

## Appendix 11. Willamette Valley - Puget Trough - Georgia Basin Ecoregion Terrestrial Ecological System EO Specs and EO Rank Specs

*Systems are listed by type in the following order: marine associated, freshwater wetlands, dry herbaceous, oak woodlands and conifer forests.*

### INTERTIDAL SALT MARSHES

CAREX LYNGBYEI - (DISTICHLIS SPICATA - TRIGLOCHIN MARITIMUM) HERBACEOUS VEGETATION  
CAREX LYNGBYEI HERBACEOUS VEGETATION  
DISTICHLIS SPICATA - (SALICORNIA VIRGINICA) HERBACEOUS VEGETATION  
GLAUX MARITIMA HERBACEOUS VEGETATION  
SALICORNIA VIRGINICA - DISTICHLIS SPICATA - TRIGLOCHIN MARITIMUM - (JAUMEA CARNOSA) HERBACEOUS VEGETATION  
SALICORNIA VIRGINICA HERBACEOUS VEGETATION  
SCIRPUS (AMERICANUS, PUNGENS) TIDAL HERBACEOUS VEGETATION  
SCIRPUS MARITIMUS TIDAL HERBACEOUS VEGETATION  
TRIGLOCHIN MARITIMUM - (SALICORNIA VIRGINICA) HERBACEOUS VEGETATION  
ARGENTINA EGEDII - ASTER SUBSPICATUS HERBACEOUS VEGETATION  
ARGENTINA EGEDII - JUNCUS BALTICUS HERBACEOUS VEGETATION  
CAREX LYNGBYEI - ARGENTINA EGEDII HERBACEOUS VEGETATION  
DESCHAMPSIA CESPITOSA - (CAREX LYNGBYEI - DISTICHLIS SPICATA) HERBACEOUS VEGETATION  
DESCHAMPSIA CESPITOSA - ARGENTINA EGEDII HERBACEOUS VEGETATION  
DESCHAMPSIA CESPITOSA - SIDALCEA HENDERSONII HERBACEOUS VEGETATION  
FESTUCA RUBRA - (ARGENTINA EGEDII) HERBACEOUS VEGETATION

Intertidal salt marshes are small patch systems, confined to specific environments defined by salinity, tidal inundation regime, and soil texture. They usually occur as zonal mosaics of multiple communities. Low marshes are located in areas that flood every day and are dominated by a variety of low-growing forbs and low to medium-height graminoids, especially *Salicornia virginica*, *Distichlis spicata*, and *Carex lyngbyei*. High marshes are located in areas that flood infrequently and are dominated by medium-tall graminoids and low forbs, especially *Deschampsia cespitosa*, *Argentina egedii* (*Potentilla pacifica*), and *Juncus balticus*.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) a natural community from a different ecological system wider than 0.5 km.

**Justification:** Intertidal marsh associations are usually intermixed. They sometimes occur as mosaics over large areas at estuaries of major rivers, where all patches of the same community type at the same estuary should probably be considered the same occurrence, i.e. other intertidal marsh communities are probably not barriers.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, filling, grazing, dredging, digging, vehicle use, etc. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or slightly altered by local drainage, filling, grazing, dredging, digging, or vehicle use. Alteration is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs, though high marsh may have abundant *Agrostis alba*.

**C -rated condition:** Natural hydrologic regime altered by local drainage, diking, filling, digging, or dredging. Alteration is extensive but potentially restorable over several decades. Vehicle use or grazing disturbance, if present, is extensive and significant enough to have notable impact on species composition. Exotic species (especially *Spartina* spp.) may be widespread but potentially manageable with restoration of most natural processes, except for *Agrostis alba* in the high marsh which is currently unmanageable.

**D -rated condition:** Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Invasive exotic species (*Spartina*) may be dominant over significant portions of area, with little hope for control. Community may be a result of colonization of fill material.

Justification for AA@-rated criteria: Intertidal marshes are dependent on specific hydrologic regimes, soils, and topographic levels. A-ranked Occurrences have processes, species composition, and physical environment intact.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation.

#### **SIZE.SPECS**

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Intertidal marshes are composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** No evidence of human-caused alteration of longshore currents or sedimentation processes. No invasive *Spartina* present on adjacent tidal flats. Uplands and/or freshwater wetlands surrounding Occurrence are largely unaltered by urban or agricultural uses (>90% natural). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. Minor or no known water quality problem in the estuary, due to local or upstream sources. No flood control dams on river feeding the estuary.

**B -rated landscape context:** Limited or minor human-caused alteration of longshore currents or sedimentation processes. No or very little, and easily controlled, invasive *Spartina* present on adjacent tidal flats. Uplands and freshwater wetlands surrounding Occurrence with moderate urban or agricultural alteration (60-90% natural), but retaining much connectivity. Few barriers present. Minor water quality problems in the estuary, due to local or upstream sources. Flood control dams on river feeding the estuary may be present.

**C -rated landscape context:** Local or moderate human-caused alteration of longshore currents or sedimentation processes that are restorable. Invasive *Spartina* may be abundant on adjacent tidal flats, altering hydrology and sedimentation processes. Uplands and freshwater wetlands surrounding Occurrence are fragmented by alteration (20-60% natural), with limited connectivity. Some barriers are present. Significant, but easily restorable, water quality problems in the estuary, due to local or upstream sources. Flood control dams on river feeding the estuary may be present.

**D -rated landscape context:** Major human-caused alteration of longshore currents or sedimentation processes, that may be unrestorable. Uplands and freshwater wetlands surrounding Occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered. Major water quality problems in the estuary, due to local or upstream sources. Flood control dams on river feeding the estuary may be present.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences. Flood control dams can have indirect influence by controlling sedimentation and erosion.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Natural processes are severely altered. *Spartina* on adjacent mudflats alters hydrology and sedimentation and threatens to invade marshes.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 11, 2000

## COASTAL SPITS, DUNES, AND STRAND

CAREX MACROCEPHALA HERBACEOUS VEGETATION  
FESTUCA RUBRA - AMBROSIA CHAMISSONIS HERBACEOUS VEGETATION  
LEYMUS MOLLIS SSP. MOLLIS - LATHYRUS JAPONICUS HERBACEOUS VEGETATION  
ARTEMISIA CAMPESTRIS - GRINDELIA STRICTA HERBACEOUS VEGETATION

These are linear communities dependent upon longshore drift and wind. Most of these are spits or berms behind sandy beaches, dunes are very rare in this ecoregion. In their natural state these are dominated by short to medium-tall grasses, sedges, or forbs, often with abundant bare sandy or gravelly surface exposed. *Leymus mollis* and *Festuca rubra* are the two most common dominant species, many other species are largely restricted to this environment.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including major highways, urban development, large bodies of water, (2) a natural community from a different ecological system wider than 2 km, unless the two areas of strand are part of the same contiguous beach, spit, or dune system.

**Justification:** These communities typically occur as linear bands together or as small patch mosaics, and may shift about in their precise locations over time. Communities within the same dune, spit, or berm system (site), are probably connected ecologically regardless of distance from nearest patch of same vegetation type.

**RANK.PROCEDURE:** (1) landscape context, (2) condition, (3) size. Primary and secondary factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** No evidence of alteration due to filling, grazing, digging, vehicle use, erosion control structures, recreation, or development. No or very few exotic species present with very little potential for expansion. Shrubs and trees absent or present as scattered small individuals. At least 10 dune or beach-associated native plant species present.

**B -rated condition:** Evidence of minor or local alteration by filling, grazing, digging, recreation, or vehicle use. No development of human structures. Alteration is easily restorable by ceasing such activities. Few exotic species, cover of exotics <10%. Exotic *Ammophila arenaria* is absent or present in very small amounts and easily controlled. Shrubs or trees may be present but are small and do not dominate significant areas.

**C -rated condition:** Evidence of local to widespread alteration by grazing, digging, erosion control structures, recreation, or vehicle use. Alteration may be restored over several decades with active intervention. Local development of human structures may be present but limited and apparently restorable. Exotic species generally co-dominant over significant portions of occurrence. Exotic *Ammophila arenaria* may be prevalent in patches, but still potentially controllable. Shrubs or trees may be numerous and widespread, with potential to convert to different vegetation type in the next few decades.

**D -rated condition:** Alteration or disturbance to site not restorable over the next several decades. Exotics species dominant, <10% cover of native species. *Ammophila arenaria*, if present, is beyond reasonable control. Shrubs or small trees may be dominating significant portions of occurrence.

**Justification for AA@-rated criteria:** Native dominated with natural environment intact. No threats from invader species.

**Justification for AC/D@ threshold:** C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation.

### SIZE.SPECS

**A -rated size:** Very large (>5 mi/8 km long)

**B -rated size:** Large (1.25-5 mi/2-8 km)

**C -rated size:** Moderate (0.3-1.25 mi/0.5-2 km)

**D -rated size:** Small (<0.3 mi/0.5 km)

**Justification for AA@-rated criteria:** Occurrences of this size may have high species diversity and are well buffered from edge effects. They are naturally rare in this ecoregion.

**Justification for AC/D@ threshold:** C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. Small sites generally have low species diversity and are vulnerable to edge effect.

## **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** No evidence of human-caused alteration of longshore currents or sedimentation processes. No bulkheads or other erosion control structures on connecting beaches or nearby bluffs. Uplands or wetlands surrounding Occurrence are largely unaltered by urban or agricultural uses (>90% natural). No barriers present. Connectivity of habitats allows natural processes and species migration to occur.

**B -rated landscape context:** Little evidence of human-caused alteration of longshore currents or sedimentation processes. No erosion control structures on connecting beaches. Uplands and wetlands surrounding Occurrence with moderate urban or agricultural alteration (60-90% natural), but retaining much connectivity. Few barriers present.

**C -rated landscape context:** Moderate human-caused alteration of longshore currents or sedimentation processes. Bulkheads or other erosion control structures may be present on connecting beaches or nearby bluffs, but the impacts to processes appear to be restorable if structures are removed. Uplands and wetlands surrounding Occurrence are fragmented by alteration (20-60% natural), with limited connectivity. Some barriers are present.

**D -rated landscape context:** Alteration of longshore currents or sedimentation processes is moderate to major and appears unrestorable. Bulkheads or other erosion control structures are located on connecting beaches or nearby bluffs. Uplands and wetlands surrounding Occurrence are mostly converted to agricultural or urban uses. Connectivity is severely hampered.

Justification for AA@-rated criteria: Natural processes and connectivity appear to be intact. No off-site impacts to processes.

Justification for AC/D@ threshold: Natural processes (sedimentation, longshore currents) appear to be restorable for C, so altered that not restorable for D. Connectivity with surrounding systems disrupted completely in D.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 11, 2000

## DEPRESSIONAL WETLAND SHRUBLANDS

CORNUS SERICEA - SALIX (HOOKERIANA, SITCHENSIS) SHRUBLAND  
CORNUS SERICEA SHRUBLAND SEASONALLY FLOODED SHRUBLAND  
ALNUS (INCANA, VIRIDIS SSP. SINUATA) / LYSICHITON AMERICANUS - OENANTHE SARMENTOSA SHRUBLAND  
MALUS FUSCA - (SALIX HOOKERIANA) / CAREX OBNUPTA SHRUBLAND  
MALUS FUSCA SHRUBLAND  
SALIX (HOOKERIANA, SITCHENSIS) - SPIRAEA DOUGLASII SHRUBLAND  
SALIX GEYERIANA - SALIX HOOKERIANA SSP. PIPERI SHRUBLAND  
SALIX HOOKERIANA SSP. PIPERI - (SALIX SITCHENSIS) SHRUBLAND  
SALIX SITCHENSIS SHRUBLAND  
SPIRAEA DOUGLASII SHRUBLAND

These are medium to tall deciduous broadleaf shrub swamps that are located in depressions, or around lakes or ponds, where water tables fluctuate seasonally (seasonally to semi-permanently flooded). These are nutrient-rich systems that have muck or mineral soils. Various species of *Salix*, *Spirea douglasii*, *Malus fusca*, or *Cornus sericea* are typical. Some of these associations also occur in Sphagnum Bogs and Fens system or in Riparian Forests and Shrublands: fens are distinguished by their peat soils and an abundance of brown mosses, riparian by their riverine setting.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different natural community wider than 1 km along a river corridor or within a wetland, or 0.5 km in other situations, (3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

**Justification:** Shrub swamps are usually intermixed because of similar hydrologic requirements and topography. Shrub swamps may be large or small depending on size of wetland. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or very little evidence of alteration due to drainage, flood control, clearing, grazing, logging, fire suppression, etc. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage or diking. Alteration from local drainage, diking, clearing, grazing, logging, or fire suppression is extensive but potentially restorable over several decades. Exotic species may be widespread, but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species dominant or co-dominant, at least in understory, with little hope for control.

**Justification for AA@-rated criteria:** Most shrub swamps in the Pacific Northwest depend on seasonal water regime. A-ranked Occurrences have these processes intact, with no or little history of logging, clearing or grazing.

**Justification for AC/D@ threshold:** C-ranked occurrences have potential for restoration over several decades. D-ranked occurrences have little or no potential for restoration because of extensive degradation.

### SIZE.SPECS

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

**Justification for AA@-rated criteria:** Shrub swamps are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects.

Justification for AC/D@ threshold: C-ranked occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked occurrences occur in small patches surrounded by uplands, and are actually typical for some of the associations included in this system. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## DEPRESSIONAL WETLAND BROADLEAF FORESTS

ALNUS RUBRA / ATHYRIUM FILIX-FEMINA - LYSICHTON AMERICANUS FOREST  
ALNUS RUBRA / RUBUS SPECTABILIS / CAREX OBNUPTA - LYSICHTON AMERICANUS WOODLAND  
FRAXINUS LATIFOLIA - (POPULUS BALSAMIFERA SSP. TRICHOCARPA) / CORNUS SERICEA FOREST  
FRAXINUS LATIFOLIA / CAREX DEWEYANA - URTICA DIOICA SSP GRACILIS FOREST  
FRAXINUS LATIFOLIA / CAREX OBNUPTA FOREST  
FRAXINUS LATIFOLIA / JUNCUS PATENS FOREST  
FRAXINUS LATIFOLIA / SPIRAEA DOUGLASII FOREST  
FRAXINUS LATIFOLIA / SYMPHORICARPOS ALBUS FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ALNUS RUBRA / CAREX OBNUPTA FOREST  
POPULUS TREMULOIDES / CAREX OBNUPTA FOREST  
QUERCUS GARRYANA - (FRAXINUS LATIFOLIA) / SYMPHORICARPOS ALBUS FOREST

These are deciduous broadleaf forested wetlands that are located in depressions, or around lakes or ponds, where water tables fluctuate seasonally (mostly seasonally flooded regime). These are nutrient-rich systems that have muck or mineral soils. *Fraxinus latifolia* and *Alnus rubra* are the major dominant species. Some of these associations also may occur as Riparian Forests and Shrublands.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different natural community wider than 1 km along a river corridor or within a wetland, or 0.5 km in other situations, (3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: These wetlands are sometimes intermixed and may be large or small depending on size of wetland. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or very little evidence of alteration due to drainage, flood control, clearing, grazing, logging, fire suppression, etc. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage or diking. Alteration from local drainage, diking, clearing, grazing, logging, or fire suppression is extensive but potentially restorable over several decades. Exotic species may be widespread, but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species dominant or co-dominant, at least in understory, with little hope for control.

Justification for AA@-rated criteria: These systems depend on seasonal water regime. A-ranked Occurrences have these processes intact, with no or little history of logging, clearing or grazing.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation.

### SIZE.SPECS

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Occurrences of this size may have high species diversity and are well buffered from edge effects.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by uplands, and are

actually typical for some of the associations included in this system. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## RIPARIAN FORESTS AND SHRUBLANDS

ACER MACROPHYLLUM - ABIES GRANDIS / SYMPHORICARPOS ALBUS FOREST  
ACER MACROPHYLLUM - PSEUDOTSUGA MENZIESII / ACER CIRCINATUM / POLYSTICHUM MUNITUM FOREST  
ACER MACROPHYLLUM - PSEUDOTSUGA MENZIESII / CORYLUS CORNUTA / HYDROPHYLLUM TENUIPES FOREST  
ACER MACROPHYLLUM / ACER CIRCINATUM FOREST  
ACER MACROPHYLLUM / CAREX DEWEYANA FOREST  
ACER MACROPHYLLUM / RUBUS SPECTABILIS FOREST  
ACER MACROPHYLLUM / RUBUS URSINUS FOREST  
ACER MACROPHYLLUM / SYMPHORICARPOS ALBUS / URTICA DIOICA SSP GRACILIS FOREST  
ACER MACROPHYLLUM / URTICA DIOICA SSP GRACILIS FOREST  
ALNUS RUBRA / ACER CIRCINATUM / CLAYTONIA SIBIRICA FOREST  
ALNUS RUBRA / ELYMUS GLAUCUS FOREST  
ALNUS RUBRA / OPLOPAX HORRIDUS - RUBUS SPECTABILIS FOREST  
ALNUS RUBRA / OXALIS (OREGANA, TRILLIFOLIA) FOREST  
ALNUS RUBRA / PETASITES FRIGIDUS FOREST  
ALNUS RUBRA / RUBUS PARVIFLORUS FOREST  
ALNUS RUBRA / RUBUS SPECTABILIS FOREST  
ALNUS RUBRA / RUBUS SPECTABILIS / CAREX OBNUPTA - LYSICHTON AMERICANUS WOODLAND  
ALNUS RUBRA / STACHYS CILIATA - TOLMIEA MENZIESII FOREST  
CORNUS SERICEA - SALIX (HOOKERIANA, SITCHENSIS) SHRUBLAND  
EQUISETUM ARVENSE HERBACEOUS VEGETATION  
FRAXINUS LATIFOLIA / CAREX DEWEYANA - URTICA DIOICA SSP GRACILIS FOREST  
FRAXINUS LATIFOLIA / CAREX OBNUPTA FOREST  
FRAXINUS LATIFOLIA / SYMPHORICARPOS ALBUS FOREST  
FRAXINUS LATIFOLIA - (POPULUS BALSAMIFERA SSP. TRICHOCARPA) / CORNUS SERICEA FOREST  
FRAXINUS LATIFOLIA - POPULUS BALSAMIFERA SSP. TRICHOCARPA / ACER CIRCINATUM FOREST  
FRAXINUS LATIFOLIA - POPULUS BALSAMIFERA SSP. TRICHOCARPA / CORYLUS CORNUTA - PHYSOCARPUS  
CAPITATUS FOREST  
FRAXINUS LATIFOLIA - POPULUS BALSAMIFERA SSP. TRICHOCARPA / RUBUS SPECTABILIS FOREST  
FRAXINUS LATIFOLIA - POPULUS BALSAMIFERA SSP. TRICHOCARPA / SYMPHORICARPOS ALBUS FOREST  
QUERCUS GARRYANA - (FRAXINUS LATIFOLIA) / SYMPHORICARPOS ALBUS FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ACER MACROPHYLLUM / EQUISETUM HYEMALE FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ACER MACROPHYLLUM / SYMPHORICARPOS ALBUS FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ALNUS RHOMBIFOLIA FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ALNUS RUBRA / RUBUS SPECTABILIS FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ALNUS RUBRA / SYMPHORICARPOS ALBUS / URTICA DIOICA  
FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA / CORNUS SERICEA / IMPATIENS CAPENSIS WOODLAND  
SALIX LUCIDA SSP. LASIANDRA / URTICA DIOICA SSP GRACILIS FOREST  
SALIX LUCIDA SSP. LASIANDRA / SALIX X FLUVIATILIS WOODLAND  
SALIX SITCHENSIS / EQUISETUM ARVENSE - PETASITES FRIGIDUS SHRUBLAND  
TSUGA HETEROPHYLLA - (THUJA PLICATA) / OPLOPAX HORRIDUS / POLYSTICHUM MUNITUM FOREST

These forests and tall shrublands are linear in character, occurring on floodplains or terraces of rivers and streams. Riverine flooding and the succession that occurs after major flooding events are the major natural processes that drive this system. Very early successional stages can be sparsely vegetated or dominated by herbaceous vegetation. Conifers tend to increase with succession in the absence of major disturbance. Conifer-dominated types are now very rare and not well described, *Abies grandis*, *Pseudotsuga menziesii*, *Picea sitchensis*, and *Thuja plicata* are important. Major broadleaf dominant species are *Acer macrophyllum*, *Alnus rubra*, *Populus balsamifera ssp. trichocarpa*, *Salix sitchensis*, *Salix lucida ssp. lasiandra*, *Cornus sericea*, and *Fraxinus latifolia*. Some of these associations may also occur as Depressional Wetland Broadleaf Forests, Coniferous Forested Wetlands, or Depressional Wetland Shrublands.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation or very degraded example of same community greater than 2 km wide, major highways, urban development, large bodies of water, (2) major break in hydrology, topography, soils, geology, etc.

**Justification:** Riparian forest associations are usually intermixed because of similar hydrologic requirements and topography. They are usually linear because of land conversion and/or topography. Hydrologic divides are particularly important functionally.

**RANK.PROCEDURE:** (1) landscape context, (2) condition, (3) size. Secondary and tertiary factors should be weighted equally.

## CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. Possible indicators of intact hydrology include depositional features, silt stains, or other evidence of seasonal flooding, though many communities flood less than annually. No or little evidence of alteration due to drainage, flood control, clearing, grazing, logging, fire suppression, etc. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime largely intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage or diking, or regional flood control dams. Alteration from local drainage, diking, clearing, grazing, logging, and fire suppression is extensive but potentially restorable over several decades. Alteration from regional flood control dams not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Riparian Occurrence may be reduced to narrow strip with much edge effect. Exotic species may be dominant, at least in understory, with little hope for control.

Justification for AA@-rated criteria: Most riparian forests in the Pacific Northwest depend on frequent to occasional disturbance by flood. A-ranked Occurrences have these processes intact, with no or little history of logging, clearing or grazing, or hydrograph impacts from flood control dams.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Riparian Occurrences along higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

## SIZE.SPECS

**Streams with limited floodplain development, primarily braided channels, or extremely sinuous stable channels (mostly A, B, D, E, or F in Rosgen 1996)**

**A -rated size:** Very large (>10 mi/16 km)

**B -rated size:** Large (4-10 mi/6.4-16 km)

**C -rated size:** Moderate (1-4 mi/1.6-6.4 km)

**D -rated size:** Small (<1 mi/1.6 km)

**Meandering streams with well-developed floodplains and wide channels (mostly C in Rosgen 1996).**

**A -rated size:** Very large (>25 meander wavelengths or 50 point bars)

**B -rated size:** Large (10-25 meander wavelengths or 20-50 point bars)

**C -rated size:** Moderate (4-10 meander wavelengths or 8-20 point bars)

**D -rated size:** Small (<4 meander wavelengths or <8 point bars)

Justification for AA@-rated criteria: Riparian forests are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects. Streams with differing floodplain morphology need different size criteria. Relatively straight channels with not much floodplain have narrow riparian strips that lend themselves to length as a criterion. Classic actively meandering streams should be scaled depending on the size of the stream, thus the number of meander wavelengths (or point bars) accomplishes this.

Justification for AC/D@ threshold: C-ranked occurrences have minimally enough length or area to support the dynamic nature of the flooding regime and its disturbances. D-ranked occurrences are clearly too small to support a shifting mosaic of disturbance patches. C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by uplands. Small sites generally have low species diversity and are vulnerable to edge effect.

## LANDSCAPE.CONTEXT.SPECS

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No regional flood control dam upstream.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised. No regional flood control dam upstream, or effects mostly dampened due to distance.

**C -rated landscape context:** Uplands surrounding Occurrence or upstream watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts. Some barriers are present, and natural processes few. No regional flood control dam upstream, or effects known to be mostly dampened due to distance.

**D -rated landscape context:** Uplands surrounding Occurrence or upstream watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted. One or more regional flood control dams located upstream.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low. Riparian occurrences depend upon flooding disrupted by large dams upstream.

**AUTHORSHIP:** John Christy and Chris Chappell

**DATE:** December 22, 2000

Rosgen, D. 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs, Colorado. 352 pp.

## CONIFEROUS FORESTED WETLANDS

PICEA SITCHENSIS / CAREX OBNUPTA - LYSICHITON AMERICANUS FOREST  
THUJA PLICATA - TSUGA HETEROPHYLLA / LYSICHITON AMERICANUS FOREST  
TSUGA HETEROPHYLLA - (THUJA PLICATA) / OPLOPANAX HORRIDUS / POLYSTICHUM MUNITUM FOREST

Conifer-dominated swamps are mostly small patch size, occurring sporadically in glacial depressions, in river valleys, around the edges of lakes and marshes, or on slopes with seeps that form subirrigated soils. They typically have muck or mineral soils and are seasonally flooded or permanently subirrigated. They were probably never common or extensive in the landscape. Major dominant species are *Tsuga heterophylla*, *Thuja plicata*, and *Picea sitchensis*. Some of these associations may also occur as Riparian Forests and Shrublands or Tidally-influenced Freshwater Wetlands.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different natural community wider than 0.5 km, (3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Conifer swamps are usually contiguous with other wetland types such as marshes or riparian stands because of similar hydrologic requirements and topography. They are usually round or elliptical, but may be linear when constrained or in narrow valleys or floodplains.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, clearing, grazing, logging, fire suppression, etc. No or very few exotic species present with no potential for expansion. At least half of occurrence has old-growth stands of trees (>200 years old).

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage, local diking, or regional flood control dams. Alteration from local drainage, diking, clearing, grazing, logging, and fire suppression is extensive but potentially restorable over several decades. Alteration from regional flood control dams most likely not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Occurrence on narrow floodplain or in narrow valley may be reduced to narrow strip with much edge effect. Exotic species may be dominant in understory, with little hope for control.

Justification for AA@-rated criteria: Most conifer swamps in the Pacific Northwest depend on a perennial water and infrequent disturbance by windstorm, flood or fire. A-ranked Occurrences have these processes intact, with no or little history of logging, clearing or grazing. Historically, a major portion of occurrences at any one time would be old-growth in age, now this condition is very rare.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Riparian Occurrences along higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

### SIZE.SPECS

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Conifer swamps are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by uplands, and are actually typical for some of the associations included in this system. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low. Riparian occurrences depend upon flooding disrupted by large dams upstream.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## TIDALLY-INFLUENCED FRESHWATER WETLANDS

ALNUS RUBRA / RUBUS SPECTABILIS / CAREX OBNUPTA - LYSICHITON AMERICANUS WOODLAND  
BIDENS CERNUA HERBACEOUS VEGETATION  
CAREX LYNGBYEI HERBACEOUS VEGETATION  
CORNUS SERICEA - SALIX (HOOKERIANA, SITCHENSIS) SHRUBLAND  
LILAEOPSIS OCCIDENTALIS HERBACEOUS VEGETATION  
MYRIOPHYLLUM HIPPUROIDES HERBACEOUS VEGETATION  
PICEA SITCHENSIS / CAREX OBNUPTA - LYSICHITON AMERICANUS FOREST  
PICEA SITCHENSIS / CORNUS SERICEA - SALIX HOOKERIANA WOODLAND  
POPULUS BALSAMIFERA SSP. TRICHOCARPA - ACER MACROPHYLLUM / EQUISETUM HYEMALE FOREST  
POPULUS BALSAMIFERA SSP. TRICHOCARPA / CORNUS SERICEA / IMPATIENS CAPENSIS WOODLAND

Tidally-influenced Freshwater Wetlands occur as narrow strips to more extensive patches along tidally-influenced portions of rivers. This system is driven by daily tidal flooding of freshwater. Vegetation structure and composition is varied and depends on substrate characteristics and tidal flooding regime of particular sites. Many of these associations also occur in other systems including Autumnal Freshwater Mudflats, Freshwater Marshes, Intertidal Salt Marshes, Riparian Forests and Shrublands, and Coniferous Forested Wetlands. There has been little vegetation data collection in this type in this ecoregion.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) a natural community from a different ecological system wider than 0.5 km.

**Justification:** Tidally-influenced Freshwater wetlands associations are usually intermixed. All patches of the same community type at the same estuary should probably be considered the same occurrence, i.e. other Tidally-influenced Freshwater communities are probably not barriers because of tidal movements.

**RANK.PROCEDURE:** (1) landscape context, (2) condition, (3) size. Primary and secondary factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact, evidence of daily tidal flooding. No or little evidence of alteration due to drainage, flood control, dredging, excessive siltation, logging, or invasion by upland species. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact, evidence of daily tidal flooding, or altered by local drainage. Alteration from local drainage or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage or diking. Alteration from local drainage, logging and/or diking is extensive but potentially restorable over several decades. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant, with little hope for control.

**Justification for AA@-rated criteria:** These systems depend on tidal regime. A-ranked Occurrences have these processes intact, with no history of drainage, dredging, or diking.

**Justification for AC/D@ threshold:** C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Floodplain Occurrences along higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

### SIZE.SPECS

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Occurrences of this size may have relatively high species diversity and are well buffered from edge effects. Occurrences of this size are rare because most of these have been converted to agricultural or urban uses.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate species diversity and may be well buffered from edge effect. D-ranked Occurrences are small sites with low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No regional flood control dam upstream.

**B -rated landscape context:** Uplands surrounding Occurrence and upstream watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. No regional flood control dam upstream, or its effects mostly dampened.

**C -rated landscape context:** Uplands surrounding Occurrence or upstream watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few. Regional flood control dam may be significantly altering hydrograph.

**D -rated landscape context:** Uplands surrounding Occurrence or upstream watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted. One or more regional flood control dams may be located upstream.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Flood control dams have some influence on hydrograph, but tidal action is primary hydrologic process.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## FRESHWATER AQUATIC BEDS

AZOLLA (FILICULOIDES, MEXICANA) HERBACEOUS VEGETATION  
BRASENIA SCHREBERI HERBACEOUS VEGETATION  
CALLITRICHE HETEROPHYLLA HERBACEOUS VEGETATION  
CERATOPHYLLUM DEMERSUM HERBACEOUS VEGETATION  
ELODEA CANADENSIS HERBACEOUS VEGETATION  
FONTINALIS (ANTIPYRETICA, HOWELLII) BRYOPHYTE VEGETATION  
LEMNA MINOR HERBACEOUS VEGETATION  
MENYANTHES TRIFOLIATA HERBACEOUS VEGETATION  
NUPHAR LUTEA SSP. POLYSEPALA HERBACEOUS VEGETATION  
POLYGONUM AMPHIBIUM HERBACEOUS VEGETATION [PROVISIONAL]  
POTAMOGETON NATANS HERBACEOUS VEGETATION  
RANUNCULUS AQUATILIS HERBACEOUS VEGETATION  
RANUNCULUS LOBBII HERBACEOUS VEGETATION  
SCIRPUS SUBTERMINALIS HERBACEOUS VEGETATION  
UTRICULARIA MACRORHIZA HERBACEOUS VEGETATION  
WOLFFIA (BOREALIS, COLUMBIANA) HERBACEOUS VEGETATION

Freshwater aquatic beds are small patch size, confined to lakes, ponds, rivers and streams. In large bodies of water, they are usually restricted to the littoral region where penetration of light is the limiting factor for growth. A variety of rooted or floating aquatic herbaceous species may dominate. These communities occur in water too deep for emergent vegetation.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including all uplands, deep water for some taxa, or water degraded by turbidity or pollution; (2) different natural community wider than 0.5 km.

**Justification:** Freshwater aquatic bed associations are usually intermixed because of similar hydrologic requirements. Taxa may be linear in littoral areas, or may completely fill bodies of water. Aquatic beds are isolated from other wetlands by intervening uplands, and are vulnerable to sedimentation and turbidity caused by runoff. Herbivory and/or turbidity caused by exotic fish such as carp and grass carp also isolate and eliminate populations on a landscape scale.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, clearing, grazing, logging, fire suppression, etc., in the water body and surrounding uplands. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage, local diking, or regional flood control dams. Alteration from local drainage, diking, clearing, grazing, logging, and fire suppression is extensive but potentially restorable over several decades. Alteration from regional flood control dams most likely not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant, with little hope for control.

**Justification for AA@-rated criteria:** Most aquatic bed Occurrences in the Pacific Northwest depend on a seasonal or perennial water regime, and floodplain Occurrences may need frequent to occasional disturbance by flooding. A-ranked Occurrences have these processes intact, with no history of logging, clearing or grazing on surrounding uplands.

**Justification for AC/D@ threshold:** C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Aquatic bed Occurrences on floodplains of higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

## **SIZE.SPECS**

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Aquatic bed Occurrences are usually composed of mosaics of different associations included in this system. Water bodies of this size may have high species diversity and are better buffered from edge effects than smaller-sized bodies of water.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate species diversity and will be better buffered from edge effect than smaller-sized bodies of water. D-ranked Occurrences occur in small bodies of water, have low species diversity, and are highly vulnerable to edge effect.

## **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts. Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have limited buffering from upland influences. D-ranked Occurrences have very little buffering and are subject to siltation and pollution. Species diversity will be very low.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## FRESHWATER MARSHES

CALAMAGROSTIS CANADENSIS WESTERN HERBACEOUS VEGETATION  
CAREX EXSICCATA HERBACEOUS VEGETATION  
CAREX OBNUPTA HERBACEOUS VEGETATION  
DULICHUM ARUNDINACEUM HERBACEOUS VEGETATION  
ELEOCHARIS PALUSTRIS - CAREX UNILATERALIS HERBACEOUS VEGETATION  
ELEOCHARIS PALUSTRIS - LUDWIGIA PALUSTRIS HERBACEOUS VEGETATION  
ELEOCHARIS PALUSTRIS HERBACEOUS VEGETATION  
EQUISETUM ARVENSE HERBACEOUS VEGETATION  
EQUISETUM FLUVIATILE HERBACEOUS VEGETATION  
HIPPIRIS VULGARIS HERBACEOUS VEGETATION  
JUNCUS BALTICUS - CAREX OBNUPTA HERBACEOUS VEGETATION  
JUNCUS BALTICUS HERBACEOUS VEGETATION  
JUNCUS BUFONIUS HERBACEOUS VEGETATION  
JUNCUS EFFUSUS HERBACEOUS VEGETATION  
LYSICHITON AMERICANUS HERBACEOUS VEGETATION  
OENANTHE SARMENTOSA HERBACEOUS VEGETATION  
PASPALUM DISTICHUM HERBACEOUS VEGETATION  
SAGITTARIA LATIFOLIA HERBACEOUS VEGETATION  
SCIRPUS ACUTUS HERBACEOUS VEGETATION  
SCIRPUS MICROCARPUS HERBACEOUS VEGETATION  
SCIRPUS TABERNAEMONTANI TEMPERATE HERBACEOUS VEGETATION  
SPARGANIUM ANGUSTIFOLIUM HERBACEOUS VEGETATION  
SPARGANIUM EURYCARPUM HERBACEOUS VEGETATION  
TYPHA LATIFOLIA WESTERN HERBACEOUS VEGETATION

Freshwater marshes are mostly small patch, confined to limited areas in suitable floodplain or basin topography. They are mostly seasonally to semi-permanently flooded. Soils are muck or mineral, and water is high nutrient. There is some compositional overlap with fens, which are distinguished by peat soils and an abundance of brown mosses, and with Tidally-influenced Freshwater wetlands, which differ by their tidal flooding regime. By definition, freshwater marshes are dominated by herbaceous species, mostly graminoids (*Carex*, *Scirpus*, *Eleocharis*, *Juncus*), but also some forbs (especially *Typha latifolia*). Marshes dominated by *Typha* or *Scirpus acutus* that occur in transition zones between salt and fresh marshes are included here in the freshwater marshes system. A few of these associations may also occur in Tidally-influenced Freshwater Wetlands or Intertidal Salt Marshes systems.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different upland natural community wider than 0.5 km, (3) different wetland natural community wider than 1 km, (4) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

**Justification:** Freshwater marsh associations are usually intermixed because of similar hydrologic requirements and topography. They may be highly fragmented because of land conversion and/or topography. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, grazing, fire suppression, etc. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage, local diking, or regional flood control dams. Alteration from local drainage, diking, grazing, and fire suppression is extensive but potentially restorable over several decades. Alteration from regional flood control dams most likely not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species may be dominant, with little hope for control.

Justification for AA@-rated criteria: Most freshwater marshes in the Pacific Northwest depend on seasonal or perennial water regime and frequent to occasional disturbance by flood or fire. A-ranked Occurrences have these processes intact, with no history of grazing.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Riparian Occurrences along higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

#### **SIZE.SPECS**

**A -rated size:** Very large (> 200 ac/80 ha)

**B -rated size:** Large (75-200 ac/30-80 ha)

**C -rated size:** Moderate (5-75 ac/2-30 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Freshwater marshes are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects. Occurrences of this size are rare because hydric landforms of this size are rare, and most of these have been converted to agricultural or urban uses.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by uplands, and are actually typical for some of the associations included in this system. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised. No or minor effects from regional flood control dams.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts. Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low. Riparian occurrences depend upon flooding disrupted by large dams upstream.

**AUTHORSHIP:** John Christy **DATE:** March 31, 2000

## **AUTUMNAL FRESHWATER MUDFLATS**

BIDENS CERNUA HERBACEOUS VEGETATION  
BIDENS FRONDOSA HERBACEOUS VEGETATION  
ELEOCHARIS OBTUSA HERBACEOUS VEGETATION  
ERAGROSTIS HYPNOIDES - GNAPHALIUM PALUSTRE HERBACEOUS VEGETATION  
EUTHAMIA OCCIDENTALIS HERBACEOUS VEGETATION  
LUDWIGIA PALUSTRIS - POLYGONUM HYDROPIPEROIDES HERBACEOUS VEGETATION  
MYRIOPHYLLUM HIPPUROIDES HERBACEOUS VEGETATION

Autumnal freshwater mudflats are linear in nature along major rivers or in seasonally-flooded shallow lakebeds or floodplains that lack inflow and outflow where they may be small patch in character. They are flooded for significant portions during the wet season and exposed for significant portions of the dry season. They are dominated by a variety of forbs or graminoids. Some of these associations also occur in Tidally-influenced Freshwater Wetlands system.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including all uplands and large bodies of water, (2) different natural community wider than 0.5 km.

Justification: Freshwater mudflat associations are usually fairly uniform because of similar hydrologic requirements and topography. Those found on drying lakebeds are isolated hydrologically from other wetlands and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size. Primary and secondary factors should be weighted equally because the type is sometimes linear and sometimes small patch.

### **CONDITION.SPECS**

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, dredging, excessive siltation, or invasion by upland species. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage, local diking, or regional flood control dams. Alteration from local drainage and diking is extensive but potentially restorable over several decades. Alteration from regional flood control dams and dredging most likely not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species dominant may be dominant, with little hope for control.

Justification for AA@-rated criteria: Most freshwater mudflats in the Pacific Northwest depend on tidal or seasonal water regime. A-ranked Occurrences have these processes intact, with no history of drainage, dredging, diking or dams.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Floodplain Occurrences along higher-order rivers are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

### **SIZE.SPECS**

**A -rated size:** Very large (> 100 ac/40 ha)

**B -rated size:** Large (25-100 ac/10-40 ha)

**C -rated size:** Moderate (5-25 ac/2-10 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Occurrences of this size may have relatively high species diversity and are well buffered from edge effects. Occurrences of this size are rare because hydric landforms of this size are rare, and most of these have been converted to agricultural or urban uses.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate species diversity and may be well buffered from edge effect. D-ranked Occurrences are small sites with low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur. No effects from regional flood control dams.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised. No or minor effects from regional flood control dams.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few. May be significant effects from regional flood control dams.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low. Riparian occurrences depend upon flooding impacted by flood control dams upstream.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## SPHAGNUM BOGS AND FENS

CAREX AQUATILIS VAR. DIVES - CAREX UTRICULATA HERBACEOUS VEGETATION  
CAREX AQUATILIS VAR. DIVES HERBACEOUS VEGETATION  
CAREX AQUATILIS VAR. DIVES / SPHAGNUM SPP. HERBACEOUS VEGETATION  
CAREX CUSICKII - (MENYANTHES TRIFOLIATA) HERBACEOUS VEGETATION  
CAREX EXSICCATA HERBACEOUS VEGETATION  
CAREX LASIOCARPA HERBACEOUS VEGETATION  
CAREX OBNUPTA HERBACEOUS VEGETATION  
DULICHIMUM ARUNDINACEUM HERBACEOUS VEGETATION  
ERIOPHORUM CHAMISSONIS / SPHAGNUM SPP. HERBACEOUS VEGETATION  
LEDUM GROENLANDICUM - KALMIA MICROPHYLLA / XEROPHYLLUM TENAX SHRUBLAND  
LEDUM GROENLANDICUM - KALMIA MICROPHYLLA / SPHAGNUM SPP. SHRUBLAND  
LEDUM GROENLANDICUM - MYRICA GALE / SPHAGNUM SPP. SHRUBLAND  
MYRICA GALE / CAREX (AQUATILIS VAR. DIVES, UTRICULATA) SHRUBLAND  
PINUS CONTORTA VAR. CONTORTA / LEDUM GROENLANDICUM / SPHAGNUM SPP. WOODLAND  
PINUS MONTICOLA / LEDUM GROENLANDICUM / SPHAGNUM SPP. WOODED SHRUBLAND  
RHYNCHOSPORA ALBA - (VACCINIUM OXYCOCCUS) / SPHAGNUM SPP. HERBACEOUS VEGETATION  
SPIRAEA DOUGLASII SHRUBLAND  
SPIRAEA DOUGLASII / CAREX AQUATILIS VAR. DIVES SHRUBLAND  
SPIRAEA DOUGLASII / SPHAGNUM SPP. SHRUBLAND  
TSUGA HETEROPHYLLA - (THUJA PLICATA) / LEDUM GROENLANDICUM / SPHAGNUM SPP. WOODLAND  
TSUGA HETEROPHYLLA / SPHAGNUM SPP. FOREST

Sphagnum bogs and fens are distinguished from other wetlands by an abundance of sphagnum or brown mosses, and the presence of peat soils. Decomposition is so slow that peat accumulates, and the water ranges from very nutrient poor in bogs to rich in rich fens. Bogs tend to be influenced mostly by rainwater, whereas fens are significantly influenced by surface water or flowing ground water. Bogs and fens are often found together in the same wetland system. This system may be dominated by graminoids, evergreen or deciduous broadleaf shrubs, or evergreen needleleaf trees. Many plant species are confined to this system. Some of these associations, especially those in fens, also occur in Freshwater Marshes or Depressional Wetland Shrublands systems.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different natural community wider than 0.5 km, (3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

**Justification:** Sphagnum bogs and fens may be intermixed with other wetlands because of similar hydrologic requirements and topography. They are often isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, peat excavation, clearing, grazing, logging, fire suppression, etc. No or very few exotic species present with no potential for expansion. Native species that increase with disturbance or changes in hydrology/nutrients (e.g. *Juncus effusus*, *Spirea douglasii*, *Carex obnupta*) are absent or confined to nutrient-medium to rich communities (fens).

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, clearing or logging is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. Native species that increase with disturbance or changes in hydrology/nutrients are absent, low in abundance, or restricted to high-nutrient microsites or nutrient-medium to rich communities (fens).

**C -rated condition:** Natural hydrologic regime altered by local drainage. Alteration from local drainage, clearing, grazing, logging, and fire suppression is extensive but potentially restorable over several decades. Alteration from peat excavation may be present, but minor in extent or severity. Exotic species may be widespread but potentially manageable with restoration of most natural processes. Native species that increase with disturbance or changes in hydrology/nutrients may be very prominent, even in communities adapted to nutrient poor conditions (sphagnum bogs).

**D -rated condition:** Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Major alteration by peat excavation. Exotic species may be

dominant. Native species that increase with disturbance or changes in hydrology/nutrients are prominent to dominant.

Justification for AA@-rated criteria: Most sphagnum bogs in the Pacific Northwest depend on perennial water regime and occasional disturbance by fire. A-ranked Occurrences have these processes intact, with no history of logging, clearing, grazing or peat excavation.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several to many decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Occurrences with deep peat excavation may take centuries to rebuild peat mass, and have the least likelihood of restoration as palustrine systems.

#### **SIZE.SPECS**

**A -rated size:** Very large (> 150 ac/60 ha)

**B -rated size:** Large (50-150 ac/20-60 ha)

**C -rated size:** Moderate (5-50 ac/2-20 ha)

**D -rated size:** Small (< 5 ac/2 ha)

Justification for AA@-rated criteria: Sphagnum bogs are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by uplands, generally have low species diversity, and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts. Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact watersheds and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low.

**AUTHORSHIP:** John Christy and Chris Chappell

**DATE:** May 10, 2000

## WET PRAIRIES

BRODIAEA SP HERBACEOUS VEGETATION  
CAMASSIA QUAMASH WET PRAIRIE HERBACEOUS VEGETATION  
CAREX APERTA HERBACEOUS VEGETATION  
CAREX Densa - DESCHAMPSIA CESPITOSA HERBACEOUS VEGETATION  
CAREX Densa - ELEOCHARIS PALUSTRIS HERBACEOUS VEGETATION  
CAREX UNILATERALIS - HORDEUM BRACHYANTHERUM HERBACEOUS VEGETATION  
DESCHAMPSIA CESPITOSA - DANTHONIA CALIFORNICA HERBACEOUS VEGETATION  
ISOETES NUTTALLII HERBACEOUS VEGETATION  
ROSA NUTKANA / DESCHAMPSIA CESPITOSA SHRUBLAND  
ROSA NUTKANA / OENANTHE SARMENTOSA SHRUBLAND  
VACCINIUM CAESPITOSUM / LICHEN SHRUBLAND

Wet prairies historically covered large areas of the Willamette Valley where they were maintained by a combination of wetland soil hydrology and frequent burning. These are high nutrient wetlands that are temporarily to seasonally flooded. They have been reduced to tiny fragments of their former extent. They are dominated primarily by graminoids, especially *Deschampsia cespitosa* and *Carex* spp., and to a lesser degree by forbs or shrubs.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .5 km wide, major highways, urban development, large bodies of water, (2) different natural community wider than 1 km, (3) major break in topography, soils, geology, etc., especially one resulting in a hydrologic break.

Justification: Willamette Valley wet prairie associations may be intermixed because of similar hydrologic requirements and topography. Remnant stands are usually surrounded by converted land, and are easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size. Secondary and tertiary factors should be equally weighted because this was naturally a large patch type but existing examples are mostly small patch with degraded landscapes.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, agriculture, grazing, fire suppression, etc. No or very few exotic species present with no potential for expansion. At least 15 grassland-associate species present (Appendix A).

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, fire suppression, or light grazing is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs. At least 10 grassland-associate species present.

**C -rated condition:** Natural hydrologic regime altered by local drainage, or excessive flooding from altered drainage from surrounding land. Alteration from local drainage, prior agricultural use, grazing, and fire suppression is extensive but potentially restorable over several decades. Exotic species widespread but potentially manageable with restoration of most natural processes. At least 10 grassland-associate species present.

**D -rated condition:** Natural hydrologic regime and disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species dominant, with little hope for control. Alteration from prolonged agricultural use or prolonged grazing most likely not restorable.

Justification for AA@-rated criteria: Most Willamette Valley wet prairies depend on seasonal water regime and frequent fire. A-ranked Occurrences have these processes intact, with no history of agricultural use or grazing. Very few prairie remnants in the region now meet these criteria, and most that do will be small in size, making them vulnerable to edge effect.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation.

### SIZE.SPECS

**A -rated size:** Very large (>300 ac/120 ha)

**B -rated size:** Large (100-300 ac/40-120 ha)

**C -rated size:** Moderate (10-100 ac/4-40 ha)

**D -rated size:** Small (<10 ac/4 ha)

Justification for AA@-rated criteria: Willamette Valley wet prairies are usually composed of mosaics of different associations included in this system. Occurrences of this size may have high species diversity and are well buffered from edge effects. Occurrences of this size are rare because hydric landforms of this size that have not been converted to agricultural or urban uses are rare.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. D-ranked Occurrences occur in small patches surrounded by converted lands, and generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered). No barriers present. Connectivity of habitats allows natural processes and species migration to occur.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity. Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity. If there is little to no urban development in the surrounding landscape, then a landscape consisting largely of agriculture (50-100% agricultural alteration) is acceptable. Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to urban (>50% altered), or are a mix of urban and agriculture. Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact surroundings and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences. C-ranked occurrences in agricultural landscapes have potential to expand with restoration. D-ranked Occurrences have no buffering, and are subject to invasion of exotic species. Species diversity will be very low.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## VERNAL POOLS

DOWNINGIA ELEGANS VERNAL POOL HERBACEOUS VEGETATION  
ERYNGIUM PETIOLATUM - GRINDELIA NANA HERBACEOUS VEGETATION  
ERYNGIUM PETIOLATUM - LASTHENIA GLABERRIMA HERBACEOUS VEGETATION  
PLAGIOBOTHRYUS FIGURATUS VERNAL POOL HERBACEOUS VEGETATION  
PLAGIOBOTHRYUS SCOULERI - PLANTAGO BIGELOVII HERBACEOUS VEGETATION

Vernal pools are rare in the ecoregion being restricted to the Willamette Valley, Gulf Islands and San Juan Islands. They are characterized by freshwater inundation for much of the winter and spring, followed by dramatic lowering of the water table at the approach of summer, such that soils are dry in the summer. They are found in isolated small depressions with no inflow or outflow and a restrictive subsurface soil layer (clay or bedrock). Vegetation is dominated primarily by annual forbs.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .25 km wide, major highways, urban development, large bodies of water, (2) different natural community or degraded example of same community wider than .5 km, (3) major break in topography, soils, geology, etc.

Justification: Vernal pool associations are often intermixed because of similar hydrologic requirements, microtopography within the pools, and fluctuating water levels. Occurrences are often zonal. They are isolated hydrologically from other wetlands, and easily impacted by surrounding land use.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size.

### CONDITION.SPECS

**A -rated condition:** Natural hydrologic regime intact. No or little evidence of alteration due to drainage, flood control, plowing, grazing, or fire suppression. No or very few exotic species present with no potential for expansion.

**B -rated condition:** Natural hydrologic regime intact or altered by local drainage. Alteration from local drainage, fire suppression, or light grazing is easily restorable by ceasing such activities. Few exotic species with little potential for expansion if restoration occurs.

**C -rated condition:** Natural hydrologic regime altered by local drainage, local diking, or regional flood control dams. Alteration from local drainage, diking, plowing, grazing, and fire suppression is extensive but potentially restorable over several decades. Alteration from regional flood control dams most likely not restorable. Exotic species widespread but potentially manageable with restoration of most natural processes.

**D -rated condition:** Natural hydrologic regime or disturbance to site not restorable. System remains fundamentally compromised despite restoration of some processes. Exotic species dominant or co-dominant with little hope for control.

Justification for AA@-rated criteria: Most vernal pools in the Pacific Northwest depend on seasonal water regime and frequent disturbance by flood and fire. A-ranked Occurrences have these processes intact, with no history of flood control, fire suppression, plowing, or grazing. Very few wetlands in the region now meet these criteria, and most that do will be small in size, making them vulnerable to edge effect.

Justification for AC/D@ threshold: C-ranked Occurrences have potential for restoration over several decades. D-ranked Occurrences have little or no potential for restoration because of extensive degradation. Occurrences on floodplains are particularly impacted by flood control dams, and have the least likelihood of restoration unless dams are removed.

### SIZE.SPECS

**A -rated size:** Very large (> 25 ac/10 ha)

**B -rated size:** Large (5-25 ac/2-10 ha)

**C -rated size:** Moderate (.5-5 ac/.2-2 ha)

**D -rated size:** Small (< .5 ac/.2 ha)

Justification for AA@-rated criteria: Remnant vernal pools are usually composed of mosaics of different associations included in this system. Occurrences may have high species diversity and are well buffered from edge

effects. Occurrences of this size are rare because hydric landforms not already converted to agricultural or urban uses are extremely rare.

Justification for AC/D@ threshold: C-ranked Occurrences may have moderate to high species diversity and may be well buffered from edge effect. Small sites generally have low species diversity and are vulnerable to edge effect.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Uplands surrounding Occurrence and in the watershed of the occurrence are largely unaltered by urban or agricultural uses (<5% altered), and have few to no recent (<20 years) clearcuts (<10% of landscape). No barriers present. Connectivity of habitats allows natural processes and species migration to occur.

**B -rated landscape context:** Uplands surrounding Occurrence and its watershed with moderate urban or agricultural alteration (5-20% altered), but retaining much connectivity, or uplands are heavily managed forest landscape with many tree plantations (<50% of watershed in recent clearcuts). Few barriers present. Some natural processes such as fire may be compromised.

**C -rated landscape context:** Uplands surrounding Occurrence and its watershed are fragmented by urban or agricultural alteration (20-50% altered), with limited connectivity, or >50% of watershed in recent clearcuts). Some barriers are present, and natural processes few.

**D -rated landscape context:** Uplands surrounding Occurrence and its watershed are mostly converted to intensive agriculture or urban (>50% altered). Connectivity and natural processes are largely disrupted.

Justification for AA@-rated criteria: These are Occurrences with nearly intact surroundings and processes. Wetlands are fully connected with uplands, and fully buffered from upland influences.

Justification for AC/D@ threshold: C-ranked Occurrences have some limited buffering from upland influences because of size. D-ranked Occurrences have no buffering, and are subject to siltation and pollution. Species diversity will be very low.

**AUTHORSHIP:** John Christy

**DATE:** March 31, 2000

## UPLAND PRAIRIES AND SAVANNAS

DANTHONIA CALIFORNICA VALLEY GRASSLAND HERBACEOUS VEGETATION  
FESTUCA ROEMERI - ASTER CURTUS HERBACEOUS VEGETATION  
FESTUCA ROEMERI - SIDDALCEA MALVIFLORA SSP. VIRGATA HERBACEOUS VEGETATION  
QUERCUS GARRYANA / FESTUCA ROEMERI WOODED HERBACEOUS VEGETATION  
PINUS PONDEROSA / CAREX INOPS - FESTUCA ROEMERI WOODLAND  
PINUS PONDEROSA - QUERCUS GARRYANA / FESTUCA ROEMERI WOODED HERBACEOUS

This ecosystem formed a complex mosaic of varying patch sizes with wet prairies and riparian forests over much of the Willamette Valley during the pre-European settlement era. In parts of the Puget Trough, it occurred as large patches in more forested landscapes, usually associated with deep, coarse outwash deposits. It occurs on well-drained soils and was maintained historically by frequent anthropogenic burning. In the absence of disturbance, many of them have succeeded to forest and others continue to do so. Dominant vegetation is perennial bunchgrasses, especially *Festuca roemeri*, and to a lesser degree, *Danthonia californica*, with abundant and diverse forbs. Scattered deciduous (*Quercus garryana*) and/or conifer (*Pseudotsuga menziesii*, *Pinus ponderosa*) trees are rarely found now, but such savannas historically covered about 1/3 of the total acreage.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: Small fragments close to each other may have some genetic interchange.

**RANK.PROCEDURE:** (1) size, (2) landscape setting, (3) condition. All three factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** Native species dominate, non-native species are typically present but in small amounts <5% total cover, native species that increase with grazing disturbance are <10% cover; invasive exotics with major potential to alter structure and composition are absent, e.g. *Cytisus scoparius*, *Arrhenatherum elatius*, *Holcus lanatus*, *Agrostis capillaris*, *Chrysanthemum leucanthemum*; Douglas fir, if present, consists of widely scattered large, old trees; native invader shrubs, e.g. *Toxicodendron diversiloba*, absent or very sparse; at least 15 species of grassland-associates (appendix A) present.

**B -rated condition:** Native species dominate, non-native species are present but in small amounts <10% total cover, native increaser species <20% total cover; invasive exotics with major potential to alter structure and composition may be present; Douglas fir, if present, found at densities of <4 individuals/acre regardless of size; native invader shrubs may be frequent but <10% cover; at least 10 species of grassland-associates present.

**C -rated condition:** Vascular plant cover is co-dominated by native and non-native species or dominated by native increaser species (e.g. *Carex inops*), non-native and native species each typically occupy >10% total cover, with native species >20% relative cover; invasive exotics with major potential to alter structure and composition may be very prominent; Douglas fir may be numerous as seedlings/saplings/small trees; native invader shrubs may be present to abundant but do not completely dominate; >10 species of grassland-associates are present.

**D -rated condition:** Non-native species dominate, native species <10% cover and <20% relative cover; native invader shrubs may be threatening to overwhelm herbaceous vegetation; less than 10 species of grassland-associates present.

Justification for AA@-rated criteria: This may not exist anymore but is probably within reach on best condition extant sites. Small component of non-natives is inescapable. Problematic invasives, native invader shrubs, and Douglas fir pose major threats to viability.

Justification for AC/D@ threshold: Restoration of a D would be unfeasible. C still providing lots of habitat for natives and potentially restorable.

### SIZE.SPECS

**A -rated size:** Very large (>500 ac/400 ha)

**B -rated size:** Large (100-500 ac/40-400 ha)

**C -rated size:** Moderate (20-100 ac/8-40 ha)

**D -rated size:** Small (<20 ac/8 ha)

Justification for AA@-rated criteria: Large enough to support a population of western meadowlarks (Altman 1999).

Justification for AC/D@ threshold: C-ranked occurrences are large enough to manage with a prescribed fire rotation (E. Alverson pers. comm.). Sites smaller than this unlikely to have western meadowlarks (Altman 1999), sites larger are marginal for that species. Restoration of a truly pre-settlement fire regime is not possible due to societal constraints (large, potentially intense, and unpredictable fires). Conservation of existing C-ranked occurrences, despite their relatively small size is crucial for many species that are still extant.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a landscape with native-dominated (in all physiognomic layers) vegetation, very little to no development or agriculture, and little to no industrial forestry.

**B -rated landscape context:** 1000 acres of surrounding landscape composed of at least 75% natural or semi-natural vegetation, with any development occurring not directly adjacent to the occurrence; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer.

**C -rated landscape context:** Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation. Urban alteration <50% of landscape. Agricultural alteration can be near 100% if urban alteration is <10%.

**D -rated landscape context:** Landscape has >50% urban alteration or has >10% urban alteration combined with >50% agricultural alteration. Minority of landscape in natural or semi-natural landscape.

Justification for AA@-rated criteria: Connectivity intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e.g. roads, development.

Justification for AC/D@ threshold: Occurrences surrounded by agriculture with little urban development have potential to be expanded through restoration. Landscapes with much urban development limit connectivity and opportunities for prescribed fire.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 10, 2000

Altman, B. 1999. Status and conservation of grassland birds in the Willamette Valley. Unpubl. report submitted to Oregon Dept. of Fish and Wildlife, Corvallis, Oregon.

## HERBACEOUS BALDS AND BLUFFS

STIPA LEMMONII / RACOMITRIUM CANESCENS HERBACEOUS VEGETATION

FESTUCA RUBRA - (CAMASSIA LEICHTLINII - GRINDELIA INTEGRIFOLIA VAR. MACROPHYLLA) HERBACEOUS VEGETATION

FESTUCA ROEMERI - CERASTIUM ARVENSE - KOELERIA MACRANTHA HERBACEOUS VEGETATION

RACOMITRIUM CANESCENS - SELAGINELLA WALLACEI BRYOPHYTE VEGETATION

MIMULUS GUTTATUS - BRYUM MINIATUM HERBACEOUS VEGETATION

Herbaceous balds and bluffs occur in the driest environmental settings within the ecoregion that support continuous vegetation: generally south- to west-facing slopes on shallow or sandy/gravelly soils. They are most numerous in the driest climatic portion of the ecoregion in the Gulf Islands, San Juan Islands, and southeastern Vancouver Island. They typically occur as isolated sites within a forest matrix or on coastal bluffs. Fire was probably an important process historically on most of these sites, and some of them are threatened by invasion of trees in the absence of disturbance. Vegetation is dominated by perennial bunchgrasses, forbs, and mosses. Scattered trees, especially *Pseudotsuga menziesii*, are often present.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation greater than 0.5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

**Justification:** Occurrences further away than 1 km are unlikely to have much interaction. These are small patches associated with specific environments.

**RANK.PROCEDURE:** (1) condition, (2) landscape setting, (3) size.

### CONDITION.SPECS

**A -rated condition:** Native species dominate, non-native species are typically present but in small amounts <5% total cover; *Festuca idahoensis*, *Festuca rubra* (native varieties), or *Stipa lemmonii* are the dominant graminoids; invasive exotics with major potential to alter structure and composition are absent, e.g. *Cytisus scoparius*, *Ulex europaeus*, *Holcus lanatus*, *Agrostis capillaris*; Douglas fir, if present, consists of widely scattered large, old trees; native invader shrubs (e.g. *Rosa nutkana*, *Symphoricarpos albus*) absent or present only at edges; at least 15 species of grassland-associates (appendix A) present.

**B -rated condition:** Native species dominate, non-native species are present but in small amounts <10% total cover; *Festuca idahoensis*, *Festuca rubra* (native varieties), or *Stipa lemmonii* are the dominant graminoids, *Danthonia californica* may be co-dominant; invasive exotics with major potential to alter structure and composition may be present; Douglas fir, if present, found at densities of <8 individuals/acre regardless of size; native invader shrubs may be frequent but <10% cover; at least 10 species of grassland-associates present.

**C -rated condition:** Vascular plant cover is co-dominated by native and non-native species, non-native and native species each typically occupy >10% total cover, with native species >20% relative cover; native graminoids other than *F. idahoensis*, native *F. rubra*, or *Stipa lemmonii* may be dominant, especially *Danthonia californica* or *Carex inops*; invasive exotics with major potential to alter structure and composition may be very prominent; Douglas fir may be relatively numerous as seedlings/saplings; native invader shrubs may be present to abundant but do not dominate; >10 species of grassland-associates are present.

**D -rated condition:** Non-native species dominate, native species <10% cover and <20% relative cover; Douglas fir may have numerous seedlings/saplings; native invader shrubs may be threatening to overwhelm herbaceous vegetation with high percent cover; less than 10 species of grassland-associates present.

**Justification for AA@-rated criteria:** Small component of non-natives is inescapable. Problematic invasives, native invader shrubs, and Douglas fir pose major threats to viability.

**Justification for AC/D@ threshold:** Restoration of a D would be unfeasible. C still providing lots of habitat for natives and potentially restorable.

### SIZE.SPECS

**A -rated size:** Very large (>50 ac/20 ha)

**B -rated size:** Large (10-50 ac/4-20 ha)

**C -rated size:** Moderate (1-10 ac/0.4-4 ha)

**D -rated size:** Small (<1 ac/0.4 ha)

Justification for AA@-rated criteria: Near upper range of extant patches. Likely to have high diversity. Likely to be large enough to support multiple Vesper Sparrow territories (Altman 1999).

Justification for AC/D@ threshold: Smaller than this likely to be very vulnerable to invasion by shrubs and trees, low diversity. Vesper sparrows do not appear to be area-sensitive and occur in small patches of habitat scattered across the landscape. Area-sensitive western meadowlarks do not use this habitat.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a landscape with native-dominated (in all physiognomic layers) vegetation, very little to no development or agriculture, and little to no industrial forestry.

**B -rated landscape context:** Landscape composed of at least 75% natural or semi-natural vegetation, with any development occurring not directly adjacent to the occurrence; or surrounding landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer.

**C -rated landscape context:** Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 35-75% of the landscape.

**D -rated landscape context:** Occurrence surrounded primarily by urban or agricultural landscape, with <35% landscape cover of natural or semi-natural vegetation.

Justification for AA@-rated criteria: Connectivity intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e.g. roads, development.

Justification for AC/D@ threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 10, 2000

Altman, B. 1999. Status and conservation of grassland birds in the Willamette Valley. Unpubl. report submitted to Oregon Dept. of Fish and Wildlife, Corvallis, Oregon.

## DRY EVERGREEN FORESTS AND WOODLANDS

ARBUTUS MENZIESII / ARCTOSTAPHYLOS COLUMBIANA WOODLAND  
PSEUDOTSUGA MENZIESII - ABIES GRANDIS / SYMPHORICARPOS ALBUS / MELICA SUBULATA FOREST  
PSEUDOTSUGA MENZIESII / CORYLUS CORNUTA / POLYSTICHUM MUNITUM FOREST  
PSEUDOTSUGA MENZIESII / GAULTHERIA SHALLON - HOLODISCUS DISCOLOR FOREST  
PSEUDOTSUGA MENZIESII / ROSA GYMNOCARPA - HOLODISCUS DISCOLOR FOREST  
PSEUDOTSUGA MENZIESII / SYMPHORICARPOS ALBUS - HOLODISCUS DISCOLOR FOREST  
PINUS CONTORTA VAR. CONTORTA - PSEUDOTSUGA MENZIESII / GAULTHERIA SHALLON FOREST  
PINUS CONTORTA VAR. CONTORTA - PSEUDOTSUGA MENZIESII / LICHEN FOREST  
PSEUDOTSUGA MENZIESII - ARBUTUS MENZIESII / GAULTHERIA SHALLON FOREST  
PSEUDOTSUGA MENZIESII - ARBUTUS MENZIESII / LONICERA HISPIDULA FOREST  
PSEUDOTSUGA MENZIESII - ARBUTUS MENZIESII - QUERCUS SPP. / TOXICODENDRON DIVERSILOBUM -  
SYMPHORICARPOS ALBUS FOREST  
PSEUDOTSUGA MENZIESII / SYMPHORICARPOS HESPERIUS FOREST

This system occupies small to large patches associated with dry sites or prairie landscapes in most of the ecoregion. In the Willamette Valley section, this system becomes the dominant upland conifer forest type. It acts as a matrix type on foothills around the perimeter of the ecoregion in the Willamette Valley section, but historically was probably more like a large patch type in those areas. This system historically had moderate- to low-severity fires moderately frequently. Historically, these communities were either part of larger forested landscapes or occupied sheltered topographic positions in prairie-dominated landscapes. They now also occur on some sites that formerly supported prairies or tall shrublands (*Coylus cornuta*) with scattered trees. This is a forest or woodland primarily dominated by the long-lived conifer *Pseudotsuga menziesii*. The evergreen broadleaf *Arbutus menziesii*, the short-lived conifer *Pinus contorta*, the broadleaf deciduous *Acer macrophyllum*, and the shade-tolerant conifer *Abies grandis* are local dominant or co-dominant species. These sites are too dry and warm or have been too frequently and extensively burned for anything more than small amounts of *Tsuga heterophylla* or *Thuja plicata* present as regeneration.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

**Justification:** These communities are somewhat specific in the environment within which they occur, but can intergrade with other forest communities, so separation distances are intermediate.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size. All three factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** At least 1/2 of occurrence has stand age greater > 200 years or multi-cohort stand with significant component of >200 year old trees (>10/acre) (Franklin and Spies 1984); no or very little evidence of past logging disturbance; non-native species absent or present with low frequency; community is not a result of tree invasion on former grasslands or savanna within the last 150 years. *Pinus contorta* stands do not need to meet the first criteria.

**B -rated condition:** Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stands are <200 years of age, or majority of stands >200 years of age but show evidence of selective logging that has altered their structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover; community is not a result of tree invasion on former grasslands or savanna within the last 150 years.

**C -rated condition:** Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover); community may be a result of tree invasion on former grasslands or savanna within the last 150 years.

**D -rated condition:** Non-native species abundant in the understory; or dominant trees were planted; stand is typically regenerated after logging.

Justification for AA@-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. Communities little altered by logging. Non-native species with low threat of spread.

Justification for AC/D@ threshold: Plantations do not have native genetic stock so are not restorable in the short term. Prescribed fire is almost out of the question in forests of this ecoregion.

#### **SIZE.SPECS**

**A -rated size:** Very large (>400 ac/160 ha)

**B -rated size:** Large (100-400 ac/40-160 ha)

**C -rated size:** Moderate (20-100 ac/8-40 ha)

**D -rated size:** Small (< 20 ac/8 ha)

Justification for AA@-rated criteria: More resistant to non-native invasions, toward the high end of natural size for the type, more likely to contain high diversity, some natural processes have space in which to operate and create disturbance mosaics.

Justification for AC/D@ threshold: Areas smaller than 20 acres are highly susceptible to being eliminated or severely degraded by disturbance.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a large (>1500 acres/600 ha) area of natural-origin forest or native prairie that has been little disturbed by past logging or other human activities; surrounding landscape can include other natural communities in addition to forest but has little to no urbanization or agriculture.

**B -rated landscape context:** Occurrence surrounded primarily by an area of largely intact native (not a plantation) forest or other natural community that is at least 250 acres in total size; larger landscape of at least 1000 acres can be tree plantations; development, if present, is a minor landscape component (<20%).

**C -rated landscape context:** Occurrence surrounded by degraded forest vegetation, e.g. clearcuts or tree plantations, by agriculture, or by a mosaic of urban/suburban/agriculture and forest or other natural community (maximum 50% urbanized)

**D -rated landscape context:** Occurrence surrounded by urbanized or semi-urbanized land cover, >50% urban development in landscape.

Justification for AA@-rated criteria: Occurrences part of a landscape large enough to support some degree of patch dynamics over time, as well as a high degree of diversity.

Justification for AC/D@ threshold: Isolated occurrences with very little opportunity for genetic exchange or natural processes. Agricultural landscapes do not pose major threats, especially in landscapes where pre-settlement prairies were common.

**AUTHORSHIP:** Chris Chappell

**DATE:** 10 May 2000

Franklin, J. F., and T. A. Spies. 1984. Characteristics of old-growth Douglas-fir forests. Pages 328-334 *in* Proceedings, Soc. of American Foresters national convention, Oct. 16-20, 1983. Soc. of American Foresters, Washington, D.C.

## UPLAND MOIST-SITE BROADLEAF FORESTS

ALNUS RUBRA / POLYSTICHUM MUNITUM FOREST

BETULA PAPYRIFERA VAR. COMMUTATA - ALNUS RUBRA/ POLYSTICHUM MUNITUM FOREST

ACER MACROPHYLLUM - THUJA PLICATA / OEMLERIA CERASIFORMIS FOREST

ACER MACROPHYLLUM - ALNUS RUBRA / POLYSTICHUM MUNITUM - TELLIMA GRANDIFLORA FOREST

These forests occur as dynamic successional patches (large patch character). They occur on relatively moist sites, many of which have seasonally fluctuating water tables. They are found in two contrasting landscape settings, driven by two different natural processes. The first and most common is early-successional patches (lasting up to about 100 years after disturbance) in Douglas-fir - Western Hemlock – Western Redcedar Forests or Dry Evergreen Forests and Woodlands, initiated by fire, windthrow, or logging. The second landscape setting where they occur is steep slopes and bluffs that are susceptible to mass movements. Here they are found in patches of differing age associated with different landslide events. The vegetation is deciduous broadleaf forests, sometimes with varying components of conifers also. *Alnus rubra* and *Acer macrophyllum* are the major species. For the purposes of conservation targets for the ecoregion, this system was lumped with the Douglas-fir - Western Hemlock – Western Redcedar Forests or Dry Evergreen Forests and Woodlands within which it occurs. However, these EO Specs and EO Rank Specs were used to rank occurrences of the above plant associations.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break in topography, soils, geology, etc.

Justification: These communities are naturally patchy and dynamic, and generally not confined to very specific environments. Therefore, patches somewhat near each other are expected to interact with each other over time if the intervening communities are forested.

**RANK.PROCEDURE:** (1) condition, (2) size, (3) landscape context. All three factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** Non-native species absent or present in very low abundance; community initiated after natural disturbance, no sign of past logging; natural processes favor continued existence of community (i.e. located on steep slope prone to erosion, or part of large forested landscape likely to experience blowdown or fire prior to successional transition).

**B -rated condition:** Non-native species in low abundance but may be frequent with potential to spread over time; community initiated after natural disturbance, may be signs of past selective logging that did not have a major impact on community structure; natural processes favoring continued existence of community appear to be present but there is considerable uncertainty about likelihood of disturbance prior to successional transition.

**C -rated condition:** Non-native understory species may be frequent or important but not dominant; or evidence of logging as a primary disturbance agent in community initiation; or natural processes favoring continued existence of community apparently not present.

**D -rated condition:** Non-native understory species >20% cover; community initiated from logging disturbance; natural processes favoring continued existence of community not present.

Justification for A-rated criteria: Natural-origin occurrences with high likelihood of continued existence associated with natural processes.

Justification for AC/D@ threshold: Occurrences with abundant non-native species are difficult if not impossible to restore.

### SIZE.SPECS

**A -rated size:** Very large (>300 ac/120 ha)

**B -rated size:** Large (100-300 ac/40-120 ha)

**C -rated size:** Moderate (40-100 ac/15-40 ha)

**D -rated size:** Small (< 40 ac/15 ha)

Justification for AA@-rated criteria: Large enough to have likelihood of natural processes operating, including successional dynamic; more resistant to non-native invasions.

Justification for AC/D@ threshold: Areas smaller than 40 acres are susceptible to non-native invasions and not large enough to accommodate a shifting mosaic of small disturbance patches.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a large (>1500 acres/600 ha) area of natural-regeneration forest; surrounding landscape can include other natural communities in addition to forest but has little to no urbanization or agriculture.

**B -rated landscape context:** Occurrence surrounded primarily by an area of largely intact native (not a plantation) forest or other natural community that is at least 250 acres in total size; larger landscape of at least 1000 acres can be tree plantations; development and agriculture are minor landscape components, <20%.

**C -rated landscape context:** Occurrence surrounded by degraded forest vegetation, e.g. clearcuts or plantations, or by a mosaic of urban/suburban/agriculture and forest or other natural community (25-80% natural or semi-natural vegetation). Landscape <50% urbanized.

**D -rated landscape context:** Occurrence surrounded by urbanized or semi-urbanized land cover or agriculture (<25% natural or semi-natural vegetation). Landscape may be >50% urbanized.

Justification for AA@-rated criteria: Occurrences part of a landscape large enough to support patch dynamics over time, as well as a high degree of diversity.

Justification for AC/D@ threshold: Isolated occurrences with very little opportunity for genetic exchange or natural processes.

**AUTHORSHIP:** Chris Chappell **DATE:** 2 May 2000

## DOUGLAS FIR - WESTERN HEMLOCK - WESTERN REDCEDAR FORESTS

PINUS CONTORTA VAR. CONTORTA - PSEUDOTSUGA MENZIESII / GAULTHERIA SHALLON FOREST  
PSEUDOTSUGA MENZIESII - THUJA PLICATA / GAULTHERIA SHALLON FOREST  
PSEUDOTSUGA MENZIESII - TSUGA HETEROPHYLLA / GAULTHERIA SHALLON FOREST  
PSEUDOTSUGA MENZIESII - TSUGA HETEROPHYLLA / MAHONIA NERVOSA VAR. NERVOSA FOREST  
PSEUDOTSUGA MENZIESII - TSUGA HETEROPHYLLA / POLYSTICHUM MUNITUM FOREST  
PSEUDOTSUGA MENZIESII - TSUGA HETEROPHYLLA / RHODODENDRON MACROPHYLLUM - VACCINIUM OVATUM FOREST  
PSEUDOTSUGA MENZIESII - TSUGA HETEROPHYLLA / VACCINIUM OVATUM FOREST  
THUJA PLICATA - ABIES GRANDIS / POLYSTICHUM MUNITUM FOREST  
TSUGA HETEROPHYLLA/POLYSTICHUM MUNITUM FOREST  
TSUGA HETEROPHYLLA/OXALIS OREGANA-POLYSTICHUM MUNITUM FOREST

These communities together formed the matrix in much of the ecoregion, occurring on moderately dry to moist sites. In the Willamette Valley section, this system is less extensive and occurs mostly as large patches around the periphery of the ecoregion. Most of these associations occur as a mosaic of large patches across the landscape, differing in vegetation with their response to moisture and nutrient gradients. This system for the most part formerly supported a moderate-severity fire regime involving occasional stand-replacement fires and more frequent moderate-severity fires. This fire regime would create a complex mosaic of stand structures across the landscape. The dominant vegetation is evergreen conifer forest, especially the very long-lived seral *Pseudotsuga menziesii*, and the shade-tolerant *Abies grandis*, *Tsuga heterophylla* and *Thuja plicata*. The deciduous broadleaf trees *Alnus rubra* and *Acer macrophyllum* are common but subordinate. The short-lived *Pinus contorta* can dominate on some sites after high-severity fires if an adequate seed source is present.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km if the communities do not frequently occur in a mosaic or 2 km if the communities frequently occur together in a mosaic; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology); (4) residential development that is more dense than one house per 20 acres.

**Justification:** Many of these communities occur naturally in a mosaic much of the time so minor breaks or small barriers are probably a very common part of the natural distribution and variability. If the breaks are larger, barriers may exist for some species.

**RANK.PROCEDURE:** (1) size, (2) landscape context, (3) condition. Secondary and tertiary factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** At least 1/3 of occurrence has stand age greater > 200 years or multi-cohort stand with significant component of >200 year old trees (>10/acre) (Franklin and Spies 1984); no or very little evidence of past logging disturbance; non-native species absent or present with low frequency. Community is not the result of tree invasion on former grasslands or savanna within the last 150 years. No residential development within the occurrence.

**B -rated condition:** Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stands are <200 years of age, or majority of stands >200 years of age but show evidence of selective logging that has altered their structure; non-native species may be present with low to moderate frequency in the understory, but have low percent cover. Community is not the result of tree invasion on former grasslands or savanna within the last 150 years. No or very little residential development within the occurrence.

**C -rated condition:** Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure; non-native species may be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover). Community may be a result of tree invasion on former grasslands or savanna within the last 150 years. There may be up to one house per 20 acres over limited areas of the occurrence.

**D -rated condition:** Non-native species abundant in the understory; or dominant trees were planted; stand is typically regenerated after logging. Residential development scattered over a significant portion of the occurrence, or exceeding one house per 20 acres.

Justification for AA@-rated criteria: Frequency of old-growth stands has been much reduced in this ecoregion, so old-growth carries a premium for condition. It is likely that about 1/3 of the pre-settlement landscape had old-growth conditions at any one time. Communities little altered by logging. Non-native species with low threat of spread.

Justification for AC/D@ threshold: Plantations do not have native genetic stock so considered unrestorable.

#### **SIZE.SPECS**

**A -rated size:** Very large (>5000 ac/2000 ha)

**B -rated size:** Large (1500-5000 ac/600-2000 ha)

**C -rated size:** Moderate (160-1500 ac/64-600 ha)

**D -rated size:** Small (<160 ac/64 ha)

Justification for AA@-rated criteria: Large enough to support a full mosaic of stand conditions, ages, and disturbance patterns. Mean high-severity patch size for a moderate-severity fire regime in somewhat similar Douglas-fir forests in the central Oregon Cascades is about 30 acres (Morrison and Swanson 1990): 50 times this size is 1500 acres, three times that size provides some extra latitude for very high-severity events. Large enough to support all forest-dependent fauna except those largely extirpated from the ecoregion.

Justification for AC/D@ threshold: C-ranked occurrences are large enough to support multiple pairs of breeding varied thrushes and brown creepers, two area-sensitive bird species (Brooks 1978, McGarigal and McComb 1995, Manuwal and Pearson 1997). D-ranked occurrences have only a small area that is not being influenced by microenvironmental edge effects. C-ranked occurrences have some opportunity to absorb effects of small disturbances.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a large area (>1500 ac/600 ha) of natural vegetation. Few small roads in the surrounding landscape.

**B -rated landscape context:** Landscape composed of at least 80% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.

**C -rated landscape context:** Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 35-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years). Landscape is no more than 50% urbanized.

**D -rated landscape context:** Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. Landscape can be >50% urbanized.

Justification for AA@-rated criteria: Connectivity intact. Natural processes can function.

Justification for AC/D@ threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

**AUTHORSHIP:** Chris Chappell

**DATE:** 2 May 2000

Brooks, J. P. 1997. Bird-habitat relationships at multiple spatial resolutions in the Oregon Coast Range. M.S. thesis, Oregon State Univ., Corvallis, Oregon.

Franklin, J. F., and T. A. Spies. 1984. Characteristics of old-growth Douglas-fir forests. Pages 328-334 in Proceedings, Soc. of American Foresters national convention, Oct. 16-20, 1983. Soc. of American Foresters, Washington, D.C.

Manuwal, D. A., and S. Pearson. 1997. Bird populations in managed forests in the western Cascade Mountains, Washington. In Wildlife use of managed forests: a landscape perspective. Vol. 2, West-side research studies.

McGarigal, K., and W. C. McComb. 1995. Relationships between landscape structure and breeding birds in the Oregon Coast Range. Ecol. Monographs 65:235-260.

Morrison, P., and F. J. Swanson. 1990. Fire history and pattern in a Cascade Range landscape. U.S.D.A. For. Serv. Gen. Tech. Rep. PNW-GTR-254.

## WILLAMETTE OAK WOODLANDS

QUERCUS GARRYANA - QUERCUS KELLOGII - (ARBUTUS MENZIESII) / TOXICODENDRON DIVERSILOBA WOODLAND  
QUERCUS GARRYANA / SYMPHORICARPOS ALBUS / POLYSTICHUM MUNITUM FOREST  
QUERCUS GARRYANA / TOXICODENDRON DIVERSILOBA/ ELYMUS GLAUCUS WOODLAND  
PSEUDOTSUGA MENZIESII - QUERCUS GARRYANA / SYMPHORICARPOS ALBUS FOREST  
PSEUDOTSUGA MENZIESII - QUERCUS GARRYANA / TOXICODENDRON DIVERSILOBA FOREST  
QUERCUS GARRYANA / CEANOTHUS CUNEATUS / FESTUCA IDAHOENSIS WOODLAND

By definition, this system occurs only in the Willamette Valley section where oak woodlands were historically a large patch type dependent on aboriginal burning activity. Soils are generally mesic yet well-drained. Succession in the absence of fire tends to favor increased shrub dominance in the understory, increased tree density, and increased importance of conifers, with the end result being conversion to a conifer forest. The vegetation is a woodland or forest dominated by deciduous broadleaf trees, mostly *Quercus garryana*. Co-dominance by the evergreen conifer *Pseudotsuga menziesii* is common.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: These are naturally patchy communities.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size. All three factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** Native species dominate all physiognomic layers, non-native species are present in very low abundance without an immediate threat of spreading rapidly; conifers are absent, scattered, or small and of moderate density (<30 saplings per acre); mature (>150 years old or >24" dbh) cohort of oaks is prominent, though not necessarily dominant, in the canopy; multiple age classes or size classes of oak are present; very little to no evidence of past logging or grazing. No residential development within the occurrence.

**B -rated condition:** Native species largely dominate in understory and overstory, non-native species may be frequent with some potential to spread but are <10% cover overall; conifers are absent or present but do not pose a near-term threat to the oak canopy; little to no evidence of past logging or grazing, with perhaps noticeable but minor changes in species composition. Residential development absent or minor and located at edge of occurrence.

**C -rated condition:** Native species at least co-dominant in understory, dominant in canopy, non-native species may be low in abundance to co-dominant in understory layers; conifers may be numerous in the canopy and/or understory, but have not overtopped and shaded the majority of the oak canopy; moderate to no logging history; grazing impacts to understory composition may be significant but restorable. Residential development may cover a limited area at no more than 1 house per 5 acres.

**D -rated condition:** Non-native species dominate understory with minor native understory component; or successional pathway appears headed very soon for conifer dominance (conifers have overtopped and are shading majority of oaks); may be much disturbed by logging or grazing. Residential development of more than 1 house per 5 acres or covering a substantial portion of the occurrence.

Justification for AA@-rated criteria: Natural occurrences with few non-native species and no near-term within-community threats. This condition is rare but still does exist. Some trees large enough to support white-breasted nuthatches, or old enough to provide structural complexity. Multiple age or size classes indicate potentially greater long-term viability.

Justification for AC/D@ threshold: C occurrences still have substantial native component in the understory and are not in immediate danger of being shaded out by conifers, therefore they are restorable.

## **SIZE.SPECS**

**A -rated size:** Very large (>100 ac/40 ha)

**B -rated size:** Large (40-100 ac/16-40 ha)

**C -rated size:** Moderate (5-40 ac/2-16 ha)

**D -rated size:** Small (<5 ac/2 ha)

Justification for AA@-rated criteria: Large enough to support white-breasted nuthatches (Hagar and Stern 1997), for substantial within-community diversity, and to provide some buffer against catastrophic events.

Justification for AC/D@ threshold: Area smaller than 5 acres unlikely to provide habitat for oak-associated wildlife, subject to extreme edge effects and vulnerable to extirpation, low within-community diversity.

## **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a landscape with native-dominated (in all physiognomic layers) vegetation, very little to no development or agriculture, and little to no industrial forestry.

**B -rated landscape context:** Landscape composed of at least 80% natural or semi-natural vegetation, with any development occurring not directly adjacent to the occurrence; or landscape surrounding has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer.

**C -rated landscape context:** Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape. No more than 50% of landscape is urbanized.

**D -rated landscape context:** Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. May be more than 50% of landscape urbanized.

Justification for AA@-rated criteria: Connectivity intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e.g. roads, development.

Justification for AC/D@ threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 2, 2000

Hagar, J. C., and M. A. Stern. 1997. Avifauna in oak woodland habitats of the Willamette Valley, Oregon 1994-1996. Unpubl. report, U.S. Fish and Wildlife Service, Portland, Oregon.

## NORTHERN OAK WOODLANDS

QUERCUS GARRYANA / CAREX INOPS - CAMASSIA QUAMASH WOODLAND  
QUERCUS GARRYANA / SYMPHORICARPOS ALBUS / CAREX INOPSWOODLAND  
QUERCUS GARRYANA / TOXICODENDRON DIVERSILOBA/ ELYMUS GLAUCUS WOODLAND  
QUERCUS GARRYANA / VIBURNUM ELLIPTICUM - TOXICODENDRON DIVERSILOBA FOREST  
PSEUDOTSUGA MENZIESII - QUERCUS GARRYANA / MELICA SUBULATA FOREST  
PSEUDOTSUGA MENZIESII - QUERCUS GARRYANA / SYMPHORICARPOS ALBUS FOREST

This small patch system is associated with dry sites and frequent pre-settlement fires north of the Willamette Valley section, i.e., from the Portland Basin north. It is typically found on either shallow bedrock soils or deep gravelly glacial outwash soils. Succession in the absence of fire tends to favor increased shrub dominance in the understory, increased tree density, and increased importance of conifers, with the end result being conversion to a conifer forest. The vegetation is a woodland or forest dominated by deciduous broadleaf trees, mostly *Quercus garryana*. Co-dominance by the evergreen conifer *Pseudotsuga menziesii* is common.

**SEPARATION DISTANCES:** (1) substantial barriers to natural processes or species movement, including cultural vegetation (includes clearcuts/tree plantations) greater than .5 km wide, major highways, urban development, large bodies of water; (2) a different natural community wider than 1 km; (3) a major break or change in the ecological land unit (e.g. topography, soils, geology).

Justification: These are naturally patchy communities.

**RANK.PROCEDURE:** (1) condition, (2) landscape context, (3) size. All three factors should be weighted equally.

### CONDITION.SPECS

**A -rated condition:** Native species dominate all physiognomic layers, non-native species are present in very low abundance without an immediate threat of spreading rapidly; conifers are absent, scattered, or small and of moderate density (<30 saplings per acre); mature (>150 years old or >24" dbh) cohort of oaks is prominent, though not necessarily dominant, in the canopy; multiple age classes or size classes of oak are present; very little to no evidence of past logging or grazing. No residential development within the occurrence.

**B -rated condition:** Native species largely dominate in understory and overstory, non-native species may be frequent with some potential to spread but are <10% cover overall; conifers are absent or present but do not pose a near-term threat to the oak canopy; little to no evidence of past logging or grazing, with perhaps noticeable but minor changes in species composition. Residential development absent or minor and located at edge of occurrence.

**C -rated condition:** Native species at least co-dominant in understory, dominant in canopy, non-native species may be low in abundance to co-dominant in understory layers; conifers may be numerous in the canopy and/or understory, but have not overtopped and shaded the majority of the oak canopy; moderate to no logging history; grazing impacts to understory composition may be significant but restorable. Residential development may cover a limited area at no more than 1 house per 5 acres.

**D -rated condition:** Non-native species dominate understory with minor native understory component; or successional pathway appears headed very soon for conifer dominance (conifers have overtopped and are shading majority of oaks); may be much disturbed by logging or grazing. Residential development of more than 1 house per 5 acres or covering a substantial portion of the occurrence.

Justification for AA@-rated criteria: Natural occurrences with few non-native species and no near-term within-community threats. This condition is rare but still does exist. Some trees large enough to support white-breasted nuthatches, or old enough to provide structural complexity. Multiple age or size classes indicate potentially greater long-term viability.

Justification for AC/D@ threshold: C occurrences still have substantial native component in the understory and are not in immediate danger of being shaded out by conifers, therefore they are restorable.

### SIZE.SPECS

**A -rated size:** Very large (>100 ac/40 ha)

**B -rated size:** Large (40-100 ac/16-40 ha)

**C -rated size:** Moderate (5-40 ac/2-16 ha)

**D -rated size:** Small (<5 ac/2 ha)

Justification for AA@-rated criteria: Large enough to support white-breasted nuthatches (Hagar and Stern 1997), for substantial within-community diversity, and to provide some buffer against catastrophic events.

Justification for AC/D@ threshold: Area smaller than 5 acres unlikely to provide habitat for oak-associated wildlife, subject to extreme edge effects and vulnerable to extirpation, low within-community diversity.

#### **LANDSCAPE.CONTEXT.SPECS**

**A -rated landscape context:** Occurrence surrounded by a landscape with native-dominated (in all physiognomic layers) vegetation, very little to no development or agriculture, and little to no industrial forestry.

**B -rated landscape context:** Landscape composed of at least 80% natural or semi-natural vegetation, with any development occurring not directly adjacent to the occurrence; or landscape surrounding has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer.

**C -rated landscape context:** Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape. No more than 50% of landscape is urbanized.

**D -rated landscape context:** Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation. May be more than 50% of landscape urbanized.

Justification for AA@-rated criteria: Connectivity intact; non-native species not a landscape threat; no obvious hindrances to use of prescribed fire, e..g. roads, development.

Justification for AC/D@ threshold: Landscape connectivity seriously impacted below about 35% cover of natural/semi-natural vegetation.

**AUTHORSHIP:** Chris Chappell

**DATE:** May 2, 2000

Hagar, J. C., and M. A. Stern. 1997. Avifauna in oak woodland habitats of the Willamette Valley, Oregon 1994-1996. Unpubl. report, U.S. Fish and Wildlife Service, Portland, Oregon.