



REGION 1 Observed & Projected Changes for Habitats & Fish Species



Habitats



credit: Linda Repplinger

Mixed Conifer Forest

- Projected shifts in species dominance from moist temperate needleleaf forest to a mix of sub-tropical and temperate rain forest (similar to the northern California coast).
- Drier conditions could decrease growth and increase mortality in areas where Douglas-fir relies on groundwater in shallow soils.
- With temperature increases, western hemlock abundance may decrease.

Coastal Sitka Spruce Forest



credit: Jeremy Erickson

- Projected expansion of coastal mixed forest and an increase in hardwoods.
- Decreased fog would increase stress on Sitka spruce.

Oak Savanna Woodlands



credit: Sue Sierralupe

- Projected increases in woodland area along Willamette Valley margins.
- Increased oak mortality due to increased susceptibility to sudden oak death, increased frequency and severity of summer droughts, and increased fire frequency.

Montane Forests and Meadows



credit: Jeff Gunn

- Increased winter flooding, reduced snowpack duration, and increased drought stress in summer could result in further restriction or elimination of remnant noble fir patches, increased susceptibility of noble fir to disease, impacts on high-elevation forbs and shrubs (including extirpation), and forest encroachment into meadows.

Coastal Meadows and Grasslands



credit: Sean Clawson

- Potential conversion of meadows and grasslands to other vegetation; for example, if moisture increases, forest encroachment is likely.
- If fog is reduced, some native grasses and forbs may be lost.
- Possible loss of habitat due to sea level rise.

Aquatic & Wetland Ecosystems



credit: OWEB

- Increased frequency, duration, & intensity of drought & higher rates of evapotranspiration.
- Decreased groundwater recharge.
- Increased water temperatures.
- Increased winter flooding and erosion.
- Increased scour events and transport of large wood and sediments out of headwater areas into lower-gradient floodplains.
- Saltwater intrusion.

Estuarine



credit: OWEB

- Higher sea level, stronger winter storms, and warmer and drier summer conditions will affect the spatial extent of estuarine habitats as well as interactions with coastal terrestrial habitats.
- Saltwater intrusion.
- Coastal flooding and erosion.
- Large mainstem rivers close to estuaries may experience greater tidal inundation and flooding in the winter in response to higher sea levels coupled with high flows from intense winter storms.
- Increased tidal inundation time on lowland marshes, altering vegetation composition and leading to a transition to mudflat or open water.

Fish Species

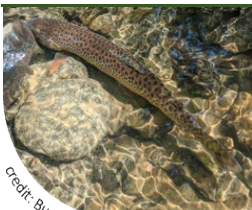
Winter Steelhead Trout



credit: Greg Shields, cc

- Warming temperatures could lead to a change in life history expression, with a loss of steelhead life history forms and an increase in inland rainbow trout forms because of a faster growth rate.
- Rearing juvenile steelhead are vulnerable to low flows and higher stream temperatures in summer.
- Adults likely face barriers to migration due to warming water temperatures (i.e., steelhead populations stop moving when water temperature exceeds 21°C (69.8°F)).
- Headwater rearing locations are susceptible to debris flows and scour.

Coastal Cutthroat Trout



Credit: Bureau of Environmental Services.

- Returning adults (of sea-run form) and juveniles located farther down the river network may be subject to increased river temperatures.
- Potential increased susceptibility to wildfire and lower summer flows for freshwater forms using stream reaches further up.
- Downstream displacement of headwater-rearing fish, with increased exposure to warmer stream temperatures and potential for intensified biological interactions with native and nonnative species found lower in the watershed.

Pacific Lamprey



credit: USFWS

- Increased risk of mortality for embryonic and newly-hatched Pacific lamprey due to water temperatures exceeding 20°C (68°F) in summer.
- Increases in water temperature can also affect survival of larval rearing fishes, timing or number of individuals as they metamorphose into ocean-going life stage, or lead to premature migration of juvenile lamprey (which could expose them to salt water before they have made necessary physiological changes).
- Like Pacific lamprey, Western Brook Lamprey are vulnerable to water temperatures above 20°C (68°F).

Coho Salmon



credit: USGS

- Warming water temperatures can accelerate egg incubation rates in winter or spring, accelerate growth in spring, and potentially desynchronize the developmental phenology of juveniles from the temporal availability of seasonal habitats.
- Increased habitat degradation due to warming temperatures.

Chinook Salmon



credit: Greg Morgan, BLM

- Tillamook, Nestucca, and Alsea River populations may be more at risk due to warming summer stream temperatures as their abundance is already low.
- Highly variable flow and temperature regimes in April and May can affect smolt migration (e.g., high flows and water temperatures can narrow migration window while cool temperatures and minimal flows can delay migration).
- Holding adults are vulnerable to higher summer water temperatures.
- Holding and migrating adults may become increasingly stressed and susceptible to disease, diminishing reproductive potential and increasing pre-spawn mortality.
- Reduced availability of coldwater refuges.
- Altered behavior, physiology, and growth due to warmer water temperatures.
- Spring Chinook salmon may have more vulnerability to freshwater conditions than fall Chinook, while fall-migrating fish may be more vulnerable to changes in ocean conditions

Chum Salmon



credit: K King, USFW

- Sensitive to degraded estuarine conditions as they depend on tidally influenced and estuarine habitats for rearing.
- Increased exposure to warmer water temperatures in freshwater habitats.

Information from the following references and the citations therein:

1. Halofsky, J.E., D.L. Peterson, and R.A. Gravenmier, eds. 2023. Climate change vulnerability and adaptation in Coastal Oregon. Gen. Tech. Rep. PNW-GTR-XXX. U.S. Dept of Ag., Forest Service, Pacific Northwest Research Station. XXX p.