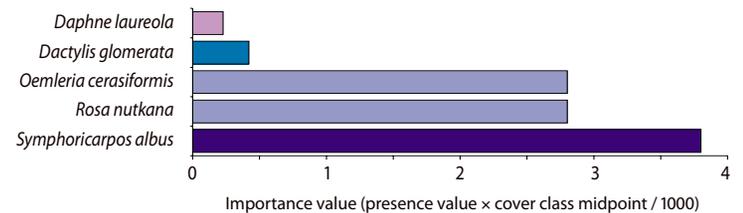
Management Ranking	
Preservation priority	Very high
Regeneration potential	Moderate
Aesthetic appeal	Moderately high
Susceptibility to disturbance	Moderate
Prescribed fire potential	Low
Threats	Very high
Restoration potential	Very high
Restoration priority	Moderately high

Relative Importance Value of Major Species

c8 from Erickson (1996, 1998)



c9 from Erickson (1996, 1998)



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Synopsis

Mostly native dominant species

Bedrock landscapes

Warm aspects¹⁴: **Grey rock-moss – Wallace’s selaginella...Qgrm**

Cool aspects: **Broom-moss...Qgbm**

Dry colluvial sites: **Hairy honeysuckle...Qghh**

Cool or wet sites, dense shrubs: Oceanspray – Common snowberry...Qgos

Gentle to steep slopes with native herbaceous vegetation

Exposed subxeric sites: **Roemer’s fescue...Qgrf**

Moderate submesic sites: **Common camas – Blue wildrye...Qgcc**

Lower slope mesic sites: **Great camas – Blue wildrye...Qggc**

If not, see 2 below.

Full Vegetation Key to Garry Oak Plant Associations and Communities¹⁵

- 1 Mostly native dominant species, Scotch broom* absent or of secondary importance $\leq 11\%$ cover:
 - 1a Bedrock landscapes with prominent moss cover and herbaceous vegetation
 - 1a1 Warm aspects on exposed south- and west-facing slopes, grey rock-moss dominant, Wallace’s selaginella and/or grey rock-moss $\geq 11\%$ cover, the other of which $> 2\%$ cover: Garry oak – Grey rock-moss – Wallace’s selaginella plant association Qgrm
 - 1a2 Cool aspects and protected north- and east-facing slopes, broom-moss $\geq 11\%$ cover: Garry oak – Broom-moss plant association Qgbm:
 - 1a2a Early season (April 1 to May 15) sea blush $\geq 11\%$ cover: Garry oak – Broom-moss – Sea blush phenological community type Qgbm-c5¹⁶
 - 1a2b Small-leaved montia $\geq 11\%$ cover: Garry oak – Broom-moss – Small-leaved montia community type Qgbm-c11
 - 1a2c Broad-leaved stonecrop $\geq 11\%$ cover: Garry oak – Broom-moss – Broad-leaved stonecrop community type Qgbm-c45
 - 1b Dry, colluvial sites, often at the margins of bedrock landscapes or grassy slopes, dominated by native shrubs, hairy honeysuckle $\geq 11\%$ cover \geq other species except as below: Garry oak – Hairy honeysuckle plant association Qghh
 - 1b1 Tall Oregon-grape $\geq 11\%$ cover \geq other species: Garry oak – Tall Oregon-grape plant community type Qghh-c26
 - 1c Cool sites receiving moisture additions off bedrock, and wet, mesic to subhygric, deep-soil sites dominated by dense cover of native shrubs in thickets, oceanspray and/or common snowberry $\geq 11\%$ cover: Garry oak – Oceanspray – Common snowberry plant association Qgos

¹³ This key is facultative, not dichotomous.

¹⁴ “Garry oak” and “plant association” are left out of the synopsis for brevity.

¹⁵ At each stage of the key, see next for further choices, or go to 2.

¹⁶ The second part of the plant community code derives from Erickson (1996, 1998).

- 1c1 Cool or shaded sites receiving moisture additions in a bedrock landscape, licorice fern $\geq 11\%$ cover¹⁷: Garry oak – Oceanspray – Common snowberry – Licorice fern plant community type Qgos-c15
- 1c2 Mesic to permesic deep-soil sites with rocky substrate, electrified cat's-tail moss $\geq 11\%$ cover (usually $> 26\%$): Garry oak – Oceanspray – Common snowberry – Electrified cat's-tail moss plant community type Qgos-c10
- 1c3 Wet, mesic to subhygric, deep-soil sites dominated by dense cover of native shrubs in thickets, Nootka rose usually dominant, western trumpet (orange honeysuckle) or Indian-plum often $\geq 11\%$ cover: Garry oak – Nootka rose – Common snowberry plant community type Qgos-c8
- 1d Gentle to steep slopes with soil mantle dominated by native herbaceous vegetation
 - 1d1 Exposed subxeric sites on moderate to steep, mid- and upper slopes with bedrock exposure, Roemer's fescue $\geq 11\%$ cover: Garry oak – Roemer's fescue plant association: Qgrf
 - 1d1a Seaside location with oaks usually in krummholz form, American vetch usually $\geq 11\%$: Krummholz Garry oak – Roemer's fescue – American vetch subcommunity Qgrf-c42
 - 1d1b Small-headed clover $\geq 11\%$ cover: Garry oak – Roemer's fescue – Small-headed clover subcommunity Qgrf-c27
 - 1d1c Field chickweed $\geq 11\%$ cover, Roemer's fescue usually $\geq 11\%$, other species $\leq 11\%$: Garry oak – Roemer's fescue – Field chickweed subcommunity Qgrf-c25
 - 1d2 Submesic gentle to moderate mid-slopes, light to moderate shrub understorey, common camas (April 1 to May 15) and/ or blue wildrye (May 15 onwards) $\geq 11\%$ cover \geq other herb species: Garry oak – Common camas – Blue wildrye plant association Qgcc
 - 1d2a Early season¹⁸ (April 1 to May 15): herbaceous vegetation, especially bulb-forming species, common camas $\geq 11\%$ cover: Garry oak – Common camas phenological plant community type Qgcc-c37a
 - 1d2a1 White fawn lily $\geq 11\%$ cover: Garry oak – Common camas – White fawn lily phenological subcommunity Qgcc-c35a
 - 1d2a2 Broad-leaved shootingstar $\geq 11\%$ cover, common camas usually $\geq 11\%$ cover: Garry oak – Common camas – Broad-leaved shootingstar phenological subcommunity Qgcc-c35b

¹⁷ Licorice fern dies back in late spring and summer and grows continuously from late summer, through the winter, into spring. In summer, abundant rooted stalks and residues remain from the fronds.

¹⁸ Stands can be keyed in the early season between April 1 and May 15 or when plant phenology allows. A site may also be keyed to a later season classification and thus have two identified communities, but they are unified under one plant association.

- 1d2a3 Western buttercup $\geq 11\%$ cover, common camas usually $\geq 11\%$ cover: Garry oak – Common camas – Western buttercup phenological subcommunity Qgcc-c37b
- 1d2c Late season classification (after May 15), herbaceous grassy vegetation
 - 1d2c1 Blue wildrye $\geq 11\%$ cover \geq other herb species: Garry oak – Blue wildrye plant community type Qgcc-c47
 - 1d2c2 Long-stoloned sedge $\geq 11\%$ cover \geq other species: Garry oak – Long-stoloned sedge plant community type Qgcc-c14
 - 1d2c3 California brome $\geq 11\%$ cover, other species various: Garry oak – California brome native successional plant community type Qgcc-c43
- 1d3 Mesic to submesic gentle lower slopes, light to moderate native shrub understorey, great camas (April 21 to May 15) and/or blue wildrye (May 15 onwards) $\geq 11\%$ cover \geq other herb species: Garry oak – Great camas – Blue wildrye plant association Qggc
 - 1d3a Early season classification¹⁹ (April 21 to May 15): herbaceous forb vegetation, especially bulb-forming species
 - 1d3a1 Great camas $\geq 11\%$ cover: Garry oak – Great camas phenological plant community type Qggc-c36
 - 1d3a2 Miner's-lettuce $\geq 11\%$ cover: Garry oak – Miner's-lettuce native successional community type Qggc-c48
 - 1d3b Late season classification (after May 15), herbaceous grassy vegetation
 - 1d3b1 Blue wildrye $\geq 11\%$ cover, \geq other herb species: Garry oak – Blue wildrye plant community type Qggc-c47
 - 1d3b2 Alaska oniongrass $\geq 11\%$ cover \geq other species: Garry oak – Alaska oniongrass community type Qggc-c13
 - 1d3b3 Purple peavine $\geq 11\%$ cover, other species various: Garry oak – Purple peavine native successional community type Qggc-c41
- 2 If dominated by native species, repeat this key, examine keys within the closest plant association, and select the best fit. If dominated by introduced species, see Appendix 4, or the table with invasive alien communities under the plant association. If there is still no fit, name, describe, and report it as a new community.

¹⁹ Stands can be keyed in the early season section between April 1 and May 15 or when plant phenology allows. A site may also be keyed to a later season classification and thus have two identified plant communities.

- A** Bedrock or other rocky xeric landscapes, usually dominated by bryophytes or sparse, deep-rooted shrubs
Primarily uniform bedrock, usually dominated by bryophytes:
Warm aspects, exposed sites on rapidly drained topography, high site mineral soil exposure, trees if present may include Douglas-fir and arbutus at relatively high cover: Garry oak – Grey rock-moss – Wallace’s selaginella plant association Qgrm
Cool aspects, topographically protected sites, but with high mineral soil exposure and high percent soil coarse fragments: Garry oak – Broom-moss plant association Qgbm
Dry colluvial sites primarily underlain by fractured rock talus; if bedrock then cracked and fissured, not uniform; usually dominated by sparse, deep-rooted shrubs: Garry oak – Hairy honeysuckle plant association Qghh
- B** Less xeric landscape with a surface soil mantle
Usually dominated by grassy herbaceous species:
Soil coarse fragments with high percentage: Garry oak – Roemer’s fescue plant association Qgrf
Gentle to steep slopes with soil mantle, usually dominated by native herbaceous vegetation:
Less xeric, often submesic gentle to moderate mid-slopes, sometimes with high mineral soil exposure cover; light to moderate native shrub understorey, usually dominated in early season by herbaceous forb species or later by herbaceous grasses: Garry oak – Common camas – Blue wildrye plant association Qgcc
Mesic to submesic gentle lower slopes, sometimes cool, protected, or wetter topographic sites including basins and gentle topography; soils relatively deep, medium-textured, with low or moderate percent coarse fragments; light to moderate native shrub understorey; usually dominated in early season by herbaceous forb species or later by herbaceous grasses: Garry oak – Great camas – Blue wildrye plant association Qggc
- C** Wetter topographic sites; cool sites receiving moisture additions off bedrock, and wet, mesic to subhygric, deep-soil sites usually dominated by dense cover of native shrubs, including dense, multi-layered native shrub thickets: Garry oak – Oceanspray – Common snowberry plant association Qgos

²⁰ This environmental key is a first approximation that combines field observation with analytical results (Erickson 2002b). It is facultative rather than dichotomous, and its general nature suggests the need to pick the best fit from among the choices.

Garry oak – Grey rock-moss – Wallace’s selaginella plant association Qgrm
none

Garry oak – Broom-moss plant association Qgbm

Garry oak – Broom-moss – Small-leaved montia plant community type
Qgbm-c11²¹

Garry oak – Broom-moss – Broad-leaved stonecrop plant community type
Qgbm-c45

Garry oak – Broom-moss – Sea blush phenological community type
Qgbm-c51

Garry oak – Hairy honeysuckle plant association Qghh

Garry oak – Tall Oregon-grape plant community type Qghh-c26

Garry oak – Roemer’s fescue plant association Qgrf

Garry oak – Roemer’s fescue – Field chickweed plant subcommunity
Qgrf-c25

Garry oak – Idaho fescue – Small-headed clover plant subcommunity
Qgrf-c27

Krummholz Garry oak – Roemer’s fescue – American vetch plant sub-
community Qgrf-c42

Garry oak – Common camas – Blue wildrye plant association Qgcc

Garry oak – Common camas phenological plant community type
Qgcc-c37a

Garry oak – Common camas – White fawn lily phenological subcommu-
nity Qgcc-c35a

Garry oak – Common camas – Broad-leaved shootingstar phenological
subcommunity Qgcc-c35b

Garry oak – Common camas – Western buttercup phenological subcom-
munity Qgcc-c37b

Garry oak – Blue wildrye plant community type Qgcc-c47

Garry oak – Long-stoloned sedge plant community type Qgcc-c14

Garry oak – California brome native successional plant community type
Qgcc-c43

Garry oak – Great camas – Blue wildrye plant association Qggc

Garry oak – Great camas phenological plant community type Qggc-c36

Garry oak – Blue wildrye plant community type Qggc-c47

Garry oak – Alaska oniongrass plant community type Qggc-c13

Garry oak – Miner’s-lettuce native successional (phenological) community
type Qggc-c48

Garry oak – Purple peavine native successional community type Qggc-c41

²¹ These alphanumeric numbers are the equivalent communities in Erickson (1996, 1998), where more detail can be found.

Garry oak – Oceanspray – Common snowberry plant association Qgos

Garry oak – Oceanspray – Common snowberry – Licorice fern plant community type Qgos-c15

Garry oak – Oceanspray – Common snowberry – Electrified cat’s-tail moss plant community type Qgos-c10

Garry oak – Nootka rose – Common snowberry plant community type Qgos-c8

Summary of plant associations and their communities

Plant associations (7)	No. of native community types	No. of native subcommunities
Garry oak - Grey rock-moss - Wallace’s selaginella	0	
Garry oak - Broom-moss	3	
Garry oak - Hairy honeysuckle	1	
Garry oak - Roemer’s fescue	0	3
Garry oak - Common camas - Blue wildrye	5	3
Garry oak - Great camas - Blue wildrye	5	
Garry oak - Oceanspray - Common snowberry	3	
Total ²²	17	6

²² These totals are higher than the total above because some community types are repeated across the plant associations.

APPENDIX 4 Garry Oak Plant Associations and Invasive Alien Communities (from Erickson 1996, 1998)²³

Garry oak – Grey rock-moss – Wallace’s selaginella plant association Qgrm		
Invasive alien subcommunities ²⁴	Garry oak – Grey rock-moss – Annual fescue* ²⁵ (c50) (includes Garry oak – Scotch broom* – Grey rock-moss – Annual fescue* – Hairgrass* (c3))	Garry oak – Scotch broom* – Grey rock-moss (c17) (includes Garry oak – Scotch broom* – Grey rock-moss – Cheatgrass* (c22))
Garry oak – Broom-moss plant association Qgbm		
Invasive alien communities	none	
Garry oak – Hairy honeysuckle plant association Qghh		
Invasive alien community types	Garry oak – Barren brome (c23)	Garry oak – Hedgehog dogtail* (c21)
	Garry oak – Scotch broom* – Hedgehog dogtail* (c2)	
Garry oak – Roemer’s fescue plant association Qgrf		
Invasive alien community types	Garry oak – Hedgehog dogtail* (c21)	Garry oak – Scotch broom* – Hedgehog dogtail* (c2)
Garry oak – Common camas – Blue wildrye plant association Qgcc		
Invasive alien community types	Garry oak – Sweet vernalgrass* (c31a)	Garry oak – Scotch broom* – Kentucky bluegrass* (c4)
	Garry oak – Scotch broom* – Sweet vernalgrass* (c31b)	
Invasive alien subcommunities	Garry oak – Barren brome* (c23)	Garry oak – Kentucky bluegrass* – Common vetch* (c29a)
Garry oak – Great camas – Blue wildrye plant association Qggc		
Invasive alien community types	Garry oak – Scotch broom* – Blue wildrye (c6)	Garry oak – Orchardgrass* – Tall oatgrass* (c30)
	Garry oak – Orchardgrass* – Redtop hairgrass* (c49)	
Invasive alien subcommunities	Garry oak – Orchardgrass* (c28a and b)	Garry oak – Scotch broom* – Orchardgrass* (c5)
Garry oak – Oceanspray – Common snowberry plant association Qgos		
Invasive alien communities	none ²⁶	

²³ There is also further overlap in occurrence of the invasive alien communities than shown.

²⁴ Invasive alien community types are named but not described here. Community numbers are from Erickson (1996, 1998, which see for a description).

²⁵ * = introduced (non-native) species.

²⁶ Invasive alien vegetation, such as Himalayan blackberry, spurge-laurel, and English ivy, grow in these wetter areas, but these highly disturbed stands were outside the scope of our sampling.

Similarity Analysis and Thresholds

The similarity of communities (IS) was analyzed with pairwise adjusted Motyka Index of Similarity (ISmo) comparisons (Erickson 1996, 1998). This method considers similarities versus differences considering both cover and constancy. Values in the original analysis ranged from ISmo = 0 to ISmo = 1.85. Thresholds were developed and used here based on a tolerance of ISmo = 1STD (Standard Deviation) for valid plant community types; and ISmo=2STD for subcommunities. Values of ISmo > 2STD led to combinations of communities. Thresholds and their interpretation were as follows: ISmo < 0.2 – retain as separate taxa (e.g., plant association); ISmo > 0.2 to 0.96 – community type difference; ISmo > 0.96 to 1.34 – subcommunity difference; ISmo > 1.34 – combine. Only the results that explain classification changes compared with Erickson (1996, 1998) are given here.

Classification Notes

Garry oak – Broom-moss (*Quercus garryana* – *Dicranum scoparium*) plant association: Qgbm

The plant community types Qgbm-c45 and -c11 have their level of classification raised because of mid-range IS (0.4) values. The community type Qgbm-c51 was designated as phenological because it was previously grouped with the early season communities and could be attributed to the plant association (c52 in Erickson 1996, 1998) in late season. There is a scattering of Scotch broom* in this habitat but not enough to define invasive alien communities. One community has been excluded from a temporary placement here and its name not maintained: *Quercus garryana* – *Dicranum scoparium* – *Polypodium glycyrrhiza* (= c15; Erickson 1996, 1998). It is found below Qgos-c15 with the wet shrub thicket communities.

Garry oak – Roemer’s fescue (*Quercus garryana* – *Festuca roemerii*²⁷) plant association: Qgrf

The Krummholz Garry oak – Roemer’s fescue – American vetch subcommunity Qgrf-c42 is not separated at a higher level because it is similar enough to IS > 0.96 to remain here as a subcommunity.

Garry oak – Common camas – Blue wildrye (*Quercus garryana* – *Camassia quamash* – *Elymus glaucus*) plant association: Qgcc

The invasive alien subcommunities, Garry oak – barren brome* (c23) and Garry oak – Kentucky bluegrass* – common vetch* (c29a) (Erickson 1996, 1998), are placed as subcommunities here based on their similarity IS > 1.0.

Garry oak – Great camas – Blue wildrye (*Quercus garryana* – *Camassia leichtlinii* – *Elymus glaucus*) plant association: Qggc

The suggestion of using *Bromus sterilis* in this plant association name (i.e., “*Quercus garryana* – *Camassia leichtlinii* – *Bromus sterilis*”) was not followed here because it denotes an invasive alien community, and one that usually occurs on drier sites. The invasive alien subcommunity above, c28, is a combination of 28a with c28b from Erickson (1996, 1998) based on their high similarity value IS > 1.34.

²⁷ *Festuca idahoensis* is equivalent and is covered here under *F. roemerii*.

Garry oak – Oceanspray – Common snowberry (*Quercus garryana* – *Holodiscus discolor* – *Symphoricarpos albus*) plant association: Qgos
Oceanspray was added and Nootka rose dropped from the plant association name with the addition of two communities and the combination of the other two. The Garry oak – Nootka rose – Common snowberry community type Qgos-c8 is a combination of the *Quercus garryana* – *Symphoricarpos albus* – *Rosa nutkana* – *Lonicera ciliosa* (old c8) and the *Quercus garryana* – *Symphoricarpos albus* – *Rosa nutkana* – *Oemleria cerasiformis* (c9) subcommunities from Erickson (1996, 1998). They are combined here because of their high similarity ($IS > 1.34$). Surveyors can still use their judgement as to whether to record these separately.

Garry oak – (Douglas-fir) – Oceanspray – Snowberry – Electrified cat's-tail moss Qgos-c10 is included here as similar enough ($IS > 0.20$ compared with old c8) to fit into this plant association. Note that it also functions as a native successional community type where it increases or invades drier sites outside the area of this plant association. Garry oak – Oceanspray – Common snowberry – Licorice fern Qgos-c15 is included here because it is similar enough ($IS > 0.2$) to c10 to be in the same plant association. It is nonetheless still distinctive for the winter growth of its dominant fern, which probably indicates both the mildness of the coastal winters and of the winter-wet part of the modified Mediterranean climate.

Scientific Name	Qgrm	Qgbm	Qghh	Qgrf	Qgcc	Qggc	Qgos	Common Name
Tree Layer								
<i>Quercus garryana</i>	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	Garry oak
Shrub Layer								
<i>Quercus garryana</i>	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	Garry oak
<i>Lonicera hispidula</i>	■	■	■■■■	■■	■	■	■	hairy honeysuckle
<i>Holodiscus discolor</i>		■■■	■	■	■	■	■■■■	oceanspray
<i>Mahonia aquifolium</i>		■	■■■	■	■	■	■	tall Oregon-grape
<i>Symphoricarpos albus</i>		■■	■	■	■■■	■■■	■■■■	common snowberry
<i>Rosa nutkana</i>		■	■		■	■	■■■	Nootka rose
<i>Oemleria cerasiformis</i>					■		■■	Indian-plum
<i>Lonicera ciliosa</i>							■■	western trumpet honeysuckle
Herb Layer								
<i>Bromus carinatus</i>	■	■	■	■■	■	■	■	California brome
<i>Carex inops</i>	■■	■	■	■■	■■■	■	■	long-stoloned sedge
<i>Elymus glaucus</i>	■	■	■■	■■	■■	■■■	■	blue wildrye
<i>Festuca roemerii</i>	■	■	■	■■■	■	■	■	Roemer's fescue
<i>Galium aparine</i>	■	■■	■■	■■	■	■■	■	cleavers
<i>Vicia americana</i>	■	■	■	■■	■	■	■	American vetch
<i>Cerastium arvense</i>	■	■	■	■■	■	■		field chickweed
<i>Luzula comosa</i> var. <i>comosa</i>	■	■	■	■	■			Pacific wood-rush
<i>Selaginella wallacei</i>	■■■■	■	■	■				Wallace's selaginella
<i>Clarkia amoena</i>	■							farewell-to-spring
<i>Koeleria macrantha</i>	■							junegrass
<i>Eriophyllum lanatum</i>			■					woolly eriophyllum
<i>Collinsia parviflora</i>	■				■			small-flowered blue-eyed Mary
<i>Lotus micranthus</i>	■			■	■			small-flowered birds-foot trefoil
<i>Dodecatheon hendersonii</i>	■			■	■		■	broad-leaved shootingstar
<i>Lomatium triternatum</i>	■	■			■			nine-leaved desert-parsley
<i>Sedum spathulifolium</i>	■	■■■		■				broad-leaved stonecrop
<i>Delphinium menziesii</i>		■						Menzies' larkspur

Scientific Name	Qgrm	Qgbm	Qghh	Qgrf	Qgcc	Qggc	Qgos	Common Name
<i>Heuchera micrantha</i>		■						small-flowered alumroot
<i>Lomatium utriculatum</i>		■		■	■			spring gold
<i>Lathyrus nevadensis</i>		■			■	■	■	purple peavine
<i>Erythronium oregonum</i>		■			■■■		■	white fawn lily
<i>Brodiaea coronaria</i>		■	■	■	■■	■		harvest brodiaea
<i>Claytonia perfoliata</i>		■■■		■	■	■■	■■	miner's-lettuce
<i>Camassia leichtlinii</i>		■■■	■	■■	■	■■■	■■■	great camas
<i>Camassia quamash</i>		■■	■	■	■■■■	■	■■	common camas
<i>Melica subulata</i>		■■	■■	■	■■	■■■■	■■	Alaska oniongrass
<i>Sanicula crassicaulis</i>		■■	■■■	■■■	■■	■■■	■■	Pacific sanicle
<i>Montia parvifolia</i>		■■■■			■		■	small-leaved montia
<i>Nemophila parviflora</i>		■	■	■		■	■	small-flowered nemophila
<i>Rubus ursinus</i>		■	■		■		■	trailing blackberry
<i>Osmorhiza berteroi</i>		■	■		■	■■		mountain sweet-cicely
<i>Plectritis congesta</i>		■■■			■			sea blush
<i>Polypodium glycyrrhiza</i>		■■				■	■■■■	licorice fern
<i>Clinopodium douglasii</i>			■■	■■	■		■	yerba buena
<i>Danthonia californica</i>			■		■	■		California oatgrass
<i>Trifolium microcephalum</i>			■	■■■			■	small-headed clover
<i>Trifolium oliganthum</i>				■				few-flowered clover
<i>Ranunculus occidentalis</i>				■	■■■	■		western buttercup
Moss Layer								
<i>Racomitrium canescens</i>	■■■■■	■	■	■■	■■	■	■■	grey rock-moss
<i>Polytrichum juniperinum</i>	■■■	■■		■	■■		■■	juniper haircap moss
<i>Dicranum scoparium</i>	■	■■■■	■	■■	■■	■	■■	broom-moss
<i>Eurhynchium oregonum</i>		■■	■	■	■	■■	■■	Oregon beaked-moss
<i>Rhytidiadelphus triquetrus</i>		■■■■	■	■	■■	■■	■■■	electrified cat's-tail moss

		Qgrm	
		Comm. types	
		C46	
Layer	Scientific Name	Pres - Cover	Common Name
Trees			
A	<i>Pseudotsuga menziesii</i>	0.75 - 10.50	Douglas-fir
A	<i>Quercus garryana</i>	0.75 - 33.00	Garry oak
Shrubs			
B1	<i>Quercus garryana</i>	0.75 - 24.75	Garry oak
B2	<i>Quercus garryana</i>	0.75 - 6.13	Garry oak
B2	<i>Lonicera hispidula</i>	0.50 - 6.00	hairy honeysuckle
B2	<i>Cytisus scoparius</i>	0.50 - 4.63	Scotch broom
B2	<i>Paxistima myrsinites</i>	0.50 - 0.25	falsebox
Herbs			
C	<i>Aira caryophyllea</i>	0.50 - 0.25	silver hairgrass
C	<i>Aira praecox</i>	0.75 - 1.75	early hairgrass
C	<i>Allium cernuum</i>	0.50 - 0.25	nodding onion
C	<i>Bromus carinatus</i>	1.00 - 4.63	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.50 - 1.63	soft brome
C	<i>Bromus sterilis</i>	0.50 - 14.00	barren brome
C	<i>Bromus tectorum</i>	0.50 - 4.63	cheatgrass
C	<i>Carex inops</i>	0.50 - 9.00	long-stoloned sedge
C	<i>Cerastium arvense</i>	0.50 - 4.63	field chickweed
C	<i>Clarkia amoena</i>	0.50 - 1.63	farewell-to-spring
C	<i>Collinsia parviflora</i>	0.75 - 3.13	small-flowered blue-eyed Mary
C	<i>Crepis</i> sp.	0.75 - 0.38	
C	<i>Elymus glaucus</i>	1.00 - 3.25	blue wildrye
C	<i>Eriophyllum lanatum</i>	0.75 - 1.75	woolly eriophyllum
C	<i>Festuca idahoensis</i>	0.50 - 3.00	Idaho fescue
C	<i>Galium aparine</i>	0.50 - 1.63	cleavers
C	<i>Koeleria macrantha</i>	0.50 - 6.00	junegrass
C	<i>Lomatium triternatum</i>	0.50 - 1.63	nine-leaved desert-parsley
C	<i>Lotus micranthus</i>	0.75 - 3.13	small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.75 - 4.75	Pacific wood-rush
C	<i>Pentagramma triangularis</i>	0.75 - 0.38	goldenback fern
C	<i>Rumex acetosella</i>	0.75 - 0.38	sheep sorrel
C	<i>Selaginella wallacei</i>	1.00 - 25.00	Wallace's selaginella
C	<i>Vulpia bromoides</i>	0.75 - 4.75	barren fescue
Mosses and Lichens			
D	<i>Polytrichum juniperinum</i>	0.75 - 10.50	juniper haircap moss
D	<i>Quercus garryana</i>	1.00 - 3.25	Garry oak
D	<i>Racomitrium canescens</i>	0.75 - 29.75	grey rock-moss
Additional species < 50% presence			
B1	<i>Arbutus menziesii</i>	0.25 - 4.50	arbutus
B1	<i>Pseudotsuga menziesii</i>	0.25 - 9.50	Douglas-fir
B2	<i>Arbutus menziesii</i>	0.25 - 0.13	arbutus
B2	<i>Mahonia aquifolium</i>	0.25 - 0.13	tall Oregon-grape
B2	<i>Pseudotsuga menziesii</i>	0.25 - 4.50	Douglas-fir
B2	<i>Symphoricarpos albus</i>	0.25 - 0.13	common snowberry
C	<i>Anthoxanthum odoratum</i>	0.25 - 0.13	sweet vernalgrass
C	<i>Brodiaea coronaria</i>	0.25 - 0.13	harvest brodiaea
C	<i>Bromus rigidus</i>	0.25 - 4.50	rip-gut brome
C	<i>Camassia quamash</i>	0.25 - 0.13	common camas
C	<i>Claytonia perfoliata</i>	0.25 - 0.13	miner's-lettuce

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

		Qgrm	
		Comm. types	
		C46	
Layer	Scientific Name	Pres - Cover	Common Name
C	<i>Clinopodium douglasii</i>	0.25 - 0.13	yerba buena
C	<i>Cynosurus echinatus</i>	0.25 - 4.50	hedgehog dogtail
C	<i>Dodecatheon hendersonii</i>	0.25 - 4.50	broad-leaved shootingstar
C	<i>Galium aparine</i>	0.25 - 0.13	cleavers
C	<i>Geranium molle</i>	0.25 - 0.13	dovefoot geranium
C	<i>Hypochaeris radicata</i>	0.25 - 0.13	hairy cat's-ear
C	<i>Lomatium utriculatum</i>	0.25 - 0.13	spring gold
C	<i>Nemophila parviflora</i>	0.25 - 0.13	small-flowered nemophila
C	<i>Piperia elegans</i>	0.25 - 0.13	elegant rein orchid
C	<i>Sanicula crassicaulis</i>	0.25 - 0.13	Pacific sanicle
C	<i>Sedum spathulifolium</i>	0.25 - 1.50	broad-leaved stonecrop
C	<i>Stellaria media</i>	0.25 - 0.13	common chickweed
C	<i>Trifolium oliganthum</i>	0.25 - 0.13	few-flowered clover
C	<i>Vicia americana</i>	0.25 - 1.50	American vetch
D	<i>Dicranum scoparium</i>	0.25 - 1.50	broom-moss
D	<i>Pseudotsuga menziesii</i>	0.25 - 0.13	Douglas-fir

Layer	Scientific Name	Qgbm			Common Name
		Comm. types		Phen	
		C11	C45	C51	
		Pres - Cover	Pres - Cover	Pres - Cover	
Trees					
A	<i>Quercus garryana</i>	0.57 - 13.33		1.00 - 54.67	Garry oak
Shrubs					
B1	<i>Holodiscus discolor</i>	0.29 - 11.50	0.20 - 3.60	0.67 - 14.67	oceanspray
B1	<i>Quercus garryana</i>	1.00 - 42.83	1.00 - 44.00	1.00 - 14.00	Garry oak
B2	<i>Cytisus scoparius</i>	0.57 - 0.33	0.20 - 0.10	1.00 - 4.17	Scotch broom
B2	<i>Holodiscus discolor</i>	0.14 - 0.08	0.60 - 17.40	0.33 - 2.00	oceanspray
B2	<i>Mahonia aquifolium</i>	0.43 - 2.08	0.60 - 4.90	0.33 - 0.17	tall Oregon-grape
B2	<i>Paxistima myrsinites</i>	0.14 - 0.08	0.60 - 2.50		falsebox
B2	<i>Quercus garryana</i>	0.57 - 8.00	1.00 - 31.00	0.67 - 4.00	Garry oak
B2	<i>Symphoricarpos albus</i>	0.71 - 8.50	1.00 - 12.10	1.00 - 0.50	common snowberry
Herbs					
C	<i>Aira praecox</i>	0.86 - 7.25	0.40 - 1.30	0.33 - 0.17	early hairgrass
C	<i>Anthoxanthum odoratum</i>	0.71 - 14.33	0.20 - 0.10	1.00 - 8.17	sweet vernalgrass
C	<i>Bromus carinatus</i>	0.71 - 3.17	0.60 - 2.50	0.67 - 4.00	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.14 - 0.08	0.20 - 0.10	0.67 - 2.17	soft brome
C	<i>Bromus sterilis</i>	0.29 - 0.17	0.40 - 4.80	0.67 - 2.17	barren brome
C	<i>Camassia leichtlinii</i>	0.43 - 2.08	0.60 - 1.40	1.00 - 20.67	great camas
C	<i>Camassia quamash</i>	0.57 - 3.08			common camas
C	<i>Cerastium arvense</i>	0.29 - 1.08	0.60 - 0.30	0.67 - 2.17	field chickweed
C	<i>Claytonia perfoliata</i>	0.71 - 14.33	0.20 - 0.10	1.00 - 14.83	miner's-lettuce
C	<i>Collinsia parviflora</i>	0.29 - 1.08	0.20 - 0.10	0.67 - 0.33	small-flowered blue-eyed Mary
C	<i>Dactylis glomerata</i>	0.57 - 3.08	0.20 - 0.10	0.67 - 8.00	orchard-grass
C	<i>Delphinium menziesii</i>	0.29 - 1.08	0.40 - 0.20	0.67 - 2.17	Menzies' larkspur
C	<i>Elymus glaucus</i>	1.00 - 11.17	0.60 - 1.40	0.67 - 2.17	blue wildrye
C	<i>Erythronium oregonum</i>	0.43 - 3.17	0.40 - 0.20	0.67 - 2.17	white fawn lily
C	<i>Festuca roemerii</i>	0.14 - 1.00	0.60 - 3.80	0.33 - 2.00	Roemer's fescue
C	<i>Galium aparine</i>	1.00 - 11.17	0.80 - 3.70	1.00 - 14.00	cleavers
C	<i>Geranium molle</i>	0.29 - 0.17	0.20 - 1.20	0.67 - 0.33	dovefoot geranium
C	<i>Heuchera micrantha</i>	0.43 - 1.17	0.60 - 1.40	0.67 - 2.17	small-flowered alumroot
C	<i>Hypochaeris radicata</i>	0.57 - 1.25	0.40 - 0.20	0.33 - 0.17	hairy cat's-ear
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.57 - 1.25	0.40 - 0.20		Pacific wood-rush
C	<i>Melica subulata</i>	0.29 - 4.00	0.60 - 7.30	0.67 - 6.17	Alaska oniongrass
C	<i>Montia parvifolia</i>	1.00 - 28.50	0.20 - 1.20	0.67 - 4.00	small-leaved montia
C	<i>Osmorhiza berteroi</i>	0.29 - 1.08		1.00 - 2.33	mountain sweet-cicely
C	<i>Plectritis congesta</i>	0.43 - 4.08	0.20 - 0.10	1.00 - 24.67	sea blush
C	<i>Poa pratensis</i>	0.29 - 2.00	0.60 - 0.30	0.67 - 8.00	Kentucky bluegrass
C	<i>Polypodium glycyrrhiza</i>	0.86 - 4.17	0.60 - 1.40	0.33 - 0.17	licorice fern
C	<i>Polystichum munitum</i>	0.14 - 0.08		0.67 - 0.33	sword fern
C	<i>Rubus ursinus</i>		0.20 - 0.10	1.00 - 2.33	trailing blackberry
C	<i>Rumex acetosella</i>	0.57 - 4.17	0.40 - 0.20	0.33 - 0.17	sheep sorrel
C	<i>Sanicula crassicaulis</i>	0.29 - 4.00	0.60 - 2.50	1.00 - 8.17	Pacific sanicle
C	<i>Sedum spathulifolium</i>	0.43 - 4.08	1.00 - 22.00	1.00 - 6.33	broad-leaved stonecrop
C	<i>Stellaria media</i>	0.29 - 0.17	0.20 - 0.10	0.67 - 0.33	common chickweed
C	<i>Vicia americana</i>	0.14 - 0.08	0.20 - 1.20	0.67 - 2.17	American vetch
C	<i>Vicia hirsuta</i>	0.29 - 2.00	0.40 - 1.30	0.67 - 0.33	tiny vetch
C	<i>Vicia sativa</i>	0.29 - 1.08	0.20 - 0.10	0.67 - 2.17	common vetch
C	<i>Vulpia bromoides</i>	0.57 - 3.25	0.60 - 4.90	0.67 - 4.00	barren fescue

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

Layer	Scientific Name	Qgbm			Common Name
		Comm. types		Phen	
		C11	C45	C51	
		Pres - Cover	Pres - Cover	Pres - Cover	
Mosses and Lichens					
D	<i>Dicranum scoparium</i>	0.86 - 23.50	0.80 - 16.00	1.00 - 14.00	broom-moss
D	<i>Eurhynchium oregonum</i>	0.29 - 11.50	0.40 - 2.40	0.67 - 8.00	Oregon beaked-moss
D	<i>Polytrichum juniperinum</i>	0.57 - 6.00	0.40 - 2.40	0.33 - 2.00	juniper haircap moss
D	<i>Quercus garryana</i>	0.86 - 2.33	0.80 - 2.60	1.00 - 2.33	Garry oak
D	<i>Rhytidiadelphus triquetrus</i>	0.71 - 21.83	0.20 - 1.20	1.00 - 20.67	electrified cat's-tail moss
Additional species < 50% presence					
A	<i>Arbutus menziesii</i>	0.14 - 3.00		0.33 - 2.00	arbutus
A	<i>Pseudotsuga menziesii</i>	0.43 - 5.00			Douglas-fir
B1	<i>Arbutus menziesii</i>		0.40 - 4.80	0.33 - 0.17	arbutus
B1	<i>Lonicera ciliosa</i>			0.33 - 0.17	western trumpet honeysuckle
B1	<i>Pseudotsuga menziesii</i>	0.14 - 1.00	0.20 - 1.20		Douglas-fir
B2	<i>Amelanchier alnifolia</i>	0.14 - 0.08	0.20 - 0.10		saskatoon
B2	<i>Daphne laureola</i>	0.14 - 0.08		0.33 - 0.17	spurge-laurel
B2	<i>Lonicera ciliosa</i>	0.14 - 0.08	0.20 - 1.20	0.33 - 0.17	western trumpet honeysuckle
B2	<i>Lonicera hispidula</i>	0.14 - 3.00	0.40 - 4.80	0.33 - 0.17	hairy honeysuckle
B2	<i>Oemleria cerasiformis</i>		0.20 - 0.10		Indian-plum
B2	<i>Pseudotsuga menziesii</i>	0.14 - 0.08	0.20 - 1.20		Douglas-fir
B2	<i>Rosa nutkana</i>			0.33 - 2.00	Nootka rose
C	<i>Aira caryophylla</i>	0.14 - 0.08	0.40 - 0.20		silver hairgrass
C	<i>Allium cernuum</i>		0.20 - 0.10		nodding onion
C	<i>Arrhenatherum elatius</i>	0.14 - 0.08		0.33 - 12.67	tall oatgrass
C	<i>Brodiaea coronaria</i>	0.29 - 1.08	0.20 - 0.10	0.33 - 2.00	harvest brodiaea
C	<i>Carex inops</i>	0.14 - 3.00	0.20 - 3.60		long-stoloned sedge
C	<i>Clarkia amoena</i>		0.20 - 0.10		farewell-to-spring
C	<i>Crepis</i> sp.		0.20 - 0.10	0.33 - 0.17	
C	<i>Cynosurus echinatus</i>	0.14 - 0.08	0.40 - 0.20		hedgehog dogtail
C	<i>Danthonia californica</i>	0.14 - 0.08			California oatgrass
C	<i>Dodecatheon hendersonii</i>	0.14 - 1.00			broad-leaved shootingstar
C	<i>Fritillaria affinis</i>	0.14 - 0.08			chocolate lily
C	<i>Holcus lanatus</i>	0.14 - 0.08	0.20 - 0.10		common velvet-grass
C	<i>Lathyrus nevadensis</i>	0.14 - 0.08	0.40 - 3.70	0.33 - 0.17	purple peavine
C	<i>Lomatium triternatum</i>		0.20 - 0.10	0.33 - 2.00	nine-leaved desert-parsley
C	<i>Lomatium utriculatum</i>		0.20 - 0.10	0.33 - 2.00	spring gold
C	<i>Lotus micranthus</i>		0.40 - 0.20		small-flowered birds-foot trefoil
C	<i>Moehringia macrophylla</i>	0.43 - 3.17		0.33 - 0.17	big-leaved sandwort
C	<i>Myosotis discolor</i>	0.43 - 0.25	0.20 - 0.10		common forget-me-not
C	<i>Nemophila parviflora</i>	0.29 - 1.08	0.40 - 0.20	0.33 - 2.00	small-flowered nemophila
C	<i>Piperia elegans</i>	0.14 - 0.08	0.20 - 0.10		elegant rein orchid
C	<i>Plantago lanceolata</i>	0.14 - 0.08			ribwort plantain
C	<i>Ranunculus occidentalis</i>	0.14 - 1.00			western buttercup
C	<i>Selaginella wallacei</i>	0.43 - 0.25	0.40 - 4.80	0.33 - 0.17	Wallace's selaginella
C	<i>Taraxacum officinale</i>	0.14 - 0.08			common dandelion
C	<i>Trifolium dubium</i>			0.33 - 2.00	small hop-clover
C	<i>Trifolium oliganthum</i>		0.20 - 0.10		few-flowered clover
C	<i>Veronica serpyllifolia</i>	0.29 - 0.17	0.40 - 0.20	0.33 - 0.17	thyme-leaved speedwell
D	<i>Pseudotsuga menziesii</i>	0.29 - 0.17			Douglas-fir
D	<i>Racomitrium canescens</i>	0.14 - 1.00	0.40 - 2.40	0.33 - 2.00	grey rock-moss

		Qghh		
		Comm. types		
		C16a	C26	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Common Name
Trees				
A	<i>Pseudotsuga menziesii</i>	0.67 - 12.89	0.25 - 4.50	Douglas-fir
A	<i>Quercus garryana</i>	0.56 - 32.22	0.75 - 36.00	Garry oak
Shrubs				
B1	<i>Quercus garryana</i>	0.67 - 23.67	0.75 - 26.75	Garry oak
B2	<i>Cytisus scoparius</i>	0.22 - 0.72	0.50 - 6.00	Scotch broom
B2	<i>Lonicera hispidula</i>	1.00 - 34.67		hairy honeysuckle
B2	<i>Mahonia aquifolium</i>	0.22 - 1.33	1.00 - 28.00	tall Oregon-grape
B2	<i>Quercus garryana</i>	0.89 - 14.72	1.00 - 9.00	Garry oak
B2	<i>Symphoricarpos albus</i>	0.44 - 6.94	0.50 - 11.00	common snowberry
Herbs				
C	<i>Allium cernuum</i>	0.11 - 0.06	0.50 - 0.25	nodding onion
C	<i>Brodiaea coronaria</i>	0.67 - 2.89	0.25 - 0.13	harvest brodiaea
C	<i>Bromus carinatus</i>	0.67 - 6.67	1.00 - 3.25	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.22 - 2.67	0.50 - 6.00	soft brome
C	<i>Bromus sterilis</i>	0.67 - 5.72	1.00 - 10.63	barren brome
C	<i>Camassia leichtlinii</i>	0.33 - 2.72	0.50 - 1.63	great camas
C	<i>Carex inops</i>	0.33 - 3.33	0.50 - 4.63	long-stoloned sedge
C	<i>Cerastium arvense</i>	0.56 - 3.44	0.75 - 7.50	field chickweed
C	<i>Cynosurus echinatus</i>	0.44 - 2.78	0.75 - 11.13	hedgehog dogtail
C	<i>Dactylis glomerata</i>	0.44 - 0.83	0.50 - 6.00	orchard-grass
C	<i>Elymus glaucus</i>	0.89 - 9.61	1.00 - 10.63	blue wildrye
C	<i>Eriophyllum lanatum</i>	0.11 - 0.06	0.50 - 1.63	woolly eriophyllum
C	<i>Festuca roemerii</i>	0.33 - 1.39	0.50 - 0.25	Roemer's fescue
C	<i>Galium aparine</i>	0.89 - 10.06	0.75 - 6.13	cleavers
C	<i>Osmorhiza berteroi</i>	0.56 - 3.33	0.25 - 0.13	mountain sweet-cicely
C	<i>Plantago lanceolata</i>	0.33 - 2.00	0.50 - 0.25	ribwort plantain
C	<i>Poa pratensis</i>	0.56 - 2.83	0.50 - 3.00	Kentucky bluegrass
C	<i>Sanicula crassicaulis</i>	0.89 - 4.22	0.75 - 9.13	Pacific sanicle
C	<i>Sedum spathulifolium</i>	0.11 - 0.67	0.50 - 0.25	broad-leaved stonecrop
C	<i>Vicia hirsuta</i>	0.78 - 4.78	0.50 - 6.00	tiny vetch
C	<i>Vicia sativa</i>	0.89 - 10.94	1.00 - 4.63	common vetch
C	<i>Vulpia bromoides</i>	0.33 - 3.33	0.50 - 6.00	barren fescue
Mosses and Lichens				
D	<i>Quercus garryana</i>	0.78 - 3.56	1.00 - 3.25	Garry oak
D	<i>Racomitrium canescens</i>	0.11 - 0.67	0.50 - 3.00	grey rock-moss
Additional species < 50% presence				
B1	<i>Arbutus menziesii</i>	0.22 - 1.33		arbutus
B1	<i>Cytisus scoparius</i>	0.11 - 4.22		Scotch broom
B1	<i>Holodiscus discolor</i>	0.33 - 1.39	0.25 - 4.50	oceanspray
B1	<i>Lonicera hispidula</i>	0.11 - 0.06		hairy honeysuckle
B1	<i>Pseudotsuga menziesii</i>		0.25 - 1.50	Douglas-fir
B2	<i>Amelanchier alnifolia</i>	0.22 - 0.72	0.25 - 0.13	saskatoon
B2	<i>Arbutus menziesii</i>	0.22 - 0.72		arbutus
B2	<i>Holodiscus discolor</i>	0.33 - 3.33		oceanspray
B2	<i>Lonicera ciliosa</i>		0.25 - 0.13	western trumpet honeysuckle
B2	<i>Pseudotsuga menziesii</i>	0.11 - 2.00	0.25 - 4.50	Douglas-fir
B2	<i>Rosa nutkana</i>	0.11 - 0.67	0.25 - 1.50	Nootka rose
C	<i>Aira caryophyllea</i>	0.11 - 0.06		silver hairgrass
C	<i>Aira praecox</i>	0.11 - 0.67		early hairgrass

Note: Presence ≥ 0.60 0-5, 5.1-10, 10.1-25, > 25

		Qghh		
		Comm. types		
		C16a	C26	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Common Name
C	<i>Anthoxanthum odoratum</i>	0.33 - 4.33	0.25 - 1.50	sweet vernalgrass
C	<i>Bromus rigidus</i>	0.22 - 2.06		rip-gut brome
C	<i>Camassia quamash</i>	0.22 - 2.06		common camas
C	<i>Claytonia perfoliata</i>	0.22 - 0.72	0.25 - 0.13	miner's-lettuce
C	<i>Clinopodium douglasii</i>	0.22 - 6.22	0.25 - 1.50	yerba buena
C	<i>Collinsia parviflora</i>	0.11 - 0.06		small-flowered blue-eyed Mary
C	<i>Crepis</i> sp.	0.33 - 0.17		
C	<i>Danthonia californica</i>	0.22 - 1.33	0.25 - 1.50	California oatgrass
C	<i>Delphinium menziesii</i>		0.25 - 0.13	Menzies' larkspur
C	<i>Dodecatheon hendersonii</i>		0.25 - 0.13	broad-leaved shootingstar
C	<i>Erythronium oregonum</i>	0.11 - 0.06		white fawn lily
C	<i>Fritillaria affinis</i>	0.22 - 0.72	0.25 - 0.13	chocolate lily
C	<i>Galium aparine</i>	0.11 - 0.67	0.25 - 0.13	cleavers
C	<i>Geranium molle</i>	0.33 - 1.39	0.25 - 1.50	dovefoot geranium
C	<i>Holcus lanatus</i>	0.22 - 0.72		common velvet-grass
C	<i>Hypochaeris radicata</i>	0.33 - 0.17	0.25 - 4.50	hairy cat's-ear
C	<i>Koeleria macrantha</i>	0.11 - 2.00	0.25 - 0.13	junegrass
C	<i>Lomatium nudicaule</i>		0.25 - 0.13	barestem desert-parsley
C	<i>Lomatium triternatum</i>		0.25 - 0.13	nine-leaved desert-parsley
C	<i>Lomatium utriculatum</i>	0.11 - 0.06		spring gold
C	<i>Lotus micranthus</i>	0.11 - 0.67	0.25 - 0.13	small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.33 - 2.11	0.25 - 0.13	Pacific wood-rush
C	<i>Melica subulata</i>	0.44 - 2.78	0.25 - 4.50	Alaska oniongrass
C	<i>Moehringia macrophylla</i>	0.11 - 0.06		big-leaved sandwort
C	<i>Myosotis discolor</i>	0.33 - 0.78	0.25 - 0.13	common forget-me-not
C	<i>Nemophila parviflora</i>	0.44 - 1.44	0.25 - 0.13	small-flowered nemophila
C	<i>Pentagramma triangularis</i>	0.11 - 0.06		goldenback fern
C	<i>Plectritis congesta</i>	0.11 - 0.06		sea blush
C	<i>Ranunculus occidentalis</i>	0.33 - 0.78	0.25 - 0.13	western buttercup
C	<i>Rubus ursinus</i>	0.11 - 2.00		trailing blackberry
C	<i>Rumex acetosella</i>	0.22 - 0.11	0.25 - 1.50	sheep sorrel
C	<i>Selaginella wallacei</i>	0.44 - 0.83	0.25 - 1.50	Wallace's selaginella
C	<i>Stellaria media</i>	0.33 - 0.78		common chickweed
C	<i>Taraxacum officinale</i>	0.22 - 0.11		common dandelion
C	<i>Trifolium dubium</i>	0.11 - 0.06	0.25 - 0.13	small hop-clover
C	<i>Trifolium microcephalum</i>	0.22 - 2.67		small-headed clover
C	<i>Trifolium oliganthum</i>	0.11 - 0.06		few-flowered clover
C	<i>Veronica serpyllifolia</i>	0.11 - 0.06		thyme-leaved speedwell
C	<i>Vicia americana</i>	0.33 - 1.39	0.25 - 1.50	American vetch
D	<i>Dicranum scoparium</i>	0.33 - 2.00	0.25 - 1.50	broom-moss
D	<i>Eurhynchium oregonum</i>	0.11 - 0.67	0.25 - 1.50	Oregon beaked-moss
D	<i>Pseudotsuga menziesii</i>	0.11 - 0.06		Douglas-fir
D	<i>Rhytidadelphus triquetrus</i>		0.25 - 1.50	electrified cat's-tail moss

		Qgrf				
		Comm. types				
		C20	C25	C27	C42	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
Trees						
A	<i>Pseudotsuga menziesii</i>	0.43 - 8.86	0.17 - 3.00	0.50 - 3.00	0.33 - 2.00	Douglas-fir
A	<i>Quercus garryana</i>	0.71 - 48.57	0.50 - 17.83	1.00 - 56.75	0.50 - 24.00	Garry oak
Shrubs						
B1	<i>Quercus garryana</i>	0.86 - 16.00	0.83 - 47.17	0.25 - 1.50	0.67 - 19.50	Garry oak
B2	<i>Amelanchier alnifolia</i>	0.29 - 0.93			0.50 - 6.08	saskatoon
B2	<i>Cytisus scoparius</i>	0.14 - 0.07	0.67 - 8.00	0.25 - 4.50	0.17 - 1.00	Scotch broom
B2	<i>Lonicera hispidula</i>	0.71 - 13.57	0.50 - 5.00	0.50 - 6.00	0.67 - 6.17	hairy honeysuckle
B2	<i>Mahonia aquifolium</i>	0.14 - 0.86	0.33 - 1.08	0.25 - 0.13	0.67 - 2.17	tall Oregon-grape
B2	<i>Pseudotsuga menziesii</i>	0.14 - 0.86	0.17 - 3.00	0.50 - 3.00	0.17 - 1.00	Douglas-fir
B2	<i>Quercus garryana</i>	0.86 - 13.14	0.67 - 3.08	0.50 - 1.63	1.00 - 54.33	Garry oak
B2	<i>Symphoricarpos albus</i>	0.43 - 1.00	0.50 - 2.08		0.83 - 10.50	common snowberry
Herbs						
C	<i>Aira caryophylla</i>	0.14 - 0.86	0.33 - 0.17	0.75 - 3.13	0.33 - 1.08	silver hairgrass
C	<i>Aira praecox</i>	0.43 - 3.50	0.17 - 0.08	0.25 - 0.13	0.50 - 0.25	early hairgrass
C	<i>Anthoxanthum odoratum</i>	0.43 - 1.79	0.83 - 11.42	0.50 - 6.00	0.50 - 7.42	sweet vernalgrass
C	<i>Brodiaea coronaria</i>	0.57 - 1.07	0.50 - 1.17	0.25 - 0.13	0.67 - 1.25	harvest brodiaea
C	<i>Bromus carinatus</i>	0.71 - 7.71	0.83 - 11.00	0.75 - 0.38	0.83 - 8.08	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.43 - 1.79	0.50 - 2.08	0.50 - 0.25	0.50 - 1.17	soft brome
C	<i>Bromus rigidus</i>		0.50 - 2.08	0.25 - 1.50	0.17 - 0.08	rip-gut brome
C	<i>Bromus sterilis</i>	0.43 - 2.57	0.17 - 1.00	0.75 - 20.50	0.67 - 4.17	barren brome
C	<i>Camassia leichtlinii</i>	0.14 - 2.57	0.17 - 3.00		0.83 - 3.17	great camas
C	<i>Camassia quamash</i>	0.43 - 3.50	0.50 - 2.08	0.25 - 0.13	0.17 - 1.00	common camas
C	<i>Carex inops</i>	0.29 - 1.71	0.50 - 5.00	0.75 - 18.50	0.17 - 0.08	long-stolonated sedge
C	<i>Cerastium arvense</i>	0.86 - 3.57	1.00 - 21.33	1.00 - 6.25	1.00 - 2.33	field chickweed
C	<i>Claytonia perfoliata</i>	0.14 - 0.86	0.50 - 1.17	0.25 - 0.13	0.33 - 1.08	miner's-lettuce
C	<i>Clinopodium douglasii</i>	0.14 - 0.07	0.17 - 0.08		0.50 - 9.42	yerba buena
C	<i>Cynosurus echinatus</i>	0.43 - 8.07	0.33 - 1.08	0.25 - 9.50	0.50 - 4.08	hedgehog dogtail
C	<i>Dactylis glomerata</i>	0.43 - 3.50	0.33 - 0.17	0.25 - 0.13	0.50 - 19.83	orchard-grass
C	<i>Elymus glaucus</i>	0.86 - 11.21	0.83 - 10.08	1.00 - 1.88	0.67 - 10.00	blue wildrye
C	<i>Erythronium oregonum</i>				0.50 - 0.25	white fawn lily
C	<i>Festuca roemerii</i>	1.00 - 26.57	1.00 - 17.33	0.75 - 23.50	0.83 - 10.08	Roemer's fescue
C	<i>Fritillaria affinis</i>	0.29 - 0.14	0.50 - 0.25		0.50 - 1.17	chocolate lily
C	<i>Galium aparine</i>	0.86 - 7.00	0.83 - 6.25	0.75 - 6.13	1.00 - 8.17	cleavers
C	<i>Geranium molle</i>	0.14 - 0.07	0.17 - 0.08	0.50 - 3.00		dovefoot geranium
C	<i>Heuchera micrantha</i>	0.14 - 0.07			0.50 - 0.25	small-flowered alumroot
C	<i>Holcus lanatus</i>	0.29 - 0.14	0.50 - 1.17		0.17 - 0.08	common velvet-grass
C	<i>Hypochaeris radicata</i>	0.71 - 0.36	0.33 - 0.17	0.75 - 6.13	0.50 - 0.25	hairy cat's-ear
C	<i>Lomatium utriculatum</i>	0.29 - 0.14	0.67 - 2.17	0.25 - 0.13	0.17 - 1.00	spring gold
C	<i>Lotus micranthus</i>	0.14 - 2.57	0.33 - 3.08	0.50 - 3.00	0.17 - 0.08	small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.57 - 3.57	0.33 - 1.08	0.50 - 3.00	0.50 - 1.17	Pacific wood-rush
C	<i>Melica subulata</i>	0.29 - 0.93	0.17 - 0.08	0.25 - 1.50	0.50 - 1.17	Alaska oniongrass
C	<i>Myosotis discolor</i>	0.14 - 0.07	0.17 - 0.08	0.50 - 3.00		common forget-me-not
C	<i>Pentagramma triangularis</i>	0.14 - 0.07	0.17 - 0.08	0.50 - 0.25		goldenback fern
C	<i>Plantago lanceolata</i>	0.57 - 1.86	0.50 - 4.08		0.67 - 1.25	ribwort plantain
C	<i>Poa pratensis</i>	0.71 - 9.43	0.50 - 7.00	0.50 - 3.00	0.83 - 7.17	Kentucky bluegrass
C	<i>Ranunculus occidentalis</i>	0.43 - 1.00	0.50 - 2.08	0.25 - 4.50	0.33 - 1.08	western buttercup
C	<i>Rumex acetosella</i>	0.57 - 1.86	0.83 - 0.42	0.75 - 1.75	0.33 - 0.17	sheep sorrel
C	<i>Sanicula crassicaulis</i>	1.00 - 10.50	0.33 - 4.00	0.50 - 3.00	0.83 - 6.08	Pacific sanicle
C	<i>Selaginella wallacei</i>	0.29 - 0.93	0.33 - 3.08	1.00 - 6.25	0.17 - 0.08	Wallace's selaginella

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

		Qgrf				
		Comm. types				
		C20	C25	C27	C42	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
C	<i>Trifolium dubium</i>	0.43 - 0.21	0.33 - 1.08	0.25 - 0.13	0.50 - 0.25	small hop-clover
C	<i>Trifolium microcephalum</i>	0.14 - 0.07		1.00 - 23.00		small-headed clover
C	<i>Trifolium oliganthum</i>	0.14 - 0.07	0.17 - 0.08	0.75 - 1.75		few-flowered clover
C	<i>Veronica serpyllifolia</i>	0.29 - 0.14	0.17 - 0.08	0.50 - 0.25		thyme-leaved speedwell
C	<i>Vicia americana</i>	0.29 - 5.50	0.17 - 3.00		1.00 - 15.33	American vetch
C	<i>Vicia hirsuta</i>	0.43 - 2.71	0.50 - 5.00		0.17 - 3.00	tiny vetch
C	<i>Vicia sativa</i>	0.57 - 5.29	0.83 - 6.08	0.50 - 1.63	1.00 - 7.08	common vetch
C	<i>Vulpia bromoides</i>	0.43 - 6.36	0.50 - 2.08	0.50 - 1.63	0.50 - 2.08	barren fescue
Mosses and Lichens						
D	<i>Dicranum scoparium</i>	0.43 - 6.00	0.50 - 5.00	0.50 - 3.00		broom-moss
D	<i>Eurhynchium oregonum</i>	0.14 - 0.86			0.50 - 3.00	Oregon beaked-moss
D	<i>Pseudotsuga menziesii</i>	0.29 - 0.14	0.17 - 0.08	0.75 - 0.38	0.17 - 0.08	Douglas-fir
D	<i>Quercus garryana</i>	0.86 - 3.71	0.50 - 1.17	0.50 - 0.25	0.83 - 11.42	Garry oak
D	<i>Racomitrium canescens</i>	0.14 - 2.57	0.17 - 1.00	0.75 - 7.50	0.17 - 1.00	grey rock-moss
Additional species < 50% presence						
A	<i>Arbutus menziesii</i>	0.14 - 0.86			0.17 - 3.00	arbutus
B1	<i>Amelanchier alnifolia</i>	0.14 - 0.86				saskatoon
B1	<i>Arbutus menziesii</i>	0.14 - 2.57				arbutus
B1	<i>Cytisus scoparius</i>		0.17 - 1.00			Scotch broom
B1	<i>Holodiscus discolor</i>	0.14 - 2.57			0.33 - 6.00	oceanspray
B1	<i>Pseudotsuga menziesii</i>	0.14 - 0.86			0.17 - 1.00	Douglas-fir
B2	<i>Arbutus menziesii</i>		0.17 - 0.08			arbutus
B2	<i>Holodiscus discolor</i>	0.14 - 0.07	0.17 - 1.00		0.33 - 1.08	oceanspray
B2	<i>Lonicera ciliosa</i>				0.33 - 0.17	western trumpet honeysuckle
B2	<i>Paxistima myrsinites</i>	0.14 - 0.07			0.33 - 2.00	falsebox
B2	<i>Rosa nutkana</i>	0.14 - 0.07			0.33 - 1.08	Nootka rose
C	<i>Allium cernuum</i>	0.14 - 0.07	0.33 - 0.17	0.25 - 0.13	0.17 - 0.08	nodding onion
C	<i>Bromus tectorum</i>		0.17 - 0.08			cheatgrass
C	<i>Clarkia amoena</i>			0.25 - 0.13	0.17 - 0.08	farewell-to-spring
C	<i>Collinsia parviflora</i>	0.14 - 0.07	0.33 - 0.17	0.25 - 0.13		small-flowered blue-eyed Mary
C	<i>Crepis</i> sp.	0.14 - 0.07	0.17 - 0.08	0.25 - 0.13		
C	<i>Danthonia californica</i>	0.14 - 0.07	0.17 - 1.00	0.25 - 0.13	0.17 - 0.08	California oatgrass
C	<i>Delphinium menziesii</i>		0.33 - 0.17		0.17 - 0.08	Menzies' larkspur
C	<i>Dodecatheon hendersonii</i>	0.29 - 2.64	0.33 - 4.00			broad-leaved shootingstar
C	<i>Eriophyllum lanatum</i>		0.33 - 1.08	0.25 - 0.13		woolly eriophyllum
C	<i>Galium aparine</i>		0.33 - 1.08	0.25 - 0.13	0.17 - 1.00	cleavers
C	<i>Koeleria macrantha</i>		0.17 - 1.00	0.25 - 1.50	0.17 - 0.08	junegrass
C	<i>Lathyrus nevadensis</i>	0.29 - 0.14				purple peavine
C	<i>Lomatium nudicaule</i>		0.17 - 1.00		0.17 - 0.08	barestem desert-parsley
C	<i>Lomatium triternatum</i>			0.25 - 0.13		nine-leaved desert-parsley
C	<i>Moehringia macrophylla</i>	0.14 - 0.07				big-leaved sandwort
C	<i>Nemophila parviflora</i>	0.14 - 0.86	0.33 - 1.08			small-flowered nemophila
C	<i>Osmorhiza berteroi</i>	0.43 - 1.00	0.17 - 0.08		0.17 - 0.08	mountain sweet-cicely
C	<i>Piperia elegans</i>	0.14 - 0.07	0.17 - 0.08		0.17 - 0.08	elegant rein orchid
C	<i>Plectritis congesta</i>	0.29 - 0.93	0.17 - 0.08		0.17 - 0.08	sea blush
C	<i>Polypodium glycyrrhiza</i>	0.14 - 0.07	0.17 - 1.00			licorice fern
C	<i>Polystichum munitum</i>	0.14 - 0.07				sword fern
C	<i>Rubus ursinus</i>	0.29 - 0.14				trailing blackberry
C	<i>Sedum spathulifolium</i>	0.29 - 1.71	0.17 - 0.08	0.25 - 0.13	0.33 - 3.08	broad-leaved stonecrop
C	<i>Stellaria media</i>	0.29 - 0.14	0.33 - 0.17	0.25 - 0.13	0.17 - 0.08	common chickweed

		Qgrf				
		Comm. types				
		C20	C25	C27	C42	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
C	<i>Taraxacum officinale</i>	0.14 - 0.07		0.25 - 0.13		common dandelion
D	<i>Arbutus menziesii</i>	0.43 - 0.21		0.25 - 0.13		arbutus
D	<i>Polytrichum juniperinum</i>	0.29 - 1.71	0.17 - 1.00			juniper haircap moss
D	<i>Rhytidiadelphus triquetrus</i>		0.17 - 1.00		0.33 - 4.00	electrified cat's-tail moss

		Qgcc						
		Comm. types		Phen. types				
		C47, in part	C14	C37a	C35a	C35b	C37b	
Layer	Scientific Name	Pres - Cover	Common Name					
Trees								
A	<i>Pseudotsuga menziesii</i>	0.29 - 8.00	0.33 - 4.00	0.25 - 4.17	0.40 - 2.40	0.75 - 4.50		Douglas-fir
A	<i>Quercus garryana</i>	0.71 - 40.00	0.83 - 52.50	0.83 - 48.33	0.60 - 31.40	0.75 - 10.50	0.83 - 48.33	Garry oak
Shrubs								
B1	<i>Arbutus menziesii</i>	0.07 - 0.43	0.67 - 6.00	0.17 - 1.00	0.20 - 1.20	0.50 - 6.00		arbutus
B1	<i>Quercus garryana</i>	0.71 - 32.36	0.50 - 12.33	0.83 - 21.42	0.80 - 29.00	1.00 - 12.00	0.50 - 13.67	Garry oak
B2	<i>Cytisus scoparius</i>	0.57 - 3.04	0.17 - 0.08	0.58 - 14.29	0.40 - 0.20	0.75 - 16.00		Scotch broom
B2	<i>Mahonia aquifolium</i>	0.36 - 2.21	0.50 - 1.17	0.58 - 4.04	0.80 - 2.60	0.75 - 0.38	0.17 - 1.00	tall Oregon-grape
B2	<i>Quercus garryana</i>	0.64 - 6.89	0.33 - 9.33	0.75 - 5.04	0.60 - 12.40	0.25 - 1.50	0.83 - 3.17	Garry oak
B2	<i>Symphoricarpos albus</i>	0.64 - 16.75	0.50 - 9.42	0.75 - 12.08	1.00 - 21.20	0.75 - 6.13	0.67 - 6.00	common snowberry
Herbs								
C	<i>Aira praecox</i>	0.07 - 0.04	0.33 - 1.08	0.25 - 0.13	0.20 - 0.10	0.50 - 1.63	0.33 - 2.00	early hairgrass
C	<i>Anthoxanthum odoratum</i>	0.29 - 0.93	0.50 - 5.00	0.58 - 7.25	0.40 - 4.80	0.50 - 0.25	0.67 - 3.25	sweet vernalgrass
C	<i>Brodiaea coronaria</i>	0.29 - 2.64	0.67 - 5.08	0.58 - 7.71	0.60 - 4.90	0.75 - 0.38	0.33 - 1.08	harvest brodiaea
C	<i>Bromus carinatus</i>	0.57 - 1.07	0.33 - 4.00	0.58 - 2.21	0.40 - 1.30	0.75 - 1.75	0.67 - 5.08	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.50 - 0.64		0.25 - 1.58			0.33 - 2.00	soft brome
C	<i>Bromus sterilis</i>	0.64 - 5.43	0.50 - 1.17	0.33 - 2.08		0.25 - 0.13	0.67 - 10.42	barren brome
C	<i>Camassia leichtlinii</i>	0.50 - 6.04	0.17 - 1.00	0.17 - 1.00	0.20 - 3.60		0.17 - 1.00	great camas
C	<i>Camassia quamash</i>	0.14 - 1.71	0.67 - 8.00	1.00 - 22.42	1.00 - 22.20	1.00 - 10.63	1.00 - 23.08	common camas
C	<i>Carex inops</i>	0.71 - 10.64	1.00 - 43.00	0.58 - 9.33	0.60 - 4.90	0.75 - 6.13	0.33 - 6.00	long-stoloned sedge
C	<i>Cerastium arvense</i>	0.64 - 5.64	0.50 - 5.00	0.25 - 0.13	0.20 - 1.20	0.50 - 1.63	0.33 - 3.08	field chickweed
C	<i>Claytonia perfoliata</i>	0.36 - 1.36		0.50 - 2.63		0.25 - 0.13	0.33 - 1.08	miner's-lettuce
C	<i>Clinopodium douglasii</i>	0.07 - 1.29	0.33 - 1.08	0.17 - 0.54	0.20 - 0.10	0.50 - 1.63		yerba buena
C	<i>Collinsia parviflora</i>		0.33 - 2.00	0.25 - 0.13		0.75 - 1.75	0.33 - 1.08	small-flowered blue-eyed Mary
C	<i>Cynosurus echinatus</i>	0.64 - 3.61	0.50 - 9.42	0.25 - 1.58			0.17 - 0.08	hedgehog dogtail
C	<i>Dactylis glomerata</i>	0.21 - 1.29	0.33 - 2.00	0.42 - 6.25	0.80 - 6.10	0.50 - 0.25	0.83 - 6.08	orchard-grass
C	<i>Danthonia californica</i>	0.29 - 5.00	0.83 - 2.25	0.25 - 0.58	0.20 - 0.10			California oatgrass
C	<i>Dodecatheon hendersonii</i>	0.29 - 0.14		0.42 - 1.13	0.20 - 0.10	1.00 - 18.00	0.33 - 0.17	broad-leaved shootingstar
C	<i>Elymus glaucus</i>	1.00 - 28.57	0.83 - 5.00	0.67 - 5.08	0.40 - 1.30	1.00 - 4.63	0.50 - 1.17	blue wildrye
C	<i>Erythronium oregonum</i>	0.21 - 0.11	0.33 - 3.08	0.33 - 1.08	1.00 - 28.60	0.50 - 4.63	0.50 - 2.08	white fawn lily
C	<i>Festuca roemerii</i>	0.43 - 1.39	0.67 - 2.17	0.50 - 1.17	0.20 - 0.10	0.50 - 11.00	0.17 - 0.08	Roemer's fescue
C	<i>Fritillaria affinis</i>	0.14 - 0.07	0.50 - 3.17	0.25 - 0.13	0.40 - 3.70	0.50 - 0.25	0.50 - 1.17	chocolate lily
C	<i>Galium aparine</i>	0.93 - 9.14	0.83 - 7.00	0.92 - 3.75	0.60 - 2.50	1.00 - 3.25	0.67 - 4.17	cleavers
C	<i>Geranium molle</i>	0.29 - 1.39	0.33 - 0.17	0.42 - 3.04			0.50 - 2.08	dovefoot geranium
C	<i>Hypochaeris radicata</i>	0.14 - 0.07	0.67 - 0.33	0.58 - 1.21	0.60 - 0.30	0.25 - 0.13	0.50 - 2.08	hairy cat's-ear
C	<i>Lathyrus nevadensis</i>	0.21 - 0.89	0.17 - 3.00	0.08 - 0.50	0.40 - 3.70	0.25 - 1.50	0.50 - 6.08	purple peavine
C	<i>Lomatium utriculatum</i>	0.29 - 1.39	0.67 - 4.17	0.50 - 1.17	0.20 - 0.10	0.75 - 1.75	0.50 - 3.00	spring gold
C	<i>Lotus micranthus</i>	0.14 - 0.46	0.67 - 3.08	0.25 - 0.58		0.25 - 0.13	0.17 - 1.00	small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.14 - 0.46	0.50 - 1.17	0.25 - 0.58	0.40 - 0.20	0.75 - 1.75	0.17 - 1.00	Pacific wood-rush
C	<i>Melica subulata</i>	0.57 - 6.46	0.50 - 2.08	0.33 - 6.83	0.20 - 0.10		0.17 - 0.08	Alaska oniongrass
C	<i>Nemophila parviflora</i>	0.50 - 1.82		0.25 - 0.58	0.20 - 0.10	0.50 - 0.25		small-flowered nemophila
C	<i>Piperia elegans</i>	0.07 - 0.43	0.17 - 0.08	0.08 - 0.04		0.50 - 0.25		elegant rein orchid
C	<i>Plantago lanceolata</i>	0.14 - 0.07	0.67 - 0.33	0.50 - 0.25	0.60 - 1.40	0.25 - 0.13	0.67 - 1.25	ribwort plantain
C	<i>Plectritis congesta</i>	0.36 - 0.57	0.17 - 1.00	0.33 - 1.08	0.20 - 0.10	0.75 - 1.75	0.17 - 1.00	sea blush
C	<i>Poa pratensis</i>	0.64 - 7.07	0.50 - 4.08	0.67 - 7.08	0.60 - 6.00	0.25 - 0.13	1.00 - 9.50	Kentucky bluegrass
C	<i>Ranunculus occidentalis</i>	0.43 - 1.00	0.83 - 4.08	0.17 - 0.08	0.40 - 1.30		1.00 - 21.33	western buttercup

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

Layer	Scientific Name	Qgcc						Common Name
		Comm. types		Phen. types				
		C47, in part	C14	C37a	C35a	C35b	C37b	
		Pres - Cover						
C	<i>Rhinanthus minor</i>			0.33 - 1.08		0.50 - 3.00		yellow rattle
C	<i>Rumex acetosella</i>	0.43 - 0.21	0.83 - 1.33	0.58 - 1.67	0.20 - 1.20	0.75 - 0.38	0.33 - 0.17	sheep sorrel
C	<i>Sanicula crassicaulis</i>	0.93 - 6.50	0.67 - 4.00	1.00 - 10.54	0.40 - 1.30	0.75 - 1.75	0.50 - 5.00	Pacific sanicle
C	<i>Stellaria media</i>	0.36 - 1.43	0.33 - 0.17	0.67 - 3.17	0.60 - 0.30	1.00 - 0.50	0.83 - 3.17	common chickweed
C	<i>Taraxacum officinale</i>			0.33 - 0.17	0.60 - 1.40		0.50 - 0.25	common dandelion
C	<i>Trifolium oliganthum</i>	0.21 - 0.11	0.33 - 1.08	0.08 - 0.04		0.75 - 0.38	0.17 - 0.08	few-flowered clover
C	<i>Vicia hirsuta</i>	0.36 - 4.89	0.83 - 6.25	0.58 - 5.58	0.40 - 1.30	0.50 - 0.25	0.50 - 4.08	tiny vetch
C	<i>Vicia sativa</i>	0.64 - 4.39	1.00 - 3.25	0.67 - 3.63	0.60 - 2.50		1.00 - 6.17	common vetch
C	<i>Vulpia bromoides</i>	0.50 - 1.43		0.25 - 2.04			0.17 - 1.00	barren fescue
Mosses and Lichens								
D	<i>Dicranum scoparium</i>	0.07 - 0.43	0.67 - 6.00	0.25 - 1.04	0.40 - 4.80	0.75 - 4.50	0.17 - 3.00	broom-moss
D	<i>Polytrichum juniperinum</i>			0.08 - 0.50	0.20 - 1.20	1.00 - 4.63		juniper haircap moss
D	<i>Quercus garryana</i>	0.79 - 2.82	0.67 - 1.25	0.58 - 0.75	0.60 - 1.40	1.00 - 1.88		Garry oak
D	<i>Racomitrium canescens</i>	0.14 - 0.86	0.50 - 3.00	0.17 - 2.00	0.20 - 1.20	1.00 - 15.63	0.17 - 1.00	grey rock-moss
D	<i>Rhytidiadelphus triquetrus</i>	0.21 - 2.14	0.17 - 1.00	0.25 - 4.17	0.20 - 7.60	0.50 - 6.00		electrified cat's-tail moss
Additional species < 50% presence								
A	<i>Arbutus menziesii</i>		0.33 - 3.08		0.20 - 0.10	0.25 - 4.50		arbutus
B1	<i>Cytisus scoparius</i>	0.07 - 1.29		0.17 - 2.00			0.17 - 1.00	Scotch broom
B1	<i>Holodiscus discolor</i>	0.29 - 3.43	0.33 - 7.33	0.17 - 5.75	0.40 - 13.80	0.25 - 4.50	0.33 - 2.00	oceanspray
B1	<i>Oemleria cerasiformis</i>	0.07 - 0.04		0.08 - 0.04	0.20 - 7.60		0.17 - 1.00	Indian-plum
B1	<i>Pseudotsuga menziesii</i>	0.07 - 0.43						Douglas-fir
B1	<i>Rosa nutkana</i>						0.17 - 6.33	Nootka rose
B2	<i>Amelanchier alnifolia</i>	0.14 - 1.32	0.33 - 1.08	0.08 - 0.04	0.20 - 1.20		0.17 - 1.00	saskatoon
B2	<i>Arbutus menziesii</i>		0.17 - 1.00		0.20 - 1.20			arbutus
B2	<i>Daphne laureola</i>	0.21 - 1.75	0.17 - 0.08	0.33 - 0.17	0.20 - 0.10		0.17 - 0.08	spurge-laurel
B2	<i>Holodiscus discolor</i>	0.21 - 2.14	0.33 - 1.08	0.17 - 1.00	0.20 - 1.20			oceanspray
B2	<i>Lonicera ciliosa</i>		0.17 - 1.00			0.25 - 0.13		western trumpet honeysuckle
B2	<i>Lonicera hispidula</i>	0.36 - 6.61	0.33 - 1.08	0.25 - 0.58	0.40 - 3.70		0.17 - 1.00	hairy honeysuckle
B2	<i>Oemleria cerasiformis</i>				0.20 - 0.10			Indian-plum
B2	<i>Paxistima myrsinites</i>	0.07 - 0.04			0.20 - 0.10	0.25 - 0.13		falsebox
B2	<i>Pseudotsuga menziesii</i>	0.14 - 0.46	0.17 - 3.00		0.20 - 3.60			Douglas-fir
B2	<i>Rosa nutkana</i>	0.07 - 1.29	0.17 - 3.00	0.17 - 1.00	0.20 - 1.20	0.25 - 0.13	0.17 - 3.00	Nootka rose
C	<i>Aira caryophyllea</i>	0.21 - 0.11	0.17 - 0.08	0.08 - 0.04			0.17 - 1.00	silver hairgrass
C	<i>Allium cernuum</i>	0.36 - 0.57		0.17 - 0.08				nodding onion
C	<i>Arrhenatherum elatius</i>						0.17 - 1.00	tall oatgrass
C	<i>Bromus rigidus</i>						0.33 - 1.08	rip-gut brome
C	<i>Bromus tectorum</i>			0.17 - 0.54		0.25 - 0.13	0.17 - 1.00	cheatgrass
C	<i>Crepis</i> sp.	0.14 - 0.07						
C	<i>Delphinium menziesii</i>	0.21 - 0.50	0.17 - 0.08	0.08 - 0.04			0.17 - 0.08	Menzies' larkspur
C	<i>Eriophyllum lanatum</i>	0.29 - 0.14	0.17 - 0.08	0.08 - 0.04	0.20 - 0.10	0.25 - 0.13		woolly eriophyllum
C	<i>Galium aparine</i>	0.14 - 0.07		0.25 - 0.58		0.25 - 0.13		cleavers
C	<i>Heuchera micrantha</i>		0.17 - 0.08	0.08 - 0.04	0.20 - 0.10	0.25 - 0.13		small-flowered alumroot
C	<i>Holcus lanatus</i>			0.08 - 0.04			0.33 - 2.00	common velvet-grass
C	<i>Koeleria macrantha</i>		0.17 - 0.08					junegrass
C	<i>Lomatium nudicaule</i>			0.08 - 0.04				barestem desert-parsley
C	<i>Lomatium triternatum</i>	0.29 - 1.79		0.17 - 0.08				nine-leaved desert-parsley
C	<i>Moehringia macrophylla</i>	0.07 - 1.29		0.17 - 0.08	0.20 - 0.10	0.25 - 0.13		big-leaved sandwort
C	<i>Montia parvifolia</i>					0.25 - 1.50		small-leaved montia
C	<i>Montia parvifolia</i>				0.20 - 3.60	0.25 - 0.13		small-leaved montia
C	<i>Muscari botryoides</i>				0.20 - 0.10		0.17 - 0.08	common grape hyacinth

		Qgcc						
		Comm. types		Phen. types				
		C47, in part	C14	C37a	C35a	C35b	C37b	
Layer	Scientific Name	Pres - Cover	Common Name					
C	<i>Myosotis discolor</i>	0.07 - 0.04	0.33 - 1.08	0.33 - 0.63			0.33 - 1.08	common forget-me-not
C	<i>Osmorhiza berteroi</i>	0.36 - 5.29	0.33 - 0.17	0.17 - 1.00	0.20 - 0.10			mountain sweet-cicely
C	<i>Pentagramma triangularis</i>	0.07 - 0.04				0.25 - 0.13		goldenback fern
C	<i>Polypodium glycyrrhiza</i>	0.21 - 0.50			0.20 - 1.20	0.25 - 1.50	0.17 - 0.08	licorice fern
C	<i>Polystichum munitum</i>	0.43 - 1.00		0.33 - 0.17			0.17 - 0.08	sword fern
C	<i>Rubus ursinus</i>		0.17 - 3.00					trailing blackberry
C	<i>Sedum spathulifolium</i>			0.08 - 0.04	0.20 - 1.20	0.25 - 0.13		broad-leaved stonecrop
C	<i>Selaginella wallacei</i>	0.21 - 0.11				0.25 - 1.50	0.17 - 1.00	Wallace's selaginella
C	<i>Trifolium dubium</i>						0.33 - 3.08	small hop-clover
C	<i>Trifolium microcephalum</i>	0.14 - 0.07	0.17 - 0.08	0.08 - 0.04			0.17 - 3.00	small-headed clover
C	<i>Veronica serpyllifolia</i>	0.21 - 0.11	0.33 - 0.17	0.33 - 0.63			0.33 - 0.17	thyme-leavedspeedwell
C	<i>Vicia americana</i>	0.36 - 3.46	0.17 - 1.00	0.25 - 0.13	0.40 - 1.30	0.25 - 0.13		American vetch
D	<i>Eurhynchium oreganum</i>	0.29 - 2.57	0.17 - 1.00	0.25 - 2.50	0.20 - 1.20		0.17 - 1.00	Oregon beaked-moss
D	<i>Pseudotsuga menziesii</i>	0.29 - 0.14	0.17 - 0.08			0.25 - 0.13	0.17 - 0.08	Douglas-fir

		Qggc			
		Comm. types			
Layer	Scientific Name	C36	C47, in part	C13	Common Name
		Pres - Cover	Pres - Cover	Pres - Cover	
Trees					
A	<i>Pseudotsuga menziesii</i>	0.18 - 2.92	0.29 - 8.00	0.50 - 18.58	Douglas-fir
A	<i>Quercus garryana</i>	0.72 - 32.94	0.71 - 40.00	0.75 - 40.17	Garry oak
Shrubs					
B1	<i>Quercus garryana</i>	0.80 - 30.48	0.71 - 32.36	0.83 - 30.67	Garry oak
B2	<i>Cytisus scoparius</i>	0.66 - 10.30	0.57 - 3.04	0.58 - 5.58	Scotch broom
B2	<i>Mahonia aquifolium</i>	0.54 - 2.86	0.36 - 2.21	0.50 - 2.54	tall Oregon-grape
B2	<i>Quercus garryana</i>	0.78 - 9.73	0.64 - 6.89	0.75 - 15.04	Garry oak
B2	<i>Symphoricarpos albus</i>	0.84 - 16.10	0.64 - 16.75	0.50 - 8.83	common snowberry
Herbs					
C	<i>Bromus carinatus</i>	0.66 - 4.89	0.57 - 1.07	0.67 - 4.17	California brome
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	0.52 - 1.71	0.50 - 0.64	0.42 - 1.67	soft brome
C	<i>Bromus sterilis</i>	0.66 - 5.70	0.64 - 5.43	0.58 - 7.25	barren brome
C	<i>Camassia leichtlinii</i>	1.00 - 22.00	0.50 - 6.04	0.50 - 2.63	great camas
C	<i>Carex inops</i>	0.24 - 0.69	0.71 - 10.64	0.42 - 2.58	long-stoloned sedge
C	<i>Cerastium arvense</i>	0.40 - 1.56	0.64 - 5.64	0.42 - 0.67	field chickweed
C	<i>Claytonia perfoliata</i>	0.42 - 3.05	0.36 - 1.36	0.75 - 3.67	miner's-lettuce
C	<i>Cynosurus echinatus</i>	0.36 - 2.05	0.64 - 3.61	0.17 - 2.00	hedgehog dogtail
C	<i>Dactylis glomerata</i>	0.62 - 10.96	0.21 - 1.29	0.50 - 3.63	orchard-grass
C	<i>Elymus glaucus</i>	0.84 - 8.17	1.00 - 28.57	1.00 - 5.71	blue wildrye
C	<i>Galium aparine</i>	0.86 - 6.72	0.93 - 9.14	1.00 - 9.54	cleavers
C	<i>Melica subulata</i>	0.26 - 2.32	0.57 - 6.46	1.00 - 34.25	Alaska oniongrass
C	<i>Myosotis discolor</i>	0.28 - 0.36	0.07 - 0.04	0.50 - 0.25	common forget-me-not
C	<i>Nemophila parviflora</i>	0.30 - 1.51	0.50 - 1.82	0.50 - 1.17	small-flowered nemophila
C	<i>Osmorhiza berteroi</i>	0.18 - 0.42	0.36 - 5.29	0.50 - 5.08	mountain sweet-cicely
C	<i>Plantago lanceolata</i>	0.40 - 1.58	0.14 - 0.07	0.50 - 1.17	ribwort plantain
C	<i>Poa pratensis</i>	0.76 - 10.24	0.64 - 7.07	0.92 - 7.88	Kentucky bluegrass
C	<i>Polystichum munitum</i>	0.14 - 0.18	0.43 - 1.00	0.58 - 1.21	sword fern
C	<i>Sanicula crassicaulis</i>	0.76 - 6.56	0.93 - 6.50	1.00 - 10.63	Pacific sanicle
C	<i>Stellaria media</i>	0.42 - 1.44	0.36 - 1.43	0.58 - 2.13	common chickweed
C	<i>Vicia hirsuta</i>	0.70 - 6.72	0.36 - 4.89	0.67 - 4.54	tiny vetch
C	<i>Vicia sativa</i>	0.74 - 6.60	0.64 - 4.39	0.75 - 6.13	common vetch
C	<i>Vulpia bromoides</i>	0.64 - 4.10	0.50 - 1.43	0.58 - 2.67	barren fescue
Mosses and Lichens					
D	<i>Quercus garryana</i>	0.76 - 2.42	0.79 - 2.82	0.75 - 2.29	Garry oak
Additional species < 50% presence					
A	<i>Arbutus menziesii</i>	0.04 - 0.48		0.17 - 2.00	arbutus
B1	<i>Amelanchier alnifolia</i>	0.10 - 0.84			saskatoon
B1	<i>Arbutus menziesii</i>	0.10 - 0.84	0.07 - 0.43	0.42 - 3.50	arbutus
B1	<i>Cytisus scoparius</i>	0.14 - 0.75	0.07 - 1.29	0.17 - 1.00	Scotch broom
B1	<i>Holodiscus discolor</i>	0.28 - 5.96	0.29 - 3.43	0.33 - 6.75	oceanspray
B1	<i>Lonicera ciliosa</i>	0.06 - 0.03			western trumpet honeysuckle
B1	<i>Lonicera hispidula</i>	0.02 - 0.12		0.08 - 0.04	hairy honeysuckle
B1	<i>Oemleria cerasiformis</i>	0.12 - 0.63	0.07 - 0.04		Indian-plum
B1	<i>Pseudotsuga menziesii</i>	0.06 - 0.36	0.07 - 0.43	0.25 - 2.50	Douglas-fir
B1	<i>Rosa nutkana</i>	0.04 - 0.48			Nootka rose
B2	<i>Amelanchier alnifolia</i>	0.20 - 0.76	0.14 - 1.32	0.25 - 1.04	saskatoon
B2	<i>Arbutus menziesii</i>	0.02 - 0.01		0.17 - 0.54	arbutus
B2	<i>Daphne laureola</i>	0.22 - 0.90	0.21 - 1.75		spurge-laurel

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

		Qggc			
		Comm. types			
		C36	C47, in part	C13	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
B2	<i>Holodiscus discolor</i>	0.34 - 3.88	0.21 - 2.14	0.25 - 2.50	oceanspray
B2	<i>Lonicera ciliosa</i>	0.12 - 0.74		0.17 - 0.54	western trumpet honeysuckle
B2	<i>Lonicera hispidula</i>	0.20 - 1.59	0.36 - 6.61	0.33 - 5.00	hairy honeysuckle
B2	<i>Lycium barbarum</i>	0.02 - 0.12			matrimony vine
B2	<i>Oemleria cerasiformis</i>	0.22 - 0.57			Indian-plum
B2	<i>Paxistima myrsinites</i>	0.02 - 0.01	0.07 - 0.04	0.08 - 0.04	falsebox
B2	<i>Pseudotsuga menziesii</i>	0.02 - 0.12	0.14 - 0.46	0.17 - 1.00	Douglas-fir
B2	<i>Rosa nutkana</i>	0.34 - 2.61	0.07 - 1.29	0.08 - 0.50	Nootka rose
B2	<i>Rubus leucodermis</i>	0.08 - 0.37		0.17 - 1.54	black raspberry
C	<i>Aira caryophyllea</i>	0.24 - 0.34	0.21 - 0.11	0.17 - 0.08	silver hairgrass
C	<i>Aira praecox</i>	0.22 - 1.14	0.07 - 0.04	0.08 - 0.04	early hairgrass
C	<i>Allium cernuum</i>	0.18 - 0.42	0.36 - 0.57	0.17 - 0.08	nodding onion
C	<i>Anthoxanthum odoratum</i>	0.46 - 6.71	0.29 - 0.93	0.25 - 3.04	sweet vernalgrass
C	<i>Arrhenatherum elatius</i>	0.06 - 0.73			tall oatgrass
C	<i>Brodiaea coronaria</i>	0.38 - 1.42	0.29 - 2.64	0.17 - 2.00	harvest brodiaea
C	<i>Bromus rigidus</i>	0.20 - 1.59		0.08 - 0.04	rip-gut brome
C	<i>Bromus tectorum</i>	0.06 - 0.14			cheatgrass
C	<i>Camassia quamash</i>	0.22 - 1.82	0.14 - 1.71	0.08 - 1.50	common camas
C	<i>Clinopodium douglasii</i>	0.12 - 0.76	0.07 - 1.29	0.08 - 0.50	yerba buena
C	<i>Collinsia parviflora</i>	0.10 - 0.27		0.25 - 0.13	small-flowered blue-eyed Mary
C	<i>Crepis</i> sp.		0.14 - 0.07		
C	<i>Danthonia californica</i>	0.06 - 0.14	0.29 - 5.00	0.25 - 0.13	California oatgrass
C	<i>Delphinium menziesii</i>	0.22 - 1.25	0.21 - 0.50	0.08 - 0.04	Menzies' larkspur
C	<i>Dodecatheon hendersonii</i>	0.26 - 0.46	0.29 - 0.14	0.33 - 1.08	broad-leaved shootingstar
C	<i>Eriophyllum lanatum</i>	0.02 - 0.01	0.29 - 0.14		woolly eriophyllum
C	<i>Erythronium oregonum</i>	0.30 - 1.45	0.21 - 0.11	0.25 - 0.13	white fawn lily
C	<i>Festuca roemerii</i>	0.20 - 1.35	0.43 - 1.39	0.33 - 1.54	Roemer's fescue
C	<i>Fritillaria affinis</i>	0.12 - 0.06	0.14 - 0.07	0.17 - 0.54	chocolate lily
C	<i>Galium aparine</i>	0.14 - 0.18	0.14 - 0.07		cleavers
C	<i>Geranium molle</i>	0.48 - 2.52	0.29 - 1.39	0.42 - 4.71	dovefoot geranium
C	<i>Heuchera micrantha</i>	0.04 - 0.13			small-flowered alumroot
C	<i>Holcus lanatus</i>	0.26 - 1.45		0.08 - 0.50	common velvet-grass
C	<i>Hypochaeris radicata</i>	0.42 - 0.21	0.14 - 0.07	0.33 - 0.17	hairy cat's-ear
C	<i>Lathyrus nevadensis</i>	0.16 - 1.86	0.21 - 0.89	0.25 - 0.58	purple peavine
C	<i>Lomatium triternatum</i>	0.08 - 0.37	0.29 - 1.79	0.08 - 0.04	nine-leaved desert-parsley
C	<i>Lomatium utriculatum</i>	0.12 - 0.17	0.29 - 1.39		spring gold
C	<i>Lotus micranthus</i>	0.14 - 0.40	0.14 - 0.46		small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.12 - 0.06	0.14 - 0.46	0.33 - 0.17	Pacific wood-rush
C	<i>Moehringia macrophylla</i>	0.12 - 0.52	0.07 - 1.29	0.25 - 1.58	big-leaved sandwort
C	<i>Montia parvifolia</i>	0.14 - 0.40		0.08 - 0.04	small-leaved montia
C	<i>Pentagramma triangularis</i>	0.06 - 0.03	0.07 - 0.04	0.08 - 0.04	goldenback fern
C	<i>Piperia elegans</i>	0.06 - 0.03	0.07 - 0.43	0.17 - 0.08	elegant rein orchid
C	<i>Plectritis congesta</i>	0.20 - 0.89	0.36 - 0.57	0.17 - 0.54	sea blush
C	<i>Polypodium glycyrrhiza</i>	0.36 - 4.02	0.21 - 0.50		licorice fern
C	<i>Ranunculus occidentalis</i>	0.36 - 0.62	0.43 - 1.00	0.42 - 1.13	western buttercup
C	<i>Rhinanthus minor</i>	0.04 - 0.24			yellow rattle
C	<i>Rubus ursinus</i>	0.08 - 0.39		0.17 - 0.08	trailing blackberry
C	<i>Rumex acetosella</i>	0.34 - 0.50	0.43 - 0.21	0.25 - 0.13	sheep sorrel
C	<i>Sedum spathulifolium</i>	0.10 - 0.40		0.08 - 0.50	broad-leaved stonecrop
C	<i>Selaginella wallacei</i>	0.08 - 0.15	0.21 - 0.11		Wallace's selaginella
C	<i>Taraxacum officinale</i>	0.18 - 0.20		0.25 - 0.13	common dandelion

		Qggc			
		Comm. types			
		C36	C47, in part	C13	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
C	<i>Trifolium dubium</i>	0.36 - 1.52			small hop-clover
C	<i>Trifolium microcephalum</i>	0.06 - 0.03	0.14 - 0.07	0.17 - 0.54	small-headed clover
C	<i>Trifolium oliganthum</i>	0.06 - 0.03	0.21 - 0.11		few-flowered clover
C	<i>Veronica serpyllifolia</i>	0.14 - 0.07	0.21 - 0.11	0.25 - 0.13	thyme-leaved speedwell
C	<i>Vicia americana</i>	0.32 - 3.08	0.36 - 3.46	0.25 - 1.04	American vetch
D	<i>Dicranum scoparium</i>	0.28 - 2.64	0.07 - 0.43	0.25 - 1.50	broom-moss
D	<i>Eurhynchium oreganum</i>	0.34 - 3.16	0.29 - 2.57	0.42 - 2.50	Oregon beaked-moss
D	<i>Polytrichum juniperinum</i>	0.06 - 0.36		0.08 - 0.50	juniper haircap moss
D	<i>Pseudotsuga menziesii</i>	0.02 - 0.01	0.29 - 0.14	0.25 - 0.13	Douglas-fir
D	<i>Racomitrium canescens</i>	0.26 - 3.32	0.14 - 0.86		grey rock-moss
D	<i>Rhytidiadelphus triquetrus</i>	0.20 - 4.24	0.21 - 2.14	0.33 - 5.00	electrified cat's-tail moss

		Qgos				
		Comm. types				
		C8	C9	C10	C15	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
Trees						
A	<i>Pseudotsuga menziesii</i>	0.36 - 6.18		0.80 - 9.60	0.33 - 5.56	Douglas-fir
A	<i>Quercus garryana</i>	1.00 - 58.45	0.80 - 53.40	1.00 - 45.00	0.67 - 29.22	Garry oak
Shrubs						
B1	<i>Arbutus menziesii</i>	0.09 - 1.64		0.60 - 6.00		arbutus
B1	<i>Holodiscus discolor</i>	0.55 - 15.36	0.50 - 8.60	1.00 - 54.00	0.22 - 11.22	oceanspray
B1	<i>Lonicera ciliosa</i>	0.73 - 5.55			0.11 - 0.06	western trumpet honeysuckle
B1	<i>Oemleria cerasiformis</i>	0.36 - 2.27	0.90 - 18.55		0.11 - 0.06	Indian-plum
B1	<i>Quercus garryana</i>	0.91 - 22.18	0.70 - 21.20	1.00 - 23.80	0.89 - 31.89	Garry oak
B1	<i>Rosa nutkana</i>	0.36 - 8.36	0.50 - 13.80			Nootka rose
B2	<i>Amelanchier alnifolia</i>	0.27 - 1.64	0.40 - 1.85	0.60 - 1.40	0.22 - 1.33	saskatoon
B2	<i>Cytisus scoparius</i>	0.45 - 2.23	0.20 - 0.10	0.80 - 2.60	0.78 - 6.72	Scotch broom
B2	<i>Daphne laureola</i>	0.45 - 5.14	0.80 - 2.70	0.40 - 1.30	0.22 - 0.72	spurge-laurel
B2	<i>Holodiscus discolor</i>	0.45 - 5.73	0.20 - 2.40	0.60 - 7.30	0.78 - 7.72	oceanspray
B2	<i>Lonicera ciliosa</i>	1.00 - 18.36		0.40 - 0.20	0.11 - 0.67	western trumpet honeysuckle
B2	<i>Mahonia aquifolium</i>	0.64 - 3.91	0.50 - 4.85	0.80 - 2.60	0.33 - 3.33	tall Oregon-grape
B2	<i>Oemleria cerasiformis</i>	0.27 - 0.14	0.60 - 10.50	0.20 - 3.60	0.22 - 0.72	Indian-plum
B2	<i>Quercus garryana</i>	0.91 - 10.55	0.60 - 3.15	0.80 - 10.10	0.78 - 15.17	Garry oak
B2	<i>Rosa nutkana</i>	0.82 - 20.55	0.90 - 22.45	0.20 - 1.20	0.33 - 1.39	Nootka rose
B2	<i>Rubus leucodermis</i>	0.64 - 3.41	0.10 - 0.60	0.20 - 0.10		black raspberry
B2	<i>Symphoricarpos albus</i>	1.00 - 33.91	1.00 - 42.80	1.00 - 18.70	0.67 - 11.56	common snowberry
Herbs						
C	<i>Anthoxanthum odoratum</i>	0.18 - 1.68		0.60 - 2.50	0.33 - 4.33	sweet vernalgrass
C	<i>Bromus carinatus</i>	0.55 - 1.27	0.50 - 1.90	0.80 - 2.60	0.56 - 5.39	California brome
C	<i>Camassia leichtlinii</i>	0.64 - 4.50	0.50 - 3.65	0.60 - 11.30	0.89 - 13.33	great camas
C	<i>Camassia quamash</i>	0.09 - 1.64	0.40 - 5.60	0.60 - 6.00	0.11 - 0.06	common camas
C	<i>Carex inops</i>	0.09 - 0.55	0.10 - 0.05	1.00 - 2.70	0.33 - 0.78	long-stoloned sedge
C	<i>Clinopodium douglasii</i>	0.27 - 1.64	0.10 - 1.80	0.60 - 1.40		yerba buena
C	<i>Dactylis glomerata</i>	0.82 - 10.77	0.80 - 5.55	0.80 - 1.50	0.44 - 6.06	orchard-grass
C	<i>Elymus glaucus</i>	0.82 - 4.50	0.40 - 1.30	0.80 - 1.50	1.00 - 6.11	blue wildrye
C	<i>Erythronium oregonum</i>	0.27 - 0.64	0.40 - 1.85	0.80 - 5.00	0.44 - 1.44	white fawn lily
C	<i>Fritillaria affinis</i>	0.27 - 0.64		0.80 - 0.40	0.11 - 0.06	chocolate lily
C	<i>Galium aparine</i>	0.82 - 5.09	0.60 - 3.05	1.00 - 6.20	0.78 - 6.11	cleavers
C	<i>Hypochaeris radicata</i>	0.36 - 0.18	0.30 - 0.15	0.20 - 0.10	0.56 - 0.89	hairy cat's-ear
C	<i>Melica subulata</i>	0.55 - 3.95	0.20 - 0.65	0.40 - 7.70	0.22 - 0.72	Alaska oniongrass
C	<i>Moehringia macrophylla</i>	0.18 - 0.59	0.10 - 0.05	1.00 - 0.50	0.11 - 0.06	big-leaved sandwort
C	<i>Nemophila parviflora</i>	0.09 - 0.55	0.10 - 1.80	0.60 - 3.60	0.11 - 0.67	small-flowered nemophila
C	<i>Poa pratensis</i>	0.91 - 4.55	0.60 - 3.70	0.60 - 3.80	0.67 - 0.33	Kentucky bluegrass
C	<i>Polypodium glycyrrhiza</i>	0.27 - 1.73		0.40 - 1.30	1.00 - 35.22	licorice fern
C	<i>Rumex acetosella</i>	0.18 - 0.09			0.56 - 0.28	sheep sorrel
C	<i>Sanicula crassicaulis</i>	0.45 - 2.23	0.40 - 1.30	1.00 - 6.00	0.22 - 0.72	Pacific sanicle
C	<i>Stellaria media</i>	0.09 - 0.55	0.20 - 0.65	0.80 - 1.50	0.56 - 1.50	common chickweed
C	<i>Vicia americana</i>	0.36 - 1.68	0.10 - 0.05	0.80 - 1.50	0.11 - 0.67	American vetch
C	<i>Vicia hirsuta</i>	0.45 - 1.23		0.60 - 3.80		tiny vetch
C	<i>Vicia sativa</i>	0.73 - 2.86	0.30 - 1.25	0.40 - 0.20		common vetch
C	<i>Vulpia bromoides</i>	0.09 - 0.05		0.40 - 1.30	0.56 - 1.50	barren fescue
Mosses and Lichens						
D	<i>Dicranum scoparium</i>	0.09 - 0.55		0.40 - 2.40	0.78 - 7.33	broom-moss
D	<i>Eurhynchium oregonum</i>	0.36 - 4.36	0.50 - 7.40	0.40 - 4.80	0.44 - 4.00	Oregon beaked-moss
D	<i>Quercus garryana</i>	0.64 - 0.82	0.30 - 0.15	1.00 - 0.50	0.89 - 1.06	Garry oak

Note: Presence \geq 0.60 0-5, 5.1-10, 10.1-25, > 25

		Qgos				
		Comm. types				
		C8	C9	C10	C15	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
D	<i>Racomitrium canescens</i>			0.20 - 0.10	0.67 - 10.22	grey rock-moss
D	<i>Rhytidiadelphus triquetrus</i>	0.18 - 5.09	0.20 - 6.90	1.00 - 23.60	0.11 - 4.22	electrified cat's-tail moss
Additional species < 50% presence						
A	<i>Arbutus menziesii</i>			0.20 - 3.60	0.11 - 0.67	arbutus
B1	<i>Amelanchier alnifolia</i>	0.09 - 0.55	0.20 - 2.40	0.40 - 2.40		saskatoon
B1	<i>Cytisus scoparius</i>	0.18 - 1.09	0.30 - 1.80		0.22 - 2.06	Scotch broom
B1	<i>Lonicera hispidula</i>	0.18 - 0.09		0.20 - 1.20		hairy honeysuckle
B1	<i>Mahonia aquifolium</i>		0.10 - 0.05			tall Oregon-grape
B1	<i>Pseudotsuga menziesii</i>	0.27 - 2.23	0.10 - 0.60	0.20 - 1.20	0.11 - 0.67	Douglas-fir
B2	<i>Arbutus menziesii</i>	0.09 - 0.05				arbutus
B2	<i>Lonicera hispidula</i>	0.45 - 10.09		0.40 - 2.40	0.22 - 1.33	hairy honeysuckle
B2	<i>Paxistima myrsinites</i>			0.20 - 0.10	0.11 - 0.06	falsebox
B2	<i>Pseudotsuga menziesii</i>	0.09 - 0.55				Douglas-fir
C	<i>Aira caryophylla</i>			0.20 - 0.10	0.33 - 0.78	silver hairgrass
C	<i>Aira praecox</i>		0.10 - 0.60		0.33 - 1.39	early hairgrass
C	<i>Allium cernuum</i>				0.11 - 0.06	nodding onion
C	<i>Arrhenatherum elatius</i>	0.27 - 0.14				tall oatgrass
C	<i>Brodiaea coronaria</i>	0.09 - 0.55	0.10 - 0.05	0.20 - 0.10	0.33 - 0.17	harvest brodiaea
C	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>		0.10 - 0.05	0.40 - 2.40	0.22 - 0.11	soft brome
C	<i>Bromus rigidus</i>				0.22 - 2.67	rip-gut brome
C	<i>Bromus sterilis</i>	0.27 - 0.64	0.40 - 1.30	0.40 - 2.40	0.33 - 0.78	barren brome
C	<i>Cerastium arvense</i>	0.27 - 0.14		0.20 - 0.10	0.11 - 0.06	field chickweed
C	<i>Claytonia perfoliata</i>	0.18 - 1.68	0.20 - 1.20	0.40 - 11.20	0.44 - 2.06	miner's-lettuce
C	<i>Collinsia parviflora</i>	0.09 - 0.05			0.11 - 0.06	small-flowered blue-eyed Mary
C	<i>Cynosurus echinatus</i>	0.18 - 0.09	0.10 - 0.05		0.22 - 0.11	hedgehog dogtail
C	<i>Delphinium menziesii</i>	0.09 - 0.05	0.10 - 0.05	0.20 - 0.10	0.11 - 0.06	Menzies' larkspur
C	<i>Dodecatheon hendersonii</i>	0.09 - 0.55		0.40 - 3.70	0.11 - 0.06	broad-leaved shootingstar
C	<i>Festuca roemerii</i>				0.33 - 1.39	Roemer's fescue
C	<i>Galium aparine</i>			0.20 - 0.10	0.11 - 0.06	cleavers
C	<i>Geranium molle</i>	0.18 - 0.59		0.40 - 1.30	0.11 - 0.67	dovefoot geranium
C	<i>Heuchera micrantha</i>	0.09 - 0.05	0.10 - 0.05	0.20 - 0.10	0.11 - 0.06	small-flowered alumroot
C	<i>Holcus lanatus</i>	0.45 - 0.73	0.20 - 0.65		0.11 - 0.67	common velvet-grass
C	<i>Lathyrus nevadensis</i>	0.27 - 4.55	0.30 - 1.25	0.40 - 2.40	0.33 - 0.78	purple peavine
C	<i>Lomatium utriculatum</i>	0.09 - 0.05	0.10 - 0.60	0.40 - 0.20	0.11 - 0.06	spring gold
C	<i>Lotus micranthus</i>				0.11 - 0.06	small-flowered birds-foot trefoil
C	<i>Luzula comosa</i> var. <i>comosa</i>	0.09 - 0.05		0.20 - 1.20	0.11 - 0.06	Pacific wood-rush
C	<i>Montia parvifolia</i>		0.20 - 1.20	0.20 - 0.10	0.11 - 0.06	small-leaved montia
C	<i>Myosotis discolor</i>	0.09 - 0.05		0.40 - 0.20		common forget-me-not
C	<i>Osmorhiza berteroi</i>	0.45 - 1.73	0.20 - 0.65	0.40 - 0.20	0.22 - 0.11	mountain sweet-cicely
C	<i>Piperia elegans</i>	0.18 - 0.09		0.40 - 0.20	0.11 - 0.06	elegant rein orchid
C	<i>Plantago lanceolata</i>	0.45 - 0.23	0.10 - 0.60	0.20 - 0.10	0.11 - 0.06	ribwort plantain
C	<i>Plectritis congesta</i>			0.40 - 0.20	0.22 - 0.11	sea blush
C	<i>Polystichum munitum</i>	0.18 - 0.09	0.40 - 0.75	0.40 - 0.20		sword fern
C	<i>Ranunculus occidentalis</i>	0.18 - 0.09	0.10 - 1.80		0.11 - 0.06	western buttercup
C	<i>Rubus ursinus</i>	0.45 - 8.64	0.40 - 1.85	0.20 - 0.10	0.11 - 0.06	trailing blackberry
C	<i>Sedum spathulifolium</i>	0.09 - 0.05		0.20 - 0.10	0.33 - 0.17	broad-leaved stonecrop
C	<i>Selaginella wallacei</i>				0.11 - 0.67	Wallace's selaginella
C	<i>Taraxacum officinale</i>	0.09 - 0.05	0.40 - 0.20	0.20 - 0.10		common dandelion
C	<i>Trifolium dubium</i>	0.09 - 0.05	0.10 - 0.05	0.20 - 1.20		small hop-clover

		Qgos				
		Comm. types				
		C8	C9	C10	C15	
Layer	Scientific Name	Pres - Cover	Pres - Cover	Pres - Cover	Pres - Cover	Common Name
C	<i>Trifolium microcephalum</i>			0.20 - 1.20		small-headed clover
C	<i>Veronica serpyllifolia</i>	0.09 - 0.05				thyme-leaved speedwell
D	<i>Arbutus menziesii</i>	0.09 - 0.05			0.11 - 0.67	arbutus
D	<i>Polytrichum juniperinum</i>			0.20 - 0.10	0.44 - 6.22	juniper haircap moss
D	<i>Pseudotsuga menziesii</i>	0.27 - 0.14		0.20 - 0.10	0.11 - 0.06	Douglas-fir

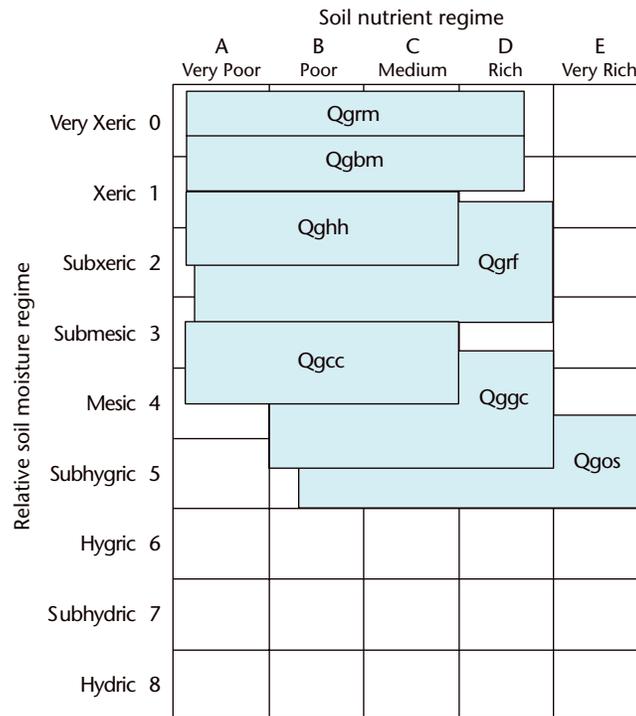
CDFmm Forested Site Series Edatopic Grid

		Soil nutrient regime				
		A Very Poor	B Poor	C Medium	D Rich	E Very Rich
Relative soil moisture regime	Very Xeric 0	02			03	
	Xeric 1					
	Subxeric 2	01			04	
	Submesic 3					
	Mesic 4					
	Subhygic 5	05			06, 07, 08, 09, 12, 13	
	Hygic 6					
	Subhydric 7	10		11		
			14			
Hydric 8						

Codes and Names for CDFmm Forested Site Series

- 01 Fd – Salal
- 02 FdPl – Arbutus
- 03 Fd – Oniongrass
- 04 FdBg – Oregon-grape
- 05 CwFd – Kindbergia
- 06 CwBg – Foamflower
- 07 Cw – Snowberry
- 08 Act – Red-osier dogwood
- 09 Act – Willow
- 10 Pl – Sphagnum
- 11 Cw – Skunk cabbage
- 12 Cw – Vanilla leaf
- 13 Cw – Indian-plum
- 14 Cw – Slough sedge

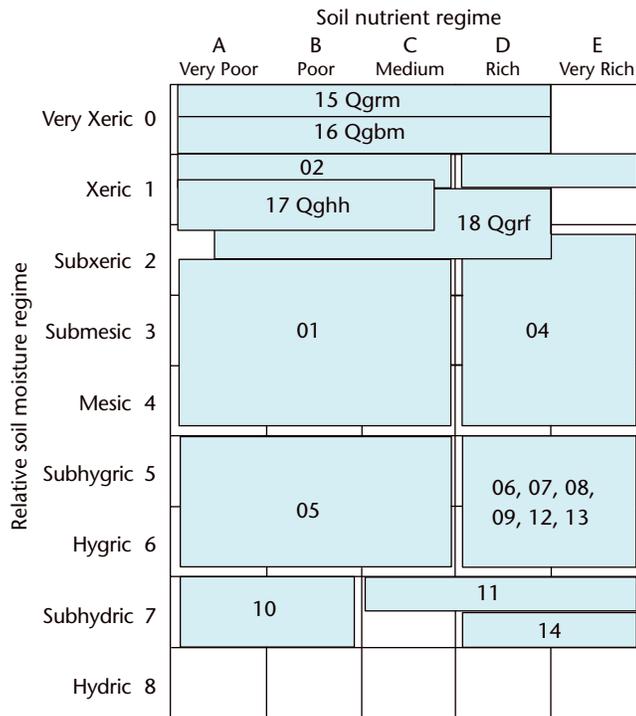
Generalized Distribution of Garry Oak Plant Associations on Edatopic Grid



Codes and Common Names for Garry Oak Plant Associations

- Qgrm Garry oak – Grey rock-moss – Wallace’s selaginella plant association
- Qgbm Garry oak – Broom-moss plant association
- Qghh Garry oak – Hairy honeysuckle plant association
- Qgrf Garry oak – Roemer’s fescue plant association
- Qgcc Garry oak – Common camas – Blue wildrye plant association
- Qggc Garry oak – Great camas – Blue wildrye plant association
- Qgos Garry oak – Oceanspray – Common snowberry plant association

**CDFmm Forested Site Series Edatopic Grid with
Proposed Garry Oak Ecosystems**



**Proposed Treatment of Garry Oak Plant Associations in
Biogeoclimatic Ecosystem Classification (BEC)**

New Site Series

- 15 Garry oak – Grey rock-moss – Wallace’s selaginella (Qgrm)
- 16 Garry oak – Broom-moss (Qgbm)
- 17 Garry oak – Hairy honeysuckle (Qghh)
- 18 Garry oak – Roemer’s fescue (Qgrf)

Seral[‡] Associations

- Qgcc \$Garry oak – Common camas – Blue wildrye seral plant association
- Qggc \$Garry oak – Great camas – Blue wildrye seral plant association
- Qgos \$Garry oak – Oceanspray – Common snowberry seral plant association

‡ In the BEC context, seral is a placement in comparison to climax Douglas-fir forest on circum-mesic sites. In other contexts, the Garry oak ecosystems could be interpreted as a disclimax or as a climax within a smaller geographic scale, both within a natural disturbance regime.

Example of How To Use Seral Association Codes

The seral association codes are appended to the site series code. For example, the Garry oak – Common camas – Blue wildrye seral plant association overlaps mostly with the 01 site series. The seral code is appended to the site series code, separated by a hyphen: **01-Qgcc**.

Diameter Classes

Diameter classes are given for oak (diameter at breast height) as follows: small, 0–29 cm; medium, 30–49 cm; large, ≥ 50 cm. Diameters were taken at 50 cm on oaks < 2 m tall and at 20 cm on oaks < 0.5 m tall.

Preservation Priority

Preservation priority is the most important interpretive category and should be considered first in the assessment of an area. We assigned rankings to the plant communities based on the following scale, which we developed to emphasize the composition of native species:

- Very high:**
 - native plant communities of bedrock outcrops.
 - other native plant communities.
 - early season native plant communities.
- High:**
 - early season native plant communities with a possible.
 - natural understorey succession role.
- Moderately high:** – first-order disturbance plant communities that are dominated partly by native species.
- Moderate:** – second-order disturbance plant communities that are dominated partly by native species.
- Low:** – the remainder of the first-order disturbance plant communities.
- Very low:** – the remainder of the second-order disturbance plant communities.

The assignment of preservation priority should be further refined by considering geographic area. A generalized rating of susceptibility to destruction (threats) takes into account each geographic area. Meeting the objective of preserving whole landscapes and the deep soil parkland types would require an adjustment in the ratings. A site-specific assessment could add other factors, such as composition of native species.

Regeneration

Observed regeneration was used to assess oak regeneration potential. Seedlings and saplings are described separately. We used the low shrub layer, as above, to delineate the “sapling” class. The tall shrub layer could not be used because it included adult oaks. The statement about the presence of regeneration used the presence class requirement above: all sites, 1.0; most sites, < 1.0 but ≥ 0.70 ; some sites, < 0.70. Stocking categories were as follows: “Non-stocked,” no seedlings or saplings; “Lightly stocked,” averaged cover class 1; “Moderately well-stocked,” averaged class 2; “Well-stocked,” averaged class 3 or greater.

Aesthetic appeal

Physiognomic types were assigned aesthetic classes. The physiognomic types were given aesthetic ratings as follows, from highest to lowest: open parklands, krummholz sea-edge, oak – light shrub cover – herb parkland, oak – talus; shrub oak – rock outcrop, other parklands, shrub oak basin; oak woodlands, oak – fern rockland, shrub oak – basin broomland, shrub oak – broom – rockland; broom parkland, shrub oak – thicket, oak – dense shrub. Ratings were reduced by a class for first-order disturbance (invasive alien) communities.

An overall rating was developed numerically from classes developed in four categories: physiognomic type, oak form-class, form-complexity index, and diameter. Oak form-class emphasized openness and, together with average diameters, indexed the positive aesthetic characteristics of large size. Oak form-complexity was computed numerically and the values used in classes, based on our assumption that the greater the complexity, the greater the aesthetic appeal. Physiognomic type classes reflected the properties of diversity and openness. The assessments were modified with factors such as the presence of early season flowering plant communities.

Susceptibility to disturbance

The plant communities were rated for susceptibility to disturbance using the generalizations suggested by the consolidated categories and ecological moisture regime. This assessment included susceptibility to grazing and recreational impact. Categories were assigned in the following order, from highest to lowest susceptibility: native “xeric” communities and native early season communities; other native communities and first-order disturbance “xeric” communities; “xeric” broom communities; remainder of first-order disturbance (invasive alien) communities; native “wet” communities; and remainder of broom communities.

Prescribed fire potential

The need of the plant community for prescribed fire was assessed, then the desirability, contraindicated by the presence of responsive species ready to take over the plant community. Shrub density and possible forb rejuvenation in grass stands were the main positive vegetation indicators. It is recommended that a number of site-specific considerations, such as fuel loads, stand structure, fire weather/season of burn, and potential containment, also be considered in any evaluation, using standard methodologies.

The prescribed fire interpretations are based on the important role suggested for periodic burning in the oak ecosystem. The basic framework for the prescribed fire assessment was as follows, from highest to lowest: moderate to dense shrub communities and early season communities; other parklands with shrub communities or dense introduced grasses; rock outcrop types; some “xeric” or talus communities with bedrock; broom communities; and “wet” shrub communities.

Threats

Threats addressed are those posed by development. Many of the points above were considered, along with geographic area, slope, and presence of bedrock as an indicator of view home locations. The geographic area assessment rated the areas in the following order of threat, from highest to lowest: Saanich Peninsula, western shore, Nanaimo–Duncan, southern Gulf Islands, and northern Gulf Islands. Locality-specific considerations are better built into detailed planning levels, such as proximity to municipal water, sewage systems, and transportation corridors.

Restoration potential and priority

Providing that communities had a high restoration potential, restoration priority paralleled preservation priority. The ratings for native plant communities assume a level of site disturbance from which recovery would be required. Lower priority was designated for plant communities with lower restoration potential. In addition to native communities and the two orders of disturbance (invasive alien) communities, site quality was considered through the use of ecological moisture regime.

Priority was assigned in the following order, from highest to lowest: native communities of mesic sites and early season native communities; introduced communities of mesic sites with native species; remaining native communities and introduced communities of mesic sites; remaining first-order communities; and xeric introduced communities; and remaining broom communities.

Potential was assigned in the following order, from highest to lowest: native wet, mesic, and early season communities; native subxeric and xeric communities; disturbed communities with native species; remaining communities.

