Optimizing Barrier Culvert Removal in Washington State

1. Background

In 2001, Washington State was sued on behalf of 21 Northwest tribes for violating treaty fishing rights. The plaintiff argued that state-owned culverts are barriers to salmon and steelhead accessing historical upstream spawning habitat, violating the Stevens Treaties. The lawsuit resulted in a 2013 federal court injunction requiring the state remove barrier culverts under its jurisdiction by 2030. After nearly two decades of legal battles, in 2018, the U.S. Supreme Court ruled in favor of the tribes, upholding the 2013 federal injunction.

As of 2020, the Washington State Department of Transportation (WSDOT), responsible for the vast majority of state-owned culverts within the case area, has corrected 87 injunction barrier culverts opening up an estimated 383.3 miles of habitat at a cost of over $159 million. Since the ruling, WSDOT has replaced an average of 12.4 culverts per year, including 13 in 2020. To satisfy the federal injunction, the rate of culvert replacements must ramp up dramatically. Despite increasing investment in culvert improvement within the case area since the injunction, WSDOT still owns an estimated 998 culvert barriers in the case area as of the end of 2020, and will need to increase the rate of culvert improvement almost ten-fold to meet the 2030 deadline.

Importantly, the 2013 injunction strictly applies to state-owned culverts whereas there exist an estimated 3,000 and 1,300 additional barrier culverts owned by counties and cities respectively, along with barrier culverts on private lands, often on the same streams as state-owned culverts. Cities and counties are relatively resource constrained and depend on state and federal grant funds for barrier culvert removal and planning.

Currently WSDOT prioritizes barrier culverts for removal based on factors such as: amount of habitat blocked and habitat quality, tribal input, project cost, traffic detour management during construction, maintenance issues, partnership opportunities, the presence and number of ESA listed species, and permitting constraints. Counties, cities, and other actors have developed their own prioritization frameworks with limited resources and data to inform prioritization.

2. Project Summary

Our proposed research will develop a data-driven framework for project prioritization, within the injunction area of Washington state, that synthesizes multiple geospatial datasets with statistical economic and ecological models to identify restoration plans that maximize ecological, social, and economic objectives at a given funding level. Our framework will be used to assess the tradeoffs between key objectives including creating salmon habitat, an equitable distribution of habitat gains across tribes, and avoiding risk. We will also use the framework to analyze gains from coordinating barrier culvert replacement across key actors (the state, counties, and cities) and alternative funding streams. We will make the framework accessible to users through an online decision support tool (DST) similar to FISH*Pass* developed for California and Fishwerks developed for the Great Lakes. The tool has the potential to improve the benefits from current restoration decisions and provide a coordinating function to the various actors currently funding barrier removal projects in Washington state.