

Vulnerability and adaptation of freshwater ecosystems to climate change in the Cariboo-Chilcotin, British Columbia

**Marc Nelitz¹, Marc Porter¹, Katherine Wieckowski¹, Katrina Bennett^{2,3},
Arelia Werner³, Katy Bryan¹, Frank Poulsen¹, and David Carr¹**

¹ESSA Technologies Ltd.

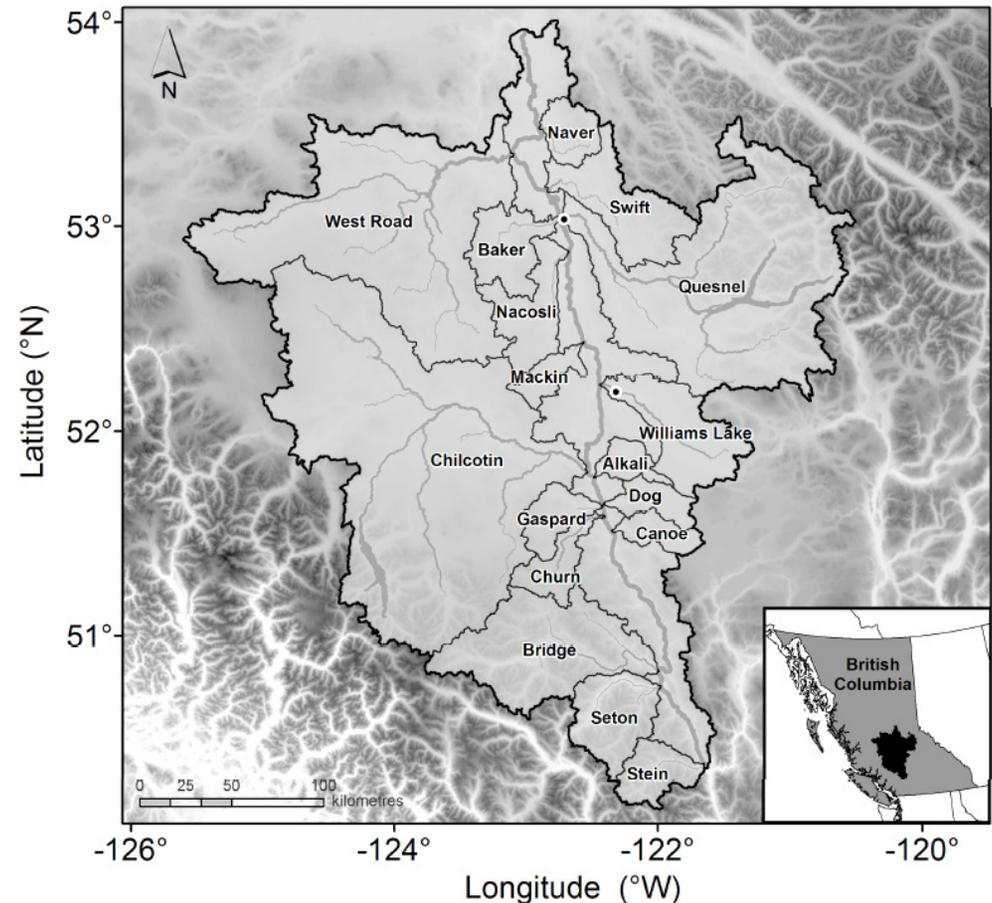
²International Arctic Research Center,
University of Alaska Fairbanks

³Pacific Climate Impacts Consortium

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Human communities and ecosystems

- Resource dependent communities (forestry, mining, agriculture)
- Land and water use decisions influenced by conservation values: chinook and coho salmon, bull trout, etc.

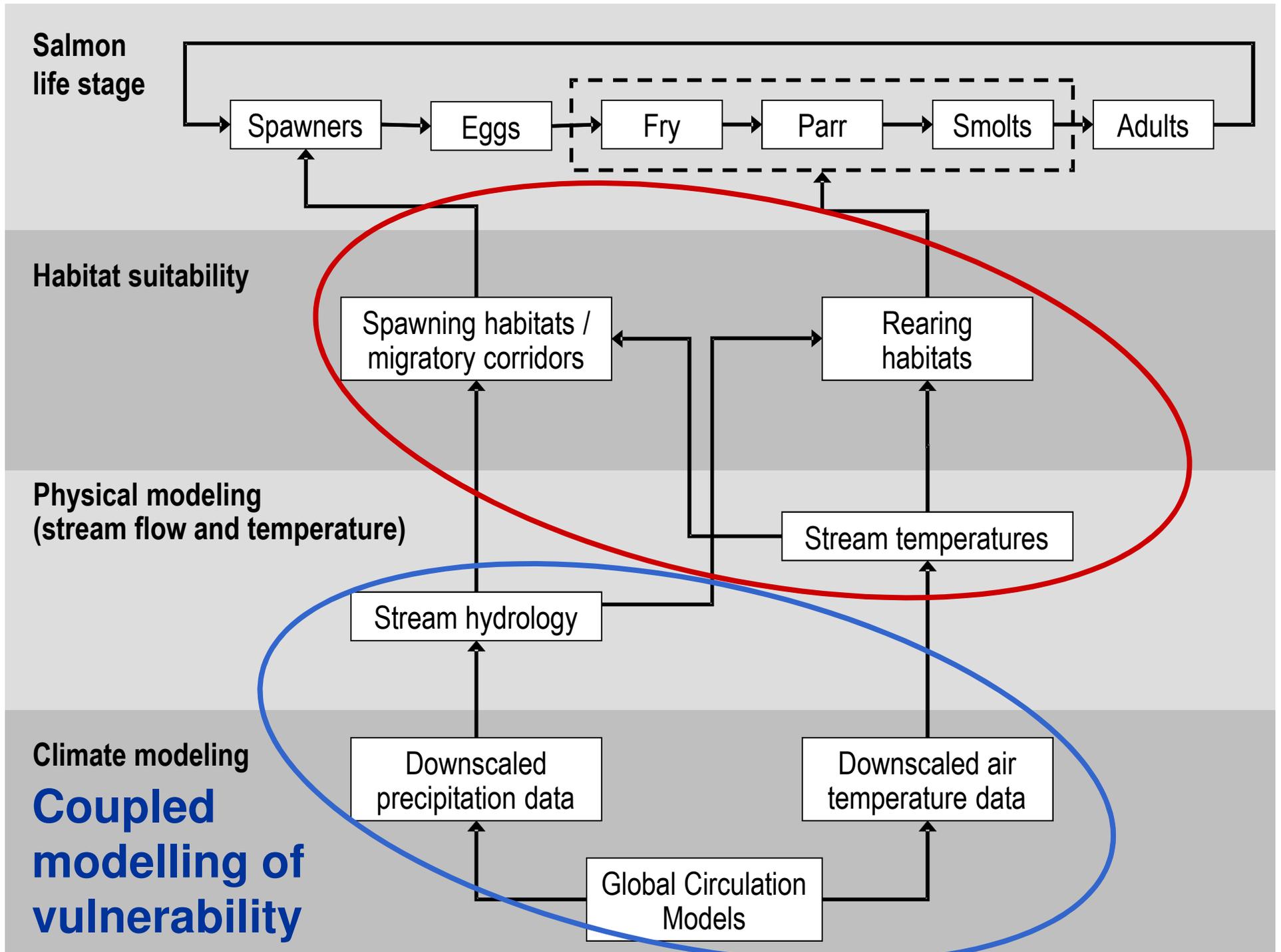


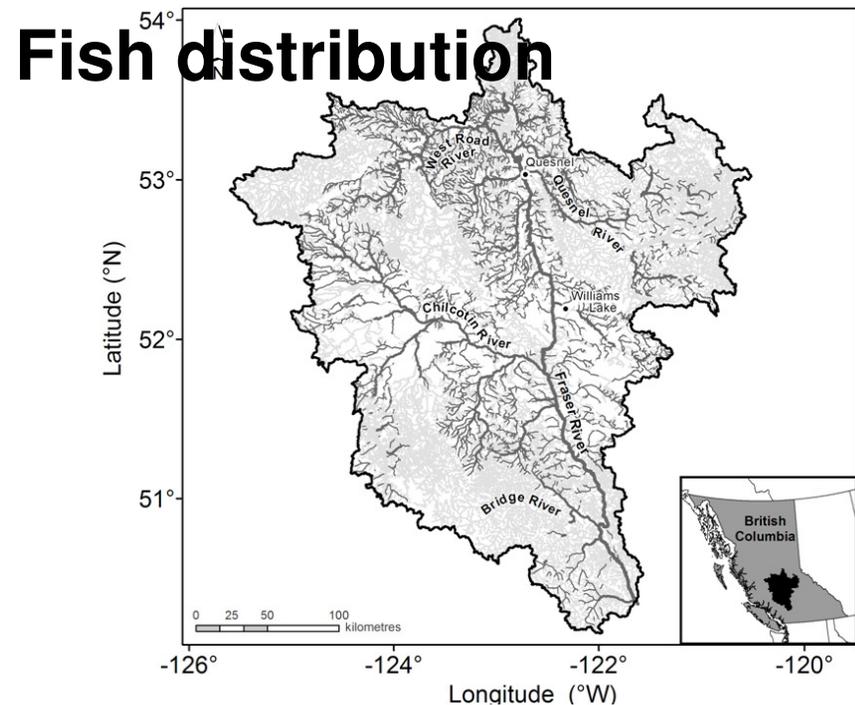
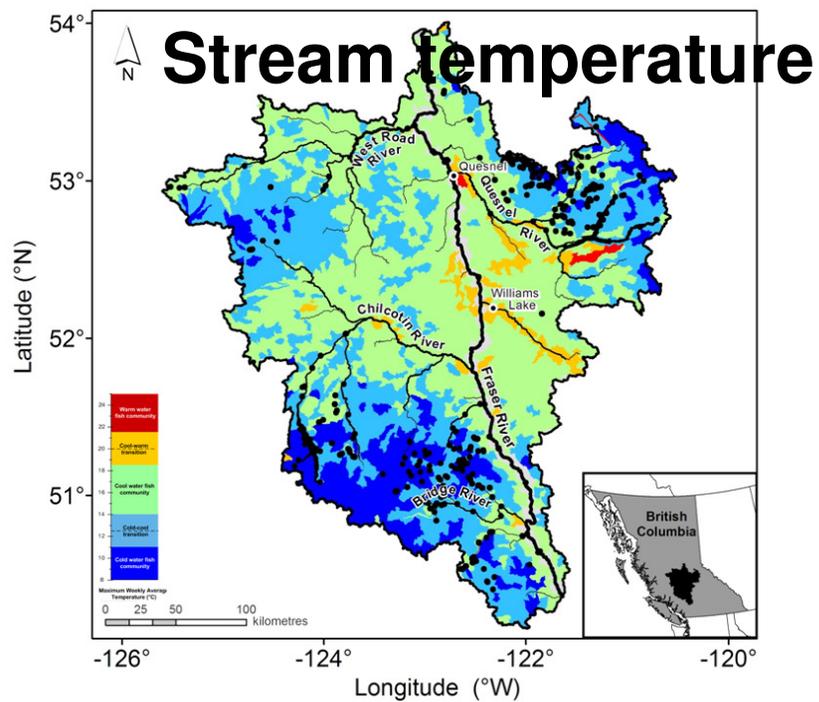
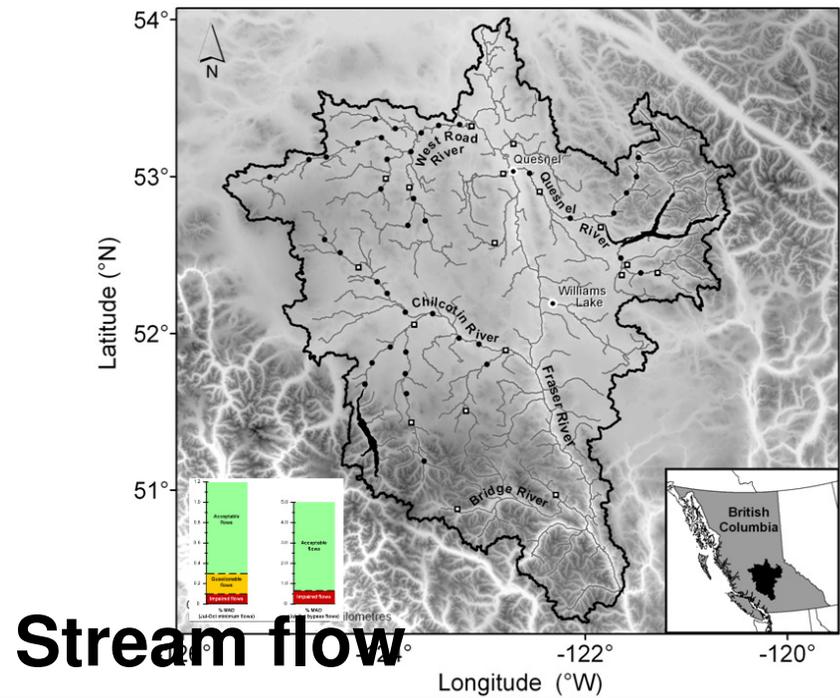
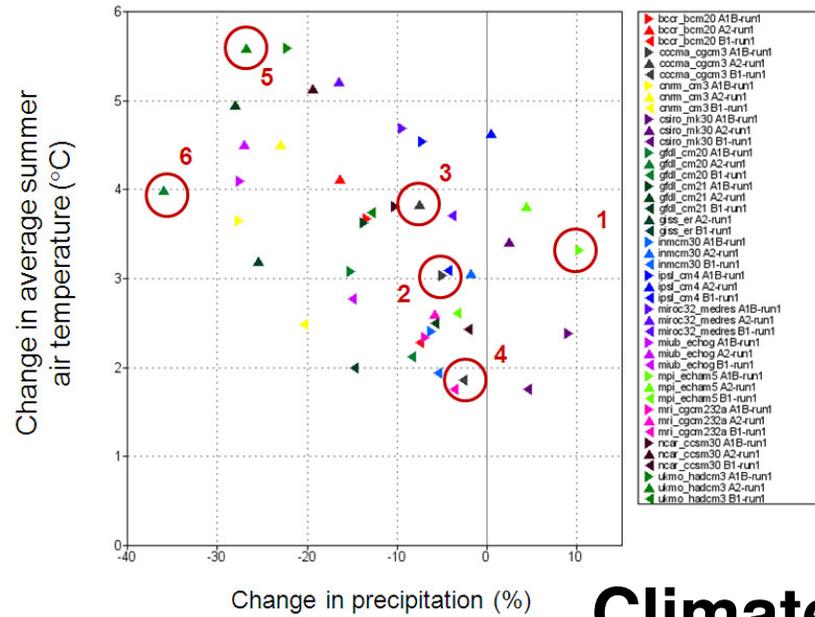
Context for planning / decision making

- Broad scale changes associated with Mountain Pine Beetle
- Out of date land use plan; recent conservation strategy outlining adaptation priorities
- Lack of fine scale understanding of physical and biological changes related to climate change and implications on planning and natural resource decisions

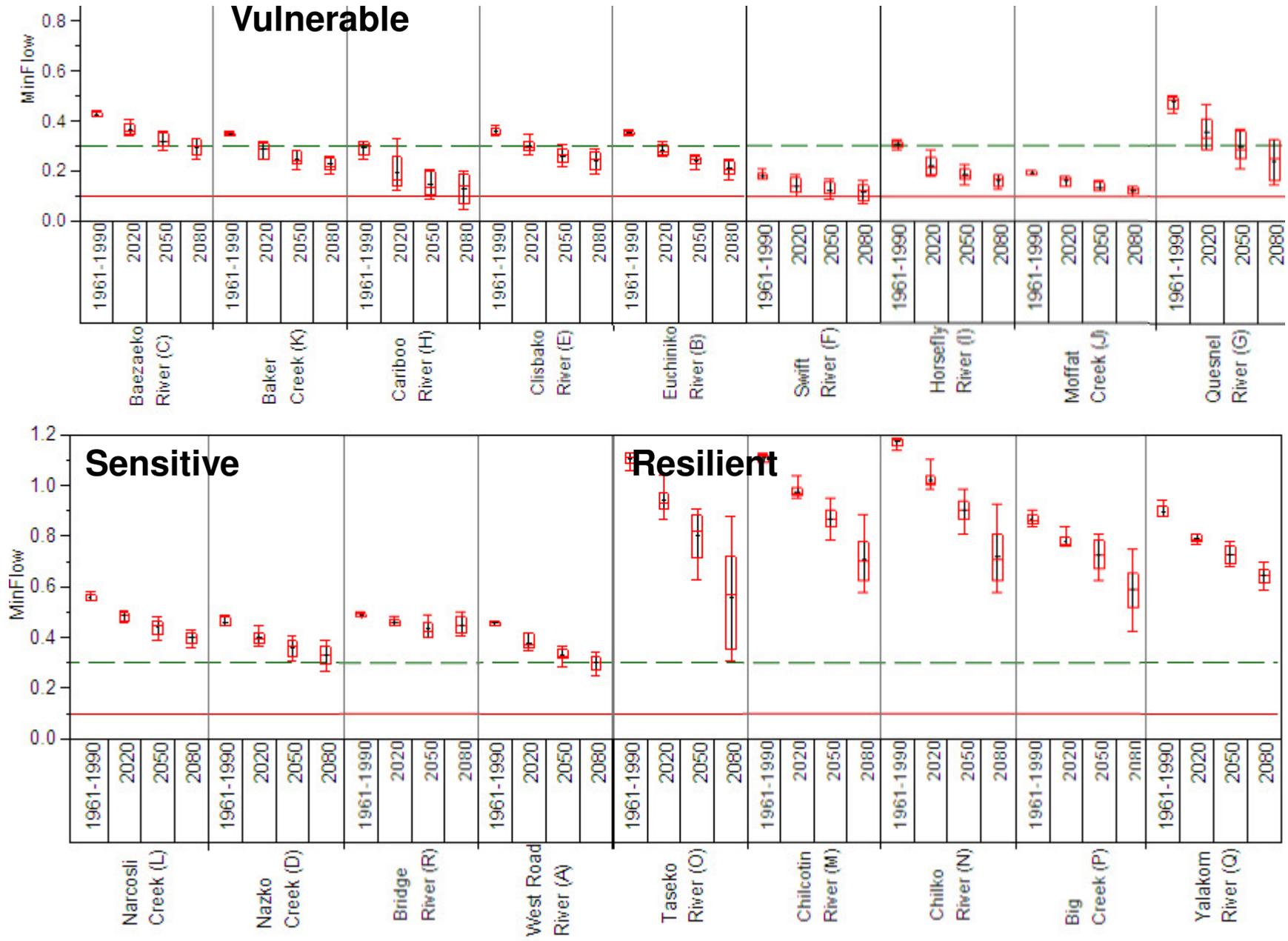


Vulnerability

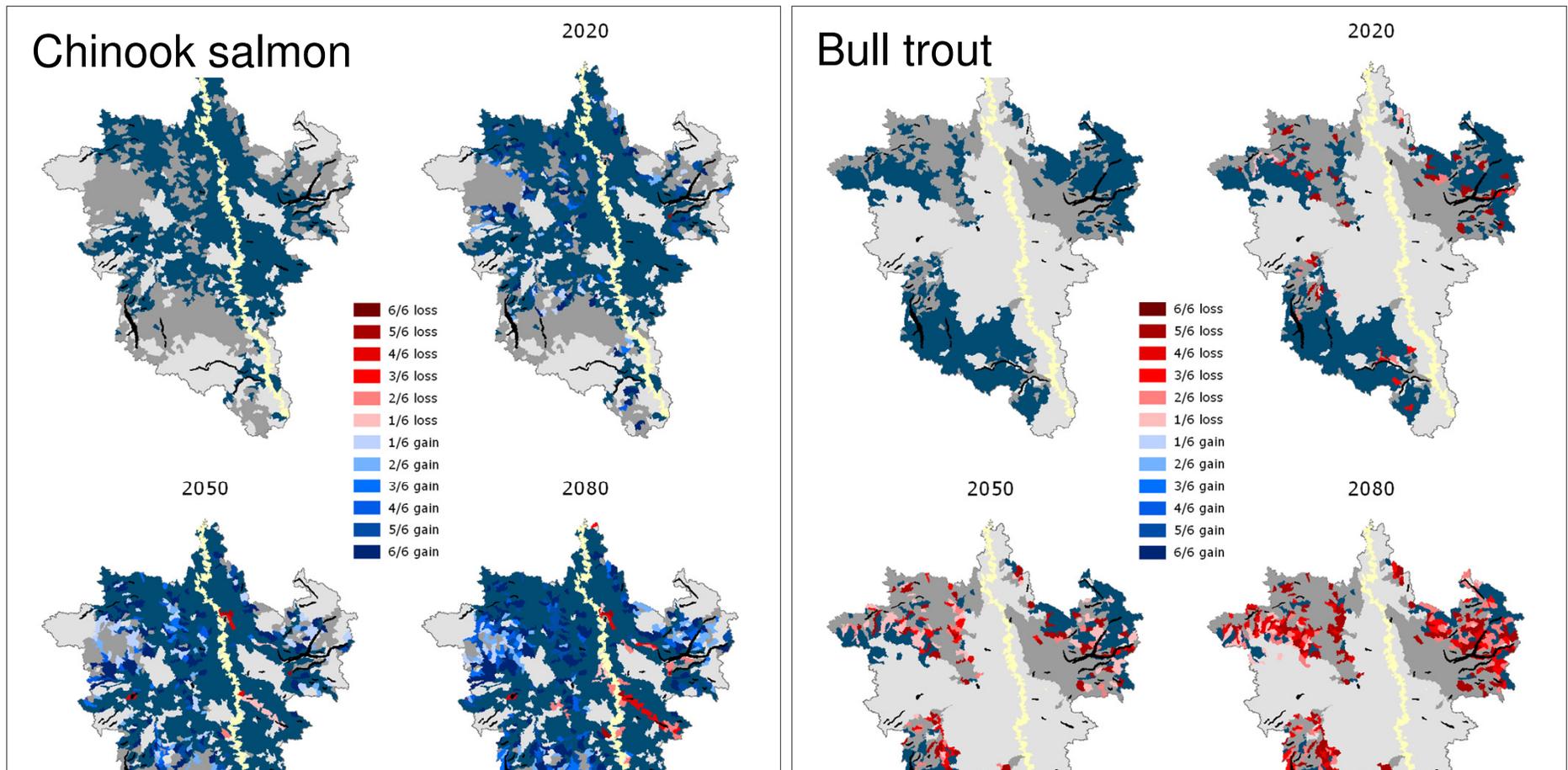




Changes in stream flow suitability



Changes in stream temperature suitability



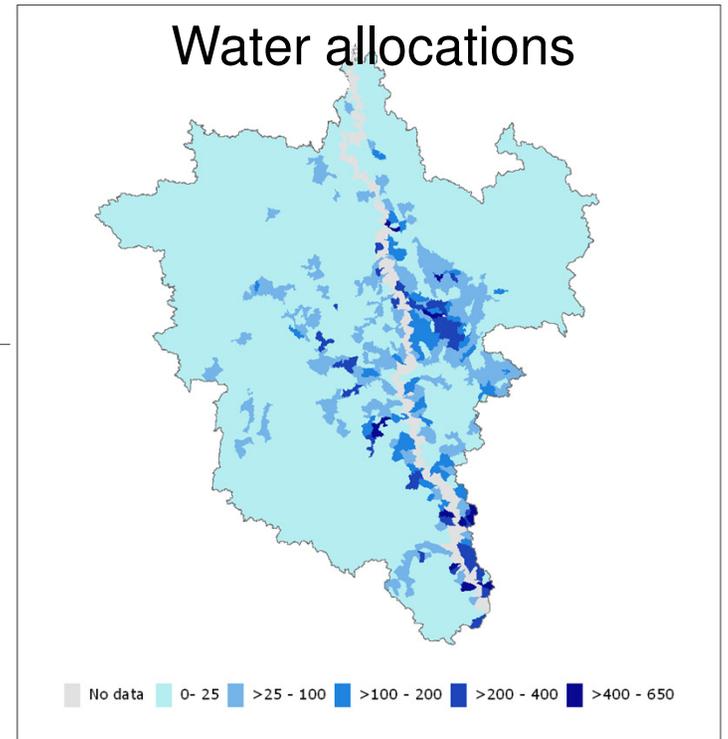
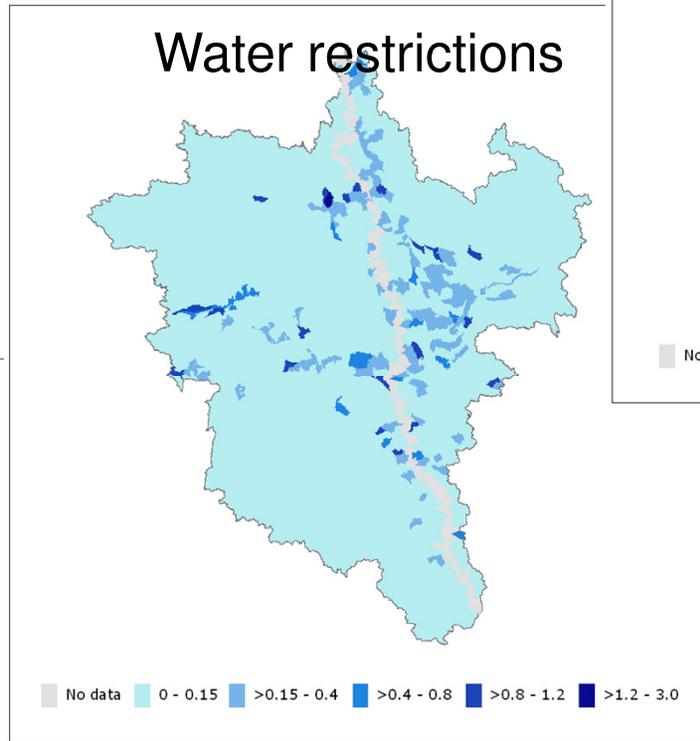
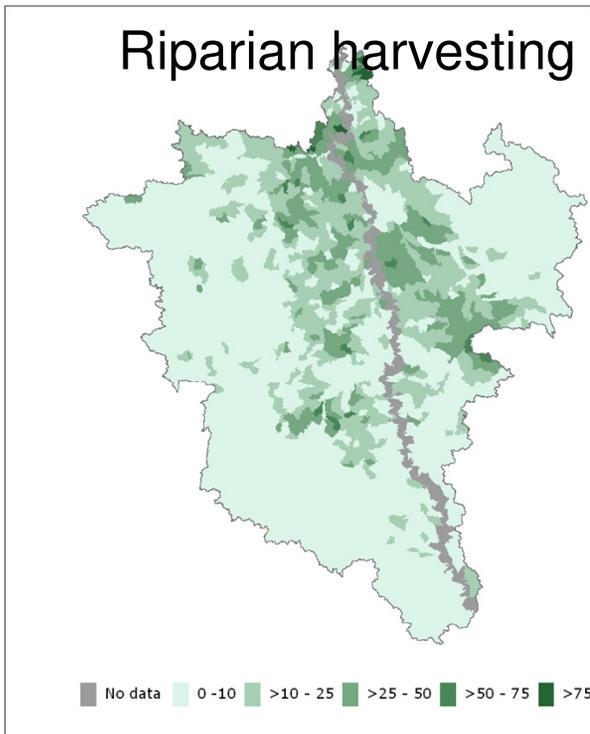
- Expect winners, losers, or no changes for some species / habitats; those at margins most vulnerable
- Spatial arrangement matters; implications on planning and decision making (protect what is under threat vs. protect strongholds)

Adaptation

Adaptation strategies

- **Restore riparian ecosystems**
 - Create deep pools
 - Enhance production with hatcheries
 - Transport fish manually
 - **Improve fish passage**
 - Implement low impact grazing practices
 - Zone water availability in space and/or time
 - **Adjust water allocations and licensing**
 - Implement low impact irrigation practices
 - Build additional storage capacity
 - Divert water from other locations
 - Manage water storage
 - Release cold water
 - Manipulate surface water / groundwater interactions
 - Use existing land designations to promote special management
 - Enhance forest retention at the landscape level
 - Adjust patterns of forest harvesting
 - Adjust management of forest roads
 - Enhance conservation of pristine habitats
- Priorities for adaptation driven by feasibility of implementation; informed by financial, technological, policy, institutional, scientific, and/or social barriers

Opportunities for adaptation



Key insights

- Hunger among end users for relevant information; limited ability / capacity to act on it.
- Regional climate data were necessary for understanding vulnerability of freshwater ecosystems to climate change.
- Vulnerability has implications on planning and decision making:
 - Targets of vulnerability and spatial arrangement matter;
 - Effectiveness of today's resource decisions and conservation actions could be compromised if forecasts are not explicitly considered.
- Tough choices: Protect what's under threat vs. protect the strongholds.

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