

Climate Implications in the Northern Coastal Temperate Rainforest of North America

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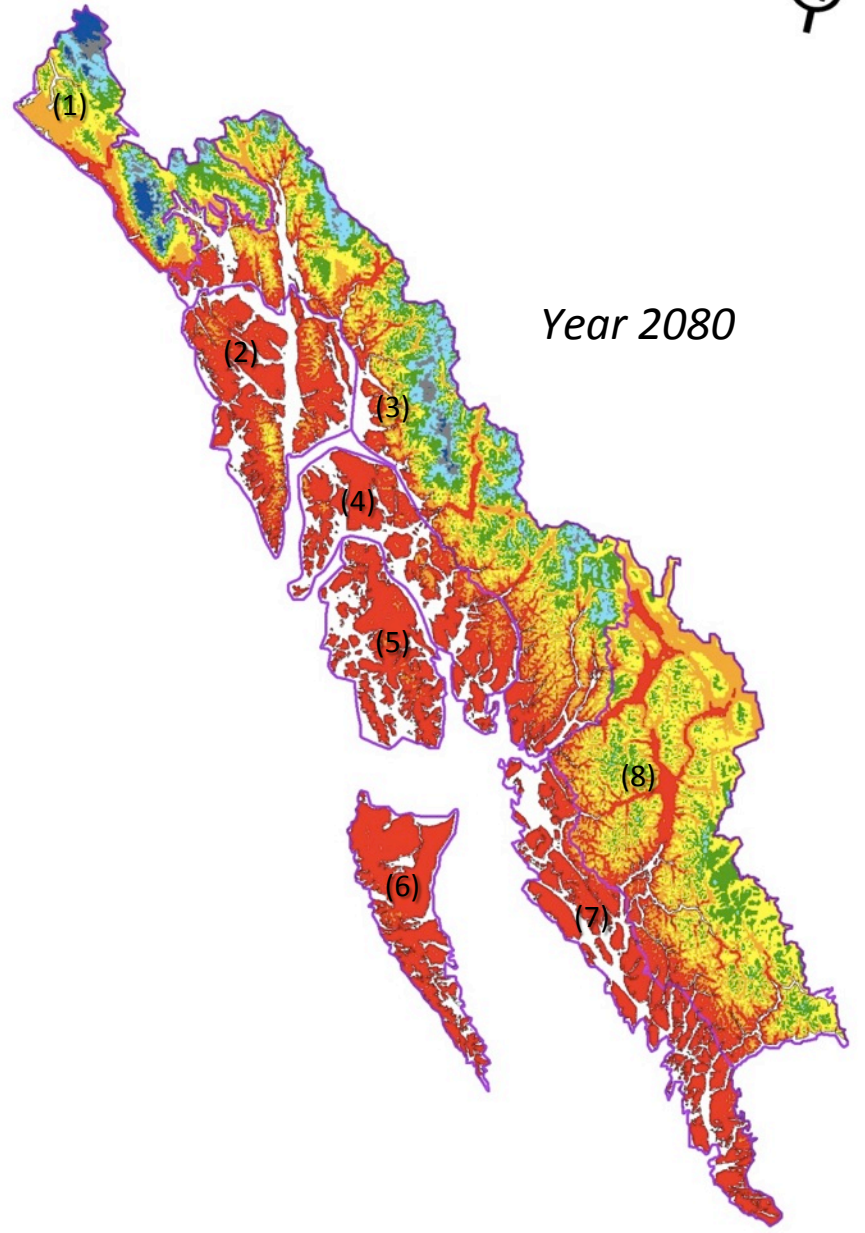
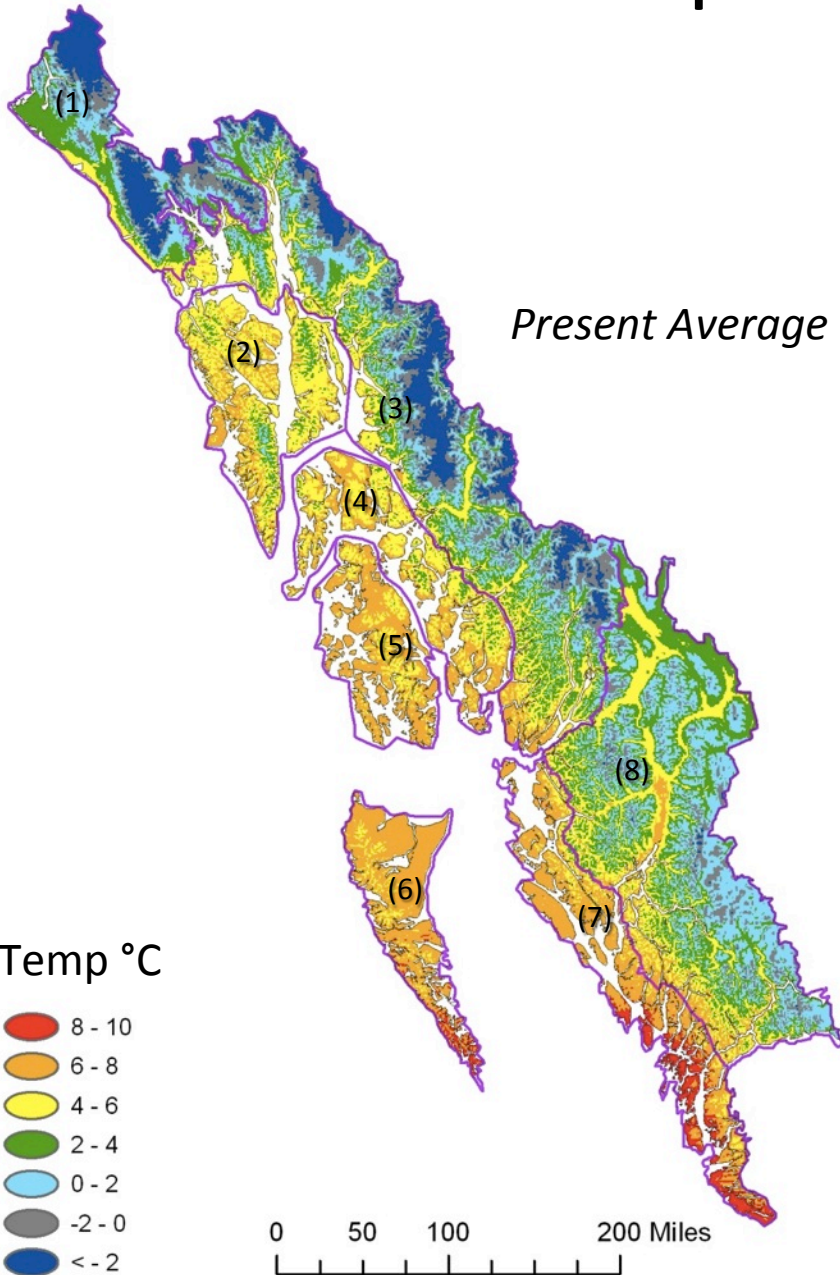
Tongass Vulnerability Workshop
Jan 14, 2014

A scenic landscape featuring a large, dark rock formation in the foreground, with several trees growing on it. In the background, a river flows through a valley, surrounded by more trees and a misty atmosphere. The overall scene is lush and natural.

What did we do?

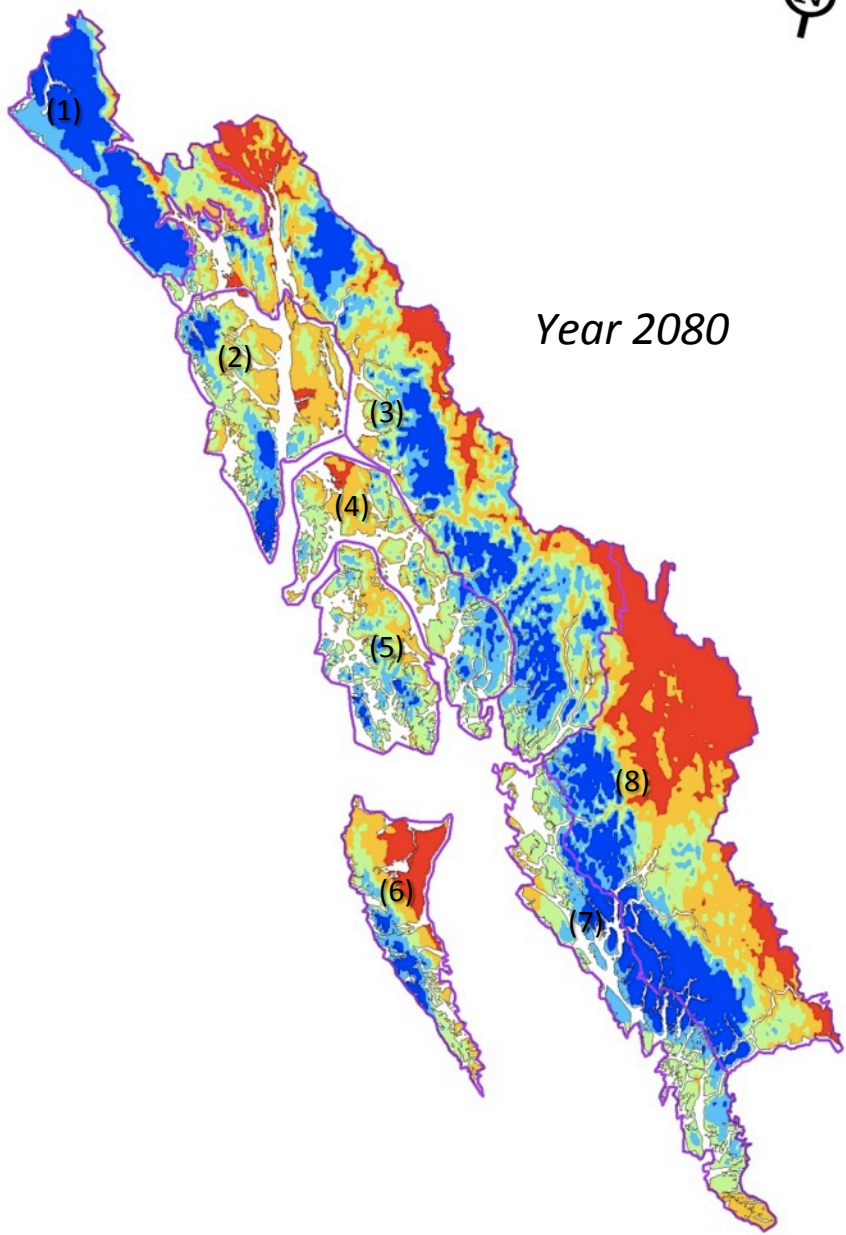
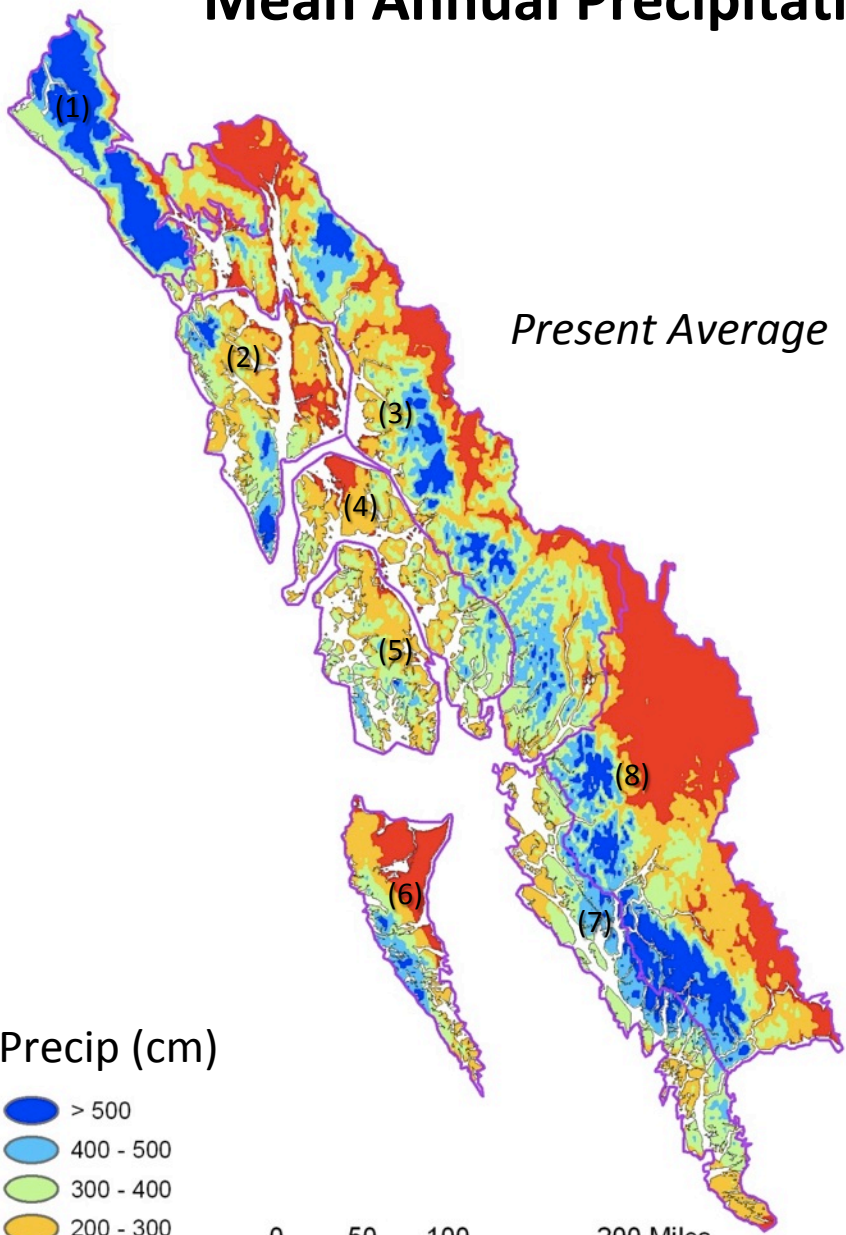
- Hydroecological & Terrestrial ecological systems
- IPCC 4
- ECHAM5 climate model— (Radic and Clarke 2011)
- ClimateWNA 4.62 (Wang et al. 2012b)
- Spatial Resolution = 1 km
- Historical Mean = 1961 – 1990
- Temporal Resolution = 2080
- Biogeoclimatic zones (Meidinger & Pojar 1991; USFS 2008)

Mean Annual Temperature



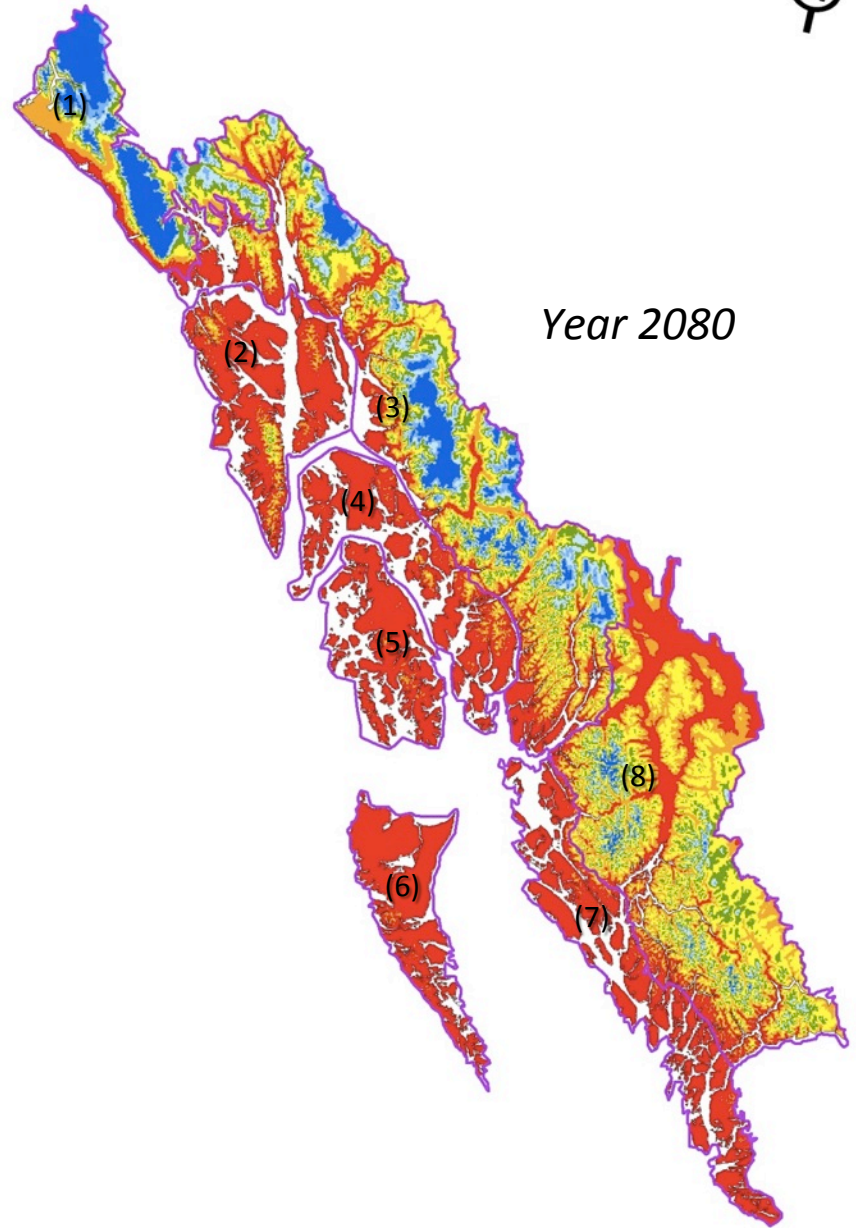
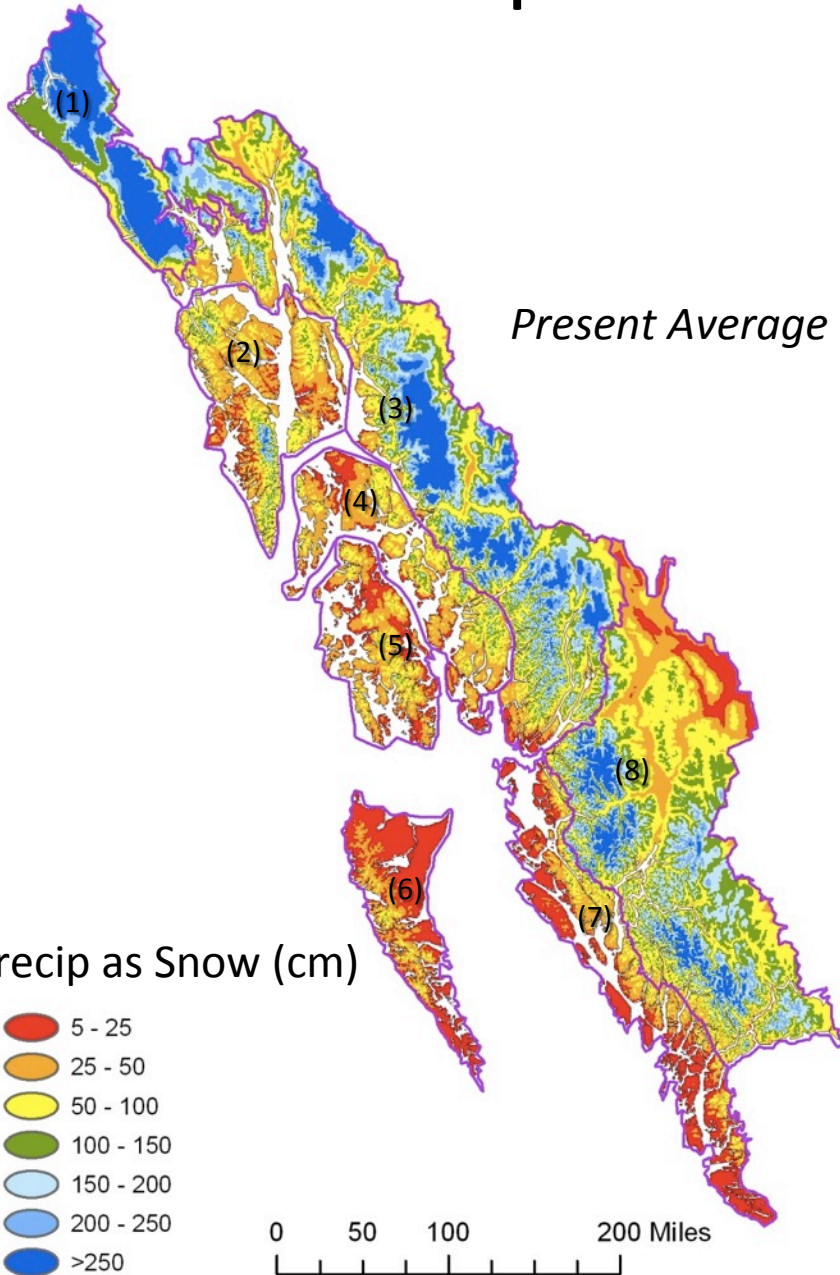
ECHAM5 Climate model- A1B Emission scenario

Mean Annual Precipitation



ECHAM5 Climate model- A1B Emission scenario

Annual Precipitation as Snow



What did we find?

Two gradients:

- Temp & Precipitation (north to south)
- Snow (mainland to outer coast)

An increase in mean annual temperature

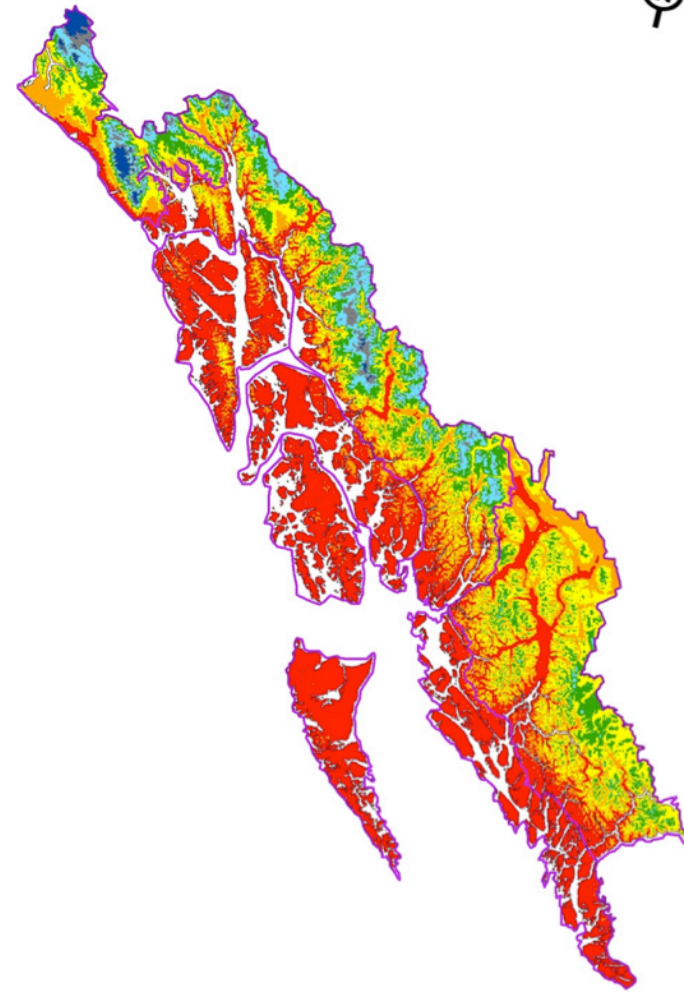
- from a current avg of 38° to 44 °F (+18%)

An increase in mean annual precipitation

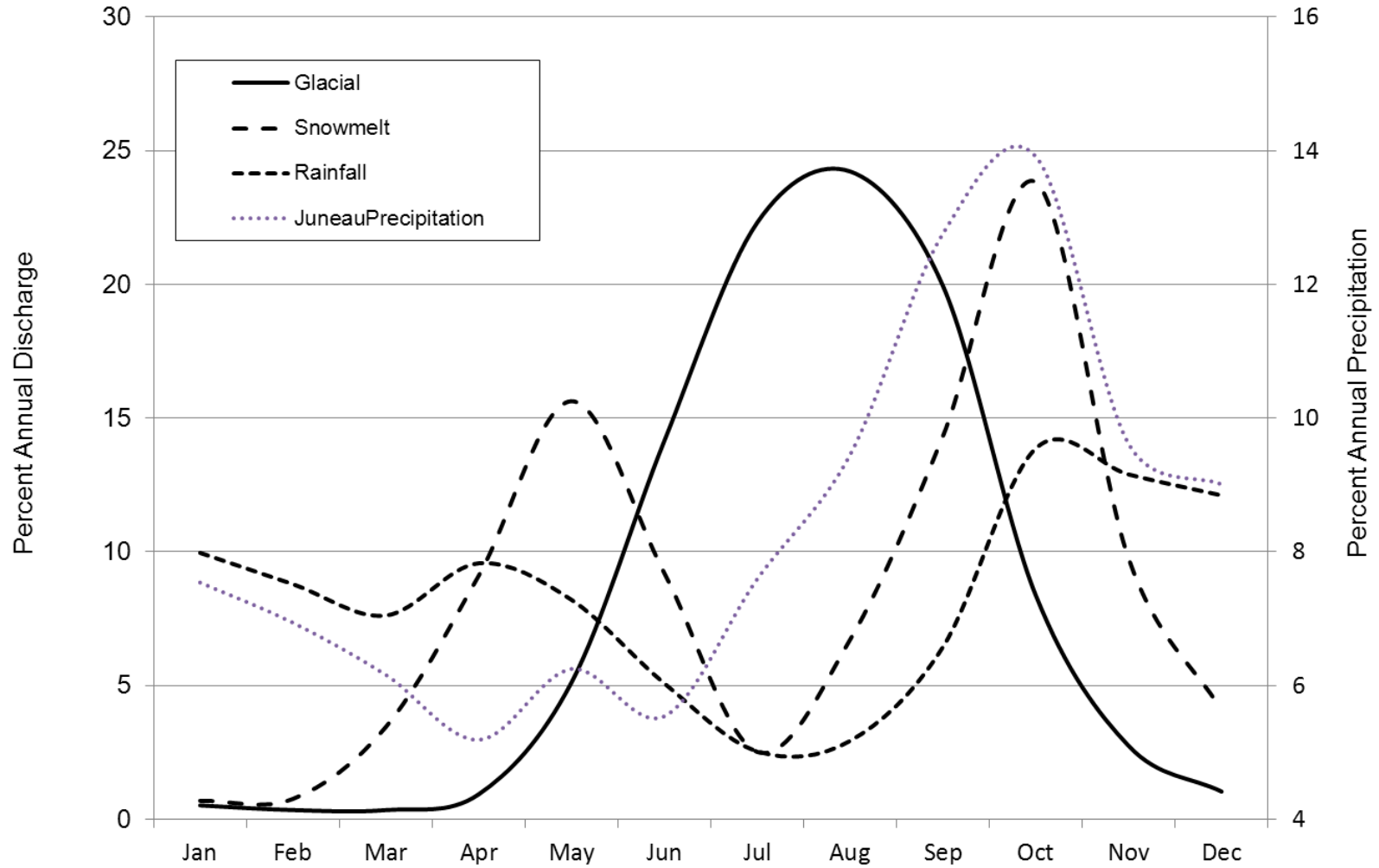
- from a current avg of 123 in to 145 in (+18%)

A decrease in annual precipitation as snow

- from a current avg of 47 in to 30 in (-35%)



Characteristic Hydrographs for Three Watershed Types in Juneau



Questions?



Implications: Vegetation

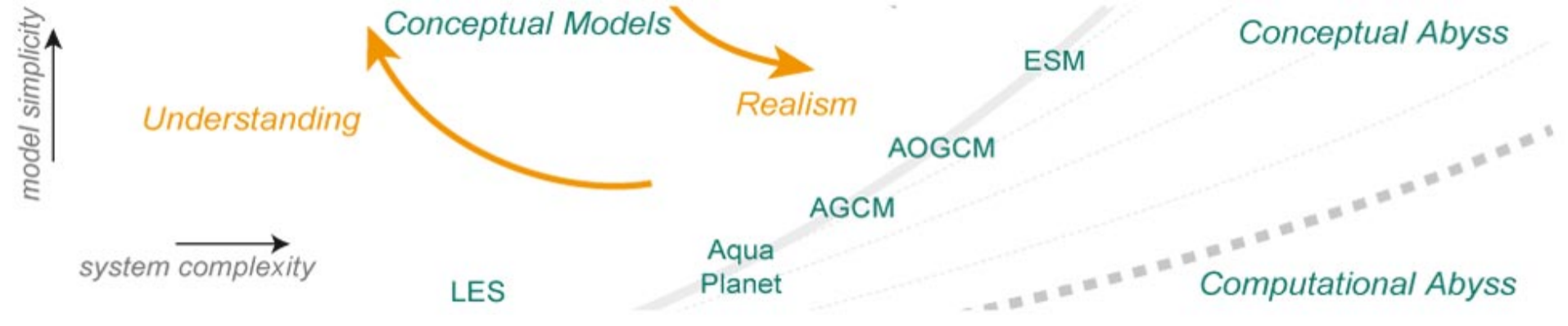


- **Alpine temp > current subalpine temp by 2050**
- **Accumulated snow will decline**
- **Treeline elevation increases 200m by 2080**
- **Lower boundary of the subalpine increases by 450m**



Implications Lowlands & Wildlife

- **Lowland forests – wetter; more insects & disease**
- **Altitudinal and latitudinal expansion of lowland forests**
- **Ungulates: expanded lowland forest habitats in winter**



Implications Freshwater Hydrology & Fishes

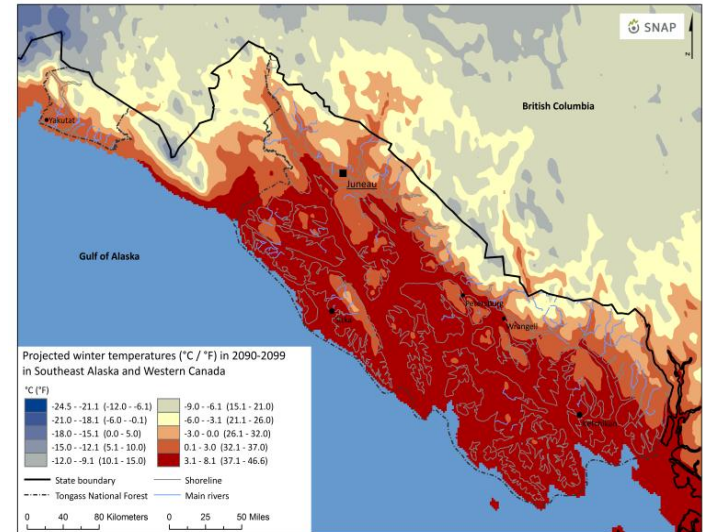
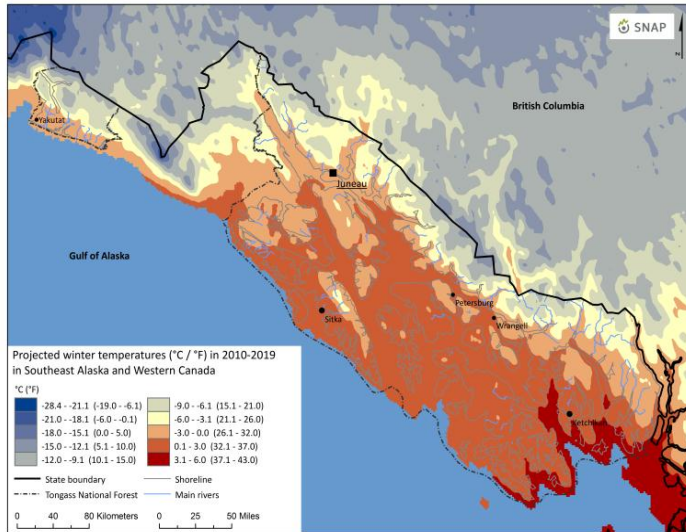
Changing hydrologic regimes could alter:

1. the distribution and productivity of fisheries
2. Dependability/functionality of hydropower
3. desirable tourism activities (e.g., wildlife viewing)

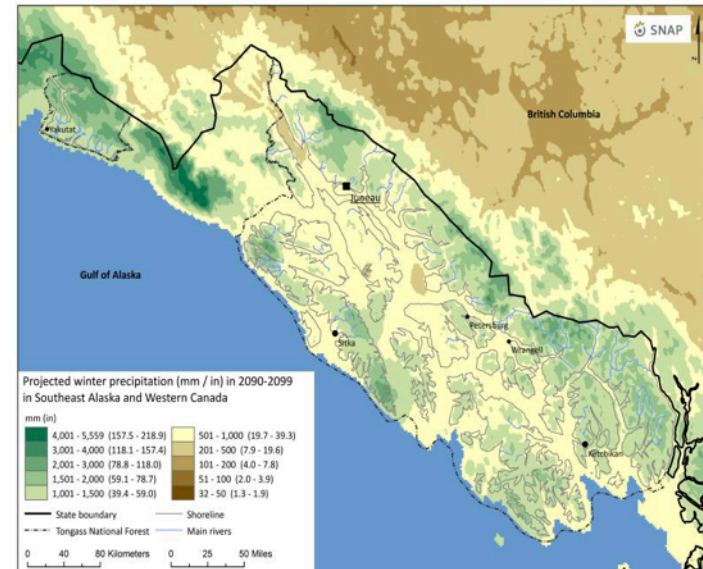
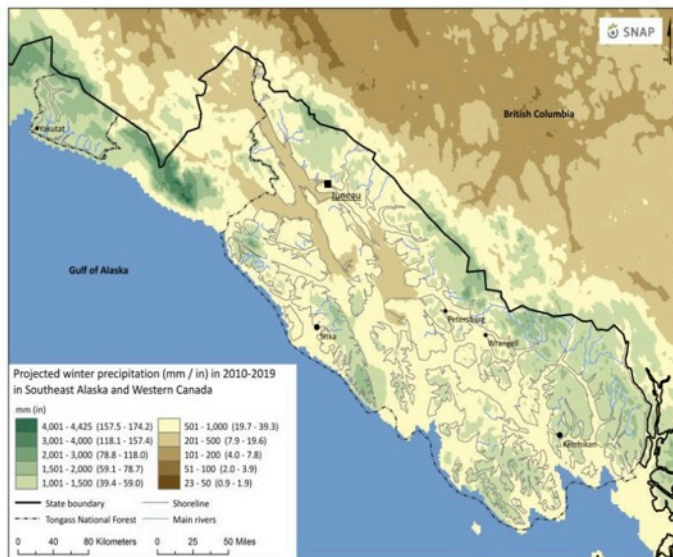
Decadal means – Winter

2010-2019

2090-2099



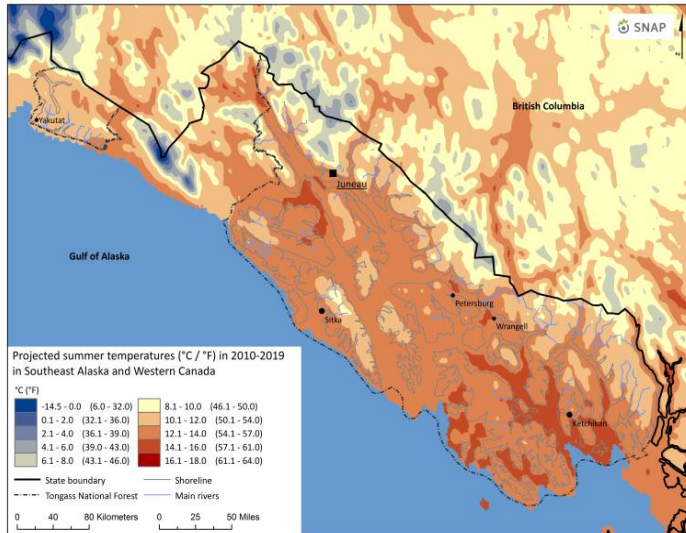
Temp



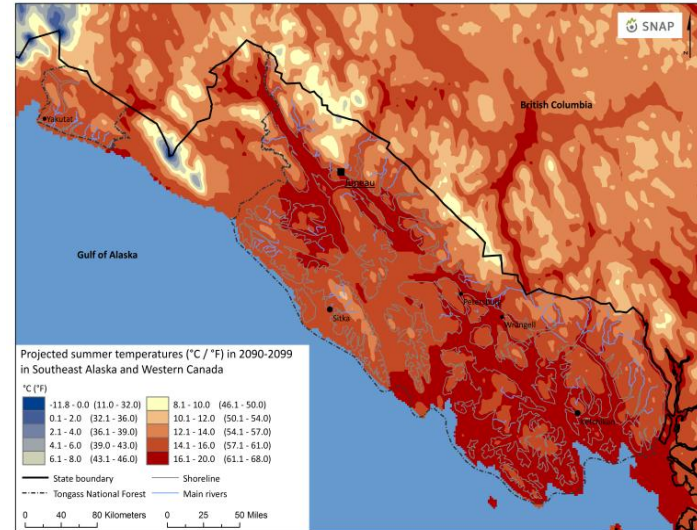
Precip

Decadal means – Summer

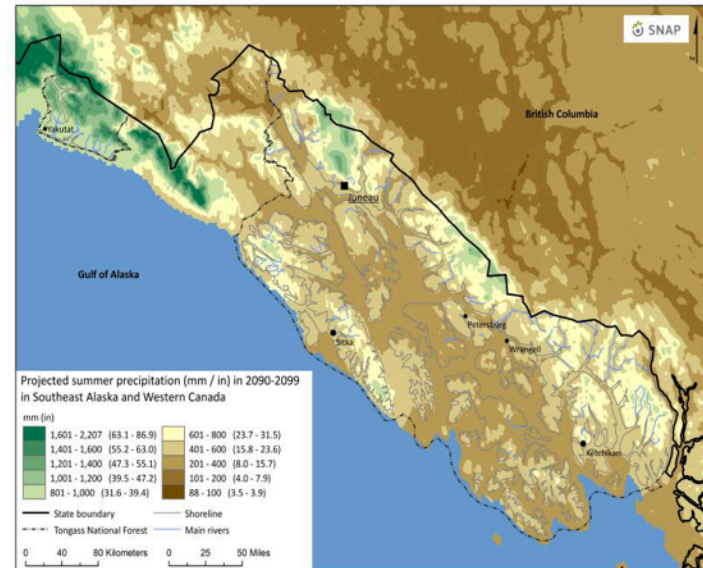
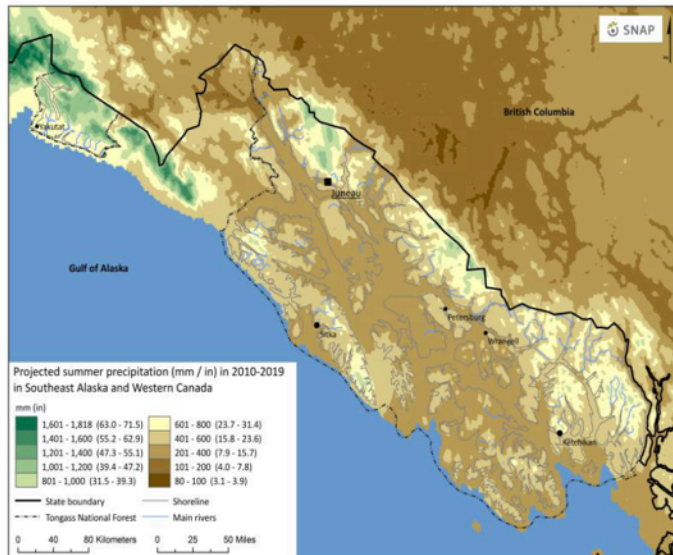
2010-2019



2090-2099



Temp



Precip