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Garry Oak (*Quercus garryana*) Plant Communities and Ecosystems in southwestern British Columbia

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[2] Content excerpted from:Erickson, 1996. **Classification and Interpretation of Garry Oak (*Quercus garryana*) Plant Communities and Ecosystems in southwestern British Columbia,** M.Sc. thesis, Jan., 1996., Dept. Geography, Univ. Victoria.

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PLANT COMMUNITIES AND ECOSYSTEMS (2): INTRODUCED PLANT COMMUNITIES

SCOPE OF THIS REPORT

This report conveys information on plant communities from my M.Sc. thesis (Erickson, 1996). Some background information is included, along with the descriptions (which use common names), a key to the plant communities and a numerical list of them. Common names are provided in the .key to the plant communities and a numerical list of them. The use of field guides such as Pojar and MacKinnon (1994[3]) is suggested for those not familiar with these plants.A popular brochure, *Garry Oak: Ecosystems at Risk* is available from Ministry of Environment, Land and Parks. There is also more information on the plant communities available in the thesis.

The classification is suggested for use as a baseline in land management and restoration activities. It addresses both native and introduced plant communities and hypothesizes relationships between them which can be used conceptually and checked in monitoring activities. In addition the classification recognizes early-season plant communities, which typically have a higher proportion of native species and are therefore worthy of special attention in ecological assessments and plannning. Rock outcrops provide unique habitat opportunities which are addressed in a class devoted to them. Two classes of introduced plant communities are used for organization purposes, distinguished by their order of disturbance.

This is a detailed classifiication suitable for use in the Garry oak habitat for ecological inventory, mapping, assessment and planning for biodiversity and preservation priorities. These communities are intended as recognizable entities, the occurrence of which often corresponds to environmental breaks. In transitional settings, assignment to the closest community is suggested in preference to the use of an undifferentiated category.

SUMMARY OF THE THESIS

The thesis from which this information originates is summarized in the following paragraphs.

A literature review on the vegetation and ecology of Garry oak ecosystems helped identify values, ecological perspectives and assumptions used in my study. This information is presented and interpreted as a background to the rest of this text. Other vegetation work from the literature provided a context for my plant community classification. The endangered status of the Garry oak ecosystems sharpened the need for a classification and associated recommendations.

[3] Pojar, J. and MacKinnon, A., ed., 1994. Plants of Coastal British Columbia. Lone Pine Publishing. Vancouver.

A three-year reconnaissance ecological survey of the main range of Garry oak (*Quercus garryana*) ecosystems in British Columbia was completed using standard, subjective methods. Additional work in the U.S. part of the range helped provide a setting for the study. I used measures such as cover classes to increase efficiency and ensure the numerical adequacy of the sampling effort. Over 300 reconnaissance plot descriptions were used to form a plant community classification with 43 plant communities, organized as follows:

- 27 native plant communities, of which:
  - 7 are early season
  - 5 are of bedrock outcrops, and there are
  - 15 others
- 9 first-order disturbance communities (introduced species, but without broom (*Cytisus scoparius*) dominance)
- 8 second-order disturbance communities (introduced species and broom dominance), of which:
  - 3 are of bedrock outcrops, and there are
  - 5 others

A key to the plant communities is provided, along with tabular and text descriptions. I did not adopt a taxonomic classification framework, instead just assigning the term "plant community" for the basic elements, with plant "subcommunity" added as necessary. This is the first time many of these communities have been recognized in British Columbia, although most have analogues further south within the range of oak woodlands. Some particularly notable communities are from the early season category, usually dominated by camas (*Camassia quamash, Q. leichtlinii*) and those communities dominated by native grasses such as Idaho fescue (*Festuca idahoensis*) and blue wild-rye (*Elymus glaucus*). The classification differs from most previous work in British Columbia by concerning itself with the variety of actual plant communities, rather than only those hypothesized to represent a theoretical climax condition. A context is provided for my communities by incorporating a discussion of similar communities from the literature into the text description of each.

My classification was formed using subjective methods based on tabular comparison (Muellller-Dombois and Ellenberg, 1974), but emphasizing plant dominance through cover. This orientation is consistent with the Anglo-American approach to vegetation classification. Several objective tests were used, with the purpose of aiding the subjective classification. Success in adequately

representing the cover of constant species within communities was checked with the use of a "constant cover value index". The degree of similarities and differences between communities was checked with the "adjusted Motyka coefficient". Several realignments of communities into subcommunities were made as a result of the coefficient values obtained. Both of the previous tests also served to reinforce the primacy of cover in my classification. Comparisons with community pairs from other oak woodlands, savannahs and grasslands within the Pacific Northwest produced a scientific context for my classification by comparing its level of differentiation with that of the other studies. My level of differentiation compared most closely with that of the other studies of oak woodlands. An automated classification, *TWINSPAN*, was considered as an objective test of classification, but it did not meet my review objectives and therefore did not contribute to the final classification.

Interpretations and descriptions are given for the ecosystems associated with the plant communities. The descriptions are derived from the plot work, with key features generalized and asserted subjectively. Ecological relationships for the plant communities are given in three ways: in charts of distribution and moisture regime; in landscape diagrams; and, from a temporal perspective, in charts with suggested origins and derivations. Multiple regression and correlation results objectively suggest relationships at a broad level between the plant community gradient and environmental variables, particularly ecological moisture regime and elevation. Interpretations are given for categories such as preservation priority, wildlife habitat, aesthetic/recreational attributes and susceptibility to disturbance. These subjectively assigned characteristics, uses or values are intended to provide considerations or suggest actions in management decision-making. The final assessment is intended to be made within the context of the overall management strategy.

Climate summaries for the study years suggest that while climate was not normal, it seemed to vary around normal in such a way that it probably did not cause a change in vegetation for the study years. Oak regeneration results from my plots were generally favourable and lacked differences between native plant communities and introduced ones. This lack raises questions about hypotheses which consider competition from introduced species, broom and native shrubs to be suppressing oak regeneration.

The demise of the Garry oak ecosystems combined with the ecological survey results to preoccupy the development of a management strategy intended to:

- preserve all larger Garry oak areas, acquiring those in private ownership
- apply detailed classification and inventory, preserving and acquiring smaller tracts on an ecosystem-by-ecosystem basis
- evaluate and actively manage each Garry oak parcel
- promote and undertake the research required to complement the activities of the strategy.

This management strategy for the Garry oak habitat emphasizes its preservation and the need for active management. Carrying out the management strategy requires multiple-party involvement. The strategy and interpretations should help maintain and preserve ecosystem integrity and biodiversity.

INTRODUCTION

THE NEED FOR AN ECOLOGICAL STUDY OF GARRY OAK COMMUNITIES

Garry oak communities are at risk in British Columbia (British Columbia Ministry of Environment, Lands and Parks, 1993). They have declined dramatically, and most of the remaining communities have been strongly modified. It is probable that these ecosystems will be completely lost if determined conservation measures are not undertaken. Such loss would seriously threaten the biodiversity heritage of British Columbia. Ceska (1992) estimated that approximately 140 of British Columbia's plant species (6% of the total vascular flora) are found only in these habitats (British Columbia Conservation Data Centre, 1995). Garry oak communities also sustain an impressively large proportion of the rare and potentially vulnerable plant taxa (red- and blue-lists) (op.cit.) and the taxa which may become vulnerable in the near future (yellow-list). About 75 red and blue-listed plant taxa (approximately 12.5 % of the total) and about 50 yellow-listed taxa (approximately 20 % of the total) occur in Garry oak communities (op.cit.).

The threats to Garry oak ecosystems accentuate the need for basic studies that can contribute to preservation and management. Garry oak ecosystems have not received a great deal of focus in the past, but there seems to be a growing awareness and deepening concern, which should support both scientific studies and public action. The full sense of value for the Garry oak ecosytems will probably be realized in the future. Studies now which contribute to their preservation and management are therefore an investment in our future.

There are serious management problems that should be confronted if the remaining ecosystems are to be conserved. Solutions to these problems must be based, in part, on information from research studies. Though Roemer (1972) focused partly on the Garry oak ecosytems, research information remains limited. More information is required for understanding the dynamics of the Garry oak landscape. The scope and accuracy of ecological evaluations and recommendations should increase with knowledge extrapolated from the U.S. part of Garry oak's range. A classification of the British Columbia stands based on more intensive sampling will help facilitate judicious application of this knowledge. Sampling programs in British Columbia have been preoccupied with "undisturbed climax conditions". However, many Garry oak communities are dominated by adventive species, and a comprehensive management approach should be based on understanding them. The fact that my classification focused equally on these communities is one difference from most previous classification work.

There are many management concerns associated with Garry oak communities. My study has been guided by the need for management criteria dealing with:

- the floristic composition of the Garry oak ecosystems
- which communities should be preserved if undisturbed stands are not available
- the adequacy of oak regeneration
- factors that may be limiting oak regeneration, such as the cover of annual grasses
- the possible role of prescribed burning
- the susceptibility of different sites to encroachment by Douglas-fir (*Pseudotsuga menziesii*), native shrubs or broom (*Cytisus scoparius*)
- maintaining biodiversity in the Garry oak communities

Key research questions formed the basis for three objectives:

To gather and interpret information available on the vegetation and ecology of Garry oak ecosystems.

To sample and classify the array of current Garry oak communities in British Columbia at a reconnaissance level.

To interpret management options and implications, including strategies for maintenance and preservation of ecosystem integrity and biodiversity.

The objectives seek to provide information essential to the management and conservation of Garry oak ecosystems, then interpret this information for management and present an overall strategy. A plant community classification provides a framework within which knowledge of ecosystem function and dynamics can be organized. It communicates elements of the Garry oak landscape to managers, scientists and naturalists, and provides a common language which allows knowledge-sharing. A classification establishes a reference point for comparing the results of treatments and suggests hypotheses to investigate. Classification is fundamental to the completion of other needed pursuits, such as inventory and mapping.

DISTRIBUTION AND GENERAL CHARACTERISTICS OF GARRY OAK COMMUNITIES

Garry oak is British Columbia's only native oak. Its landscape pattern in British Columbia is a mosaic of separated stands, a characteristic shared with Washington, which Taylor and Boss (1975) called "scattered relics". In contrast, Garry oak forms a continuous part of landscapes further south, and extensive portions of Oregon and California are occupied by *Q. garryana* (Bolsinger, 1988; Riegel et al., 1992). *Q. garryana* is especially abundant in the Willamette Valley of Oregon, which is also near the centre of its distribution.

The British Columbia stands have been described in a variety of ways (Roemer, 1972; Regional District of Comox-Strathcona, 1975; McMinn et al., 1976; Valentine et.al., 1978; Pojar and Meidinger, 1991). At the stand level, "oak parkland" seems to be an appropriate label, consistent with world level terminology (Daubenmire, 1968). "Meadows" suitably describes the openings in spring. The mosaic of "savanna" and "woodlands" recognized in the U.S. part of the range (Fonda and Bernardi, 1973; Franklin and Dyrness, 1973; Griffin, 1977; Sugihara et al., 1987; Whitney, 1989) actually also applies to British Columbia at the broader, landscape level. Interspersion with grassland and coniferous forest is a further characteristic of the *Q. garryana* landscape. Association with bedrock outcrops is one landscape feature frequently noted for Garry oak stands in British Columbia (Roemer, 1972; Ceska, 1982; van Vliet et al., 1987).

RESULTS

REGENERATION OF OAK

Natural regeneration of oak was compared using seedling and sapling designations for all native plant communities and all first and second-order plant communities (see ahead). Regeneration here is the ability to successfully recruit seedling and shrub layer oaks. There has been a great deal of concern expressed in the literature about lack of oak regeneration (Tunison, 1973; Pojar, 1980b; Gordon et al., 1989; Keeler-Wolfe, 1990; Kavanaugh, n.d.; Hibbs and Yoder, 1993). Rossi (1980, p.8) called " the conspicuous lack of oak regeneration" "perhaps the most important issue in oak management." There were three transects without any saplings (<1 m) in the regeneration study of Corrigan (1991) for the Victoria area.

Competition from introduced plant species, broom and native shrubs is considered to be an important factor responsible for this shortcoming (e.g. Reed and Sugihara, 1987; Welker and Menke, 1990; Hibbs and Yoder, 1993; Kavanaugh, 1992a, n.d.). Therefore, I expected to confirm these relationships with plot data comparisons between native and introduced plant community categories. Contrary to these expectations, there was not much difference in these and other categories, except for:

- a slightly higher percentage of native plant communities with saplings present on all sites and a slightly higher percentage which are well-stocked compared with "disturbed" (first- and second- order) communities (see the next section)

- slightly more plant communities with sapling regeneration on all sites from the other native plant communities compared with the early-season plant communities

- a higher percentage of plant communities with sapling and seedling regeneration present on all sites on the second-order category (broom) communities than the first-order disturbance category and a higher percentage with moderate to well-stocked saplings

- a higher percentage of plant communities with light stocking for both the sapling and seedling classes on the first-order disturbance category than the second-order disturbance (broom) category

- a slightly higher percentage with saplings present on most sites and seedling regeneration present on all sites for the second-order disturbance categories compared with other native plant communities

- a higher percentage with well-stocked saplings for other native plant communities compared with second-order disturbance communities

The first-year results of Krannitz and Bennett (1994) for one site on Vancouver Island (Mary Hill) correspond in general to my results. These authors suggested that grass and shrub competition did not affect oak survival. The regeneration results from Corrigan (1991) for the Victoria area exceeded those in the recuitment model of Anderson and Pasquinelli (1984) for *Quercus garryana* in northern California.

My comparisons raise questions regarding the suggested inadequacy of oak regeneration and the role of competition from introduced species and native shrubs. Although this competition is hypothesized to be an ecosystem dynamic, regeneration of oaks in the native plant community category was not better than that of the introduced community category. Similarly, regeneration was apparently not inhibited by native shrub plant communities. It seems possible that the comment of Bartolome et al. (1987) may also apply to the study area, that overgeneralization of the actual status of oak regeneration is the common thread that binds together the concerns expressed.

More detail on a more precise scale for evaluation is provided in the plant community descriptions. When considered on a community-by-community basis there were 11 plant communities in which regeneration was limited in some way, either absent or present only on some sites or with stocking below normal. These communities were split about evenly between introduced and native communities and between "xeric" and "mesic", but were predominantly "grassy". Grass competition with oak species has been demonstrated in California, where competition inhibited growth and this was thought to lead to decreased seedling survival (Danielsen and Halvorson, 1991). Further investigation at an appropriate scale might reveal a similar situation in British Columbia.

OVERVIEW OF THE PLANT COMMUNITIES

Forty-three (43) plant communities are recognized and characterized. They are described in detail with their ecosystems in Chapters 5 and 6 (of the thesis). At the end of this report there is a key for determining plant communities on an area and a summary for looking up communities by their alphanumeric designation. Communities are grouped into six consolidated categories which formed the basic sequence used throughout. The consolidated categories are a means of organizing the communities and do not represent a classification. The terms "first-order" and "second-order" disturbance communities reflect the apparent sequence of vegetation change and site disturbance following the introduction of non-indigenous species by European colonists (see the thesis). The use of alpha-numeric designations for the plant communities provides a cross-reference mechanism to my sequential data files and a short form for representing the communities.

The six consolidated categories give an idea of the nature of diversity in the Garry oak communities. Three native and three non-native divisions are recognized. Of the native groupings, there were seven early-season plant communities (with early peak vegetation cover growth between April 1 and May 15), four native plant communities of rock outcrops and 15 other native plant communities encompassing the rest of the sequence of moisture conditions. The non-native plant communities roughly parallel this pattern. They are divided into two portions according to the timing and degree of disturbance leading to their composition. A "First-Order Disturbance" group without broom (*Cytisus scoparius*) dominance and has nine plant communities. A "Second-Order Disturbance" group is with broom dominance, consisting of three rock-outcrop commmunities and five others from less-severe moisture condition sites.

The key to identifying the plant communities in the field is given in Appendix 1, a numerical list (by the plant community numbers I've assigned) in Appendix 2, and the list of plant communities by consolidated categories follows:

LIST OF CONSOLIDATED GROUPINGS OF PLANT COMMUNITIES
(see ahead for common names)

Early Season Plant Communities:
c37a Oak - *Camassia quamash*: Typic subcommunity
c35a Oak- *Camassia quamash- Erythronium oregonum* subcommunity
c35b Oak - *Camassia quamash - Dodecatheon hendersonii* subcommunity
c37b Oak - *Camassia quamash - Ranunculus occidentalis* subcommunity
c36 Oak - *Camassia leichtlinii*
c48 Oak - *Montia perfoliata*
c51 Oak - *Dicranum scoparium - Plectritus congesta* subcommunity (also below)

Native Plant Communities of Bedrock Outcrops
c51 Oak - *Dicranum scoparium - Plectritus congesta* subcommunity (early season) (also above)
c11 Oak - *Dicranum scoparium - Montia parvifolia* subcommunity
c45 Oak - *Dicranum scoparium - Sedum spathulifolium* subcommunity
c52 Oak - *Dicranum scoparium*: Typic subcommunity
c46 Oak - (Fd) - *Rhacomitrium canescens - Selaginella wallacei* subcommunity

Other Native Plant Communities (dry to wet):
c26 Oak - *Mahonia aquifolium*
c16a Oak - *Lonicera hispidula* (colluvial)
c20 Oak - *Festuca idahoensis*: Typic subcommunity
c25 Oak - *Festuca idahoensis - Cerastium arvense* subcommunity
c27 Oak - *Festuca idahoensis - Trifolium microcephalum* subcommunity
c42 Krummholz Oak - *Festuca idahoensis - Vicia americana* subcommunity (sea-edge)

Other Native Plant Communities (dry to wet, cont.):
c47 Oak - *Elymus glaucus*
c41 Oak - *Lathyrus nevadensis*
c43 Oak - *Bromus carinatus*
c14 Oak - *Carex inops*
c13 Oak - *Melica subulata*
c15 Oak - *Holodiscus discolor - Symphoricarpos albus - Polypodium glycyrrhiza*
C10 Oak - (Fd) - *Holodiscus discolor - Symphoricarpos albus - Rhytidiadephus triquetris*
c8 Oak - *Symphoricarpos albus - Rosa nutkana - Lonicera ciliosa* subcommunity (thickets)
c9 Oak - *Symphoricarpos albus - Rosa nutkana - Oemleria cerasiformis* subcommunity (thickets)

First-Order Disturbance Plant Communities (dry to wet):
c50 Oak - *Rhacomitrium canescens - Festuca bromoides* subcommunity
c21 Oak - *Cynosurus echinatus* (late season)

c23 Oak - *Bromus sterilis*
c31a Oak - *Anthoxanthum odoratum*
c29a Oak - *Poa pratensis* - *Vicia sativa*
c28a Oak - *Dactylis glomerata*: Typic subcommunity
c28b Oak - *Dactylis glomerata* - *Bromus carinatus* subcommunity
c30 Oak - *Dactylis glomerata* - *Arrhenatherum elatius* subcommunity
c49 Oak - *Dactylis glomerata* - *Agrostis stolonifera* subcommunity

Second-Order Disturbance Communities (Broom series)
Bedrock outcrops:
c3 Oak - Broom - *Rhacomitrium canescens* - *Festuca bromoides* - *Aira* subcommunity
c17 Oak - Broom - *Rhacomitrium canescens: Typic* subcommunity
c22 Oak - Broom - *Rhacomitrium canescens* - *Bromus tectorum* subcommunity

Other Second- Order Disturbance Communities (Broom series) (dry to wet):
c2 Oak - Broom - *Cynosurus echinatus* (late season)
c31b Oak - Broom - *Anthoxanthum odoratum*
c6 Oak - Broom - *Elymus glaucus*
c4 Oak - Broom - *Poa pratensis*
c5 Oak - Broom - *Dactylis glomerata*

LIST OF CONSOLIDATED GROUPINGS OF PLANT COMMUNITIES: COMMON NAMES

Early Season Plant Communities:
c37a Oak - early camas: Typical subcommunity
c35a Oak- early camas - Easter lily subcommunity
c35b Oak - early camas - Henderson's shooting star subcommunity
c37b Oak - early camas - western buttercup subcommunity
c36 Oak - great camas
c48 Oak - perfoliate-leaved miner's lettuce
c51 Oak - broom moss - seablush subcommunity (also below)

Native Plant Communities of Bedrock Outcrops
c51 Oak - broom moss - seablush subcommunity (early season) (also above)
c11 Oak -broom moss - small-leaved montia subcommunity
c45 Oak - broom moss - broad-leaved stonecrop subcommunity
c52 Oak - broom moss - Typical subcommunity
c46 Oak - (Douglas-fir) - gray frayed-cap moss subcommunity

Other Native Plant Communities (dry to wet):
c26 Oak - tall Oregon grape
c16a Oak - hairy honeysuckle (colluvial)
c20 Oak - Idaho fescue: Typical subcommunity
c25 Oak - Idaho fescue - field chickweed subcommunity
c27 Oak - Idaho fescue - woolly clover subcommunity
c42 Krummholz Oak - Idaho fescue - American vetch subcommunity (sea-edge)
c47 Oak - blue wildrye
c41 Oak - peavine
c43 Oak - California bromegrass
c14 Oak - long-stoloned sedge
c13 Oak - oniongrass
c15 Oak - ocean spray - snowberry - licorice fern subcommunity
c10 Oak - (Douglas-fir) - ocean spray - snowberry - electic cat's-tail moss subcommunity
c8 Oak - ocean spray - snowberry - orange honeysuckle subcommunity (thickets)
c9 Oak - snowberry - Nootka rose - osoberry subcommunity (thickets)

First-Order Disturbance Plant Communities (dry to wet):
c50 Oak - gray frayed-cap moss - annual fescue* subcommunity
c21 Oak - dogtail bristlegrass* (late season)
c23 Oak - sterile barngrass*
c31a Oak - sweet vernalgrass*

c29a Oak - Kentucky bluegrass* - common vetch*
c28a Oak - orchardgrass*: Typical subcommunity
c28b Oak - orchardgrass* - California bromegrass subcommunity
c30 Oak - orchardgrass* - tall oatgrass* subcommunity
c49 Oak - orchardgrass* - redtop* subcommunity

Second-Order Disturbance Communities (Broom series)
Bedrock outcrops:
c3 Oak - Broom* - gray frayed-cap moss - annual fescue* - hairgrass* subcommunity
c17 Oak - Broom* - gray frayed-cap moss typical
c22 Oak - Broom* - gray frayed-cap moss - cheatgrass* subcommunity

Other Second- Order Disturbance Communities (Broom series) (dry to wet):
c2 Oak - Broom* - dogtail bristlegrass* (late season)
c31b Oak - Broom* - sweet vernalgrass*
c6 Oak - Broom* - blue wildrye
c4 Oak - Broom* - Kentucky bluegrass*
c5 Oak - Broom* - orchardgrass*

* introduced species

PLANT COMMUNITIES AND ECOSYSTEMS

INTRODUCTION

The next two chapters (in the thesis) follow from the overview in Chapter 4, by describing the plant communities, the focus of this study, discussing and interpreting them. Native plant communities (named for native plant species) are covered in this chapter, introduced plant communities (named for introduced plant species), corresponding to the first-order and second-order disturbance communities, in the following chapter. The terms "first-order" and "second-order" disturbance communities reflect the apparent sequence of vegetation change and site disturbance following the introduction of non-indigenous species by European colonists (see 2.5). The plant community interpretations are intended to be used within the context of the management strategy in Chapter 7. Generalized relationships of the native plant communities to the landscape (but not necessarily to each other) are illustrated in Figures 10 to 13 of the thesis, and a summary of the placement of the native plant communities by ecological moisture regime and geographic area is provided in Figures 14 to 19.

DESCRIPTIVE CATEGORIES The plant communities which follow (see 5.2) consist of three major categories, an ecosystem description, discussion and interpretations. These categories are explained in the following section unless otherwise dealt with in the methods chapter (3). I used both the scientific and common names in order to make the content available to a wide range of audiences. I have particularly used common names for three very familiar and easily identifiable

species: oak (Qg in tree symbol) (*Quercus garryana*), Douglas-fir (Fd in tree symbol) (*Pseudotsuga menziesii*) and broom (*Cytisus scoparius*). Non-indigenous species have the term "introduced" added to their common names to clearly differentiate them from native species.

Ecosystem Description Category

Plant Community Descriptions: All species with a mean presence of >= 0.70 (>= 0.67 for 3-plot groups) are included. The average cover of each species is given according to the average of the cover classes, as follows: Class **1**: 0 to 1 %, Class **2**:2 to 10%, Class **3**: 11 to 25 %, Class **4**: 26 to 50 %, Class **5**: 51 to 75 %,Class **6**: 76 to 100 %. The values in the descriptions are the average class converted back from percent cover data. Two classes together (e.g. "2 to 3") do not express a range, rather the average was close to the mid-point for the two classes. The low shrub layer (B2) is 0.5 to 2 m The tall shrub layer (B1) is 2 to 10m (Walmsley et al., 1980).

Oak Regeneration: All regeneration was apparently natural regeneration. Seedlings and saplings are described separately. I 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. I adapted the stocking categories from Bolsinger (1988) to accommodate my field data, as follows: "Nonstocked" -- no seedlings or saplings; "Lightly-stocked" -- averaged cover class 1; "Moderately well-stocked" -- averaged class 2; "Well-stocked" -- averaged class 3 or greater.

Elevation: Elevation was expressed in relative classes within the elevation range of the study area, as follows: low -- 0 to 50 m; medium -- 51 to 99 m; high -- >= 100m. There were a number of sites well up into the high elevation class (up to about 550 m), but the 100 m lower boundary was chosen because it seemed appropriate from my field observations.

Slope: gentle: 0 to 20 %, moderate: 21 to 30 %, moderately steep: 31 to 40 %, steep: 41 to 60 %, very steep >= 61 %.

Distribution: Five geographic area categories were used: 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).

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

Percent Coarse Fragments: These are designated for rock fragments (gravel, cobbles and stones) > 2mm (Walmsley et al.,1980) within soil, with categories as follows: low: 0 to 40%; medium: 40--70% ; high: >= 70%.

Physiognomic Type: I developed the 17 physiognomic type classes to relate to the structural form of the stands, vegetation physiognomy, genetic materials and other major features as part of a wildlife habitat classification (Erickson, 1993c). The following classes were subjectively assigned to the plant communities:
Oak - Dense Shrub Cover; Oak - Moderate Shrub Cover - Herb - Parkland; Oak - Light Shrub Cover - Bulb -Parkland; Oak - Grass - Parkland; Oak - Light Shrub Cover - Herb - Rockland; Oak- Fern - Rockland; Oak - Grass - Rockland; Oak - Talus - Sparse Shrub Cover - Herb Parkland; Shrub Oak - Krummholz - Sea-edge; Oak - Woodland; Shrub Oak- Broom - Rockland; Oak - Broom - Parkland; Shrub Oak - Basin - Broomland; Shrub Oak - Basin; Shrub Oak - Rock Outcrop; Shrub Oak - Shrub Thicket and Oak - Shrub Thicket.

These are called physiognomic types because physiognomic attributes are common to each, although other characteristics make a contribution. I reviewed world-level physiognomic classifications, found contradictions such as height vs. cover restrictions, and decided to use the classes of Daubenmire (1968) as my basis (Erickson, 1993a). The following factors were used in developing or refining the major classes: form of oak, vertical vegetation structure by layer, horizontal vegetation structure, major vegetation type, landform genetic material/ surface expression and special situations. The final physiognomic types are not represented in all possible combinations because they did not seem to be expressed that way in the field.

Woodlands have high oak tree layer cover (class 5 or greater) and were of a size which could be mapped (1/2 ha minimum). Smaller than this or with lesser or discontinuous oak cover and the stand was called a parkland. Whereas woodlands have oak cover as the continuous part of the landscape, parklands have openings as the continuous phase, with oaks in patches (Daubenmire, 1968). The term "parkland" has a history of use in our area (e.g. Roemer, 1972; McMinn et al.,1976). "Shrub oak/ Rock Outcrop" was used for bedrock dominated landscapes with B layer oaks (< 10 m), following historic precedence (McMinn et al., 1976). I am using the term "shrub" to avoid the use of the derogatory term "scrub". It should be noted that shrubby growth forms of oaks are characteristic of habitat where environmental stress is relatively great" (Rundel, 1980, p.52). "Rockland" was a type parallel to shrub oak/rock outcrop, but with tree layer oaks. One type was recognized on stabilized talus and this is reflected in its name. Others such as Beard (1978) have recognized the role of physiographic features such as talus and scree in physiognomic systems.

Dominant vegetation layers, growth forms or species are recognized in the names of the types. "Broomland" is used in recognition of the significance of this species (e.g. Zielke et al., 1992) and to relate to all the previous types on the broom dominated landscape. Native shrub cover is specified into classes, including recognition of the thicketed form where heavy cover is the most pronounced, multi-layered and has a distinct edge. I used the term "krummholz" in the name of

one class because this term best describes its form of oak, which grades upwards from pencil height to about 2 m with distance away from the wind and sea exposure. This creeping growth habit is consistent with the use of the term in the literature (Franklin and Dyrness, 1973; Mueller-Dombois and Ellenberg, 1974), although it is qualified with and applied to this phenomena at the upper elevation tree line (op.cit.). Kruckeberg (1982) described a shrubby form of oak found on exposed headlands in the San Juan Islands of Washington, which is likely the same as I have labelled "krummholz".

Information on other categories in the descriptions is found in the source materials for the field survey methods (Canada Soil Survey Committee, 1978; Walmsley et al., 1980 and Klinka et al., 1981).

Comments or Discussion Category

In the comments or discussion section for each plant community I examine the environmental factors which seem to distinguish them from each other (see also Figures 10 to 19, 23 to 28 of the thesis) from a simple review and comparison of their respective features. The discussion of these features is a supplement to the charts of distribution and moisture regime and the landscape diagrams (in the thesis) which also serve to distinguish the communities.

c37a Oak - *Camassia quamash*: Typic subcommunity

Ecosystem description:

Frequency of Occurrence: 12 plots, moderately frequent

Distribution: From Plots: Hornby Is., Nanoose Hill, Mt. Tzuhalem, Saanich Peninsula: Mt. Finlayson, Thetis Lk., Uplands; western shore: Juan de Fuca Pk., Fort Rodd Hill, Rocky Pt. From Notes: western shore: Belmont Pk.

Plant Community Description: *Camassia quamash* (early camas) is present on all sites and averages class 3 cover. *Sanicula crassicaulis* (Pacific snakeroot) occurs on all sites and averages class 2 to 3 cover. *Symphoricarpos albus* (snowberry) and *Galium aparine* (cleavers) grow on most sites and average class 2 to 3, and class 1 to 2 cover, respectively.

Tree Canopy/ Landscape Expression: usually tree canopy (A) layer

Oak Characteristics: Diameters: various; Regeneration: is present on most sites for saplings and on some sites for seedlings. Stocking averages moderately well-stocked for saplings and lightly-stocked for seedlings.

Physiognomic Type: often Oak - Light Shrub - Herb - Bulb Parkland (6), some Oak -Broom - Parkland (2), Oak Woodlands (2), and others.

Elevation: various: 20 to 330 m Slope: mostly gentle Aspect: primarily southeast (south) to west Surface Shape: mainly concave (7), also straight (3), and various

Moisture Regime: chiefly submesic to mesic, often with "compensating" moisture influxes (4), ranges from very xeric to permesic

Exposure: wind (9), insolation (6) Bedrock Geology: various

Surface Substrate Features: some (3) have moderate to high bedrock exposure (class 3 or 4) Soil Classification: mainly Orthic Sombric Brunisols (9), also Orthic Humic Regosols (3) Humus Classification: Vermimulls and Orthi Rhizomulls (4)

Depth of Ah Horizon: generally > 25 to 35 cm(7), or 6 to 30 cm(5)

Colour of Ah Horizon: usually dark, 10YR2/1, 2/1.5

Depth to Bedrock: mostly none, some 25 to 80 cm (estimated)

Surface Soil Texture: generally silt loam (8), gravelly and very gravelly

Percent Coarse Fragments: various

Comments: Four plots were observed to be receiving extra moisture from surrounding sites. This plant community provides one of the flower shows for which the Garry oak habitat is famous in spring. The tendency toward occupance of concave sites, which suggests moisture influxes, is an

environmental characteristic distinguishing this subcommunity. The several subcommunities with *Camassia quamash* (c37a,b; c35a,b) develop about three weeks earlier than *Camassia leichtlinii (c36)*.

c35a Oak- *Camassia quamash- Erythronium oregonum* **subcommunity**

Ecosystem description:

Frequency of Occurrence: 5 plots, infrequent

Distribution: From Plots: Hornby Island: Downes Pt., Duncan: Priest Point, St. Peter's; Saanich Peninsula: Beacon Hill Park. From Notes: none

Plant Community Description: *Camassia quamash* (early camas) is present on all sites and averages class 3 cover. *Erythronium oregonum* (easter lily) occurs on all sites and averages class 3 to 4 cover. *Symphoricarpos albus* (snowberry) grows on all sites and averages class 3 cover. *Dactylis glomerata* (introduced orchardgrass) and *Mahonia aquifolium* (tall Oregon grape) occupy most sites and average class 2 and 1 cover, respectively.

Tree Canopy/ Landscape Expression: either tall shrub canopy (B1) layer (3) or high cover tree canopy (A) layer (2)

Oak Characteristics: Diameters: mostly small diameters (4);

Regeneration: Regeneration is occurring on most sites. Stocking for saplings averages moderately well- to well-stocked. Stocking for seedlings averages lightly-stocked.

The averages reported here are lower because two of these plots are mowed annually, suppressing regeneration.

Physiognomic Type: various: some Oak - Light Shrub - Herb - Bulb - Parkland (2).

Elevation: low to medium elevation Slope: mostly gentle

Aspect: southeast (south) to west Surface Shape: various

Moisture Regime: chiefly mesic (3), also xeric, subxeric

Exposure: insolation (3), wind (2)

Bedrock Geology: conglomerate (2), no data (2)

Surface Substrate Features: few features

Soil Classification: Orthic Sombric Brunisols (3) and Regosols (2)

Humus Classification: mainly Orthi Vermimulls (4)

Depth of Ah Horizon: 5, 20 cm, or > 10 to 15 cm

Colour of Ah Horizon: dark, 10YR2/1 Depth to Bedrock: none (3), or shallow, 5, 20 cm Surface Soil Texture: sandy loam to silt loam

Percent Coarse Fragments: none (2), or no data

Comments: This plant community provides one of the flower shows for which the Garry oak habitat is famous in spring. This subcommunity is partly distinguished by a mesic ecological moisture regime.

c35b Oak - *Camassia quamash - Dodecatheon hendersonii* **subcommunity**

Ecosystem description:

Frequency of Occurrence: 4 plots, infrequent

Distribution: From Plots: Duncan: Genoa Bay, Mt. Tzuhalem, Priest Pt.

From Notes: none

Plant Community Description: *Camassia quamash* (early camas) is present on all sites and averages class 2 to 3 cover. *Dodecatheon hendersonii* (broad-leaved shootingstar) occurs on all sites and averages class 3 cover.

Rhacomitrium canescens (gray frayed-cap moss) grows on all sites and averages class 3 cover. *Elymus glaucus* (blue wildrye) and *Polytrichum juniperinum* (juniper hair-cap moss) exist on all sites and average class 2 cover. *Galium aparine* (cleavers) occupies all sites and averages class 1 to 2 cover. *Achillea millefolium* (yarrow), *Rumex acetosella* (introduced sheep sorrel), and *Stellaria media* (introduced chickweed) are present on all sites and average class 1 cover.

The remaining species are present on most sites. *Cytisus scoparius* (introduced broom) averages class 3 cover. *Symphoricarpos albus* (snowberry), *Carex inops* (long-stoloned sedge), and *Dicranum scoparium* (broom moss) average cover class 2.

Mahonia aquifolium (tall Oregon grape), *Bromus carinatus* (California bromegrass), *Luzula multiflora* (many-flowered woodrush), *Plectritis congesta* (seablush), *Sanicula crassicaulis* (Pacific snakeroot), *Brodiaea coronaria* (harvest brodiaea), *Lomatium utriculatum* (spring gold), *Collinsia parviflora* (small-flowered blue-eyed Mary), and *Trifolium oliganthum* (few-flowered clover) average class 1 cover.

Tree Canopy/ Landscape Expression: either tree canopy (A) layer (2), or tall shrub (B1) layer canopy (2)

Oak Characteristics: Diameters: small diameter; Regeneration: Regeneration is present on some sites for saplings and on all sites for seedlings. Average stocking level is light for both saplings and seedlings.

Physiognomic Type: various: some Oak - Light Shrub - Herb - Bulb Parkland (2).

Elevation: usually high elevation, 170 to 275 m Slope: gentle to moderate

Aspect: south and west to north Surface Shape: various

Moisture Regime: mostly subxeric to submesic (one xeric)
Exposure: wind (3), insolation (2) Bedrock Geology: conglomerate (2), slate (2)
Surface Substrate Features: some (2) have moderately high to very high (class 3 to 6) bedrock exposure Soil Classification: Orthic Sombric Brunisols (2) or Regosols (2) Humus Classification: primarily Vermimulls Depth of Ah Horizon: generally 8 to 15 cm (3) Colour of Ah Horizon: usually dark, 10YR2/1, 2/1.5 (3)
Depth to Bedrock: some shallow, 8 and 15 cm, some with none (1), or at depth (60 cm, estimated) (1) Surface Soil Texture: gravelly and very gravelly loam
Percent Coarse Fragments: mainly high surface coarse fragments
Comments: This plant community provides one of the flower shows for which the Garry oak habitat is famous in spring. Occurrence on bedrock ledges is one environmental characteristic distinguishing this subcommunity. Occurrence at high elevation is probably a second feature which demarcates.

c37b Oak - *Camassia quamash - Ranunculus occidentalis* **subcommunity**

Ecosystem Description:
Frequency of Occurrence: 6 plots, moderately frequent in certain areas
Distribution: From Plots: Nanoose Bay: Dolphin Hill; Saturna Island: Mt. Warburton-Pike; Saanich Peninsula: Uplands, Summit Pk., Anderson Hill Pk., Beacon Hill Pk. From Notes: none
Plant Community Description: *Camassia quamash* (early camas) and *Ranunculus occidentalis* (western buttercup) are present on all sites and average class 3 cover. *Poa pratensis* (introduced Kentucky bluegrass) and *Vicia sativa* (introduced common vetch) occur on all sites and average class 2 cover. *Dactylis glomerata* (introduced orchardgrass) grows on most sites and averages class 2 cover. *Stellaria media* (introduced chickweed) exists on most sites and averages class 1 to 2 cover.
Tree Canopy/ Landscape Expression: mostly tree canopy (A) layer
Oak Characteristics: Diameters: various: 5.9 cm to 89.9 cm;

Regeneration: Regeneration of saplings is occurring on most sites. Stocking averages lightly- to moderately well-stocked. There was no seedling regeneration.

Physiognomic Type: usually Oak - Light Shrub - Herb - Bulb Parkland (4).
Elevation: various, 30 to 415 m Slope: chiefly gentle (5), one is steep
Aspect: mainly south-south-east (south) to west-south-west (4)

Surface Shape: various Moisture Regime: submesic to subxeric
Exposure: insolation (3), wind (2)
Bedrock Geology: coarse: granitic, sandstone, conglomerate (3), and slate (2)
Surface Substrate Features: some (3) with moderate to high bedrock exposure (class 3 or 4) Soil Classification: primarily Orthic Sombric Brunisols (5)
Humus Classification: generally Orthi Rhizomulls
Depth of Ah Horizon: 20 to 37 cm (3), or > 10 to 20 cm (3)
Colour of Ah Horizon: usually dark, 10YR2/1, 2/1.5 (5)
Depth to Bedrock: none (3), or 20 to 50 cm (estimated) (3)
Surface Soil Texture: mostly silt loam
Percent Coarse Fragments: low to medium (3), and no data (3)
Comments: This plant community provides one of the flower shows for which the Garry oak habitat is famous in spring. Fine textured- silt loam and deep *Ah* horizons are soil features which may partly distinguish this subcommunity. This subcommunity is a deeper soil type than c35a or b.

c36 Oak - *Camassia leichtlinii*

Ecosystem Description:
Frequency of Occurrence: 50 plots, very frequent
Distribution: From Plots: widespread: Nanaimo, southern Gulf Islands, Saanich Peninsula, western shore, not detected for Hornby Is., Gabriola Is., Duncan's eastern shore, Saturna Is. and Saltspring Is. From Notes: Observatory Hill, western shore: Rocky Pt. This community was so common it often was not recorded.
Plant Community Description: *Camassia leichtlinii* (great camas) is present on all sites and averages class 3 cover. The other species listed are present on most sites. *Symphoricarpos albus* (snowberry) averages class 3 cover. *Poa pratensis* averages class 2 to 3 cover. *Elymus glaucus* (blue wildrye), *Sanicula crassicaulis* (Pacific snakeroot), *Galium aparine* (cleavers), *Vicia hirsuta* (introduced hairy vetch), and *Vicia sativa* (introduced common vetch) average class 2 cover.
Tree Canopy/ Landscape Expression: mostly tree canopy (A) layer
Oak Characteristics: Diameters: various; Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Stocking of saplings averages moderately well-stocked. Seedlings average lightly-stocked.

Physiognomic Type: various: often Oak - Light Shrub - Herb - Bulb -Parkland (15), some Shrub Oak - Rock Outcrop (6), Oak - Broom Parkland (6), Shrub Oak - Basin (5), and others.
Elevation: various Slope: usually gentle to moderately steep
Aspect: various Surface Shape: various Moisture Regime: very xeric to permesic
Exposure: insolation, wind, seaspray Bedrock Geology: various
Surface Substrate Features: plots often (27) have either moderately high to very high bedrock exposure (class 3 to 6) (21) or moderately high to high (class 3 to 5) surface rocks (16)
Soil Classification: generally Orthic Sombric Brunisols (32) or Regosols (16)
Humus Classification: Vermimulls and Rhizomulls
Depth of Ah Horizon: primarily > 10 to 35 cm (26), or 4 to 40 cm
Colour of Ah Horizon: mainly dark, 10YR2/1
Depth to Bedrock: chiefly none, or 4 to 70 cm (estimated) (21)
Surface Soil Texture: usually loam to silt loam, gravelly and very gravelly
Percent Coarse Fragments: various, partly with high subsurface coarse fragments (21)
Comments: This plant community is one of the showy flower meadows for which the Garry oak habitat is famous in spring. This community may be partly distinguished by its association with fine textured soils-- loam to silt loam,-- and by deep *Ah* horizons. *Camassia leichtlinii* develops about three weeks later in the spring than the various *Camassia quamash* communities (c35 a, b, c37a, b). Its core is on the Saanich Peninsula and western shore (see 5.11) in contrast to the several *Camassia quamash* subcommunities which seem to be best developed in the Duncan area.

c48 Oak - *Montia perfoliata*

Ecosystem Description:
Frequency of Occurrence: 12 plots, frequent
Distribution: From Plots: Saltspring Island: Mt. Maxwell; Saanich Peninsula: Mt. Finlayson, Mt. Doug., Uplands, Glendale Lands, Thetis Lk. Pk.; western shore: Juan de Fuca Pk., Colwood DND, Rocky Pt. From Notes: Naden Hill
Plant Community Description: *Montia perfoliata* (perfoliate-leaved miners lettuce) is present on all sites and averages class 3 cover. The remaining species occur on most sites. *Cytisus scoparius* (introduced broom) and *Galium aparine* (cleavers) average cover class 3. *Elymus glaucus* (blue wildrye), *Bromus sterilis* (introduced barren barngrass), *Poa pratensis* (introduced Kentucky bluegrass), *Sanicula crassicaulis* (Pacific snakeroot), *Camassia leichtlinii* (great camas), and

Stellaria media (introduced chickweed) average cover class 2. *Bromus carinatus* (California bromegrass) averages cover class 1 to 2.

Tree Canopy/ Landscape Expression: either tree canopy (A) layer (6), or tall shrub canopy (B1) layer

Oak Characteristics: Diameters: mostly small (10); Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Stocking for saplings averages lightly- to moderately well-stocked. Stocking for seedlings averages moderately well-stocked.

Physiognomic Type: various: some Shrub Oak - Basin Broomland (4) and Oak - Light Shrub - Herb - Bulb Parkland (2).

Elevation: low to high elevation Slope: gentle to steep

Aspect: various Surface Shape: various: concave (5), straight (3)

Moisture Regime: mainly subxeric to permesic (very xeric)

Exposure: insolation, wind Bedrock Geology: primarily coarse: granitic, gneiss

Surface Substrate Features: most plots (9) have either moderate to very high (class 3 to 6) bedrock exposure (6) or moderate to high surface rocks (class 3 to 5) (6)

Soil Classification: generally Orthic Sombric Brunisols, some Regosols (2)

Humus Classification: Vermimulls (6) and Rhizomulls (5)

Depth of Ah Horizon: usually > 25 to 35 cm (8), or some 0 to 25 cm

Colour of Ah Horizon: dark, 10YR2/1

Depth to Bedrock: mostly without (9), some with bedrock at 4 to 25 cm (3)

Surface Soil Texture: sandy loam to silt loam, some gravelly and very gravelly (6)

Percent Coarse Fragments: some high coarse fragments (4)

Comments: This plant community is probably not as visually obvious as the others. It was not directly recognized as a community in the field work, instead being derived from later reflection and review of the data. Presence of deep *Ah* horizons may be a feature which partly distinguishes this community.

c51 Oak - *Dicranum scoparium* - *Plectritis congesta* **subcommunity**

Ecosystem Description:

Frequency of Occurrence: 3 plots, infrequent

Distribution: From Plots: Saanich Peninsula: Thetis Lk. Pk.; western shore: Colwood DND, Pedder Bay. From Notes: Nanaimo: Harewood Plains; Glendale Lands

Plant Community Description: *Dicranum scoparium* (broom moss) is present on all sites and averages class 2 to 3 cover. *Plectritis congesta* (seablush) thrives on all sites and averages class 3 cover.

Camassia leichtlinii (great camas), *Montia perfoliata* (perfoliate-leaved miners lettuce), and *Rhytidiadelphus triquetrus* (electrified cat's-tail moss) occur on all sites and average class 3 cover. *Galium aparine* (cleavers) occupies all sites and averages class 2 to 3 cover. *Cytisus scoparius* (introduced broom), *Anthoxanthum odoratum* (introduced sweet vernalgrass), *Sanicula crassicaulis* (Pacific snakeroot), and *Sedum spathulifolium* (broad-leaved stonecrop) exist on all sites and average class 2 cover. *Symphoricarpos albus* (snowberry), *Rubus ursinus* (trailing blackberry), and *Osmorhiza chilensis* (sweet cicely) are present on all sites and average class 1.

The remaining species are present on most sites. *Holodiscus discolor* (oceanspray), *Bromus carinatus* (California bromegrass), *Melica subulata* (oniongrass), *Poa pratensis* (introduced Kentucky bluegrass), *Dactylis glomerata* (introduced orchardgrass), *Festuca bromoides* (introduced annual fescue), and *Montia parvifolia* (small-leaved montia) average cover class 2. *Elymus glaucus* (blue wildrye), *Bromus mollis* (introduced soft bromegrass), *Bromus sterilis* (introduced barren barngrass), *Heuchera micrantha* (small-flowered alumroot), *Cerastium arvense* (field chickweed), *Polystichum munitum* (swordfern), *Delphinium menziesii* (Menzies' larkspur), *Erythronium oregonum* (easter lily), *Vicia americana* (American vetch), *Collinsia parviflora* (small-flowered blue-eyed Mary), *Geranium molle* (introduced dovefoot geranium), *Vicia hirsuta* (introduced hairy vetch), *Vicia sativa* (introduced common vetch), and *Stellaria media* (introduced chickweed) average cover class 1.

Tree Canopy/ Landscape Expression: tree canopy (A) layer

Oak Characteristics: Diameters: various, 25.3 to 42.9 cm;

Regeneration: Regeneration is occurring on most sites for saplings and on all sites for seedlings. Sapling stocking averages moderately well-stocked. Seedling stocking averages light.

Physiognomic Type: usually Oak - Light Shrub - Herb - Rockland (2).

Elevation: low to mid-elevation (55 to 80 m) Slope: steep (45 to 75 %)

Aspect: north and east Surface Shape: convex

Moisture Regime: usually xeric to very xeric (also permesic on rubble with seepage)

Exposure: generally without Bedrock Geology: granitic (2), basalt (1)

Surface Substrate Features: all plots have high to very high (class 4 to 6) bedrock exposure

Soil Classification: Orthic Humic Regosols (2), Orthic Sombric Brunisols (1)

Humus Classification: Vermimulls Depth of Ah Horizon: > 10 to 30 cm

Colour of Ah Horizon: dark, 10YR2/1 Depth to Bedrock: 15 cm (estimated) to 40 cm (estimated)
Surface Soil Texture: silt loam (2) or loam (1), usually very gravelly (2) or gravelly (1) Percent Coarse Fragments: usually high (2) (60 to 90 %)
Comments: This plant community is one of the showy flower meadows for which the Garry oak habitat is famous in spring. With only three plots, this characterization can only be considered tentative. This subcommunity is partly distinguished by shallowness to bedrock and occupance on northerly- facing slopes. Its association with fine textured soils-- loam to silt loam-- and deep *Ah* horizons may further separate from related communities.

c11 Oak - *Dicranum scoparium - Montia parvifolia* subcommunity

Ecosystem Description:
Frequency of Occurrence: 7 plots, infrequent
Distribution: From Plots: Duncan to Nanaimo: Harewood Plains, Priest Pt.; Saanich Peninsula: Water Tower Hill, Glendale Lands, Thetis Lk. Pk.; western shore: Colwood DND, Rocky Pt. From Notes: Saltspring Is.: Channel Ridge; Saanich Peninsula: Gore Pk., Observatory Hill.
Plant Community Description: *Dicranum scoparium* (broom moss) is present on most sites and averages class 3 cover. *Montia parvifolia* (small-flowered montia) occupies all sites and averages class 3 to 4 cover. *Elymus glaucus* (blue wildrye) and *Galium aparine* (cleavers) grow on all sites and average class 2 to 3 cover. The remaining species occur on most sites. *Anthoxanthum odoratum* (introduced sweet vernalgrass), *Montia perfoliata* (perfoliate-leaved miners lettuce) and *Rhytidiadelphus triquetrus* (electrified cat's-tail moss) average class 3 cover. *Symphoricarpos albus* (snowberry), *Aira caryophyllea* (silver hairgrass), and *Polystichum munitum* (swordfern) average cover class 2. *Bromus carinatus* (California bromegrass) averages cover class 1 to 2.
Tree Canopy/ Landscape Expression: usually tall shrub canopy (B1) layer, some tree canopy (A) layer
Oak Characteristics: Diameters: small diameter; Regeneration: Regeneration is occurring on some sites for saplings and most sites for seedlings. Stocking averages moderately well-stocked for saplings and lightly-stocked for seedlings.
Physiognomic Type: usually Shrub Oak - Rock Outcrop (3) or Oak - Light Shrub - Herb - Bulb - Parkland (2).
Elevation: primarily low and medium elevation Slope: usually steep to moderately steep
Aspect: west (north) east Surface Shape: various

Moisture Regime: xeric to very xeric Exposure: insolation (5), some wind (2)
Bedrock Geology: coarse: conglomerate, granitic gneiss
Surface Substrate Features: all plots have moderate to very high bedrock exposure (class 3 to 6). Most plots (4) have moderate to high (class 3 to 5) surface rocks
Soil Classification: usually Orthic Regosols Humus Classification: usually Rhizomulls (5) Depth of Ah Horizon: mainly very shallow, 3 to 6 cm,
Colour of Ah Horizon: dark, 10YR2/1
Depth to Bedrock: usually very shallow, 2 to 6 cm (6)
Surface Soil Texture: usually silt loam (4+)
Percent Coarse Fragments: none to low, 0 to 40 %
Comments: related in a general way to the Oak - (Fd) - *Holodiscus discolor* - *Symphoricarpos albus* - *Polypodium glycyrrhiza* plant community (c15). This subcommunity is distinguished by its residence on northerly- facing slopes, and partly by the silt loam texture of the shallow *Ah*.

c45 Oak - *Dicranum scoparium* - *Sedum spathulifolium* subcommunity

Ecosystem Description:
Frequency of Occurrence: 5 plots, infrequent
Distribution: From Plots: Duncan - Nanaimo: Jack Pt., Yellow Pt.: Flewitt Pt.; Saanich Peninsula: Glendale Lands, Thetis Lk.; western shore: East Sooke.

From Notes: Nanaimo: Neck Pt., Harewood Plains, Joan Pt.; Galiano Is.: Mt. Galiano, Bellhouse Pk.; Saanich Peninsula: Naden Hill, Woodsend Dr.; western shore: Pedder Bay, Mary Hill, Rocky Pt.

Plant Community Description: *Dicranum scoparium* (broom moss) is present on most sites and averages cover class 3. *Sedum spathulifolium* (broad-leaved stonecrop) thrives on all sites and averages cover class 3. *Symphoricarpos albus* (snowberry) occupies all sites and averages class 2 to 3 cover. *Galium aparine* (cleavers) occurs on most sites and averages class 1 to 2 cover.
Tree Canopy/ Landscape Expression: tall shrub (B1) canopy layer
Oak Characteristics: Diameters: small diameter; Regeneration: Regeneration is occurring on all sites for saplings and most sites for seedlings. Saplings average well-stocked. Seedlings average lightly- to moderately well-stocked.
Physiognomic Type: Shrub Oak - Rock Outcrop
Elevation: low to medium Slope: moderate to very steep
Aspect: chiefly southeast to west-southwest

Surface Shape: mostly convex (4), one is variable
Moisture Regime: xeric to very xeric Exposure: insolation, wind (3)
Bedrock Geology: usually coarse: granitic, gneiss, sandstone (4)
Surface Substrate Features: all plots have moderate to very high (class 3 to 6) bedrock exposure and some plots (2) have high (class 4 or 5) surface rocks
Soil Classification: Regosols Humus Classification: various
Depth of Ah Horizon: (0) 4 to 20 cm Colour of Ah Horizon: generally dark, 10YR2/1 Depth to Bedrock: shallow, 4 to 20 cm
Surface Soil Texture: sandy loam to silt loam, often gravelly (3)
Percent Coarse Fragments: often high (70 to 93 %) (3)
Comments: one plot representative from Saltspring Island was allocated elsewhere, to c4 Oak - Broom - *Poa pratensis*. This subcommunity is partly distinguished by its high coarse fragments, sharing other features with c46 and c52, and by its occurrence on southerly- facing slopes, sharing other features with c51 and c11.

c52 Oak- *Dicranum scoparium*: Typic subcommunity

Ecosystem description:
Frequency of Occurrence: 4 plots, infrequent
Distribution: From Plots: widely distributed: Nanoose Bay: Dolphin Hill; Nanaimo: Jack Pt.; Fort Rodd Hill, Portland Island, not on main Gulf Islands though

From Notes: Summit Pk.

Plant Community Description: *Dicranum scoparium* (broom moss) is present on all sites and averages class 3 to 4 cover. The remaining species are present on most sites. *Festuca bromoides* (introduced annual fescue) averages class 3 cover. *Anthoxanthum odoratum* (introduced sweet vernalgrass) and *Rhacomitrium canescens* (gray frayed-cap moss) average class 2 to 3 cover. *Symphoricarpos albus* (snowberry), *Lonicera hispidula* (hairy honeysuckle), and *Elymus glaucus* (blue wildrye) average cover class 2. *Festuca idahoensis* (Idaho fescue) and *Lotus micranthus* (small-flowered lotus) average cover class 1 to 2. *Galium aparine* (cleavers) averages cover class 1.
Tree Canopy/ Landscape Expression: most have a tree canopy (A) layer
Oak Characteristics: Diameters: 21.7 to 29.3 cm;

Regeneration: Regeneration is occurring on all sites for saplings and on some sites for seedlings. Stocking of saplings averages moderately well-stocked. Seedling stocking averages light.

Physiognomic Type: various
Elevation: low to high Slope: primarily gentle (3), one steep
Aspect: east-southeast to west Surface Shape: convex (2) and various
Moisture Regime: about subxeric to very xeric
Exposure: insolation, wind (3) Bedrock Geology: mainly coarse: sandstone (2), granitic (1); slate (1)
Surface Substrate Features: all plots have moderate to high (class 3 to 5) bedrock exposure, some plots (2) have moderately high (class 3) surface rocks
Soil Classification: Orthic Sombric Brunisols, Regosols
Humus Classification: Rhizomulls (2)
Depth of Ah Horizon: 3 to > 25 cm Colour of Ah Horizon: dark, 10YR2/1, 2/1.5 (3) Depth to Bedrock: 3 to 50 cm (estimated) Surface Soil Texture: sandy loam to silt loam, chiefly gravelly, one very gravelly Percent Coarse Fragments: mostly low to medium (20 to 40 %), one is high (80 to 95 %)
Discussion Occurrence on sites with convex surface shapes partly distinguishes this subcommunity, which shares other features with c45 and c46.

c46 Oak - (Fd) - *Rhacomitrium canescens* - *Selaginella wallacei* subcommunity

Ecosystem Description:
Frequency of Occurrence: 4 plots, infrequent
Distribution: From Plots: Duncan: Genoa Bay; southern Gulf Islands: Galiano Is.: Bodega Ridge, Salalikim Rock; Mayne Island: Mt. Parke From Notes: Nanoose Bay: Dolphin Hill; Galiano Is.: Bluffs Pk.; Tumbo Is.; Pender Is.: Oak Bluffs; Portland Is.; Saltspring Is.: Mt. Maxwell; Saanich Peninsula: Gore Pk., Mt. Work, Woodsend Dr.; western shore: Rocky Pt.
Plant Community Description: *Rhacomitrium canescens* (gray frayed-cap moss) is present on all sites and averages class 3 to 4 cover. *Selaginella wallacei* (Wallace's selaginella) occurs on all sites and averages class 3 cover.

Bromus carinatus (California bromegrass) and *Elymus glaucus* (blue wildrye) grow on all sites and average cover class 2 and 1 to 2, respectively. The remaining species exist on most sites. *Polytrichum juniperinum* (juniper haircap moss) averages class 2 to 3 cover. *Luzula multiflora* (many-flowered woodrush) and *Festuca bromoides* (introduced annual fescue) average cover class 2. *Achillea millefolium* (yarrow), *Lotus micranthus* (small-flowered lotus), and

Collinsia parviflora (small-flowered blue-eyed Mary) average cover class 1 to 2. *Eriophyllum lanatum* (woolly sunflowers), *Aira praecox* (early hairgrass), *Crepis cf. modocensis* (modoc hawkweed), *Rumex acetosella* (introduced hairy cats ear), and *Pityrogramma triangularis* (goldback fern) average cover class 1.

Tree Canopy/ Landscape Expression: Oak: tree canopy (A) layer (2), or tall shrub (B1) canopy layer (2). Douglas-fir (Fd, *Pseudotsuga menziesii*) is present on most sites in the tree canopy (A) layer, and averages class 2 to 3 cover. There are also some sites with Douglas-fir in the tall shrub (B1) layer, which averages class 2 cover.

Oak Characteristics: Diameters: various; Regeneration: Regeneration is occurring on most sites for saplings and all sites for seedlings. Stocking for both saplings and seedlings averages moderately well-stocked.

Physiognomic Type: various rockland and rock outcrop types.

Elevation: usually high elevation

Slope: generally very steep (65 to 115 %), one moderate slope

Aspect: south to west Surface Shape: some are convex (2)

Moisture Regime: usually very xeric (3) Exposure: insolation, wind

Bedrock Geology: coarse: conglomerate, sandstone

Surface Substrate Features: all plots have high or very high (class 4 to 6) bedrock exposure Soil Classification: Orthic Regosols (2), or Orthic Dystric Brunisols (2) Humus Classification: some Orthi Rhizomulls (2)

Depth of Ah Horizon: 5 to 30 cm (estimated)

Colour of Ah Horizon: dark, 10YR2/1.5, or dark and slightly brownish

Depth to Bedrock:5 to 50 cm (estimated)

Surface Soil Texture: sandy loam to loam, gravelly to very gravelly

Percent Coarse Fragments: usually high (60 to 70 %)

Comments: These are the most xeric plots in the entire survey. This subcommunity is probably distinguished by very high bedrock exposure and high-elevation occurrence on very steep, convex, south- and west- facing slopes.

c26 Oak - *Mahonia aquifolium*

Ecosystem Description:

Frequency of Occurrence: 4 plots, infrequent

Distribution: From Plots: Denman Island, Saanich Peninsula: Lone Tree Hill, Observatory Hill, Glendale Lands From Notes: Yellow Pt.: Boathouse Harbour n.; Newcastle Island, Saanich Peninsula: Bear Hill, Thetis Lk. Pk., Naden Hill; Mill Hill
Plant Community Description: *Mahonia aquifolium* (tall Oregon grape) is present on all sites in the low shrub layer (B2), and averages class 3 to 4 cover. *Elymus glaucus* (blue wildrye), *Bromus carinatus* (California bromegrass), *Vicea sativa* (introduced common vetch) and *Bromus sterilis* (introduced barren barngrass) are present on all sites and average class 2 cover. The remaining species occur on most sites. *Cynosurus echinatus* (introduced dogtail bristlegrass) averages class 2 to 3. *Achillea millefolium* (yarrow), *Cerastium arvense* (field chickweed), *Sanicula crassicaulis* (Pacific snakeroot), *Galium aparine* (cleavers), and *Vicia sativa* (introduced common vetch) average cover class 2. *Bromus carinatus* (California bromegrass) averages cover class 1 to 2.
Tree Canopy/ Landscape Expression: usually tree canopy (A) layer (3)
Oak Characteristics: Diameters: small diameters, 17 to 28.4 cm;
Regeneration: Regeneration is occurring on all sites for both saplings and seedlings. Stocking is moderate for saplings and light to moderate for seedlings.
Physiognomic Type: various Elevation: low to primarily high (2) elevation
Slope: usually steep, 25 to 70 % (3), one is gentle
Aspect: southwest to northwest Surface Shape: straight (3)
Moisture Regime: subxeric to xeric Exposure: usually insolation, wind
Bedrock Geology: various Surface Substrate Features: some plots (3) have either moderately high or high (class 3 to 5) bedrock exposure (2) or moderately high surface rock (2) Soil Classification: Orthic Sombric Brunisols
Humus Classification: Vermimulls, Xeromulls
Depth of Ah Horizon: some > 25 to 30 cm (2), 15 cm (1), no data (1)
Colour of Ah Horizon: dark and brownish, 10YR2/2 to 2.5/1.5 and 3.5/2
Depth to Bedrock: chiefly none (2), one at 30 cm, one estimated at 60 cm
Surface Soil Texture: mostly sandy loam to loam, some gravelly (2)
Percent Coarse Fragments: high subsurface coarse fragments (60 to 80+ %) (3)
Comments: Occurs on very rocky, colluvial talus sites. Occurrence on more northerly slopes and very high surface coarse fragments partly distinguish this community.

c16a Oak - *Lonicera hispidula* (colluvial)

Ecosystem Description:

Frequency of Occurrence: 9 plots, frequent in some areas

Distribution: From Plots: Duncan-Nanaimo: Nanoose Bay, Nanoose Hill, Yellow Pt.: Flewitt Pt.; Gulf Islands: Gabriola Is., Galiano Is.: Montague Harbour; Saturna Is.: East Pt.; Pender Is.: Hermit Hill; Saltspring Island: Reginald Hill

From Notes: Hornby Island, Yellow Pt.: s. of Roberts Memorial Pk., Kullet Bay; Galiano Is.: Bodega Ridge, Mt. Galiano, Salalikim Rock, Bellhouse Pk.; Mayne Island: Mt. Parke, Navy Channel; Pender Is.: Bedwell Harbour, Oak Bluffs; Saanich Peninsula: Bear Hill, Glendale Lands, Thetis Lk. Pk.; western shore: Mill Hill.

Plant Community Description: *Lonicera hispidula* (hairy honeysuckle) is present on all sites and averages class 4 cover. The remaining species occur on most sites. *Galium aparine* (cleavers) and *Vicia sativa* (introduced common vetch) average class 2 to 3. *Elymus glaucus* (blue wildrye), *Sanicula crassicaulis* (Pacific snakeroot), and *Vicia hirsuta* (introduced hairy vetch) average class 2 cover.

Tree Canopy/ Landscape Expression: tree canopy (A) layer (5), often high cover (class 5) (4), or tall shrub (B1) canopy layer

Oak Characteristics: Diameters: various; Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Saplings are well-stocked, on average, and seedlings are lightly- to moderately well-stocked.

Physiognomic Type: various: some Shrub Oak - Rock Outcrop (2), Oak - Grass Rockland (2), and Oak - Grass - Parkland (2).

Elevation: usually low elevation, one is medium and two are high elevation

Slope: generally steep Aspect: south to southwest

Surface Shape: convex (4), straight (3), and others

Moisture Regime: submesic to xeric Exposure: insolation, wind, some seaspray (3)

Bedrock Geology: chiefly sandstone (5), and others

Surface Substrate Features: most plots (5) have either moderately high (class 3) exposed bedrock (3) or moderately high surface rocks (5).

Soil Classification: Orthic Sombric Brunisols (4) or Orthic Humic Regosols (4)

Humus Classification: Vermimulls (4), Orthi Rhizomulls (3), and others

Depth of Ah Horizon: 12 to 30 cm (4), or > 10 to 25 cm (4)

Colour of Ah Horizon: dark, 10YR2/1 (5), or dark and slightly brownish (3)

Depth to Bedrock:usually none, or 20 to 30 cm (4)

Surface Soil Texture: coarse: loamy-sand to sandy loam (6), usually gravelly to very gravelly (7)

Percent Coarse Fragments: usually high subsurface coarse fragments (60 to 95 %) (6)

Comments: largely rocky colluvial, talus sites. This talus is stabilized and is below the surface, so is not reflected in the physiognomic type classification. This plant community is often found near the sea-edge. This plant community is partly distinguished by its high surface coarse fragments, its relatively coarse soils: loamy sand to sandy loam, and its occurrence primarily at low elevations.

c20 Oak - *Festuca idahoensis* Typic subcommunity

Ecosystem Description:

Frequency of Occurrence: 7 plots, frequent in certain areas

Distribution: From Plots: Duncan-Nanaimo: Neck Pt., Mt. Tzuhalem; Gulf Islands: Galiano Is.: Dionisio Pt.; Saturna Is.: Elliott Bluff; Pender Is.: Gowland Pt.; Portland Island; western shore: Rocky Pt. From Notes: Nanaimo to Duncan: Nanoose Hill, Newcastle Is., Woodley Range, Genoa Bay; Mayne Is.: Edith Pt.; Saanich Peninsula: Mt. Work, Observatory Hill, Thetis Lk. Pk; western shore: Mill Hill, Pedder Bay.

Plant Community Description: *Festuca idahoensis* (Idaho fescue) is present on all sites, and averages class 3 to 4 cover. *Sanicula crassicaulis* (Pacific snakeroot) occurs on all sites and averages class 2 to 3 cover. The remaining species occupy most sites. *Lonicera hispidula* (hairy honeysuckle) and *Elymus glaucus* (blue wildrye) average class 2 to 3 cover. *Bromus carinatus* (California bromegrass), *Poa pratensis* (introduced Kentucky bluegrass), and *Galium aparine* (cleavers) average cover class 2. *Cerastium arvense* (field chickweed) averages class 1 to 2. *Hypochaeris radicata* (introduced hairy cats ear) averages cover class 1.

Tree Canopy/ Landscape Expression: mostly tree canopy (A) layer and high cover (5), some tall shrub (B1) layer canopy

Oak Characteristics: Diameters: chiefly small and medium;

Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Average stocking is moderately- to well-stocked for saplings and light to moderate for seedlings.

Physiognomic Type: usually Oak - Grass - Parkland (3) or Oak - Light Shrub - Herb -Bulb Parkland (2). Elevation: mainly lower elevation (5) Slope: usually gentle to moderate

Aspect: all, but usually southeast (south) to west (5)

Surface Shape: straight (4) to convex (3) Moisture Regime: submesic to very xeric

Exposure: wind, insolation, some seaspray (3) Bedrock Geology: primarily sandstone (4) Surface Substrate Features: most plots (4) have moderate to high bedrock exposure (class 3 to 5) (4)

Soil Classification: generally Regosols (4) or Orthic Sombric Brunisols (3)

Humus Classification: usually Vermimulls (4) or Rhizomulls (2)
Depth of Ah Horizon: usually 5 to 20 cm (4), or > 30 cm (3)
Colour of Ah Horizon: dark, 10YR2/1 Depth to Bedrock: 7 to 20 cm(4) or none (3) Surface Soil Texture: mostly coarse: loamy-sand to sandy loam, gravelly to very gravelly Percent Coarse Fragments: some high coarse fragments (60 to 90 %) in subsurface horizons (4)
Comments: This is an important community which has been overlooked in people's focus on the showy flower meadow communities. Relatively coarse soils: loamy sand to sandy loam, and a primary ocurrence at low elevations partly distinguish this plant community.

c25 Oak - *Festuca idahoensis - Cerastium arvense* subcommunity

Ecosystem Description:
Frequency of Occurrence: 6 plots, moderately frequent in certain areas
Distribution: From Plots: Duncan-Nanaimo: Piper's Lagoon, Mt. Tzuhalem; Gulf Islands: Gabriola Is., Tumbo Is., Saturna Is.: Elliott Bluff; western shore: Rocky Pt.
From Notes: Yellow Pt.: Deer Pt.; Pender Is.: Hermit Hill
Plant Community Description: *Festuca idahoensis* (Idaho fescue) and *Cerastium arvense* (field chickweed) thrive on all sites and average class 3 cover. *Achillea millefolium* (yarrow) grows on all sites and averages class 2 cover. The remaining species occur on most of the sites. *Bromus carinatus* (California bromegrass), *Elymus glaucus* (blue wildrye), and *Anthoxanthum odoratum* (introduced sweet vernalgrass) average class 2 to 3 cover. *Galium aparine* (cleavers) and *Vicia sativa* (introduced common vetch) average class 2. *Rumex acetosella* (introduced sheep sorrel) averages class 1 cover.
Tree Canopy/ Landscape Expression: usually tall shrub (B1) layer canopy (4), some tree canopy (A) layer (2)
Oak Characteristics: Diameters: generally small (4); Regeneration: Saplings are present on most sites. Stocking averages light to moderate. Seedlings are present on some sites. Stocking averages light.
Physiognomic Type: usually Oak - Grass - Parkland (4).
Elevation: primarily low elevation (4), some medium and high (2)
Slope primarily gentle to moderate slopes (6), one steep slope
Aspect: southeast to west Surface Shape: straight (3) or convex (3)
Moisture Regime: submesic to subxeric (one very xeric)
Exposure: insolation, wind, some seaspray (3)
Bedrock Geology: mainly coarse, sandstone, granitic (4)

Surface Substrate Features: some plots (3) have either moderate to high (class 3 to 5) bedrock exposure (2) or moderately high surface rocks (class 3) (2)
Soil Classification: Orthic Humic Regosols (3) or Orthic Sombric Brunisols (2) Humus Classification: Orthi Rhizomulls (3) or Vermimulls (3)
Depth of Ah Horizon: chiefly > 15 to 30 cm, some shallow (10 to 12 cm) (2)
Colour of Ah Horizon: mostly dark, 10YR2/1, 2/1.5 (5)
Depth to Bedrock: none (3), or 10 to 25 cm (3)
Surface Soil Texture: sandy loam to silt loam, generally gravelly (5)
Percent Coarse Fragments: various (15 to 85 %)
Discussion:

This subcommunity is partly distinguished by its primary occurrence at lower elevations.

c27 Oak - *Festuca idahoensis - Trifolium microcephalum* **subcommunity**

Ecosystem Description:
Frequency of Occurrence: 4 plots, infrequent
Distribution: From Plots: Gulf Islands: Mayne Is: s. Heck Hill; Saturna Is.: Mt. Warburton Pike and East Pt.; Saltspring Is.: Mt. Maxwell From Notes: none
Plant Community Description: *Festuca idahoensis* (Idaho fescue) is present on most sites and averages class 3 cover. *Trifolium microcephalum* (woolly clover) occurs on all sites and averages class 3 cover. *Elymus glaucus* (blue wildrye), *Cerastium arvense* (field chickweed), and *Selaginella wallacei* (Wallace's selaginella) occupy all sites and average cover class 1, 2, and 2, respectively.

The remaining species grow on most of the sites. *Carex inops* (long-stoloned sedge) and *Bromus sterilis* (introduced barren barngrass) average cover class 3. *Galium aparine* (cleavers), *Hypochaeris radicata* (introduced hairy cats ear), and *Rhacomitrium canescens* (gray frayed-cap moss) averages cover class 2. *Aira caryophyllea* (silver hairgrass) averages cover class 1 to 2. *Bromus carinatus* (California bromegrass), *Rumex acetosella* (introduced sheep sorrel), and *Trifolium oliganthum* (few-flowered clover) average cover class 1.
Tree Canopy/ Landscape Expression: largely high cover (class 5) (3), tree canopy (A) layer
Oak Characteristics: Diameters: various; Regeneration: There is regeneration for both saplings and seedlings on some sites. Stocking averages light for both.
Physiognomic Type: various Elevation: usually high elevation (3), one medium elevation
Slope: moderate to very steep Aspect: south to west

Surface Shape: various Moisture Regime: chiefly subxeric
Exposure: insolation, wind Bedrock Geology: coarse: sandstone, gneiss
Surface Substrate Features: all plots have either moderate to high bedrock exposure (class 3 to 4) (4) or moderately high surface rocks (class 3) (3)
Soil Classification: Orthic Sombric Brunisols (3)
Humus Classification: Rhizomulls (3) Depth of Ah Horizon: 20 to > 30 cm
Colour of Ah Horizon: dark, 10YR2/1 and dark and slightly brownish
Depth to Bedrock: mainly without Surface Soil Texture: loamy-sand to loam
Percent Coarse Fragments: various, some high (1)
Comments: *Koeleria macrantha* and/or *Danthonia californica* may have replaced *Festuca idahoensis* in certain areas. This type (c27) is related to the Oak - *Rhacomitrium canescens* - *Selaginella wallacei* type (c46). Relatively coarse soils: loamy sand to loam and a primary occurrence at higher elevations partly distinguish this subcommunity.

c42 Krummholz Oak - *Festuca idahoensis* - *Vicia americana* subcommunity

Ecosystem Description:
Frequency of Occurrence: 6 plots, moderately frequent in certain areas
Distribution: From Plots: Yellow Point: Flewitt Pt.; Gulf Islands: Gabriola Is. islet, Mayne Is.: Edith Pt.; Saltspring Is.: Ruckle Pt.; western shore: Rocky Point
From Notes: none: plot 93 NB01 from Nanoose Bay could be added
Plant Community Description: *Festuca idahoensis* (Idaho fescue) occurs on most sites and averages class 2 to 3 in cover. *Vicia americana* (American vetch) occupies all sites and averages class 3 cover. *Galium aparine* (cleavers) and *Vicia sativa* (introduced common vetch) grow on all sites and average class 2 cover. *Cerastium arvense* (field chickweed) is present on all sites and averages class 1 cover. The remaining species exist on most sites. *Symphoricarpos albus* (snowberry) averages class 2 to 3 cover. *Bromus carinatus* (California bromegrass), *Poa pratensis* (introduced Kentucky bluegrass), and *Sanicula crassicaulis* (Pacific snakeroot) average class 2 cover. *Camassia leichtlinii* (great camas) averages class 1 to 2.
Tree Canopy/ Landscape Expression: krummholz, wind-trained low (B2) to tall (B1) shrub layer canopy, sometimes grading up to a low tree layer (A3) canopy with distance away from the sea (3).
Oak Characteristics: Diameters: primarily small; Regeneration: Regeneration was observed on all sites for saplings and on most sites for seedlings. Saplings average (very) well-stocked. Seedlings average moderately well- to well-stocked.

Physiognomic Type: usually Shrub Oak - Krummholz - Sea-edge (4), sometimes combined with Oak - Moderate Shrub - Herb - Parkland (2).
Elevation: sea-edge: 2 to 20 m Slope: gentle to moderate Aspect: various and west (3) Surface Shape: usually convex (4), or hummocky/irregular (2)
Moisture Regime: subxeric to xeric Exposure: seaspray zone, wind, insolation
Bedrock Geology: coarse: sandstone, granitic (4)
Surface Substrate Features: most plots (5) have either moderate to high bedrock exposure (class 3 to 4) (3) or moderately high surface rocks (class 3) (3)
Soil Classification: usually Regosols (4), some Orthic Sombric Brunisols (2)
Humus Classification: Orthi Rhizomulls (3) or Vermimulls (3)
Depth of Ah Horizon: 5 to 30 cm, or > 25 to 30 cm
Colour of Ah Horizon: generally dark, 10YR2/1, 2/1.5 (5)
Depth to Bedrock:none, or 5 to 20 cm (3) Surface Soil Texture: usually silt loam (4), usually gravelly (5) Percent Coarse Fragments: usually moderate or high
Comments: The classification requirement was lowered for *Vicia americana* in this community: being set at > = cover class 2. The oaks of this community grow to a height of perhaps 20 cm where most exposed to the wind on the sea-edge. They then grade upwards in a continuous mat with distance away from the exposure. The term krummholz is used to describe this stunted form (see 5.13). An Oak - *Vicia americana* 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 this parkland type is present at Yellow Pt.: Boathouse Harbour north, Deer Pt., Flewitt Pt.; Water Tower Hill and Summit Pk. There were other occurrences of the krummholz sea-edge form of oak without *Vicia americana*. One plant community with a couple of these occurrences is c43 Oak - *Bromus carinatus*. The sea-edge occurrence in wind exposed sites distinguishes this subcommunity.

c47 Oak - *Elymus glaucus*

Ecosystem Description:
Frequency of Occurrence: 14 plots, frequent
Distribution: From Plots: widespread: Duncan to Nanaimo: Nanoose Hill, Mt. Tzuhalem; southern Gulf Islands: Galiano Is.: Mt. Galiano, Bluffs Pk., Arbutus Pt.; Pender Is.: George Hill; Saltspring Is.; Saanich Peninsula: Mt. Work, Lone Tree Hill, Bear Hill, Observatory Hill, Knockan Hill From Notes: Nanaimo: Neck Pt., Jack Pt., Harewood Plains; Galiano Is.: Mayne

Island: Navy Channel; Pender Is.: Stanford Hill; Saanich Peninsula: Water Tower Hill, Lohbrunner Rd., Thetis Lk. Pk.; western shore: Rocky Pt.

Plant Community Description: *Elymus glaucus* (blue wildrye) is present on all sites and averages cover class 3 to 4. The remaining species occur on most sites. *Carex inops* (long-stoloned sedge) averages cover class 2 to 3. *Galium aparine* (cleavers) and *Sanicula crassicaulis* (Pacific snakeroot) average cover class 2.

Tree Canopy/ Landscape Expression: chiefly tree (A) layer canopy (10), and some tall shrub (B1) layer canopy (4)

Oak Characteristics: Diameters: various; Regeneration: There is regeneration on most sites. Stocking averages moderate for saplings and light to moderate for seedlings.

Physiognomic Type: various: some Oak - Grass - Parkland (3).

Elevation: mainly medium to high elevation Slope: gentle to very steep

Aspect: primarily southeast (south) to west, (some northeast, northwest)

Surface Shape: straight (8), concave (4) Moisture Regime: quite a few compensating submesic and mesic (6), otherwise subxeric to submesic with some seepage

Exposure: insolation, wind (7) Bedrock Geology: various

Surface Substrate Features: most plots (8) have either moderate to high surface rocks (class 3 or 4) (4) or moderate to high bedrock exposure (6)

Soil Classification: usually Orthic Sombric Brunisols (11), some Regosols (3)

Humus Classification: Rhizomulls (7) and Vermimulls (7)

Depth of Ah Horizon: 8 to 30 cm (8), and > 25 to 35 cm (6)

Colour of Ah Horizon: dark, 10YR2/1, 2/1.5 (9), or dark and slightly brownish

Depth to Bedrock: chiefly without (7), or 8 to 70 cm (estimated) (7)

Surface Soil Texture: sandy loam to silt loam, gravelly to very gravelly

Percent Coarse Fragments: often high subsurface coarse fragments (8)

Comments: *Symphoricarpos albus* might have provided a division for c47, but this shrub type was not frequent enough, being represented by only 4 plots. This community usually occurs on medium to high elevation sites, which partly distinguishes it.

c41 Oak - *Lathyrus nevadensis*

Ecosystem Description:

Frequency of Occurrence: 5 plots

Distribution: From Plots: Galiano Island: Arbutus Pt., Saanich Peninsula: Summitt Pk., Beacon Hill Park; western shore: Juan de Fuca Pk. From Notes: Nanaimo: Jack Pt.; Yellow Pt.: Flewitt Pt.; Gore Pk., Knockan Hill, Thetis Lk. Pk.

Plant Community Description: *Lathyrus nevadensis* (peavine) is present on all sites and averages class 3 to 4 in cover. *Sanicula crassicaulis* (Pacific snakeroot) and *Dactylis glomerata* (introduced orchardgrass) occupy all sites and average class 2 and 3, respectively. The remaining species occur on most sites. *Symphoricarpos albus* (snowberry) and *Camassia leichtlinii* (great camas) average cover class 3. *Festuca bromoides* (introduced annual fescue), *Bromus sterilis* (introduced barren barngrass), *Poa pratensis* (introduced Kentucky bluegrass), *Vicia sativa* (introduced common vetch) and *Plantago lanceolata* (introduced narrow leaved plantain) average cover class 2.

Tree Canopy/ Landscape Expression: all tree (A) layer canopy, mainly high cover (class 5,6) (5)

Oak Characteristics: Diameters: primarily medium to large;

Regeneration: Regeneration is present on some sites for saplings and most sites for seedlings. Stocking averages moderate for saplings and light for seedlings.

Physiognomic Type: usually Oak - Light Shrub - Herb - Bulb Parkland.

Elevation: low to medium elevation Slope: gentle slopes, 5 to 20 %

Aspect: east (south) to west Surface Shape: straight

Moisture Regime: mesic to submesic (5) Exposure: some wind (2)

Bedrock Geology: generally without, sandstone (1)

Surface Substrate Features: all plots have either moderate to high (class 3 or 4) surface bedrock exposure (3) or moderately high (class 3) surface rocks

Soil Classification: Orthic Sombric Brunisols

Humus Classification: Vermimulls (3) and Rhizomulls (2)

Depth of Ah Horizon: 20 cm (2), or > 10 to 30 cm

Colour of Ah Horizon: usually dark, 10YR 2/1, 2/1.5 (4)

Depth to Bedrock: none Surface Soil Texture: chiefly loam (4), some gravelly (3) Percent Coarse Fragments: low or medium (15 to 40 %)

Comments: most plots were of the parkland physiognomic type. However, one plot from Galiano Island (94 GALI02) was a krummholz, sea-edge stand. Submesic to mesic ecological moisture regime, low subsurface coarse fragments, occurrence primarily at low elevations, partly on concave sites; all contribute to distinguishing this community.

c43 Oak - *Bromus carinatus*

Ecosystem Description:

Frequency of Occurrence: 6 plots, moderately frequent

Distribution: From Plots: southern Gulf Islands: rocky islet off Cabbage Is., Galiano Is.: Bellhouse and Dionisio Pts.; Saanich Peninsula: Mt. Doug.; western shore: Rocky Pt. From Notes: Yellow Pt.: s. of Joan Pt., Deer Pt.; Newcastle Is., Gabriola Is., Tumbo Is., Glencoe Cove.

Plant Community Description: *Bromus carinatus* (California bromegrass) occupies all sites and averages cover class 3 or 4. *Vicia sativa* (introduced common vetch), *Galium aparine* (cleavers), and *Camassia leichtlinii* (great camas) occur on all sites and average class 2, 2 to 3, and 2, respectively. The other species listed were present on most sites. *Bromus sterilis* (introduced barren barngrass) and *Galium aparine* (cleavers) averages cover class 2 to 3. *Elymus glaucus* (blue wild-rye) average cover class 1.

Tree Canopy/ Landscape Expression: mainly tall shrub (B1) layer canopy (4), some tree layer (A) layer canopy

Oak Characteristics: Diameters: small to medium; Regeneration: Saplings were well-stocked on all sites. Seedlings are regenerating on most sites and average moderately- to well- stocked.

Physiognomic Type: usually Oak - Grass Parkland (2) or Shrub Oak - Krummholz -Sea-edge (2).

Elevation: low elevation, high elevation Slope: gentle to steep

Aspect: primarily south to southwest (4) Surface Shape: generally straight (4)

Moisture Regime: usually subxeric to submesic (5), mesic (1)

Exposure: insolation, wind, some seaspray (2)

Bedrock Geology: coarse: granitic, conglomerate, sandstone

Surface Substrate Features: some moderate to high (class 3 to 5) surface rockiness (2), or moderately high surface bedrock exposure (class 3) (1)

Soil Classification: Orthic Sombric Brunisols (5) Humus Classification: Vermimulls

Depth of Ah Horizon: deep, mostly 25 to 30 cm

Colour of Ah Horizon: chiefly dark, 10YR2/1 (4), some dark and slightly brownish

Depth to Bedrock: largely without bedrock, one is 15 cm

Surface Soil Texture: mainly sandy loam to loam (5), usually gravelly to very gravelly (5)

Percent Coarse Fragments: usually high surface or subsurface coarse fragments (4)

Comments: Four of these plots are very near the sea, and the other two are post-burn on Mt. Doug. This plant community is probably not as visually obvious as the others. It was not directly recognized as a community in the field work, although its potential to form a group was recognized. This potential was then confirmed by a check of the data. High surface or subsurface

coarse fragments may be a factor distinguishing this community. The sea-edge occurrence in wind exposed sites partly distinguishes this community.

c14 Oak - *Carex inops*

Ecosystem Description:

Frequency of Occurrence: 6 plots, moderately frequent

Distribution: From Plots: Hornby Island, Nanoose Bay, Nanoose Hill, Nanaimo: Westwood Dr., Saltspring Is.: Mt. Tuam. From Notes: Ladysmith: Woodley Range; Duncan: Genoa Bay; Saanich Peninsula: Thetis Lk. Pk.

Plant Community Description: *Carex inops* (long-stoloned sedge) thrives on all sites and averages a cover of class 4. *Vicia sativa* (introduced common vetch) is present on all sites and averages class 1 to 2 cover. The remaining species occur on most sites. *Elymus glaucus* (blue wildrye) *Ranunculus occidentalis* (western buttercup), *Galium aparine* (cleavers), and *Vicia hirsuta* (introduced hairy vetch) average class 2 cover. *Danthonia californica* (California oatgrass) and *Rumex acetosella* (introduced sheep sorrel) average class 1 cover.

Tree Canopy/ Landscape Expression: generally tree layer (A) canopy layer, often high cover (class 5 or 6) (3)

Oak Characteristics: Diameters: various; Regeneration: Regeneration is present on some sites for saplings and most sites for seedlings. Stocking averages moderate for saplings and light for seedlings.

Physiognomic Type: various: some Oak - Grass - Parkland (2).

Elevation: low to high (3) elevation Slope: usually gentle to moderately steep

Aspect: east to south Surface Shape: straight (3), concave (2), or hummocky (1)

Moisture Regime: usually subxeric to submesic (ranges from xeric to permesic)

Exposure: wind (4), insolation (3) Bedrock Geology: various

Surface Substrate Features: some (2) have moderately high bedrock exposure (class 3) Soil Classification: Orthic Sombric Brunisols (3) or Orthic Humic Regosols

(3) Humus Classification: Rhizomulls (4) or Vermimulls (2)

Depth of Ah Horizon:usually 10 to 25 cm Colour of Ah Horizon: dark, 10YR2/1 (5) Depth to Bedrock: none, or 20 to 30 cm

Surface Soil Texture: silt loam, usually very gravelly (4)

Percent Coarse Fragments: usually high (55 to 70 %) (4)

Comments: This community may be geographically confined within its generally widespread distribution. In my sampling it was represented only from the '93 plots. Occurrence on silt loam textured soils may be one factor which distinguishes this plant community. It is thought to occur on different types of sites than the several above. Its composition may also reflect the influence of more complete oak stands.

c13 Oak - *Melica subulata*

Ecosystem Description:

Frequency of Occurrence: 12 plots, frequent

Distribution: From Plots: widespread: Yellow Pt.: Flewitt Pt.; Galiano Is.: Mt. Galiano; Saltspring Is.: Mt. Maxwell; Saanich Peninsula: Mt. Doug., Thetis Lk. Pk.; western shore: Mill Hill, Lester Pearson College, Pedder Bay, Mary Hill, Rocky Point.

From Notes: Ladysmith: Woodley Range; Galiano Is.: Bluffs Pk.; Mayne Is.: Edith Pt.; Saturna Is.: Elliott Bluff; Pender Is.: Stanford Hill; Saanich Peninsula: Lone Tree Hill, Observatory Hill.

Plant Community Description: *Melica subulata* (oniongrass) occupies all plots, and averages cover class 4. *Sanicula crassicaulis* (Pacific snakeroot) grows on all sites and averages cover class 2 to 3. *Elymus glaucus* (blue wildrye) and *Galium aparine* (cleavers) occur on all sites and average cover class 2.

The remaining species listed are present on most sites. *Poa pratensis* (introduced Kentucky bluegrass) and *Vicia sativa* (introduced common vetch) average cover class 2. *Montia perfoliata* (perfoliate-leaved miners lettuce) averages cover class 1 to 2.

Tree Canopy/ Landscape Expression: Usually tree canopy (A) layer oaks, some have tall shrub (B1) canopy layer. Douglas-fir (Fd, *Pseudotsuga menziesii*) is present on some sites (about half) in the tree canopy (A) layer. Average cover is class 3.

Oak Characteristics: Diameters: usually small to medium, two are large;

Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Saplings are well-stocked, on average. Seedlings average lightly-stocked.

Physiognomic Type: usually Oak - Grass - Parkland (6), some Oak Woodlands (2), and others.

Elevation: low elevation (5) or high elevation (6)

Slope: usually gentle to moderate Aspect: all, but usually south to southwest (8)

Surface Shape: often concave (6) or straight (4)

Moisture Regime: usually subxeric to permesic

Exposure: insolation (6), wind (4) Bedrock Geology: various

Surface Substrate Features: several (6) have either moderate to high bedrock exposure (class 3 or 4) (5) or moderate to high surface rocks (3)
Soil Classification: usually Orthic Sombric Brunisols (6), some Orthic Dystric Brunisols (2) and Orthic Humic Regosols (3)
Humus Classification: usually Vermimulls (8)
Depth of Ah Horizon: chiefly deep, > 25 to 35 cm(7), some shallow, 5 to 6 cm (3)
Colour of Ah Horizon: mainly dark, 10YR2/1 (6), some dark and slightly brownish (4) Depth to Bedrock: usually none in the profile, two plots have bedrock at 10 and 16 cm Surface Soil Texture: sandy loam (6) to loam (5), usually gravelly, some very gravelly (2) Percent Coarse Fragments: usually low, 10 to 40 %, in surface horizons (11), some high in subsurface horizons (70 to 85 %) (5)
Discussion:

This community is thought to occur on different types of sites than the several above. Its composition may also reflect the influence of more complete stand conditions, however.

c15 Oak - *Holodiscus discolor - Symphoricarpos albus - Polypodium glycyrrhiza*

Ecosystem Description:
Frequency of Occurrence: 9 plots, frequent
Distribution: From Plots: Duncan: Priest Pt.; Saanich Peninsula: Bear Hill, Mt. Doug., Summit Pk., Gonzales Hill, Saxe Pt., Knockan Hill. From Notes: Saanich Peninsula: Horth Hill, Uplands, Walbran Pk., Songhees-Craigflower; western shore: Pedder Bay.
Plant Community Description: *Holodiscus discolor* (oceanspray) thrives on most sites in the low shrub (B2) layer, and on some sites in the tall shrub (B1) layer. Cover averages class 2 and 2 to 3, respectively. *Polypodium glycyrrhiza* (licorice fern) occupies on all sites and averages class 4 cover. *Elymus glaucus* (blue wildrye) grows on all sites, averaging class 2 cover. The remaining species are present on most sites. *Camassia leichtlinii* (great camas) averages class 2 to 3 cover. *Cytisus scoparius* (introduced broom), *Galium aparine* (cleavers), and *Dicranum scoparium* (broom moss) average cover class 2.
Tree Canopy/ Landscape Expression: primarily tree canopy (A) layer (6)
Oak Characteristics: Diameters: generally smaller diameter, 3 are medium or large;

Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Average stocking is moderate for saplings and light for seedlings.

Physiognomic Type: usually Oak - Fern - Rockland and Shrub Oak - Rock Outcrop (3).
Elevation: various Slope: usually moderate to moderately steep
Aspect: west (north) to east Surface Shape: various
Moisture Regime: usually xeric to very xeric, some are submesic (2) or permesic (2)
Exposure: none Bedrock Geology: usually granitic (7)
Surface Substrate Features: all plots have either moderate to very high (class 3 to 6) bedrock exposure (6) or moderate to high (class 3 or 4) surface rocks (4)
Soil Classification: chiefly Orthic Regosols Humus Classification: mainly Orthi Rhizomulls
Depth of Ah Horizon: primarily shallow (4 to 14 cm)
Colour of Ah Horizon: generally dark, 10YR2/1 (6) Depth to Bedrock: normally shallow, 4 to 18 cm Surface Soil Texture: usually silt loam (6)
Percent Coarse Fragments: various
Comments: *Polypodium glycyrrhiza* (licorice fern) dies back in the late spring and resumes growth again in the late summer. This type was not detected out on the Gulf Islands. One distinguishing factor is the absence of c15 from the Gulf Islands. This may be controlled by greater deer grazing pressure. Other factors are the soil classification as Orthic Regosols, reflecting the shallow *Ah* horizons and shallow soil over bedrock; the high surface exposure of granitic bedrock and the occurrence on northerly- facing slopes.

c10 Oak - (Fd) - *Holodiscus discolor - Symphoricarpos albus - Rhytidiadephus triquetrus*

Ecosystem Description:
Frequency of Occurrence: 5 plots, infrequent to moderately frequent
Distribution: From Plots: Duncan: Mt. Tzuhalem, Priest Pt.; Saanich Peninsula: Water Tower Hill, Mt. Finlayson, Thetis Lk. Pk. From Notes: Ladysmith: Woodley Range; Cowichan Valley, Mt. Tzuhalem, Dunsmuir Lodge, Skirt Mt., Beaver Lake, Marigold Pk.
Plant Community Description: *Holodiscus discolor* (oceanspray) prospers on all sites and averages high cover, class 5, in the tall shrub (B1) layer. *Symphoricarpos albus* (snowberry) occurs on all sites in the low shrub (B2) layer, averaging class 3 cover. *Rhytidiadelphus triquetrus* (electrified cat's-tail moss) occupies all sites, with an average class 3 cover.

Sanicula crassicaulis (Pacific snakeroot), *Galium aparine* (cleavers), *Carex inops* (long-stoloned sedge), and *Arenaria macrophyllum* (large-leaved sandwort) are present on all sites and average cover class 2,2,1 to 2, and 1, respectively.

The remaining species exist on most sites. *Erythronium oregonum* (easter lily) averages cover class 2. *Mahonia aquifolium* (tall oregon-grape), *Cytisus scoparius* (introduced broom), and *Bromus carinatus* (California bromegrass) average class 1 to 2. *Elymus glaucus* (blue wild-rye), *Dactylis glomerata* (introduced orchardgrass), *Vicia americana* (American vetch), *Fritillaria lanceolata* (chocolate lily), and *Stellaria media* (introduced chickweed) average cover class 1.

Tree Canopy/ Landscape Expression: tree canopy (A) layer oak. Douglas-fir (Fd, *Pseudotsuga menziesii*) is present as an A layer tree on most sites, and on sites some in the tall shrub layer. Cover is small, averaging class 2 for the former and class 1 for the latter.

Oak Characteristics: Diameters: mostly small (one is large);

Regeneration: Regeneration is present for saplings on most sites and for seedlings on all sites. Stocking is moderate to well-stocked for saplings and lightly-stocked for seedlings.

Physiognomic Type: various: some Oak - Dense Shrub (2).

Elevation: low (2) to high (3) elevation Slope: gentle (one steep)

Aspect: east (south) to west Surface Shape: various: concave (2), variable (2)

Moisture Regime: submesic to permesic Exposure: none for most (3), insolation (2) Bedrock Geology: ordinarily coarse: granitic, gneiss

Surface Substrate Features: most (3) have moderate to high (class 3 to 5) bedrock exposure Soil Classification: generally Orthic Sombric Brunisols (4)

Humus Classification: Vermimulls Depth of Ah Horizon: commonly > 25 to 30 cm, or 4 to 10 cm Colour of Ah Horizon: mostly dark (3), some dark and brownish (2)

Depth to Bedrock: none

Surface Soil Texture: loam to silt loam, usually very gravelly (3) or gravelly (1)

Percent Coarse Fragments: usually high (50 to 70%) (4)

Comments: These sites are receiving additional moisture from the surrounding landscape, as indicated by the toe (2), concave or slightly concave positions (2), and observations of seepage below one site. One plot was without these indicators. Some of these sites are shrub thickets.This community is partly distinguished by its absence from the Gulf Islands. These sites are unique in their signs of seepage. See the community discussion in c15.

c8 Oak - *Symphoricarpos albus - Rosa nutkana - Lonicera ciliosa* **subcommunity (thickets)**

Ecosystem Description:

Frequency of Occurrence: 11 plots, frequent

Distribution: From Plots: widespread: Gulf Islands: Cabbage Is.; Saturna Is.: East Pt.; Galiano Is.: Dionisio Pt.; Saltspring Is.: Ruckle Pt.; Saanich Peninsula: Tsuhem Harbour, Uplands, Songhees, Knockan Hill; western shore: Juan de Fuca Pk.

From Notes: Nanaimo: Jack Pt.; Yellow Pt.: s. of Joan Pt., n. of Boathouse Harbour; Thetis Lk. Pk., Saxe Pt.

Plant Community Description: *Symphoricarpos albus* (snowberry) occupies all sites, averaging cover class 4 in the low shrub (B2) layer. *Rosa nutkana* (nootka rose) occurs on most sites in the low shrub (B2) layer, and some sites in the tall shrub (B1) layer. Cover averages class 3 for the former, and class 2 for the latter. *Lonicera ciliosa* (orange honeysuckle) grows as a low shrub (B2 layer) on all sites, and as a tall shrub (B1) on most sites. Average covers are class 3 and 2, respectively.

The remaining species listed are present on most sites. *Dactylis glomerata* (introduced orchardgrass) averages class 2 to 3. *Elymus glaucus* (blue wildrye), *Poa pratensis* (introduced Kentucky bluegrass), and *Galium aparine* (cleavers) average cover class 2. *Vicia sativa* (introduced common vetch) averages cover class 1 to 2.

Tree Canopy/ Landscape Expression: tree canopy (A) layer (A), chiefly high cover (class 5 or 6) (7)

Oak Characteristics: Diameters: mainly small to medium, two are large;

Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Stocking is moderately- to well-stocked for saplings, and light for seedlings. Physiognomic Type: usually Oak - Shrub - Thicket (6 or 7), some Oak -Dense Shrub (2), and others. Suggested Elevation: usually low elevation (10), one is medium elevation

Slope: usually gentle (0 to 20 %) Aspect: all

Surface Shape: usually straight (5) or concave (4)

Moisture Regime: usually submesic to subhygric

Exposure: some wind (6), seaspray (6), and insolation (5)

Bedrock Geology: usually coarse: granitic or sandstone (7)

Surface Substrate Features: several (4) with either moderate to high bedrock exposure (class 3 to 4) (3) or moderate to high (class 3 to 5) surface rocks (3), some with moderate to high (class 3 to 4) surface dead wood (3)

Soil Classification: primarily Orthic Sombric Brunisols

Humus Classification: Vermimulls Depth of Ah Horizon: usually deep: > 20 to 30 cm

Colour of Ah Horizon: usually dark, 10YR2/1 Depth to Bedrock: typically none

Surface Soil Texture: generally silt loam to loam (10), gravelly or very gravelly subsurface horizons Percent Coarse Fragments: various

Comments: Often near the sea-edge. These sites are multi-layered shrub thickets. Along with c9, this plant community occupies gentle slopes on all aspects at low elevations and has deep dark-coloured *Ah* horizons. These factors partly distinguish it. The distribution and development of c8 seems to be inversely related to deer populations, and possibly to livestock as well.

c9 Oak - *Symphoricarpos albus - Rosa nutkana - Oemleria cerasiformis* subcommunity (thickets)

Ecosystem Description:

Frequency of Occurrence: 10 plots, frequent

Distribution: From Plots: Yellow Point: Reynolds Pt.; Saanich Peninsula: Water Tower Hill, UVIC, Uplands, Anderson Hill Pk., Beacon Hill Pk., Naden Hill, Panama Hill, Thetis Lk. Pk. From Notes: Yellow Pt.: Sharpe Pt.; Gabriola Is.: False Narrows; Songhees- Craigflower, Marigold Pk.

Plant Community Description: *Symphoricarpos albus* (snowberry) thrives on all sites, averaging high cover, class 4, in the low shrub (B2) layer. *Rosa nutkana* (nootka rose) occupies most sites in the low shrub (B2) layer and some sites in the tall shrub (B1) layer. The former cover averages class 3 and the latter class 2 to 3. *Oemleria cerasiformis* (osoberry) occurs on most sites in the tall shrub (B1) layer and some sites in the low shrub (B2) layer. Cover averages class 3 in the taller layer and class 2 to 3 in the lower. *Daphne laureola* (introduced daphne) grows most sites in the low shrub layer (B2), and averages cover class 1 to 2. *Dactylis glomerata* (introduced orchardgrass) is present on most sites and averages cover class 2.

Tree Canopy/ Landscape Expression: usually high cover (class 5 or 6) tree canopy (A) layer (6)

Oak Characteristics: Diameters: various; Regeneration: Saplings are regenerating on most sites, seedlings on some sites. Stocking averages moderate to well-stocked for saplings, and (very) light for seedlings.

Physiognomic Type: usually Oak - Shrub- Thicket (8 or 9).

Elevation: mostly low elevation Slope: usually gentle slopes

Aspect: various Surface Shape: usually straight (6) Moisture Regime: mesic to subhygric

Exposure: several, including wind (4), cool air (2), seaspray (2)

Bedrock Geology: various Surface Substrate Features: ordinarily without features, some (4) moderately high (class 3) surface dead wood

Soil Classification: usually Orthic Sombric Brunisols
Humus Classification: Orthi Vermimulls
Depth of Ah Horizon: usually deep, > 20 to 30 cm
Colour of Ah Horizon: normally dark, 10YR2/1 Depth to Bedrock: none
Surface Soil Texture: silt loam to loam Percent Coarse Fragments: low: 0 to 40 %
Comments: These sites are multi-layered shrub thickets. This plant community, along with c8, occupies gentle slopes on all aspects at low elevations and has deep dark-coloured *Ah* horizons. These factors partly distinguish it.

PLANT COMMUNITIES AND ECOSYSTEMS (2): INTRODUCED PLANT COMMUNITIES

Introduced plant communities (those named for introduced species) begin with the "first-order disturbance communities", and the "second-order disturbance communities". The terms "first-order" and "second-order" disturbance communities reflect the apparent sequence of vegetation change and site disturbance following the introduction of non-indigenous species by European colonists (see 2.5 in the thesis).

c50 Oak - *Rhacomitrium canescens - Festuca bromoides* subcommunity

Ecosystem Description:

Frequency of Occurrence: 3 plots, infrequent

Distribution: From Plots: Galiano Island: Bodega Ridge, Galiano Mt.; Saanich Peninsula: Water Tower Hill From Notes: Nanaimo: Westwood Dr., Jack Pt.; Yellow Pt., Saanich Peninsula: Summit Pk., Beacon Hill Pk., Songhees- West Bay.

Plant Community Description: *Rhacomitrium canescens* (gray frayed-cap moss) occupies on all sites and averages class 4 to 5 cover. *Festuca bromoides* (introduced annual fescue) thrives on all sites and averages cover class 4.

Lotus micranthus (small-flowered lotus) grows on all sites and averages class 2 to 3 cover. *Lonicera hispidula* (hairy honeysuckle), *Elymus glaucus* (blue wildrye), *Aira praecox* (early hairgrass), and *Sanicula crassicaulis* (Pacific snakeroot) occupy on all sites and average class 2 cover. *Bromus carinatus* (California bromegrass) and *Hypochaeris radicata* (introduced hairy cats ear) are present on all sites and average cover class 1.

The remaining species exist on most sites. *Carex inops* (long-stoloned sedge), *Bromus mollis* (introduced soft bromegrass), *Cynosurus echinatus* (introduced dogtail bristlegrass), *Cerastium arvense* (field chickweed), *Trifolium microcephalum* (woolly clover), and *Polytrichum juniperinum* (juniper haircap moss) average cover class 2. *Luzula multiflora* (multi-flowered woodrush), *Bromus sterilis* (introduced barren barngrass), *Poa pratensis* (introduced Kentucky bluegrass), *Achillea millefolium* (yarrow), *Clarkia amoena* (farewell-to-spring), *Brodiaea coronaria* (harvest brodiaea), *Rumex acetosella* (introduced sheep sorrel), *Vicia hirsuta* (introduced hairy vetch), and *Vicia sativa* (introduced common vetch) average cover class 1.

Tree Canopy/ Landscape Expression: some of each of tree canopy (A), tall shrub (B1) canopy, and intermediate (A and B) canopies

Oak Characteristics: Diameters: generally small (13.8 to 33.9 cm);

Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Both saplings and seedlings average moderately well-stocked.

Physiognomic Type: various, usually rockland or rock outcrop types.

Elevation: high elevation, 110 to 300 m Slope: gentle to very steep (17 to 85 %)

Aspect: southwest, west Surface Shape: straight (2) and slightly convex (1)

Moisture Regime: xeric to very xeric Exposure: insolation, wind (2)

Bedrock Geology: coarse: granitic, conglomerate, sandstone

Surface Substrate Features: most plots (2) have high or very high (class 4 to 6) bedrock exposure

Soil Classification: Orthic Sombric Brunisols (2), Orthic Regosols (1) Humus Classification: Rhizomulls (2), Vermimulls (1)

Depth of Ah Horizon: 4 to > 25 cm

Colour of Ah Horizon: dark, 10YR2/1, 2/1.5, or dark and brownish

Depth to Bedrock: shallow (4, 20 cm) to moderately deep (50 cm estimated)

Surface Soil Texture: silt loam (2) to sandy loam (1)

Percent Coarse Fragments: primarily low to medium (10 to 45 %)

Comments: This type was split from c3 based on lesser amounts of broom. Soils shallow-to-bedrock, occurrence partly on very steep slopes, mostly at high elevations, and high or very high exposure of coarse bedrock partly distinguished this community.

c21 Oak - *Cynosurus echinatus* (late season)

Ecosystem Description:

Frequency of Occurrence: 9 plots, frequent

Distribution: From Plots: Duncan- Nanaimo: Nanoose Bay, Yellow Point; southern Gulf Islands: Saltspring Island, Galiano Island: Salalikim Rock; Saanich Peninsula: Scafe Hill From Notes: Nanaimo: Piper's Lagoon; Newcastle Is., Lone Tree Hill.

Plant Community Description: *Cynosurus echinatus* (introduced dogtail bristlegrass) occupies all sites and has high cover, an average of class 5. The remaining species occur on most sites. *Poa pratensis* (introduced Kentucky bluegrass), *Trifolium microcephalum* (woolly clover), and *Rhacomitrium canescens* (gray frayed-cap moss) average class 2 to 3 cover. *Elymus glaucus* (blue wildrye), *Bromus sterilis* (introduced barren barngrass), and *Lotus micranthus* (small-flowered lotus) average cover class 2. *Cerastium arvense* (field chickweed) averages cover class 1 to 2.

Tree Canopy/ Landscape Expression: tree canopy (A) layer, mostly high cover (class 5 or 6) (6)

Oak Characteristics: Diameters: mainly large diameter (6);

Regeneration: Regeneration is present on most sites for saplings and on some sites for seedlings. Both average light stocking.

Physiognomic Type: usually Oak - Grass - Parkland (8).

Elevation: various, but 5 plots are from higher elevation Slope: gentle to steep Aspect: chiefly south to southwest (west) Surface Shape: straight (4) to concave (4) Moisture Regime: generally xeric to very xeric Exposure: insolation, wind, some seaspray (2) Bedrock Geology: normally coarse: granitic, conglomerate, gneiss

Surface Substrate Features: some moderate to high bedrock exposure (class 3 or 4) (4) Soil Classification: ordinarily Orthic Humic Regosols and Orthic Sombric Brunisols (4) Humus Classification: usually Rhizomulls (6)

Depth of Ah Horizon: 8 to 30 cm, or > 20 to 35 cm (3)

Colour of Ah Horizon: chiefly dark 10YR2/1 (7)

Depth to Bedrock: mostly 8 to 30 cm Surface Soil Texture: sandy loam to silt loam, gravelly to very gravelly Percent Coarse Fragments: many (5) have high coarse fragments (55 to 80 %) in surface soils

Comments: usually xeric, disturbed sites. This community is partly distinguished by soils shallow to bedrock, high surface coarse fragments, and occurrence partly on steep slopes, mostly at high elevations.

c23 Oak - *Bromus sterilis*

Ecosystem Description:

Frequency of Occurrence: 9 plots, frequent

Distribution: From Plots: Yellow Point: Deer Pt; Pender Island: Oak Bluffs, Hermit Hill; Saanich Peninsula: Observatory Hill, Mt. Doug., Uplands, Beacon Hill Park

From Notes: Mayne Is.: Heck Hill.

Plant Community Description: *Bromus sterilis* (introduced barren barngrass) thrives on all sites, with an average class 4 cover. *Vicia sativa* (introduced common vetch) occupies all sites and averages class 2 to 3 cover. The remaining species are present on most sites. *Elymus glaucus* (blue wildrye), *Bromus carinatus* (California bromegrass), *Festuca bromoides* (introduced annual fescue), *Vicia hirsuta* (introduced hairy vetch), *Sanicula crassicaulis* (Pacific snakeroot), and *Galium aparine* (cleavers) average cover class 2.

Tree Canopy/ Landscape Expression: mostly tree canopy (A) layer (6), some tall shrub (B1) layer (3)
Oak Characteristics: Diameters: various; Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Stocking averages moderately well for both.
Physiognomic Type: various: some Oak - Grass - Parkland (3).
Elevation: low to high elevation Slope: gentle to very steep Aspect: usually southwest to west (6)
Surface Shape: ordinarily straight (5), some convex (2)
Moisture Regime: usually subxeric to xeric Exposure: insolation, wind
Bedrock Geology: coarse: granitic, gneiss, conglomerate, sandstone
Surface Substrate Features: some (4) have either moderately high bedrock exposure (class 3) (2) or moderate to high (class 3 to 5) surface coarse fragments (4)
Soil Classification: Orthic Sombric Brunisols Humus Classification: Rhizomulls (5), or Vermimulls (3) Depth of Ah Horizon: usually > 10 cm to 30 cm (7)
Colour of Ah Horizon: dark, 10YR2/1, 2/1.5 Depth to Bedrock: usually none, some 8 to 20 cm (2) Surface Soil Texture: sandy loam to silt loam, gravelly to very gravelly Percent Coarse Fragments: some plots (5) have high subsurface coarse fragments
Comments: There are both broom (2) and non-broom plots included. Occurrence on very steep slopes and the presence of deep, dark *Ah* horizons partly distinguishes this community.

c31a Oak - *Anthoxanthum odoratum*

Ecosystem Description:
Frequency of Occurrence: 7 plots, moderately frequent in certain areas
Distribution: From Plots: Hornby Island, Nanaimo: Harewood Plains; Saltspring Island; Saanich Peninsula: Gore Pk., Water Tower Hill, Beacon Hill Pk.

From Notes: Tumbo Is., Pender Is.: Oak Bluffs; Portland Is., West Chatham Is., Florence Lake, Fort Rodd Hill, Mary Hill.

Plant Community Description: *Anthoxanthum odoratum* (introduced sweet vernalgrass) thrives on all sites, and averages class 4 to 5 in cover. *Poa pratensis* (introduced Kentucky bluegrass) averages class 3 and occupies all sites. The remaining species are present on most sites. *Symphoricarpos albus* (snowberry), *Elymus glaucus* (blue wildrye), *Danthonia californica* (California oatgrass), *Dactylis glomerata* (introduced orchardgrass), *Vicia sativa* (introduced common vetch), and *Trifolium dubium* (introduced small hop clover) average cover class 2. *Sanicula crassicaulis* (Pacific snakeroot), *Galium aparine* (cleavers), and *Plantago lanceolata*

(introduced narrow leaved plantain) average class 1 to 2. *Ranunculus occidentalis* (western buttercup) averages class 1.

Tree Canopy/ Landscape Expression: usually tree layer (A) canopy (5)

Oak Characteristics: Diameters: various, 15.9 cm to 57.8 cm;

Regeneration: There is regeneration on most sites for saplings and some sites for seedlings. Sapling stocking averages moderately well-stocked. Seedlings are lightly-stocked.

Physiognomic Type: usually Oak - Grass Parkland (4) or Shrub Oak Basin (2).

Elevation: low to high Slope: gentle to moderate slopes

Aspect: southeast, south to west Surface Shape: normally concave (5)

Moisture Regime: generally compensating submesic to mesic (5), some subxeric to xeric (2)

Exposure: some wind (3) and insolation (2)

Bedrock Geology: coarse: granitic, conglomerate, sandstone

Surface Substrate Features: most plots (5) have either moderately high (class 3) bedrock exposure (2) or moderate to high (class 3 or 4) surface rocks (3)

Soil Classification: Orthic Sombric Brunisols (5), Regosols (2)

Humus Classification: generally Rhizomulls

Depth of Ah Horizon: primarily > 10 to 30 cm (4), or 8 to 10 cm (3)

Colour of Ah Horizon: mainly dark, 10YR2/1 (5), or dark and slightly brownish

Depth to Bedrock: 8 to 60 cm (estimated) (5), or without (2)

Surface Soil Texture: chiefly silt loam (5), some gravelly to very-gravelly subsurface coarse fragments Percent Coarse Fragments: various

Comments: Slightly moister sites in a bedrock landscape because of concave to slightly concave surface shape. This community is distinguished by its occurrence on moister sites in a bedrock landscape, the presence of deep, dark *Ah* horizons in soils with a shallow to moderate depth to bedrock.

c29a Oak - *Poa pratensis - Vicia sativa*

Ecosystem Description:

Frequency of Occurrence: 14 plots, frequent

Distribution: From Plots: widespread: Duncan-Nanaimo: Jack Pt., Yellow Pt.; southern Gulf Islands: Cabbage Is., Saturna Is., Pender Is.- Hermit Hill, Oak Bluffs, Saltspring Is.; Saanich Peninsula: Water Tower Hill, Uplands Pk., Skirt Mt.; western shore: Juan de Fuca Pk., Pedder Bay From Notes: Yellow Pt.: Deer Pt.; Maple Bay, Saanich Peninsula: Woodsend Drive

Plant Community Description: *Poa pratensis* (introduced Kentucky bluegrass) occupies all sites and averages cover class 3 or 4. The remaining species exist on most sites. *Vicia sativa* (introduced common vetch) is cover class 3. *Geranium molle* (introduced dovefoot geranium) and *Vicia hirsuta* (introduced hairy vetch) average class 2 or 3. *Elymus glaucus* (blue wildrye), *Bromus sterilis* (introduced barren barngrass), *Sanicula crassicaulis* (Pacific snakeroot) and *Galium aparine* (cleavers) are class 2. *Bromus carinatus* (California bromegrass) averages class 1 to 2. *Festuca bromoides* (introduced annual fescue) and *Hypochaeris radicata* (introduced hairy cats ear) are class 1.

Tree Canopy/ Landscape Expression: mostly high cover (class 5,6) tree canopy (A) layer (9), some tall shrub (B1) layer canopy (4)

Oak Characteristics: Diameters: various; Regeneration: Stocking averages light to moderate for both seedlings and saplings. Regeneration is present on most sites. Physiognomic Type: usually Oak - Grass - Parkland (5), Oak - Light Shrub - Herb -Bulb Parkland (5), some Oak - Moderate Shrub - Herb - Bulb Parkland (2), and others.

Elevation: various Slope: generally gentle (9)

Aspect: normally east, south, west (10) Surface Shape: straight (6), concave (5), and various Moisture Regime: ordinarily submesic (12) to mesic (4)

Exposure: insolation (12), wind (10), seaspray (5) Bedrock Geology: coarse: sandstone, granitic (9) Surface Substrate Features: some moderately high or high (class 3 and 4) bedrock exposure (3) Soil Classification: Orthic Sombric Brunisols (10), Regosols (3) Humus Classification: Vermimulls (11), Orthic Rhizomulls (3)

Depth of Ah Horizon: > 30 cm (7), or 5 to 30 cm (7)

Colour of Ah Horizon: dark, 10YR 2/1, 2/1.5 (11), or dark and slightly brownish (3)

Depth to Bedrock: usually without (10), or 7 to 80 cm (estimated) (6)

Surface Soil Texture: sandy loam to silt loam, commonly gravelly to very-gravelly (10)

Percent Coarse Fragments: various, sometimes (5) high coarse fragments in the surface soil

Discussion:

Occurrence on sites lacking bedrock and on concave slope positions which receive additional soil moisture from the surrounding landscape partly distinguish this community. It has coarser textured soil (sandy loam to silt loam) than c28a (silt loam).

c28a Oak - *Dactylis glomerata* **Typic subcommunity**

Ecosystem Description:

Frequency of Occurrence: frequent, 16 plots

Distribution: From Plots: widespread: Duncan - Nanaimo: Hornby Is., Piper's Lagoon, Newcastle Is., Yellow Pt., Genoa Bay; Pender Is.: Stanford Hill; Saltspring Is.: Channel Ridge; Saanich Peninsula: Mt. Finlayson, Water Tower Hill, UVIC, Uplands, Gonzales Hill; western shore: Fort Rodd Hill, Witty's Lagoon, Mary Hill.

From Notes: Nanoose Hill, Somenos Lk., Gabriola Is.; Galiano Is.: Bellhouse Pk., Portland Is., Saanich Peninsula: Glendenning Dr., Frances King Pk.; western shore: Lester Pearson College, Rocky Pt.

Plant Community Description: *Dactylis glomerata* (introduced orchardgrass) averages cover class 4 and thrives on all sites. The remaining species are present on most sites. *Symphoricarpos albus* (snowberry) averages class 2 or 3. *Elymus glaucus* (blue wildrye) and *Bromus carinatus* (California bromegrass) average class 2. *Vicia hirsuta* (introduced hairy vetch), *Vicia sativa* (introduced common vetch), *Sanicula crassicaulis* (Pacific snakeroot), *Galium aparine* (cleavers) and *Geranium molle* (introduced dovefoot geranium) average class 2.

Tree Canopy/ Landscape Expression: tree canopy (A) layer, often with high cover, class 5 or 6 (9)

Oak Characteristics: Diameters: various; Regeneration: Regeneration is present on most sites for both saplings and seedlings. Stocking averages light to moderate for both. Physiognomic Type: various: often Oak - Grass - Parkland (6), some Oak - Light Shrub - Herb - Bulb Parkland (2), and others.

Aspect: east (south) to west Surface Shape: straight (7), concave (4), and various

Moisture Regime: usually submesic to mesic (xeric to subhygric)

Exposure: wind (12), insolation (10), some seaspray (3)

Bedrock Geology: chiefly coarse: granitic, gneiss, conglomerate, sandstone

Surface Substrate Features: some (5) moderate to very high (class 3 to 6) bedrock exposure or moderate to high surface rocks (class 3,4) (3)

Soil Classification: usually Orthic Sombric Brunisol (12)

Humus Classification: Rhizomulls and Vermimulls

Depth of Ah Horizon: usually >25 or 30 cm Colour of Ah Horizon: usually dark, 10YR 2/1 Depth to Bedrock: usually none, or 5-25 cm (4)

Surface Soil Texture: usually silt loam (12)

Percent Coarse Fragments: various, some with high subsurface horizon coarse fragments (6)

Comments: Together with Oak - Broom - *Dactylis glomerata* (c5), this community is the most dominant and widespread in the Garry oak habitat. Replacement by broom types, such as this

latter community, seems to account for the reduced frequency on Galiano, Gabriola and most of Saltspring Island. One plot from Saltspring Island (93 SS18) could be added. *Dactylis glomerata* (orchardgrass) is used in seeding, consequently this type is partly found on old pastures. The presence of *Symphoricarpos albus* could potentially divide c28a, but it was not frequent enough, being represented by only three plots. This subcommunity occurs mostly on sites without bedrock in the soil profile and partly in concave slope positions which receive additional soil moisture from the surrounding landscape. Deep, dark *Ah* horizons with silt loam texture are a further characteristic which partly distinguish this community.

c28b Oak - *Dactylis glomerata - Bromus carinatus* **subcommunity**

Ecosystem Description:

Frequency of Occurrence: 5 plots

Distribution: From Plots: Saanich Peninsula: Water Tower Hill, Glendale Lands, Naden Hill, southern Gulf Islands - Pender, Tumbo Is. From Notes: Nanaimo: Jack Pt.

Plant Community Description: *Dactylis glomerata* (introduced orchardgrass) occupies all sites and averages cover class 4 to 5. *Bromus carinatus* (California bromegrass) grows on all sites and averages class 3 cover. *Poa pratensis* (introduced Kentucky bluegrass) occurs on all sites and averages class 3 or 4. *Vicia hirsuta* (introduced hairy vetch) is present on all sites and averages class 2 for cover. The remaining species exist on most sites and average class 2 cover: *Elymus glaucus* (blue wildrye), *Vicia sativa* (introduced common vetch), *Galium aparine* (cleavers), and *Camassia leichtlinii* (great camas). *Hypochaeris radicata* (introduced hairy cats-ear) and *Sanicula crassicaulis* (Pacific snakeroot) are present on most sites and average class 1 or 2.

Tree Canopy/ Landscape Expression: tree canopy (A) layer, mostly with high cover (class 5 or 6) (4)

Oak Characteristics: Diameters: small to (mainly) large (3);

Regeneration: Regeneration is present on most sites for both saplings and seedlings. Stocking averages light for seedlings and moderate for saplings.

Physiognomic Type: usually Oak - Grass Parkland

Elevation: primarily low elevation, one high elevation plot

Slope: gentle (4), moderate (1) Aspect: east (south) to west

Surface Shape: straight (3) (and various) Moisture Regime: about submesic (subxeric to permesic) Exposure: insolation (3), wind (2), seaspray (2)

Bedrock Geology: various Surface Substrate Features: some moderately or high bedrock (class 3 to 5) (2) or moderately high surface rocks (class 3) (2)

Soil Classification: Orthic Sombric Brunisols (4)
Humus Classification: Vermimulls (3), Rhizomulls (2)
Depth of Ah Horizon: generally > 25 to 30 cm (4) Colour of Ah Horizon: normally dark, 10YR 2/1 (3), some dark and slightly brownish 10YR2/2 (2)
Depth to Bedrock: ordinarily none, or 5 to 30 cm (2)
Surface Soil Texture: usually silt loam (3), gravelly to very gravelly (3)
Percent Coarse Fragments: high coarse fragments in the subsurface horizons (55-80%) (4)
Comments: This plant community is probably not as visually obvious as the others. It was not directly recognized as a community in the field work, although its potential to form a group was recognized. This potential was then confirmed by a check of the data. Medium to high subsurface coarse fragments partly distinguishes this community. It is not otherwise distinguished from c28a in its characteristics. It occurs mostly at low elevations, which partly differentiates from c28a and c29a, which are found at all elevations.

c30 Oak - *Dactylis glomerata - Arrhenatherum elatius* **subcommunity**

Ecosystem Description:
Frequency of Occurrence: 6 plots, infrequent
Distribution: From Plots: Saanich Peninsula: Uplands Pk., Summitt Pk., Panama Hill, Naden Hill; and western shore: Pedder Bay From Notes: Songhees: West Bay
Plant Community Description: *Dactylis glomerata* (introduced orchardgrass) and *Arrhenatherum elatius* (introduced tall oatgrass) occupy all sites, averaging class 3 and 4, respectively. The following three species grow on all sites: *Poa pratensis* (introduced Kentucky bluegrass) with class 3 cover, *Vicia sativa* (introduced common vetch) with class 2 or 3, and *Galium aparine* (cleavers) with class 1 cover. The remaining species are on most of the sites. *Bromus sterilis* (introduced barren barngrass) is class 1 to 2 cover. *Vicia hirsuta* (introduced hairy vetch) is class 2 to 3 cover, *Sanicula crassicaulis* (Pacific snakeroot) is class 2, and *Geranium molle* (introduced dovefoot geranium) is class 1 to 2.
Tree Canopy/ Landscape Expression: all are tree canopy (A) layer stands
Oak Characteristics: Diameters: primarily large- 67.5 to 106.3 cm (4);

Regeneration: Stocking averages light for both seedlings and saplings. Regeneration is present on some sites. Physiognomic Type: usually Oak - Grass -Parkland (2) or Oak - Light Shrub - Herb - Bulb Parkland (2).
Elevation: usually low elevation (5) Slope: usually gentle slopes (5), one steep

Aspect: east, south, west Surface Shape: primarily straight (4)
Moisture Regime: usually mesic to submesic, but with some outliers (2)
Exposure: usually insolation Bedrock Geology: various
Surface Substrate Features: mainly without features
Soil Classification: Orthic Sombric Brunisols (4) or Regosols (2)
Humus Classification: Orthi Rhizomulls (3) or Vermimulls (3)
Depth of Ah Horizon: 5 to 20 cm (3) or > 20 to 25 cm (3)
Colour of Ah Horizon: chiefly dark, 10YR 2/1 or 2/1.5 (5)
Depth to Bedrock: generally without R (4), or 5 to 20 cm (2)
Surface Soil Texture: normally silt loam (4)
Percent Coarse Fragments: ordinarily low to medium (5)
Comments: The two dominant grasses are used in seeding, consequently the type is found partly on old pastures. This subcommunity is on similar sites to the moister c28a sites, and drier sites than c49. It differs in seeding history and possibly in the history of their agricultural management. This subcommunity occurs mostly at low elevations, which partly distinguishes it from c28a and c29a, which are found at all elevations.

c49 Oak - *Dactylis glomerata - Agrostis stolonifera* **subcommunity**

Ecosystem Description:
Frequency of Occurrence: 5 plots
Distribution: From Plots: Saanich Peninsula: Glendale Lands, Saxe Pt.; and western shore: Juan de Fuca Pk., Mary Hill, Rocky Pt. From Notes none
Plant Community Description: *Dactylis glomerata* (introduced orchardgrass) and *Agrostis stolonifera* (introduced redtop) are on all sites and average class 3 to 4. *Vicia sativa* (introduced common vetch) and *Taraxacum officinale* (introduced dandelion) are present on most sites and average class 2 and 1, respectively.
Tree Canopy/ Landscape Expression: primarily tree canopy (A) layer (4)
Oak Characteristics: Diameters small (2) and large (3) (>80 cm);
Regeneration: Regeneration is present on most sites for both seedlings and saplings. Stocking averages light for both.
Physiognomic Type: various: some Oak - Grass Parkland (2)
Elevation: mostly low (4), one medium elevation
Slope: flat and gentle slopes Aspect: various
Surface Shape: chiefly concave (4) Moisture Regime: submesic to subhygric (4)

Exposure: wind (4), insolation (2), seaspray (2) Bedrock Geology: granitic (3)
Surface Substrate Features: some moderate to high bedrock exposure (2)
Soil Classification: Orthic Sombric Brunisols (2), Regosols (2), Orthic Humic Gleysols (1) Humus Classification: Vermimulls (3)
Depth of Ah Horizon: 10 to 30 cm (one is an organic)
Colour of Ah Horizon: dark, 10YR2/1 (4) Depth to Bedrock: largely without (3)
Surface Soil Texture: mainly loam to silt loam (one clay-loam, one organic, some gravelly (3)
Percent Coarse Fragments: low (0 to 30%) (4), some high (80%) subsurface coarse fragments (1)
Comments: This is the moister of the subcommunities in the *Dactylis glomerata* group. The two dominant grasses are used in seeding, consequently this type is partly found on old pastures.Occurrence on moister sites than c28a and c49 distinguishes this subcommunity. It also differs in seeding history and possibly in the history of agricultural management. This sucommunity occurs partly in concave slope positions which receive additional moisture from the surrounding landscape. Occurrence partly on flat sites is also unique among the plant communities. It generally occurs at low elevations, which partly distinguishes it from c28a and c29a, which are found at all elevations.

c3 Oak - Broom - *Rhacomitrium canescens - Festuca bromoides - Aira* **subcommunity**

Ecosystem Description:
Frequency of Occurrence: 10 plots, frequent
Distribution: From Plots: Saanich Peninsula: Skirt Mt., Observatory Hill, Mt. Doug., Glendale Lands, Summit Pk., Naden Hill; western shore: Juan de Fuca Pk., Lester Pearson College, Mary Hill. From Notes: Galiano Is.: Mt. Galiano; Saanich Peninsula: Knockan Hill.
Plant Community Description: *Cytisus scoparius* (introduced broom) thrives on all sites, generally as a low shrub (B2), but sometimes as a tall shrub (B1). Its cover averages class 4 for the former and class 2 for the latter. *Rhacomitrium canescens* (gray frayed-cap moss) occupies most sites and averages class 3 to 4 cover. *Festuca bromoides* (introduced annual fescue) grows on all sites and averages class 4. *Aira praecox* (introduced early hairgrass) and *Aira caryophyllea* (introduced silver hairgrass) occur on most sites and average class 2 cover. *Rumex acetosella* (introduced sheep sorrel) is present on all sites and averages cover class 1. The remaining species exist on most sites. *Cynosurus echinatus* (introduced dogtail bristlegrass), *Bromus sterilis*

(introduced barren barngrass), *Elymus glaucus* (blue wildrye) and *Bromus mollis* (introduced soft bromegrass) average class 2 cover. *Galium aparine* (cleavers) averages class 1 to 2 cover.
Tree Canopy/ Landscape Expression: tall shrub (B1) canopy (6), or tree canopy (A) layer (4)
Oak Characteristics: Diameters: various (10.9 to 55.2 cm);

Regeneration: Regeneration is occurring on most sites for saplings and all sites for seedlings. Saplings average moderate stocking and seedlings average light to moderate stocking.
Physiognomic Type: usually Shrub Oak - Broom - Rockland (6).
Elevation: various elevations, low to high, 10 to 210 m
Slope: usually moderate to steep Aspect: usually south to west
Surface Shape: usually convex Moisture Regime: usually subxeric (2) to very xeric (5) Exposure: insolation, often wind (6) Bedrock Geology: various
Surface Substrate Features: all plots have either moderate to very high bedrock exposure (class 3 to 6) or moderately high surface rocks (class 3) (2)
Soil Classification: Orthic Sombric Brunisols, Regosols
Humus Classification: usually Rhizomulls Depth of Ah Horizon: often shallow (6): 3 to 6 cm Colour of Ah Horizon: usually dark: 10YR2/1 (7)
Depth to Bedrock: usually shallow, 3 to 7 cm (6), 25 cm (1)
Surface Soil Texture: often silt loam or gravelly silt loam (6)
Percent Coarse Fragments: various
Discussion:

This subcommunity is partly distinguished by its very shallow, silt loam textured soils over
bedrock. It is generally more xeric than c22.

c17 Oak - Broom - *Rhacomitrium canescens: Typic* subcommunity

Ecosystem Description:
Frequency of Occurrence: 3 plots, locally frequent
Distribution: From Plots: Saanich Peninsula: Scafe Hill, Songhees; western shore: Colwood DND From Notes: Ladysmith: Woodley Range; Saltspring Is.: Ruckle Pt.; Saanich Peninsula: Uplands, Saxe Pt.; western shore: Mill Hill.
Plant Community Description: *Cytisus scoparius* (introduced broom) is present on all sites as a low shrub (B2), but sometimes also as a tall shrub (B1). Its cover is marginal, averaging class 2 to 3 for the former and class 1 for the latter. *Rhacomitrium canescens* (gray frayed-cap moss) thrives on most sites and averages class 4 in cover.

Rumex acetosella (introduced sheep sorrel) and *Brodiaea coronaria* (harvest brodiaea) exist on all sites and average cover class 1. *Galium aparine* (cleavers), *Aira praecox* (introduced early hairgrass) and *Selaginella wallacei* grow on all sites and average cover class 1 to 2, 2 and 2, respectively.

The remaining species occupy most sites. *Symphoricarpos albus* (snowberry), *Elymus glaucus* (blue wildrye), *Bromus mollis* (introduced soft bromegrass), *Bromus tectorum* (introduced cheatgrass), *Anthoxanthum odoratum* (introduced sweet vernalgrass), *Camassia leichtlinii* (great camas), *Vicia sativa* (introduced common vetch), *Lotus micranthus* (small flowered lotus) and *Polytrichum juniperinum* (juniper haircap moss) average cover class 2.

Mahonia aquifolium (tall Oregon grape), *Luzula multiflora* (many-flowered woodrush), *Bromus sterilis* (introduced barren barngrass), *Collinsia parviflora* (small flowered blue-eyed Mary), *Stellaria media* (introduced chickweed) and *Veronica serpyllifolia* (thyme-leaved speedwell) average cover class 1.

Tree Canopy/ Landscape Expression: tall shrub (B1) layer canopy

Oak Characteristics: Diameters: small; Regeneration: Sapling regeneration was present on all sites, seedlings on most sites. Stocking averages moderate for both.

Physiognomic Type: usually Shrub Oak- Rock Outcrop (2).

Elevation: low elevation (2), high elevation (1)

Slope: moderate to very steep Aspect: south to southwest

Surface Shape: convex Moisture Regime: very xeric

Exposure: insolation, wind (2) Bedrock Geology: coarse: granitic, conglomerate

Surface Substrate Features: all plots have high or very high surface bedrock exposure (class 3 to 6) Soil Classification: Orthic Humic Regosols (2), Orthic Regosols (1) Humus Classification: Rhizomulls (2), Xeromulls (1)

Depth of Ah Horizon: 2 to 10 cm (2), > 25 cm (1)

Colour of Ah Horizon: dark, 10YR2/1 Depth to Bedrock: 7 to 10 cm (2), 40 cm (estimated) (1)

Surface Soil Texture: sandy loam (2), gravelly to very gravelly

Percent Coarse Fragments: moderate to high (35 to 60 %)

Comments: This plant subcommunity was identified in the field and sampled as a non- or lesser-broom type, before re-grouping in the analysis with the broom types. Occurrence on very shallow, sandy loam textured soils over coarse bedrock and on some very steep low elevation slopes partly distinguishes this community.

c22 Oak - Broom - *Rhacomitrium canescens - Bromus tectorum* subcommunity

Ecosystem Description:

Frequency of Occurrence: 4 plots, infrequent

Distribution: From Plots: Pender Island: George Hill; Saanich Peninsula: Water Tower Hill, Bear Hill; western shore: Juan de Fuca Pk. From Notes: Cowichan Bay, Pender Is.: Stanford Hill; Saanich Peninsula: Observatory Hill.

Plant Community Description: *Rhacomitrium canescens* (gray frayed-cap moss) and *Cytisus scoparius* (introduced broom) thrive on all sites, and average class 4 cover, the latter as a low shrub (B2). *Bromus tectorum* (introduced cheatgrass) occupies all sites and averages class 3.

Bromus mollis (introduced soft bromegrass) and *Bromus sterilis* (introduced barren barngrass) grow on all sites, and average cover class 3. The remaining species are present on most sites. *Festuca bromoides* (introduced annual fescue), *Aira praecox* (introduced early hairgrass), *Vicia sativa* (introduced common vetch), *Galium aparine* (cleavers), and *Trifolium tridentatum* (tomcat clover) average class 2 cover.

Elymus glaucus (blue wildrye) and *Lotus micranthus* (small flowered lotus) average class 1 or 2. *Mahonia aquifolium* (tall Oregon grape), *Brodiaea coronaria* (harvest brodiaea) and *Sanicula crassicaulis* (Pacific snakeroot) average cover class 1.

Tree Canopy/ Landscape Expression: tree canopy (A) layer (2), or tall shrub (B1) canopy (2)

Oak Characteristics: Diameters: various; Regeneration: Regeneration is occurring on all sites for both saplings and seedlings. Stocking of saplings averages moderate, and averages light for seedlings.

Physiognomic Type: Oak - Broom - Parkland (2) or Shrub Oak - Rock Outcrop (2).

Elevation: usually high elevation (3) Slope: usually moderately steep or steep (3)

Aspect: southwest (south to west) Surface Shape: convex

Moisture Regime: normally subxeric to very xeric Exposure: insolation, some wind

Bedrock Geology: coarse: granitic, sandstone

Surface Substrate Features: most plots have either moderate to very high bedrock exposure (class 3 to 6) (3) or moderately high surface rocks (class 3) (3)

Soil Classification: Orthic Regosols (2), and Orthic Sombric Brunisols (2)

Humus Classification: Vermimulls (2) or Rhizomulls (2)

Depth of Ah Horizon: 4 to 20 cm Colour of Ah Horizon: 10YR2/1

Depth to Bedrock: usually shallow (4 to 25 cm) (3)

Surface Soil Texture: loam to silt loam, gravelly

Percent Coarse Fragments: low (20 to 25 %) (2), or very high coarse fragments (80%) at depth (2)

Comments: This plant community was reassigned as a subcommunity after comparison with the Oak - Broom - *Rhacomitrium canescens*: Typic subcommunity (c17). The ground layer portion of c22 is more typical of open areas away from the oaks. This subcommunity is partly distinguished by its shallow soils over bedrock and its occurrence on high elevation sites with moderate to very high surface exposure of bedrock or coarse fragments. This community is generally less xeric than c3.

c2 Oak - Broom - *Cynosurus echinatus* (late season)

Ecosystem Description:

Frequency of Occurrence: 6 plots, moderately frequent

Distribution: From Plots: fairly widespread: Galiano Island: Salalikim Rock; Saanich Peninsula: Lone Tree Hill, Mt. Finlayson, Observatory Hill; western shore: Mill Hill, Lester Pearson College From Notes: Skirt Mt.

Plant Community Description: *Cytisus scoparius* (introduced broom) thrives on all sites and averages high cover (class 5) in the low shrub (B2) layer. There is also some tall shrub (B1) occurrence, which averages class 2 cover. *Cynosurus echinatus* (introduced dogtail bristlegrass) occupies all sites and averages class 4 cover. *Festuca bromoides* (introduced annual fescue) grows on all sites and averages class 3. The remaining species are present on most sites. *Bromus sterilis* (introduced barren barngrass), *Galium aparine* (cleavers), and *Sanicula crassicaulis* (Pacific snakeroot) average cover class 2. *Aira caryophyllea* (introduced silver hairgrass) and *Elymus glaucus* (blue wildrye) average class 1 to 2.

Tree Canopy/ Landscape Expression: some tree layer (A) canopy (3), one sparse tree layer canopy, some tall shrub (B1) layer canopy (2)

Oak Characteristics: Diameters: various; Regeneration: Sapling regeneration is present on most sites. Seedling regeneration occurs on some sites. Stocking of saplings averages moderate. Seedlings are (very) lightly-stocked.

Physiognomic Type: Oak - Broom - Parkland (4) and Shrub Oak - Broom - Rockland (2).

Elevation: ordinarily high elevation (4), some low and medium elevation (3)

Slope: usually moderate to moderately steep slopes, some gentle slopes (2)

Aspect: chiefly south (4) Surface Shape: various

Moisture Regime: largely subxeric to xeric (ranges from submesic to very xeric)

Exposure: insolation, wind Bedrock Geology: various
Surface Substrate Features: most plots (6) have either moderate to high bedrock exposure (class 3 or 4) (4) or moderate to high surface rocks (2).
Soil Classification: mainly Orthic Sombric Brunisols (4)
Humus Classification: Orthi Rhizomulls (5)
Depth of Ah Horizon: usually greater than 25 or 30 cm (4)
Colour of Ah Horizon: usually dark or dark and slightly brownish: 10YR2/1, 2/2
Depth to Bedrock: primarily without (3), or 8 cm to 50 cm (estimated) (3)
Surface Soil Texture: various Percent Coarse Fragments: most have high coarse fragments (60 to 85%) in subsurface horizons
Comments: The dominant *Cynosurus echinatus* has a late season of growth. Most plots are described between May 14 and June 22. There is one early season plot, so the type can be detected in early season, but it is more difficult. Deep dark *Ah* horizons, high subsurface coarse fragments, and occurrence on high elevation sites with moderate to high surface exposure of bedrock or coarse fragments partly distinguish this community. Slopes are generally less steep (moderate) than the previous three plant communities.

c31b Oak - Broom - *Anthoxanthum odoratum*

Ecosystem Description:
Frequency of Occurrence: 3 plots, infrequent
Distribution: From Plots: Saturna Island: Elliott Bluff; Thetis Lake.
From Notes: none
Plant Community Description: *Cytisus scoparius* (introduced broom) thrives on all sites as a low shrub (B2), and some stands as a tall shrub (B1). Low shrub (B2) cover is high, averaging class 5. Tall shrub cover averages class 2. *Anthoxanthum odoratum* (sweet vernalgrass) occupies all sites, with cover averaging class 4.

Poa pratensis (introduced Kentucky bluegrass), *Sanicula crassicaulis* (Pacific snakeroot), and *Rhytidiadelphus triquetrus* (electric cats-tail moss) grow on all sites and average cover class 2. *Elymus glaucus* (blue wildrye), *Bromus carinatus* (California bromegrass), *Luzula multiflora* (many-flowered woodrush), *Montia perfoliata* (perfoliate-leaved miners lettuce), and *Vicia sativa* (introduced common vetch) are present on all sites and average cover class 1.

The remaining species exist on most sites. *Symphoricarpos albus* (snowberry) averages cover class 3. *Lonicera hispidula* (hairy honeysuckle), *Festuca bromoides* (introduced annual fescue), *Bromus sterilis* (introduced barren barngrass), *Bromus mollis* (introduced soft

bromegrass), *Galium aparine* (cleavers), *Plectritis congesta* (seablush), *Rhacomitrium canescens* (gray frayed-cap moss), and *Eurhynchium oregonum* (moss) average class 2 cover. *Daphne laureola* (introduced daphne), *Melica subulata* (oniongrass), *Aira praecox* (introduced early hairgrass), *Dactylis glomerata* (introduced orchardgrass), *Collinsia parviflora* (small flowered blue-eyed Mary), *Veronica serpyllifolia* (thyme-leaved speedwell), *Dodecatheon hendersonii* (broad-leaved shootingstar), *Stellaria nitens* (starwort), *Stellaria media* (introduced chickweed), *Myosotis discolor* (introduced forget-me-not), *Hypochaeris radicata* (introduced hairy cats ear), *Sherardia arvensis* (introduced blue field madder), *Geranium molle* (introduced dovefoot geranium), *Plantago lanceolata* (introduced narrow leaved plantain), *Teesdalia nudicaule* (introduced teesdalia), and *Vicia hirsuta* (introduced hairy vetch) average cover class 1.
Tree Canopy/ Landscape Expression: tall shrub (B1) canopy layer (2), one tree canopy (A) layer
Oak Characteristics: Diameters: various: 12.6 to 45.2 cm;

Regeneration: Regeneration is present for saplings on most sites, and for seedlings on all sites. Stocking is moderately to well-stocked for saplings, and light for seedlings.
Physiognomic Type: various of the broom series.
Elevation: medium elevation Slope: gentle slopes
Aspect: southwest to west Surface Shape: various
Moisture Regime: submesic to subxeric Exposure: insolation (2)
Bedrock Geology: basalt (2) Surface Substrate Features: all plots have moderately high to very high bedrock exposure (class 3 to 6)
Soil Classification: Orthic Sombric Brunisols
Humus Classification: Orthi Rhizomulls (2), Orthi Vermimulls (1)
Depth of Ah Horizon: > 30 cm (2), 10 cm (1)
Colour of Ah Horizon: dark, 10YR2/1 to dark and slightly brownish 10YR2/2
Depth to Bedrock: none (2), 15 cm (1) Surface Soil Texture gravelly silt loam (2) Percent Coarse Fragments: low to medium
Discussion:

This plant community is partly distinguished by its deep, dark *Ah* horizons and its occurrence on medium elevation sites with moderately high to very high exposure of bedrock or coarse fragments.

c6 Oak - Broom - *Elymus glaucus*

Ecosystem Description:

Frequency of Occurrence: 6 plots, moderately frequent

Distribution: From Plots: Galiano Island: Salalikim Rock; Saanich Peninsula: Observatory Hill, Mt. Doug, Knockan Hill; western shore: Mill Hill, Colwood DND.

From Notes: Galiano Is.: Mt. Galiano; Pender Is.: George Hill; Saanich Peninsula: Glendenning Rd., Florence Lk.; western shore: Ft. Rodd Hill, Mary Hill.

Plant Community Description: *Cytisus scoparius* (introduced broom) thrives on all sites as a low shrub (B2) and on some sites as a tall shrub (B1), averaging class 4 and 2 cover, respectively. *Elymus glaucus* (blue wildrye) occupies all sites, and averages class 3 cover.

Vicia sativa (introduced common vetch) and *Festuca bromoides* (introduced annual fescue) grow on all sites and average class 2 and 3 cover, respectively. The remaining species occur on most sites. *Bromus sterilis* (introduced barren barngrass) averages class 2 to 3 cover. *Galium aparine* (cleavers) and *Osmorhiza chilensis* (sweet cicely) average class 2 cover. *Bromus carinatus* (California bromegrass) and *Sanicula crassicaulis* (Pacific snakeroot) average class 1.

Tree Canopy/ Landscape Expression: either tree canopy (A) layer or tall shrub (B1) canopy layer

Oak Characteristics: Diameters: small diameter; Regeneration: Regeneration is present on most sites for saplings and all sites for seedlings. Saplings are moderately well- to well-stocked. Seedlings are moderately well-stocked.

Physiognomic Type: usually Oak - Broom - Parkland (2) or Shrub Oak - Basin Broomland.

Elevation: various: 3 are high elevation Slope: usually moderately steep to very steep, two plots are on gentle or moderate slopes Aspect: usually southwest

Surface Shape: various Moisture Regime: submesic to subxeric (xeric)

Exposure: insolation, usually wind (4)

Bedrock Geology: usually coarse: granitic or conglomerate

Surface Substrate Features: most (4) have either moderately high bedrock exposure (class 3) (3) or moderately high surface rocks (2)

Soil Classification: generally Orthic Sombric Brunisols (4)

Humus Classification: normally Rhizomulls (3) and Vermimulls (2)

Depth of Ah Horizon: 8 to > 30 cm Colour of Ah Horizon: ordinarily dark, 10YR2/1 Depth to Bedrock: various: two are shallow (4, 8 cm), two are 60 cm (estimated), 80 cm (estimated), two are without indications of bedrock

Surface Soil Texture: coarse: loamy sand to loam, several are very gravelly (3)

Percent Coarse Fragments: usually high (60 to 90 %) in subsurface horizons (4)

Comments: Occurrence on very steep to moderately steep slopes, moderately high bedrock or rock exposure, deep, dark *Ah* horizons of sandy loam to loam texture, and high subsurface coarse fragments partly distinguish this plant community.

c4 Oak - Broom - *Poa pratensis*

Ecosystem Description:

Frequency of Occurrence: 5 plots, moderately frequent locally

Distribution: From Plots: Saanich Peninsula: Water Tower Hill, Scafe Hill, Thetis Lk. Pk., Glendale Lands, Naden Hill From Notes: none

Plant Community Description: *Cytisus scoparius* (introduced broom) thrives on all sites as a low (B2) and a tall (B1) shrub, both with high cover, averaging class 4 to 5 for the former and class 3 for the latter.

Poa pratensis occupies most sites and averages class 4 in cover. *Elymus glaucus* (blue wildrye), *Vicia sativa* (introduced common vetch), and *Sanicula crassicaulis* (Pacific snakeroot) occur on all sites, and average class 2, 1, and 2, respectively.

The remaining species are present on most sites. *Eurhynchium oregonum* (moss) averages class 2 to 3 cover. *Symphoricarpos albus* (snowberry), *Dactylis glomerata* (introduced orchardgrass), *Galium aparine* (cleavers), and *Camassia leichtlinii* (great camas) average class 2. *Bromus carinatus* (California bromegrass), *Bromus mollis* (introduced soft bromegrass), *Montia perfoliata* (perfoliate-leaved miners lettuce), and *Stellaria media* (introduced chickweed) average cover class 1 to 2. *Veronica serpyllifolia* (thyme-leaved speedwell) and *Geranium molle* (introduced dovefoot geranium) average cover class 1.

Tree Canopy/ Landscape Expression: generally tall shrub (B1) layer canopy

Oak Characteristics: Diameters: mostly small; Regeneration: Regeneration is occurring on most sites for both saplings and seedlings. Stocking is moderate for both.

Physiognomic Type: usually Oak - Broom - Parkland (3) or Shrub Oak - Basin Broomland. Elevation: low to high (3) Slope: primarily gentle (one is steep)

Aspect: various Surface Shape: various, concave (2)

Moisture Regime: about submesic (subxeric to mesic) Exposure: several (3) with insolation exposure Bedrock Geology: various: granitic or gneiss (3), no data (1)

Surface Substrate Features: some moderately high bedrock exposure (class 3) (2) Soil Classification: Orthic Sombric Brunisols Humus Classification: usually Orthi Rhizomulls Depth of Ah Horizon: usually > 20 cm to 30 cm

Colour of Ah Horizon: dark and slightly brownish Depth to Bedrock: some 5 to 25 cm (3) Surface Soil Texture: sandy loam to silt loam, usually gravelly to very gravelly at depth (4). Percent Coarse Fragments: various

Discussion:

This plant community is partly distinguished by its deep, dark *Ah* horizons of sandy loam to silt loam texture, and its occurrence on gentle slopes on a variety of aspects. It is geographically restricted to the Saanich Peninsula.

c5 Oak - Broom - *Dactylis glomerata*

Ecosystem Description:

Frequency of Occurrence: frequent, 5 plots

Distribution: From Plots: Gabriola Is.; Pender Island: Oak Bluffs; Saanich Peninsula: Thetis Lk. Pk.; western shore: Lester Pearson College From Notes: Saanich Peninsula: Summit Pk; western shore: Belmont Pk., Mary Hill.

Plant Community Description: *Cytisus scoparius* (introduced broom) occupies all sites as a low shrub (B2) and as a tall shrub (B1), both with an average class 3 cover. *Dactylis glomerata* (introduced orchardgrass) thrives, with high cover- class 4 to 5, on all sites.

Galium aparine (cleavers) and *Osmorhiza chilensis* (sweet cicely) occur on all sites and average class 2 to 3 cover. *Bromus carinatus* (California bromegrass), *Poa pratensis* (introduced Kentucky bluegrass), *Vicia sativa* (introduced common vetch), and *Sanicula crassicaulis* (Pacific snakeroot) grow on all sites and average class 2 in cover.

The remaining species exist on most sites. *Vicia hirsuta* (introduced hairy vetch) averages cover class 2 to 3. *Montia perfoliata* (perfoliate-leaved miners lettuce) and *Plantago lanceolata* (introduced narrow leaved plantain) average class 1 to 2. *Nemophila parviflora* (grove lover) and *Polystichum munitum* (swordfern) average class 1.

Tree Canopy/ Landscape Expression: usually high cover tree canopy (A) layer

Oak Characteristics: Diameters: various: 18 to 82.7 cm;

Regeneration: is present on most sites for both saplings and seedlings. Saplings are moderately well-stocked. Seedlings are lightly-stocked.

Physiognomic Type: Oak - Broom - Parkland.

Elevation: various, 30 to 120 m Slope: chiefly gentle, one steep

Aspect: east (110 deg.) to southwest (200 deg.)

Surface Shape: usually straight Moisture Regime: mesic to submesic

Exposure: wind (3) Bedrock Geology: various, several coarse: sandstone, conglomerate (3) Surface Substrate Features: few features
Soil Classification: usually Orthic Sombric Brunisols
Humus Classification: commonly Vermimulls Depth of Ah Horizon: usually > 25 cm(4) Colour of Ah Horizon: dark, 10YR 2/1, 2/1.5
Depth to Bedrock: typically without, two are shallow, 4 to 25 cm
Surface Soil Texture: tends to be coarse, all are gravelly or very gravelly
Percent Coarse Fragments: medium to high coarse fragments in the subsurface horizons (55 to 80 %)
Discussion:

Coarse-textured, deep, dark *Ah* horizons, medium to high subsurface coarse fragments, occurrence on gentle slopes and widespread geographic distribution partly distinguish this plant community.

Key to the Garry Oak Plant Communities

SYNOPSIS OF KEY

A. Early-season classification...[4]5

Camassia quamash usually dominant:
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 3 REMAINING COMMUNITIES WHICH FITS

B. Later season classification...

1.Mostly native dominant species...

1a. Bedrock landscapes...

Rhacomitrium canescens...
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

Dicranum scoparium...
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

1b. Dominated by dense cover of native shrubs

Rosa nutkana...
CHOOSE THE FIRST OF THE 2 SUBCOMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 2 REMAINING COMMUNITIES WHICH FITS

1c. Dominated by native herbaceous vegetation

Festuca idahoensis...
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 5 REMAINING COMMUNITIES WHICH FITS

1d. Previous criteria not met, dry colluvial sites, native shrubs
CHOOSE THE FIRST OF THE 2 COMMUNITIES WHICH FITS

2. Mostly introduced dominant species... broom absent or...

Dactylis glomerata ...
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 4 REMAINING COMMUNITIES WHICH FITS

3. Broom dominant...

3a. Bedrock landscape...

Rhacomitrium canescens...
CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

3b. Other broom sites, dominated primarily by herbaceous...
CHOOSE THE FIRST OF THE 3 COMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 3 *Dactylis glomerata* SUBCOMMUNITIES WHICH FITS
CHOOSE THE FIRST OF THE 2 REMAINING COMMUNITIES WHICH FITS

C Repeat key if community not found

[4] Stands are to be keyed in the early season section between April 1 and May 15 or when plant phenology allows. Once keyed to an early season plant community, a site may also be keyed to a later season classification and have two identified plant communities.

Facultative Key to Garry Oak Plant Communities:

This key is primarily to be applied where Garry oak (*Quercus garryana*) is dominant in at least one layer, secondarily where it is co-dominant or subdominant. The reference to "other species" in the key alludes only to those in this key. Percent cover values are given here for convenience only. The cover classes outlined in Methodology and used in the plant community chapters (5 & 6) are recommended for use. Stands of vegetation are to be classified into one or both of the two time interval classes shown ahead.

A. Early-season classification, April 1 to May 15: early-season plant communities defined by herbaceous vegetation, especially bulb-forming species: broom (*Cytisus scoparius*) present or absent[6]: (if not see B.)

A1a. *Camassia quamash* usually dominant: (if not see **A1b.**)

A1a1. *Erythronium oreganum* usually >= 11% cover, *Camassia quamash* usually >= 11% cover: **c35a** Oak- *Camassia quamash - Erythronium oreganum* subcommunity (if not see **A1a2.**)

A1a2. *Dodecatheon hendersonii* >= 11% cover, *Camassia quamash* usually >= 11% cover: **c35b** Oak - *Camassia quamash - Dodecatheon hendersonii* subcommunity (if not see **A1a3.**)

A1a3. *Ranunculus occidentalis* >= 11% cover, *Camassia quamash* usually >= 11% cover: **c37b** Oak - *Camassia quamash - Ranunculus occidentalis* subcommunity (if not see **A1a4.**)

A1a4. previous three sets of criteria not met, *Camassia quamash* usually >= 11% cover: **c37a** Oak - *Camassia quamash*: Typic subcommunity (if not go to **C.**)

A1b. *Plectritis congesta* >= 11% cover, *Dicranum scoparium* usually >= 11% cover, bedrock landscapes: **c51** Oak - *Dicranum scoparium - Plectritis congesta* subcommunity (if not see **A1c.**) (also in the key below)

A1c. *Montia perfoliata* >= 11% cover: **c48** Oak - *Montia perfoliata* (if not see **A1d.**)

[6] Stands are to be keyed in the early season section between April 1 and May 15 or when plant phenology allows. Once keyed to an early season plant community, a site may also be keyed to a later season classification and have two identified plant communities.

A1d. *Camassia leichtlinii* >= 11% cover: **c36** Oak - *Camassia leichtlinii* (if not see **B.**)

B. Later season classification (generally after May 15): Continue in the key to add classification where not determined in previous step[7]: (if not go to C.)

1. Mostly native dominant species, broom absent or of secondary importance <= 11 to 15% cover (low cover class 3): **(if not, go to 2.)**

1a. Bedrock landscapes, units defined by combinations of mosses and herbaceous vegetation: **(if not, go to 1b.)**

1a1. *Rhacomitrium canescens* usually dominant, south- and west-facing slopes: **(if not, go to 1a2.)**

1a1a. *Selaginella wallacei* and/or *Rhacomitrium canescens* >= 11% cover, the other of which > 2% cover: **c46** Oak - *Rhacomitrium canescens -Selaginella wallacei* subcommunity **(if not, go to 1a1b.)**

1a1b. *Festuca bromoides* and/or *Rhacomitrium canescens* >= 11% cover, the other of which > 2% cover: **c50** Oak - *Rhacomitrium canescens - Festuca bromoides* subcommunity **(if not, go to 1a1c.)**

1a1c. *Bromus tectorum* >= 11% cover, *Rhacomitrium canescens* usually >= 11% cover (often > 51%): **c22** Oak - Broom - *Rhacomitrium canescens - Bromus tectorum* subcommunity **(if not, go to 1a1d.)** (also in the key below)

1a1d. previous three sets of criteria not met, *Rhacomitrium canescens* >= 26% cover, > other species: **c17** Oak - Broom - *Rhacomitrium canescens*: Typic subcommunity (if not go to **C.**) (also in the key below)

1a2. *Dicranum scoparium* usually dominant, usually north-

[7] Stands are generally to be keyed in the later season section after May 15, or when plant phenology allows. Once keyed to a later season plant community, a site may also be keyed to an early season classification and have two identified plant communities.

and east- facing slopes: **(if not, go to 1b.)**

1a2a. *Montia parvifolia* >= 11% cover, *Dicranum scoparium* usually >= 11% cover: **c11** Oak -*Dicranum scoparium - Montia parvifolia* subcommunity
(if not, go to 1a2b.)

1a2b. *Plectritis congesta* >= 11% cover, *Dicranum scoparium* usually >= 11% cover: **c51** Oak - D*icranum scoparium - Plectritis congesta* subcommunity
(**if not see 1a2c.**) (also in the key below)

1a2c. *Sedum spathulifolium* >= 11% cover, *Dicranum scoparium* usually >= 11% cover: **c45** Oak - *Dicranum scoparium - Sedum spathulifolium* subcommunity
(if not see **1a2d.**)

1a2d. previous three sets of criteria not met, *Dicranum scoparium* >= 11% cover: **c52** Oak - *Dicranum scoparium*: Typic subcommunity (if not go to **C.**)

1b. Dominated by dense cover of native shrubs (thickets):
(if not see **1c.**)

1b1. *Rosa nutkana* usually dominant: (if not see **1b2.**)

1b1a. *Lonicera ciliosa* and/or *Rosa nutkana* >= 11% cover, the other of which >= 2%: **c8** Oak - *Symphoricarpos albus - Rosa nutkana - Lonicera ciliosa* subcommunity (if not see **1b1b.**)

1b1b. *Oemleria cerasiformis* and/or *Rosa nutkana* >= 11% cover (usually >26%), the other of which > 2%: **c9** Oak - *Symphoricarpos albus - Rosa nutkana - Oemleria cerasiformis* subcommunity (if not go to **C.**)

1b2. *Rhytidiadephus triquetris* and/or *Holodiscus discolor* >= 11% cover (usually > 26%), rocky substrate: **c10** Oak - (Fd) - *Holodiscus discolor* - *Symphoricarpos albus* - *Rhytidiadephus triquetris* (if not see **1b3.**)

1b3. *Polypodium glycyrrhiza* >= 11% cover, usually with *Holodiscus discolor* and/or *Symphoricarpos albus* >= 11% cover, bedrock landscape: **c15** Oak - *Holodiscus discolor* - *Symphoricarpos albus* - *Polypodium glycyrrhiza* (if not go to **C.**)

1c. Dominated by native herbaceous vegetation: (if not go to **1d.**)

1c1. *Festuca idahoensis* usually dominant: (if not see **1c2.**)

1c1a. *Vicia americana* >= 2 % cover (usually >= 11%), *Festuca idahoensis* often >= 11% cover, seaside location, usually krummholz oak form: **c42** Krummholz Oak - *Festuca idahoensis* - *Vicia americana* subcommunity (if not see **1c1b.**)

1c1b. *Trifolium microcephalum* >= 11% cover, *Festuca idahoensis* usually >= 11%: **c27** Oak - *Festuca idahoensis* - *Trifolium microcephalum* subcommunity (if not see **1c1c.**)

1c1c. *Cerastium arvense* >= 11% cover, *Festuca idahoensis* usually >= 11%, other species <= 11%: **c25** Oak - *Festuca idahoensis* - *Cerastium arvense* subcommunity (if not see **1c1d.**)

1c1d. previous three sets of criteria not met, *Festuca idahoensis* >= 11% cover, other species <=11% : **c20** Oak - *Festuca idahoensis*: Typic subcommunity (if not go to **C.**)

1c2. *Lathyrus nevadensis* >= 11% cover, other species various: **c41** Oak - *Lathyrus nevadensis* (if not see **1c3.**)

1c3. *Bromus carinatus* >= 11% cover, other species various: **c43** Oak - *Bromus carinatus* (if not see **1c4.**)

1c4. *Elymus glaucus* >= 11% cover, >= other herb species: **c47** Oak - *Elymus glaucus* (if not see **1c5.**)

1c5. *Melica subulata* >= 11% cover, >= other species: **c13** Oak - *Melica subulata* (if not see **1c6.**)

1c6. *Carex inops* >= 11% cover, >= other species: **c14** Oak - *Carex inops* (if not go to **C.**)

1d. Previous criteria sets not met, dry, colluvial sites, dominated by native shrubs: (if not go to **C.**)

1d1. *Lonicera hispidula* >= 11% cover >= other species: **c16a** Oak - *Lonicera hispidula* (colluvial) (if not see **1d2.**)

1d2. *Mahonia aquifolium* >= 11% cover >= other species: **c26** Oak - *Mahonia aquifolium* (if not go to **C.**)

2. Mostly introduced dominant species, or mixed with native secondary dominants, broom absent or of secondary importance <= 11-15% (low class "3"): (if not see **3.**)

2a. *Dactylis glomerata* usually dominant: (if not see **2b.**)

2a1. *Bromus carinatus* >= 11% cover, *Dactylis glomerata* >= 26% >= other species: **c28b** Oak - *Dactylis glomerata - Bromus carinatus* subcommunity (if not see **2a2.**)

2a2. *Arrhenatherum elatius* >= 11% cover, *Dactylis glomerata* >= 11% cover, either >= other species: **c30** Oak - *Dactylis glomerata - Arrhenatherum elatius* subcommunity (if not see **2a3.**) (also in the key below)

2a3. *Agrostis stolonifera* >= 11% cover, *Dactylis glomerata* usually >= 11%, either >= other species: **c49** Oak - *Dactylis glomerata - Agrostis stolonifera* subcommunity (if not see **2a4.**) (also in the key below)

2a4. previous three sets of criteria not met, *Dactylis glomerata* >= 11% cover >= other herb species: **c28a** Oak - *Dactylis glomerata*: Typic subcommunity (if not go to **C.**)

2b. *Cynosurus echinatus* >= 26% cover, >= other species: **c21** Oak - *Cynosurus echinatus* (late-season) (if not see **2c.**)

2c. *Bromus sterilis* >= 11% cover, usually >= 26%: **c23** Oak - *Bromus sterilis* (if not see **2d.**) (also in the key below)

2d. *Anthoxanthum odoratum* >= 11% cover, usually >= 26%, >= other species: **c31a** Oak - *Anthoxanthum odoratum* (if not see **2e.**)

2e. *Poa pratensis* and/or *Vicia sativa* >= 11% cover, >= other herb species: **c29a** Oak -*Poa pratensis* (if not go to **C.**)

3. Broom dominant, >= 15% cover, (> low class "3"), usually >26%: (if not go to **C.**)

3a. Bedrock landscape, dominated by combinations of mosses and herbaceous vegetation: (if not see **3b.**)

3a1. *Rhacomitrium canescens* usually dominant, >= 26% cover: (if not see **3b.**)

3a1a. *Bromus tectorum* >= 11% cover, *Rhacomitrium canescens* usually >= 11% (often > 51%): **c22** Oak - Broom - *Rhacomitrium canescens* - *Bromus tectorum* subcommunity (if not see **3a1b.**)
(also in the key above)

3a1b. *Festuca bromoides* >= 11% cover, >= other species, *Rhacomitrium canescens* usually >= 11%: **c3** Oak - Broom - *Rhacomitrium canescens* -*Festuca bromoides* - *Aira* subcommunity (if not see **3a1c.**)

3a1c. *Rhacomitrium canescens* >= 26% cover, > other species: **c17** Oak - Broom - *Rhacomitrium canescens*: Typic subcommunity (if not go to **C.**)
(also in the key above)

3b. Other broom sites, dominated primarily by introduced herbaceous vegetation: (if not go to **C.**)

3b1. *Elymus glaucus* >= 11% cover: **c6** Oak - Broom - *Elymus glaucus* (if not see **3b2.**)

3b2. *Cynosurus echinatus* >= 11% cover, >= other species, late-season plant community: **c2** Oak - Broom -*Cynosurus echinatus* (if not see **3b3.**)

3b3. *Anthoxanthum odoratum* >= 11% cover (usually >= 26%) > other species: **c31b** Oak -Broom -*Anthoxanthum odoratum* (if not see **3b4.**)

3b4. *Dactylis glomerata* usually dominant: (if not see **3b5.**)

3b4a. *Dactylis glomerata* >= 11% cover, (usually >= 26%) >= other species: **c5** Oak - Broom - *Dactylis glomerata* (if not see **3b4b.**)

3b4b. *Arrhenatherum elatius* >= 11% cover, *Dactylis glomerata* >= 11% cover, either >= other species: **c30** Oak - *Dactylis glomerata - Arrhenatherum elatius* subcommunity (if not see **3b4c.**) (also in the key above)

3b4c. *Agrostis stolonifera* >= 11% cover, *Dactylis glomerata* usually 11%, either >= other species: **c49** Oak - *Dactylis glomerata - Agrostis stolonifera* subcommunity (if not go to **C.**) (also in the key above)

3b5. *Poa pratensis* >= 11% cover, (usually >= 26%) >= other species: **c4** Oak - Broom - *Poa pratensis* (if not see **3b6.**)

3b6. *Bromus sterilis* >= 11% cover, usually >= 26%: **c23** Oak - *Bromus sterilis* (if not go to **C.**) (also in the key above))

C. Repeat key and obtain best "fit". If there is no "fit", note as an unrecognized community.

Common Name Key to the Garry Oak Plant Communities

SYNOPSIS OF KEY

A. Early-season classification...[8]

early camas usually dominant:

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 3 REMAINING COMMUNITIES WHICH FITS

B. Later season classification...

1.Mostly native dominant species...

1a. Bedrock landscapes...

gray frayed-cap moss ...

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

broom moss ....

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

1b. Dominated by dense cover of native shrubs

Nootka rose ...

CHOOSE THE FIRST OF THE 2 SUBCOMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 2 REMAINING COMMUNITIES WHICH FITS

1c. Dominated by native herbaceous vegetation

Idaho fescue ...

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 5 REMAINING COMMUNITIES WHICH FITS

1d. Previous criteria not met, dry colluvial sites, native shrubs

CHOOSE THE FIRST OF THE 2 COMMUNITIES WHICH FITS

2. Mostly introduced dominant species... broom absent or...

orchardgrass ...

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 4 REMAINING COMMUNITIES WHICH FITS

3. Broom dominant...

3a. Bedrock landscape...

gray frayed-cap moss...

CHOOSE THE FIRST OF THE 4 SUBCOMMUNITIES WHICH FITS

3b. Other broom sites, dominated primarily by herbaceous...

CHOOSE THE FIRST OF THE 3 COMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 3 orchardgrass SUBCOMMUNITIES WHICH FITS

CHOOSE THE FIRST OF THE 2 REMAINING COMMUNITIES WHICH FITS

C Repeat key if community not found.

[8] Stands are to be keyed in the early season section between April 1 and May 15 or when plant phenology allows. Once keyed to an early season plant community, a site may also be keyed to a later season classification and have two identified plant communities.

Common Name Key to Garry Oak Plant Communities:

This key is primarily to be applied where Garry oak is dominant in at least one layer, secondarily where it is co-dominant or subdominant. The reference to "other species" in the key alludes only to those in this key. Percent cover values are given here for convenience only. The cover classes outlined in Methodology and used in the plant community chapters (5 & 6) are recommended for use. Stands of vegetation are to be classified into one or both of the two time interval classes shown ahead.

A. Early-season classification, April 1 to May 15: early-season plant communities defined by herbaceous vegetation, especially bulb-forming species: broom present or absent[9]: (if not see B.)

A1a. early camas usually dominant: (if not see **A1b.**)

A1a1. Easter lily usually >= 11% cover, early camas usually >= 11% cover: **c35a** Oak- early camas - Easter lily subcommunity (if not see **A1a2.**)

A1a2. Henderson's shooting star >= 11% cover, early camas usually >= 11% cover: **c35b** Oak - early camas - Henderson's shooting star subcommunity (if not see **A1a3.**)

A1a3. western buttercup >= 11% cover, early camas usually >= 11% cover: **c37b** Oak - early camas - western buttercup subcommunity (if not see **A1a4.**)

A1a4. previous three sets of criteria not met, early camas usually >= 11% cover: **c37a** Oak - early camas: Typical subcommunity (if not go to **C.**)

A1b. seablush >= 11% cover, broom moss usually >= 11% cover, bedrock landscapes: **c51** Oak - broom moss - seablush subcommunity (if go to **A1c.**) (also in the key below)

A1c. perfoliate-leaved miner's lettuce >= 11% cover: **c48** Oak - perfoliate-leaved miner's lettuce (if not see **A1d.**)

[9] Stands are to be keyed in the early season section between April 1 and May 15 or when plant phenology allows. Once keyed to an early season plant community, a site may also be keyed to a later season classification and have two identified plant communities.

A1d. great camas >= 11% cover: **c36** Oak - great camas (if not see **B.**)

B. Later season classification (generally after May 15): Continue in the key to add classification where not determined in previous step[10]: (if not go to C.)

1. Mostly native dominant species, broom absent or of secondary importance <= 11 to 15% cover (low cover class 3): **(if not, go to 2.)**

1a. Bedrock landscapes, units defined by combinations of mosses and herbaceous vegetation: **(if not, go to 1b.)**

1a1. gray frayed-cap moss usually dominant, south- and west-facing slopes: **(if not, go to 1a2.)**

1a1a. Wallace's selaginella and/or gray frayed-cap moss >= 11% cover, the other of which > 2% cover: **c46** Oak - gray frayed-cap mossWallace's selaginella subcommunity **(if not, go to 1a1b.)**

1a1b. annual fescue and/or gray frayed-cap moss >= 11% cover, the other of which > 2% cover: **c50** Oak - gray frayed-cap moss - annual fescue subcommunity **(if not, go to 1a1c.)**

1a1c. cheatgrass >= 11% cover, gray frayed-cap moss usually >= 11% cover (often > 51%): **c22** Oak - Broom - gray frayed-cap moss - cheatgrass subcommunity **(if not, go to 1a1d.)** (also in the key below)

1a1d. previous three sets of criteria not met, gray frayed-cap moss >= 26% cover, > other species: **c17** Oak - Broom - gray frayed-cap moss: Typical subcommunity (if not go to **C**) (also in the key below)

[10] Stands are generally to be keyed in the later season section after May 15, or when plant phenology allows. Once keyed to a later season plant community, a site may also be keyed to an early season classification and have two identified plant communities.

1a2. broom moss usually dominant, usually north- and east-facing slopes: **(**if not, go to **1b.)**

1a2a. small-leaved montia >= 11% cover, broom moss usually >= 11% cover: **c11** Oak broom moss - small-leaved montia subcommunity **(**if not, go to **1a2b.)**

1a2b. seablush >= 11% cover, broom moss usually >= 11% cover: **c51** Oak - broom moss seablush subcommunity (if not go to **1a2c.**) (also in the key below)

1a2c. broad-leaved stonecrop >= 11% cover, broom moss usually >= 11% cover: **c45** Oak - broom moss - broad-leaved stonecrop subcommunity (if not see **1a2d.**)

1a2d. previous three sets of criteria not met, broom moss >= 11% cover: **c52** Oak - broom moss: Typical subcommunity (if not go to **C.**)

1b. Dominated by dense cover of native shrubs (thickets): (if go to **1c.**)

1b1. Nootka rose usually dominant: (if not see **1b2.**)

1b1a. orange honeysuckle and/or nootka rose >= 11% cover, the other of which >= 2%: **c8** Oak - snowberry - nootka rose - orange honeysuckle subcommunity (if not see **1b1b.**)

1b1b. osoberry[11] and/or nootka rose >= 11% cover (usually >26%), the other of which > 2%: **c9** Oak - snowberry - nootka rose - osoberry[12] subcommunity (if not go to **C.**)

[11] Osoberry is also known as Indian plum.

[12]Osoberry is also known as Indian plum.

1b2. electric cat's tail moss and/or ocean spray >= 11% cover (usually > 26%), rocky substrate: **c10** Oak - (Douglas-fir) - ocean spray - snowberry - electric cat's tail moss (if not see **1b3.**)

1b3. licorice fern >= 11% cover, usually with ocean spray and/or snowberry >= 11% cover, bedrock landscape: **c15** Oak - ocean spray - snowberry - licorice fern (if not go to **C.**)

1c. Dominated by native herbaceous vegetation: (if not go to **1d.**)

1c1. Idaho fescue usually dominant: (if not go to **1c2.**)

1c1a. American vetch >= 2 % cover (usually >= 11%), Idaho fescue often >= 11% cover, seaside location, usually krummholz[13] oak form: **c42** Krummholz Oak - Idaho fescue - American vetch subcommunity (if not go to **1c1b.**)

1c1b. woolly clover >= 11% cover, Idaho fescue usually >= 11%: **c27** Oak - Idaho fescue - woolly clover subcommunity (if not go to **1c1c.**)

1c1c. field chickweed >= 11% cover, Idaho fescue usually >= 11%, other species <= 11%: **c25** Oak - Idaho fescue - field chickweed subcommunity (if not go to **1c1d.**)

1c1d. previous three sets of criteria not met, Idaho fescue >= 11% cover, other species <=11% : **c20** Oak - Idaho fescue: Typical subcommunity (if not go to **C.**)

1c2. purple peavine >= 11% cover, other species various: **c41** Oak - purple peavine (if not go to **1c3.**)

1c3. California bromegrass >= 11% cover, other species various: **c43** Oak - California bromegrass (if not go to **1c4.**)

1c4. blue wildrye >= 11% cover, >= other herb species: **c47** Oak - blue wildrye (if not go to **1c5.**)

[13] krummholz form in oak refers to a prostrate and creeping habit on the most exposed sites.

1c5. oniongrass >= 11% cover, >= other species:
c13 Oak - oniongrass (if not go to **1c6.**)

1c6. long-stoloned sedge >= 11% cover, >= other species:
c14 Oak - long-stoloned sedge (if not go to **C.**)

1d. Previous criteria sets not met, dry, colluvial sites, dominated by native shrubs: (if not go to **C.**)

1d1. hairy honeysuckle >= 11% cover >= other species:
c16a Oak - hairy honeysuckle (colluvial) (if not see **1d2.**)

1d2. tall Oregon grape >= 11% cover >= other species:
c26 Oak - tall Oregon grape (if not go to **C.**)

2. Mostly introduced dominant species, or mixed with native secondary dominants, broom absent or of secondary importance <= 11-15% (low class "3"): (if not see **3.**)

2a. orchardgrass usually dominant: (if not see **2b.**)

2a1. California bromegrass >= 11% cover, orchardgrass >= 26% >= other species: **c28b** Oak - orchardgrass - California bromegrass subcommunity (if not see **2a2.**)

2a2. tall oatgrass >= 11% cover, orchardgrass >= 11% cover, either >= other species: **c30** Oak - orchardgrass - tall oatgrass subcommunity (if not see **2a3.**) (also in the key below)

2a3. redtop hairgrass >= 11% cover, orchardgrass usually >= 11%, either >= other species: **c49** Oak - orchardgrass - redtop subcommunity (if not see **2a4.**)
(also in the key below)

2a4. previous three sets of criteria not met, orchardgrass >= 11% cover >= other herb species: **c28a** Oak - orchardgrass: Typical subcommunity (if not go to **C.**)

2b. dogtail bristlegrass >= 26% cover, >= other species: **c21** Oak - dogtail bristlegrass (late-season) (if not go to **2c.**)

2c. barren barngrass >= 11% cover, usually >= 26%: **c23** Oak - barren barngrass (if not see **2d.**) (also in the key below)

2d. sweet vernal grass >= 11% cover, usually >= 26%, >= other species: **c31a** Oak - sweet vernal grass (if not go to **2e.**)

2e. Kentucky bluegrass and/or common vetch >= 11% cover, >= other herb species: **c29a** Oak - Kentucky bluegrass - common vetch (if not go to **C.**)

3. Broom dominant, >= 15% cover, (> low class "3"), usually >26%: (if not go to **C.**)

3a. Bedrock landscape, dominated by combinations of mosses and herbaceous vegetation: (if not see **3b.**)

3a1. gray frayed cap moss usually dominant, >= 26% cover: (if not see **3b.**)

3a1a. cheatgrass >= 11% cover, gray frayed cap moss usually >= 11% (often > 51%): **c22** Oak - Broom - gray frayed cap moss - cheatgrass subcommunity (if not see **3a1b.**) (also in the key above)

3a1b. annual fescue >= 11% cover, >= other species, gray frayed cap moss usually >= 11%: **c3** Oak - Broom-gray frayed cap moss - annual fescue subcommunity (if not go to **3a1c.**)

3a1c. gray frayed cap moss >= 26% cover, > other species: **c17** Oak - Broom - gray frayed cap moss: Typical subcommunity (if not go to **C.**) (also in the key above)

3b. Other broom sites, dominated primarily by introduced herbaceous vegetation: (if not go to **C.**)

3b1. blue wildrye >= 11% cover: **c6** Oak - Broom - blue wildrye (if not see **3b2.**)

3b2. dogtail bristlegrass >= 11% cover, >= other species, late-season plant community: **c2** Oak - Broom - dogtail bristlegrass (if not see **3b3.**)

3b3. sweet vernalgrass >= 11% cover (usually >= 26%) > other species: **c31b** Oak -Broom -sweet vernalgrass (if not see **3b4.**)

3b4. orchardgrass usually dominant: (if not see **3b5.**)

3b4a. orchardgrass >= 11% cover, (usually >= 26%) >= other species: **c5** Oak - Broom - orchardgrass (if not see **3b4b.**)

3b4b. tall oatgrass >= 11% cover, orchardgrass >= 11% cover, either >= other species: **c30** Oak - orchardgrass - tall oatgrass subcommunity (if not go to **3b4c.**) (also in the key above)

3b4c. redtop >= 11% cover, orchardgrass usually > = 11%, either >= other species: **c49** Oak - orchardgrass-redtop subcommunity (if not go to **C.**) (also in the key above)

3b5. Kentucky bluegrass >= 11% cover, (usually >= 26%) >= other species: **c4** Oak - Broom - Kentucky bluegrass (if not see **3b6.**)

3b6. barren barngrass >= 11% cover, usually >= 26%: **c23** Oak - barren barngrass (if not go to **C.**) (also in the key above))

C. Repeat key and obtain best "fit". If there is no "fit", note as an unrecognized community.

NUMERICAL LIST OF GARRY OAK PLANT COMMUNITES (see ahead for common names)

c2 Oak - Broom - *Cynosurus echinatu*s (late season)
c3 Oak - Broom - *Rhacomitrium canescens- Festuca bromoides - Aira* subcommunity
c4 Oak - Broom - *Poa pratensis*
c5 Oak - Broom - *Dactylis glomerata*
c6 Oak - Broom - *Elymus glaucus*
c8 Oak - *Symphoricarpos albus - Rosa nutkana - Lonicera ciliosa* subcommunity (thickets)
c9 Oak - *Symphoricarpos albus - Rosa nutkana - Oemleria cerasiformis* subcommunity (thickets)
c10 Oak - (Fd) - *Holodiscus discolor - Symphoricarpos albus - Rhytidiadephus triquetris*
c11 Oak - *Dicranum scoparium - Montia parvifolia* subcommunity
c13 Oak - *Melica subulata*
c14 Oak - *Carex inops*
c15 Oak - *Holodiscus discolor - Symphoricarpos albus - Polypodium glycyrrhiza*
c16a Oak - *Lonicera hispidula* (colluvial)
c17 Oak - Broom - *Rhacomitrium canescens: Typic* subcommunity
c20 Oak - *Festuca idahoensis*: Typic
c21 Oak - *Cynosurus echinatus* (late season)
c22 Oak - Broom - *Rhacomitrium canescens - Bromus tectorum* subcommunity
c23 Oak - *Bromus sterilis*
c25 Oak - *Festuca idahoensis - Cerastium arvense* subcommunity
c26 Oak - *Mahonia aquifolium*
c27 Oak - *Festuca idahoensis - Trifolium microcephalum* subcommunity
c28a Oak - *Dactylis glomerata*: Typic subcommunity
c28b Oak - *Dactylis glomerata - Bromus carinatus* subcommunity
c29a Oak - *Poa pratensis - Vicia sativa*
c30 Oak - *Dactylis glomerata - Arrhenatherum elatius* subcommunity
c31a Oak - *Anthoxanthum odoratum**
c31b Oak- Broom - *Anthoxanthum odoratum**
c35a Oak - *Camassia quamash - Erythronium oregonum* subcommunity (early season)
c35b Oak - *Camassia quamash - Dodecatheon hendersonii* subcommunity (early season)
c36 Oak - *Camassia leichtlinii* (early season)
c37a Oak - *Camassia quamash*: Typic subcommunity (early season)

c37b Oak - *Camassia quamash* - *Ranunculus occidentalis* subcommunity (early season)
c41 Oak - *Lathyrus nevadensis*
c42 Krummholz Oak - *Festuca idahoensis* - *Vicia americana* (sea-edge) subcommunity
c43 Oak - *Bromus carinatus*
c45 Oak - *Dicranum scoparium* - *Sedum spathulifolium* subcommunity
c46 Oak - (Fd) - *Rhacomitrium canescens* - *Selaginella wallacei* subcommunity
c47 Oak - *Elymus glaucus*
c48 Oak - *Montia perfoliata* (early season)
c49 Oak - *Dactylis glomerata* - *Agrostis stolonifera* subcommunity
c50 Oak - *Rhacomitrium canescens* - *Festuca bromoides* subcommunity
c51 Oak - *Dicranum scoparium* - *Plectritis congesta* subcommunity (early season)
c52 Oak - *Dicranum scoparium*: Typic subcommunity

NUMERICAL LIST OF GARRY OAK PLANT COMMUNITIES BY COMMON NAME

c2 Oak - Broom* - dogtail bristlegrass* (late season)
c3 Oak - Broom* - gray frayed-cap moss - annual fescue* - hairgrass* subcommunity
c4 Oak - Broom* - Kentucky bluegrass*
c5 Oak - Broom* - orchardgrass*
c6 Oak - Broom* - blue wildrye
c8 Oak - ocean spray - snowberry - orange honeysuckle subcommunity (thickets)
c9 Oak - snowberry - Nootka rose - osoberry[14] subcommunity (thickets)
c10 Oak - (Douglas-fir) - ocean spray - snowberry - electic cat's-tail moss subcommunity
c11 Oak -broom moss - small-leaved montia subcommunity
c13 Oak - oniongrass
c14 Oak - long-stoloned sedge
c15 Oak - ocean spray - snowberry - licorice fern subcommunity
c16a Oak - hairy honeysuckle (colluvial)
c17 Oak - Broom* - gray frayed-cap moss typical subcommunity
c20 Oak - Idaho fescue: typical subcommunity
c21 Oak - dogtail bristlegrass* (late season)
c22 Oak - Broom* - gray frayed-cap moss - cheatgrass* subcommunity
c23 Oak - sterile barngrass*
c25 Oak - Idaho fescue - field chickweed subcommunity
c26 Oak - tall Oregon grape
c27 Oak - Idaho fescue - woolly clover subcommunity
c28a Oak - orchardgrass*: typical subcommunity
c28b Oak - orchardgrass* - California bromegrass subcommunity
c29a Oak - Kentucky bluegrass* - common vetch*
c30 Oak - orchardgrass* - tall oatgrass* subcommunity
c31a Oak - sweet vernalgrass*
c31b Oak - Broom* - sweet vernalgrass*
c35a Oak- early camas - Easter lily subcommunity
c35b Oak - early camas - Henderson's shooting star subcommunity
c36 Oak - great camas

[14]Osoberry is also known as Indian plum.

c37a Oak - early camas: typical subcommunity
c37b Oak - early camas - western buttercup subcommunity
c41 Oak - peavine
c42 Krummholz Oak - Idaho fescue - American vetch subcommunity (sea-edge)
c43 Oak - California bromegrass
c45 Oak - broom moss - broad-leaved stonecrop subcommunity
c46 Oak - (Douglas-fir) - gray frayed-cap moss subcommunity
c47 Oak - blue wildrye
c48 Oak - perfoliate-leaved miner's lettuce
c49 Oak - orchardgrass* - redtop hairgrass* subcommunity
c50 Oak - gray frayed-cap moss - annual fescue* subcommunity
c51 Oak - broom moss - seablush subcommunity (also below)
c52 Oak - broom moss - Typical subcommunity

* introduced species

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