

# 2016 State of Our Watersheds Report

## Lummi Watershed



*Our elders used to tell us salmon is good medicine. It's part of our schelangen – our way of life. Now the salmon is in trouble, so our way of life is in trouble.*

**– MERLE JEFFERSON SR.  
LUMMI NATION**



## Lummi Nation

The Lummi people were among the original inhabitants of what is now Washington's northernmost coast and southern British Columbia. For thousands of years, they have worked, struggled and celebrated life on the shores and waters of Puget Sound. The Lummi Nation is a self-governing sovereign nation within the United States and one of the largest tribes in Washington state with more than 5,000 members. The Lummi Nation has the largest fishing fleet of all tribal nations in the United States.

# Degraded Habitat Limits Salmon Recovery



Kari Neumeier, NWIFC

The Lummi Natural Resources Department reconnects tidal channels to restore wetlands that will provide essential rearing habitat for juvenile salmon along Smugglers Slough.

The Nooksack River watershed, which comprises approximately 786 square miles, is the largest drainage in Water Resource Inventory Area (WRIA) 1. Located in northwestern Washington, the watershed encompasses most of northern and western Whatcom County, part of Skagit County, and extends into British Columbia. The Nooksack River watershed has remained largely rural and has one of the higher quality estuaries in Puget Sound.<sup>1</sup>

Since the mid-1800s, salmonid habitat has been severely degraded by forestry and agriculture practices that constitute the primary land uses within the basin. Nearly all of the lower mainstem and delta forests had been converted to agricultural land by the 1930s. Since 1950, land-use conversion has been primarily for commercial, residential, municipal and industrial development.

Water quality and quantity continue to be impacted by forestry and agricultural practices, along with the population growth now being experienced within the watershed. Whatcom County's population was estimated at 212,000 people in 2015, and projected to grow to 273,000 people by 2036,<sup>2,3</sup> which presents a substantial threat to salmon recovery and shellfish habitat protection efforts.

## Habitat is Limiting Salmonid Production in WRIA 1

Technical analyses identified seven significant habitat limiting factors for salmonid production from the Nooksack River watershed:

1. Channel instability in the unconfined portions of the three forks and the upper mainstem;
2. Increased sediment loading from natural and human causes, and how that sediment is transported through the system;
3. Loss of habitat diversity associated with the loss of large in-channel wood, disconnection of the channel from the floodplain due to channel incision or flood control, simplification of bank condition through bank hardening, loss of channel sinuosity and associated channel length and habitat quantity through channelization, and debris flows and frequent channel shifting;
4. Bank armoring mostly in the South Fork Nooksack River and mainstem Nooksack River that constrain the river and eliminate side channels where fish rear and could seek refuge during floods;
5. Fish passage barriers that impeded access to upstream habitats;
6. Changes in river flow and temperature due to land-use practices and climate change; and
7. Changes along the marine shoreline in Bellingham Bay and adjacent in nearshore areas.<sup>4</sup>

## Steps to Restore Harvestable Populations

The identified goal for WRIA 1 is to recover self-sustaining salmon runs to harvestable levels that will sustainably support fisheries and a culture centered on salmon harvests. In establishing this goal, the WRIA 1 Salmonid Recovery Board acknowledged that this will require protecting existing good habitat and natural stream processes and maintaining critical salmon habitat while restoring degraded salmon habitat. This is to be achieved by guiding the majority of future development into designated urban growth areas and managing rural growth so there are minimal impacts to current habitat conditions.

The overall WRIA 1 habitat recovery approach was structured into seven key strategies:

1. Remove significant barriers to high-quality habitat;
2. Restore habitat in the forks, mainstem and major tributaries;
3. Ensure floodplain management protects and enhances fish habitat;
4. Protect good habitat through local Critical Areas Ordinances and Shoreline Management Programs administered by Whatcom County;
5. Protect and improve instream water flows for fish;
6. Identify priority estuaries and nearshore areas for protection and restoration; and
7. Restore conditions in lowland tributaries and independent tributaries to the Fraser River and Strait of Georgia.<sup>5</sup>

# Recovery Efforts Show Signs of Improvement but Still Lagging in Key Indicators

At the 10-year mark of the Puget Sound Salmon Recovery Plan, a review of key environmental indicators for the Nooksack basin shows improvements for barrier removal, mixed results for riparian and floodplain processes, and degradation of water quantity and quality. In general, there is a shortage of agency staff at all levels (e.g., federal, state, tribal, county, cities) needed to address the issues and implement actions to restore and protect habitat and

to monitor and enforce compliance of existing regulations. In addition, funding shortfalls for large-scale projects contribute to the slow pace of progress.

A review of the trend for these key environmental indicators since the 2012 State of Our Watersheds Report shows improvement for some indicators and a steady loss for others in habitat status:

Tribal Indicator	Status	Trend Since SOW 2012 Report
Water Quality - Shellfish	In September 2014, in order to protect public health and safety, the Lummi Nation, in consultation with the Washington Department of Health, voluntarily closed 335 acres of shellfish growing area in Portage Bay when the National Shellfish Sanitation Program (NSSP) standards were not achieved at several water quality monitoring stations. After poor water quality was measured over the Portage Bay shellfish growing area during November 2014, additional water quality monitoring stations failed to meet the NSSP standards, resulting in the Lummi Nation and the Washington State Department of Health needing to conditionally close a total of 496 acres. The conditional closure classification prohibits shellfish harvest from the affected areas from April 1 through June 30, and from October 1 through December 31. Water quality over the Portage Bay shellfish growing area continued to be degraded during 2015, causing an additional station to fail the NSSP standards and resulting in the conditional closure of 324 additional acres for a total closure area of 820 acres.	Declining
Water Wells	Between 2008 and 2014, WAECY estimates that 565 new permit-exempt wells were drilled in Whatcom County (coincident with most of WRIA 1). Approximately 72% of all wells in WRIA 1 are in basins either seasonally closed or closed year-round to water withdrawal due to instream flow levels that are less than the minimum flows established in 1985.	Concerns
Forest Roads	About 90% (1,277 miles out of 1,426 total miles) of private and state-owned forest roads have been repaired or abandoned in the Upper Nooksack River watershed. About 95% (125 of 132 culverts) on private and state-owned forest roads have been repaired or abandoned.	Improving
Floodplain - Wetlands	The WRIA 1 Salmonid Recovery Plan recommends a return to historical wetland conditions in the lower mainstem floodplain of the Nooksack River. Based on the most recent comprehensive wetland study of the lower mainstem floodplain of the Nooksack River, in 1880 there were 4,754 acres of wetlands within the Nooksack River floodplain, and by 1998 wetlands had been reduced to less than 10% of that historical area. There has been little change in floodplain wetland area since the late 1990s. There was an estimated 1.5% loss of wetland area in the floodplain between 1996 and 2006, and no further loss between 2006 and 2011.	Declining
Restoration - Estuary	The Lummi Nation has been working since the 1990s to improve estuarine habitat in the Nooksack River and Lummi River deltas. The Lummi Nation's Wetland and Habitat Mitigation Bank, which is the first tribal wetland mitigation bank in the United States, became operational in 2012. The mitigation bank is located immediately adjacent to a large restoration project known as the Smugglers Slough Restoration Project. Together, these two projects will permanently protect and restore nearly 3,000 acres of estuarine habitat in the Nooksack and Lummi River deltas.	Improving
Large Woody Debris	Engineered logjams are being consistently funded, placed and monitored throughout the North, Middle and South forks of the Nooksack River. This has resulted in an increase in density of instream wood since 2005.	Improving

The Lummi Nation continues to work toward the protection and restoration of healthy and functional nearshore, estuarine and river habitat. These efforts include establishing conservation easements to protect these habitat types, restoring those areas that are degraded, and conducting research to better understand the organisms and the habitats they occupy.

Low summer flows on the Nooksack River continue to degrade salmonid spawning and rearing habitat through loss of habitat connectivity, reduced habitat volume, stranding of juveniles and higher stream temperatures. Climate change is predicted to increase the duration and frequency of these low summer instream flows.

The WRIA 1 watershed instream flow rules were adopted in

1985 to “protect and preserve” instream resources from low flow exceedances. One of the primary human causes of salmon-limiting streamflows in the lower Nooksack basin is agricultural irrigation combined with the continued ditching and draining of wetland areas that removes the natural storage of winter precipitation from the landscape. Extensive agricultural drainage activity bypasses storage in the system and moves water off the landscape during the spring months. As a result, water is not in the system during the summer months to maintain instream flows; these conditions are made worse by the large number of irrigation diversions during the summer months.

# Looking Ahead

WRIA 1 and Whatcom County have seen great economic progress since the late 19th century, but not without environmental costs. Water quality and quantity continue to decline, the large-scale loss of floodplain forest associated with flood protection for municipalities and agriculture persists, and the quality and quantity of fish and wildlife habitat continue to be degraded. To change these trends will require more than just site-scale restoration of fish and wildlife habitat; it will require a full integration of environmental costs into future land-use and economic planning. For site-scale habitat restoration to succeed, overall watershed health must also be restored – everything is connected.

The regulatory approach within WRIA 1 varies among jurisdictions, but overall the goal is to implement, adapt and enforce compliance of existing regulations for the protection and restoration of salmonid and shellfish habitat. It is recognized that integrating incentives and other non-regulatory approaches within existing regulatory programs may improve compliance (i.e., use incentives to promote protection and restoration, apply penalties to discourage degradation). For this approach to be successful, the accompanying regulatory framework must protect the existing habitat from degradation as improvements in habitat quality and quantity are realized through voluntary effort and directed capital enhancement projects. This is not occurring within WRIA 1 as salmon and shellfish habitat quality and quantity continue to decline due to a general lack of a credible compliance enforcement presence within the watershed. Regulatory reform is required as the current framework clearly is not providing adequate protection.

Implementation of the WRIA 1 Salmonid Recovery Plan is lagging behind the pace originally anticipated during plan development. Restoration work has progressed with numerous capital projects focused on restoring fish habitat and passage. However, WRIA 1 has faced significant funding shortages for restoration projects, limiting implementation progress. Progress also has lagged on implementing the regulatory and incentive programs to protect and restore salmonid habitat and habitat forming pro-



Kari Neumeyer, NWIFC

A Lummi Nation crew plants trees to help enhance riparian habitat along the Nooksack River as part of the first federally backed tribal wetland and habitat mitigation bank.

cesses.

During 2014 the Lummi Nation launched a water rights settlement initiative composed of five elements: Instream Flow, Fish Habitat Restoration, Water Quality, Water Supply for Out of Stream Uses (tribal and non-tribal), and Accountability. This comprehensive initiative was introduced to key players within WRIA 1 during 2014-2015 and is being further developed in conjunction with the state of Washington and others. Although all of the parties acknowledge that the “devil is in the details,” the primary concepts and goals of this initiative have been well received. The Lummi Nation goal is to reach a settlement agreement by July 2017 with the realization that the subsequent court filings to make the agreement permanent and binding would follow.

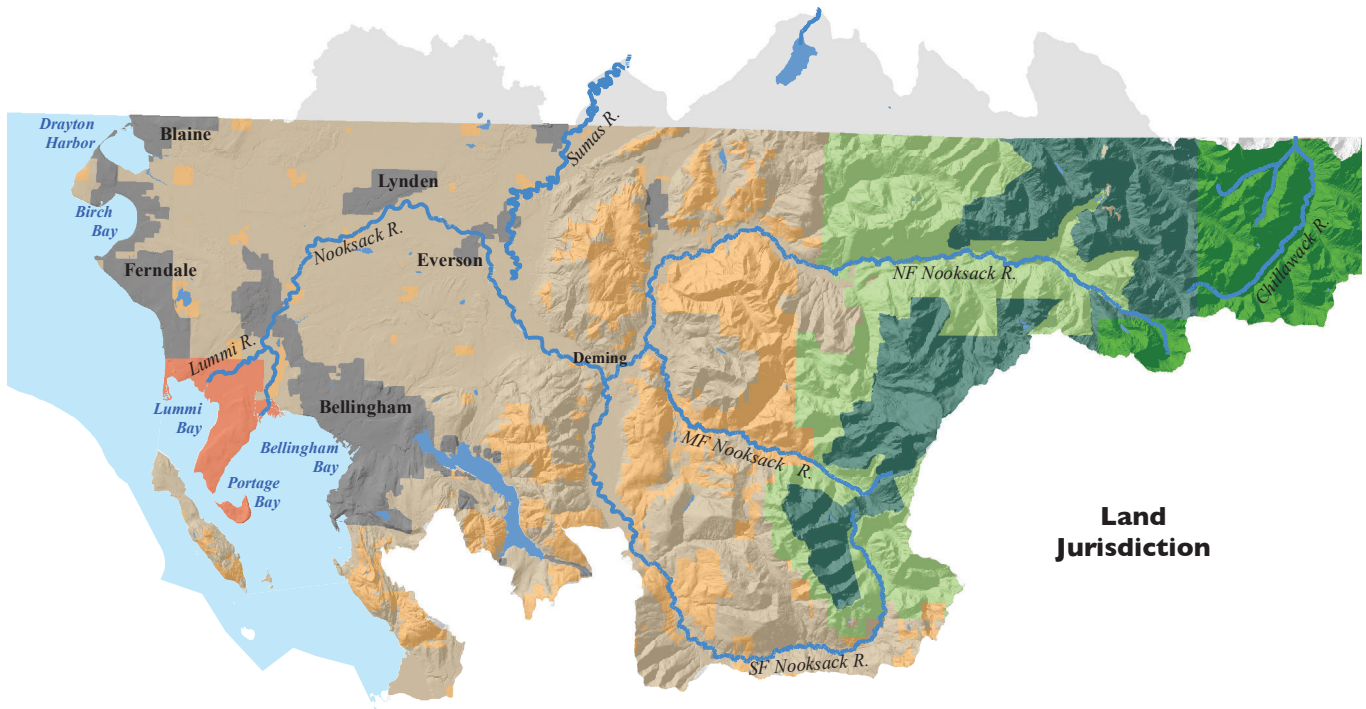
If the Lummi Nation water rights settlement initiative is successful, specific milestones for achieving instream flows, fish habitat restoration, existing water quality standards, and alternative water supply sources for out-of-stream uses will be established. The accountability element of

the settlement proposal is intended to provide an economic incentive for the affected parties to perform. If a milestone is not achieved, an economic penalty or fee will be assessed and this penalty will increase based on the extent and duration that a milestone is not achieved.

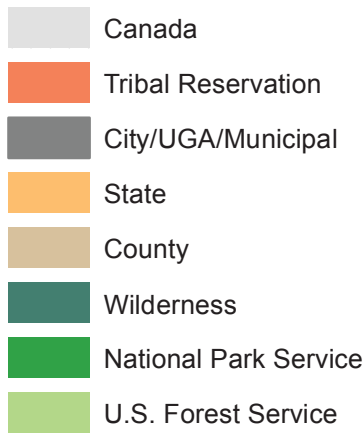
This water rights settlement initiative development effort, along with the continued development and implementation of salmon habitat restoration projects within the Nooksack River watershed, the Lummi Nation Wetland and Habitat Mitigation Bank, the deployment of advanced technologies to better characterize variations in pollutant loading that affect shellfish beds, the continued and enhanced collection and analysis of environmental variables (biological and physical), and the continued engagement in regional and local natural resources management efforts are intended to recover salmon and shellfish to the harvest levels enjoyed by the Lummi Nation as recently as 1985. All of these efforts are part of a broader effort to preserve, promote, and protect the Lummi *Schelangen* (“way of life”) into perpetuity.

# Lummi Nation

## WRIA 1: Mountains to the Sea



**Land Jurisdiction**

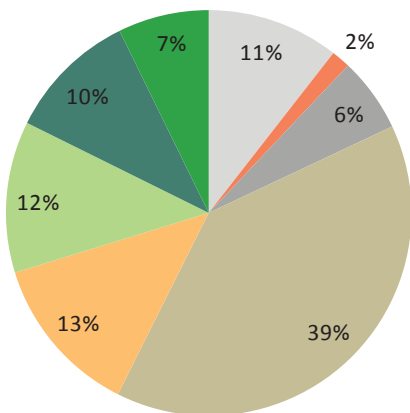


The Lummi are an aboriginal people who have fished, hunted and gathered throughout their Usual and Accustomed grounds and stations and their traditional territories since time immemorial. Living in a region with many resources, the Lummis developed vibrant communities and a rich culture. The Lummi Indian Reservation is located along the marine shorelines of the Salish Sea and includes the deltas and estuaries of the Nooksack and Lummi rivers.

The Nooksack River watershed is 786 square miles, the largest drainage in WRIA 1, and the fourth largest drainage in Puget Sound. The Nooksack River has three main tributaries: the North Fork, Middle Fork and South Fork Nooksack rivers that originate in the steep high-elevation headwaters of the North Cascades and flow westerly descending into the flats of the Puget lowlands. The North and Middle Forks are glacier-dominated rivers and originate from Mount Baker. The South Fork is a snow- and rain-fed river and originates from the non-glaciated slopes of the Twin Sisters peaks. The Middle Fork flows into the North Fork upstream of the North Fork

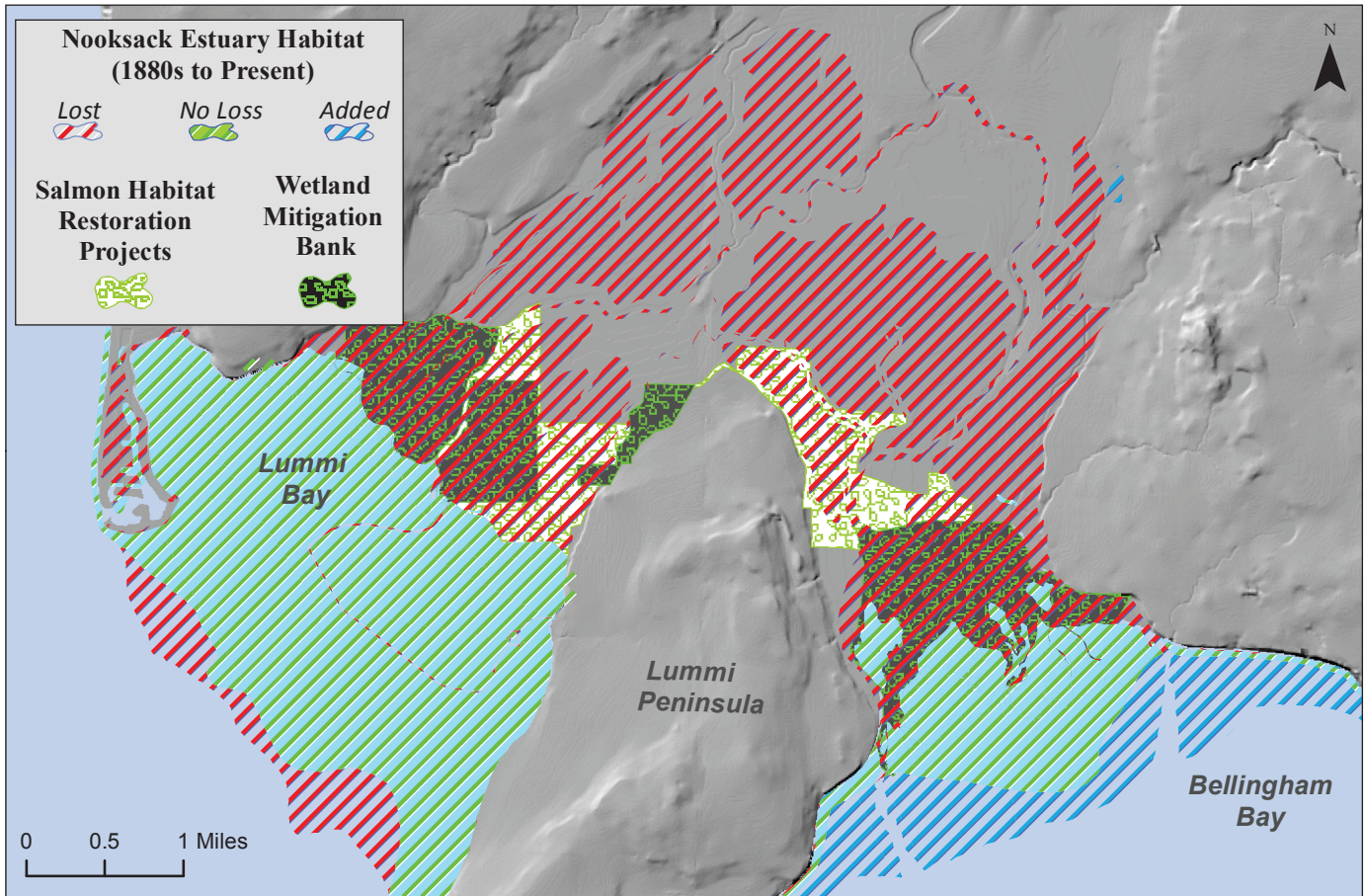
and South Fork confluence, which marks the upstream extent of the mainstem Nooksack River. The mainstem then flows as a low-gradient, low-elevation river until discharging through the Lummi Indian Reservation and into Bellingham Bay. Historically (prior to 1860), the Nooksack River alternated between flowing into Bellingham Bay and flowing through the Lummi River and into Lummi Bay. The Nooksack River and independent watersheds (WRIA 1) have five species of anadromous salmon: pink, chum, Chinook, coho and sockeye; and three species of anadromous trout: steelhead, cutthroat and bull trout.<sup>1,2</sup>

Euro-Americans began settling the area in the 1850s primarily for the logging resources, with some arriving for opportunities in prairie farming and mining. Lowland clearing for agriculture began in earnest by the 1890s. By 1925, nearly all of the lower mainstem and delta forests had been converted to agricultural land.<sup>3,4</sup> Since 1950, land-use conversion has been primarily for commercial, residential, municipal and industrial development.<sup>5</sup>



Data Sources: SSHIP 2004,<sup>6</sup> WADNR 2014a,<sup>7</sup> WADNR 2014b,<sup>8</sup> WADOT 2013,<sup>9</sup> WAECY 1994,<sup>3</sup> WAECY 2011a,<sup>10</sup> WAECY 2013a<sup>12</sup>

# Lummi Nation Committed to Protecting and Enhancing Tidal Wetlands in the Nooksack and Lummi River Deltas

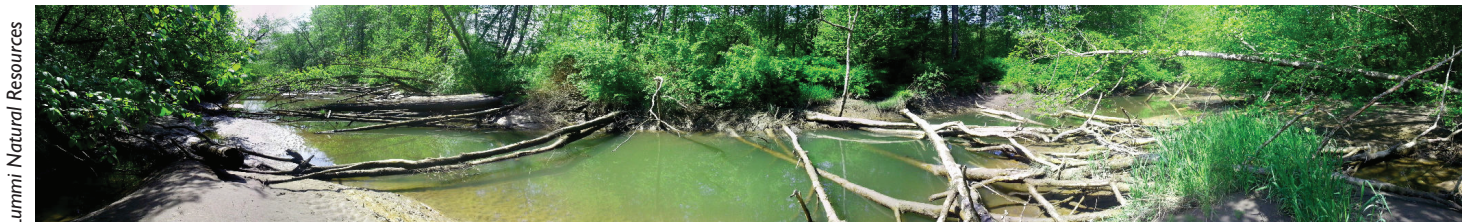


While historic tidal wetland areas have been lost in the Lummi River delta, the Nooksack delta area and associated estuary continue to grow. Through a large-scale salmon habitat restoration project and the wetland and habitat mitigation bank, the Lummi Nation is protecting and restoring large tracts of estuarine wetlands.

Over the 1926-1934 period, a sea wall was constructed along Lummi Bay, a levee constructed along the Lummi River and the west side of the Nooksack River, and drainage installed to develop agricultural lands on the Lummi Indian Reservation. This reclamation project significantly reduced historic sub-aerial estuarine habitat.<sup>1</sup> Since then, sediment deposition throughout the Nooksack River delta has expanded historic intertidal estuarine habitat along Bellingham Bay. According to the WRIA 1 Salmonid Recovery Plan, the Nooksack River estuary is presently one of the healthiest and most pristine in Puget Sound. Considering the healthy state of the Nooksack River estuary, the WRIA 1 Salmonid

Recovery Plan recommends continued protection and strategic restoration of the estuary.<sup>2</sup>

The Lummi Nation has been working since the 1990s to improve estuarine habitat in the Nooksack River and Lummi River deltas. The Lummi Nation’s Wetland and Habitat Mitigation Bank – the first tribal wetland mitigation bank in the United States – became operational in 2012. The mitigation bank is located immediately adjacent to a large salmon habitat restoration project known as the Smugglers Slough Restoration Project. Together, these two projects will permanently protect and restore nearly 3,000 acres of estuarine habitat in the Nooksack and Lummi River deltas.



Large woody debris and floodplain forests inside the Lummi Nation Wetland and Habitat Mitigation Bank.

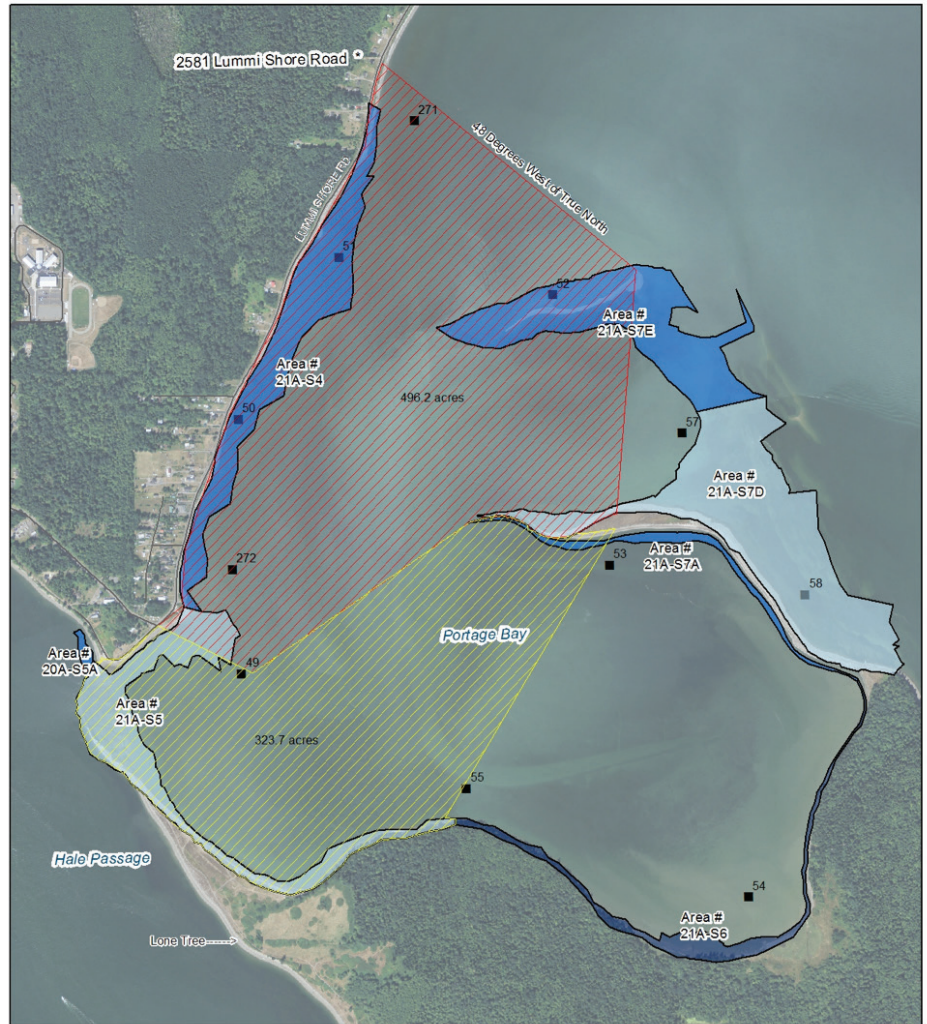
Data Sources: LIBC 2012,<sup>3</sup> PSNERP 2008,<sup>4</sup> SSHIAP 2004<sup>5</sup>

# Fecal Coliform Pollution Forces Partial Closure of Portage Bay Shellfish Growing Area

In September 2014, in order to protect public health and safety, the Lummi Nation, in consultation with the Washington Department of Health, voluntarily closed 335 acres of shellfish growing area in Portage Bay when the National Shellfish Sanitation Program (NSSP) standards were not achieved at several water quality monitoring stations.<sup>1</sup> After poor water quality was measured over the Portage Bay shellfish growing area during November 2014, additional water quality monitoring stations failed to meet the NSSP standards, resulting in the Lummi Nation and the Washington State Department of Health needing to conditionally close a total of 496 acres. The conditional closure classification prohibits shellfish harvest from the affected areas from April 1 through June 30, and from October 1 through December 31.<sup>2</sup> Water quality over the Portage Bay shellfish growing area continued to be degraded during 2015, causing an additional station to fail the NSSP standards and resulting in the conditional closure of 324 additional acres for a total closure area of 820 acres.

Manure from dairy farms and non-dairy livestock operations, and waste discharged from municipalities and failing septic systems in the Nooksack River watershed have pushed fecal coliform pollution levels in substantial portions of Portage Bay beyond federally accepted levels for safe shellfish harvest and consumption. The Portage Bay closure has a devastating impact on the livelihoods of over 200 Lummi Nation families who earn a portion of their annual income from the commercial harvest of Portage Bay shellfish. Additionally, the over 5,000 Lummi Nation tribal members who have a treaty right to harvest Portage Bay shellfish for ceremonial and subsistence harvests also are impacted or damaged by this shellfish harvest closure. Degraded water quality in the Nooksack River watershed has substantially reduced the shellfish available for Lummi to harvest and their ability to exercise their treaty rights to harvest shellfish throughout their Usual and Accustomed grounds and stations.

## Portage Bay Shellfish Growing Area



**Portage Bay Shellfish Closure Areas**  
3/8/2016

- Closed January, 2015
- Closed March, 2016
- Roads (Lummi)
- DOH Water Sample Sites

Data Sources: LNR 2016<sup>3</sup>

### GIS estimate of acres of shellfish growing area in Portage Bay

WADOH Shellfish Growing Area Status			
	Conditionally Approved	Approved	Unclassified
Portage Bay	820	491	0

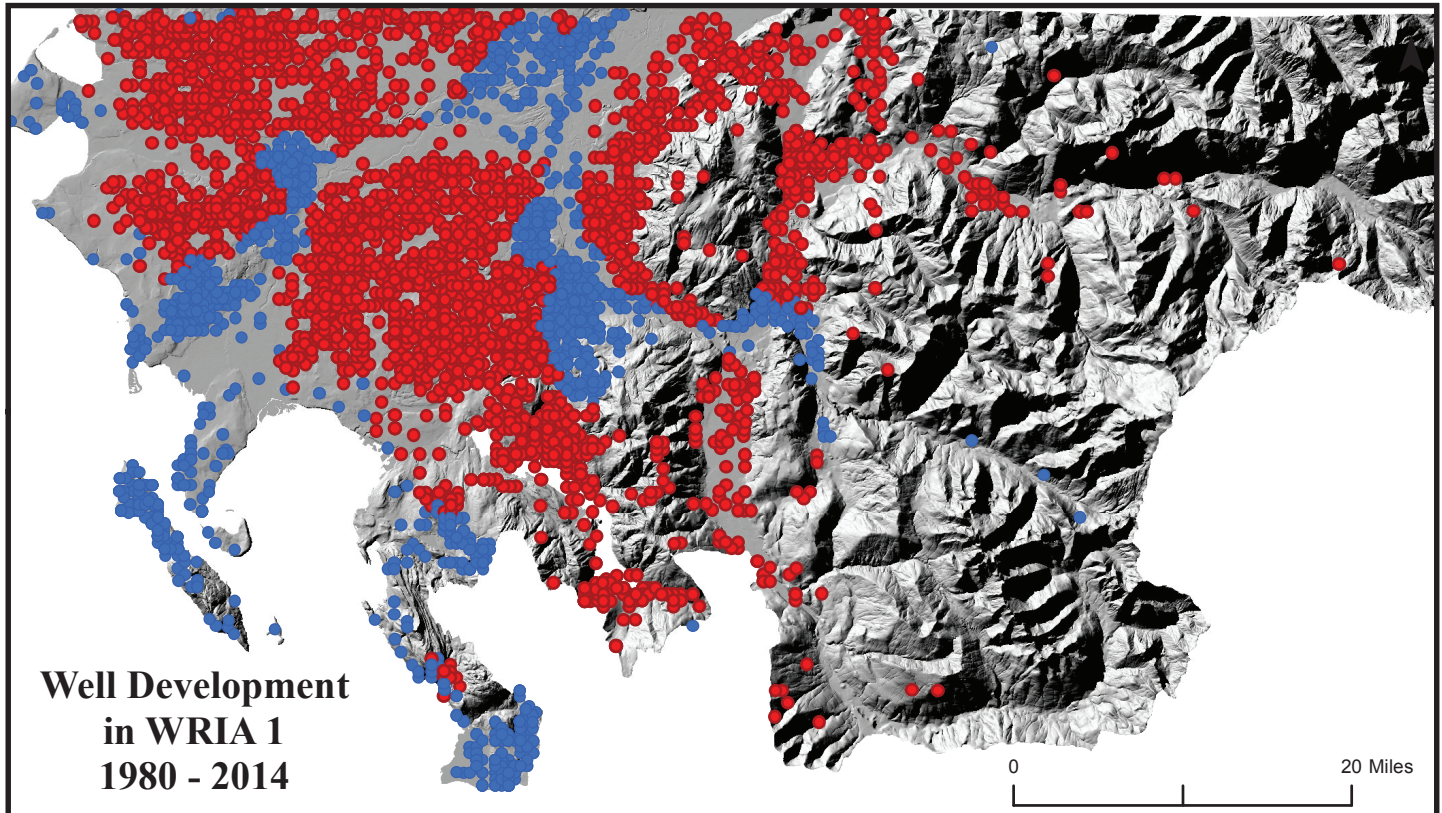


A Lummi tribal member harvests shellfish in Portage Bay prior to the downgrade of the harvest area.

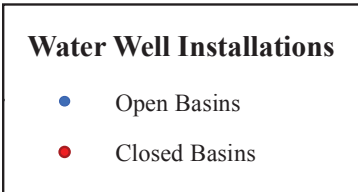
Kari Neumeier, NWIFC

# Exempt Well Development Expands in WRIA 1 While State Instream Flow Rules Continue to be Violated

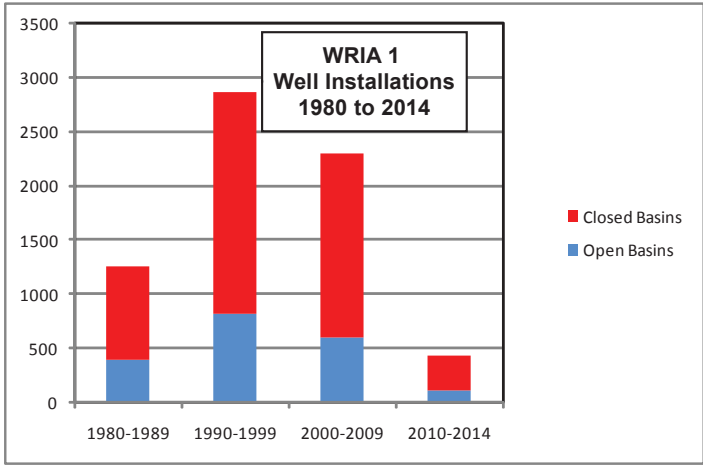
Between 2008 and 2014, Washington State Department of Ecology estimates that 565 new permit-exempt wells were drilled in Whatcom County (coincident with most of WRIA 1).<sup>1</sup> Approximately 72% of all wells in WRIA 1 are in basins either seasonally closed or closed year-round to water withdrawal due to instream flow levels that are less than the minimum flows established in 1985.<sup>2</sup>



According to the WRIA 1 Salmonid Recovery Plan, not meeting instream low flow limits results in habitat connectivity loss, reduced habitat volume, stranding of juvenile salmon, higher stream temperature and general decrease in water quality.<sup>3</sup> The WRIA 1 watershed instream flow rules were set in 1985 to “protect and preserve” instream resources from low flow exceedance.<sup>4</sup> As displayed in the map above, permit-exempt wells have continued to be developed in WRIA 1 since 1985. While legal under state water law, continued permit-exempt well development in basins that are closed to additional withdrawal under the state flow rule is in direct conflict with the guidance of the Salmonid Recovery Plan, which recommends reducing out-of-stream uses in sub-basins impacted by low instream flows.



The majority of wells developed in WRIA 1 fall inside basins that have been closed to water withdrawal since 1985.<sup>5</sup>



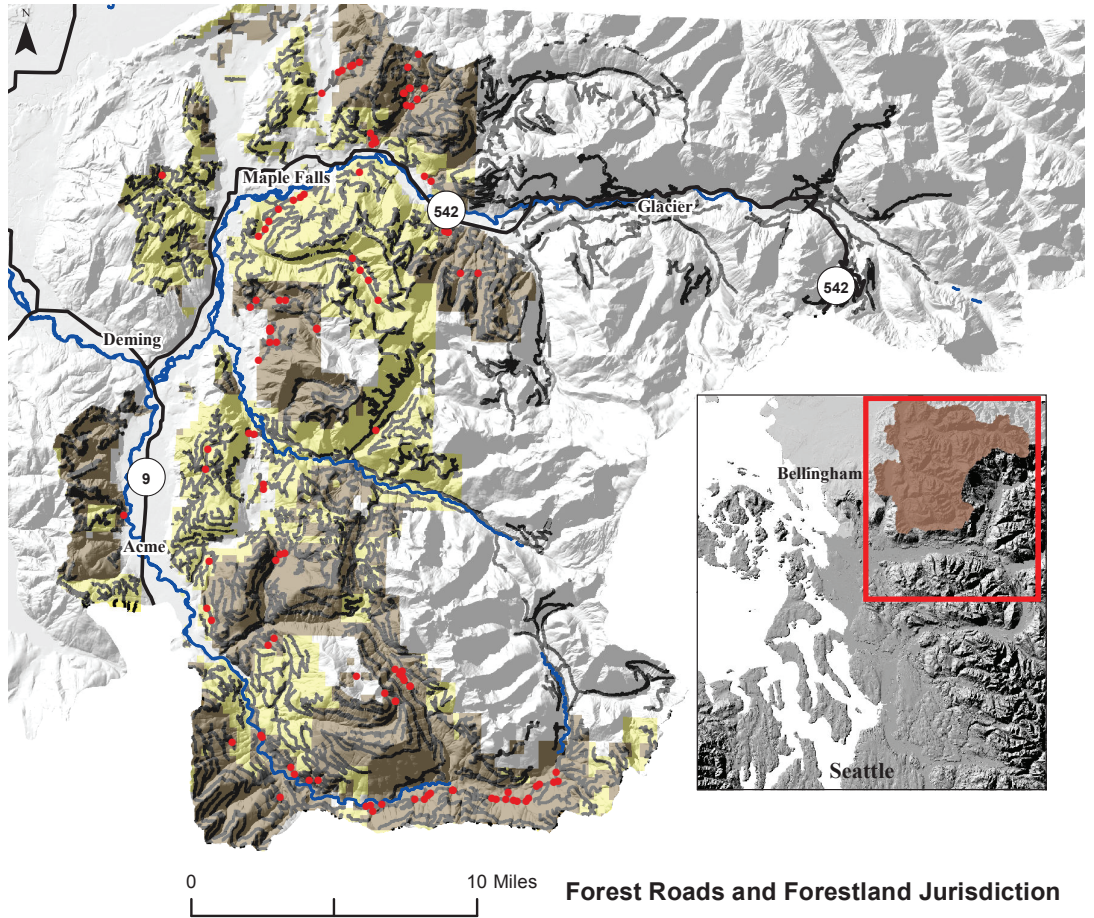
Data Sources: SSHIAP 2004,<sup>6</sup> WAECY 2015b,<sup>7</sup> Whatcom Co. 1998<sup>8</sup>



# RMAP Implementation Nearly Complete

The Washington State Forest Road Maintenance and Abandonment Plan (RMAP) implementation has resulted in the repair or abandonment of 90% (1,277 miles out of 1,426 total miles) of private and state-owned forest roads in the Upper Nooksack River watershed.<sup>1</sup> The RMAP implementation has also resulted in the repair or removal of 125 (95%) of 132 culverts on private and state-owned forest roads. The majority of all remaining work is scheduled to be completed by the end of 2016, with the three largest private landowners in the watershed, Weyerhaeuser Corporation, North Cascades Timberlands, and Sierra Pacific Industries all requesting an extension to 2021 to fix the remaining miles of road on their Upper Nooksack River watershed properties.

The majority of forest roads in the Upper Nooksack River watershed are on private industrial and state forestlands and fall under the RMAP mandate. It is expected that RMAP road repairs and abandonment will improve water quality in the upper Nooksack River watershed. Considering the role improved water quality plays in Chinook salmon habitat, the current status of RMAP being almost complete in the Upper Nooksack watershed is good news to salmon recovery. Small forest landowners were not required to develop a RMAP, and instead are expected to bring their roads up to standard and repair fish passage barriers as the roads are used for forest practices activities. Since no plans are in place there is a great deal of uncertainty about the condition of these roads.



RMAP only applies to state and private forestland jurisdictions.

Data Sources: Skagit Co. 2010,<sup>3</sup> SSHI-AP 2004,<sup>4</sup> WADNR 2014a,<sup>5</sup> WADNR 2014c,<sup>6</sup> Whatcom Co 2011b<sup>7</sup>

### Forest Roads and Forestland Jurisdiction

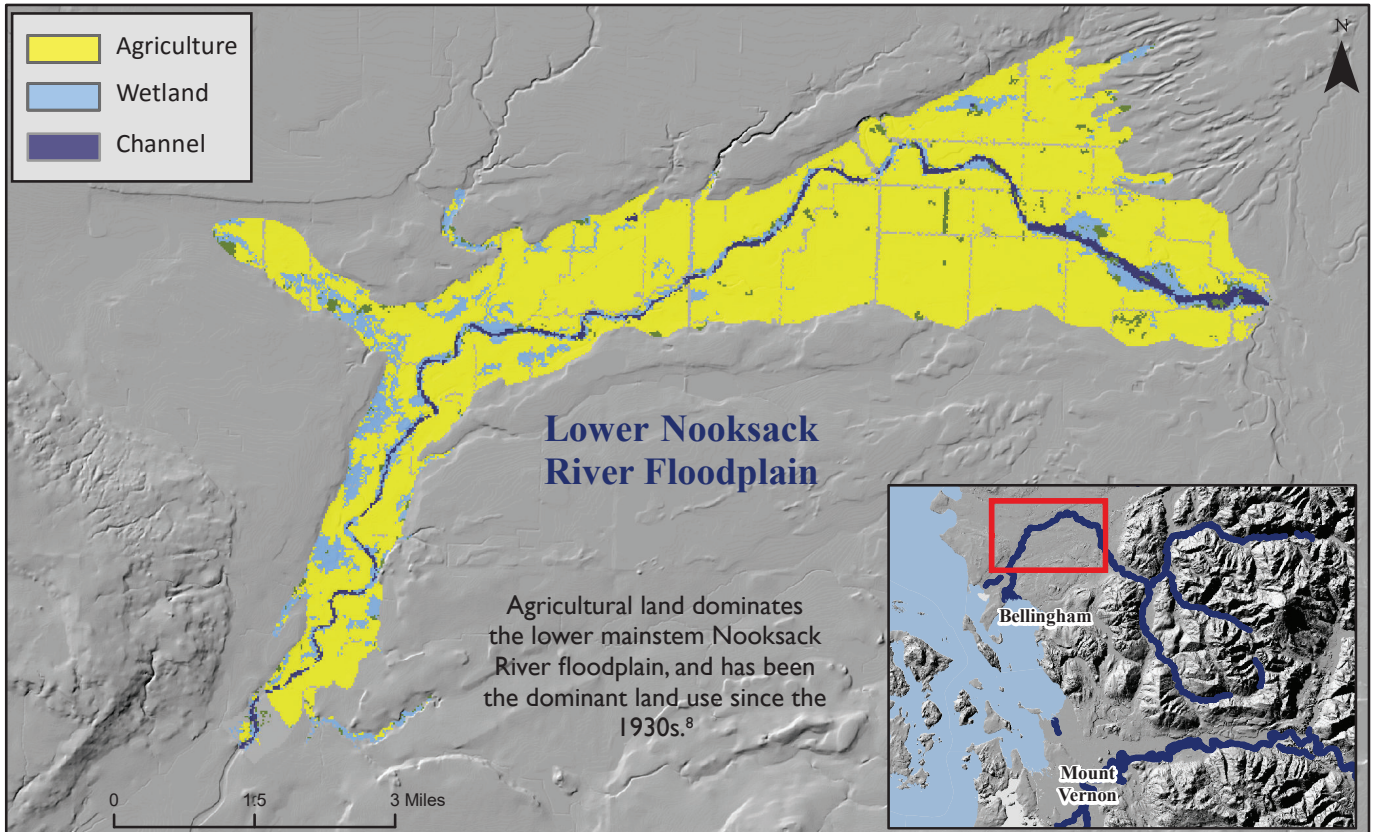
- RMAP Forest Road Culverts
- RMAP Forest Roads
- Private Industrial Forestland
- Washington State Forestland

2015 Nooksack River Watershed Road Maintenance and Abandonment Status (RMAP)					
Jurisdiction	Total Miles of Forest Road	Completed Miles	Miles Remaining	Percent Complete	Planned Date for RMAP Completion
State Lands	459	428	31	93%	10/31/2016
Private Industrial Lands	967	849	118	88%	10/31/2021
Jurisdiction	Total Number of Culverts	Repaired	Remaining to be Repaired	Percent Repaired	
State Lands	28	27	1	96%	
Private Industrial Lands	104	98	6	94%	

RMAP status shows that both the state and private forestland owners are approaching completion of road repairs and abandonment as mandated by the RMAP program.<sup>2</sup>

# Wetland Restoration Needed on Agricultural Lands in the Lower Nooksack River Floodplain

The WRIA 1 Salmonid Recovery Plan recommends a return to historical wetland conditions in the lower mainstem floodplain of the Nooksack River.<sup>1</sup> Based on the most recent comprehensive wetland study, in 1880 there were approximately 4,754 acres of wetlands within the Nooksack River floodplain; by 1998, the floodplain wetlands had been reduced to less than 10% of that historical area.<sup>2</sup> There has been little change in floodplain wetland area since the late 1990s. There was an estimated 1.5% loss of wetland area in the floodplain between 1996 and 2006, and no further loss between 2006 and 2011.<sup>3,4,5</sup>



The lower mainstem of the Nooksack River historically meandered through a complex of wetlands and beaver dams. Now, the lower mainstem floodplain is a single threaded river through cropland (raspberries, blueberries, silage corn, potatoes), hay fields and small municipalities. The lower mainstem has suffered the greatest loss of habitat area and function from historical conditions, and the losses have been especially costly for rearing juvenile Chinook salmon. In addition, the productivity of pre-spawning migrant, and over-winter and over-summer rearing life stages are all limited by the loss of historic off-channel wetland habitat in the lower mainstem.<sup>6</sup> While not the most limiting factor to Chinook recovery, all Nooksack stocks of Chinook are affected by conditions in the lower mainstem. Restoration of floodplain wetland conditions in the lower mainstem toward historic conditions remains a long-term goal of the WRIA 1 Salmonid Recovery Plan.<sup>7</sup>



The Nooksack River flows through the agricultural landscape of the lower Nooksack mainstem floodplain.

D. Anderson<sup>9</sup>

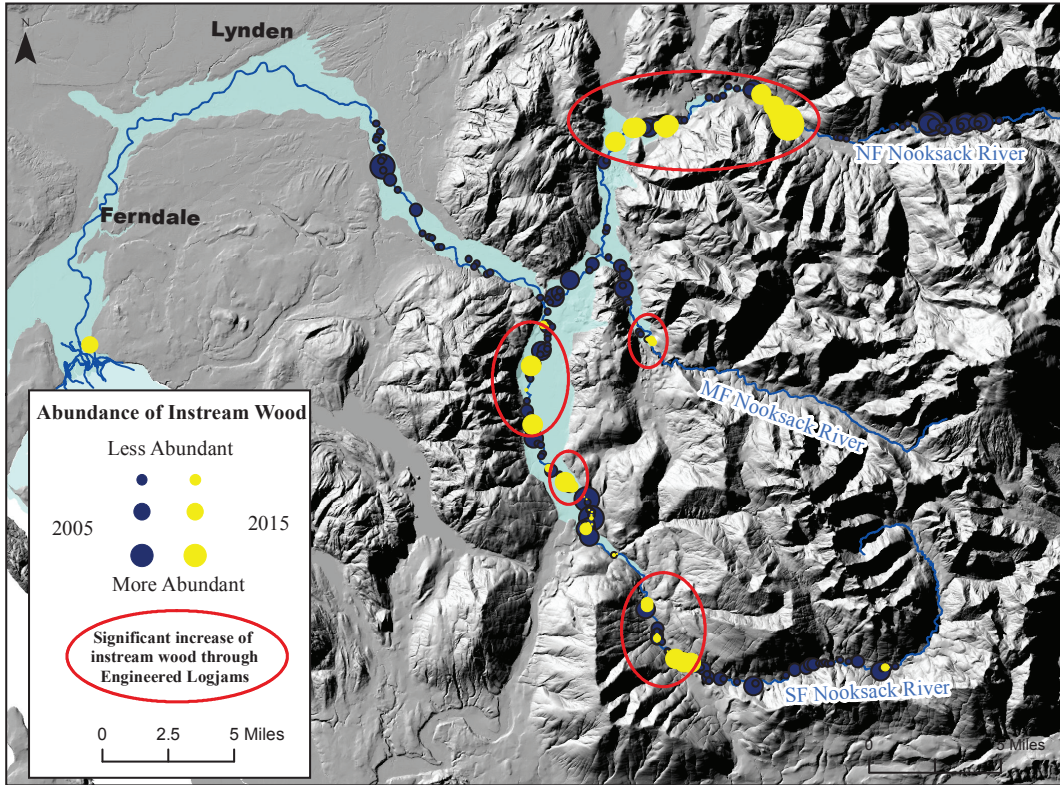
# Engineered Logjams and Long-Term Commitment Key to Restoring Wood to the Nooksack River

As described in the WRIA 1 Salmonid Recovery Plan, instream wood has a role in channel stability, habitat diversity and overall habitat quantity and quality, all limiting habitat factors to Chinook recovery.<sup>1</sup>

At present, there is a two-fold strategy for replenishing instream large woody debris. As a short-term strategy, engineered logjams are being consistently funded, constructed and monitored throughout the

North Fork, Middle Fork and South Fork of the Nooksack River by salmon habitat restoration partners. This has resulted in increasing densities of instream wood since 2005.<sup>2</sup> Additionally, the WRIA 1 Salmon

Recovery Board (SRB) has set long-term riparian targets for key piece wood recruitment. The draft 2014 revised indicators for the WRIA 1 Salmonid Recovery Plan propose a long-term WRIA 1 SRB target for a “good” or properly functioning riparian condition as a riparian forest that contributes 1.3 to 4 key pieces per 100 meters of stream length.<sup>3</sup>



Archival data suggest that instream wood was historically very abundant in Puget Sound river systems, including the Nooksack River.<sup>4</sup> Settlers’ descriptions from the 1800s of logjams 3/4 of a mile long are not uncommon.<sup>5</sup> The combination of land-clearing, riparian forest logging, splash damming and instream wood removal for navigation have all combined to leave the Nooksack River with a relatively low abundance of instream wood.

A notable exception is the Nooksack River delta where large logs have accumulated and a logjam that started to form in 2005 is now over 2/3 of a mile long and completely blocks what was the primary distributary channel of the Nooksack River. These logjams in the Nooksack River delta have substantially impaired navigation in the delta area and as a

result, have substantially interfered with the riverine fisheries of the Lummi Nation. The lower mainstem continues to be managed for flood control and navigation. There is little to no accumulation of instream wood between Lynden, Washington, and the delta of the river. The upper mainstem and the forks have a relative abundance of instream wood, but still very low compared to historic levels. The relatively higher levels of wood instream in the upper watershed are in part attributable to the engineering and construction of logjams by the salmon habitat restoration partners. Since riparian forests are still dominated by young, small-diameter trees, active logjam construction remains necessary to improve instream wood abundances in the Nooksack River system.<sup>6</sup>



Lummi Natural Resources Department

Until riparian forests are mature enough to deliver key logjam anchoring pieces of instream wood to the Nooksack River, engineered logjams remain essential to the salmon habitat restoration throughout the system.

Data Sources: LNR 2003,<sup>7</sup> NNR 2015,<sup>8</sup> SSHIAP 2004,<sup>9</sup> WAECY 2011a<sup>10</sup>

# Citations

## Chapter Summary

- 1 USGS. 2016. USGS 12213100 Nooksack River at Ferndale, WA: Stream Site description. National Water Information System. <http://waterdata.usgs.gov/wa/nwis/inventory/?station=12213100>
- 2 Whatcom County Comprehensive Plan. Draft. February 2015. Bellingham, WA: Whatcom County.
- 3 U.S. Census Bureau. 2015. U.S. Census Quick Facts: <http://www.census.gov/quickfacts/table/PST045215/53073>
- 4 Shared Strategy for Puget Sound. 2007. Puget Sound Salmon Recovery Plan, Volume 1. National Marine Fisheries Service.
- 5 Ibid.

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