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Ecological Context for the North Pacific Landscape Conservation Cooperative

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BACKGROUND

The North Pacific Landscape Conservation Cooperative (NPLCC) encompasses the temperate coastal rainforest and extends from the coastal mountains to the near-shore from the Kenai Peninsula, Alaska to Bodega Bay, California. The area spans multiple agency, state, and international boundaries over more than 22 degrees of latitude, including a wide range of type and intensity of human land-use activities. Development of NPLCC goals and administrative structures will be facilitated by a shared ecological context for discussing this expansive, diverse, and complex landscape.

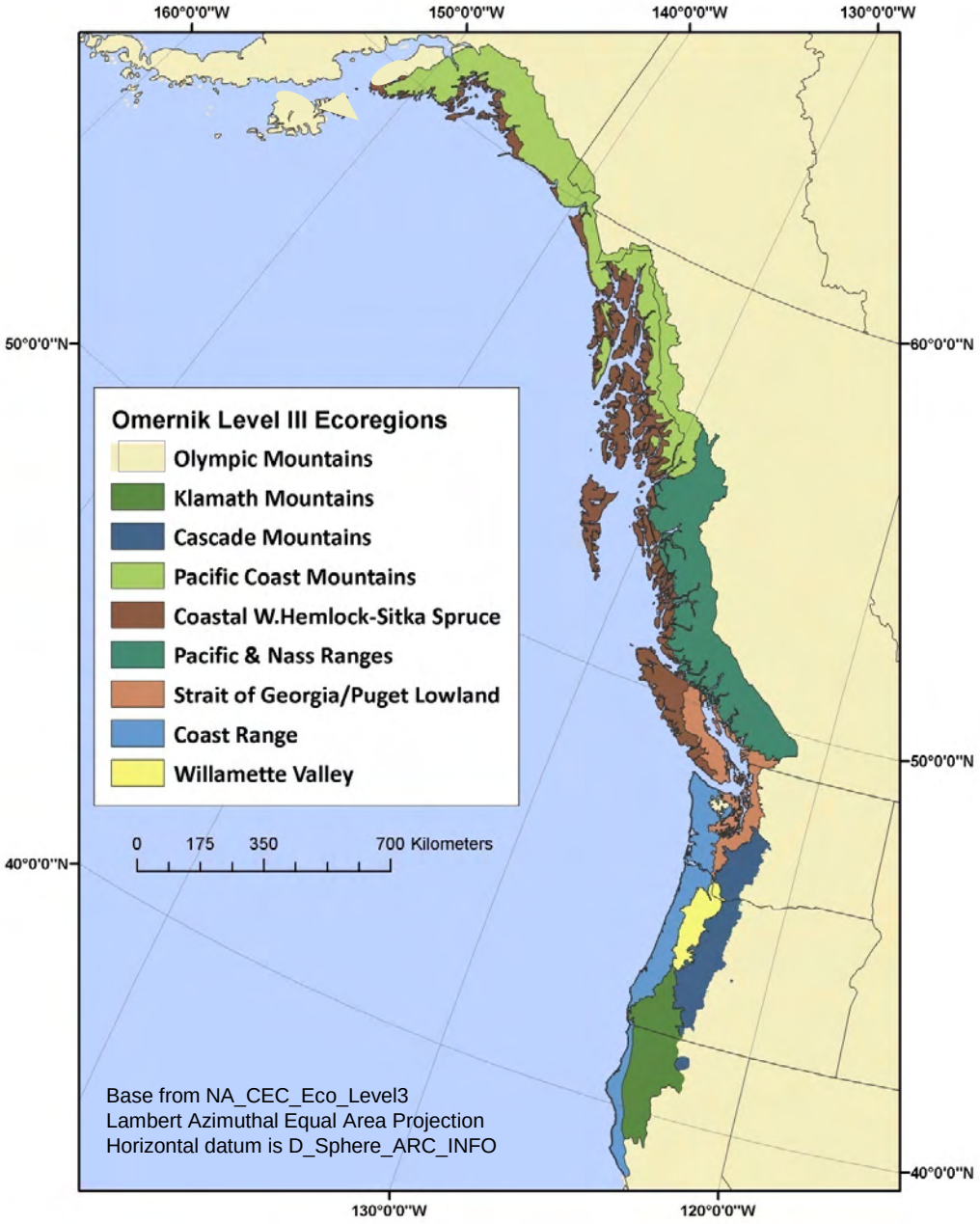
In support of activities to organize the NPLCC, we provided conceptual models to describe the ecological structure of the NPLCC. Recognizing that the boundaries of LCCs were primarily based on Level 2 of the hierarchical ecoregional classification of Omernik (Comission for Environmental Cooperation 1997), we used nested Level 3 ecoregions to define subregions within the NPLCC. Rather than develop conceptual models for all nine constituent subregions, we opted to consider five groups: Puget-Georgia Basin Lowland and Willamette Valley, Alaska-British Columbia Coast, Alaska-British Columbia Mountains, Klamath-Olympic-Cascade Mountains, and Washington-Oregon-Northern California Coast. At the conclusion of the project, we felt that the close relationship between mountain and coastal areas support combining them to create three major subregions: Alaska-British Columbia coast and mountains, Washington-Oregon-Northern California coast and mountains, and the lowlands of the Georgia Basin and Willamette Valley.

The following figures present the Omernik Level 3 ecoregions comprising the NPLCC; how the ecoregions were grouped to create conceptual models; and conceptual models for each group. The five models each consist of a table listing resources, stressors, potential climate change impacts; a landcover map; and a cartoon to summarize the table and evoke the landscape. A final figure summarizes resources, stressors, and climate change impacts that are common across the NPLCC.

<u>Cited</u>:

Commission for Environmental Cooperation,1997, Ecological regions of North America: toward a common perspective: Montreal Canada, Commission for Environmental Cooperation.

Ecoregions of the NPLCC



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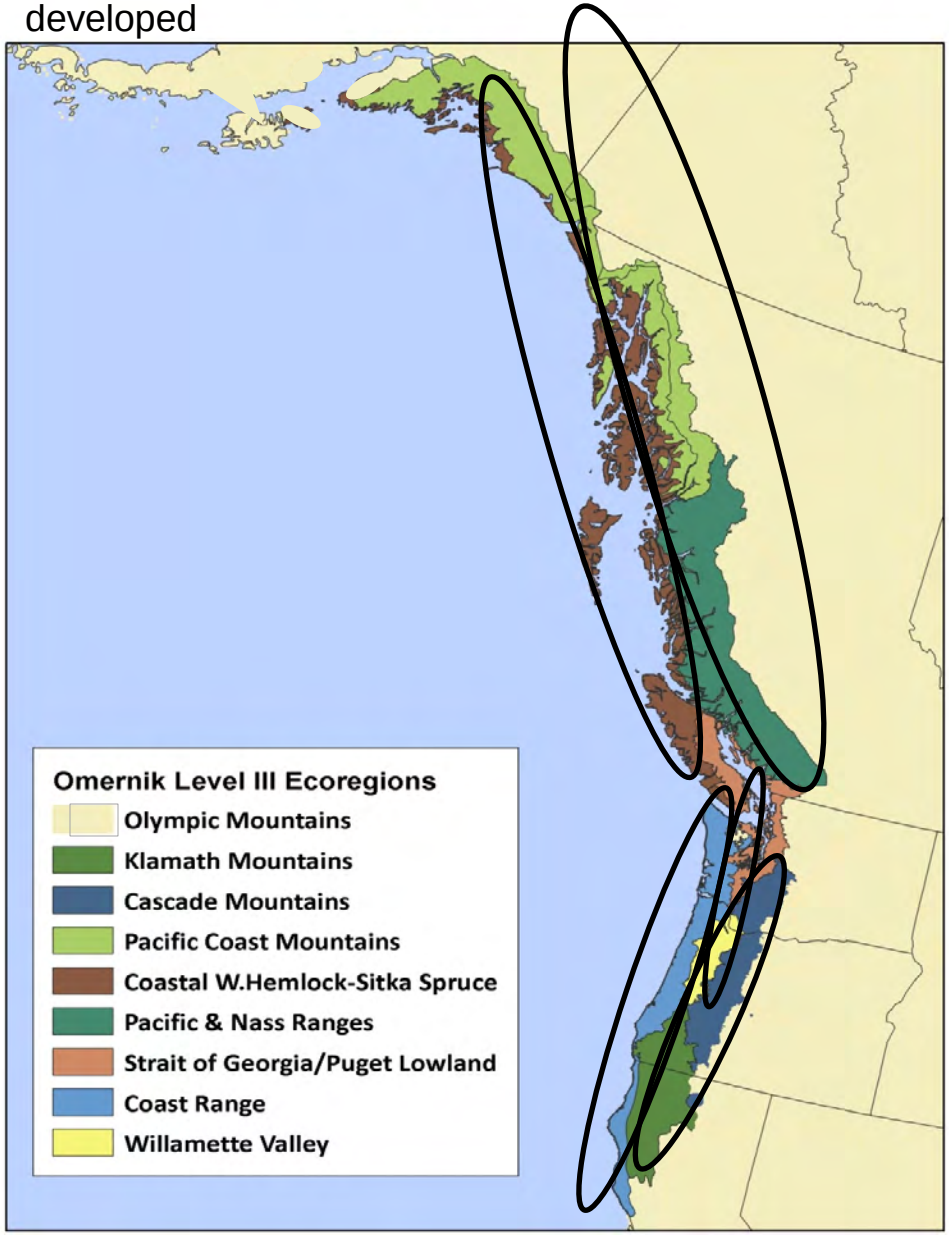
Ecoregional groups for which conceptual models were developed



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PUGET-GEORGIA BASIN LOWLANDS & WILLAMETTE VALLEY

Valued Human, Ecological, and Cultural Resources	Existing Stressors	Current and Potential Climate Change Impacts
• Human resource needs: o Water quality and quantity (residential, agricultural, industrial, commercial, recreational use) o Forest products o Hydroelectric power o Agriculture o Fisheries/aquaculture • Vulnerable habitats: o Prairies o Freshwater wetlands o Riparian areas o Forests & woodlands o Nearshore, estuary, and river delta habitats, especially eelgrass beds • Vulnerable species: o Anadromous fish o Marine mammals o Shellfish o Forage fish o Migratory birds	• Changes in land cover/land use: o Increased water withdrawal (urban, agriculture, mining) o Larger floods/ aggradation/channel capacity o Water quality/ turbidity/increased fine sediment loads o Habitat alteration, loss, fragmentation • Urbanization: o Increased impermeable surface/ heat islands o Storm water, waste water pollutants o Emissions – particulates, persistent organic pollutants • Shoreline armoring & development	• Hydrologic regime changes: o Sediment dynamics changes in rivers, estuaries and shorelines • Increased atmospheric temperatures: o Extreme/unpredictable weather o Plant & animal stress o Forest disturbance increase • Sea level rise (exacerbated by subsidence in Puget Sound): o Coastal flooding & salt water intrusion o Permanent inundation (including inhabited tribal land) • Ocean acidification

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Fraser, D.A., Gaydos, J.K., Karlsen, E. and Rylko, M.S., 2006, Collaborative science, policy development and program implementation in the transboundary Georgia Basin/Puget Sound ecosystem: Environmental Monitoring and Assessment v. 113, p. 49-69.

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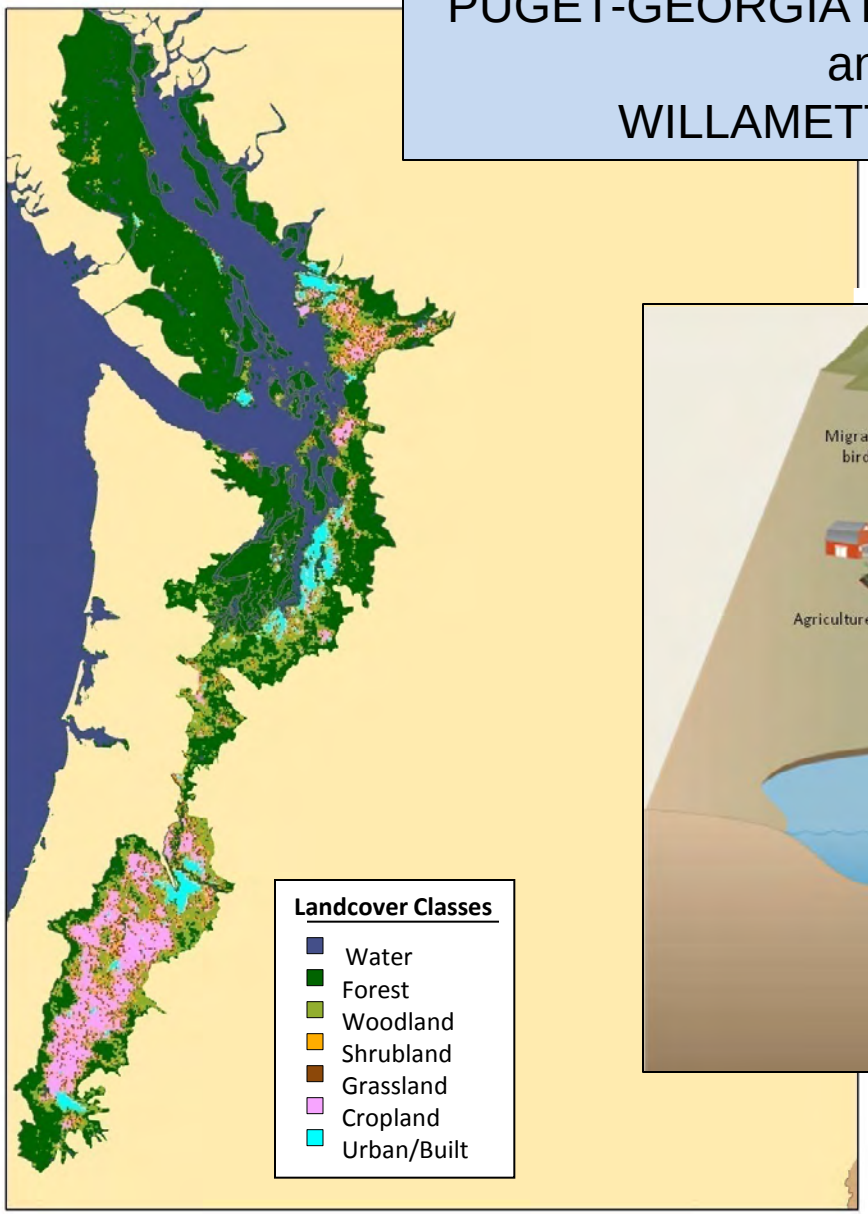
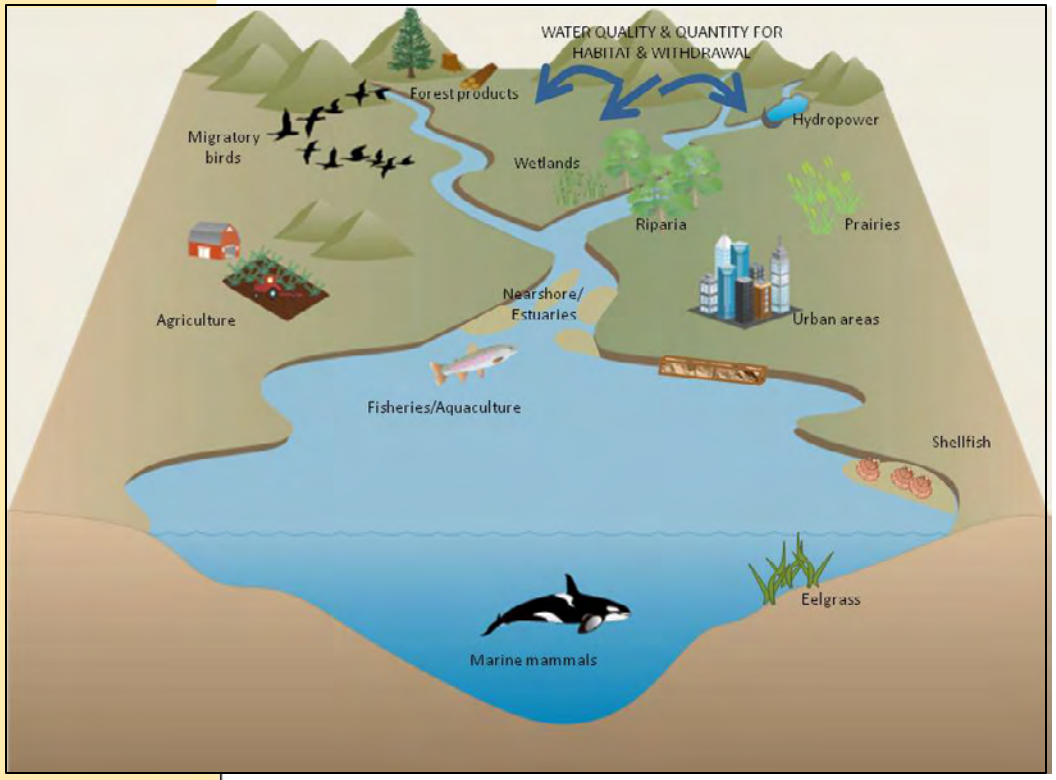
PUGET-GEORGIA BASIN LOWLANDS and WILLAMETTE VALLEY





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ALASKA-BRITISH COLUMBIA COAST

Valued Human, Ecological, and Cultural Resources	Existing Stressors	Current and Potential Climate Change Impacts
• Human resource needs: o Forest products o Recreation and tourism o Fisheries/aquaculture o Metals and minerals o Hydroelectric power o Subsistence & personal use hunting o Cultural resources • Vulnerable habitats: o Coastal old-growth forest o Riparian areas o Karst and caves o Nearshore, estuary, & river delta habitats, especially eelgrass beds • Vulnerable species: o Bird & mammal species requiring large tracts o Isolated populations of birds, mammals and fish o Marine mammals o Forage fish o Coldwater species	• Timber harvest: o Habitat fragmentation or loss o Salmon habitat degradation o Subsistence species loss • Development (including for transportation): o Habitat fragmentation o Fish passage impediments o Fish & wildlife consumption increase o Wetland and nearshore habitat alteration or loss o Contaminants • Hydroelectric projects o Hydrology alteration o Fish passage impediments • Alternative energy (currents & tidal) • Introduced pathogens: o Fish & wildlife population and habitat loss • Air & water pollution (from economic activity)	• Hydrologic regime changes: o Longer ice/snow-free season o Snowpack depth changes • Increased atmospheric temperatures: o Forest pathogen distribution increased • Sea level rise (mitigated by isostatic rebound): o Shoreline erosion o Estuary and aquifer salinity increases o Coastal flooding and inundation • Ocean acidification • Depth of ocean stratification

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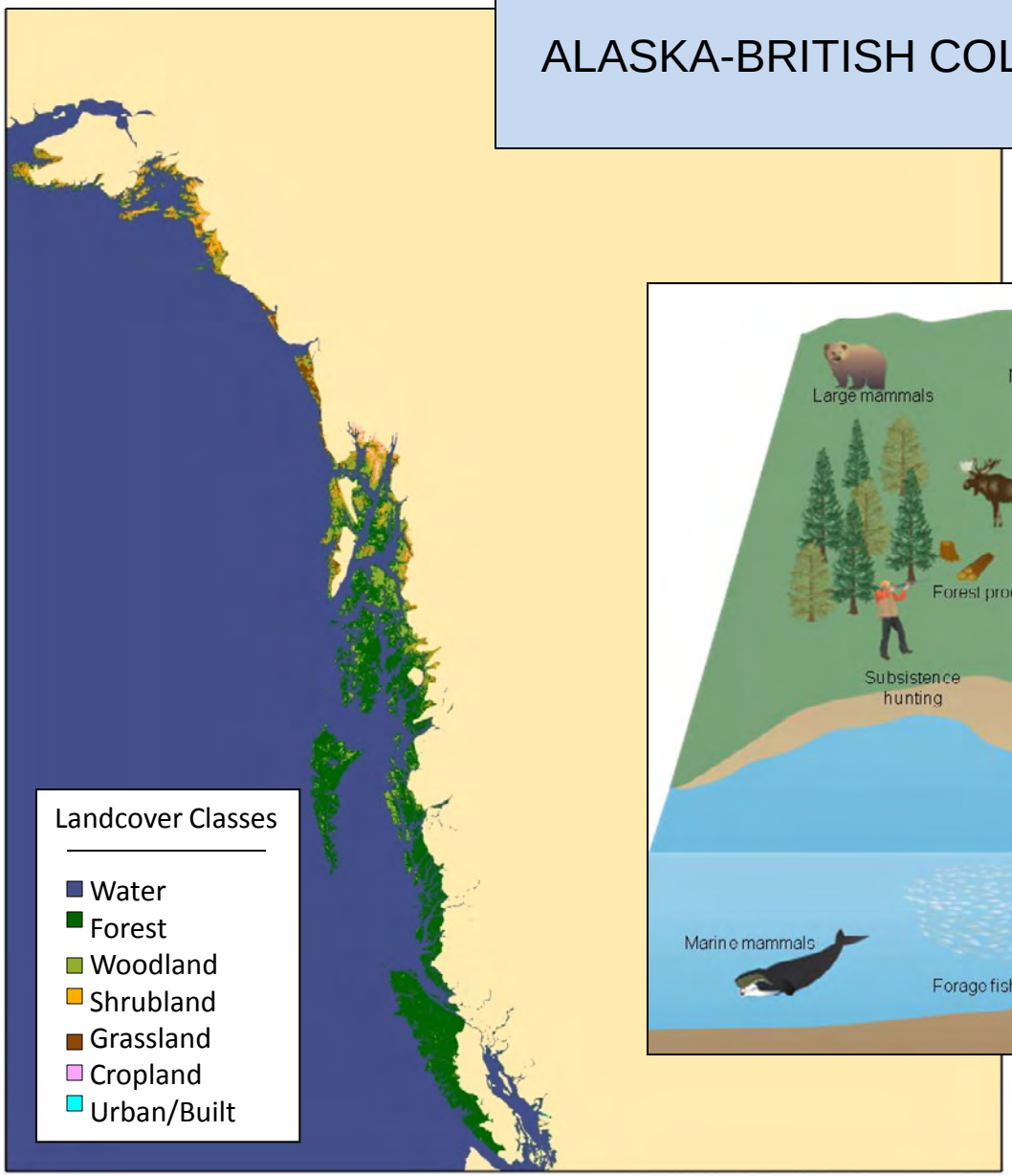
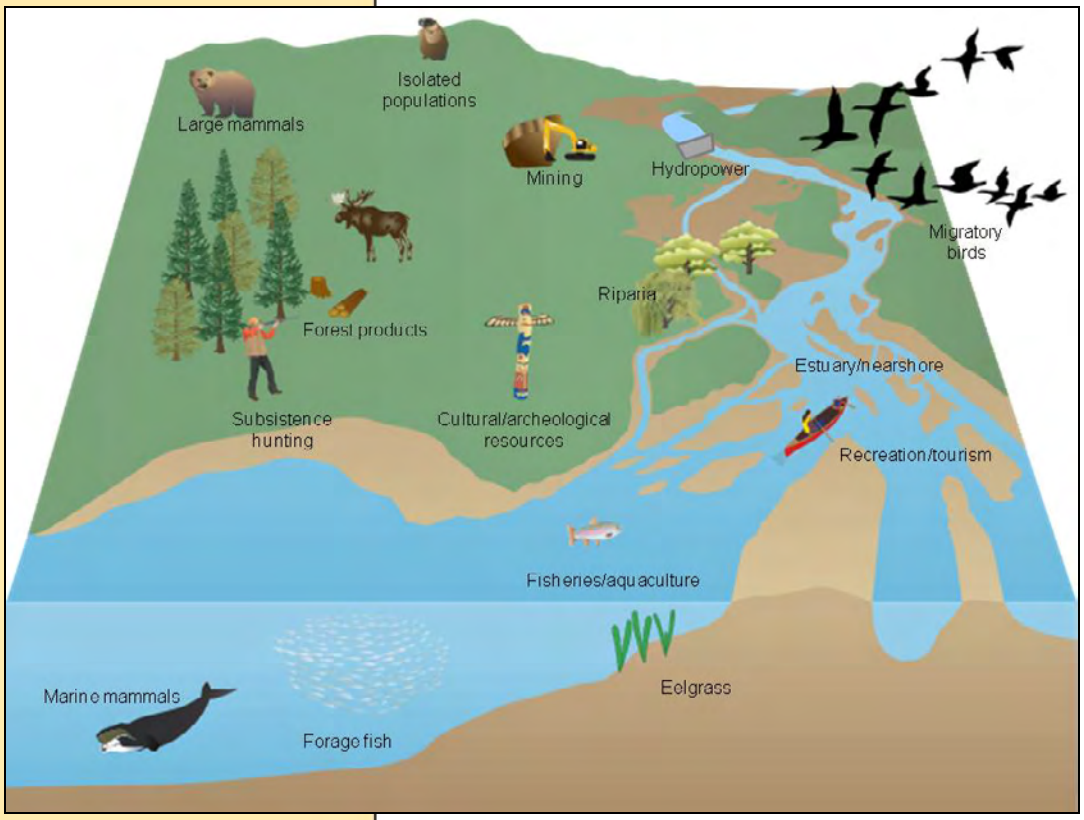
ALASKA-BRITISH COLUMBIA COAST





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ALASKA-BRITISH COLUMBIA MOUNTAINS

Valued Human, Ecological, and Cultural Resources	Existing Stressors	Current and Potential Climate Change Impacts

• Human resource needs:
  o Metals and minerals
  o Electric power (hydro-, gas/oil, wind)
  o Forest products
  o Subsistence/personal use hunting & gathering
  o Recreation & tourism
• Vulnerable habitats:
  o Coastal old-growth forest
  o Subalpine forest
  o Alpine tundra
  o Eastern slope/Nass Basin forest
  o Riparian areas
  o Mountain lakes
• Vulnerable species:
  o Bird & mammal species requiring large tracts
  o Isolated populations of birds, mammals and fish
  o Coldwater and mountain species
  o Anadromous fish
	• Timber harvest and mining:
	  o Habitat fragmentation or loss
	  o Salmon habitat degradation
	• Development (including for transportation):
	  o Habitat fragmentation
	  o Fish passage impediments
	  o Fish & wildlife consumption increase
	  o Wetland alteration or loss
	  o Contaminants
	• Hydroelectric projects
	  o Hydrology alteration
	  o Fish passage impediments
	• Introduced pathogens:
	  o Fish & wildlife population and habitat loss
		• Hydrologic regime changes:
		  o Glacier melt
		  o Ice/snow-free season changes
		  o Snowpack depth changes
		  o Soil water storage changes (drying of muskeg)
		• Increased atmospheric temperatures:
		  o Forest pathogen distribution increase
		• Changes in plant community distribution
		  o Alpine replaced by forest
		  o Yellow cedar decline
		  o Wetland community decline

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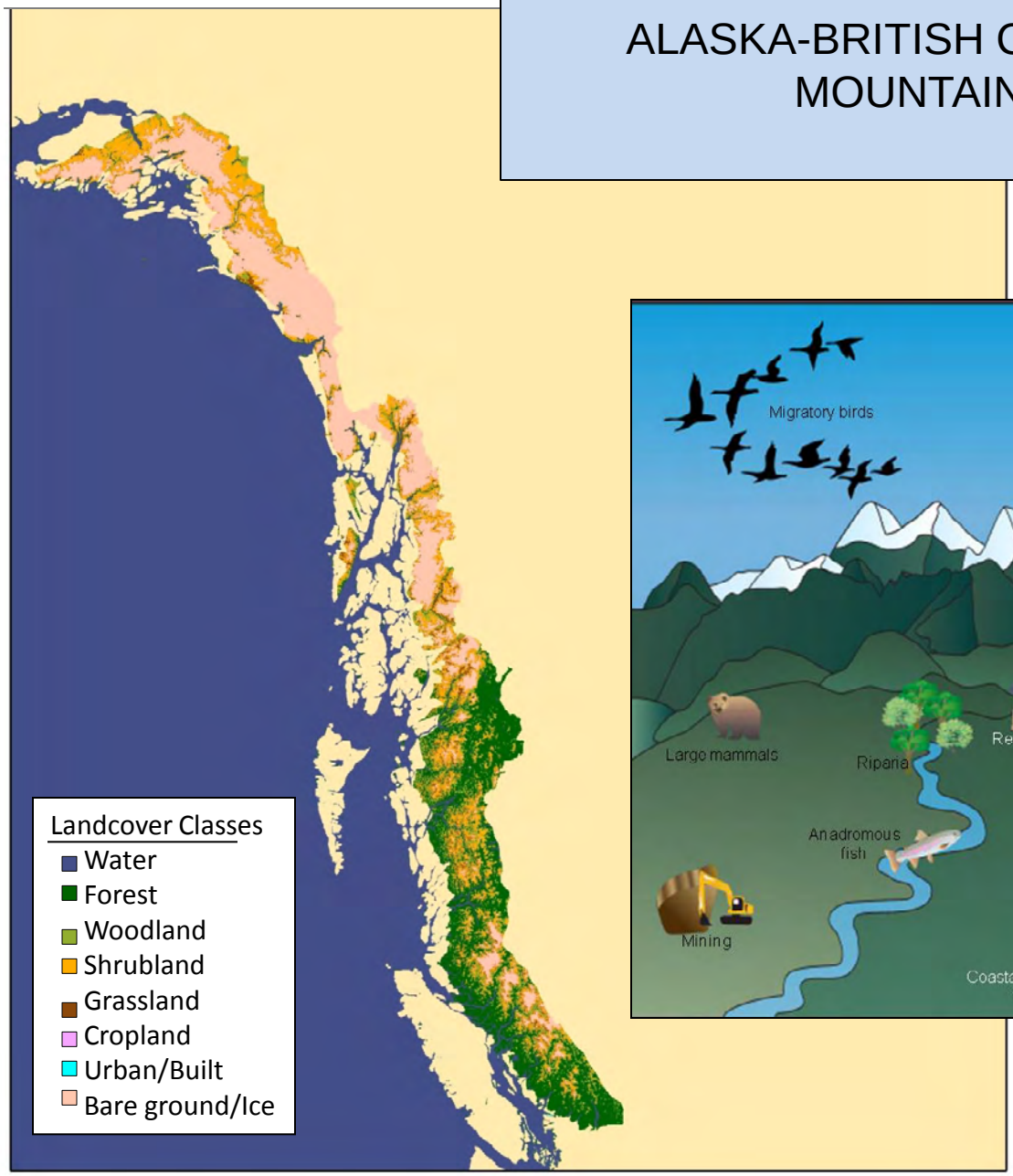
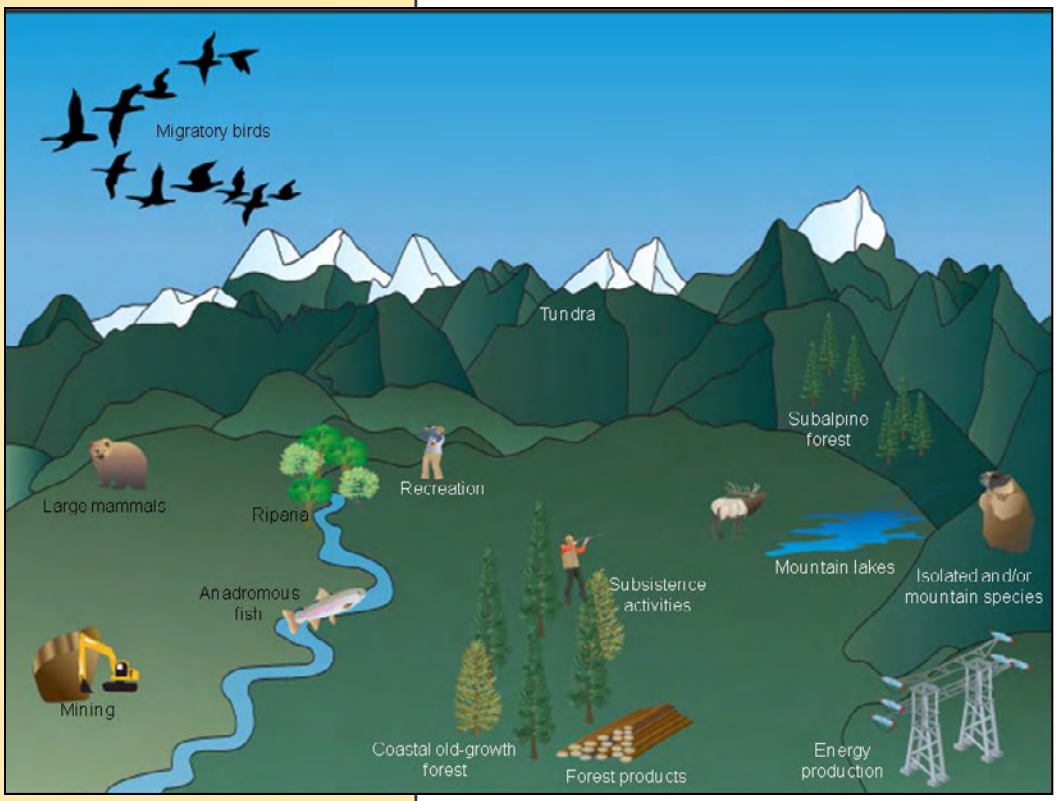
ALASKA-BRITISH COLUMBIA MOUNTAINS





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KLAMATH-OLYMPIC-CASCADE MOUNTAINS

Valued Human, Ecological, and Cultural Resources	Existing Stressors	Current and Potential Climate Change Impacts
• Human resource needs: o Water quality and quantity (urban use, agriculture) o Forest products o Fisheries o Hydroelectric power o Recreation • Vulnerable habitats o Areas of unusually high biodiversity (for example, Klamath-Siskiyou) o Forests & woodlands • Vulnerable species: o Coldwater & mountain species o Forest T and E species o Anadromous fish	• Timber harvest, road building, mining o Erosion o Sedimentation o Water quality • Fire suppression o Increased vulnerability to fires • Water diversions for agriculture and hydropower • Hatchery effects	• Hydrologic regime changes: o Longer ice/snow-free season o Decreased snowpack depth • Increased atmospheric temperatures: o Plant & animal stress o Forest fire increase • Changes in plant community distribution: o Endemic conifer community decline in Klamath-Siskiyou region o Alpine replaced by forest

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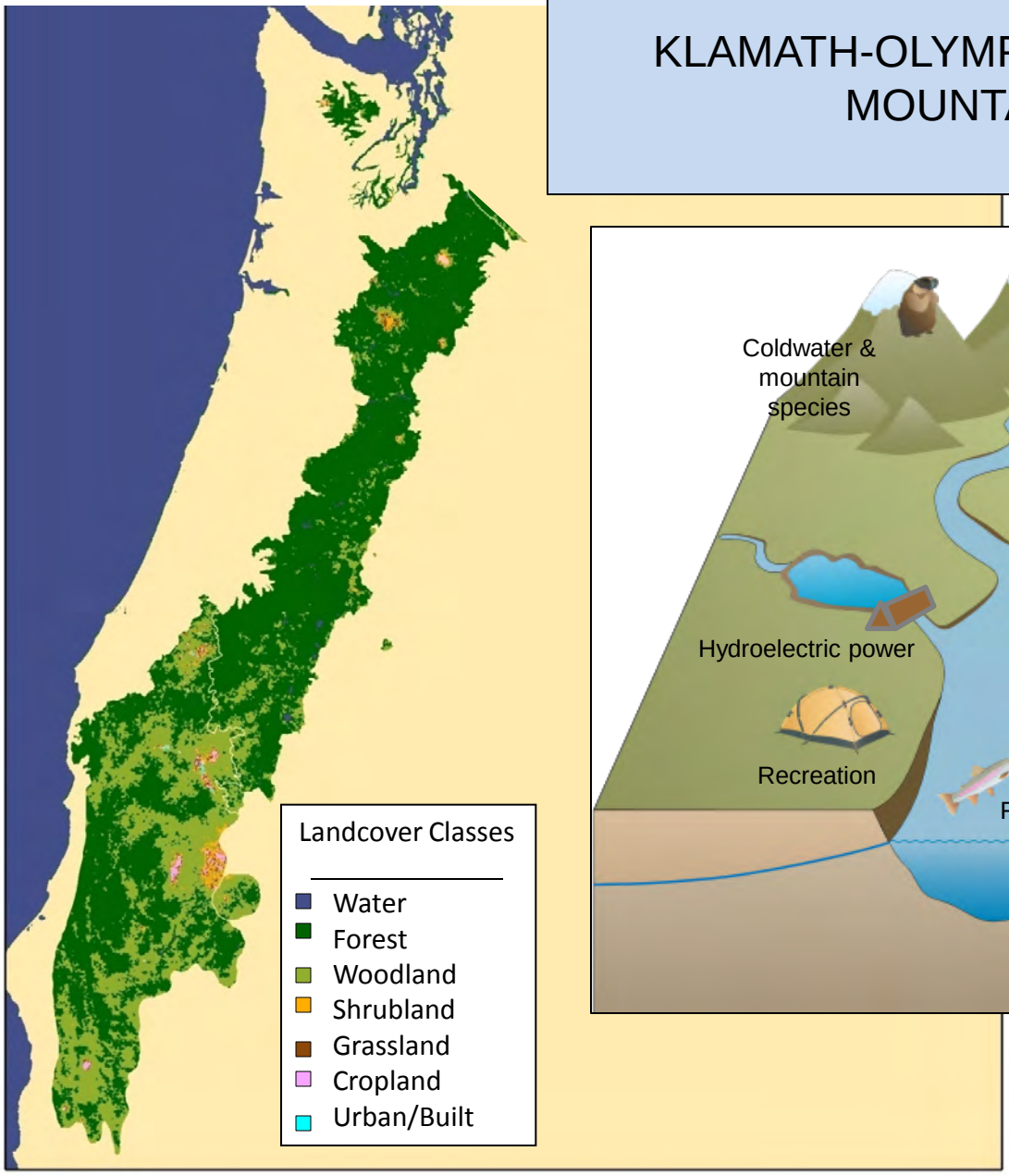
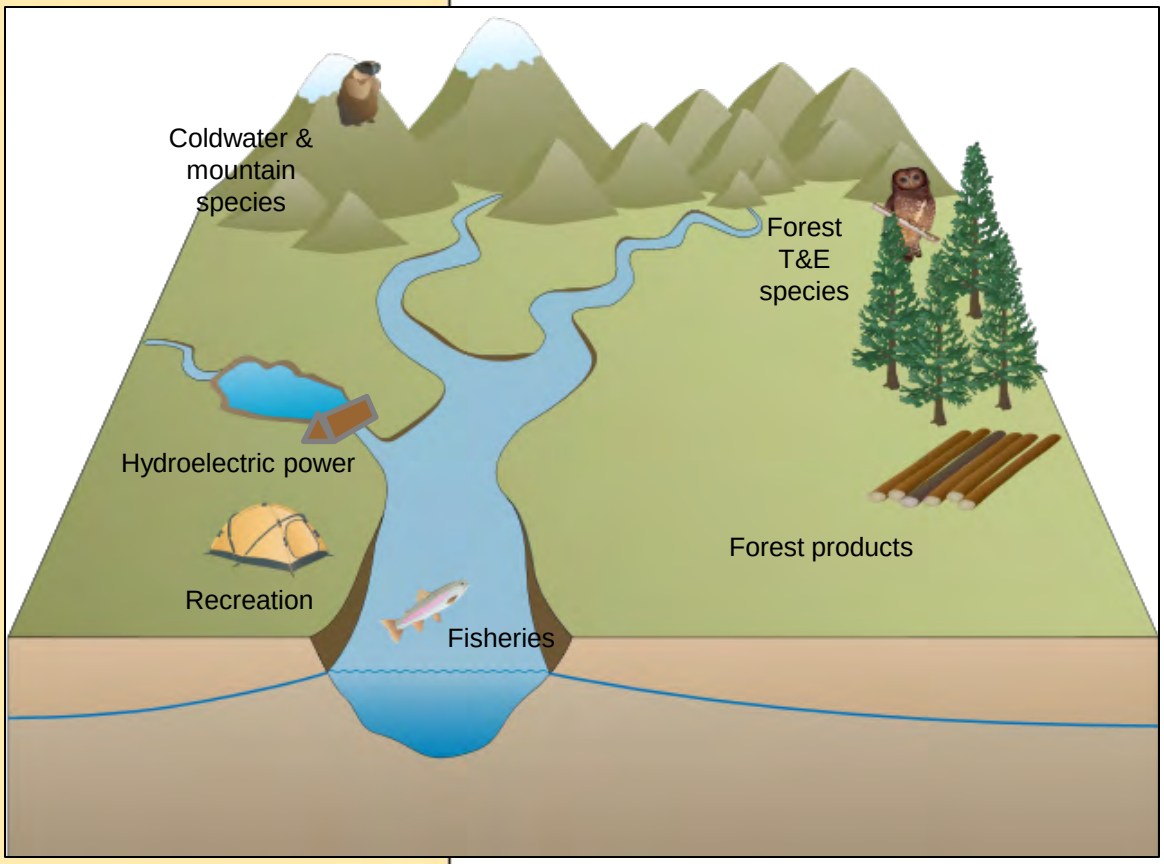
KLAMATH-OLYMPIC-CASCADE MOUNTAINS





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WASHINGTON-OREGON-NORTHERN CALIFORNIA COAST

Valued Human, Ecological, and Cultural Resources	Existing Stressors	Current and Potential Climate Change Impacts
• Human resource needs: o Forest products o Fisheries/aquaculture o Recreation o Grazing o Subsistence, cultural, archeological • Vulnerable habitats: o Coastal forests (including redwoods) o Coastal prairies o Nearshore, estuary, and beach/dune habitats, especially eelgrass beds • Vulnerable species: o Forest T and E species o Migratory birds o Anadromous fish o Forage fish	• Development & associated access: o Water system demand increase o Shoreline infrastructure o Impervious surface increase • Timber harvest: o Habitat loss and fragmentation o Salmon habitat degradation • Exotic species invasions • Fire suppression	• Hydrologic regime changes: o Sediment dynamics changes in estuaries, rivers, and shorelines • Increased atmospheric temperatures: o Forest fire increase o Forest pathogen distribution increased o Plant & animal stress • Sea level rise (exacerbated by subsidence along N OR coast): o Shoreline erosion o Estuary and aquifer salinity increases o Coastal flooding and inundation • Ocean acidification

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Noss, R., Strittholt, G., Orians, G., Adams, J., Kavangh, K., Sims, M., and Mann, G., 1999, Central Pacific coastal forest (NA0510): World Wildlife Federation web site at http://ecoregions/na0510. (Accessed September 20, 2012.)

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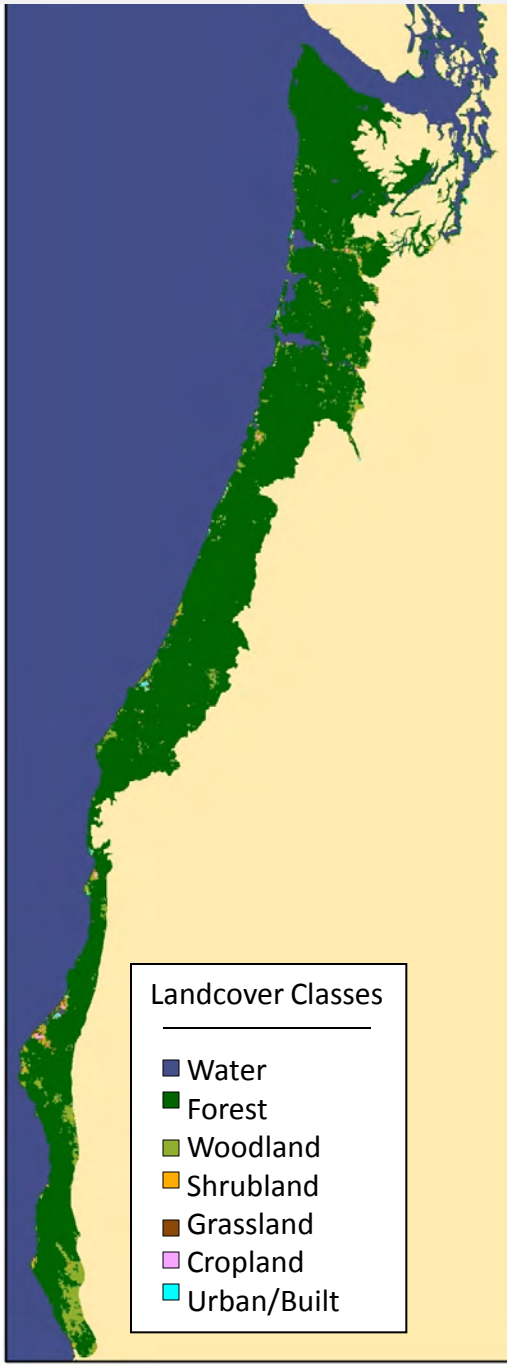
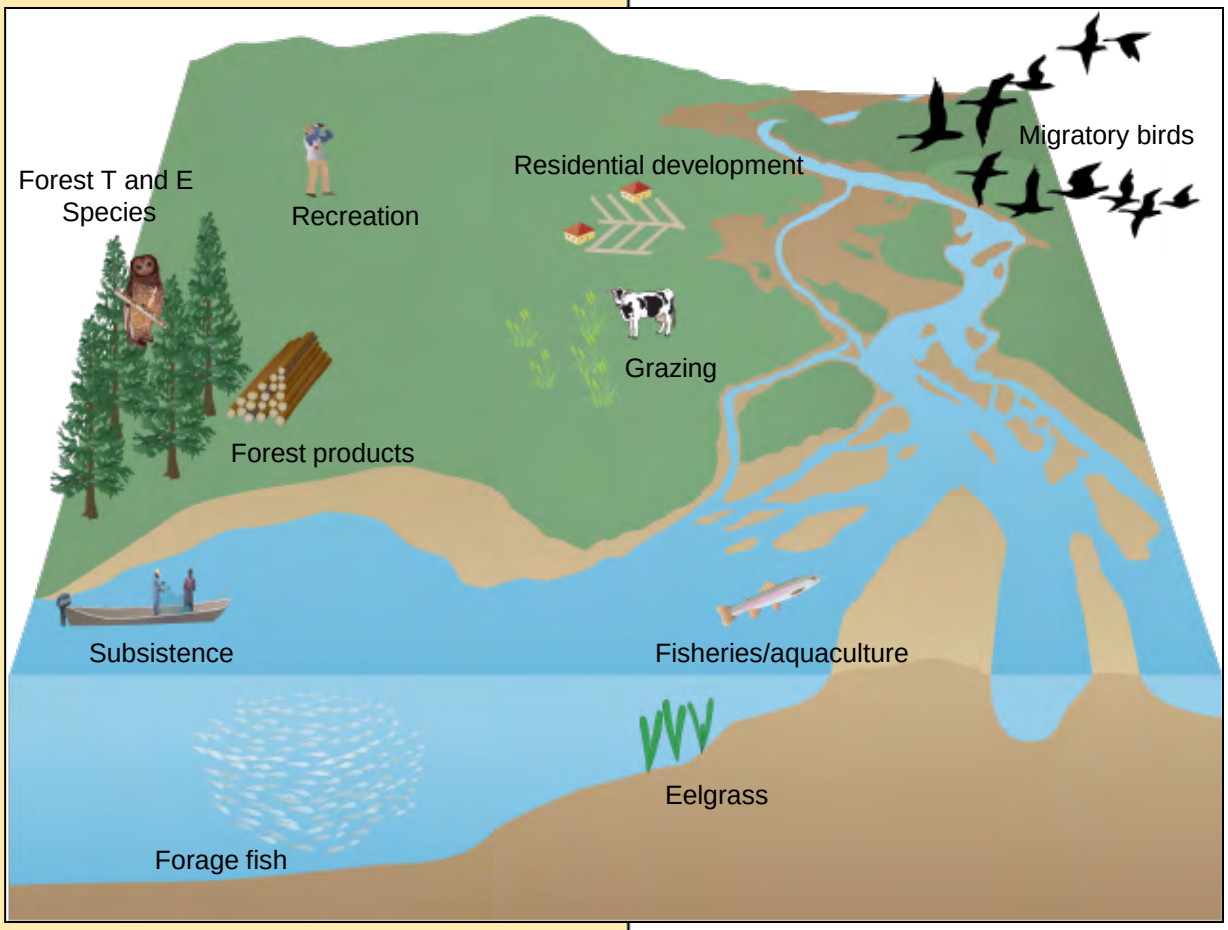
WASHINGTON-OREGON-NORTHERN CALIFORNIA COAST





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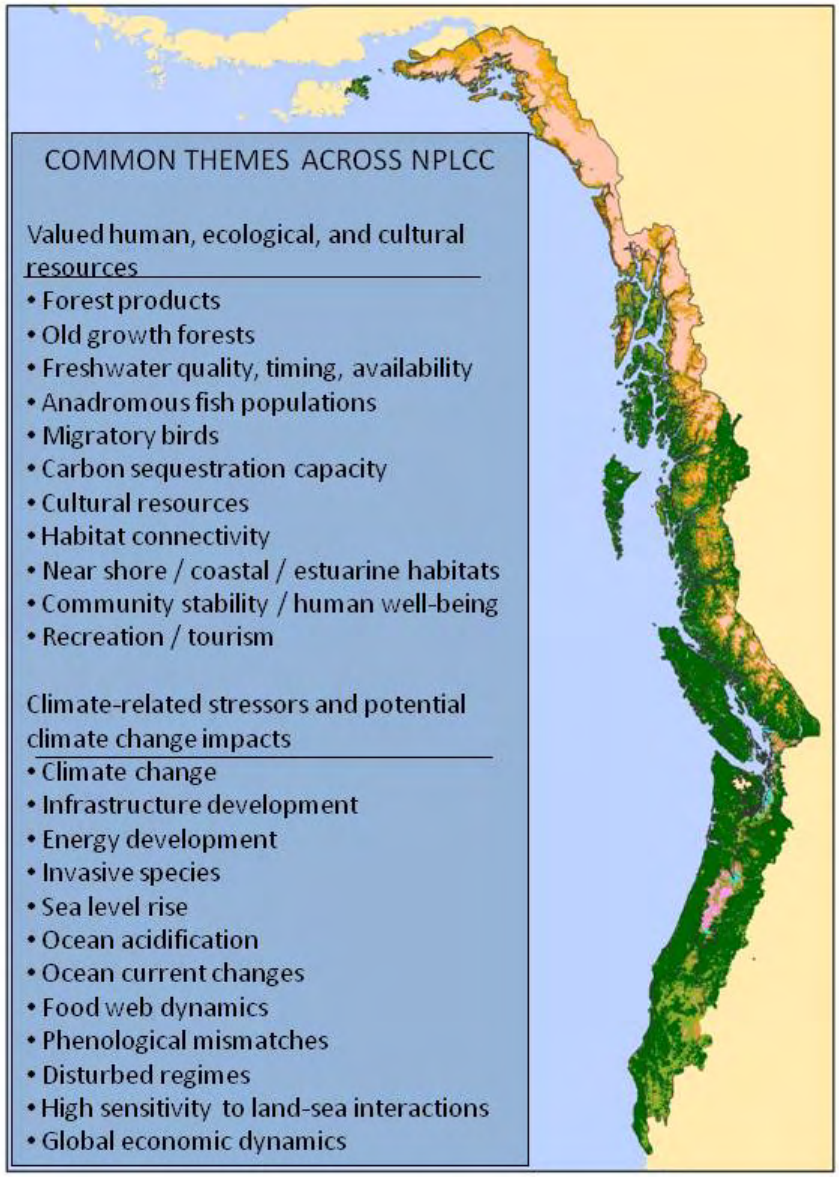
COMMON THEMES ACROSS NPLCC
Valued human, ecological, and cultural resources
• Forest products
• Old growth forests
• Freshwater quality, timing, availability
• Anadromous fish populations
• Migratory birds
• Carbon sequestration capacity
• Cultural resources
• Habitat connectivity
• Near shore / coastal / estuarine habitats
• Community stability / human well-being
• Recreation / tourism
Climate-related stressors and potential climate change impacts
• Climate change
• Infrastructure development
• Energy development
• Invasive species
• Sea level rise
• Ocean acidification
• Ocean current changes
• Food web dynamics
• Phenological mismatches
• Disturbed regimes
• High sensitivity to land-sea interactions
• Global economic dynamics

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