

Earthquake Effects in Changing Damscapes

Geomorphology and Narrative at the Bonneville Dam

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How are high-profile dams managed to adapt over time?

How might the function of the Bonneville Dam be altered in the event of a Cascadian earthquake?

INTRODUCTION

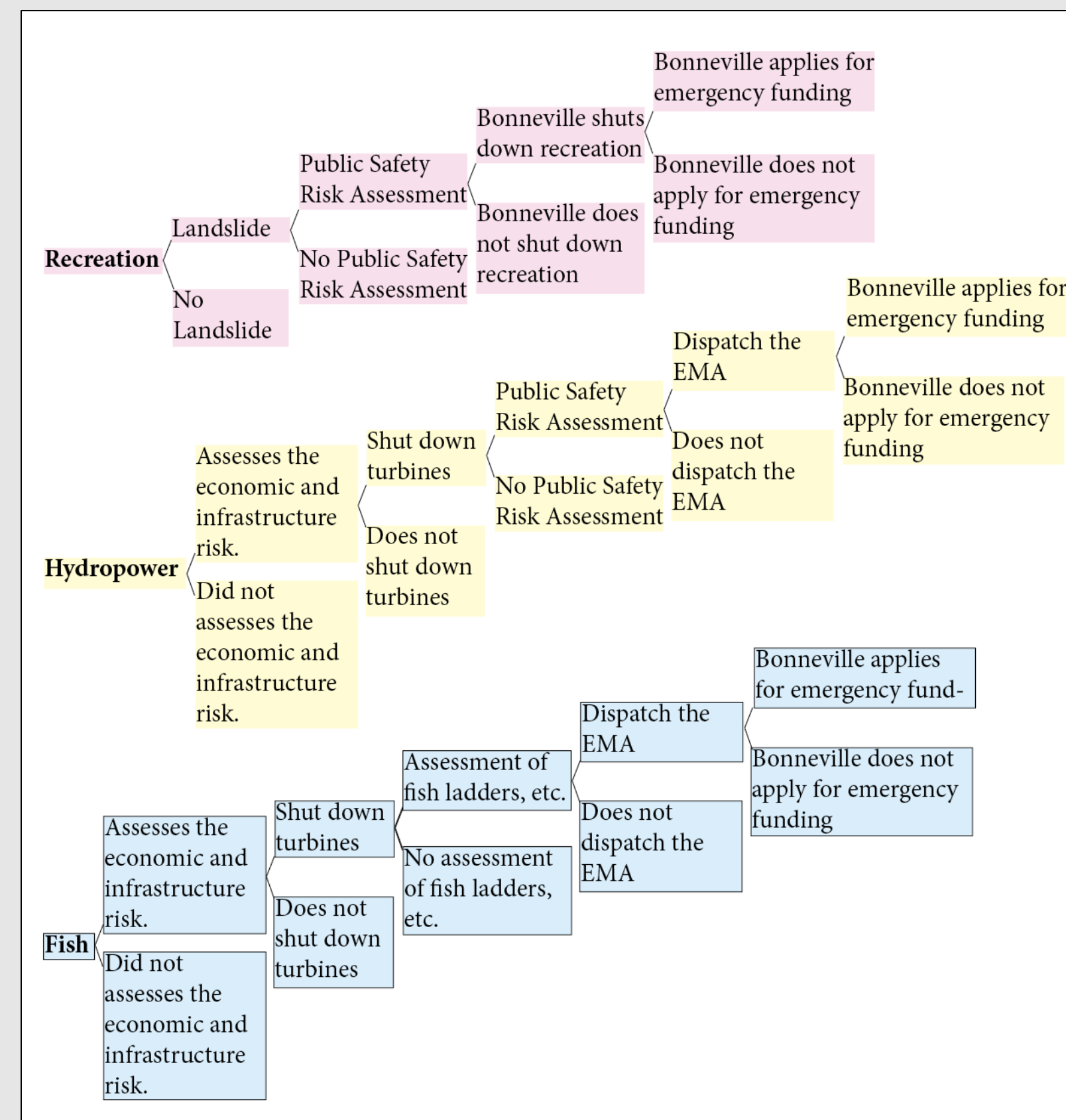
- The longevity of human structures and the evolution of their narratives
- Dams: symbols of humankind “taming nature” & embodiment of modernization
- Public image & infrastructure of dams has evolved throughout the 20th & 21st centuries
 - Impacts of dams on hydro-systems, species, and ecosystems widely known
- Societal change alters dams and their meanings; what about geologic change?

SITUATED CONTEXT

- Bonneville Dam:** run-of-the-river hydropower
- Function, structure, and purpose has adapted over time due to social and cultural change
 - World War II era vs. environmental concerns re: salmon have influenced hydropower, recreation, and fishery management
- Situated within Cascadian Subduction Zone
- Constructed prior to knowledge of large earthquakes
- Situated at the foot of historic Bonneville Landslide
- No Emergency Action Plan
- Only one dam in history has failed due to a seismic event

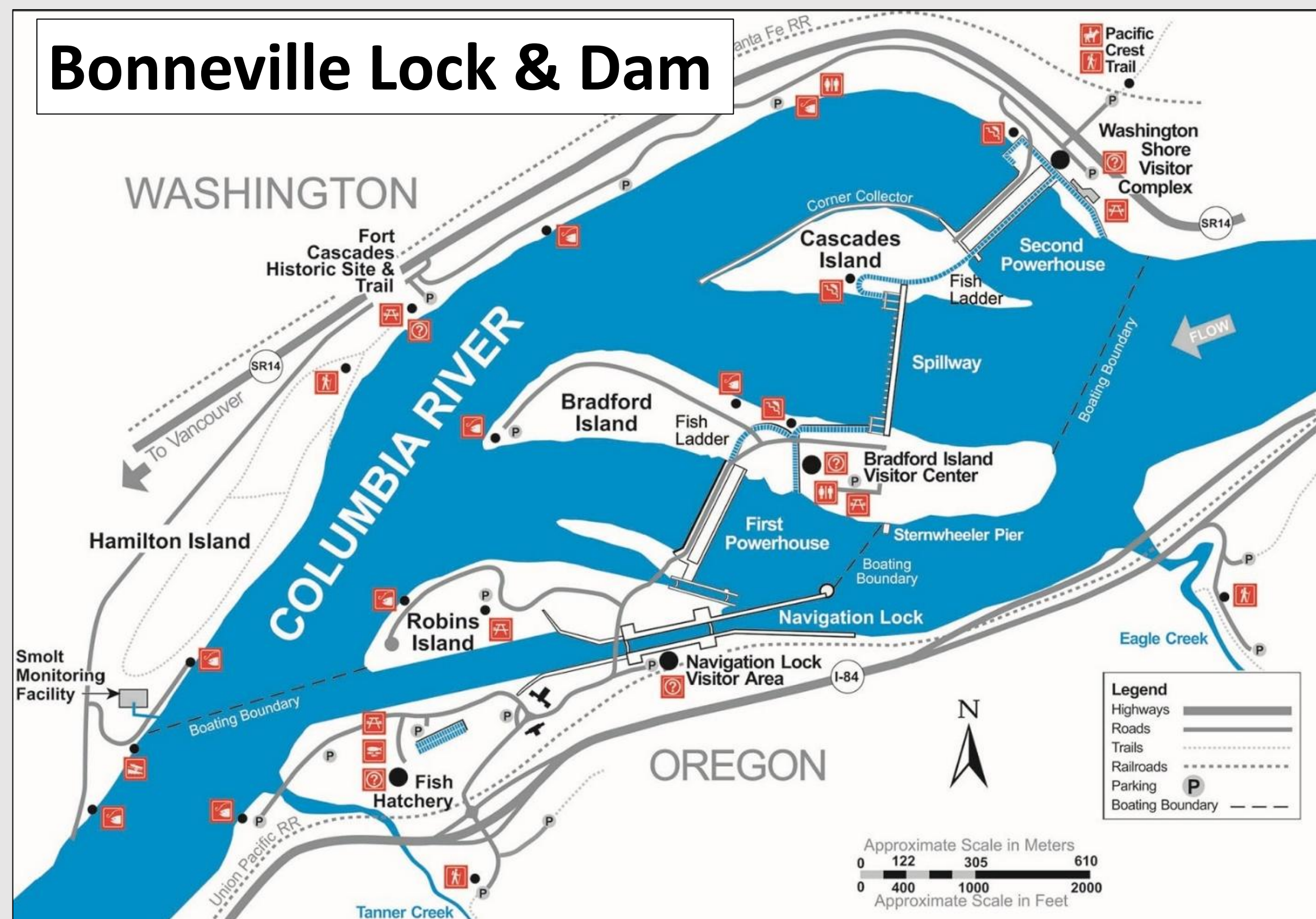
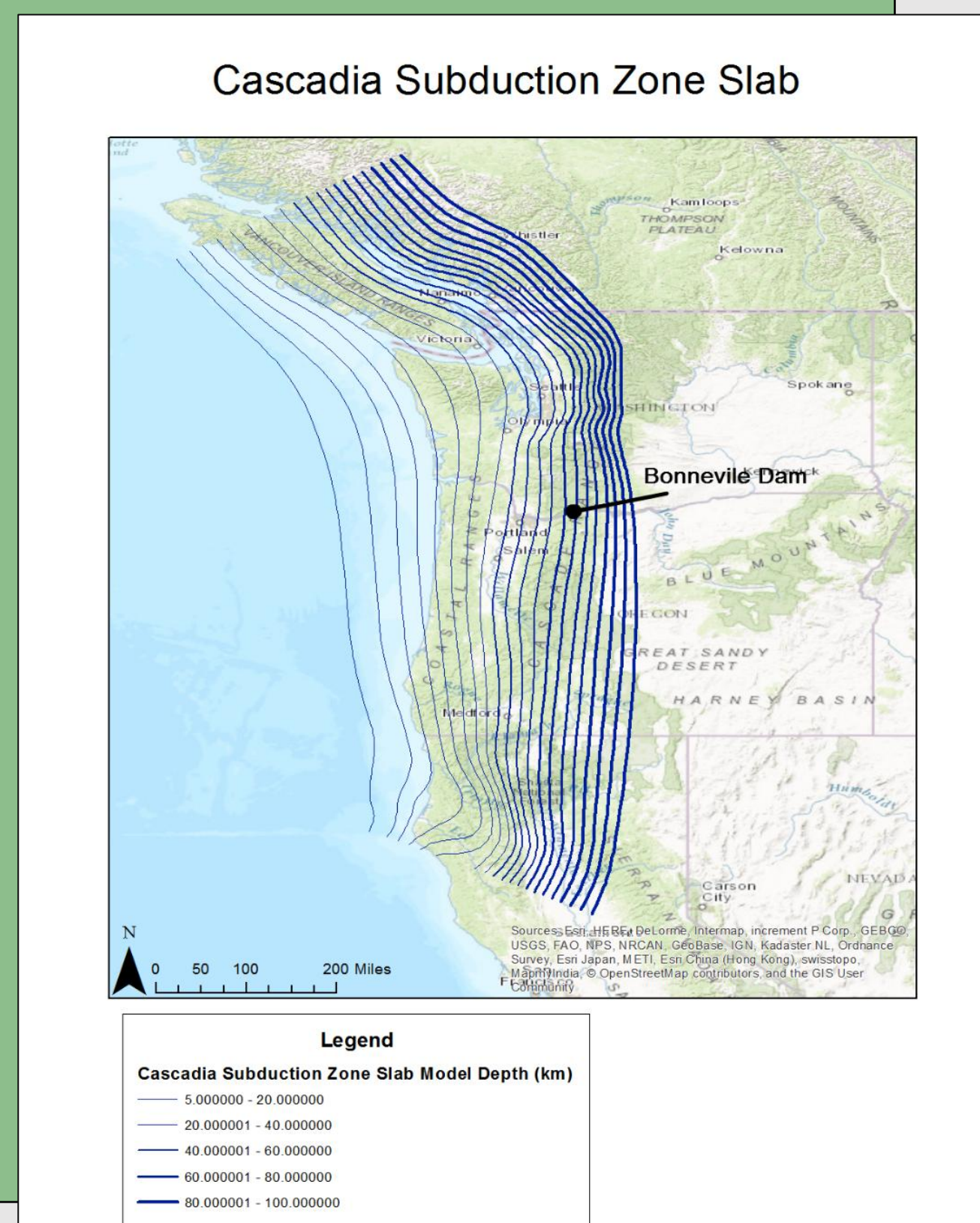
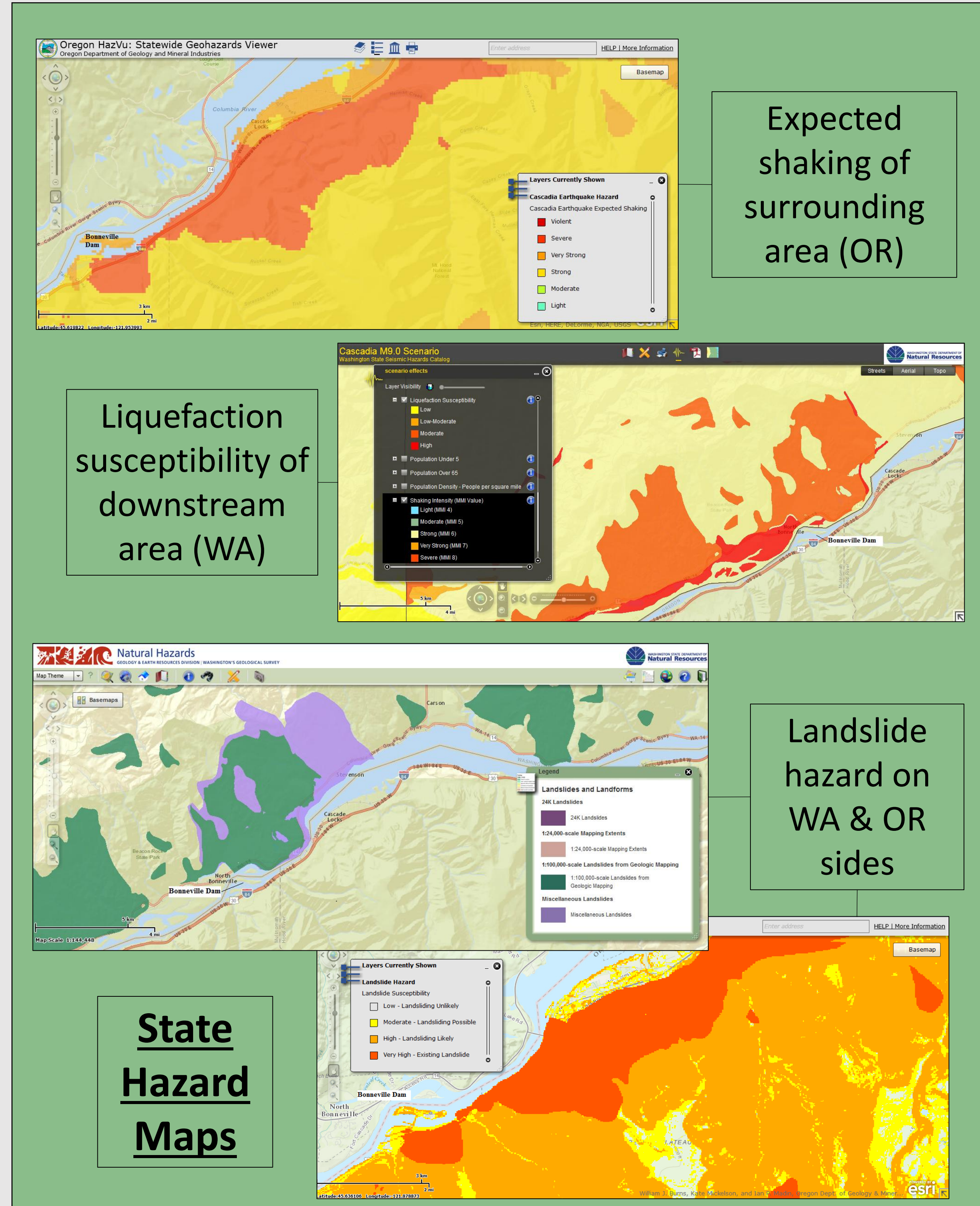
METHODS & RESULTS

- geologic hazard mapping from WA/OR state government
- chain of events analysis (FEMA)
- informal telephone interviews with key engineers and staff-persons



Event trees

- chain of decisions from disaster through resolution regarding
 - recreation
 - hydropower
 - fisheries



DISCUSSION

- Funding is reactionary not precautionary
 - Any alterations for earthquake safety will only happen after a disaster has occurred
 - Funding to Bonneville will be a lower priority than elsewhere
- Earthquake could effect access to recreation sites
- Earthquake could detriment fish rehabilitation program if no access or funding for repairs
- External Bonneville Power Administration infrastructure most at risk; regional power outages
- Lesson:** dams are part of larger systems & are managed in relation to context

Selected References

(1) Brand, Bruce, David Dollar, Luis Hernandez, Husein Hasan, Larry Nuss, Rex Rowell, and William Wallace. 2014. "Selecting Analytic Tools for Concrete Dams Address Key Events Along Potential Failure Mode Paths." P-1016. FEMA. (2) Galbraith, Kate. "Hydropower's Resurgence and the Controversy Around It." *New York Times*, May 15, 2011. Accessed March 29, 2016. (3) Kaika, Maria. "Dams as Symbols of Modernization: The Urbanization of Nature Between Geographical Imagination and Materiality." *Annals of the Association of American Geographers* 96, no. 2 (2006): 276-301. (4) Oregon Department of Geology and Mineral Industries (DOGAMI). <http://www.oregongeology.org/hazvu/>. (4) Oregon Government. Oregon Resilience Plan, Executive Summary. 2013. (5) Pringle, Patrick. "Bonneville Landslide," 2009. (6) Washington State Seismic Hazards Catalog. <https://fortress.wa.gov/dnr/protectiongis/seismicscenarios/index.html?config=cascadia.xml>.

For more information, please visit bit.ly/dam-babes

