What are WETLANDS?

Wetlands definitions from a LEGAL standpoint

Those areas that are saturated or inundated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, & similar areas. (US Army Corps of Engineers 1987)

"Wetlands" or "wetland areas" means areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands. (Washington Administrative Code 173-22-030.)

What are WETLANDS?

Wetlands are distinguished by:

1. WETLAND HYDROLOGY

Soil that is saturated or inundated for at least 2 weeks of the growing season each year

2. WETLAND VEGETATION

The presence of "hydrophytic" vegetation

3. WETLAND SOILS

The presence of "hydric" soils

Saturation: Fe oxides reduced to Fe^{2+} (ferrous) which is leached out of soil

Freshwater Wetland Productivity

Freshwater wetlands are among the most productive ecosystems

Even higher than old growth forests per unit area

WHY?

Annual Net Primary Productivity of Ecosystems

Ecosystem Type	Mean NPP g C / m² / yr	Range of NPP g C / m² / yr
Terrestrial Uplands		
Tropical rain forest	2,200	1,000 - 3,500
Temperate evergreen forest	1,320	600 - 2,500
Temperate deciduous forest	1,200	600 - 2,500
Boreal forest	800	400 - 2,000
Woodland & shrubland	700	250 - 1,200
Temperate grassland	600	200 - 1,500
Tundra and alpine	140	10 - 400
Desert & semidesert scrub	90	10 - 250
Freshwater Wetlands		
Swamp & marsh	2,000	800 - 6,000
Lake and stream	250	100 - 1,500
Marine		
Algal beds and reefs	2,500	500 - 4,000
Estuaries	1,800	500 - 4,000
Open Ocean	125	2 - 400

Freshwater wetlands provide "ecological functions"

(mostly from a human perspective)

A. **Water filtration** (pollutants, sediment; sewage treatment)

B. **Flood control** (stormwater management)

C. **Dry season stream flow maintenance**

D. **Groundwater recharge**

E. **Erosion control** (↓ peak erosive flows)

F. **Wildlife habitat** (fisheries, waterfowl, etc.)

G. **Recreation, aesthetic purposes**

Floodplain Wetland Environments

A) Water

- Summertime abundance unique for the region – effects on vegetation
- Overabundance in the soil – soil anoxia
- Hydroperiod / flooding characteristics crucial to understanding ecology

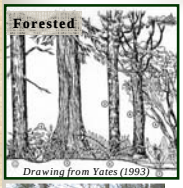
B) Nutrients

- Large organic supply
- Inorganic availability variable (sometimes limited)
  - Flooding provides nutrient input
  - Soil anoxia can limit mineralization and/or root uptake

Freshwater Wetland Vegetation Types

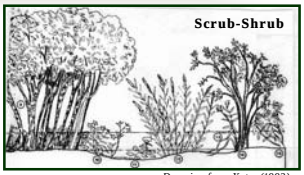
1. Forested
2. Scrub-shrub
3. Emergent
4. Aquatic bed

Forested wetlands: woody vegetation at least 6 m tall on at least 30% of the site



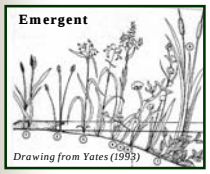
Drawing from Yates (1993)

Scrub-Shrub wetlands: woody vegetation < 6 m tall on at least 30% of site



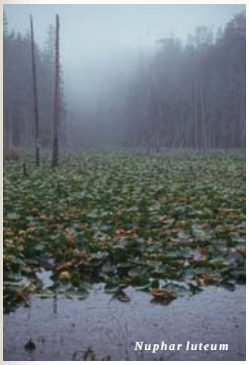
Drawing from Yates (1993)

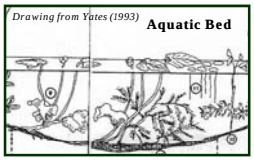
Emergent wetlands: dominated by herbaceous vegetation (growing up & out of the water)



Drawing from Yates (1993)

Aquatic bed wetlands: dominated by floating or submerged vegetation





AQUATIC HERBS (Aquatic bed vegetation)

Pond Lily

Nuphar polysepalum

Pond Weed

Potomageton natans

Smart Weed

Polygonum hydropiperoides

Lemna minor

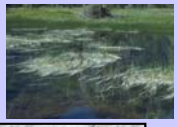
Duck Weed

HERBS

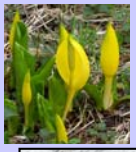
Alisma plantago-aquatica

Oenanthe sarmentosa

Equisetum arvense



Sparganium emersum



Lysichiton americanum

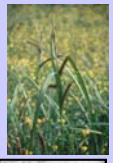
GRASSES, SEDGES & RUSHES

Carex obnupta

Typha latifolia

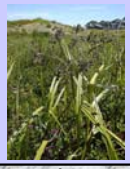
Juncus effusus

Carex comosa



Carex utriculata

Alopecurus pratensis



Scirpus microcarpus

SHRUBS

Spirea douglasii

Cornus sericea

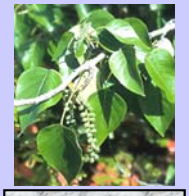
Rubus spectabilis

Lonicera involucrata

Salix species

TREES

Alnus rubra



Populus trichocarpa

Thuja plicata

Salix lucida

Fraxinus latifolia

Some exotic invasive species

Creeping buttercup

Purple loosestrife

Reed canarygrass

Puget Sound Freshwater Wetlands

Table 3-2. Species occurrence for different categor**Frequency**over dominance

Cover Dominance Category	High Occurrence (>80% wetlands)	Low Occurrence (<10% wetlands)
Usually dominant. Greater than 64% coverage in more than 19 percent of observations.	Phalaris arundinaceae Spirea douglasii	Juncus supiniformis Menyanthes trifoliata
Dominance in plots varies	Alnus rubra Athyrium filix-femina Kalmia microphylla Lonicera involucrata Polystichum munitum Pteridium aquilinum Ranunculus repens Rhamnus purshiana Rubus laciniatus Rubus spectabilis Rubus ursinus Salix pedicellaris Salix scouleriana Salix sitchensis Vaccinium parvifolium	Azola mexicana Brasenia schribneri Eriophorum chamissonis Hippurus vulgaris Hydrocotyl ranunculoides Hydrophyllum tenuipes Nymphaea odorata Polygonum amphibium Potentilla gramineus Rhynchospora alba Sparganium eurycarpum Sagittaria latifolia Scirpus acutus Veronica americana
Always less than 1% coverage	no species	Mimulus guttatus Myosotis laxa Potamogeton diversifolius Ranunculus acris Rorippa curvisiliqua Rumex obtusifolius Trillium ovatum Vaccinium ovatum Vaccinium uliginosum Vicia sativa

Cooke & Azous (2001)

Common Puget Sound Lowland Wetland Plants

2 most common:

- Reed Canary Grass
- Hardhack

Cover

Puget Sound Freshwater Wetlands

Puget Sound Freshwater Wetland Plants

TREES

Red alder
Cascara
Pacific willow
Oregon ash
Cottonwood

SHRUBS

Hardhack
Twinberry
Salmonberry
Blackberries
Red huckleberry
Willows

HERBACEOUS

Reed Canarygrass
Lady, sword, bracken ferns
Creeping buttercup
Sedges & rushes
(many herbs)

Table 3-2. Species occurrence for different categories of plant type and cover dominance.

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Cooke & Azous (2001)

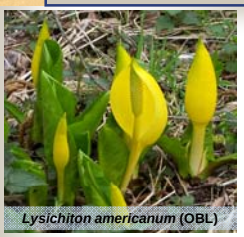
Wetland Plant Classification

Table 3-1. Indicator status categories for wetland plant species.

Code	Designation	Wetlands Probability 1
OBL	Obligate wetland	> 99
FACW	Facultative wetland	67 to 99
FAC	Facultative	34 to 66
FACU	Facultative upland	1 to 33
UPL	Obligate upland	< 1
NI	No indicator status	

1Percent occurrence of plant found in a wetland

Wetland Plant Classification



Wetland Plant Classification

Wetland Indicator Lists

Wetland plant guides

Cooke, S. (ed.) 1997. A Field Guide to the Common Wetland Plants of Western Washington & Northwestern Oregon

Guard, B.J. 1995. Wetland Plants of Oregon and Washington

US Fish & Wildlife Service Branch of Habitat Assessment

http://www.nwi.fws.gov/bha/

USDA "PLANTS" Database: http://plants.usda.gov/wetland.html

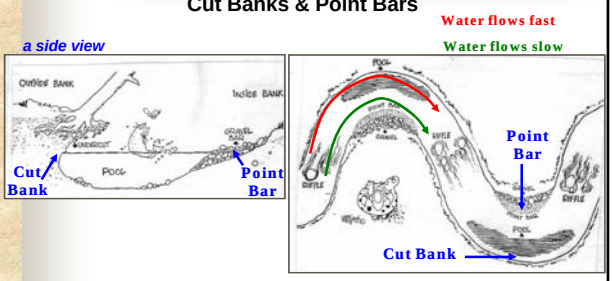
State and local government lists

Floodplain wetlands: some ecological features

1) Beavers as ecological engineers
2) Secondary substrates & floodplain microtopography
3) Disturbance & succession

Disturbance & Succession

Cut Banks & Point Bars



Drawings from Murdoch & Cheo (1999)

Campus Wetlands: point bar formation

Disturbance & Succession

Point bar succession in action

Floodplain wetlands: some ecological features

1) Beavers as ecological engineers
2) Secondary substrates & floodplain microtopography
3) Disturbance & succession
4) Disturbance & biodiversity