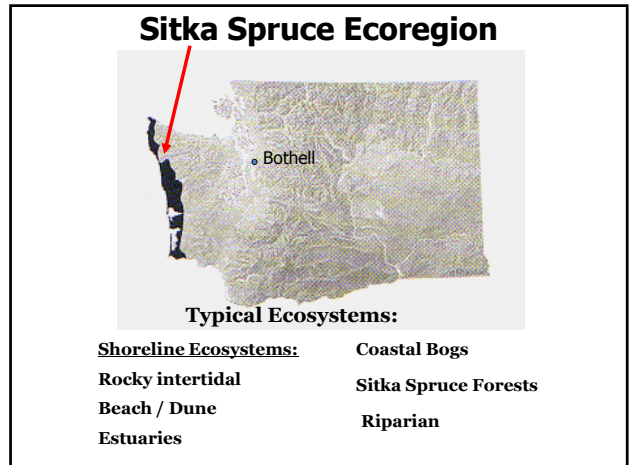


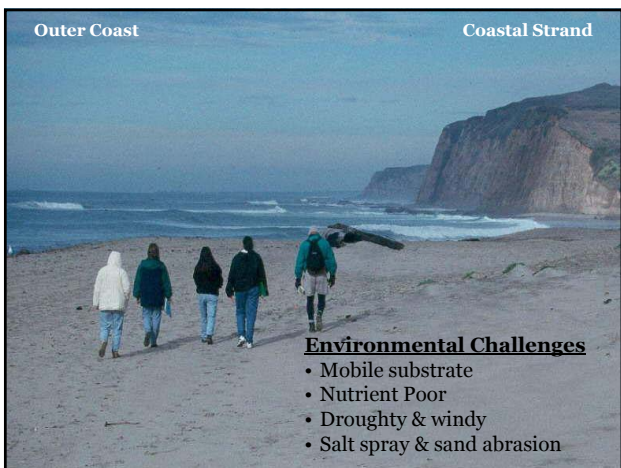
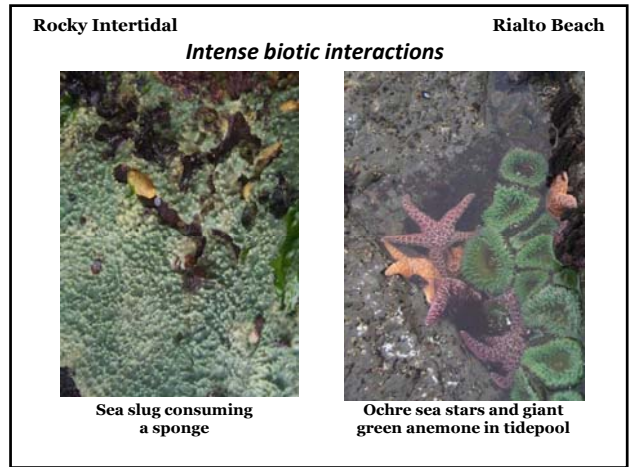
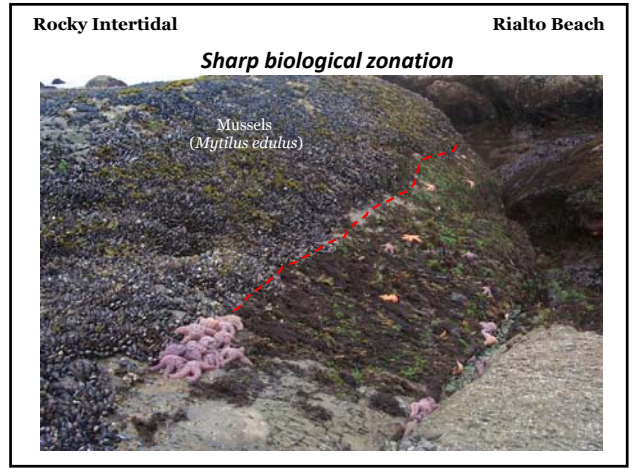
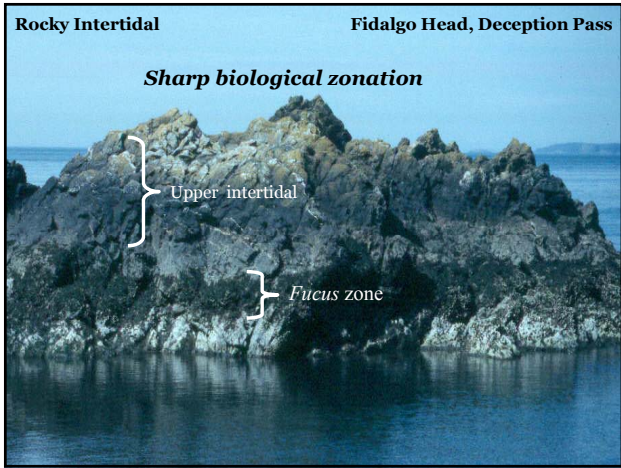
Marine Nearshore Ecoregion

Ecoregion below mean low low tide

We will only address the upper edge of these ecosystems in examining shoreline ecosystems of

- Sitka Spruce (outer coast) and
- Western Hemlock (Puget Sound) ecoregions





Coping with a Coastal Strand Habitat

Clonal forbs also bind the loose substrate
Succulent leaves help with drought & abrasion



Searocket (*Cakile edentula*)

Oyster farming

Willapa Bay



Japanese Oyster
(*Crassostrea gigas*)

Foggy Sitka Spruce forests



Sitka spruce (*Picea sitchensis*)

Coastal dominant from
Oregon to Alaska



Coastal Temperate Rainforest



Big leaf maple
(*Acer macrophyllum*)



Coastal Bogs



Embayed hydrology created by old
coastal dune geomorphology

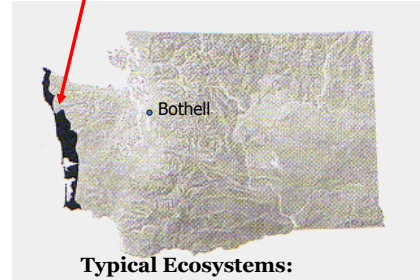


-
-
-

Coastal Bogs: cranberry farming



Sitka Spruce Ecoregion



Typical Ecosystems:

Rocky Intertidal

Coastal Bogs

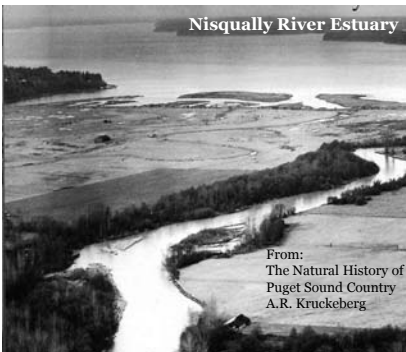
Beach / Dune

Sitka Spruce Forests

Estuaries

Riparian

Estuaries /Tideflats



Nisqually River Estuary

- Very high productivity
- Low species diversity
- Variable salinity & inundation

From:
The Natural History of
Puget Sound Country
A.R. Kruckeberg

Estuaries /Tideflats



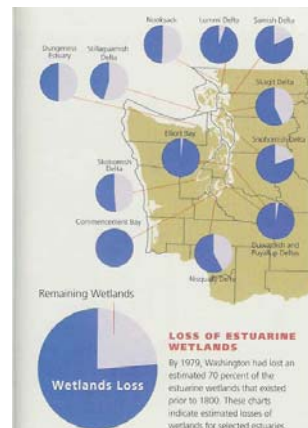
Padilla Bay

Eelgrass beds

Estuaries /Tideflats



Batallaria snails
Padilla Bay



Estuaries / Tideflats: Human Impacts

“Our Changing Nature”

Washington State
Department of Natural
Resources
1998

Estuaries / Tideflats: Diking & Draining for Agriculture



Nisqually Delta



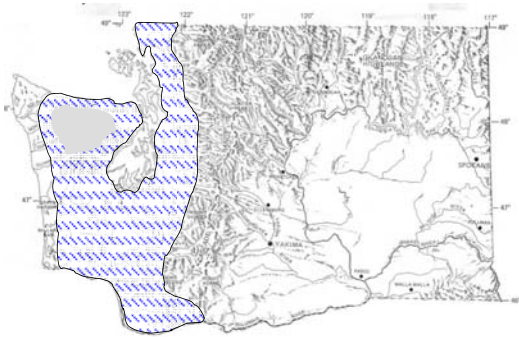
Padilla Bay

Estuaries /Tideflats: High Productivity



Snow geese
Skagit Delta

Western Hemlock Ecoregion



Western Hemlock Ecoregion Typical Ecosystems

- Low elevation forests: western hemlock, Douglas-fir, western red cedar

- Streams, lakes

- Estuaries, freshwater wetlands

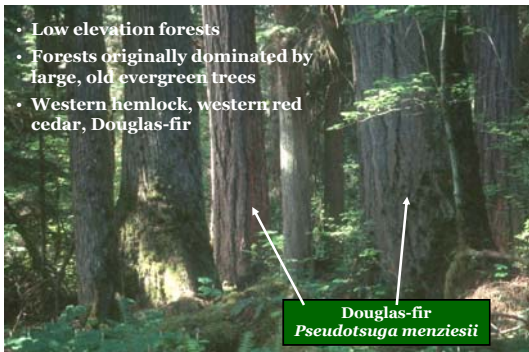
- Prairies & oak woodlands

- Bogs



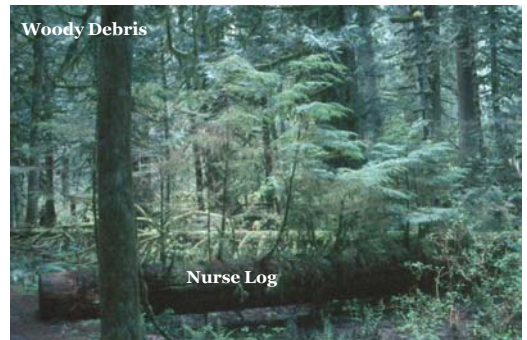
Western Hemlock Ecoregion

- Low elevation forests
- Forests originally dominated by large, old evergreen trees
- Western hemlock, western red cedar, Douglas-fir



Western Hemlock Ecoregion

Woody Debris



Nurse Log

Western Hemlock Ecoregion

Understory plants adapted to stressful conditions



- Chronic light shortage
- Acidic
- Low nutrients
- Dry summers

Western Hemlock Ecoregion: Deciduous Forests



Red alder
Alnus rubra

Western Hemlock Ecoregion: Land Management

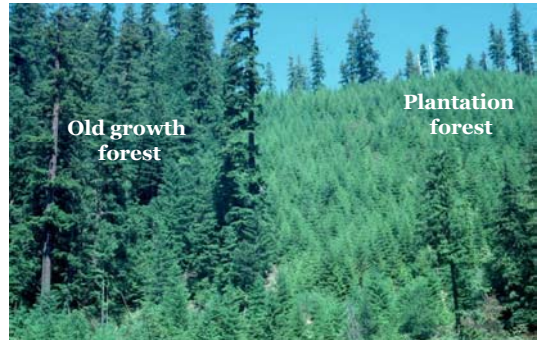
Forest harvest
Wishkah Valley



Western Hemlock Ecoregion: Land Management

Old growth
forest

Plantation
forest



Western Hemlock Ecoregion: Water Features create ecological heterogeneity in a sea of forest



Wetlands & streams provide
unique environments /
habitats

Western Hemlock Ecoregion: Prairies & Oak Woodlands offer unique habitats

Puget Prairies



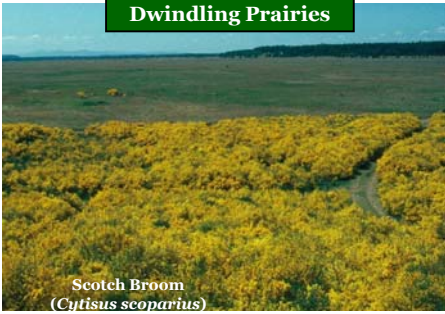
Mima Mounds



Fort Lewis

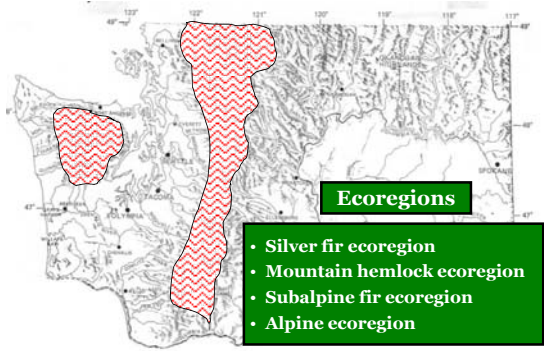
Western Hemlock Ecoregion:
Prairies & Oak Woodlands offer unique habitats

Dwindling Prairies



Scotch Broom
(*Cytisus scoparius*)

West-side Montane to Alpine Ecoregions



Ecoregions

- Silver fir ecoregion
- Mountain hemlock ecoregion
- Subalpine fir ecoregion
- Alpine ecoregion

West-side Montane to Alpine Ecoregions ★

Western WA

Eastern WA



West-side Montane to Alpine Ecoregions



Silver fir Ecoregion:
Typical Ecosystems



- Montane forests: Silver fir, Noble fir, Douglas-fir, Alaska yellow cedar

- Riparian, lakes & other wetlands

Silver fir Ecoregion



Mid elevation west side forests

Silver fir Ecoregion



- Thin soils
- Cool temperatures
- Short growing seasons

Silver fir Ecoregion



Lakes provide important sites of environmental heterogeneity within a sea of evergreen forest

Mountain Hemlock Ecoregion

High elevation snowy subalpine forests



Typical Ecosystems:

- Mountain hemlock forests
- Subalpine meadows
- Riparian & lake areas

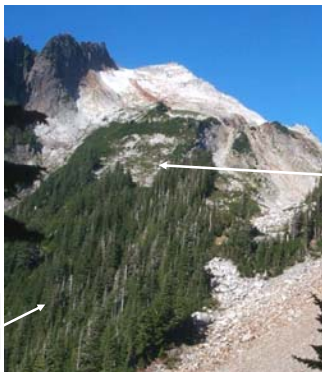
Mountain Hemlock Ecoregion



Mountain hemlock (*Tsuga mertensiana*)



Mountain Hemlock Ecoregion



Closed canopy forests at lower end

Forest – meadow mosaics at high end

Mountain Hemlock Ecoregion

Snow avalanches are an important ecological feature

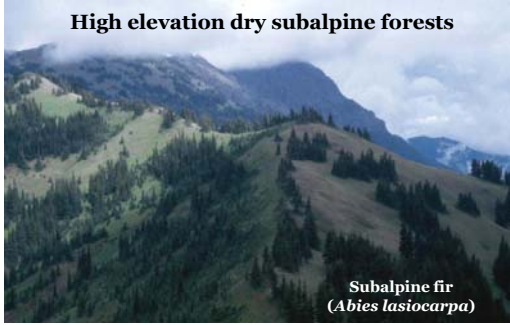


Results



Subalpine Fir Ecoregion

High elevation dry subalpine forests

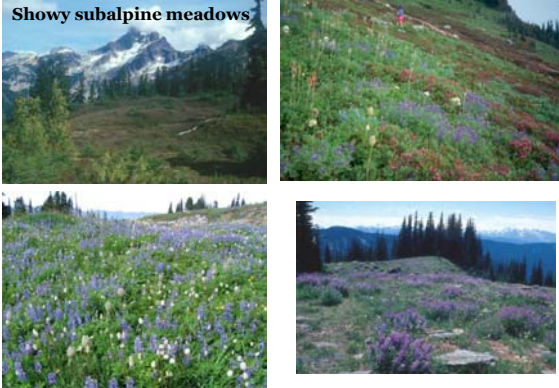


Subalpine Fir Ecoregion: Typical Ecosystems



Subalpine Fir Ecoregion

Showy subalpine meadows



Subalpine Fir Ecoregion

Trees at the edge



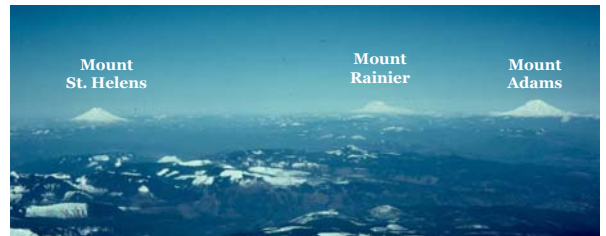
Alpine Ecoregion

High elevation treeless ecosystems



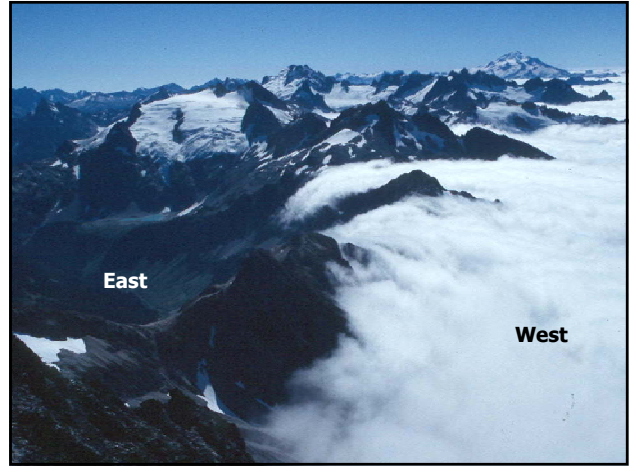
Alpine Ecoregion

Alpine habitats as ecological islands in the PNW

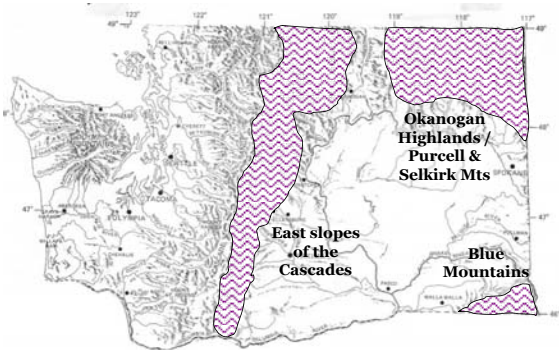


Alpine Ecoregion

Patterns & Adaptations



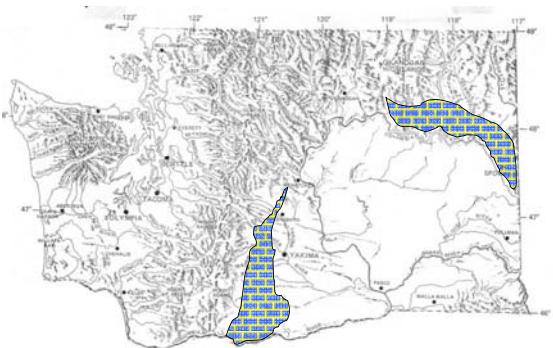
Douglas-fir / Grand fir Ecoregion



Douglas-fir / Grand fir Ecoregion



Ponderosa Pine Ecoregion



Ponderosa Pine Ecoregion



Dry, mid-elevation fire-dependent forests



Shrub Steppe Ecoregion



Shrub Steppe Ecoregion



Low elevation hot, arid shrub and grass dominated ecosystems:



Shrub Steppe Ecoregion



Grass dominated steppe and pothole wetlands



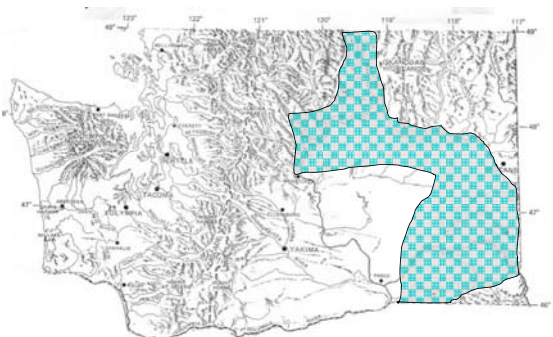
Shrub Steppe Ecoregion



Fire is a frequent natural feature



Palouse Prairie Ecoregion



Palouse Prairie Ecoregion



Low elevation hot & semi-arid grass dominated ecosystems

- Less extreme temperatures than shrub-steppe
- More summer precipitation than shrub steppe
- Forest pockets on north-facing slopes

Palouse Prairie Ecoregion



**Loess soil creates
rolling topography
and excellent
edaphic conditions
for agriculture**

