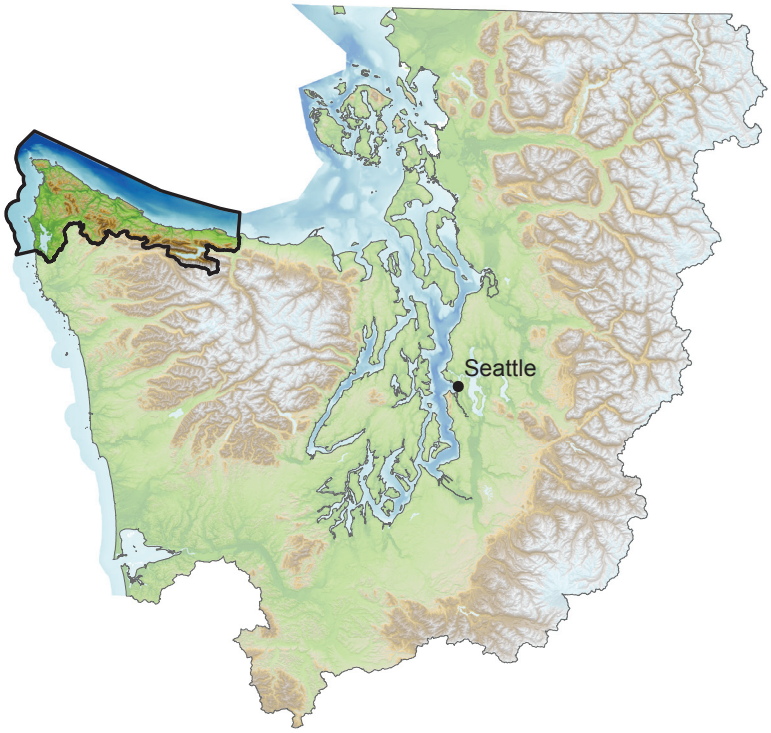
2016 State of Our Watersheds Report
Northwest Olympic Peninsula

yałoʷwisbadaxiq – tuṗałiq, dučiʔi·ʔi·ʔiq, čaʔawiq, du·pica·dax̌ haʔubaqey, hi·da·čisiq, kʷiči·ye·ʔiq, xiktu·biq, hiktu·biq, ba·ckʷa·dʔiq, šučasiq, ʔubabiq- q̓atikšiʎ̓ ʔuyak ti·caʔa·ʔał. ʔuxawa·ł qʷa·qik ʔusubaqey. ʔuč·a·ʔaḱa·ł ʔiš ʔuča·ʔaḱidica·ł.

The places- the ocean, the mountain, the fresh water, all the variety of foods, the beach, the land, the animal, the bird, the bug, the tree, the plant give thanks for them. Use what you may need. Take care of them and they will take care of you.



Makah Tribe

Located on the northwest tip of the lower 48 states, the Makah always have utilized the bounty of the sea and the forests. From seals to salmon to whales, the sea was – and still is – a large part of the livelihood of the Makah. Within their territory, the Makah had many summer and permanent villages. The five permanent villages – the Wa'atch, Tsoo-Yess, Diaht, Ozette and Ba'adah – were located in forests and on beaches. In the early 1800s, these villages were home to between 2,000 and 4,000 Makah. The Makah are highly skilled mariners, coming from a long line of ancestors who used sophisticated navigational and maritime skills to travel the rough waters of the Pacific Ocean and the Strait of Juan de Fuca to hunt whales and seals as well as travel. In 1855, the Makah, represented by 42 tribal dignitaries, negotiated and signed a treaty with the United States retaining their right to whale and hunt, fish and gather as they always had. Today, tribal headquarters are located in Neah Bay, Wash.

Recovering Habitat Means Prioritizing and Restoring

Located on the northwest corner of the Olympic Peninsula, the Makah's Area of Concern includes many independent streams that flow from the foothills of the northern Olympic Mountains and enter the shores of the Strait of Juan de Fuca or the Pacific Ocean. The largest watersheds are the Sekiu, Hoko, Clallam, Pysht, Tsoo Yess, Ozette and Lyre rivers. Chinook, coho, chum, sockeye and winter steelhead occur in the area's watersheds, with the Ozette sockeye being listed as "threatened" under the Endangered Species Act. Beginning in the late 1800s, the strait region has been heavily logged, with severe consequences to the health of its watersheds and salmon habitat. Today the region is predominantly rural, and industrial forestland management is widespread.

The restoration strategy developed for the Area of Concern consists of maintaining and improving the ecosystem productivity and genetic diversity for all salmonid species by protecting highly productive habitats and populations, and restoring impaired habitat and depressed populations. The approach is to prioritize habitat restoration, protection and enhancement activities with regard to the specific habitat conditions of each individual watershed.

The short-term focus is on habitat restoration activities such as:

- Large woody debris placement;
- Riparian planting;
- Fish-barrier culvert removal;
- Nearshore fill removal; and
- Conservation easements.[1]

Long-term habitat recovery focuses on the restoration and protection of habitat-forming processes. Insufficient time has elapsed to assess the progress toward the goals and objectives of this habitat recovery strategy. Only general conditions and trends can be highlighted.

Debbie Preston, NWIFC

The Waatch River is one of several rivers where the Makah Tribe is removing noxious weeds and creosote pilings as well as restoring habitat.

Sharing Plans and Cooperation Key to Recovery

The Makah Tribe works independently and cooperatively with state and federal agencies to monitor and implement restoration projects. But the Tribe has some concerns about the lack of sufficient commitment by federal and Washington state natural resource agencies to protect, properly manage and recover salmon, since habitat is being damaged and destroyed faster than it can be restored. For the Tribe's treaty-reserved rights to harvest salmon and other natural resources to have meaning, there must be salmon to harvest. There must be real gains in habitat protection and restoration for salmon to survive. And for this to happen, the federal and Washington state governments need to provide leadership and the necessary resources.

Recovery Efforts Show Signs of Improvement But Still Lagging in Key Indicators

A review of key environmental indicators for the Makah area shows improvements in the removal of forest road barriers and the installation of large woody debris structures, but degradation of water quantity, road densities and forestland cover. In general, there is a shortage of staff at all levels (e.g., federal, state, tribal, county) 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.

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 Quantity - Peak Flows	From 1960, peak flows have shown an increasing trend on the Hoko mainstem. If this trend continues as anticipated under predicted climate change conditions, this may pose a significant impact to salmonid runs.	**Declining**
Water Quantity - Low Flows	From 1960, summer mean low flows have shown an decreasing trend on the Hoko mainstem. If this trend continues as anticipated under predicted climate change conditions, this may pose a significant impact to salmonid runs.	**Declining**
Water Quality	In the Makah Area of Concern, 32 waterbodies were placed on the 303(d) list for water pollution in 2012. Water temperature was by far the most common pollutant which was in all but two of the waterbodies. The Hoko River was the most impaired waterbody by total length with 11.0 miles impaired by water temperature.	**Concerns**
Forest Roads	Since 2011, forest landowners have continued to implement their Road Maintenance and Abandonment Plans in the Makah Area of Concern. Almost 53% of the 1,518 culverts have been fixed, leaving about 47% to be repaired by 2021.	**Improving**
Road Densities	19 watersheds, representing 83% of the land area, may not be properly functioning because of road densities that exceed 3 miles/square mile.	**Declining**
Forestland Cover	The 2011 forest cover conditions of watersheds in the Makah Area of Concern varied widely but most were in the moderate to healthy categories. However, since 2006, most of the watersheds appear to have been trending toward a reduced forest cover. The highest reductions were in the Sail River-Frontal Strait of Juan De Fuca (10.9%), Big River (10.7%) and Upper Hoko River (9.6%) watersheds.	**Declining**
Large Woody Debris	The legacy and impacts of historic logging practices that harvested riparian zones is still felt as there is a reduced quantity and quality of large woody debris (LWD) available to being recruited to and retained in many streams in the Makah Tribe's Area of Concern. Since 2012, the Tribe has been working to design and install engineered logjams in 1.3 miles of the mainstem Pysht River and other rivers to improve instream habitat complexity, floodplain connectivity and flood risk attenuation.	**Improving**

The Tribe continues to work toward the protection and restoration of healthy and functional nearshore, estuarine and river habitat, restoring those areas that are degraded, and conducting research to understand the organisms and the habitats they occupy.

Looking Ahead

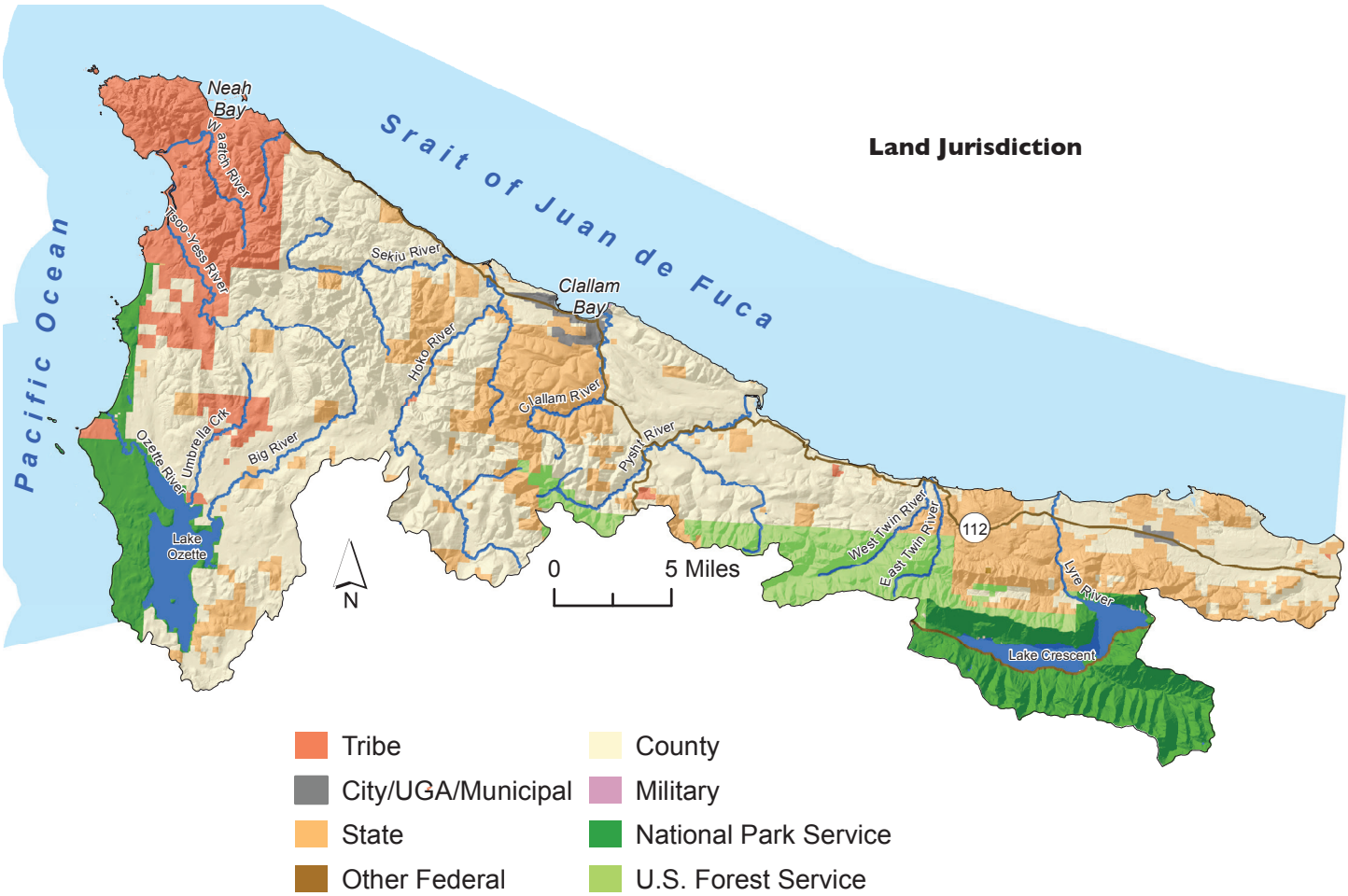
Although the watersheds within the Makah Area of Concern continue to sustain salmonid species, significant threats to fish habitat remain. Land-use practices particularly associated with forestry activities and road maintenance continue to alter watershed processes, resulting in degradation of water quality, water quantity, and stream channel complexity. There is a need for greater communication and cooperation between natural resources managers to assure achievement of the goals set in the watershed recovery plans for the region.

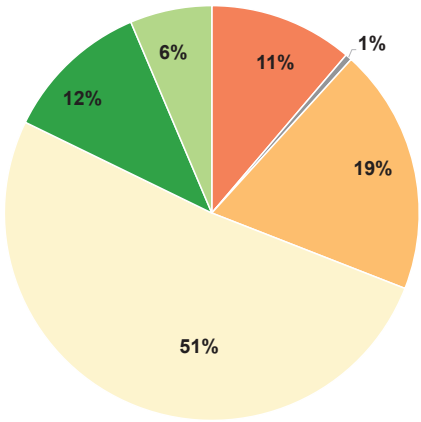
Current habitat conditions and trends speak to the need for continued restoration efforts focused on degraded habitat and increased protection of existing properly functioning habitat. To improve habitat for salmon, significant progress must be made in restoring habitat and stream function with large woody debris placement; riparian planting and fencing; culvert barrier removal; and conservation easements. We are doing our part to buy what land we can in the Area of Concern, but the threat of land transfers to other private ownership could isolate these lands from monitoring as well as collecting important cultural plants. We will need improved communication and cooperation between the myriad of natural resources managers in the area to hold the line, much less improve, fish habitat.

It is troublesome that important repairs to some of these problem road and stream crossings have been delayed with a five-year extension, meaning continued serious harm to these important streams. It is deceptive to think of the Olympic Peninsula as healthy for fish. In concert with climate change, current land-use practices hasten the threat of extinction of the salmon that are a central part of the cultural identity of Makah people.

Makah Tribe

WRIA 19 and portions of WRIA 20





Located on the northwest corner of the Olympic Peninsula, the Makah's Area of Concern includes many independent streams that flow from the foothills of the northern Olympic Mountains and enter the shores of the Strait of Juan de Fuca or the Pacific Ocean.

The largest watersheds are the Sekiu, Hoko, Clallam, Pysht, Tsoo-Yess, Ozette and Lyre rivers. Easily weathered sedimentary rock, sandstones, and siltstones of the Twin River Formation occur in the western watersheds from and including the Pysht. Streams to the east of the Pysht have a mixed geology, including less erodible basalt from the Crescent Formation in headwaters, glacial outwash in the lower plain, and siltstones of the Twin River Formation to the west. The stream channels in the region change quickly to variations in flow and sediment inputs.

Chinook, coho, chum, sockeye and winter steelhead occur in the area's watersheds; the Ozette sockeye is listed as threatened under the Endangered Species Act. Many other salmonid populations are considered critical or depressed from historic levels.[1] Traditionally flourishing off of land and sea, the Makah Tribe had villages and fishing camps most often associated with stream mouths where they could take advantage of plentiful fish and shellfish resources. With the Point No Point and Makah treaties of 1854-55, the tribes agreed to cede their lands to the U.S. government in exchange for retaining their rights to hunt, fish and gather in their usual and accustoms areas. Beginning in the late 1800s, the strait region has been heavily logged, with severe consequences to the health of its watersheds and salmon habitat. Today the region is predominantly rural, and industrial forest land management is widespread.

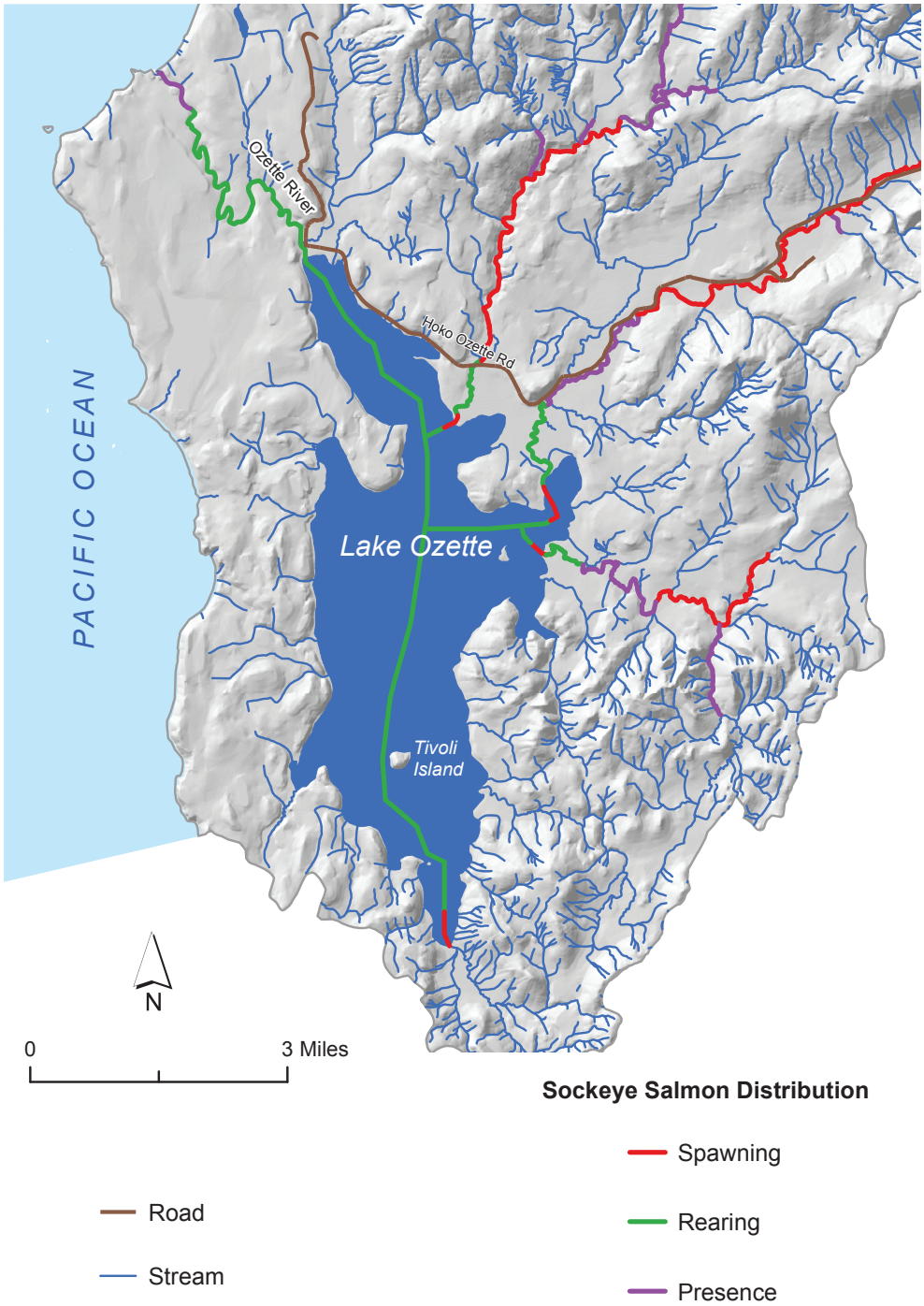
Data Sources: Makah 2016,[2] SSHIAP 2004,[3] USFWS 2014,[4] WADNR 2014a,[5] WADNR 2014b,[6] WADOT 2012,[7] WADOT 2013,[8] WAECY 1994,[9] WAECY 2011a,[10] WAECY 2013[11]

Lack of Funding for Co-Manager Response

Co-management refers to the process under which Washington state and the treaty Indian Tribes cooperatively exercise their authority as managers of the salmon resource. The co-management structure was created in 1984, in response to a U.S. Supreme Court decision upholding U.S. District Judge George Boldt's 1974 ruling in *US v. Washington* (the Boldt decision) that the tribes have a treaty right entitling them to half of all harvestable salmon returning to their Usual and Accustomed fishing areas. The Boldt decision also requires the state to maintain the habitat on which salmon depend. The Makah Tribe has some concerns with the lack of sufficient commitment by federal and Washington state natural resources agencies to protect, properly manage and recover salmon as salmon habitat is being damaged and destroyed faster than it can be restored.

One of the biggest contributing factors in the lack of co-manager involvement is that the area is poorly staffed and funded. Frequently, positions remain unfilled when people retire. Therefore you have overloaded staff who have such a large area of coverage that they cannot feasibly review every proposal in detail, especially field review. Some state agencies are better than others, but in a region that takes over 2 hours to travel one-way to a location, this means that there is a large amount of ground that co-managers aren't engaging in. Some state agencies even have to deploy staff from Olympia (some 4.5 hours away) because they won't hire a representative for the area. The area's resources are more vulnerable because of this. It is embarrassing the lack of resources that go into the area in comparison to other regions with ESA-listed salmon species. In addition, state agencies have been cutting their monitoring within the region, therefore increasing the pressure upon the tribes to take up the slack. Only through federal funding grant awards that the Tribe secures have we been able to continue much of the monitoring. Sometimes the Tribe has had to pay the state to operate these monitoring stations.

For the Tribe's treaty-reserved rights to harvest salmon and other natural resources to have meaning, there must be salmon to harvest. There must be real gains in habitat protection and restoration for salmon to survive. And for this to happen, the federal and Washington state governments need to provide leadership and the necessary resources.

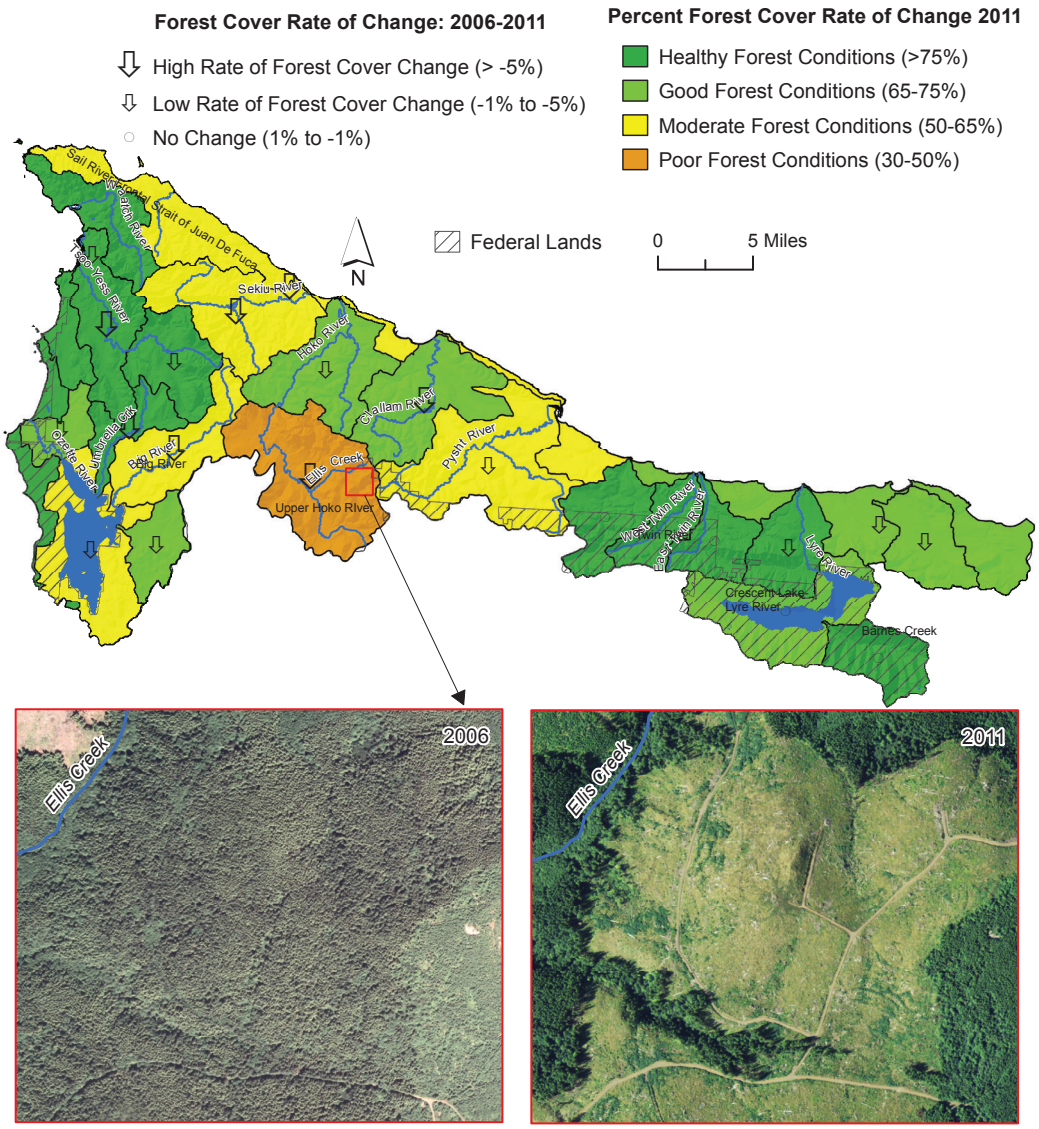


The recovery of Lake Ozette sockeye provides an excellent example of where the federal and state governments could align their agencies and programs and lead a more coordinated recovery effort. Lake Ozette sockeye were listed as a threatened species under the Endangered Species Act (ESA) in 1999.[1] In an effort to protect and increase the number of spawning sockeye, the Makah Tribe ended its commercial fishery in 1974 and ceased all ceremonial and subsistence fishing in 1982. Even so, sockeye numbers have not rebounded. Developing and implementing a plan to stop the downward trend of the species and return it to a healthy, naturally self-sustaining condition and protect treaty-guaranteed tribal fishing rights requires serious commitment and the provision of ample resources by co-managers.

Data Sources: SSHIAP 2004,[2] SWIFD 2014,[3] WADNR 2014c,[4] WADOT 2012,[5] WAECY 2011a[6]

Forest Cover Conditions

The 2011 forest cover conditions of watersheds in the Makah Area of Concern varied widely but most were in the moderate to healthy categories. However, since 2006, most of the watersheds appear to have been trending toward a reduced rate of forest cover change. The highest reductions were in the Sail River-Frontal Strait of Juan De Fuca (10.9%), Big River (10.7%) and Upper Hoko River (9.6%) watersheds.



Forest cover conditions have a tremendous impact on watershed processes and thus on salmonid habitat. Changes in forest cover can affect the rate of solar radiation reaching the stream surface, the delivery of water, large woody debris (LWD), sediments and nutrients to stream channels, as well as bank and channel stability. When the rate of change increases, it means that the watershed canopy is being removed, typically through logging, faster than it can grow back.

The 2011 forest cover conditions of the different watersheds in the Makah Area of Concern varied widely but most were in the moderate to healthy categories. The main exception was the Upper Hoko River watershed where some poor forest cover conditions exist. The Sekiu River has extensive sedimentation problems, lack of LWD, extensive riparian areas dominated by hardwoods, and the reduced age of the surrounding forests as important habitat limiting factors.[1] Excess sedimentation and a lack of LWD are primary factors that affect channel stability, impact incubating salmon eggs, and therefore limit salmon production in the Hoko River watershed.[2]

An analysis of forest cover rate of change between 2006 and 2011 shows an increase in forest cover loss in most of the watersheds. The highest reductions (of about 10% each) were in the Sail River-Frontal Strait of Juan De Fuca, Big River and Upper Hoko River watersheds. The high rate of loss in Upper Hoko River is particularly significant because of the poor forest conditions in that watershed. Notable exceptions to the general negative trend in forest cover loss were in the Barnes Creek, Crescent Lake-Lyre River and Twin River watersheds where conditions have remained relatively unchanged. While the overall forest cover conditions are generally good, the rate of forest cover change in most of the watersheds appears to be trending negative.

Data Sources: SSHIAP 2004,[3] USGS 2014,[4] WAECY 2006,[5] WAECY 2011a,[6] WAECY 2011b[7]

Large Woody Debris

The legacy and impacts of historic logging practices that harvested riparian zones is still felt as there is a reduced quantity and quality of large woody debris (LWD) available to be recruited to and retained in many streams in the Makah Tribe's Area of Concern. Since 2012, the Tribe has been working to design and install engineered log-jams in 1.3 miles of the mainstem Pysht River and other rivers to improve instream habitat complexity, floodplain connectivity and flood risk attenuation.

Healthy stream channels for salmonids requires a steady recruitment and retention of large woody debris to promote channel complexity. Wood helps form pools and other important rearing areas, stores sediment and organic matter, and influences water quality by providing thermal refugia. Biologically, LWD provides cover for fish from predators and refuge from high streamflow, in addition to offering organic processing. The abundance of salmonids is often closely linked to the abundance of LWD.

Lack of LWD was identified as a major salmonid habitat limiting factor for many watersheds including but not limited to the Hoko River, Sekiu River, Pysht River, Nelson Creek, Susie Creek, Salt Creek, Colville Creek, Waatch River, Tsoo Yess River, Ozette River and Big River.[1,2]

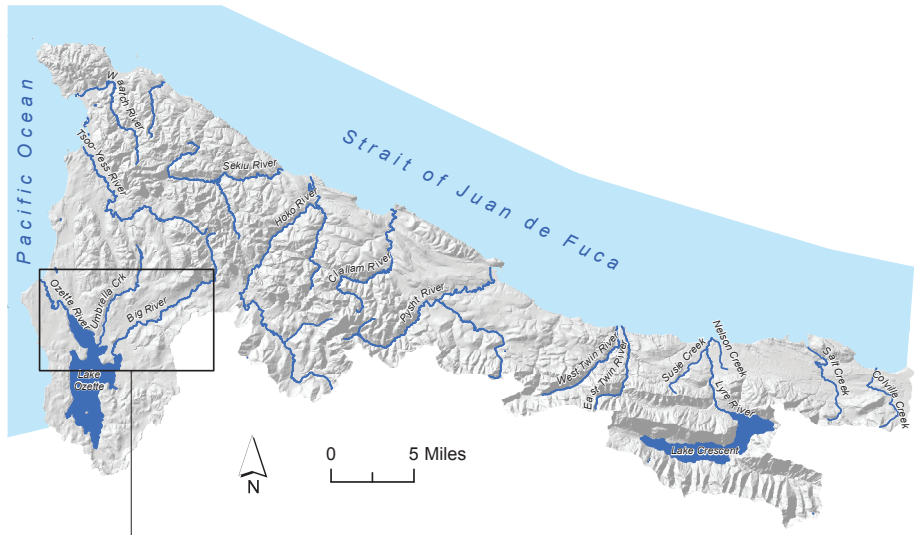
The dominant land use in the low elevation areas of these watersheds is industrial forestry which historically involved the removal of nearly all large tress from riparian zones during logging. As a result, the riparian vegetation was consequently converted from native, old-growth coniferous forests to tree plantations dominated by hardwood like red cedar. The overall trend of the effects from logging have included decreased size, abundance, quality, mobility and species composition, as well as an increased depletion rate of LWD being recruited to streams.[3]

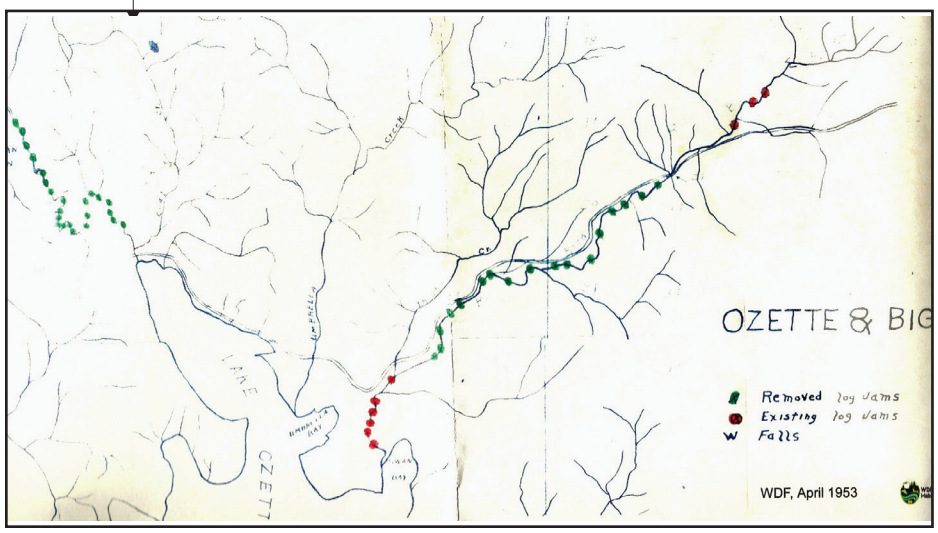
In addition, many of the larger streams and rivers were used to float logs to downstream mills before extensive logging roads were built. Stream reaches were cleared of log-jams to allow navigation. Throughout the last century, and particularly in the last 60 or 70 years, LWD was removed in the Ozette River in the belief that it helped fish or would reduce flooding.[4] A total of 26 large jams on the Ozette River were removed in 1952 alone.[5] Similar activities were carried out on the Clallam River,[6] East Twin River[7] and Hoko River.[8]

Placement of LWD has been identified as an important habitat restoration action in the area.[9]

Since 2012, the Makah Tribe has been working to design and install engineered log-jams in 1.3 miles of the mainstem Pysht River as well as 0.5 miles of the Hoko River to improve instream habitat complexity, floodplain connectivity and flood risk attenuation.

Data Sources: SSHIAP 2004,[11] WAECY 2011a[12]





Kramer 1953[10]

1953 map depicting removed and existing logjams

Debbie Preston, NWIFC

Large woody debris

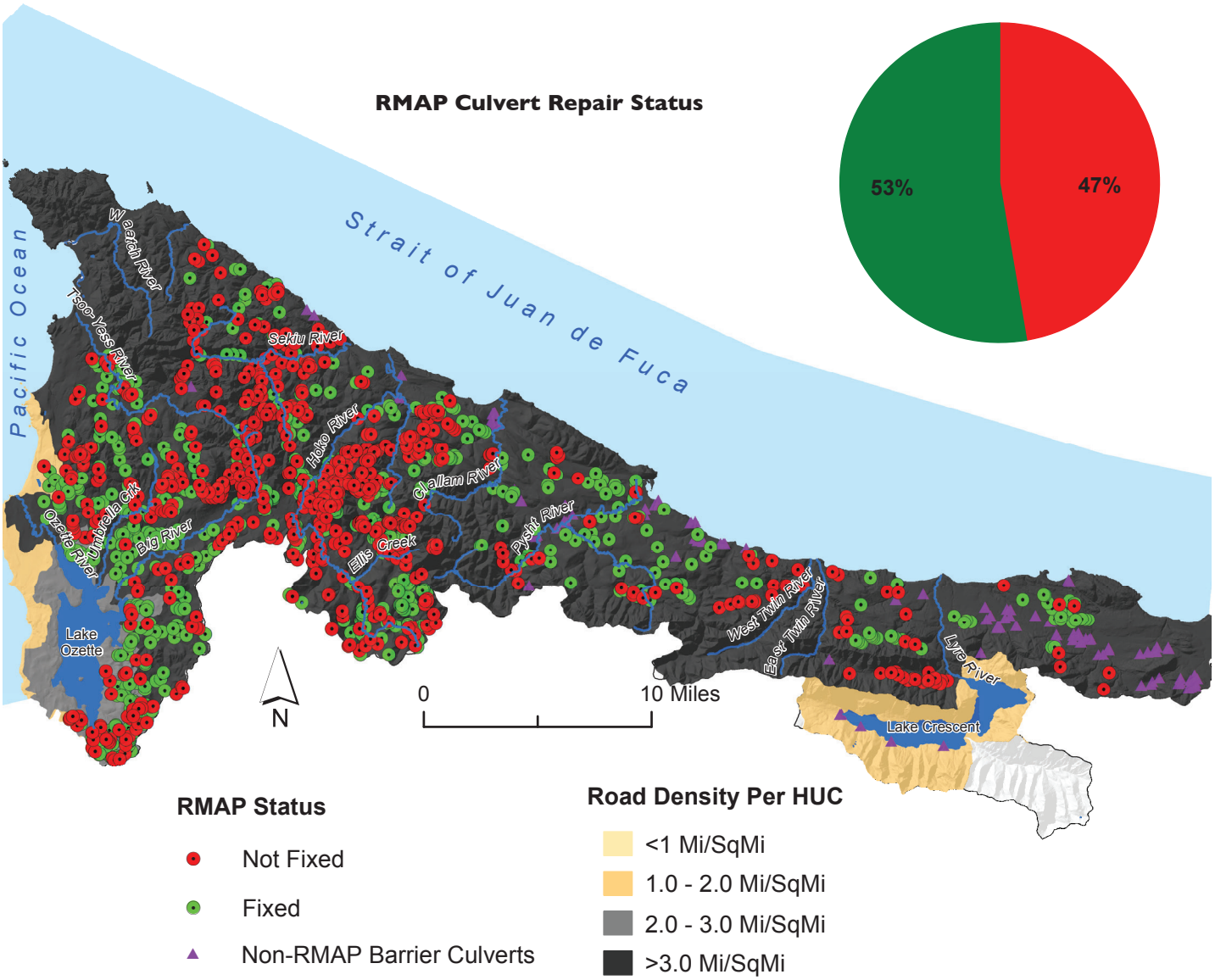
Roads as a Limiting Factor

Since 2011, forest landowners have continued to implement their Road Maintenance and Abandonment Plans (RMAP) in the Makah Area of Concern. Almost 53% of the 1,518 culverts have been fixed, leaving 47% to be repaired by 2021. Also, 19 watersheds, representing 83% of the land area, may not be properly functioning because of road densities that exceed 3 miles/square mile.

Forests roads serve many important functions. If not properly constructed or maintained, they can become a source of sediments to streams which degrade fish habitat and water quality.[1] Furniss et al.[2] concluded that the sediment contribution per unit area from roads is often much greater than all other forest activities combined. Also, many culverts at forest road crossings may constitute fish barriers.

Washington State Forest and Fish law requires most forest landowners to have a Road Maintenance and Abandonment Plan (RMAP), a schedule for any repair work needed to upgrade road systems at stream crossings and address aquatic habitat and fish passage issues. The RMAP data shows that almost 53% of the identified 1518 culverts in the Makah Area of Concern were fixed and 47% are yet to be fixed and remain barriers to fish. This repair rate represents an increase of 16% since 2011, and is a positive trend that should have a positive impact on fish habitat and water quality in the Makah Area of Concern. There are an additional 129 non-RMAP culverts in the Area of Concern.

Cederholm et al.[3] found that fine sediment in salmon spawning gravels increased by 2.6-4.3 times in watersheds with more than 4.1 miles per square mile (mi/sq mi) of land area. The National Marine Fisheries Service guidelines for salmon habitat characterize watersheds with road densities greater than 3 mi/sq mi of watershed area as "not properly functioning".[4] Watersheds were classified as "properly functioning condition" when road densities were less than 2 mi/sq mi and "at risk" when values were 2-3 mi/sq mi. A total of 19 watersheds representing 83% of the land area had road densities above 3 mi/sq mi and this could be a major limiting factor on salmonid production. Extensive sedimentation resulting from high road densities and landslides was reported for many watersheds by Smith.[5]



Data Sources: SSHIAP 2004,[6] WADNR 2014c,[7] WADNR 2014d,[8] WAECY 2011a[9]

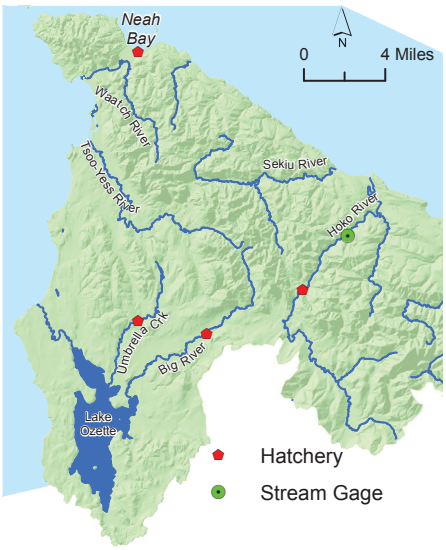
Hoko River Flow

The Hoko River streamflow has experienced a steady and alarming trend. Winter peak flow values show an increasing trend while summer mean low flow values show a decreasing trend. Both trends have been predicted to occur because of climate change and now are a reality in the Hoko. These trends may indicate that salmon habitat and other aquatic ecosystem functions may not be adequately protected under current management regime.

The magnitude, timing and variability of low streamflows and the magnitude and frequency of high streamflows are critical to salmonid survival and production. Because of its low elevation and dependence on precipitation, the Hoko River basin is naturally susceptible to low water flows in the summer and early winter like the other rain dominant watersheds in the region. However, human factors seem to be contributing to the problems of low and peak flows. One of these factors is water withdrawals for municipal water use.[1] Another factor is forestry land-use practices and the alteration of the age and composition of the surrounding forest cover. The relatively younger tree stands are believed to be associated with an increased frequency and severity of peak flows.

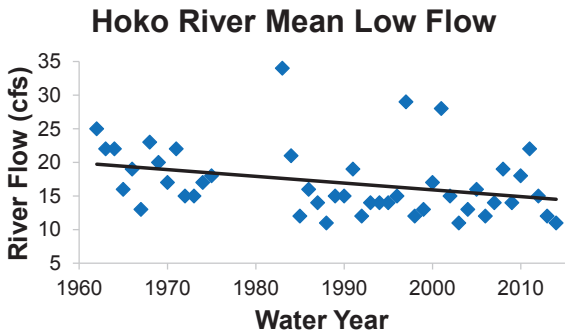
Low flows contribute to high water temperatures and limit the spawning distribution of fall Chinook to less stable areas of the mainstem, possibly increasing the likelihood of scour of redds during peak flow events.[2] The timing of these flows can also be a problem for coho salmon.[3]

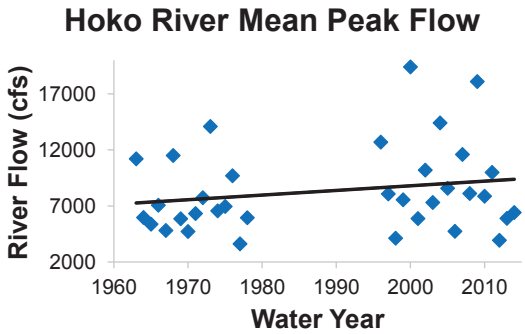
Streamflow data has been collected for the Hoko River by the USGS since 1963, although there were gaps during that period. The data show that over time, winter peak flow values have increased while summer mean low flow values showed a decreasing trend at precisely the time when streamflow is needed the most and when water temperatures are at their highest. Both trends have been predicted to occur because of climate change and now are a reality in the Hoko. These trends may indicate that salmon habitat and other aquatic ecosystem functions may not be adequately protected under current management regime.



Both photos were taken looking upstream near River Mile 10 at the base of the Hoko Falls from same general location. The high water picture (top) with the chinook salmon was taken on Oct. 3, 2013, and the low water picture (bottom) was taken Oct. 2, 2014.

Joe Hinton, Makah Tribe (2)

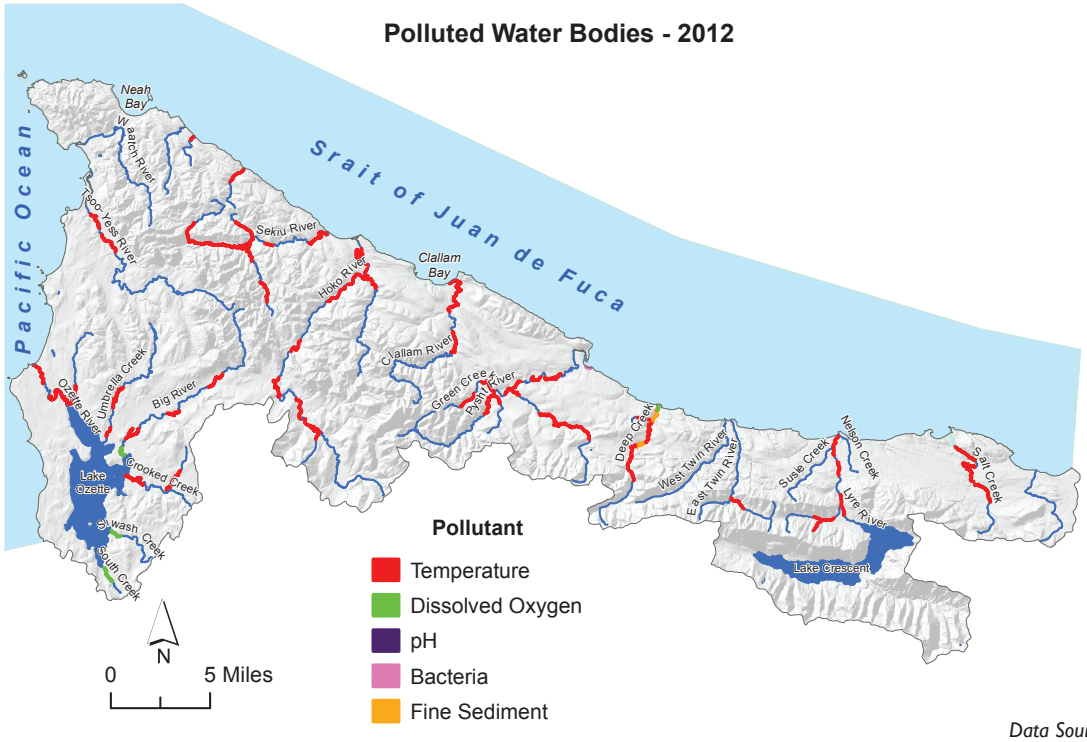




Data Sources: SSHIAP 2004,[4] USGS 2015,[5] WAECY 2011a[6]

Water Quality

In the Makah Area of Concern, 32 waterbodies were placed on the 303(d) list for water pollution in 2012. Water temperature was by far the most common pollutant, which was in all but two of the waterbodies. The Hoko River was the most impaired waterbody by total length, with 11.0 miles impaired by water temperature.

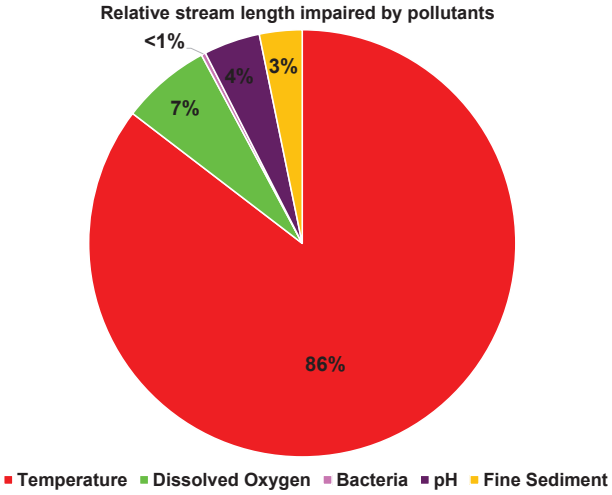


Data Sources: SSHIAP 2004,[2] WAECY 2011a,[3] WAECY 2013[4]

The federal Clean Water Act requires states to monitor and report water pollution on waters that have been assessed. Waters that do not meet water quality standards because they are too polluted are called impaired. They are placed on a list for future actions to reduce the pollution. The 303(d) list comprises those waters that are in the polluted water category, for which beneficial uses such as drinking, recreation, aquatic habitat, and industrial use are not being met.

Water quality requirements for salmonids include cool temperatures, high dissolved oxygen, natural nutrient concentrations, and low level of pollutants.[1] If the values of these factors exceed the desired range for a specific location and time of year, the ability of surface waters to sustain these fish populations is impaired.

In the Makah Area of Concern, 32 waterbodies were placed on the 303(d) list for water pollution in 2012, the latest year for which data is available. Water temperature was by far the most common pollutant which was in all but two of the waterbodies. Other pollutants were dissolved oxygen, pH, bacteria, and fine sediment and mercury (Lake Ozette is highest in Washington state). The Hoko River was the most impaired waterbody by total length with 11.0 miles impaired by water temperature. There were many occurrences in which the 7-day mean of daily maximum values (7-DADM) exceeded the temperature criterion of 16˚C for the Hoko River. Deep Creek has 8.8 miles impaired by water temperature, dissolved oxygen, and fine sediment.



Debbie Preston, NWIFC

Coho survey of a tributary of the Hoko River.

Citations

Chapter Summary

1 Golder Associations. 2009. Water Resource Inventory Area 20 Watershed Management Plan. Prepared for: Clallam County, Jefferson County, and the WRIA 20 Planning Unit.

Makah Tribe: WRIA 19 and portions of WRIA 20

1 North Olympic Peninsula Lead Entity for Salmon. 2015. Water Resource Inventory Area 19 (Lyre-Hoko) Salmonid Recovery Plan. Clallam County, WA.

2 Makah Tribe. 2016. Shapefile of Umbrella Creek Acquisition.

3 SSHIAP. 2004. Hillshade derived from University of Washington Digital Elevation Model (DEM). Olympia, WA: Northwest Indian Fisheries Commission.

4 USFWS. 2014. Polygons of FWS Approved Boundaries. Falls Church, VA: U.S. Fish and Wildlife Service.

5 WADNR. 2014a. Washington State DNR Managed Land Parcels. Olympia, WA: Washington Department of Natural Resources.

6 WADNR. 2014b. Washington State Non-DNR Major Public Lands (NDMPL) Polygons. Olympia, WA: Washington Department of Natural Resources.

7 WADOT. 2012. Linear representation of Washington State Routes (GIS Feature Class SR500kLRSSPS). Olympia, WA: Washington Department of Transportation.

8 WADOT. 2013. Polygons depicting the boundaries of Tribal Lands in Washington State. Olympia, WA: Washington Department of Transportation.

9 WAECY. 1994. Polygons of Washington State Shorelines and Boundary. Olympia, WA: Washington Department of Ecology.

10 WAECY. 2011a. NHD Major Areas, Streams, and Waterbodies. 1:24000. From U.S. Geological Survey (in cooperation with others) National Hydrography Dataset. Olympia, WA: Washington Department of Ecology.

11 WAECY. 2013. City Boundaries and Urban Growth Areas Polygons. Olympia, WA: Washington Department of Ecology.

Lack of Funding for Co-Manager Response

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