



**Project Duration**

2021 2025  
Phase 2



**Estimated Total Project Cost**

\$11.3 Million



**Funds Raised To Date**

\$9.4 Million



**Project Status**

Phase 2 Testing Underway



**Project Partners**

- Hood Canal Coordinating Council
- Port Gamble S'Klallam Tribe
- Washington Department of Fish and Wildlife
- National Oceanic and Atmospheric Administration
- Skokomish Indian Tribe
- Pacific Northwest National Laboratory
- Washington State Dept of Transportation
- U.S. Navy
- U.S. Fish and Wildlife Service



**Species Impacted**

- Salmon and steelhead
- Forage fish
- Harbor seals and killer whales



## How can we reduce the environmental impacts of a floating bridge?

**Purpose**

Phase 1 of the Hood Canal Bridge Ecosystem Impact Assessment investigated the causes of high fish mortality at the bridge and the extent of bridge impacts to water quality in this important canal with over 380 miles of freshwater steelhead habitat. In Phase 2, we are testing management actions to improve fish survival without compromising bridge functionality.

**Context**

Vital elements of Hood Canal’s natural ecosystem are at risk. Wild salmon — including Chinook, chum, and steelhead — are listed as threatened under the Endangered Species Act.

The Hood Canal Bridge spans the northern outlet of Hood Canal, connecting the Olympic and Kitsap peninsulas. As a floating bridge, its pontoons span 83% of the width of Hood Canal and extend 15 feet into the upper water layer.

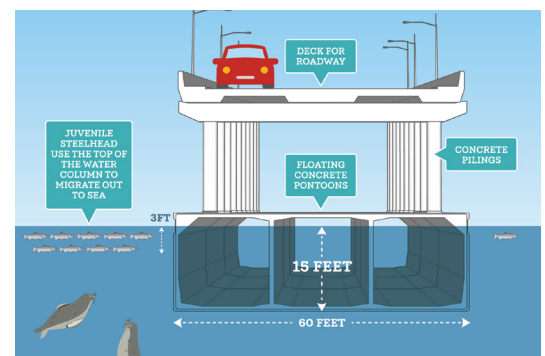
**Phase 1 Results**

Tracking data indicates that up to 50% of juvenile steelhead that make it to the bridge do not survive past it. Furthermore, water quality modeling shows that the bridge impacts temperature, salinity, and currents down to ~65 feet below the surface and 1¼ to 3 miles away from the bridge. This dual

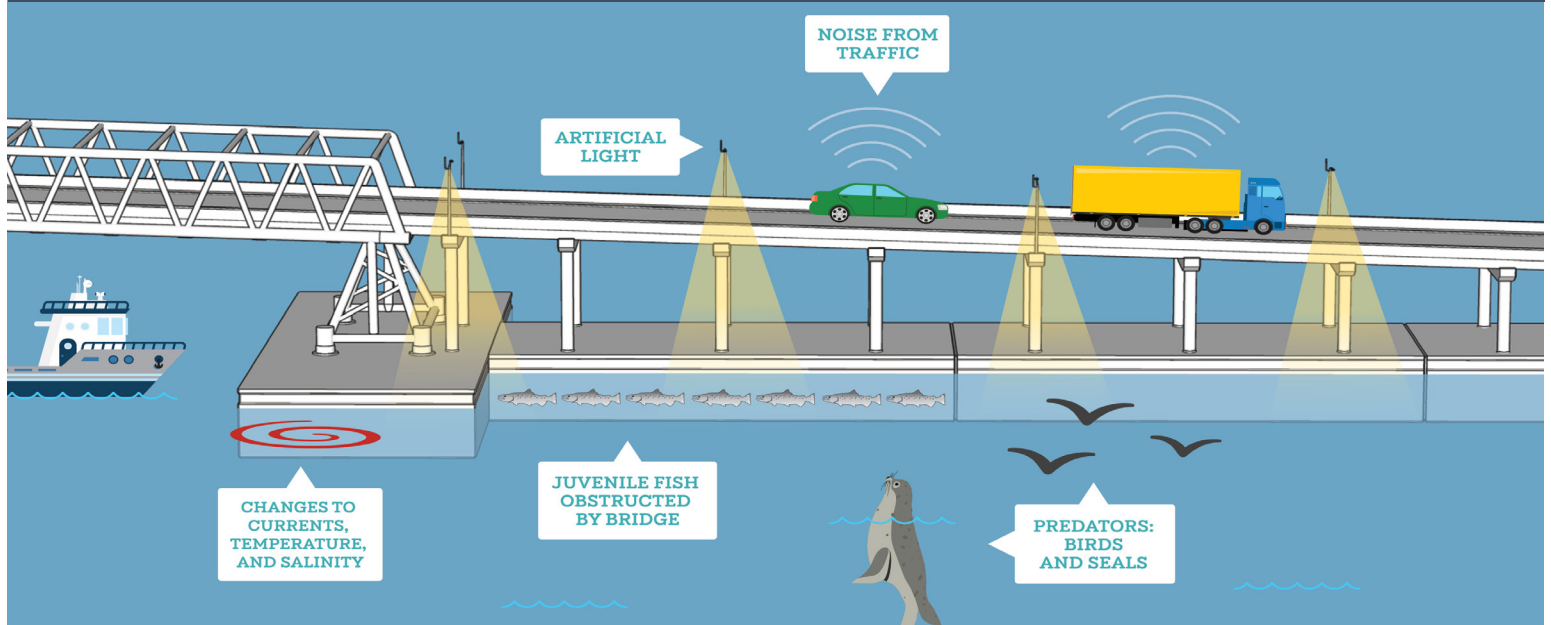
threat to fish and their ecosystem may be limiting the effectiveness of millions of dollars already spent recovering steelhead, salmon, and their habitat in Hood Canal.

**Does the bridge increase juvenile fish mortality?**

Most juvenile steelhead are swimming near the surface where the bridge creates an obstruction, increasing fish densities and making them more vulnerable to predators. Sensors in tagged fish implicate marine mammals as the primary predators. Light, shade, and noise from the bridge may lend an advantage to predators but do not appear to directly contribute to mortality. Furthermore, portions of the bridge appear to aggregate plankton, incentivizing Chinook, chum and forage fish to linger at the bridge and increasing their susceptibility to predation.



# Hood Canal Bridge Assessment



## The impact on water quality and circulation

Previous research suggested that the bridge may affect water quality throughout Hood Canal by limiting the exchange of water critical to the fjord’s health. Phase 1 collected water quality data near the bridge to refine existing models and quantify impacts to temperature, salinity, dissolved oxygen, nitrate, and algal biomass. Modeling efforts indicate water quality impacts near the bridge, but the assessment did not show significant canal-wide impacts. Additional research is needed to fully understand impacts to marine life near the bridge and predict effects under changing climate scenarios.

## Approach

The Hood Canal Bridge Assessment Team – a collaboration of federal, state, tribal, and non-profit partners coordinated

by Long Live the Kings – is working to pinpoint the causes of high mortality at the bridge and identify potential solutions. During Phase 2, the Team is working to develop, test, refine, and implement potential management actions to address impacts of the bridge without affecting its function as a major transportation corridor. Engineers have designed guidance structures (“fillets”) to reduce mortality in the pontoon corners (pictured below). Assessments in 2023 and 2024 will include experimental releases of tagged juvenile steelhead to estimate differences in survival past the bridge both with and without the structures in place. The team has also tracked adult salmon as they move past the bridge in Fall 2022 and 2023 to assess whether it may impact their return.

## Measures of Success

- Identifies impacts of the bridge on steelhead survival, salmon and forage fish distributions, and impacts to water quality in the Hood Canal ecosystem (Phase 1).
- Field-tests potential management actions and fills data gaps (Phase 2).
- Implements long term data-driven solutions that minimize or mitigate impacts to salmonids and the ecosystem (Phase 3).

## Phase 2 Cost: \$11.3 million (2021-2027)

The Washington State Legislature appropriated \$7.2 million, along with support from the Port Gamble S’Klallam Tribe, to develop and test the fillets. NOAA contributed \$100K to track adult salmon. We are seeking funding to expand research, improve and redeploy the fillets, and support a conceptual bridge redesign process.

## Phase 1 Cost: \$2.2 million (2016-2020)

Supporters included Salmon Recovery Funding Board, Port Gamble S’Klallam Tribe, NOAA, Hood Canal Coordinating Council, Laird Norton Family Foundation, Washington State Appropriation, and other federal sources.

