

Chapter 5 - Developing a strategic plan for Interstate 5 through the Nisqually River valley



The Nisqually River delta and Interstate 5 with Puget Sound in the background. I-5 traverses through the Nisqually River valley adjacent to the delta, important habitat for Endangered Species Act-listed Chinook salmon and steelhead.

In addition to transportation issues, the Legislature directed WSDOT to consider “ecosystem benefits to the Nisqually River estuary for salmon productivity and flood control” and develop “a strategic plan for the Nisqually River Bridges.”¹ The traditional home of the Nisqually Indian Tribe, the river and its delta provide critical habitat for Endangered Species Act-listed of Chinook salmon and steelhead. The river flows approximately 78 miles from its source at the Nisqually Glacier on Mount Rainier to its delta at the Billy Frank Jr. Nisqually National Wildlife Refuge, draining a 720 square mile watershed. This is the nation’s only river to begin in a National Park and end in a National Wildlife Refuge and the largest river flowing into Puget Sound south of the Tacoma Narrows Bridges. The Washington State Department of Fish and Wildlife (WDFW) ranked it as a high priority watershed² for production of Chinook salmon, an important food for the endangered southern resident Orcas³ and the Nisqually Indian Tribe’s treaty-secured rights to harvestable levels of salmon.

Significant funds have been invested to improve salmon habitat in the Nisqually River and its delta. The US Fish and Wildlife Service and the Nisqually Indian Tribe restored roughly 900 acres of the delta to tidal flooding from Puget Sound with the removal of the Brown Farm Dike. This was the largest tidal marsh restoration project in the Pacific

¹ Engrossed Substitute Senate Bill 6106; 2018 Regular Session Law; p. 46, lines 3-6; <http://lawfilesexternal.leg.wa.gov/biennium/2017-18/Pdf/Bills/Session%20Laws/Senate/6106-S.SL.pdf#page=47>

² WDFW – “Washington’s Orcas Are Hungry: Increasing the food supply for Southern Resident Killer Whales” <https://www.arcgis.com/apps/Cascade/index.html?appid=b7f52cd0c3cb44ecadb1e16d49fd04c3>

³ Office of the Governor – Orca Recovery Taskforce webpage <https://www.governor.wa.gov/issues/issues/energy-environment/southern-resident-orca-recovery>

Northwest and, with other projects, restored more than 21 miles of historic tidal slough systems and re-connected historic flood plains. The project increased potential salt marsh habitat in Puget Sound by 50 percent.⁴ Despite these investments, hurdles remain for restoring salmon habitat in the Nisqually River and its estuary.

I-5 experiences some traffic congestion through the Nisqually River valley

As discussed in Chapter Four of this report, the portion of I-5 going through the Nisqually Valley experiences congestion. Typical weekdays see slowdowns in the northbound direction during the morning peak. There is also recurring southbound congestion just north of the valley along I-5 starting at the Mounts Road interchange (exit 116 in the evenings. These slowdowns worsen at the height of travel season in the summer and expand, lasting for most of the day and into the evening peak commute period. While not considered in the study performance measures, extensive weekend congestion also occurs on this segment of northbound I-5 during the summer travel season.

WSDOT maintains I-5 pavement and bridges through the Nisqually Valley in fair or better condition

WSDOT has maintained the majority of this segment of I-5 in fair or better condition to serve the needs of

⁴ United States Fish and Wildlife Service – Nisqually Delta Restoration <http://www.nisquallydeltarestoration.org/>

the traveling public. As of the 2017-2019 biennium, roughly 96 percent of I-5 pavement is in fair or better condition according to the agency's statewide pavement management system dataset⁵ with 75 percent in good or better condition. There are eight bridges on the main line of I-5 through the Nisqually River valley. WSDOT inspects bridges every two years and all these bridges are in fair or better condition.

The northbound bridge over the Nisqually River was originally constructed in 1937 and refurbished with a new deck in 1982. WSDOT projects a remaining service life of 30-35 years for the bridge. However, the northbound bridge has a weight restriction for large freight loads due to the age and design of the structure.

The southbound bridge over the river was constructed in 1967 when I-5 was expanded through the region. To reduce costs, I-5 was put on fill through most of the Nisqually Valley, rather than on piers as originally constructed. The southbound bridge has an estimated 45-50 years of remaining service life. Both bridges have received preservation work over the years such as concrete deck overlays and repainting of steel structures to extend their service life.

Reduced sediment delivery to the Nisqually delta affects salmon recovery

One of the barriers to salmon recovery is reduced sediment delivery to the delta which occurs mainly due to the large impoundment behind Alder and La Grande dams. According to a study by USGS, roughly 90 percent of sediment is trapped in Alder Reservoir behind these dams.⁶ However, another study by USGS and the Nisqually Indian Tribe reports that of the sediment that is making it to I-5, only 10-15 percent is making it to the delta with most of the rest going out into Puget Sound. The same study estimates that due to this reduced sediment delivery and parts of the estuary having subsided while they were cut off from Puget Sound, recovery of a significant portion of the delta restoration could take up to 250 years.⁷ In a presentation made in February 2019, the Nisqually Indian Tribe's Natural Resources department outlined a belief that this is potentially due to the design of I-5 constraining where water can flow into the estuary.⁸

⁵ WSDOT – Pavement Condition online map <https://wsdot.maps.arcgis.com/home/item.html?id=f49a4724610548c693680fa745b0a44e>

⁶ USGS and Nisqually Indian Tribe Report "Suspended Sediment Delivery to Puget Sound from the Lower Nisqually River, Western Washington, July 2010-November 2011", page 1; <https://pubs.usgs.gov/sir/2016/5062/sir20165062.pdf#page=9>

⁷ USGS ESRP Learning Project Annual Progress Report: Restoring Sediment Supply to Sustain Delta Marsh, Nisqually Delta, Washington: Annual Report Year 1; Grossman E., Stevens A., & Curran C.; Not yet Published

⁸ Nisqually Indian Tribe Natural Resources Department presentation to Thurston League of Women Voters; February 17, 2019; https://www.youtube.com/watch?v=-FLfl_x5nF8

WSDOT helping to fund study of Nisqually River near I-5 Bridges

WSDOT provided \$150,000 to help the Nisqually Indian Tribe and USGS complete a study of the Nisqually River's hydrology near I-5. The study will provide information on risks to I-5 from changes in the river channel, productivity of habitat in the delta, the effect of sea-level rise and I-5's location on transitional habitat from fresh water to saltwater, and potential for major flooding with changing climate factors. Results from this study will help inform WSDOT's long-term strategies for I-5 through the Nisqually delta. WSDOT is expecting results in summer 2020.



The Nisqually River delta at I-5 when the river was flowing at about 20,000 cubic feet per second and roughly 12 feet gauge height during a flood event in February 2020. This was just below a moderate-level flood event. The record flood from 1996 hit 17.13 feet of gauge height. Photo courtesy of the Nisqually Indian Tribe.

The ability of water to flow into the estuary during flooding also has potential implications for sediment delivery to the estuary. According to the USGS and Nisqually Indian Tribe study of sediment delivery, 36 percent of sediment that was delivered to Puget Sound by the Nisqually River was transported during two days of peak high-water events.

There are four main locations where water can flow past I-5 into the Nisqually River delta

Water can flow past I-5 through the Nisqually River Valley at four locations: the bridges over the main stem of the Nisqually River; over the wetlands east of the river; over an overflow channel at the interchange with Martin Way and Nisqually Cutoff Road (Exit 114); and the bridges over McAllister Creek. Before I-5 was built on fill, water and sediment could move more freely past the highway and into the delta. Other development and roads upstream of I-5 in the valley also affect where water can flow.

Major to moderate flooding has occurred on the Nisqually River in six of the last 30 years.⁹ While major flood stage is 14 feet, in 1996 the river hit a record flood of 17.13 feet flooding roughly 12,000 acres of private land upstream of I-5. These properties remained flooded even after the Nisqually River and McAllister Creek had receded under “bankfull” volumes. In their February 2019 presentation, the Nisqually Indian Tribe’s Natural Resources department stated a belief that this is evidence that floodwaters were not being effectively moved past I-5. According to TRPC’s Hazard Mitigation Plan, the February 1996 flood cost uninsured private property owners in Thurston County losses of more than \$22 million. The plan further states that “floods in Thurston County are common, and on an annual average basis, are the costliest natural hazard.” The most recent flood, pictured above, crested at about 12 feet, only reaching minor flood stage.



An adult Pink salmon migrating up the Nisqually River to spawn. Salmon are anadromous, meaning they are born in fresh water and migrate to sea. Out-migrating juveniles use habitat where fresh and saltwater meet while their kidneys reverse function, which is essential for their ability to survive at sea. Photo courtesy of the Nisqually River Council.

As sea levels rise, salmon habitat transition between fresh water and salt water may be reduced

Another potential issue for salmon recovery in the Nisqually River is loss of habitat for young salmonids to transition between fresh and salt water due to rising sea levels. As sea levels continue to rise, the wedge of saltwater that intrudes into the delta twice a day will reach farther up the delta. In their February 2019 presentation,

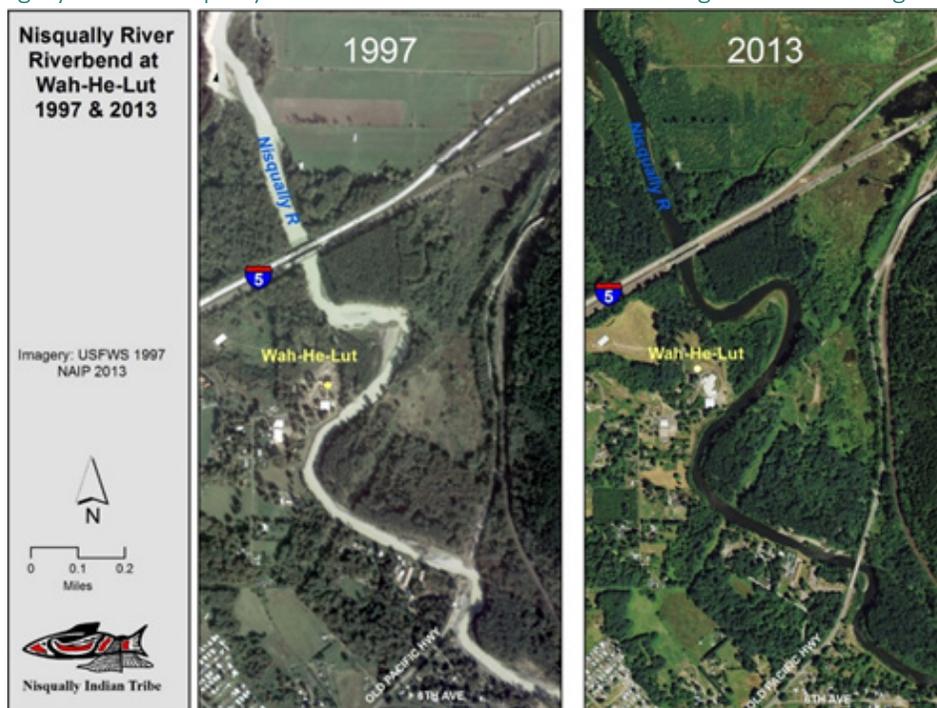
⁹ Thurston Regional Planning Council Hazard Mitigation Plan, Chapter 4.3 Flood Hazard Profile; https://www.trpc.org/DocumentCenter/View/4173/HazMit_Ch4-3_Flood?bidid=

the Nisqually Indian Tribe’s Natural Resources department outlined a belief that the location of I-5 in through the river valley may restrict where fresh water and salt water mix, making the gradient from fresh water to salt water more extreme which could impact survival of young salmon migrating out to sea.

The Nisqually River’s channel just upstream I-5 has been slowly migrating

Over time, rivers running through low-lying areas meander, changing their course year to year by varying degrees. This is especially common in high-gradient rivers in wet places such as western Washington. Exhibit 5-1 shows that the Nisqually River channel has been changing its course just

Exhibit 5-1: Aerial imagery of the Nisqually River at I-5 in 1997 and 2013 showing the channel migration



The photos above from the US Fish and Wildlife Service and National Agriculture Imagery Program (provided by the Nisqually Indian Tribe Department of Natural Resources) show the developing bend in the river just upstream (south) of the I-5 bridges in 1997 and 2013. As can be seen, the bend extended further northeast toward I-5 and a wetland complex.

upstream of the I-5 bridges crossing the main stem of the river, slowly forming a long bend. The Nisqually Indian Tribe in partnership with USGS is assessing how the channel will continue to migrate, what level of peak flows are likely to cause the channel to move, and potential risks to I-5.

In their February 2019 presentation, the Nisqually Indian Tribe's Department of Natural Resources stated a concern that a single major flood event like the one in 1996 could remove enough trees and vegetation in the riparian forest between the river and the highway to undermine the section of I-5 on fill between the Nisqually River Bridges and the bridges over the wetland complex. Such an event would cause significant disruptions in the supply chain because trucks would be re-routed on less direct routes. It could also affect access and operations for JBLM. The channel migration study, when completed, should provide more information regarding the potential for flooding to move the river bend.

Addressing the Nisqually River Bridges strategic plan requirement

The legislature articulated that the study include "...a strategic plan for the Nisqually River Bridges..." However, as of the date of this report, the study team can only make recommendations based on the information available, which is largely focused on transportation. As discussed on page 5-2, WSDOT is helping fund a study, led by the Nisqually Indian Tribe and USGS, of the current and expected future states of the Nisqually River and its delta near I-5 and any risks posed to I-5 from the river. WSDOT expects results by summer 2020, which will provide this critical environmental data.

From a transportation perspective, modeling for this study projects a significant bottleneck occurring by 2040 just

north of the bridges on I-5 at Mounts Road. Otherwise, WSDOT considers the bridges to have significant service life left and are in fair or better condition, notwithstanding the load restriction on the northbound bridge over the river. However, these bridges are part of a larger picture of the configuration of I-5 across the Nisqually delta. The biggest potential factor is the unknown risk to I-5 from the migration of the Nisqually River's channel just upstream of the bridges. Given the current lack of environmental data, the study team developed the following recommendations for a strategic approach:

- All recommendations from this study regarding transportation system needs and improvement strategies should be considered provisional until the Nisqually Indian Tribe/USGS study is completed to provide a more complete picture of risks posed to I-5 and the environmental impacts of the facility on the river and delta.
- If any alteration to I-5 through the Nisqually River valley occurs, it is recommended that salmon productivity, flood control, and other environmental considerations be incorporated into the design as contextual needs rather than as mitigation for construction impacts.
- If replacing I-5 through the Nisqually Valley is funded for environmental reasons, it is recommended that the design 1) allow for future widening, called forward compatibility, to alleviate the anticipated southbound chokepoint at Mounts Road and 2) address the active transportation gap between Thurston and Pierce counties.
- Regardless, it is recommended that all partners continue to develop interim solutions to help address salmon productivity and flood protection concerns.



The Nisqually River and I-5 Bridges looking south. The bend in the river just upstream of the bridges is partly visible in the background.