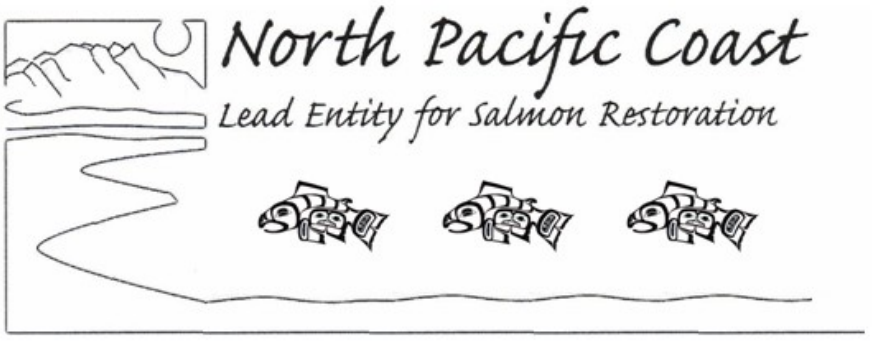

North Pacific Coast (WRIA 20) Salmon Restoration Strategy

(2020 Edition)

North Pacific Coast Lead Entity

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Approved by the North Pacific Coast Lead Entity

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Acronyms

CC	Citizen Committee
ESA	Endangered Species Act (U.S.)
ESU	Evolutionarily Significant Unit
IG	Initiating Governments
LE	Lead Entity
LWM	Large Woody Material (WA preferred term)
LWD	Large Woody Debris (earlier usage, still in play)
NOPLE	North Olympic Peninsula Lead Entity
NPCLE	North Pacific Coast Lead Entity
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service (NOAA).
RCO	Recreation and Conservation Office
SASSI	Salmon and Steelhead Stock Inventory
SRFB	Salmon Recovery Funding Board
TC	Technical Committee
WCSSP	Washington Coast Sustainable Salmon Partnership (aka Coast Salmon Partnership, CSP)
WDFW	Washington Department of Fish and Wildlife
WCRRI	Washington Coast Restoration and Resiliency Initiative
WRIA	Water Resource Inventory Area

Glossary

Definitions updated from Sustainable Salmon Plan for Coast Salmon Partnership, 2013 Glossary, used with some edits, where words appear in this strategy as well, with minor exceptions. See: https://www.coastsalmonpartnership.org/wp-content/uploads/2018/02/PLAN-5-7-13.pdf

A

ABUNDANCE (2)
The number of fish in a POPULATION at a particular LIFE-HISTORY STAGE of development.

AGGRADATION
An increase in river bed elevation and channel expansion. Occurs where sediment supply exceeds transport capacity.

ANTHROPOGENIC (6)
Caused or produced by human action Northwest Fisheries Science Center (NWFSC), NMFS, NOAA. 2008. *Glossary*. Online at: http://www.nwfsc.noaa.gov/trt/glossary.cfm

AVULSION (1, p. 14)
The rapid abandonment of a river channel by its waters and the subsequent formation of a new river channel as a result.

B

BARRIER
Any blockage, whether natural or anthropogenic, that impedes fish passage either upstream or downstream (e.g., waterfall or defective culvert). Barriers can be partial (e.g., barrier for certain life history stages) or full (all life history stages)

BASIN
An area of land and the waterbodies within it, where precipitation and/or groundwater collect and drain off into a common outlet, such as into a river, bay, or ocean. Often used interchangeably with *system, drainage* or *watershed,* and smaller drainage basins flowing into a larger one can be referred to as sub-basins.

BEST AVAILABLE SCIENCE ("BAS")
Peer-accepted data, interpretations, or processes.

BUFFER/RIPARIAN BUFFER
A riparian buffer is a vegetated area (a "buffer strip") adjacent to a waterbody, usually a stream, that stream (from tributaries to estuaries), usually forested, which intended to preserve or improve water quality for salmonids.

C

CHANNEL MIGRATION ZONE ("CMZ")
Channels meander from side to side naturally within the flood plain, as a result of the interaction between hydrology, geology, and topography. The area defined by this range of channel movement is called the Channel Migration Zone ("CMZ"). The rate of this migration depends on several factors such as geology, gradient, stream flow, sediment supply, natural instability, vegetation and anthropogenic impacts. King County Dept. of Natural Resources and Parks -- Snoqualmie/Skykomish Watershed Salmon Conservation and Restoration, *Appendix/Glossary.* 2015. Online at: http://www.govlink.org/watersheds/7/pdf/Snoq2015_App_A.pdf

CITIZEN SCIENCE
Research or field projects directed and overseen by peer scientists in a discipline, using persons less formally trained or qualified in the subject, to assist in tasks such as data gathering, computation, or observation.

D

E

ESCAPEMENT

The number of adult salmonids that escape the FISHERY, predation, and all other mortality, and return to the spawning grounds to breed (NWFSC, 2008).

ESTUARY

A partly enclosed coastal body of water in which river water is mixed with sea water; e.g., a bay; or, tidally influenced lower reaches of rivers, which may include marshes, sloughs, swamps, and tidal channels. The upstream boundary is usually defined by degree of salinity. (Saltwater→Brackish→Freshwater)

EVOLUTIONARILY SIGNIFICANT UNIT

A population must satisfy two criteria to be officially considered an ESU: (1) it must be substantially reproductively isolated from other conspecific populations units; and (2) it must represent an important component in the evolutionary legacy of a species (NMFS, NOAA, DOC, 2020).

F

FLUVIAL

Relating to a stream or river

G

GENETIC DIVERSITY

Variation in the genes (DNA). Genetic diversity may manifest in either discrete allelic states (of the genes) or continuously distributed characters, leading to different possible metrics. There may be variation in allelic states or phenotypic traits, potentially affecting fitness. [Hughes et. Al., Ecol. Letters (2008) 11:609-623].

H

I

INTRINSIC GROWTH RATE

The growth rate of a POPULATION at a low enough density so that density-dependent (COMPENSATORY) SURVIVAL is not a factor. The INTRINSIC GROWTH RATE of an individual fish is considered to be an outcome of the genetic selection traits that balance out the ability of the species to best utilize the variety of habitat, balance risks, and use resources available across its LIFE HISTORY and range.

INTRINSIC POTENTIAL

A modeled attribute of streams that refers to a measure of potential salmon habitat quality (Burnett et al., 2003). It only takes into account geomorphic features such as channel GRADIENT, valley constraint and mean annual discharge of water (NWFSC, 2008).

INTRINSIC PRODUCTIVITY

Productivity of a POPULATION in the absence of compensation, estimated as the mathematical limit of POPULATION productivity as abundance approaches zero. (See also SPAWNER/RECRUIT RELATIONSHIP.) (NWFSC, 2008).

J

JUVENILE

A salmon that has not matured sexually (gonads not fully mature) (NWFSC, 2008).

L

LACUSTRINE

Of or relating to a lake.

LARGE WOODY MATERIAL ("LWM")

Currently referred to as LW in scientific literature and historically called LARGE WOODY DEBRIS [see scoresheet, old term used…] ("LWD"). The term used for trees that meet a certain minimum length and size and fall into adjacent streams or other bodies of water. Their capacity to affect habitat depends on their size relative to the channel size and the types of soils in the CHANNEL MIGRATION ZONE. LWM, once in a channel, can serve to stabilize banks, create channel diversity, trap spawning gravel,

LIMITING FACTORS;
LIMITING FACTORS ANALYSIS ("LFA")
Factors that limit survival or abundance, either by causing a loss of habitat or habitat-forming function and processes, resulting in lowered carrying capacity of the watershed for critical stages of SALMON LIFE HISTORY. (See Chapter 3 of the WCSSP Regional Recovery Plan at https://www.coastsalmonpartnership.org/wp-content/uploads/2018/02/PLAN-5-7-13.pdf, : Critical Threats for examples.)

LISTED SPECIES
Species included on the *List of Endangered and Threatened Species* authorized under the federal ENDANGERED SPECIES ACT and maintained by the U.S. Fish and Wildlife Service and National Marine Fisheries Service of NOAA (NWFSC, 2008).

LITTORAL ZONE
In lakes, the area of lake bottom that receives enough light for rooted plants to grow. In the ocean, the marine ecological realm that experiences the effects of tidal and longshore currents and breaking waves to a depth of 5 to 10 m (16 to 33 feet) below the low-tide level, depending on the intensity of storm waves (Encyclopedia Britannica 2004; NWFSC, 2008).

LOWLAND HABITAT
Low-gradient stream habitat with slow currents, pools, and backwaters used by fish. This habitat is often converted to agricultural or urban use (NWFSC, 2008).

M

MACROINVERTEBRATES
As used in relationship to salmon habitat, insect larvae that live in POOLS AND RIFFLES and in the hyporheic (saturated) zone of stream banks, and provide forage food for salmon.

MASS WASTING
The technical name for landslides large and small. MASS WASTING is a natural process that wears down mountains and forms valleys over time. Improper forest practices can accelerate mass wasting, which can cause damage to fish streams. Mass wasting can also be triggered naturally by tectonic activity or saturation of sediment on steep slopes (WFPA, 2012). In the marine environment mass wasting is referred to as turbidity flows.

METADATA
Data that describes other data or refers to where such data may be found, and provides information about a certain item's content. For example, an image may include METADATA that describes how large the picture is, the color depth, the image resolution, or when the image was created. A document's
METADATA may contain information about size, authorship, or date, as well as summation.

MIGRATION
Movement of fish from one POPULATION to another (NWFSC, 2008); or from one habitat to another during the life cycle.

N

NOAA FISHERIES SERVICE/NMFS
The fisheries branch of NOAA, now correctly referenced as the National Marine Fisheries Service ("NMFS").

NON-ANADROMOUS
Salmonids (could just say Fish) that stay in freshwater their entire lives.
NON-ANADROMOUS fish that are RESIDENT spend their entire lives in the stream network where they were spawned. NONANADROMOUS fish that are FLUVIAL rear for some time in their natal stream, then migrate to a larger river to grow, and return to their natal stream to spawn. NON-ANADROMOUS fish that are adfluvial rear in their natal stream, then migrate to a lake or reservoir to mature, then return to their natal stream to spawn. (Quinn, T.P. 2005. *The behavior and ecology of Pacific salmon and*

trout. University of Washington Press, Seattle, WA, at page 4.)

O

OFF-CHANNEL HABITAT

Habitat types including abandoned, formerly active side channels, sloughs, dead-end channels, wetlands, isolated oxbows, and smaller watercourses and lakes in the floodplain, close to a river and maintaining an outlet connection to the main channel. These habitats are extremely important to JUVENILE salmon for overwintering rearing and as REFUGIA during high flow events (King County, 2015).

P

PACIFIC DECADAL OSCILLATION (PDO)

A pattern of Pacific climate variability that is the predominant source of inter-*decadal* climate variability in the Pacific Northwest. The PDO shifts phases on at least an inter-decadal time scale, usually about every 20 to 30 years. Identified in 1996 by the University of Washington's Climate Impacts Group researcher Nate Mantua and others, the PDO (like ENSO) is characterized by changes in sea surface temperature, sea level pressure, and wind patterns. The PDO is detected as warm or cool surface waters in the Pacific Ocean north of 20° N. During a "warm" or "positive" phase, the west Pacific becomes cool and part of the eastern Pacific warms; during a "cool" or "negative" phase, the opposite pattern occurs. (CIG: PDO). (See also ENSO.)

PHENOLOGY

The timing of recurring biological events or presentation of species in a particular habitat range as a result of suitable conditions; often used in climate science to describe shifting occurrences both temporally and geographically because of changes in a habitat's biological, physical or chemical conditions.

PHOTIC ZONE

The depth of the water in a lake or ocean that is exposed to sufficient sunlight for photosynthesis to occur. The depth of the photic zone can be affected greatly by seasonal turbidity.

POPULATION (of salmon)

"An independent population is a group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place at a different season" Ricker, W. E. 1972. Hereditary and environmental factors affecting certain salmonid populations. In R. C. Simon and P. A. Larkin (eds.), The Stock Concept in Pacific Salmon, p. 27-160. University of British Columbia, Vancouver, B. C.

PRODUCTIVITY

Also known as population growth rate. The rate at which a POPULATION is able to reproduce offspring under a given set of environmental conditions. This can be restricted to particular life stages.

R

REACH

A segment of a stream (e.g. 50 to 500 m) with a uniform set of physical characteristics, which is usually bounded by a hardened hydraulic control point or significant change in habitat type or gradient on each end (NWFSC, 2008).

RECOVERY

A general term for the reestablishment or restoration of POPULATIONS reduced in size or at risk. It is used in two senses: in a "narrow sense" as it is defined in the ESA (see DELISTING), and in a "broad sense" to include efforts that extend beyond the requirements of the ESA (NWFSC, 2008). (See RESTORATION).

RECOVERY PLAN

Under the ENDANGERED SPECIES ACT (ESA), a document identifying actions needed to improve the status of a SPECIES or ESU to the point that it no longer warrants continued

protection under the statute (NWFSC, 2008).

REFUGIA
Areas or locations in fish habitats that provide shelter or protection during times of danger or distress, or are of high-quality habitat that support populations limited to fragments of their former geographic range. REFUGIA may be a center from which dispersion may take place to re-colonize areas post disturbance. REFUGIA can refer to habitat features such as pools, but may also refer to places of retained water level in drought, off-channel wetlands during flood events or bodies of water offering thermal refugia.

RESIDENT
Describes NON-ANADROMOUS salmon who spend their entire lives in the stream where they were spawned (Quinn, 2005, p. 4). (As distinct from fluvial and adfluvial.)

RESTORATION (or BROAD-SENSE RECOVERY)
1) Referring to Endangered Species Listing, the process leading to, or condition under which, a particular EVOLUTIONARILY SIGNIFICANT UNIT ("ESU") of a salmon has returned to sufficient numbers and GENETIC DIVERSITY that it can be deemed self-sustaining and can be harvested economically (NWFSC, 2008);
2) Referring to habitat, an action that removes or repairs a threat (as defined in Chapter 3 - Threats of this document) or otherwise returns salmon habitat to a condition that fully supports a salmon life-cycle stage.

RIPARIAN
The interface between land and a stream; the geographic area around the edge of a waterway where the land and the waterway meet, overlap and interact most directly. Plant communities along the river banks are called riparian vegetation. RIPARIAN ZONES are significant in ecology and environmental management because of their role in soil conservation, their biodiversity, and the influence they have on aquatic ecosystems and may also provide microclimates; their bank stability can influence channel morphology and hence, habitat. They can occur in many forms, including grassland, woodland, wetland or even non-vegetative (ODFW, 2003). The RIPARIAN MANAGEMENT ZONE is sometimes referred to as the "RMZ." [the troops may want to rework this one.]

ROAD MAINTENANCE AND ABANDONMENT PLAN ("RMAP")
A forest road inventory and schedule for any repair work that is needed to bring roads up to state standards. It is prepared by the landowner and approved by WDNR. Washington State forest management laws require most private forest landowners to prepare and submit Road Maintenance and Abandonment Plans. (DNR:RMAP). See: http://www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_rmap.aspx

RUN
The total number of adult salmon that survive the natural mortality agents and head back to freshwater, usually their natal stream, to spawn. Those that evade causes of mortality and spawn are called the ESCAPEMENT (Quinn, 2005, p. 4).

RUN TIMING
The identified time periods each season of the year (usually identified by week) attributed to each species or separately identified stock of ANADROMOUS or RESIDENT salmon on their spawning run, when those populations typically enter an area—the mouth of a river or other terminal area—and then also when those same populations arrive and spawn in their particular upriver spawning areas (NWFSC, 2008).

S

SALMONID
Any of the SPECIES of fish in the family Salmonidae, including salmon, trout, and char (NWFSC, 2008). For this document, both *Oncorhynchus* and *Salvelinus* (bull trout or char) are included.

SCOUR
The erosive action of running water in streams, which excavates and carries away material from the bed and banks. SCOUR may occur in both earth and solid rock material (StreamNet, 2012). The removal of river and stream bed material caused by swiftly moving water. The presence of LWM in a stream channel can restrict channel width, accelerating flow and increasing the water's force on stream bed material and causing SCOUR around and downstream of the restriction. This process is key in the creation of pools and riffles essential for good salmon habitat. SCOUR is also a major cause of bridge failure when bridge supports restrict stream channels.

SERAL
Of or relating to the entire sequence of ecological communities successively occupying an area from the initial stage to the climax. Often used to describe a phase in maturation of forests, for example, "a seral stage"; "a seral community."

SMOLT
A life stage of salmon that occurs just before the fish leaves fresh water. SMOLTING is the physiological process that allows salmon to make the transition from fresh to salt water. (NWFSC, 2008). The transitions involved include altering their color, shape, osmoregulatory (salt balance) physiology, energy storage, patterns of drinking, urination and behavior (Quinn, 2005, p. 3-4).

SPECIES
Any distinct
POPULATION segment that interbreeds when mature and has sexually viable offspring. By NOAA policy, the last definition includes EVOLUTIONARILY SIGNIFICANT UNITS (ESUs) of salmon (NWFSC, 2008).

STAKEHOLDER
A party with an interest in a proceeding. Generally "STAKEHOLDERS" are considered distinct from governmental entities, which have a management role as well as a financial or political interest.

SUSTAINABLE
Refers to a population that is able to maintain its genetic legacy and long-term adaptive potential for the foreseeable future (NWFSC, 2008).

T

TERMINAL FISHERIES
FISHERIES near freshwater (usually the mouth of rivers or bays or near a hatchery release site) where the targeted species is returning to spawn. This definition includes the WDFW term "extreme terminal fisheries" defined by Crawford as ". . . areas where hatchery fish can be harvested with minimum impact on WILD STOCKS" (Crawford, 1997, Northwest Fisheries Science Center, NOAA. *Glossary*, p. 24. Online: http://www.nwfsc.noaa.gov/publications/techmemos/tm32/chapters/glossary.html

TERMINAL RUN SIZE
The number of fish in a RUN or POPULATION that return capable of spawning.

THREATENED SPECIES
Under the federal ESA, any SPECIES that is likely to become an ENDANGERED SPECIES within the foreseeable future throughout all or a significant portion of its range.

TURBIDITY
A water quality parameter that describes suspended particles and measures the degree to which they affect water clarity. The unit of measurement is NTU (Nephelometric Turbidity Units). For salmon, the state water quality standards for TURBIDITY and the range of tolerances are found in WAC 173-201A-200 (1)(e). FINES can not only adversely impact salmon eggs (by blocking INTERSTICES and limiting oxygen), but also can harm salmon gills.

END OF GLOSSARY

"Protect the best and restore the rest."

Executive Summary

The primary goal of the North Pacific Coast Lead Entity (NPCLE) is to maintain and improve ecosystem productivity and genetic diversity for all WRIA 20 salmonid species by protecting the existing highly productive habitats and populations, and restoring impaired habitat and populations with the potential to recover. To accomplish this goal the Lead Entity will utilize the best available science to set priorities, and incorporate socio-political factors in decision-making that help provide direction and focus for the success of project sponsors (NPCLE, 2007).

The North Pacific Coast is the newest Lead Entity for salmon recovery in Washington State (27th) under the Salmon Recovery Funding Board, and encompasses the same boundary as Watershed Resource Inventory Area 20 (WRIA 20). In 2006 this group split off of the North Olympic Peninsula Lead Entity (NOPLE), whose watersheds all drain into the Strait of Juan de Fuca, and became the North Pacific Coast Lead Entity (NPCLE), which has all watersheds draining into the Pacific. NPCLE is also a member of the Washington Coast Sustainable Salmon Partnership (WCSSP) similarly established in 2007. This group has informally changed its name to Coast Salmon Partnership (sometimes "CSP"). WCSSP is a strategic regional association comprised of the four Lead Entities (LEs) along the Washington coast: Pacific County LE, Chehalis Basin LE, Quinault Indian Nation LE, and North Pacific Coast LE. In 2014 the Washington Coast Sustainable Salmon Foundation (WCSSF) was established as a non-profit supporting organization to WCSSP that serves as its fiscal agent and fundraising partner. This entity has informally changed its name to Coast Salmon Foundation (sometimes, "CSF"). See https://www.coastsalmonpartnership.org/.

The North Pacific Coast recovery area encompasses 935,250 acres of land and over 80 miles of coastline starting in the south in the Hoh River Basin at the Steamboat Creek drainage, and extending north to the Ocean Creek drainage at Cape Flattery. The largest drainage area is the centrally located Quillayute River watershed, which is fed by the Dickey, Sol Duc, Calawah and Bogachiel River systems. The north end of this salmon recovery area is dominated by the extensive stream basin of Lake Ozette and the independent drainages of the Tsoo-Yess and Wa'atch Rivers.

The area experiences some 90-240+ inches of rainfall per year, being located in one of three temperate rain forests in the world. Land ownership in this region is dominated by federal, state, tribal and private commercial forest holdings. Wilderness or late seral stage forest protection covers much of the upper watersheds and nearly all the coast. The coast also includes reservation lands belonging to three tribes with an extensive overlay of off-reservation treaty rights, the Usual and Accustomed (U & A) fishing areas covering each watershed and going out into the Pacific Ocean. These U&As have been defined by federal courts. In addition to tribal U&As the nearshore is under several layers of state and federal authority depending upon the resource. Except for reservation lands, the lower elevation portions of the river systems are predominantly in either privately or government-owned commercial forestry. The relatively small remainder is in diverse rural-residential, recreational and agricultural use. There are several small urban centers, with the City of Forks as the largest.

Two salmonid species in NPCLE have been listed for federal protection: bull trout (*Salvelinus confluentus*) and Lake Ozette sockeye (*Onchorhynchus nerka*). Both of these species are listed as threatened under the federal Endangered Species Act (ESA). The five year review of the Recovery Plan for

Bull Trout was completed by the U.S. Fish and Wildlife Service (USFWS) in 2008 and in 2010 they released an update to the critical habitat designation (USFWS, 2010). The National Oceanic and Atmospheric Administration's (NOAA) has finalized the Lake Ozette Sockeye Recovery Plan (NMFS, 2009) and is currently prioritizing its first actions in concert with the Lake Ozette Sockeye Steering Committee. Chinook (*Onchorhynchus tshawytscha*), coho (*Onchorhynchus kisutch*), chum (*Onchorhynchus keta*) and steelhead (*Onchorhynchus mykiss*) stocks in NPCLE, and Lake Pleasant sockeye, are not federally listed. A status assessment on these latter populations has not been undertaken since 2002 (SASSI, 2002). However, recent tribal escapement data on many of these stocks show declines in recent years that could support designations of depressed or even critical (PFMC, 2010 and Appendix C). Currently preferred language for describing stock status; is "stable, declining, or rising" (see Appendix C-3 from Manual 18 of the Recreation and Conservation Office –"RCO", the state agency managing salmon restoration grant programs).

This strategy document has two primary sections: The first section describes the goals and objectives of the plan, the methodology of how projects are identified and annually prioritized, and the application procedure for individuals and organizations who wish to apply as project sponsors.

The second section is broken down into geographic regions by watersheds, and contains a final section that covers a nearshore project area along the entire coastline of WRIA 20. Chapters within Section 2 first provide the context of restoration in the specific basin and then provide a current list of the highest prioritized projects for each basin or habitat region.

ACKNOWLEDGEMENTS:

The North Pacific Coast Lead Entity Initiating Governments and Citizen Committee would like to thank all the hard work of the Technical Committee (Appendix E) and the Lead Entity Coordinator, and staff of the Coast Salmon Partnership and UW ONRC in producing this updated strategy for salmon restoration in WRIA 20. They would also like to acknowledge the extremely valuable regional publications that preceded and support this document by providing the scientific information that is the basis for its authority, including Carol Smith's (2000) Limiting Factors Analysis, the 2005 version of NOPLE's strategy (NOPLE, 2005), Jay Hunter's (2006) compilation of salmon restoration prioritization for the Quillayute Basin, the North Pacific Coast Lead Entity 2007 Initial Habitat Strategy for Salmonid Projects Considered within WRIA 20 (NPCLE, 2007), the 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, and 2019 editions of the North Pacific Coast (WRIA 20) Salmon Restoration Strategy, and the Hoh Basin tributary analysis by McMillan and Starr (2008). New references regarding climate or other areas of study will be footnoted or otherwise referenced within.

Dedicated to the memory of

Jim Jacoby
(1944-2012)

For his steadfast support of salmon restoration on the North Pacific Coast

Section 1: Project Prioritization and Application Process

1.1 Goals and Objectives

The primary goal of the North Pacific Coast Lead Entity is to maintain and improve ecosystem productivity and genetic diversity for all WRIA 20 salmonid species by protecting highly productive habitats and populations, and restoring impaired habitat and populations with the potential to recover. To accomplish this goal the Lead Entity will utilize the best available science to set priorities, and also incorporate socio-political factors in decision-making that help provide direction and focus for the success of project sponsors (NPCLE, 2007).

A second goal is to work with partners to engage the public in Outreach and Education projects, through a variety of methods as funding permits: professionally guided citizen science; classroom programs; media presentations and website development; mentoring and/or internships; festivals and promotional events; or lecture series.

A third goal will be to identify areas worthy of peer-level research in the hope that this will attract universities and other research facilities to collaborate on future projects in this WRIA.

For on-the-ground restoration projects, a guideline publication consulted in most of the salmon habitat prioritization processes applied to WRIA 20 basins in recent years is "A Review of Stream Restoration Techniques and a Hierarchical Strategy for Prioritizing Restoration in Pacific Northwest Watersheds" (Roni, Beechie, Bilby, Leonetti, Pollock and Pess, 2002). This publication presents the results of an analysis by Northwest Fisheries Science Center scientists of several types of restoration approaches and their effects on multiple salmonid species over time. The primary recommendations promoted in this publication have been adopted by the North Pacific Coast Lead Entity in its project prioritization process (NPCLE, 2007), and they serve as the default prioritization guidance for projects that have not yet been identified and ranked in this document.

The Roni et al (2002) review found that *"watershed restoration should focus on restoring natural processes that create and maintain habitat rather than manipulating instream habitat."* Based on that philosophy, the authors suggest that restoration efforts are usually most effective if they adhere to the following hierarchical strategy:

1. **Analyze the site**: The first step is an analysis of the watershed, reach or project site. The analysis should identify both healthy and degraded habitat based on the natural characteristics of the site. If degraded habitat is found, determine what habitat-forming processes specific to that site are altered and the factors responsible.
2. **Protect the best**: The most effective step after the analysis is to protect salmonid habitat that is already healthy.
3. **Reconnect healthy habitat**: The next most effective action is to reconnect healthy but isolated habitat. Examples include removing fish passage barriers (culverts, weirs, and other

barriers to formerly accessible fish habitat) and reconnecting the stream or river to sloughs, wetlands, high flow channels and estuarine habitat.

4. **Fix bad roads**: Road repair is high on the list because failing and poorly designed roads impair salmonid habitat in many ways. Roads can increase delivery of fine sediment that chokes spawning beds. Culverts can change stream hydrology or block the transport of sediment, wood and nutrients. Road-related landslides can increase bedload supply, filling rearing pools and impairing channel function.
5. **Restore riparian processes**: Damage to the riparian zone includes any alteration that disrupts its normal interaction with the stream, river or wetlands, or reduces the availability of food resources for rearing salmon. Examples include: dominance by invasive weeds; truncation of the floodplain through channelization, bank armoring, dikes, some modes of timber harvest; improper harvest of buffer trees; conversion of riparian zones from conifers to hardwoods (which can reduce the long-term supply of LWM); and livestock grazing in riparian corridors (which can cause stream bank erosion, channel sedimentation and widening, and decreased water quality).

6. **Restore instream habitat**: Instream habitat restoration (adding Large Woody Material-LWM, boulders, spawning gravel and nutrients) is last because it has tended to be a temporary fix and because results are variable. LWM placement should promote natural channel forming processes by mimicking natural LWM accumulations which are replenished by yearly high flows and as such should be secure enough to withstand peak flows. LWM used as a channel roughening agent should be complex and remain well anchored but use the minimum amount of metal hardware.

Incorporating Climate Change

Climate change has the potential to add new stressors to salmon habitat or aggravate existing conditions and so serves as an overarching goal in this strategy. In 2016 NPCLE determined to add this subject as an overlay to all goals, and to the scoring process. WRIA 20's location and lack of major urban development are shielding it from the most rapid changes, such as those presently experienced on the west coast of Alaska; however, change is happening, and indicators can differ even among the respective watersheds of the WRIA. These may include, but are not limited to, new or increased invasive weed presence, extremes in seasonal stream discharge and temperature, or ocean chemistry in the nearshore. Project sponsors are encouraged to take climate change into consideration wherever applicable or possible.

Many of the new risks to salmon can be attributed to phenology (shifts in locality because of temperature and/or precipitation changes on land, or temperature and/or chemistry changes in the ocean, leading to introduction of new species to a region, and loss or reduction of historically native species.[1] While NPCLE does not work on ocean conditions beyond the nearshore, the impact of changing food supplies for salmon beyond the smolt stage makes it even more critical to improve conditions for them at

[1] While some climate research and summation of watershed status has been done locally (see, e.g., downloadable studies and a metadata list at https://quileutenation.org/natural-resources/climate-change/, the extension of our rainforest into British Columbia and S.E. Alaska has been the subject of relevant peer-reviewed research, as well: Shanley, C. S. et al., *Climate change implications in the northern coastal temperate rainforest of North America.* Climate Change (2015) 130:155-170. Parallels can be drawn.

spawning and juvenile stages. [2] .

Climate-driven phenological effects are also evident for invasive species. New field observations have indicated that some invasive weeds previously assigned only to terrestrial impact have been discovered to impair channel habitat as well, and have long-term allelopathic properties, notably Scotch broom (*Cytisus scoparious*), the seeds of which are allegedly viable for 75 years.[3] The leaf litter of invasive *Polygonum* spp. (knotweed, a flowering cane) has less nutritive capacity than native plants, with an adverse domino effect on macroinvertebrates of the hyporheic zone, thus adversely impacting juvenile salmonids. Knotweeds thrive in riparian zones and sand bars and aggressively expand their range vegetatively.[4]

Education and Outreach

In recent years, RCO has accepted projects that are not directly habitat restoration per se, but support or lead to salmon species restoration through outreach and education. For example, Citizen science is a valuable contribution, especially in the current financial climate, but it is important that citizens do not act outside the framework of a managed research or field project. Such programs to be eligible for funding hereunder must have oversight by a professional, a clear quality assurance/quality control plan that has been approved by a federal, state, local, or tribal government, and have transparent reporting of data.

Similarly, classroom programs/field trips must have the endorsement of the school or institution for which they are designed, before submitting a project to NPCLE. Festivals, lectures and media presentations, websites, and any other plan to produce written or audio material must have oversight/review by persons with technical expertise regarding salmon.

Regardless of the form Outreach/Education projects may take, each must have a clear relationship to the overall technical goals of this strategy and support restoration on the ground. Projects should be conducted within the WRIA 20 boundary, unless it can be clearly demonstrated why performing them in a different area would benefit the

[2] Scheurell, M.D., Zabel, R.W. and Sandford, B. P. *Relating juvenile migration timing and survival to adulthood in two species of threatened Pacific salmon (Onchorhynchus spp.)*. J. of Applied Ecology, 2009, 46, 983-990. See also the pending research (sent to publication) by SeaGrant staff in *The Cordova Times,* November 17, 2017, involving adverse impact of ocean acidification on olfactory senses of ingressing salmonids.

[3] Muir, J.L. and Vamosi, J.C. *Invasive Sctoch broom (Ctisus scoparius, Fabaceae) and the pollination success of three Garry oak-associated plant species.* Bio. Invasions. 2015. DOI 10.1007/s10530-015-0886-3. See also Weidenhamer, J. D. andCallaway, R.M. *Direct and Indirect Effects of Invasive Plants on Soil Chemistry and Ecosystem Function.* J. Chem. Ecol. (2010) 36:59-69.

[4] Urgenson, L.S. Reichard, S.H, and Halpern, C.B. *Community and ecosystem consequences of giant knotweed (Polygonum sachalinense), invasioninto riparian forests of western Washington, USA.* Biological Conservation , in press 2017 (seems to have been submitted 2009). See also Claeson, S.M., LeRoy, C.J, Barry, J.R., and Kuehn, K. A. *Impacts of invasive riparian knotweed on litter decomposition, aquatic fungi, and macroinvertebrates.* Biological Invasions. 2013 DOI 10.1007/s10530-013-0589-6. "The final publication is available at link.springer.com":

WRIA 20 geographic region. While RCO has been the primary funding source of WRIA 20 projects to date, the strategy can include projects that may lie outside RCO's purview.

1.2 Project Prioritization Method

The process of prioritizing projects within the WRIA 20 boundaries has been revised from the 2007 strategy to focus evaluation more on how proposed projects will affect critical watershed processes and biological integrity within varying spatial and temporal scales. However, most of the key prioritization considerations from the original strategy remain as key components in this revised strategic restoration plan, which in turn incorporated most of the same prioritization variables utilized by Quileute Natural Resources in its assessment of salmon projects in the Quillayute watershed (Hunter, 2006), and the old North Olympic Peninsula Lead Entity strategy (NOPLE, 2005) under which the initial SRFB projects in WRIA 20 were implemented from 1999-2006. The primary development of the new prioritization matrix presented here took place in 2008 and 2009 with its draft application to Hoh River Basin projects for Rounds 9 and 10 of the Salmon Recovery Funding Board. Its final implementation across WRIA 20 was in the 2010 Edition of The North Pacific Coast (WRIA 20) Salmon Restoration Strategy.

This new prioritization matrix has been developed with a suite of characteristics selected by the NPCLE Technical Committee to address the types of projects and strategy they employ, the physical habitat conditions, and the biological conditions of the fish and their immediate environment that follows from Roni et al, 2002. The first three categories of the matrix are for overall consideration in promoting a project to be on the annual restoration project list (Appendix B). For individual projects being proposed in a specific round, the matrix further considers variables such as the urgency of the project to be undertaken immediately, the likelihood of success given the qualifications of the sponsor, the specific requirements of the grant round, and the level of community support.

Table 1 lists each metric with a brief description and the range of points used for ranking and weighting projects by the NPCLE Technical Committee.

(Table 1 appears on the following two pages)

PROJECT NAME / # :		REVIEWER NAME:		
CATEGORIES			**SCORE**	**COMMENTS** (Reviewer)
PROJECT STRATEGY (score only as many as appropriate)	**Category Description**	**Score Range**	(Reviewer)	
Preservation/Protection.	Obtains protection from direct human impacts to habitat conditions through conservation easements or land purchase.	**0 to 10**		
Assessment to define projects and/or to fill data gaps.	Conducts archival and empirical studies to document or ground truth current conditions prior to identifying specific restoration actions.	**0 to 10**		
Restoration of Processes - Long term	Undertakes actions that support natural processes to recover habitat conditions.	**0 to 10**		
Restoration of Physical Habitat - short term	Undertakes restoration of degraded habitat to immediately improve habitat conditions on a temporary time scale.	**0 to 5**		
Reconnect Fragmented / Isolated Habitats	Undertakes actions that repair physical corridors and restores functions of previously connected habitat areas.	**0 to 10**		
	Category Description	**Score Range**	**SCORE** (Reviewer)	**COMMENTS** (Reviewer)
Acquisition/Easement	Purchase and/or a contractual agreement to maintain or improve salmon habitat conditions.	**0 to 4**		
Fish Passage	Remove stream-crossing structures or restore, upgrade and replace stream-crossing structures to allow migration of all fish life history stages and the natural movement of streambed material and large woody material.	**0 to 4**		
Road Decommissioning	Elimination of existing road(s) and reestablishment of natural channel configuration and natural habitat functions.	**0 to 4**		
Drainage / Stabilization	Increase water crossing structure sizes to better accommodate peak flows. Increase number of cross drains to avoid excess flow into any drainage, and/or remove side cast at segments in risk of failure.	**0 to 4**		
Flood Plain & Wetland	Reconnect or re-design lowlands, road segments, dikes, bank armoring, revetments and fill that are specifically impacting floodplain, channel, or wetland function.	**0 to 4**		
Large Woody Debris Placement	Design and place engineered woody material accumulations and logjam structures to enhance channel stability, diversity, and spawning substrate, accumulate natural wood, and/or to protect significant habitat features for the maintenance of productive fish habitat.	**0 to 4**		
Riparian Restoration	Inventory and remove invasive species along banks and river bars within basins using appropriate methods for removal and control. Promote appropriate age and species composition of vegetation through landscape engineering and replanting. Fence riparian areas from livestock, relocate parallel roads and other infrastructure from riparian areas.	**0 to 4**		
Instream structure removal / abandonment	Permanent removal of culverts, failed bridges, cedar spalts, and other anthropogenic instream blockages so that the channel returns to natural conditions.	**0 to 4**		
Instream Structure Improvement/replacement	Improve or replace existing culverts, bridges, or other failed instream structures so that the channel returns to adequate function for the support of salmon habitat.	**0 to 4**		
Other	Special assessments, experimental techniques, quantitative and spatial modeling or the application of new technology.	**0 to 4**		

(continued)

(continued from other side)

	Category Description	Score Range	SCORE (Reviewer)	COMMENTS (Reviewer)
Salmonid Habitat Quality	Water quality, pool frequency, channel composition, LWD frequency positively affected by the project .	0 to 4		
Salmonid Habitat Quantity	Increase in stream length, estuary or off-channel area after project completion.	0 to 4		
Salmonid Life Histories	Range of salmon life history stages addressed and positively affected by the project (e.g. spawning, rearing, migration).	0 to 4		
Salmonid Species Diversity (current)	Number of salmonid species positively affected.	0 to 4		
Riparian forest and native vegetation	Are riparian areas healthy with native vegetation or will invasive species and/or restoration be addressed?	0 to 4		
Sediment Control	Anthropogenic or geomorphic- sediment issues and/or their restoration positively affected by the project.	0 to 4		
Climate Adaptation	Climate adaptation is formally incorporated into project benefits and addressed in the proposal description.	0 to 4		
Salmonid habitat connectivity	Improvement or maintenance of connectivity to functional or high quality habitat.	0 to 4		

	(score applicant based on track record and documented resources)	Score Range	SCORE (Reviewer)	COMMENTS (Reviewer)
Applicant is or has an appropriate project sponsor.	How complete and balanced is the project team?	0 to 4		
Likelihood of satisfying the granting agency.	How does this project address the funding requirements of the granting agency?	0 to 4		
Accuracy and completeness of budget.	Are projected expenses realistic relative to documented costs and are they adequate?	0 to 4		
Urgency for immediate implementation.	Are there timing issues for this projects success that make it more important to move forward now?	0 to 4		
Qualifications	Qualifications / track record of sponsor/partners	0 to 4		
Local Community Support	Is there endorsement (e.g support letters) of affected landowners, support by economic sectors, community awareness and adequate buy in?	0 to 4		
		TOTAL:		

1.2.1 Descriptions of Prioritization Categories:

A description for each category in Table 1 is provided below to more thoroughly explain how ranking criteria for potential and proposed projects are being applied by the NPCLE review teams.

Project Strategy: The project is assessed first as to whether it is following one or more of the following strategies, and then scored as to how adequately it proposes to accomplish each strategy that is identified.

- **Preservation/Protection:** Obtains protection from direct human impacts to habitat conditions through conservation easements or land purchase. The land should be high quality salmon habitat to begin with and/or include a long term management plan that restores it and allows it to be self-sustaining as high quality salmon habitat.
- **Assessment/Monitoring to Fill Data Gaps:** Conducts studies to document or ground truth information about current conditions prior to identifying specific restoration actions and to identify what and where restoration actions are most appropriate.
- **Restoration of Processes - Long Term:** Undertakes actions that support natural processes to recover habitat conditions. Actions primarily involving geomorphic or vegetation modifications that support or enhance existing natural conditions that may require years for measurable effects. Examples would be a bridge, reconnecting off-channel habitat and road decommissioning.
- **Restoration of Physical Habitat - Short Term:** Designs restoration of degraded habitat to immediately improve habitat conditions on a temporary basis. Projects are designed to mimic and promote natural processes in order to preserve critical conditions; usually with the hope, but not a high probability of incorporation into long term processes. Examples would be invasive plant removal, stream grade control, or other projects that require on-going maintenance.
- **Reconnect Fragmented/Isolated Habitats**: Undertakes actions that repair physical corridors and restore functions of previously connected habitat areas. This includes any fish passage blockages between previously available spawning habitat as well as important juvenile foraging areas.

Project Method: The project is assessed first as to whether it is utilizing one or more of the following methods, and then scored as to how adequately it proposes to apply each method that is identified.

- **Acquisition/Easement**: Purchase land, or establish an easement or other temporary contractual agreement for land, in order to maintain or improve salmon habitat conditions.
- **Fish Passage**: Remove stream-crossing structures or restore, upgrade and replace stream-crossing structures to allow migration of all fish life history stages and the natural movement of streambed material and large woody debris.
- **Road Decommissioning**: Eliminate existing road(s) for the reestablishment of natural channel configurations and natural habitat functions.

- **Drainage/Stabilization**: Increase water crossing structure sizes to better accommodate peak flows. Increase number of cross drains to avoid excess flow into any drainage, and remove side cast at segments in risk of failure.
- **Flood Plain & Wetlands**: Reconnect or re-design lowlands, road segments, dikes, bank armoring, revetments and fill that are specifically impacting floodplain, channel, or wetland function. This can include removing, relocating and re-designing road segments, dikes, bank armoring, revetments or fills that are specifically impacting floodplain or wetland function and hydrology.
- **Large Woody Material Placement:** Design and place large wood material structures to promote natural channel processes. These structures provide cover; create channel complexity, segregate and stabilize spawning substrate; trap and accumulate natural large woody material; and/or to protect significant habitat features within flood plains for the maintenance of productive fish habitat.
- **Riparian Restoration**: Restore riparian processes by inventorying and removing invasive species along banks and river bars within basins using appropriate methods for removal and control. Promote appropriate age and species composition of vegetation through landscaping, thinning, planting, understory vegetation control, conversion of riparian areas to mixed stands and replanting. Fence riparian areas from livestock; relocate parallel roads and other infrastructure away from riparian areas when possible.
- **Instream Structure Removal/Abandonment:** Permanently remove culverts, failed bridges, cedar spalts, and other anthropogenic instream blockages so that the channel returns to natural conditions.
- **Instream Structure Improvement/Replacement:** Improve or replace existing culverts, bridges, or other failed instream structures so that the channel returns to adequate function for the support of salmon habitat.
- **Other:** Conduct special assessments, perform quantitative and spatial modeling or apply new technology. Examples include assessments or monitoring of riparian conditions, cold water refugia, invasive species, rip-rap, culverts, etc.

Habitat and Biology Addressed: The proposed actions at the location of the project are assessed for each of the following ecological conditions and scored as to how the project improves conditions.

- **Salmonid Habitat Quality**: Pool frequency, channel type and sediment composition, water quality, riparian cover, large woody material frequency that are positively affected by the project or if conditions are maximally functional to begin with, how are they maintained by the project?
- **Salmonid Habitat Quantity:** Stream length/wetland/estuary area that is affected by the project. Is this a small postage stamp effect, or does the project affect a much larger area or system of habitats?
- **Salmonid Life Histories**: Range of salmon life history stages addressed and positively affected by the project (e.g., spawning, rearing, migration).
- **Species Diversity**: Currently documented salmonid species in the system. Is it one stock or multiple stocks that will be affected by the project?

- **Riparian Forest and Native Vegetation**: Are riparian areas healthy with native vegetation or will invasive species and/or restoration be addressed?
- **Sediment Control**: Are there anthropogenic or geomorphic sediment issues that the project addresses for an improvement in salmon habitat? If there are not current sediment issues, will the project potentially affect sediment negatively or will sediment stability be maintained or improved?
- **Climate Adaption**: Is the project area currently showing impact(s) from climate change and if so, will the project restore or remedy such impacts, or help to prevent future impacts? Examples: Are changes in precipitation pattern affecting water quantity or quality? Are new invasive species taking advantage of changes in precipitation? If so, how will the project address these changes?
- **Salmonid Habitat Connectivity**: Physical interconnection with functional or high quality habitat, or habitat that is already protected. Is this an isolated habitat or is it one that plays an important role in a larger system of habitats? Will the project positively improve or maintain connectivity?

Likelihood of Success: Assessed for the project proposal in terms of adequacy for each of the following.

- **Sponsor**: The applicant is or has teamed up with an appropriate project sponsor that provides a balanced and adequate project team.
- **Likelihood of satisfying the granting agency**: The project addresses the requirements for a successful award as identified by the granting agency in its application materials. The application is competitive and not lacking explanation in areas the granting agency has indicated are important.
- **Budget:** The budget is complete and projected expenses are realistic relative to documented costs, which are also adequate for successfully completing the project. The over-all cost of the project is realistic relative to the amount funds available from the granting agency.
- **Urgency**: The project has a time-sensitive aspect that makes it more important to be implemented in the present grant cycle. The project is either in an important sequence of restoration actions that merits consideration, or is restricted to an opportunistic time window where the scope or scale of the project will otherwise be lost or diminished.
- **Qualifications**: The training and experience of the sponsor and/or partners and their track record performing equivalent professional services will demonstrate a strong likelihood of success.
- **Community support**: The sponsor has demonstrated community awareness of, and support for, the project. Examples include documentation of landowner willingness to participate or provide access to the project; or letters of support from affected community organizations, economic sectors, local governments, and/or tribes.

1.3 Review Process (Project application procedure, form, and explanation of the evaluation process).

The project review process for the annual Salmon Recovery Funding Board (SRFB) rounds requires a pre-proposal application to the North Pacific Coast Lead Entity in the spring, prior to submission of the project to SRFB's late summer deadline; with the final award in December of the application year. Normally funds are then available for implementation of the project in the following Spring-Summer. The full pre-application package for the current year can be found in Appendix A of this document.

Periodically NPCLE will also review projects for other funding sources independent of SRFB. Under circumstances where other funding agencies are involved the Technical and Citizen Committee reviewers will either use the funding organization's required criteria or employ the matrix in Table 1 and adapt it to any peculiarities specific to those funding requirements if necessary.

Many streams and rivers in the NPCLE area still do not have prioritized lists. To help applicants choose appropriate projects in these watersheds, NPCLE has chosen Roni et al. (2002) as its default prioritization guideline as outlined on pages 6-7 above in concert with the Prioritization criteria presented in Table 1.

For questions or assistance in developing a project in WRIA 20 the North Pacific Coast Lead Entity Coordinator working out of Clallam County and Olympic Natural Resources Center in Forks (Frank Hanson 360-374-4556, fsh2@uw.edu) can help you get started by identifying potential sponsors, partners and sources for technical assistance.

1.4 Annual Project List:

The annual project list identifies actions or programs in WRIA 20 that are reviewed by the Technical and Citizens Committee for additions and subtractions each year. Additions to the list come from new projects recommended by stakeholders and Technical Committee members over the previous year, and subtractions from the list are made when projects are completed or conditions have changed so that the project is no longer relevant for further consideration. The list is generated independently for each of the five habitat regions in WRIA 20: the three primary watershed basins (Ozette, Quillayute, and Hoh), the Independent Drainages and the Nearshore. For purposes of NPCLE projects, the Nearshore extends from the littoral zone (beach shoreline) or from the area of tidal influence in lower rivers, out to a depth of 30 meters mllw (mean lower low water), 30 m being the light attenuation break. See, e.g., Shaffer, J.A., P. Crain, B. Winter, M. McHenry, C. Lear and T. Randle. 2008. Nearshore Restoration of the Elwha River through Removal of the Elwha and Glines Canyon Dams: an Overview. Northwest Science. 82:48-58.

The current list of potential projects is presented in Appendix B and serves as a menu of potential restoration actions and projects that have been locally identified and recommended as currently needed to support salmon habitat restoration. From this list the NPCLE Technical Committee then identifies the top priority projects for each basin, the Independent Drainages and the Nearshore and ranks them for that year's round of projects. The prioritized projects described here are the “highest” ranked projects on the list in Appendix B summarized the following pages under each of the five habitat regions where they occur. However, any project can be put forward as a potential candidate and considered for full funding in any one year whether or not it is listed in Appendix B.

1.5 Eligibility for the Annual Project Round:

Any proposed project submitted on time for consideration in the advertised grant round can be fully funded independent of existing lists as long as it scores high enough in the final proposal evaluation and ranking by both the NPCLE Technical Committee and Citizens Committee.

The annual SRFB project Review takes place in spring for all projects officially submitted. These annually submitted projects are reviewed and ranked against each other using the criteria described in Table 1. In the final proposal review all the top projects for which there is enough funding are put forward for full awarded. Projects for which there is not enough funding are potentially submitted as alternates at the discretion of the NPCLE Citizen's Committee. Alternates can then be considered for funding if a higher ranking project must be withdrawn for some reason, or additional funding becomes available to the Washington Coast Regional organization (Coast Salmon Partnership) before the grant round has officially ended.

Section 2: Priority Projects by Geographic Section

2.1 Hoh River Basin

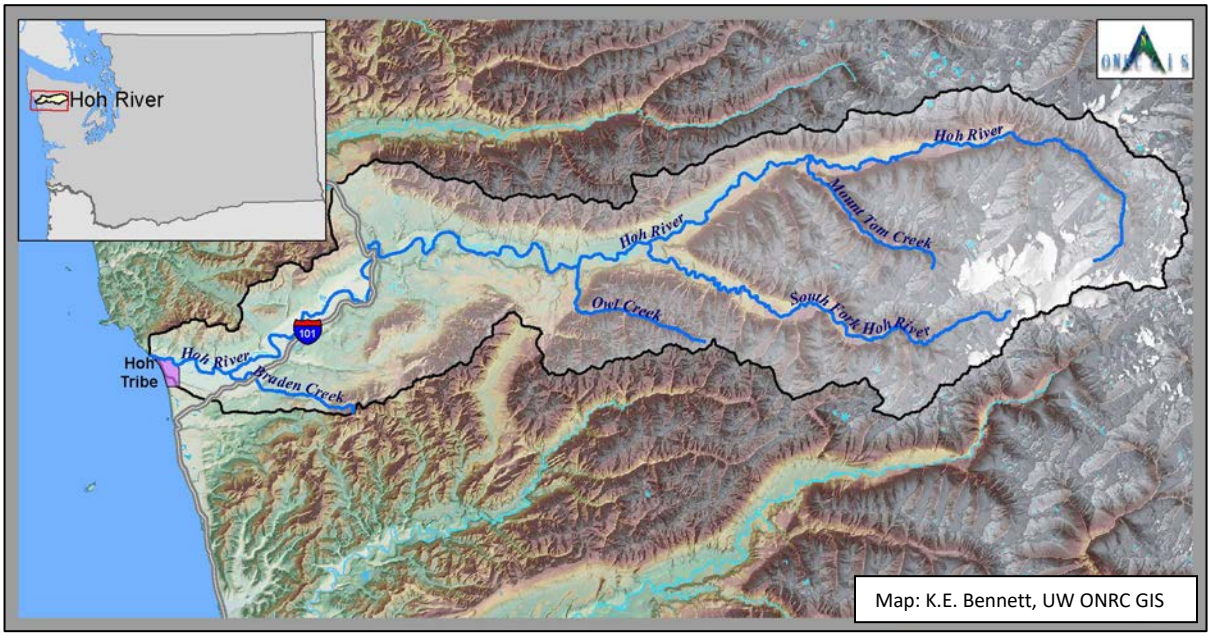


Figure 1. Relief Map of the Hoh River Basin

2.1.1 Hoh River Basin Background

The headwaters of the Hoh River Basin are located on Mt. Olympus at an altitude of 2,425 meters (m). The upper 65% of the basin, including the entire North Fork and majority of the South Fork Hoh Rivers, is protected within the Olympic National Park and is considered to be essentially in pristine condition (McHenry and Lichatowich, 1996; Smith, 2000) (Figure 1). The Hoh River is a large (481 km), glacially-influenced river with an extensive floodplain that contains a diverse array of lateral riverine habitats that are critical to rearing salmonids (Sedell et al., 1984; Smith, 2000; McHenry, 2001). Several major non-glacial tributaries to the Hoh also provide temperate rearing and spawning areas for salmonids (Sedell et al., 1982; McHenry, 2001). Most of the large tributaries are located on industrial forestlands outside the Park where land use practices have degraded salmon rearing and spawning habitat and altered the processes responsible for habitat formation (Smith, 2000; McHenry, 2001).

The wet, mild climate of the Hoh River is dominated by the influence of offshore marine air and is characterized by the highest precipitation levels in Washington State (U.S. Weather Bureau, 1965). Average annual precipitation ranges from about 225cm (90 inches) near the Pacific Coast to 600cm (240 inches) per year in the Olympic Mountains (U.S. Weather Bureau, 1965). Normal discharge fluctuations are bimodal with individual peak flows greatest during winter months (e.g., November to February) with average monthly discharges highest when snowmelt runoff occurs in June and July

(USGS, 1998). As predicted in research on climate change, recent years seem to indicate changes in the hydrograph; with higher peak flows in the November to January period, a reduced spring runoff season and a lower summer flow (USGS, 2010). Recent years have shown particularly dry spring and summer seasons, with reduced flow and higher water temperatures in tributaries. Offshore conditions such as the "Blob," a vast region of warm surface water in the North Pacific, also had a negative effect on salmonid populations.

In principle, the Hoh River supports a relatively healthy and diverse salmonid assemblage that includes five species of Pacific salmon, two species of trout, and one char species (McHenry and Lichatowich, 1996). That said, runs are greatly reduced from the days when canneries operated on the Hoh (McHenry, 2001; Appendix C). The spring/summer and fall Chinook (*Oncorhynchus tshawytscha*), fall coho (O. kisutch), and winter steelhead (*O. mykiss*) are considered among the last remaining relatively healthy populations in the lower forty-eight (Nehlsen et al., 1991; Huntington et al., 1994; McHenry and Lichatowich, 1996). The Hoh River bull trout (*Salvelinus confluentus*) population is listed as threatened under the federal Endangered Species Act but is considered to be relatively healthy and abundant (Mongillo, 1992). The Hoh River also contains unstudied populations of coastal cutthroat trout (O. clarki), resident rainbow trout and summer steelhead (O. mykiss), in addition to a few chum salmon (*O. keta*), sockeye salmon (*O. nerka*), and pink salmon (*O. gorbuscha*) (McHenry, 2001).

Most salmon species utilize slightly different riverine habitats (Sedell et al., 1982; Sedell et al., 1984; McHenry, 2001) and out-migrate at different ages during their freshwater lifecycle (Roger Moseley, WDFW, personal communication, 2007; Jim Jorgensen, Hoh Tribe, personal communication, 2007). Over 95% of the spring/summer and fall Chinook out-migrate at as juveniles at age-0, which contrasts sharply with the tendency of the other species to remain in fresh water for at least a full year. Spring/summer Chinook spawn from mid-August through mid-October while fall Chinook and coho spawn from mid-October through January. Winter steelhead spawns from December through July. No information is available on the spawn timing of summer steelhead, which are believed to spawn in the NF and SF Hoh Rivers inside Olympic National Park ("ONP") (McHenry, 2001). The juvenile and adult life histories, and ecology, of coastal cutthroat and resident rainbow trout are completely unstudied.

Bull trout are believed to spawn primarily in Olympic National Park, in the main stem river or in tributaries with active glaciers (Brenkman and Meyer, 1999). More recently, extensive research on bull trout has been conducted by ONP biologists to better understand life histories, morphology and migration patterns throughout the basin. Results indicate that there are three distinct life histories: 1) freshwater residency; 2) a single migration to sea; and 3) multiple migrations to sea (Brenkman and Corbett, 2005; Brenkman et al., 2007). Radio telemetry revealed that among fish that made multiple migrations to sea, some traveled to other coastal watersheds, including the Queets River, Quinault River and Kalaloch Creek before returning to the Hoh River (Brenkman and Corbett, 2005).

There is a wealth of peer-reviewed and unpublished reports on salmonid populations and habitat in the Hoh River Basin, though data gaps remain. Key factors limiting salmonid productivity in this basin were identified by Smith (2000). Washington Department of Natural Resources ("WDNR") conducted a partial watershed analysis, including a draft fish habitat module (McHenry, 2001) and a mass wasting module (Parks, 2001). Washington Department of Fish and Wildlife (WDFW) conducted a Level 1 Technical Assessment for WRIA 20 watersheds (Hook, 2004). US Department of Interior's Bureau of Reclamation (BOR) also did a study of the Hoh for the WRIA 20 process (Lieb and Perry, 2005). A mid-watershed hydrologic and habitat analysis was conducted by the Wild Fish Conservancy in 2011 and 2012. Other studies have been conducted in the basin by state agencies, NGOs, the Hoh Tribe, and the Northwest Indian Fisheries Commission (NWIFC). Technical reports by WDNR (Cederholm and Scarlett, 1997) and the Wild Salmon Center (WSC, 2008) examined habitat conditions in major tributaries to the Hoh. Replications of these studies are recommended. Recent geomorphic assessments have been done by the Western Federal Highways Division on channel migration, bank erosion and riparian conditions, particularly along the Upper Hoh County Road where infrastructure has been threatened.

Collectively, these technical reports conclude that while habitat functions well compared to other watersheds in the western U.S., major impacts on fish populations have occurred, and the root causes are both technically complex and socially costly to restore.

Valley side slopes, terrace edges, and inner gorge areas in the Hoh River Basin represent a high percentage of the land outside the ONP and have a naturally high erosion potential (Parks, 2001). A combination of sensitive soil types, precipitation intensity, mid-slope roads with side-cast construction, and extensive timber harvest have unnaturally increased surface erosion rates in these areas (McHenry, 2001), likely exacerbated by climate change. Although forest road systems are improving under present DNR Forest Practice regulations, the legacy of old roads has taken a toll in some areas (Smith, 2000). Unintended negative effects on salmonid habitat by county and federal highway systems, notably bank armoring, remains largely unmitigated. Mass wasting and debris flows have also resulted in channel incision which has disconnected floodplain habitat and exposed layers of clay sediment which continually erode and reduce water quality in both the main stem Hoh and tributaries (Smith, 2000).

Glacial retreat is apparent in three major Olympic Peninsula watersheds: Elwha, Hoh and Quinault. ONP staff has been conducting annual mass-balance measurements on Olympic glaciers. Currently, Park scientists are tracking the rate of growth or recession of glaciers as well as determining how much runoff is contributed to rivers by glaciers. They have documented a 34 percent decrease in the surface area of Olympic glaciers and a 15 percent decrease in volume over the last three decades. Similar studies have been conducted at Mt. Rainier National Park. While the underlying geology differs, the process and outcomes appear similar research conducted by FEMA and NPS at Mount Rainier National Park, shows increasing entrained sediment, aggradation of sediments, and channel avulsion throughout the river system. This in turn, affects

infrastructure such as roads, rural homes, forest succession, and channel location.

Channel instability and changes in vectors and pathways such as recreation, restoration construction, road construction, and weather patterns also increase the impacts of invasive plant species that are documented to alter riparian succession. Channel instability disrupts riparian succession, and arrests the passive restoration of native plant communities. These are the foundation of food webs and habitat development, and when they are impaired, cause cascading effects on salmon and other species (QIN, Lestelle et al. 2011). Succession is as dependent on control of erosions as it is on species. Succession is very complex. Mycorrhizal components need to be art of any riparian planting and invasive plant control.

The Hoh River Basin is a dynamic watershed, which in past decades has suffered destructive mass wasting, rapid lateral channel migration, locally excessive sediment accumulation and repeated scour during spawning and egg incubation periods. These effects are aggravated by many causes, some of which are within the expected range of conditions on Coast Range watersheds managed for timber production. Causes include both rapid storm runoff from young commercial forestland at low elevations and rain-on-snow events originating in mid-elevation forests. The riparian buffers left along tributaries and the main channel have not been adequate to withstand windstorms, debris flows, and channel migration. In reaches where remnant, large old growth timber remains, shore instability is just as poor as where no timber grows. The lack of large riparian timber reduces shading and limits the supply of large wood material (LWM) to that which washes down from the Olympic National Park. Few LWM pieces are large enough to remain stable and embedded during normal peak flows, so most wash through the system to the beach unless caught in a minor channel. In tributaries, habitat has been isolated by fish passage-blocking culverts along the main stem corridor and in upland tributary habitat. Road systems, in various states of repair, enable sudden storm runoff, transferring fine sediment washed from road surfaces or debris from road failures into tributaries and the river. Cedar spalt dams have also reduced access to habitat and degraded water quality in several lower elevation tributaries. Targets for restoration include expanding and diversifying riparian forests, retaining sufficient mature forest to ensure healthy watershed function, and control of invasive species.

That said, the Hoh River Basin retains a large number of low gradient, LWM filled side channels, usually found in re-vegetated abandoned main channel beds, that serve not only as juvenile salmonid habitat but allow the river at high flow to spread unimpeded across the full floodplain. These side channel networks often blend with the lowest reaches of larger tributaries to form highly productive mazes that may reach miles in length. These side channel complexes are dynamic and temporary but often appear to remain functional well into the early stages of riparian forest succession (15-30 years).

In addressing the projected and immediate effects of climate change, restoration actions on the Hoh River will need to consider wider variation in water temperature and flow levels than were seen in the recent past. However, restoration and management objectives already consider the wide range of conditions between late summer dry

periods and winter floods so most projects are already incorporating this need in their designs. Projects must also place an emphasis on access to critical cold water sources during late season low flows, better habitat connectivity for both adults and juveniles, improved shading, added in-channel roughness and both preservation of and access to high quality off-channel refugia.

Identification of high quality refugia was undertaken locally by Western Rivers Conservancy and regionally, by the Nature Conservancy. Beginning in 2003 property acquisition began to secure the long-term protection of high quality habitat, starting with the purchase of the Schmidt Bar parcel from Rayonier. The Wild Salmon Center and Western Rivers Conservancy, in partnership, used private and U.S. Fish and Wildlife Service (Sec. 6) funding for purchase of an eventual habitat corridor the length of the Hoh River, outside the ONP. An independent locally based entity, the Hoh River Trust (HRT), was formed to manage conservation lands as four more major purchases were made. By 2012, approximately 7000 acres of former industrial timberland had been put under permanent DNR conservation easement status, allowing active restoration. Long-term goals include restoration of old growth dependent listed species, (primarily bald eagle, marbled murrelet, Northern spotted owl and bull trout) as well as salmonids, game and non-game wildlife species. By 2017, nearly all planned restoration, including pre-commercial thinning, thinnings to promote old forest structure, road-caused fish passage problems, game management projects and decommissioning of unneeded or hazardous forest road sections was completed. In June 2017, the Hoh River Trust properties were joined into The Nature Conservancy (TNC) Washington coastal forest lands. The mission of the original HRT lands (Section 6 ESA Habitat Restoration, all Conservation Easements, etc.) continues under TNC ownership.

2.1.2 Hoh River Watershed Priority Projects:

The following projects from the Hoh River system were ranked by the NPCLE Technical Committee as high priority projects for salmon recovery in 2019. Some of these projects have been fully or partially funded but none of them has been fully implemented on the ground. Each projects "status" at the time of publication is indicated at the end of its description.

2.1.2.1 **Title of Project**: Low Water Access Inventory.
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed: Fish passage during low water.
Action to be taken: A range of possibilities depending on the landscape but could include LWM placements to enhance pool formations, wetland enhancements for refugia, and riparian planting.
Stocks being affected: Coho salmon, Steelhead, Cutthroat and Bull trout.
Status: Seeking funding.

2.1.2.2 **Title of Project**: Glacial Sediment Assessment
Location: Hoh River main stem.
Action to be taken: Partnering with federal, state and local governments to assess aggradation and erosional processes.
Issue/Limiting Factor being addressed: Sediment control and water quality.

Stocks being affected: Chinook, Coho salmon, Steelhead, Cutthroat and Bull trout
Status: Seeking funding.

2.1.2.3 **Title of Project**: Hoh River Field Study on Impacts of Reed Canary Grass.
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed: Water quality and fish passage.
Issue/Limiting Factor being addressed: Water quality and fish passage.
Action to be taken: Experimental design in 1-3 index areas to assess ecological limiting factors of Reed Canary Grass (RCG) under different treatment scenarios.
Stocks being affected: Coho salmon, Steelhead, Cutthroat and Bull trout
Status: Seeking funding.

2.1.2.4 **Title of Project**: SSHEAR Project Assessment & Repairs
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed:
Action to be taken: A subset (6) of the 16 preliminarily identified projects are currently being assessed and in need of immediate repair.
Stocks being affected: Coho salmon, Steelhead, Cutthroat and Bull trout.
Status: Seeking funding initial assessment underway.

2.1.2.5 **Title of Project**: SSHEAR Project Invasive Species Assessment & Mitigation.
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed: Habitat quality.
Action to be taken: Assess, inventory and treat invasive species in SSHEAR sites prior to construction, evaluate clean fill material sources.
Stocks being affected: Coho salmon, Steelhead, Cutthroat and Bull trout.
Status: Seeking funding initial assessment underway.

2.1.2.6 **Title of project:** Hoh River On-going Riparian Assessment and Restoration.
Location: Entire length of Hoh River.
Issue/Limiting Factor being addressed: Symptom of poor riparian habitat, may prevent/delay normal forest succession on river bars.
Action to be taken: Eliminate or control state listed invasive weeds including Knotweed, reed canary grass, herb Robert, Scotch broom, Canada thistle, Tansy Ragwort, etc.
Stocks being affected: Chinook, Coho, Steelhead (rainbow) & Cutthroat trout; including Bull Trout.
Status: This project was approved for SRFB funding in 2013 for implementation in 2014. It is seeking funding in 2016 for 2016 - 17.

2.1.2.7 **Title of project**: Upper Hoh Road Realignment and Decommissioning
Location: Approximately from milepost (MP) 4 to MP 6, MP 9.5 to MP 10, MP 12 to 12.5, plus short distances within ONP.
Issue/Limiting Factor being addressed: Lack of functional riparian forest, lack of buffers, lack of shade, fish passage barriers, lack of 100-year flood passage on most culverts, runoff from road surfaces, trapped excess sediment at culverts, bank erosion from lateral channel migration, leading to bank armoring.
Action to be taken: Relocation of certain road sections will eliminate the need to protect during high flow emergencies. Depending on the site, upgrade inadequate stream crossings to pass 100-year flows, remove many fish passage barriers, eliminate and stabilize many sections of bank armoring and old fills. In areas where bank armoring is already in place

and relocation impossible, adding soil and vegetation to rock covered river banks, with added LWM at the toe may mitigate most adverse effects.
Stocks being affected: Chinook, Coho, Steelhead (rainbow) & Cutthroat trout; including Bull Trout.
Status: Aspects of this project are currently being developed for funding and implementation by the "Hoh Engineering Study Steering Committee" that is being hosted by US Department of Transportation, Olympic National Park and Jefferson County.

2.1.2.8 **Title of Project**: Monitoring Western Federal Highways Flood Plan Project
Location: (MP) 3.6 – (MP) 10.2 next to Upper Hoh River
Issue/Limiting Factor being addressed: Instream work using dolos, rip rap and other anthropogenic structures that mimic nature.
Action to be taken: Multiple mitigations in order to not move the road permanently out of the flood plain. Project purpose is to develop and implement cost effective, long-term bank stabilization solutions at least three locations along the UHRR in western Jefferson County.
Stocks being affected: Chinook, Coho, Steelhead, Cutthroat trout, and Bull Trout
Status: As per Kirk Loftsgaarden, PE, Project Manager, Western Federal Lands (2/14/19): Slow movement on project. FHWA are waiting on the USACE permit (and subsequent DNR aquatic land lease) to finalized the design work. Current efforts with TNC and USFS to either acquire property or provide federal access through property. WFHA currently working with utility companies to coordinate relocation during construction. All time lines are predicated on the permitting process timing.

2.1.2.9 **Title of project:** Brandeberry/Rain Forest Community Floodplain Complex.
Location: Hoh River below South Fork Hoh confluence.
Issue/Limiting Factor being addressed: Consolidation of flow, side channel protection, and off-channel habitat access.
Action to be taken: Riparian and bank stabilization.
Stocks being affected: Hoh Spring Chinook, Hoh Fall Chinook, Hoh Fall Coho, Cutthroat trout.
Status: Seeking funding.

2.1.2.10 **Title of project**: Allen's Marsh.
Location: Hoh River mile 14.5 (East of HWY 101, south of H-1000 Rd.).
Issue/Limiting Factor being addressed: Consolidation of flow and off-channel habitat access.
Action to be taken: Culvert repair/replace, riparian and bank stabilization.
Stocks being affected: Hoh Spring Chinook, Hoh Fall Chinook, Hoh Fall Coho, Cutthroat trout.
Status: Finished by DNR with internal funding-Active

2.1.2.11 **Title of Project**: 7.9 Mile Culvert.
Location: RM 7.9.
Issue/Limiting Factor being addressed: Fish passage, sediment and nutrient flow.
Action to be taken: Replacement with box culvert.
Stocks being affected: Coho, Steelhead and Cutthroat trout.
Status: Funded and recently completed

2.2 Quillayute River Complex

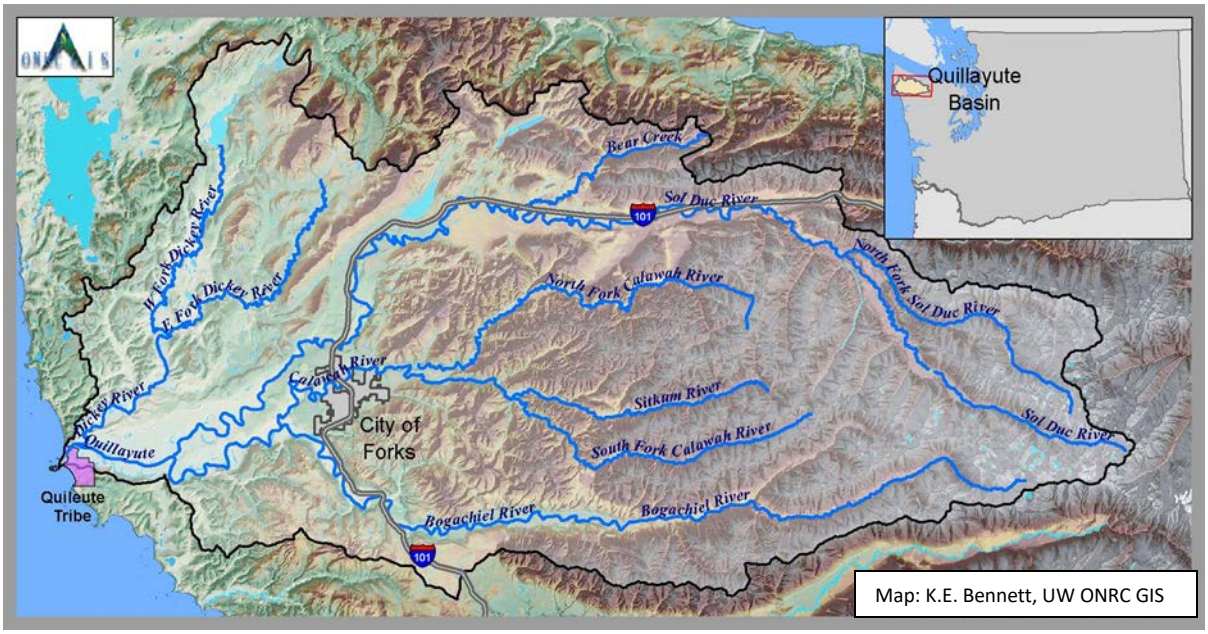


Figure 2. Relief Map of the Quillayute River Basin

2.2.1 Quillayute Basin Background:

The Quillayute River is the terminal main stem of one of the largest and most productive river system networks on the Washington Pacific coast. Four major rivers combine to form the Quillayute system. The Bogachiel, Calawah, Sol Duc and Dickey Rivers drain the Northwest Olympic Peninsula westerly to the Pacific Ocean. The headwaters of the Sol Duc, Calawah and Bogachiel originate in the Olympic National Park (ONP) from the Olympic Mountains to highlands with relatively steep terrain that becomes more gradual some 15 miles from the Pacific. Accordingly, accumulated snow in the higher elevations and the melt from it play an important role in seasonal flow for these three rivers. The Dickey River originates in lower elevations west of the Olympics and enters the Quillayute a mile from its mouth. This river system has significant wetlands and is largely a low-velocity, low-gradient system. All of the rivers have extensive tributary systems with forestry activities common outside the Olympic National Park boundaries.

The Quillayute River has a very short main stem. At river mile 5.5 the Bogachiel and Sol Duc River Systems combine to form the Quillayute. As noted above, the Dickey River enters the Quillayute one mile from the Pacific, and shares a common but limited estuary. The Calawah River joins the Bogachiel at river mile 8.5 near Forks, Washington, 20 miles from the mouth of the Quillayute River at La Push. The Quillayute River System alone drains over 825 square miles, or over 800,000 acres.

Olympic National Park owns the largest percentage of the coastal lands and the very highest reaches of the Olympic Mountains. This includes the headwaters of the

upper Sol Duc, Calawah, Sitkum and Bogachiel Rivers. The USFS manages the lands downstream of the Park (middle altitudes). Private timber and state forest lands are downstream from the USFS holdings. Rayonier is the largest private timber landowner in the watershed. The City of Forks is the only incorporated city, but there are two small towns of Beaver and Sappho in the Sol Duc watershed.

Between 1995 and 1999, after the Northwest Forest Plan and before the Washington State Forest Practices Act, portions of the Quillayute were the subject of multiple government watershed analyses, the purpose of which was to analyze risk to the salmon habitat through a variety of very structured ecosystem module studies, with teams led by peer scientists. The U.S. Forest Service ("USFS") led these for the Sol Duc River, the North Fork of the Calawah, and the Sitkum/South Fork of the Calawah. The Sitkum joins the South Fork at river mile 16.2. Federal Modules included Hydrology, Public works, Sedimentation (e.g., road erosion), Channel Morphology/Condition Assessment, Fish, Vegetation, Riparian (LWD, bank stability, temperature/shade), Wildlife, Causal Mechanism (identifying need for certain management responses). In the late 1990s Rayonier with state agencies and the Quileute Tribe conducted a watershed analysis of the East and West Forks of the Dickey River. The Washington Forest Practice Board Standard Methodology for Conducting Watershed Analysis had fewer modules (e.g., not Wildlife or Vegetation) but otherwise was quite similar to the federal methods. That study included a new state water quality module. Changes in state law ended the Dickey process before a final report, but the modules were separately completed. The watershed analyses conducted by the USFS are available to the public, either electronically or at public libraries. The other analyses are not publicly published, but are housed within WDNR, Rayonier, and the Quileute Tribe and are obtainable. USFS has additional specific data (e.g., stream temperature) that can also be obtained upon request.

In 2000 the Washington Conservation Commission completed the report "Salmon and Steelhead Habitat Limiting Factors in the North Washington Rivers of WRIA 20" (Smith, 2000, http://docs.streamnetlibrary.org/Washington/ConservationCommission/Statewide_LFA_Final_Report_2005.pdf.). This report included a list of salmon restoration projects for the Quillayute Basin and was significantly premised on the watershed analyses, along with input from a team of local biologists.

In 2000-2003 the Quileute Tribe assessed fish habitat in the Bogachiel (unpublished), using Washington Department of Natural Resources (WDNR) protocol. The Bogachiel main stem was completed in 2000, lower tributaries in 2001, middle tributaries in 2002, and upper tributaries to the Park boundary in 2002. Olympic National Park has assessed fish habitat for the Bogachiel watershed above the Park boundary.

In 2004 the Quileute Tribe assessed fish habitat in Coal Creek of the Dickey (unpublished) using WDNR protocol. Also in 2004 USFS completed a draft of aquatic and wildlife habitat conditions in the Pacific Region (for their lands only). They also finished a Draft Environmental Impact Statement (DEIS) on invasive weeds. Since the summer of 2003 the Quileute Tribe, funded by federal grants and in cooperation with

Clallam County Invasive Weed Control Board and Olympic National Park, has been eradicating knotweed in the Quillayute Basin. The Dickey, Sol Duc, Calawah, and mouth of the Quillayute have been treated (but are regularly monitored and retreated as may be needed). The Quileute Tribe began working on the Bogachiel main stem in 2008 and has completed most of the initial work. As with the other watersheds, knotweed takes several seasons to eradicate and upstream re-introduction requires new vigilance for downstream occurrences; hence, retreatment.

In 2005 the U.S. DOI Bureau of Reclamation completed a draft assessment of watershed conditions and seasonal variability for all of WRIA 20 (Lieb and Perry, 2005).Additionally, WDNR maintains comprehensive “Road Maintenance and Abandonment Plans” (RMAP) for their holdings, often in cooperation with timber company holdings. This is a valuable tool for culvert assessment and road management activities. WDNR approves and warehouses all RMAPs for those landowners large and small who are required to develop RMAPs.

Rayonier also maintains a comprehensive “Road Maintenance and Abandonment Plans” (RMAP) program for their holdings. These plans include all roads and culverts subdivided into categories such as Fish Passage; including Fish Barriers, Mass Wasting Activities, Mass Wasting Pipes, and Surface Erosion.

2.2.1.1 Climate Change Forecasts for Restoration

The reason for including the detailed salmon habitat studies cited above is to demonstrate that significant historical data sets are available, if not all handy on the Internet, and the custodians for such data are described, above. The Quileute Tribe as of the spring of 2016 received the final report of a BIA-funded study: “Climate Change Vulnerability Assessment for the Treaty of Olympia Tribes”, prepared by the Oregon Climate Change Research Institute of Oregon State University (contractor). What is clear from the chapters, presentations at climate forums and publications by others in the past several years is that at best we can only predict in generalities, when significant stream temperature changes will happen (within ten years accuracy) or how much sea level will rise (within 100 years accuracy), or to what degree winter higher flows and summer lower flows will occur, and exactly when these will become truly significant. What is clear is that remedial action to remediate potential harm cannot begin soon enough, because change IS coming. One document especially instructive with respect to salmon habitat is “Restoring Salmon Habitat for a Changing Climate”, by T. Beechie et al., published as part of River Research and Applications, in 2012. (John Wiley and Sons).

In the introduction we believe the authors sum it up perfectly: “climate change is not straightforward, as predicted change effects vary widely throughout the Pacific salmon range…”. There is an excellent decision tree in Figure 10 of this article. “In evaluating the potential effects of climate change on individual restoration projects, it is first necessary to know which species and life stage the restoration action targets.” For winter rearing habitats, what will be stream flow impact on this part of the system? It is

also important (see Summary) to evaluate if the restoration action will actually ameliorate climate change effects and improve ecosystem resilience. The last in particular will aid salmon survival during change. One type of restoration that seems to work for all serious changes—increase in temperature, lower low flows, higher peak flows, and improvement in salmon resilience—is beaver dams. It is recommended to determine where certain reaches can be improved by beaver dams. As always, more channel diversity through more Large Woody Material (LWM) and better stream temperature through riparian shading, are valuable improvements.

A 2012 publication, National Fish, Wildlife and Plants Climate Adaption Partnership, by Association of Fish and Wildlife Agencies, Council for Environmental Quality ("CEQ"), Great Lakes Indian Fish and Wildlife Fish Commission, NOAA, and USFWS (see https://www.wildlifeadaptationstrategy.gov/), speaking directly on salmon, suggests (and we support) at p. 57:

- Limit water withdrawal especially during high temperature and low flows;
- Protect undercut banks and deep pools where water temperature is lower;
- Restore riparian vegetation (we addressed this above);
- Release cold water from large storage reservoirs in summer (we may need to develop this); and
- Remove fish passage barriers.

2.2.2 Quillayute Basin Prioritized Projects:

Prioritized projects for the Quillayute Basin in 2019 are primarily projects still needing funding that have been carried forward from the assessment procedures described above (Hunter 2006; NPCLE, 2007), or projects identified as part of the US Forest Service Calawah Focus Watershed Assessment undertaken in 2010. Some of these projects have been fully or partially funded but none of them has been fully implemented on the ground. Each projects "status" at the time of publication is indicated at the end of its description.

2.2.2.1 Quillayute Main Stem and Basin-Wide Priority Projects:

2.2.2.1.1 **Title of project:** WRIA 20 Clallam County Roads Culvert Survey
Location: Clallam County roads in WRIA 20.
Issue/Limiting Factor being addressed: Fish passage
Action to be taken: Identify blocking culverts on Clallam County roads in WRIA 20.
Stocks being affected: Chinook, Hoh Fall Coho, Steelhead, Sockeye, Cutthroat trout.
Status: Funded and currently ongoing.

2.2.2.1.2 **Title of project:** Low Water Access Inventory.
Location: Entire Quillayute River system tributaries.
Issue/Limiting Factor being addressed: Fish passage during low water.
Action to be taken: A range of possibilities depend on the landscape but could include LWM placements to enhance pool formations, wetland enhancements for refugia, and

riparian planting.
Stocks being affected: Chinook, Hoh Fall Coho, Steelhead, Sockeye, Cutthroat trout.
Status: Seeking funding

2.2.2.1.3 **Title of Project**: Quillayute River Field Study on Impacts of Reed Canary Grass.
Location: Quillayute Basin tributaries.
Issue/Limiting Factor being addressed: Fish passage during low water.
Action to be taken: Experimental design in 1-3 index areas to assess ecological limiting factors of Reed Canary Grass (RCG) under different treatment scenarios.
Stocks being affected: Chinook, Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.4 **Title of Project**: SSHEAR Project Assessment & Mitigation.
Location: Quillayute River Basin tributaries.
Issue/Limiting Factor being addressed: Habitat quality.
Action to be taken: Assess, inventory and treat invasive species in SSHEAR sites prior to construction, evaluate clean fill material sources.
Stocks being affected: Chinook, Coho, Steelhead, & resident trout.
Status: Seeking funding initial assessment underway.

2.2.2.1.5 **Title of project**: Quillayute River Riparian Restoration.
Location: Entire length of the Quillayute River.
Issue/Limiting Factor being addressed: Access to off channel habitat and sediment control.
Action to be taken: Quillayute River restoration of processes by enhancing the river channel with engineered designs. The main issues the river has lost the natural meander and created a shallow, high velocity channel. The river is a threat to Mora Road (USPS) and Thunder fields (Quileute Tribe).
Stocks being affected: Chinook, Coho, Steelhead, sockeye & resident trout.
Status: Seeking funding.

2.2.2.1.6 **Title of project**: Thunder Road Fish Passage Project for Smith Slough Off-channel Habitat.
Location: La Push – lower village – Thunder Road
Issue/Limiting Factor being addressed: Replace three culvert blockages on Thunder Road which contains off channel habitat and stream habitat in the Lower Quillayute River. The road is located on the Quileute Reservation and has water quality issues.
Action to be taken: 3 culvert replacements, road betterment, & relief culverts installed proper drainage of road.
Stocks being affected: Chinook, Coho, Steelhead, & resident trout.
Status: Funded and Finished.

2.2.2.2 Dickey River Watershed Priority Projects:

2.2.2.2.1 **Title of project**: T-Bone SSHEAR Project Restoration.
Location: Dickey River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Coho, Steelhead, & resident trout.
Status: Seeking funding.
2.2.2.2.2 **Title of project**: Elk Horn Project Restoration.

Location: Dickey River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.2.3 **Title of project**: 5300 Road Decommissioning.
Location: Dickey River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: 3.86 miles of habitat gain and removes 4 culverts.
Stocks being affected: Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.2.4 **Title of project**: Soot Creek SSHEAR Repair.
Location: Dickey River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: Impassable SSHEAR project weir that will be removed and replaced with natural features
Stocks being affected: Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.2.5 **Title of project**: Decommissioning on Skunk Creek Tributaries.
Location: Dickey River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: Decommission the 9410.1 for 3200 ft. Opens 0.4 mi and removes 6 culverts.
Stocks being affected: Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.3 Bogachiel River Watershed Priority Projects:

2.2.2.3.1 **Title of project:** Lower Bogachiel Restoration.
Location: River Mile 0.0 – 7.0, especially area of SR 110 (La Push Road) bridge crossing.
Issue/Limiting Factor being addressed: Habitat has been affected by changes in the floodplain, including timber harvest, clearing for pasture and residential development, and flood fights. Dynamic in this reach, the river processes have been altered and habitat diminished due to loss of side channels, large woody materials, and floodplain forest. Impacts include sedimentation and loss of cover.
Action to be taken: Floodplain forest and other habitat features will be restored through a series of actions including working with willing landowners to establish riparian planting, removing structures and infrastructure, and re-establishing larger landscape features such as side channels and/or log jams.
Stocks being affected: Coho, Chinook, Steelhead.
Status: Seeking funding. Working group established.

2.2.2.3.2 **Title of project**: Kitchel Property Bank Stabilization.
Location: River Mile 0.7 - area of SR 110 (La Push Road) bridge crossing.
Issue/Limiting Factor being addressed: The Kitchel property has been affected by high flow events in the Bogachiel River. Efforts to protect the bank have resulted in reduced habitat function through hardening of the bank. Impacts include sedimentation, lack of

shade, and cover.
Action to be taken: Floodplain forest land owners are willing sellers. The property will be purchased, structures and infrastructure removed, invasive species removed, and riparian vegetation re-established.
Stocks being affected: Coho, Chinook, Steelhead.
Status: Seeking funding. Working group established.

2.2.2.3.3 **Title of project**: Tall Timbers Fish Passage.
Location: Bogachiel River.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Chinook, Coho, Steelhead, & resident trout.
Status: Seeking funding.

2.2.2.3.4 **Title of project**: Morganroth Pond Fish Passage Restoration
Location: Bogachiel River
Issue/Limiting Factor being addressed: Fish passage, flood plain connectivity and habitat complexity.
Action to be taken: Replace USFS fishway with more permanent structure.
Stocks being affected: Coho, Chinook, Steelhead
Status: Seeking funding.

2.2.2.3.5 **Title of project**: Malnati Property Side Channel Restoration
Location: River mile 1.0
Issue/Limiting Factor being addressed: The Malnati property is located on the outside bend of a side channel that has in the past experienced overbank flooding and erosion. Bank hardening and invasive species have affected riparian habitat resulting in sedimentation and loss of cover.
Action to be taken: Floodplain forest and other habitat features will be restored. Landowner is willing to sell. The property will be purchased, structure and infrastructure removed, invasive species removed, and riparian vegetation re-established.
Stocks being affected: Coho, Chinook, Steelhead
Status: Seeking funding. Working group established.

2.2.2.4 Calawah River Watershed Priority Projects:

2.2.2.4.1 **Title of project**: Sitkum R.2900-072, 075, 078 Road Decommissioning. This project was determined to be a high priority based on the following plans and assessments: The Quileute Reach Assessment, the Calawah Focus Watershed Restoration Plan (USFS 2011), and the Sitkum Watershed Restoration Plan (USFS 2014).
Location: In the Sitkum drainage of the South Fork Calawah River Basin, T28N, R12W, Sec 11 and 12. USFS landowner. Quileute U&A.
Issue/Limiting Factor being addressed: Deteriorating culverts and a lack of road maintenance in a highly unstable landform. Eliminating potential mass wasting that directly impacts anadromous fishes.
Action to be taken: Forest Service has ongoing HPA through MOU with state. Remove culverts and unstable side cast material, restore natural hillslope drainage, decommission road segment in accordance with USFS guidelines and policies. NEPA analysis was completed in 2015.
Stocks being affected: Sitkum River / South Fork Calawah Fall Coho, Summer and Fall Chinook, Summer and Winter Steelhead, river run Sockeye salmon, and anadromous and

resident cutthroat trout.
Status: Seeking funding.

2.2.2.4.2 **Title of project**: FS 2900 Road Culvert Replacements.
Location: FS 2900 road (mileposts 15.5, 15.7, 15.9, 16.0, 16.1, 18.3) in the Sitkum River sub watershed.
Issue/Limiting Factor being addressed: 6 large, deteriorating culverts on non-fish bearing streams, constructed along the 2900 road in an area of highly unstable geology; an increased likelihood of road related mass wasting event which will directly impact anadromous salmonids in the Sitkum / South Fork Calawah Rivers.
Action to be taken: Remove remnant culverts and replace with a proper sized that meets current USFS/WDFW standards meeting Q100 and passing debris.
Stocks being affected: Sitkum / South Fork Calawah Fall Coho, Summer and Fall Chinook, Summer and Winter Steelhead, river run sockeye, resident and anadromous cutthroat trout.
Status: NEPA completed for replacement at MP 15.5, 15.7, 16, and 16.1. NEPA incomplete for 15.9 and 18.3. The culvert at milepost 15.5 is scheduled for replacement with USFS funds in 2017. Seeking funding for remaining culverts.

2.2.2.4.3 **Title of project**: Brandeberry Creek Decommissioning FSR 2922-200, 250, 300.
Location: FSR 2922 road spurs. Sitkum River sub watershed.
Issue/Limiting Factors being addressed: Primary objective is to reduce delivery of sediment, improve water quality, and enhance fish habitat in the Sitkum River. Reduce risk of mass wasting affecting FS 2900 road.
Action to be taken: Remove remnant culverts, pullback and / or outslope areas of unstable soils; restore natural drainage and decommission road segment in accordance with USFS guidelines.
Stocks being affected: Sitkum / South Fork Calawah Fall Coho, Summer and Fall Chinook, Summer and Winter Steelhead, river run sockeye, resident and anadromous cutthroat trout.
Status: Potential funding from FS legacy roads program in 2018.

2.2.2.4.4 **Title of project**: N. Fork Calawah Large Woody Material Assessment.
Location: North Fork Calawah from River Miles RM 0.0 to RM 10.
Issue/Limiting Factor being addressed: Feasibility study to determine the need for engineered log jam (ELJ) placement in the main stem from RM 0.0 to RM10.
Action to be taken: Woody material inventory and identification of potential ELJ sites for preliminary design.
Stocks being affected: North Fork Calawah Fall Coho, Fall Chinook, and Winter Steelhead, resident and anadromous cutthroat trout.
S**tatus:** Seeking funding.

2.2.2.4.5 **Title of project:** FS 2900-030 Road Decommissioning. :
Location: FS 2900-030 road, in the Hyas Creek drainage, S.F. Calawah River sub watershed.
Issue/Limiting Factor being addressed: Deteriorating, failing culverts at stream crossings, side cast constructed roads and a lack of road maintenance has resulted in numerous failures at stream crossings directly impacting anadromous fish in the Hyas Creek drainage.
Action to be taken: Remove culverts, pullback and/or out slope areas of unstable soils; restore natural drainage and decommission road segment in accordance with USFS

guidelines.
Stocks being affected: Sitkum / South Fork Calawah Fall Coho, Fall Chinook, Summer and Winter Steelhead, river run sockeye salmon, resident and anadromous cutthroat trout.
Status: Need landowner (RTOC) permission for road segment on their ownership. Seeking funding. NEPA completed for FS segment from MP 1.9-3.6.

2.2.2.4.6 **Title of project**: FS 2922 Road Decommissioning.
Location: FS 2922 road, in the upper portions of the Sitkum sub watershed.
Issue/Limiting Factor being addressed: Without road maintenance, culverts are plugging on high gradient streams in unstable geology. Water running over the road transports sediment and increases in risk of future road failures.
Action to be taken: Remove culverts, pullback and / or out slope areas of unstable soils; restore natural drainage and decommission road segment in accordance with USFS guidelines.
Stocks being affected: Road is in upper watershed (beyond upper extent of fish) but would have indirect effects on Sitkum / South Fork Calawah Fall Coho, Fall Chinook, Summer and Winter Steelhead, resident and anadromous cutthroat trout.
Status: Active

2.2.2.5 Sol Duc River Watershed Priority Projects:

2.2.2.5.1 **Title of project**: Lower Lake Creek Restoration -assessment.
Location:
Issue/Limiting Factor being addressed: LWM, riparian planting
Action to be taken: Riparian restoration
Stocks being affected: Sol Duc Fall Coho, Sol Duc Winter Steelhead, cutthroat trout.
Status: Seeking funding.

2.2.2.5.2 **Title of project**: Bear Creek LWD
Location: Sol Duc to RM 2.0 (USFS).
Issue/Limiting Factor being addressed: Sediment control-temperature, hydrology
Action to be taken: LWM placement assessment
Stocks being affected: Sol Duc Fall Coho, Sol Duc Winter Steelhead, cutthroat trout.
Status: Seeking funding.

2.2.2.5.3 **Title of project**: Kugel Creek Culvert Replacement.
Location: Hwy 101 to Cooper Ranch Road. First stream crossing approximately ¼ mile down Cooper Ranch Road.
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: Replace an undersized and partial fish barrier culvert with a 40' bridge providing full access to 2.5 miles of anadromous fish habitat in Kugel Creek.
Stocks being affected: Sol Duc Fall Coho, Sol Duc Winter Steelhead, Cutthroat Trout.
Status: Funded by WCRRI, implementation in 2019-2020.

2.2.2.5.4 **Title of project**: Eagle Springs riparian restoration.
Location: Sol Duc
Issue/Limiting Factor being addressed: Riparian integrity.
Action to be taken: Large wood and spawning gravel placement, invasive treatment.
Stocks being affected: Sol Duc Fall Coho, Sol Duc Winter Steelhead, Cutthroat Trout.
Status: Seeking funding.

2.2.2.5.5 **Title of project:** Wisen Creek Culvert Replacements.
Location: Partial barrier on Wisen Ck. Rd, Complete barrier on Swede Rd, & Complete barrier on Grouse Glen Rd.
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: Replace 3 culverts on Sol Duc tributary Wisen Creek (20.0336)
Stocks being affected: Sol Duc Fall Coho, Sol Duc Winter Steelhead, Cutthroat Trout.
Status: Seeking funding.

2.3 Lake Ozette Basin

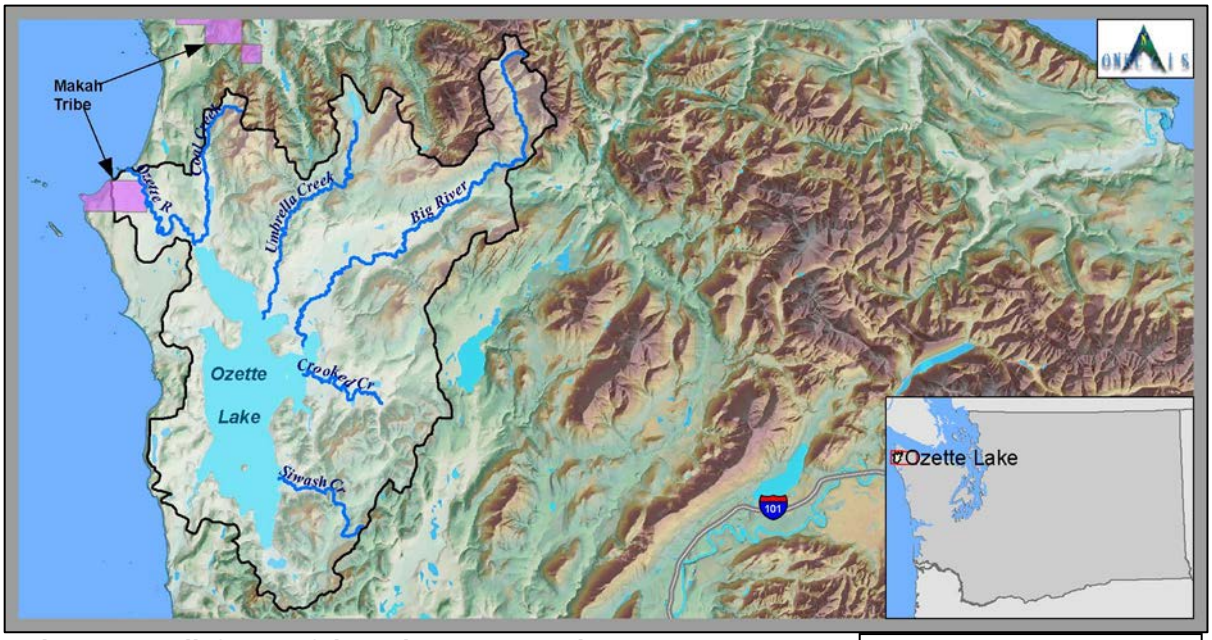


Figure 3. Relief Map of the Lake Ozette Basin

Map: K.E. Bennett, UW ONRC GIS

2.3.1 Ozette Watershed's Background

Lake Ozette watershed is located along the northwest tip of the Olympic Peninsula in Washington State (Figure 3). Lake Ozette is situated on the coastal plain between the Pacific Ocean and the Olympic Mountains. The terrain of the Ozette watershed is slightly rolling to steep with a gradual increase in elevation from zero at sea level at the Ozette River mouth, to 40 feet at the Ozette Ranger Station, to just under 2000 feet at the watersheds highest point in the upper Big River watershed. Most of the watershed ranges from 200 to 800 feet elevation.

Lake Ozette is approximately 8 miles (12.9 km) from north to south and 2 miles (3.2 km) wide. The lake is irregularly shaped and contains 36.5 miles of shoreline (Ritchie, 2005). It includes several bays (North End, Deer, Umbrella, Swan, Ericson's, Boat, Allen's, and South End), distinct points (Deer, Eagle, Shafer's, Rocky, Cemetery, and Birkestol) and three islands (Garden, Tivoli, and Baby). With a surface area of 11.8 mi2 (30.6 km2; 7,550 acres; 3,056 ha), Lake Ozette is the third largest natural lake in Washington State. The lake has a drainage basin area of 77 mi2 (199.4 km2), an average depth of approximately 130 feet (40 m), and a maximum depth of 320 feet (98 meters) (Dlugokenski, C.E., W.H. Bradshaw, and S.R. Hager., 1981). The average water surface elevation of the lake is 34 feet above mean sea level (10.4 meters; National Geodetic Vertical Datum of 1929 [NGVD 1929]). Extreme low and high water surface elevations of the lake range from 30.8 feet (9.4 m) to 41.5 feet (12.6 m) above mean sea level.

The Ozette River drains the lake from its north end, and there are no other outlet

streams. The river travels approximately 5.3 miles (8.5 km) along a sinuous course to the Pacific Ocean. The total drainage area of the Ozette watershed at the confluence with the Pacific Ocean is 88.4 mi2 (229 km2). Coal Creek, which enters just downstream from the lake's outlet, is the largest tributary to the Ozette River. Several significant tributaries drain into Lake Ozette. The largest are Umbrella Creek, Big River, Crooked Creek, Siwash Creek, and South Creek (Table1). Several smaller streams also feed the lake and include: Palmquist, Quinn, Elk, and Lost Net Creek, as well as several other unnamed streams.

Table 2: Drainage Size of Primary Lake Ozette Tributaries

Tributary	Basin Area
Big River	22.8mi/acres
Crooked Creek	12.2mi/acres
Umbrella Creek	10.6mi/acres
South Creek	3.26mi/acres
Siwash Creek	2.87mi/acres

Smith, Carol J. (2000)

The geology of the Ozette watershed is a mix of flat and gently sloping glacial and glacio-fluvial deposits situated between resistant knobs and small hills composed of Tertiary marine sedimentary rock units (mechanically weak silt and sandstones). Some glacial landforms extend for several square miles while others only occupy small valleys. Much of the land within the watershed is low-relief and contains numerous swamps, bogs, and wetlands. Other portions of the watershed (e.g., upper Big River) are steep and rugged and are underlain by Eocene age volcanic flows and breccias (Snavely et al.1993).

Salmonid populations in the Lake Ozette watershed (in addition to the ESA-listed sockeye salmon) are kokanee (non-anadromous) salmon, coho salmon, chum salmon, Chinook salmon, steelhead, and coastal cutthroat trout. Coho salmon are native to the Ozette watershed and are sustained through wild production (WDF et al., 1994; WDFW, 2002), while Chinook and chum salmon are assumed to be critical, threatened, or potentially extirpated (Nehlsen et al.1991; McHenry et al., 1996). Steelhead trout are native to the Ozette watershed and are sustained through wild production (WDF et al., 1994; McHenry et al., 1996; WDFW, 2002). Steelhead/rainbow trout primarily occur in the form of winter-run steelhead, but non-anadromous forms of the species may also be present. Winter-run steelhead in the Ozette watershed have been identified as a distinct stock in recent stock assessments conducted by WDFW (WDF et al., 1994; WDFW, 2002).

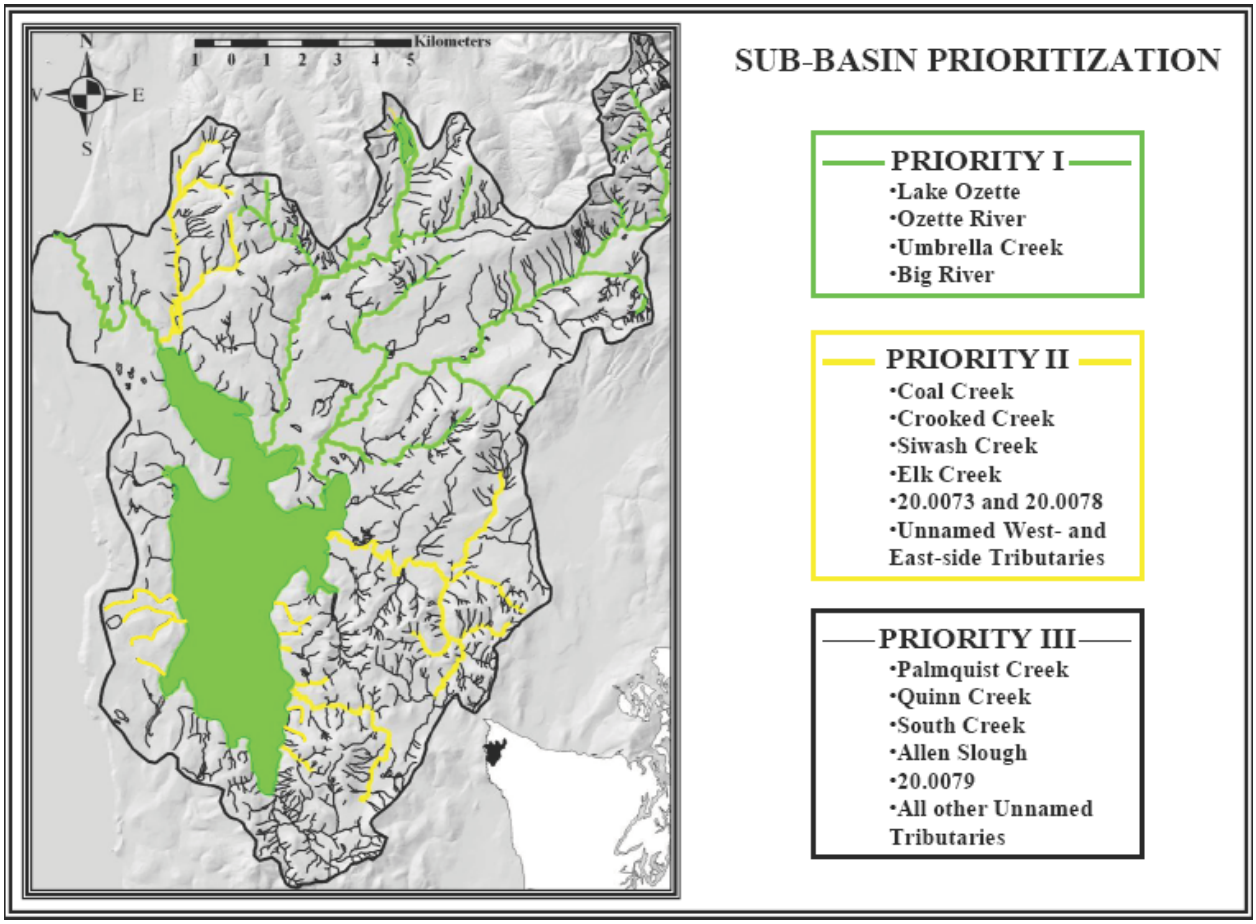
Currently the ESA-listed Lake Ozette sockeye salmon is sustained through both wild and hatchery-reared production (NMFS, 2009). An exhaustive review of current and historical population trends for the Lake Ozette sockeye can be found in the Lake Ozette Sockeye Recovery Plan and its associated technical document the Lake Ozette

Sockeye Limiting Factors Analysis (NMFS, 2009;).
http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/lake_ozette/lake_ozette_sockeye_salmon_recovery_plan.htm

2.3.2 Ozette Watershed Sockeye Project Prioritization

The Lake Ozette sockeye recovery strategy framework contains three key elements that can be used to inform which recovery actions are needed for salmon recovery in the Lake Ozette watershed. This framework used in the recovery plan can be generally applied to all species of concern within the Lake Ozette watershed because it focuses on the critical processes, inputs, and habitat conditions that are fundamental to all salmonids during common life stages. Where these strategies are found to be inconsistent with recovery of other species of concern (e.g., sub-basin prioritization, habitat prioritization by life stage), the prioritization scheme described in sections 1.2 and 1.3 is employed (following from Roni et al., 2002).

Figure 4. Lake Ozette Sockeye Recovery Plan Sub-Basin Prioritization (NMFS, 2009)



In the Lake Ozette sockeye recovery plan (NMFS, 2009; http://www.nwr.noaa.gov /Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/Lake-Ozette-Plan.cfm twenty four recovery actions have been identified and prioritized relative to the sub-basin scheme in Figure 4. In 2010 the Lake Ozette Steering Committee initiated a process of ranking those actions in order to produce a 3-year implementation plan. For sockeye projects in the Ozette Basin prioritizations based upon this independent ranking are being used directly for selecting nominations to the annual NPCLE priority project list. For other salmonid stocks in the Ozette Basin, prioritization and ranking will be undertaken as described under sections 1.2 and 1.3. For the 2019 annual project list there are three projects prioritized that are also prioritized in the Lake Ozette Sockeye Recovery Plan.

2.3.3 Ozette Basin Prioritized Projects:

Prioritized projects for the Ozette Basin in 2019 and 2020 are projects that address known restoration projects or Limiting Factors outlined in Haggerty 2009 and are prioritized projects recognized by the Lake Ozette Sockeye Steering Committee. Some of these projects have been fully or partially funded but none of them has been implemented on the ground. Each project's "status" at the time of publication is indicated at the end of its description.

2.3.3.1 Lake Ozette Tributaries Priority Projects:

2.3.3.1.1 **Title of project**: Lake Outlet and Ozette River Riparian Restoration.
Location: Lake Ozette outlet and Ozette River.
Issue/Limiting Factor being addressed: Riparian and sediment.
Action to be taken: Invasive species assessment, management and replanting.
Stocks being affected: Sockeye, Chinook, Steelhead and Coho.
Status: Seeking funding.

2.3.3.1.2 **Title of project**: Big River Riparian Restoration.
Location: Big River and upper Lake Ozette Basin.
Issue/Limiting Factor being addressed: Riparian and sediment.
Action to be taken: Invasive species control and re-vegetation for Big River then expand to the rest of basin.
Stocks being affected: Sockeye, Chinook, Steelhead, Cutthroat and Coho.
Status: Seeking funding.

2.3.3.1.3 **Title of project**: Coal Creek Culvert to Bridge.
Location: Tributary entering the North end of Lake Ozette.
Issue/Limiting Factor being addressed: This project will allow all life stages of fish to access approximately 4,850 feet of additional habitat. The existing 6'x90'culvert is no longer considered adequate by the WDFW. This proposal is to replace the culvert with a bridge.
Action to be taken: Control state listed invasive plants including Knotweed.
Stocks being affected: Sockeye, Chinook, Steelhead, Cutthroat and Coho.
Status: Seeking funding.

2.3 North Pacific Coast Independent Drainages:

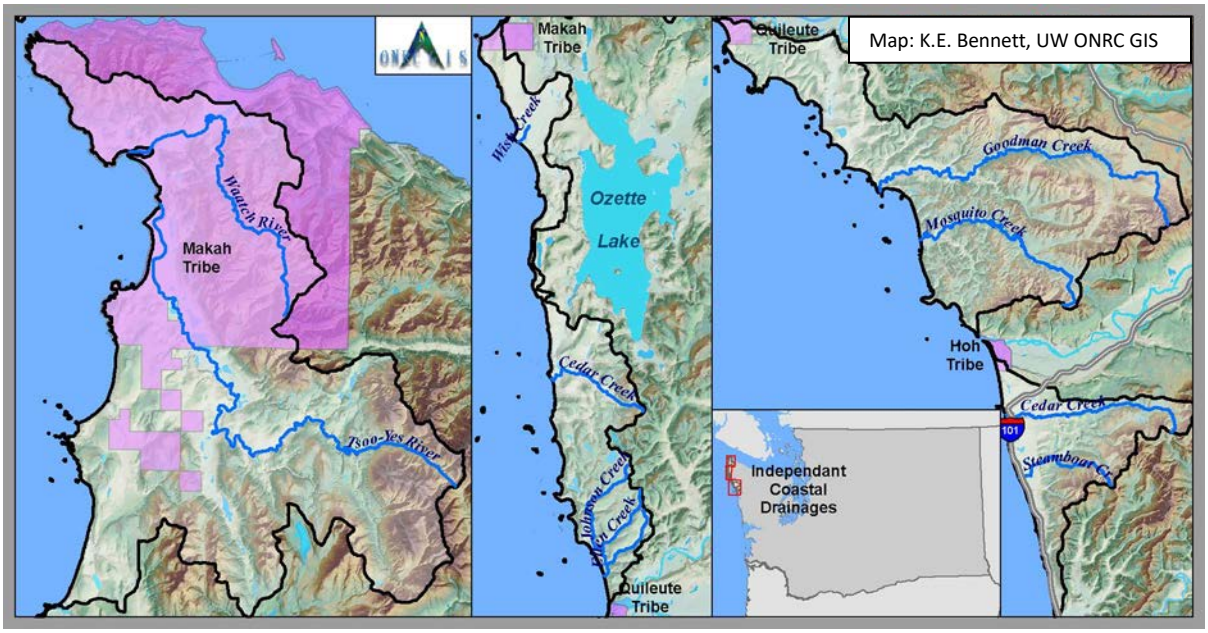


Figure 5. Relief Map of WRIA 20 Independent Drainages. (Map needs revision for Petroleum Creek)

2.4.1 Independent Drainages Background:

The independent drainages of WRIA 20 are all relatively short, rain-fed watersheds that originate in the lower elevations of the coastal foothills and independently terminate in the ocean. The coastal interface of these drainages is at best a pocket estuary or a tidal marshland on an estuarine bay like the mouth of the Tsoo-Yess, but in some cases there is only a sub-surface seep through the surf zone. All of these drainages are under extreme tidal and coastal influence and in most cases provide limited access to anadromous fish. From their headwaters and along the majority of their course, until they enter the protected coastal strip of Olympic National Park or tribal treaty lands, and dump into the ocean, these independent drainages are all located within commercial timber production areas. Outside of the Tsoo-Yess and Waatch Rivers inside the Makah Reservation, systematically documented salmonid presence in these independent creeks and small rivers is limited, and only a few of the stocks are identified by WDFW in the SaSSI (WDFW, 2002) and Salmonscape (WDFW, 2010) data bases.

2.4.1.1 The Small Olympic National Park Drainages:

The smaller independent salmon and steelhead producing coastal streams that flow into Olympic National Park's coastal strip include Goodman Creek, Mosquito Creek, Cedar Creek, and Steamboat Creek. Goodman and Mosquito Creeks are located to the north of the Hoh River; Cedar Creek and Steamboat Creek are smaller independent streams located to the south of the Hoh River. All four of these independent drainages fall within the Hoh Tribe Usual and Accustomed Fishing tribal treaty jurisdiction (U&A)

areas, except for Goodman Creek, which is a shared U&A with the Quileute Tribe.

Goodman Creek is the largest drainage with an average winter width of 15 yards in the lower 3.5 miles, diminishing to 4 yards in the upper reaches; summer width in the lower 3.5 miles is approximately 10 yards. Habitat is composed of interspaced pool and riffles. Substrates in the lower 5 miles is predominantly composed of sand and gravel, with gravel and cobble predominating in the upper reaches. The Goodman Creek Basin contains a high density of wetlands, indicating high ground waters inputs. In Mosquito Creek winter average stream widths range from 7 yards near river mile (RM) 7 to 12 yards in the lower reaches. Sand and gravel are the predominant substrates in the lower reaches while boulders and rubble are predominant in the upper drainage.

Limiting factors for salmon production in these drainages are summer low flows and the adverse effects of logging. All lands outside the Olympic National Park have been extensively logged. Little habitat data exists for these streams, but biologists have noted that sedimentation and altered riparian zones are problems. Numerous blockages from either culverts or cedar spalts have been documented in Cedar and Steamboat Creeks. The middle reaches of Goodman Creek are reported to have low levels of large woody material. According to Phinney and Bucknell (1975) stream clean out of woody debris was practiced in Goodman Creek to facilitate salmon migration.

Fall coho salmon and winter run steelhead trout have been documented in Goodman Creek, Mosquito Creek, Cedar Creek, and Steamboat Creek. Goodman Creek and Mosquito Creek have suitable spawning material for Chinook salmon, but the extent of utilization is unknown. A barrier falls exists on Falls Creek, a tributary to Goodman Creek. Coho and steelhead are able to utilize 12 miles of the main stem Goodman Creek as well as over 8 miles of tributary streams. Mosquito Creek is known to support coho production in its lower 7 miles. Coho spawning generally occurs from mid-November to mid-January in Goodman and Mosquito Creeks. Winter steelhead spawning occurs from January through April. An estimated 36 linear miles of stream are utilized for salmon production in these streams. The data for stock status determinations is limited, and remains a data need.

2.4.1.2 Tsoo-Yess River.

The Tsoo-Yess River (previously identified as Sooes River) is the largest of the independent drainages with a watershed area of about 26,700 acres. The lower 5,000 acres are located within the exterior boundaries of the Reservation. Like the rest of the watershed, much of the land along the Tsoo-Yess main stem is composed of gentle rolling topography, the result of a glacially carved valley. This landform typifies the western and southern portions of the watershed. In particular, the lower main stem and the largest tributary, Pilchuck Creek, which offers excellent spawning and rearing habitat because of the gentle topography, wetlands, side channels, and channel migration zones are frequent. The main stem Tsoo-Yess wraps around the south and west side of the basalt Crescent Formation as it leaves the Reservation. The Crescent Formation is composed of steep, landslide prone terrain. This composes much of the tributary

drainage area on the right bank (east and north) side of the river, although the mainstem itself is relatively low gradient.

The main stem Tsoo-Yess River from its mouth in Makah Bay to the reservation boundary is a low gradient floodplain river with a gravel and sand bed. Historically, the river contained numerous Large Woody Material (LWM) jams, some of which spanned the width of the channel. Due to the low gradient topography adjacent to the river and the complexity and roughness of instream wood, overbank flows and floodplain inundation were common events annually, which provided very diverse floodplain rearing habitat for salmonids. Tributaries entering the river either directly or through these river adjacent floodplain wetlands provided additional rearing habitat for salmonids and other aquatic species. Complex and connected floodplain habitat and pyrrhic zones, with numerous sources and sinks of water, have been identified both in the PNW (Peterson, 1982; Collin and Montgomery, 2002; Bramblett et al., 2002) and the world (Mertes, 1997, 2000; Hohausova et al., 2003; Wydoski and Wick, 2000) as essential to healthy river systems, the provision of refugia habitat at optimal times, and the production of freshwater fish species.

Past riparian timber harvesting and LWM removal from streams has dramatically reduced the amount of LWM and large complex jams in the lower Tsoo-Yess river. Historically, the Washington Department of Fish and Wildlife (WDFW) sanctioned LWM removal from rivers in this region by logging companies and occasionally initiated projects internally for wholesale wood removal (Kramer, 1953). Bulldozers, cable yarding systems, chainsaws, and dynamite were all used to remove wood from local stream channels. Furthermore, mainline road construction along the main stem Tsoo-Yess River, which functions as levees or dikes, isolated many tributaries and wetland complexes from flood inundation. These factors, along with increases in peak flows from land use action, have resulted in moderate channel incision along the lower main stem Tsoo-Yess river.

The Tsoo-Yess basin contains runs of anadromous Chinook (Oncorhynchus tshawytscha), coho (O. kisutch), and chum salmon (O. keta), as well as anadromous and resident cutthroat (O. clarki) and steelhead/rainbow trout (O. mykiss). The U.S. Fish and Wildlife Service's Makah National Fish Hatchery (MNFH) began supplementation efforts in the lower Tsoo-Yess River in 1982, after a precipitous decline of Tsoo-Yess River Chinook. The hatchery prevented extirpation of this stock, and currently produces native Chinook and coho salmon as well as steelhead.

2.4.1.3 Wa'atch River

Wa'atch River is low gradient with considerable tidal influence and completely within the Makah Reservation. The Wa'atch River supports chum, coho, winter steelhead, and rainbow and cutthroat trout. Primary tributaries are Educket and Bear Creek.

2.4.2. Independent Drainages Priority Projects:

Each drainage in Section 2.4.2 is included in the WRIA 20 Limiting Factors Analysis (Smith 2000; http://docs.streamnetlibrary.org/Washington/ConservationCommission/Statewide_LFA_Final_Report_2005.pdf. Only one of the nine projects on the 2012 NPCLE Project List identified under Independent Drainages (Appendix B) were nominated to high priority status in this year's project review by the NPCLE Technical Committee.

However, in the Tsoo-Yess River the Makah Tribe is currently also seeking additional funds for the development of a watershed assessment that will assist in developing a prioritization of potential recovery actions for the entire drainage. The assessment will identify specific habitats within the main stem Tsoo-Yess River, as well as its three major tributaries, that require restorative actions due to degraded processes. Existing reach-level biological and chemical data will supplement the physical meso-habitat data collected to separate Tsoo-Yess) river reaches by level of impairment.

2.4.2.1 **Title of Project**: Waatch- Bear Creek Restoration
Location: Waatch Creek.
Issue/Limiting Factor being addressed: Fish Passage and estuary reconnection
Action to be taken: Replace perched pipe blocking fish access to 10 acres of wetland and 0.3 miles of low gradient stream
Stocks being affected: Coho, Steelhead and Cutthroat trout
Status: seeking funding.

2.4.2.2 **Title of Project**: Waatch Creek Fish-blocking Culvert Correction.
Location: Waatch Creek
Issue/Limiting Factor being addressed: Fish passage and estuary reconnection
Action to be taken: Replace perched pipe blocking fish access to 10 acres of wetland and 0.3 miles of low gradient stream
Stocks being affected: Coho, Steelhead and Cutthroat trout
Status: seeking funding.

2.4.2.3 **Title of Project**: European Green Crab Management in Makah Coastal Estuaries.
Location: Waatch and Tsoo-Yess estuaries.
Issue/Limiting Factor being addressed: Protection of juvenile fish habitat.
Action to be taken: Makah Reservation-Wa'atch River and estuary approx. two miles to mouth and Tsoo-yess River and estuary approx. two lower river miles to mouth, and Neah Bay nearshore; various areas on west end of the bay
Stocks being affected: Chinook, coho, Steelhead and Cutthroat trout
Status: Seeking funding under both estuary and nearshore resources.

2.4.2.4 **Title of project**: Goodman Creek Collapsed Stringer Bridge
Location: Goodman Creek drainage
Issue/Limiting Factor being addressed: Fish passage, instream complexity
Action to be taken: Removal of Stringer Bridge remains and incorporate into LWD placement
Stocks being affected: Coho, Steelhead and Cutthroat trout.

Status: seeking funding

2.4.2.5 **Title of project**: Goodman CreekTrib: Boulder Creek Creosote Piling Removal Restoration
Location: Goodman Creek
I**ssue/Limiting Factor being addressed**: Water quality and fish passage
Action to be taken: Remove creosote pilings
Stocks being affected: Coho, Steelhead and Cutthroat trout.
Status: seeking funding.

2.4.2.6 **Title of project**: Goodman Creek 2V Road Culvert
Location: Goodman Creek 2V road
Issue/Limiting Factor being addressed: fish passage
Action to be taken: Replace undersized, perched culvert with 66% barrier.
Stocks being affected: Coho, Steelhead and Cutthroat trout.
Status: seeking funding.

2.4.2.7 **Title of project:** Goodman Creek LWD Placement
Location: Goodman Creek R.M. 10.5-13.0
Issue/Limiting Factor being addressed: Channel complexity and spawning habitat
Action to be taken: LWM enrichment from RM 10.5 to 13.0
Stocks being affected: Coho, Steelhead and Cutthroat trout.
Status: Funded 2017 Round to begin summer of 2018

2.4.2.8 **Title of project**: Goodman Creek Invasive Species Removal and Riparian Planting.
Location: Goodman Creek
Issue/Limiting Factor being addressed: Riparian, sedimentation, and habitat complexity
Action to be taken: Invasive species removal and riparian re-planting for entire watershed
Stocks being affected: Coho, Steelhead and Cutthroat trout.
Status: seeking funding.

2.4.2.9 **Title of Project:** Quileute Tribe Rayonier 5050 Road Crossing Removal
Location: Unnamed tributary to Cedar Creek (North).
Issue/Limiting Factor being addressed: Riparian, sedimentation, and habitat complexity
Action to be taken: Currently, a 40"x 120' culvert with 53' of fill with a 12' bank-full width will be removed and the stream crossing on the 5050 road will be decommissioned. This culvert (CL040142) has been identified as a potential mass wasting site due to the undersized culvert, which has high potential of becoming blocked during a major rain event that could wash out this fill and entire road prism. This culvert is located on a tributary to Cedar Creek (North), which is a coastal tributary to the Pacific Ocean. Following removal of this structure and abandonment of this road, there would be 0.5 miles (2700') of fish habitat that will be available for fish usage.
Stocks being affected: Coho and Cutthroat Trout.
Status: Seeking funding.

2.5 North Pacific Coast Nearshore:

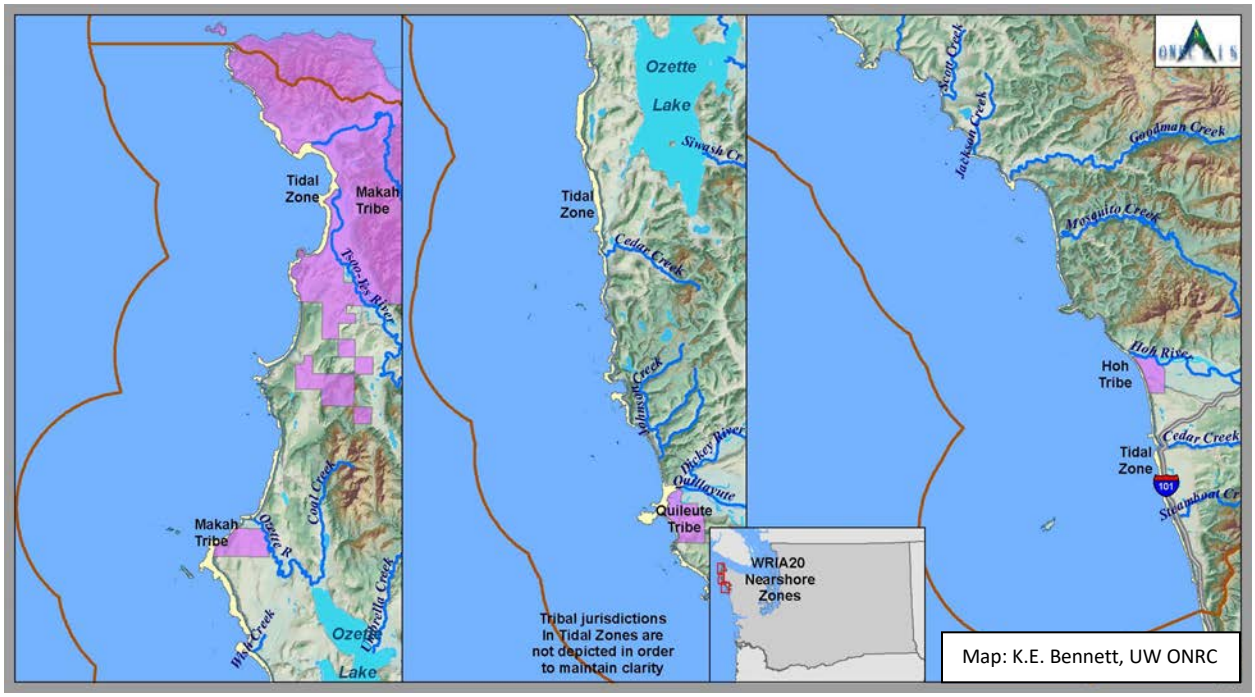


Figure 6. Relief Map of WRIA 20 Nearshore. (Need to add map key and addition of Petroleum Creek)

2.5.1 WRIA 20 Nearshore Background:

The nearshore component of WRIA 20 is a multi-jurisdictional area that is under the authority of tribal reservations, Usual and Accustomed Fishing tribal treaty jurisdiction (U&A), and/or federal ownership by Olympic National Park, the U.S. Fish and Wildlife Service, or the Olympic Coast National Marine Sanctuary. Given the overlapping tribal and federal regulation of this region, habitat protection and on-going monitoring of habitat conditions already occurs at multiple levels (Klinger et al, 2007). NPCLE salmon restoration activities within this zone have focused on promoting assessment studies of salmonid use of the nearshore for foraging and migration (Beechie et al, 2003), which up to this point in time has not been systematically studied by any of the existing tribal or governmental authorities.

The WRIA 20 nearshore includes open coast, protected tidal areas inland of the numerous networks of offshore rocks and islands, and pocket estuaries fed by independent drainages. The limited estuaries include the mouth of the Hoh River, Makah Bay at the mouth of the Tsoo-Yess and Wa'atch Rivers, and a relatively extensive estuary at the mouth of the Quillayute River inshore of James Island and extending to the mouth of the Dickey River. Very little is presently known about how these regions serve as nearshore salmon habitat, so the first priority has been for baseline assessment. Relative to other coastal regions it is likely that the estuaries and protected

tidal areas serve as foraging and holding areas for smolts and returning adult salmon, and may serve as a coastal migration zone for salmonids from both local and adjacent estuaries as far away as the Columbia River (Beechie et al, 2003; Shaffer, 2004a, 2004b).

Washington Department of Fish and Wildlife has with cooperation of the four treaty tribes on its Pacific Coast conducted forage fish sampling (2012-2014). The initial report is on line at https://wdfw.wa.gov/publications/01701/wdfw01701.pdf. Certain of the tribes are continuing this work with other funding, within their respective U&As.

2.5.2 Nearshore Priority Projects:

The following two priority salmon projects have been identified for the nearshore environment of WRIA 20 by the NPCLE technical Committee.

2.5.2.1 **Title of project**: Nearshore Assessment of Salmonid Genetic Stocks.
Location: Makah Bay, mouth of the Quillayute River and mouth of the Hoh River.
Issue/Limiting Factor being addressed: Identification of salmonid stock ESUs utilizing the nearshore for migration and foraging.
Action to be taken: Sub-sample salmonid tissue from beach seine for genetic stock identification.
Stocks being affected: All anadromous stocks in WRIA 20 and any migrating adults or juveniles from adjacent systems.
Status: Seeking funding.

2.5.2.2 **Title of project:** European Green Crab Management in Makah Reservation Coastal Estuaries.
Location: Wa'atch and Tsoo-Yess Rivers and estuaries
Issue/Limiting Factor being addressed: Estuarine and nearshore habitat, non-habitat limiting factors, and predations; Channel Stability
Action to be taken: Capacity to conduct long-term removal and control of the invasive European green crab in two coastal estuaries and nearshore beaches.
Stocks being affected: Chinook, Chum, Coho, Cutthroat, and Steelhead.
Status: Seeking funding under both estuary and nearshore resources.

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APPENDIX A

NPCLE 2020 PROJECT PROPOSAL APPLICATION FORMS

North Pacific Coast (WRIA 20)
SRFB Grant Round # 21
2020 Salmon Application

The Salmon Recovery Funding Board (SRFB) has started its annual grant round. To submit a salmon habitat project application during this funding cycle you must contact your local Lead Entity for its application procedures and timelines.

NOTE: All applications must be submitted through a Lead Entity.

PROJECT LOCATIONS:
North Pacific Coast Lead Entity (NPCLE) projects must be located within the geographic boundary of Water Resource Inventory Area 20 (WRIA 20), which includes the highlighted portions of western Clallam and Jefferson counties and their nearshore as illustrated in the map above.

BASIC APPLICATION PROCEDURE FOR ROUND 21

(Spring/Summer 2020)

(Applications must be entered into PRISM after you get your on-line Project # from the Lead Entity)

- Completed Proposals must be submitted to the Lead Entity and entered into PRISM by **Feb.18, 2020**. It is an on-line application using the PRISM grant application program.
- To get a PRISM# Contact the North Pacific Coast (WRIA 20) Lead Entity Coordinator, Frank Hanson (360) 374-4556 fsh2@uw.edu , UW Olympic Natural Resource Center, P.O. Box 1628,1455 South Forks Ave., Forks, WA 98331.
- Go to the RCO website after you have a Project # https://rco.wa.gov/grant/salmon-recovery/

General Instructions:

1. Fill out the Coast Salmon Partnership Habitat Restoration Conceptual Project form (pages 7-8 of this application package) and submit it to NPCLE coordinator Frank Hanson at any time throughout the year. We will then enter the basics of your project into the Habitat Work Schedule (HWS) and obtain a PRISM PROJECT # for you. This is accomplished by our Communications and Data Technician, Rebekah Brooks (rebalynn@uw.edu).
2. After you get your PRISM project number from the Lead Entity you will be able to fill in the rest of your information using the on-line grant program PRISM. This year is a shorter grant round than the past. The information on https://rco.wa.gov/grant/salmon-recovery/ is the new process for starting an application. There is also a link on how to apply at https://rco.wa.gov/grants/apply-for-a-grant/. Chantell Krider, Information Technology Specialist for RCO will take you through the process if you need further assistance (360-902-3020 chanell.krider@rco.wa.gov)

The 2020 Salmon Recovery Grants Manual 18 is available online https://rco.wa.gov/wp-content/uploads/2019/05/SAL-Manual18.pdf. All required application forms and project proposal templates are included in Manual 18 and you may find links to all the forms and materials you will need in the Application Checklist. (https://rco.wa.gov/wp-content/uploads/2019/10/SAL-AppC-AppChecklist.pdf).
You can also find the State-wide 2020 Grant Round Schedule (https://rco.wa.gov/wp-content/uploads/2019/10/SAL-GrantSchedule.pdf) in the manual but please note applicants should check with the local salmon Lead Entity for their specific schedule and process to submit a proposal, as it may differ on some key dates listed in Manual 18. NPCLE information can be found at https://www.coastsalmonpartnership.org/north-pacific-coast-lead-entity/.

Please contact either Frank Hanson, 360-374-4556 (fsh2@uw.edu) or Alissa Ferrell, 360-867-8618 (Alissa.ferrell@rco.wa.gov) for clarification or assistance in getting your project information into PRISM.

North Pacific Coast Lead Entity
SRFB Round 21 Application Schedule
(Winter 2020)

SCHEDULED ITEM	DATE
Official Release of the NPCLE SRFB RFP and Application Package (Request for Proposals)	**Jan.24th**
(Regular NPCLE meeting).	**Feb. 18th**
Pre-Proposals due to Lead Entity Coordinator and entered into PRISM.	**Feb. 18th**
Pre-proposals to NPCLE Technical & Citizen Committee for review.	**March 17th**
Formal oral presentations of proposals to NPCLE Citizen and Technical Committees (Regular NPCLE meeting).	**May 19th**
SRFB Technical Review Panel site visit.	**Feb. 20th**
NPCLE Technical Committee scoring discussion session.	**June 9th**
Final Q & A between applicants and the Citizen and Technical Committees (Regular NPCLE meeting).	**June 16th**
Final Draft proposals submitted for final LEG review.	**June 29th**
Technical Committee final project scoring session.	**July 7th**
Citizens Committee/Initiating Governments rank and approves projects for submittal (Regular NPCLE meeting).	**July 21st**
Ranked project list and final applications submitted to SRFB by the Lead Entity Coordinator.	**August 14th**

The Salmon Recovery Funding Board (SRFB) also offers "Successful Applicant Workshops" that can be of great assistance in understanding the SRFB policies and project application and management procedures. All applicants and grant recipients are encouraged to attend workshops at least once every other year. The workshop recorded Jan 14th 2020 is posted on SRFB application page.

Successful Applicants:

Successful applicants contact the Lead Entity in the location of their proposed project as early as possible so that stakeholders have plenty of time to be informed and potential partners can collaborate. Lead Entity Technical Committee members can be especially helpful in the early stages of project development.

SRFB Round 21 NPCLE Proposal Requirements

(DUE February 18th, 2020)

Once on PRISM with your Project # (begin entering your project):

1. Roles of the project team.
2. A project description (1-2 pages maximum- it can be a standard "abstract" of 1-2 paragraphs but should specifically address how it benefits salmon and whether it is a "priority project" identified in the NPCLE Salmon Restoration Strategy or the Lake Ozette Sockeye Recovery Plan, an R-Map plan or some other publically reviewed restoration strategy).
3. Estimated budget including 15% match (totals entered into PRISM, but details attached as a separate budget of expenses presented in any format preferred by the project applicant; see below).
4. Identification of the target salmon species affected by the project (entered into PRISM). Attach the following separate documents into the PRISM application (attaching a file in PRISM is accomplished by clicking on the "Attachments" tab at the top of the page):
5. Evidence that the project is part of a recovery plan or lead entity strategy (Identified on the NPCLE Form and/or "project description").
6. A project location map (Add as an attachment in PRISM).
7. A site or parcel map (Add as an attachment in PRISM).
8. A preliminary design plan or sketch for restoration projects (Add as an attachment in PRISM if appropriate to the type of project).
9. This 2020 Grant year is a new with hopefully a simpler process, any remaining fields or changes to the project in PRISM must be completed by June 29th, 2020

NPCLE APPLICATION REVIEW CRITERIA:

The general evaluation criteria used by the NPCLE Technical Committee and Citizen Committee in reviewing projects proposed for Round 21 SRFB Grants includes:

Project Strategy
Project Method
Habitat Quality
Habitat Quantity
Salmonid Life Histories
Species Diversity (current)
Riparian forest and native vegetation
Local Community Support
Sediment Control
Connectivity
Applicant is or has a project sponsor
Likelihood of satisfying the granting agency
Accuracy of budget
Urgency for immediate implementation
Qualifications

(A copy of the form used by technical reviewers for proposal evaluation follows on the next pages)

Table 1. Project Ranking Matrix

PROJECT NAME / # : _____ REVIEWER NAME: _____

CATEGORIES			SCORE	COMMENTS (Reviewer)
PROJECT STRATEGY (score only as many as appropriate)	**Category Description**	**Score Range**	(Reviewer)	
Preservation/Protection.	Obtains protection from direct human impacts to habitat conditions through conservation easements or land purchase.	**0 to 10**		
Assessment to define projects and/or to fill data gaps.	Conducts archival and empirical studies to document or ground truth current conditions prior to identifying specific restoration actions.	**0 to 10**		
Restoration of Processes - Long term	Undertakes actions that support natural processes to recover habitat conditions.	**0 to 10**		
Restoration of Physical Habitat - short term	Undertakes restoration of degraded habitat to immediately improve habitat conditions on a temporary time scale.	**0 to 5**		
Reconnect Fragmented / Isolated Habitats	Undertakes actions that repair physical corridors and restores functions of previously connected habitat areas.	**0 to 10**		

	Category Description	**Score Range**	**SCORE** (Reviewer)	**COMMENTS** (Reviewer)
Acquisition/Easement	Purchase and/or a contractual agreement to maintain or improve salmon habitat conditions.	**0 to 4**		
Fish Passage	Remove stream-crossing structures or restore, upgrade and replace stream-crossing structures to allow migration of all fish life history stages and the natural movement of streambed material and large woody material.	**0 to 4**		
Road Decommissioning	Elimination of existing road(s) and reestablishment of natural channel configuration and natural habitat functions.	**0 to 4**		
Drainage / Stabilization	Increase water crossing structure sizes to better accommodate peak flows. Increase number of cross drains to avoid excess flow into any drainage, and/or remove side cast at segments in risk of failure.	**0 to 4**		
Flood Plain & Wetland	Reconnect or re-design lowlands, road segments, dikes, bank armoring, revetments and fill that are specifically impacting floodplain, channel, or wetland function.	**0 to 4**		
Large Woody Debris Placement	Design and place engineered woody material accumulations and logjam structures to enhance channel stability, diversity, and spawning substrate, accumulate natural wood, and/or to protect significant habitat features for the maintenance of productive fish habitat.	**0 to 4**		
Riparian Restoration	Inventory and remove invasive species along banks and river bars within basins using appropriate methods for removal and control. Promote appropriate age and species composition of vegetation through landscape engineering and replanting. Fence riparian areas from livestock, relocate parallel roads and other infrastructure from riparian areas.	**0 to 4**		
Instream structure removal / abandonment	Permanent removal of culverts, failed bridges, cedar spalts, and other anthropogenic instream blockages so that the channel returns to natural conditions.	**0 to 4**		
Instream Structure Improvement/replacement	Improve or replace existing culverts, bridges, or other failed instream structures so that the channel returns to adequate function for the support of salmon habitat.	**0 to 4**		
Other	Special assessments, experimental techniques, quantitative and spatial modeling or the application of new technology.	**0 to 4**		

(continued)

(continued from other side)

	Category Description	Score Range	SCORE (Reviewer)	COMMENTS (Reviewer)
Salmonid Habitat Quality	Water quality, pool frequency, channel composition, LWD frequency positively affected by the project .	**0 to 4**		
Salmonid Habitat Quantity	Increase in stream length, estuary or off-channel area after project completion.	**0 to 4**		
Salmonid Life Histories	Range of salmon life history stages addressed and positively affected by the project (e.g. spawning, rearing, migration).	**0 to 4**		
Salmonid Species Diversity (current)	Number of salmonid species positively affected.	**0 to 4**		
Riparian forest and native vegetation	Are riparian areas healthy with native vegetation or will invasive species and/or restoration be addressed?	**0 to 4**		
Sediment Control	Anthropogenic or geomorphic- sediment issues and/or their restoration positively affected by the project.	**0 to 4**		
Climate Adaptation	Climate adaptation is formally incorporated into project benefits and addressed in the proposal description.	**0 to 4**		
Salmonid habitat connectivity	Improvement or maintenance of connectivity to functional or high quality habitat.	**0 to 4**		

	(score applicant based on track record and documented resources)	Score Range	SCORE (Reviewer)	COMMENTS (Reviewer)
Applicant is or has an appropriate project sponsor.	How complete and balanced is the project team?	**0 to 4**		
Likelihood of satisfying the granting agency.	How does this project address the funding requirements of the granting agency?	**0 to 4**		
Accuracy and completeness of budget.	Are projected expenses realistic relative to documented costs and are they adequate?	**0 to 4**		
Urgency for immediate implementation.	Are there timing issues for this projects success that make it more important to move forward now?	**0 to 4**		
Qualifications	Qualifications / track record of sponsor/partners	**0 to 4**		
Local Community Support	Is there endorsement (e.g support letters) of affected landowners, support by economic sectors, community awareness and adequate buy in?	**0 to 4**		
		TOTAL:		

COAST SALMON PARTNERSHIP
HABITAT RESTORATION
CONCEPTUAL PROJECT FORM

Project Information	
Project Name	
Landowner (name, phone number and/or email)	
Project Type (bank protection/ restoration/acquisition/etc.)	
Project Sponsor or Primary Contact (name, phone number and/or email)	
Brief Project Description	
Current Land Ownership (private, public, other)	
Approximate Scale of Project to be Restored/Protected, if known (linear feet, acreage, etc.)	
Project Location	
River or creek name, road crossing, nearest street address, if applicable	
Latitude/longitude	
Stream	
Sub-Basin	

	Ecosystem Type to be Protected/Restored/Acquired		
	Estuary (River Delta)		Riparian (Stream side)
	In-stream		Upland
	Wetland		Off channel floodplain
	Other_____		N/A

	Resource Concerns Addressed (Choose All That Apply)		
	Bank erosion		Infrastructure protection
	Flooding/flood control		Road maintenance
	Storm water runoff		Other _____

	Habitat: Limiting Factor Addressed (Choose All that Apply)		
	Habitat diversity		Channel stability
	Habitat composition		Width
	Floodplain connectivity/function		Water quantity/flow
	Fish Passage		Water quality
	Predation		Sedimentation
	Food		Temperature
	Non-habitat limiting factors		Unknown
	Channel structure and complexity		Other_____

	Primary Aquatic Species Benefitting (Choose All that Apply)		
	Bull Trout		Rainbow Trout
	Chinook		Sockeye
	Chum		Steelhead
	Coho		Cutthroat
	Pacific lamprey		Mountain whitefish
	Largescale sucker		Dace
	Red side shiner		Northern pike minnow
	Sculpin		Three spine stickleback
	Olympic mud minnow		Northern red-legged frog
	Northwestern salamander		Long-toed salamander
	Pacific Tree frog		Rough skin Newt
	Migratory birds		Other_____

Partner(s)	

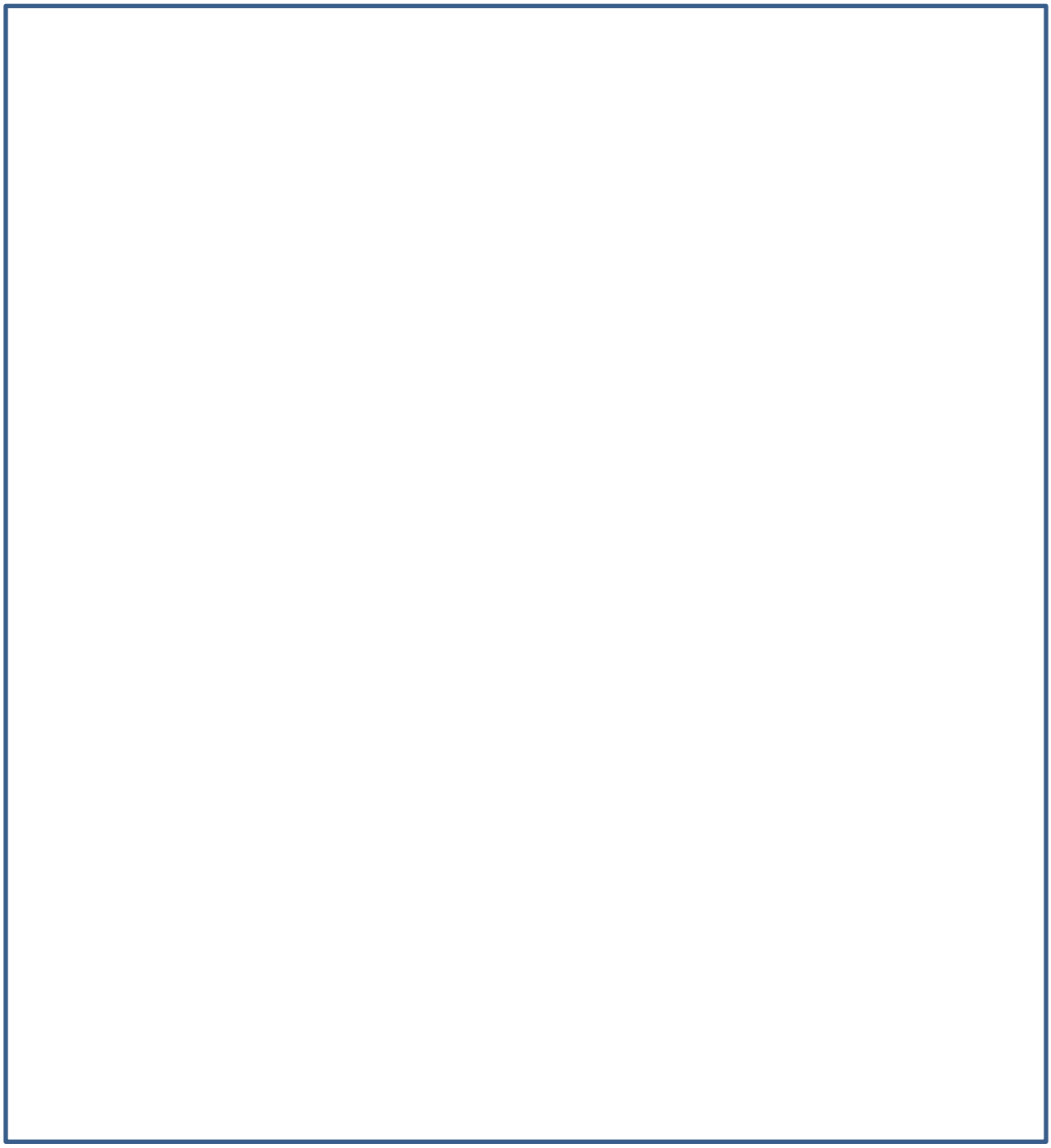
Detailed Project Information (where applicable)

Additional Information
Does this project link to any other recently completed or proposed restoration or protection projects? (List all projects related to water quality, quantity, habitat, barriers, etc.)
Is there current or future potential landowner willingness to have a project done on this land?
Would there be any educational opportunities associated with this project?

Problem Statement	*(What is the problem? What ecological concerns or limiting factors does the project address? For bank protection projects, what are the reach-scale and site specific causes of erosion (see Bank Erosion Strategy)? Are there any known potential constraints (infrastructure, access limitations, etc.) or other project considerations? Please include the chapter and section of a recovery plan where this action is recommended as well as the recovery plan goal to which the project relates.*
Goals and Objectives	
Estimated Timeframe for Project Completion	
Rough Cost Estimate (required)	
If applicable, Secured Funding and Sources	

Draw the project site

What to include in your drawing: Rivers, creeks, land use around creek, roads or stream crossings, what you are proposing to do on this land



** Optional : Attach photographs, maps, supporting documents

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APPENDIX B

North Pacific Coast Lead Entity
2020 Restoration Project List

North Pacific Coast Lead Entity: Restoration Project List

2020 Priority Project STATUS	BASIN	Project Name	Description	Targeted Limiting Factors
High	ALL WRIA 20 SYSTEMS	Culvert inventories using WDFW protacols	Comprehensive field assessments of all known culverts on fishbearing streams in WRIA 20 (County, DNR, Federal and private)	
High	ALL WRIA 20 SYSTEMS	Low Water Access Inventory	Comprehensive seasonal low flow assessment to identify dewatered mainstem bottlenecks, and off-channel access areas.	Fish passage and seasonal access.
High	HOH SYSTEM	Glacial sediment assessment of the mainstem Hoh River.	Water quality assessment of suspended sediment in the Hoh Mainstem relative to increased glacial melting.	Water quality and sedimentation.
High	HOH SYSTEM	Hoh River Field Study on impacts of RCG to stream temp., disolved oxygen and flow.	Experimental design in 1-3 index areas to assess ecological limiting factors of Reed Canary Grass (RCG) under different treatment scenarios.	Water quality and fish passage.
High	HOH SYSTEM	SSHEAR Project Assessment & Repairs Assess	A subset (6) of the 16 preliminarilly identified projects are currently being assessed and in need of immediate repair. Individual projects will be brought forward after they are scoped out for repairs.	Fish passage, cold water, low water
High	HOH SYSTEM	SSHEAR Project Invasive Species Assessment	Access ,inventoryand treat invasive species in SSHEAR sites prior to construction.	Habitat quality
High	HOH SYSTEM	On-going Riparian Assessment and Restoration	Maintain elimination of knotweed, implement control measures on other invasive species where appropriate. Monitor revegetation and implement replanting where needed.	Riparian and off-channel habitat quality.
High	HOH	Upper Hoh Road Realignment/Decommissioning	Allow Channel migration with no road anymore.Find another route outside of the flood plain to get to the ONP Hoh River campground & visitor center.	Flood plain stability, bank erosion and sedimentation.
High	HOH	Monitor the Status of the Western Federal Highways Flood Plan Project as it evolves.	Multiple mitigations in order to not move the road permanently out of the flood plain. Instream work using dolos, rip rap and other anthropogenic structures that mimic nature.	Flood plain stability, bank erosion and sediment control.
High	HOH	Hoh River Master Plan Phase I :Brandeberry/ RainForest Communities Floodplain Complex	Assessments of channel migration.	Floodplain migration, sediment processes.
High	HOH	Oil City Rd culvert repair alternatives	Propose culvert replacement alternatives.	Fish passage.
High	HOH	Owl Creek	LWM Enhancement/fluvial audit/riparian	Low LWM
High	HOH	Winfield Creek	LWM Enhancement/fluvial audit/riparian	Low LWM
High	HOH	Willoughby Creek	LWM Enhancement/fluvial audit/riparian	Low LWM
High	HOH	Canyon Creek	Eliminate culvert blockage(s)	Access - culvert(s)
High	QUILLAYUTE SYSTEM	WRIA 20 Clallam & Jefferson County roads' culvert survey	Prioritize blocking culverts on Clallam & Jefferson County roads.	Fish passage, seasonal access and sedimentation.
High	QUILLAYUTE SYSTEM	Low Water access inventory	Seasonal low flow assessment.	Fish passage seasonal access.
High	QUILLAYUTE SYSTEM	Quillayute River Field Study on impacts of RCG to stream temp., disolved oxygen and flow.	Experimental design in 1-3 index areas to assess ecological limiting factors of Reed Canary Grass (RCG) under different treatment scenarios.	Water quality and fish passage.
High	QUILLAYUTE SYSTEM	SSHEAR Project Survey, assessment and prioritization.	Many sites currently being assessed together so individual projects can be brought forward separately. Some federal, state and private timber lands.	Fish passage, cold water, low water
High	QUILLAYUTE SYSTEM	Invasive plant inventory and strategy	Invasive plant inventory, mapping, and prioritiztion of multiple species prevention and control.	Fish passage, riparian habitat.
High	QUILLAYUTE Mainstem	Quillayute River Riparian Restoration	channel with engineered designs. The main issues: the river has lost the natural meander and created a shallow, high velocity channel. The river is a threat to Mora Road (USPS) and Thunder	Access/Off-channel Habitat/Sediment Control.
High	DICKEY	T-Bone SSHEAR Restoration	SSHEAR project rehabilitation restoring fish ways.	Fish passage and habitat quality.
High	DICKEY	Elk Horn	SSHEAR project rehabilitation restoring fish ways	Fish passage and habitat quality.
High	DICKEY	5300 Road decommission	3.86 miles of habitat gain and removes four culverts.	Fish passage and habitat quality.
High	DICKEY	Soot Creek SSHEAR Repair	Impassable SSHEAR project weir that will be replaced with natural features.	Fish passage and habitat quality.
High	DICKEY	Decommission of Skunk Creek Tributaries Road 9419.1	Decommision the 9410.1 for 3200 feet; opens 0.4 mi. and six culverts.	Fish passage and habitat quality.
High	BOGACHIEL	Bogachiel Restoration	Reach-scale habitat restoration river mile 0 to 22 and associated tributaries.	Riparian and flooplain stability
High	BOGACHIEL	Kitchel Bank Stabilization	Flood plain and habitat restoration	Effects of high flow events . Reduced habitat and sedimentation.
High	BOGACHIEL	Tall Timber Fish Passage	SSHEAR project rehabilitation restoring fish ways.	Fish passage and habitat quality.

CONTINUED FROM PREVIOUS PAGE

2020 Priority Project STATUS	BASIN	Project Name	Description	Targeted Limiting Factors
High	BOGACHIEL	Morganroth Pond Fish Passage Restoration	SSHEAR:Replace USFS fishway with more permanent structure	Fish passage, flood plain connectivity, habitat complexity
High	BOGACHIEL	Malnati Property Side Channel Restoration	Acquisition, infrastructure removal and multiple restoration actions.	Fish passage and sedimentation.
High	BOGACHIEL	May Creek Fish Passage Barrier	Design and implementation of culvert replacement and riparian habiat restoration.	Fish passage and habitat restoration.
High	BOGACHIEL	Bogachiel cold water assessment	Identify cold water refuges	Water quality
High	CALAWAH (Sitkum)	2900-072,075, 078 Road Decommissioning	Remove culverts and decommission road segments (3.8 miles).	Sediment control.
High	CALAWAH (Sitkum)	FS 2900 Road - Culvert replacements	Replace 6 deteriorating, undersized culverts on FS 2900 at MP., 15.9, 16.1, 18.3.	Sediment control
High	CALAWAH (Sitkum)	FS 2952 Road Decommissioning	Decommission FS Road 2952 in the upper part of the Sitkum R. watershed.	Sediment control.
High	CALAWAH (North Fork)	N. Fork Calawah Large Woody Material Assessment.	Feasibility study to determine the placement of ELJs in the mainstem.	Sediment control
High	CALAWAH (North Fork)	North Fork Geomorphic Assessment	Geomorphic analysis to adderess habitat limiting factors and dewatering trends over a 16 mile section.	Fish passage, flood plain connectivity, habitat complexity
High	CALAWAH (South Fork)	FS 2900-030 Road decommission	Hyas Creek. Decommission road from2:0- MP 3.6, with possible storage from 0-2 (crosses Rayonier)	Sediment reduction
High	SOL DUC	Lower Lake Creek Restoration (assessment)	Assessment for LWM, riparian planting	Riparian restoration
HIGH	SOL DUC	Bear Creek LWM and riparian treatments.	LWD assessment placement on Sol Duc tributary Bear Creek to RM 0 to 4 (USFS).	Sediment control - temperature, hydrology
High	SOL DUC	Kugel Creek Culvert Replacement	To replace an undersized and partial fish barrier culvert with a 40' bridge providing full access to 2.5 miles of anadromous fish habitat in Kugel Creek.	Fish passage access-culvert
High	SOL DUC	SSHEAR Eagle Springs habitat restoration	Large wood and spawning gravel placement, invasive treatment.	Riparian integrety
High	SOL DUC	Sol Duc Tributaries Assessmnt	Habitat assessment and restoration planning (Bockman, Shuwah tributaries initially)	Sedimant control, temperature and hydrology assessments.
High	SOL DUC	Wisen Creek Culvert Replacements	3 culverts on Sol Duc trib Wisen Creek on partial barrier 2 complete barriers	Fish Passage
High	Lake Ozette	Lake outlet & Ozette River Riparian Restoration	Invasive species assessment, management and replanting.	Riparian integrity and sedimentation
High	Lake Ozette	Big River Riparian Restoration	Invasive species control and re-vegetation for Big River then expand to the rest of basin.	Riparian restoration and sediment control.
High	Lake Ozette	Assessment of log jam designs that support sockeye spawning habitat along the lake shoreline.	Riparian integrity, sedimentation, and water quality.	Sedimant control, temperature and hydrology assessments.
High	Lake Ozette	Lake Ozette Aeris data analysis and development of abundance estimates.	On going support for data analysis of Aeris hydroacoustic data to establush annual time and abundance.	Abundance, competition, predation and phenology
High	Independent (Waatch)	Bear Creek Restoration	A perched pipe on Bear Creek blocks fish passage to a 10 acre wetland and 0.3 miles of low gradient stream. This wetland is associated with an old road grade and tidal channel.	Fish passage and estuary reconnection.
High	Independent (Waatch and Tsoo-yess)	Waatch Creek Fishblocking Culvert correctio	Replace deteriorating undersized culvert on	Fish passage and estuary reconnection.
High	Independent (Waatch)	European Green Crab Management in Makah Reservation Coastal Estuaries	Makah Reservation- Lower Wa'atch River and Tsoo-yess Rivers and estuaries, and Neah Bay nearshore; includes areas on West end of the bay	Protectioun of juvenile fish habitat
High	Independent (Goodman)	Goodman Creek Collapsed Stringer Bridge	Removal of Stringer Bridge Remains and incorporate into LWD placement	Fish passage, instream complexity.
High	Independent (Goodman)	Goodman Crk. Tib-Boulder Creek Creosote Pile Removal	Remove creosote pilings.	Water quality and fish passage.
High	Independent (Goodman)	Goodman Creek 2V Road Culvert	Replace undersized culvert.	Fish passage
High	Independent (Goodman)	Goodman Crk. LWD Placement	LWM enrichment from RM 10.5 to 13.0	Channel Complexity and spawning habitat
High	Independent (Goodman)	Goodman Crk. Invasive Species Removal	Invasive species removal.	Riparian, sedimentation and habitat complexity.
High	Independent (Goodman)	Goodman Crk. Riparian replanting	Replanting of Goodman Creek riparian corridores after invasive species removal.	Riparian, sedimentation and habitat complexity.
High	Independent (N. Cedar Crk)	Rayonier 5050 Road Crossing Removal	Road decommissioning, culvert removal and restoration.	Sediment control, riparian and habitat complexity.
High	NEARSHORE	Nearshore Assessment of Salmonid presence	Beach Seine selected nearshore locations near river mouths for adult & juvenile presence.	Species and life history presence.
High	NEARSHORE	Nearshore Assessment of Salmonid genetic stocks.	Sub-sample salmonids from beach seines for genetic stock identification.	Species and life history presence.
High	NEARSHORE	Makah Resrvation Estuaries	Longterm removal and control of invasive crabs.	Channel stability and habitat quality.

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2020 Priority Project STATUS	BASIN	Project Name	Description	Targeted Limiting Factors
Med	All Basins	Recreational impact management	Signage / outreach for Redd protection, LWM protection	Reproductive habitat disturbance
Med	All Basins	WRIA 20 LWM stock pile	Stockpile available LWD timber for regional projects in the major basins. Include mobilization expenses.	Riparian restoration.
Med	HOH SYSTEM	Cedar Spalt Assessment & Removal in the Lower Hoh Tributaries.	Winfield- 3 & 4, Braden Creek, Fullerton Tributary, Lost Creek, Steanboat & Cedar Crk.	Fish passage and seasonal access.
Med	HOH SYSTEM	Rip-Rap Inventory	Compile existing inventories.	Riparian integrity, mainstem bank errosion
Med	HOH	Spruce Creek Fish Access	Fish channel restoration	Fish Passage
Med	HOH	Cassel Creek/Huelsdonk acquisition.	Riparian habitat preservation.	Riparian restoration.
Med	HOH	Braden Creek	LWM Enhancement/fluvial audit	Low LWM
Med	CALAWAH (North Fork)	FS 2922 Road culvert replacements	Replace 3 undersized, deteriorating culverts on FS 2922 road upstream of recently replaced culvert at MP 2.3 (SRF funded).	Sediment reduction
Med	SOL DUC	Gunderson Off-Channel Restoration	Restore function of off-channel ponds on Sol Duc tributary Gunderson Cr. (20.0304) (PCSC)	Juvenile access - hydrology
Med	SOL DUC	Kugel Creek FS Road 2929 Culvert Removal (Road Storage)	From milepost 3-5, deteriorating culverts could be removed while road is in stoage to reduce risk of landslides.	Sediment Control
Med	SOL DUC	Kugel Creek Road Storage and Decommissioning	1.3 miles of Road Decommission are proposed in the North Fork Calawah Vegetation Management Project 2900653 (0.2 miles), 2929045 (0.9 miles), 2929055 (0.1 miles).	Sediment Control
Med	Calawah (North Fork)	FS Road 2929 030 Fish Passage Barrier on Upper Bonidu	Milepost 0.64 is a barrier to resident cutthroat. This is a deep fill site on a Level 1 road that is also part of the proposed Calawah OHV route. Less than 0.35 miles of habitat above	Fish Passage
Med	Calawah (North Fork)	FS 2923 Culvert Replacement	Mile post 11.3. Undersized culvert on Trail Creek could be upgraded to reduce futre risk of failure, possible fish stream	Sediment Control, and fish passage
Med	Calawah (North Fork)	Calawah Road Storage and Decommissioning	2.2 miles of Road Storage and 9.2 miles of Road Decommissionings are proposed in the North Fork Calawah Vegitation Mangement Project EA: 1.3 miles of Road Decomissioining and 7.1 miles of Road Storage.	Sediment Control
Med	Lake Ozette	Ongoing Basin-Wide Invasive Weed Assessment and Mapping	Continued monitoring and control of invasive plant species in the basin	Riparian and sedimentayion.
Med	Lake Ozette	Predator assessment (RME-5)	Implementation of recommendations from the 2016 Lake Ozett Sockeye Predator Workshop.	Predation
Med	Lake Ozette	Habitat issues around sockeye egg survival	Continued experimentation to identify limting physical conditions impacting sockeye egg survival on lake shorelines.	Sedimentation, hydrology, water quality.
Med	Lake Ozette	LWM at Olson's Beach	Design small scale wood structures to increase sidement sorting and floodplain engagement.	Water quality and spawning habitat
Med	Lake Ozette	LWM Umbrella Creek	Design small scale wood structures to increase pool frequency and floodplain engagement.	Water quality and spawning habitat
Low	SOL DUC	FS 2903 Road Fish Passage Barrier (Bockman Crk.)	MP 2.92 is a barrier to resident cutthroat trout (possible Coho?) and is in poor condition. 0.7 miles of habitat above.	Fish passage
Low	SOL DUC	Explore relocation of Castle Creek Boat Launch	Explore decommishioning DNR boat ramp at Castle Creek: identify alternative	Habitat protection
Low	SOL DUC (Bockman)	FS Road 2903 035 Culvert Removal (Road Storage)	Two culverts in very poor condition (non fishbearing) could be removed while road is in storage. Fish habitat about 0.1 mile downstream	Sediment Control
Low	SOL DUC (Bockman)	Road Storage and Decommissioning	1.9 miles of Road Decommissioning, 0.8 miles of storage are proposed in the North Fork Calawah Vegetation Mangement Project. Roads 29022770 (1.5miles D), 2902272 (0.4 miles D), 2902375 (0.8 Storage).	Sediment Control
Low	Independent (Tsoo-yess)	Tyler Creek Fish Barrier Removal	Culvert to bridge. 100 % blocked. 10 acres of wetland , 0.75 mi above blockage.	Fish passage and estuary reconnection.

APPENDIX C

WRIA 20

SALMONID STOCK TREND GRAPHS

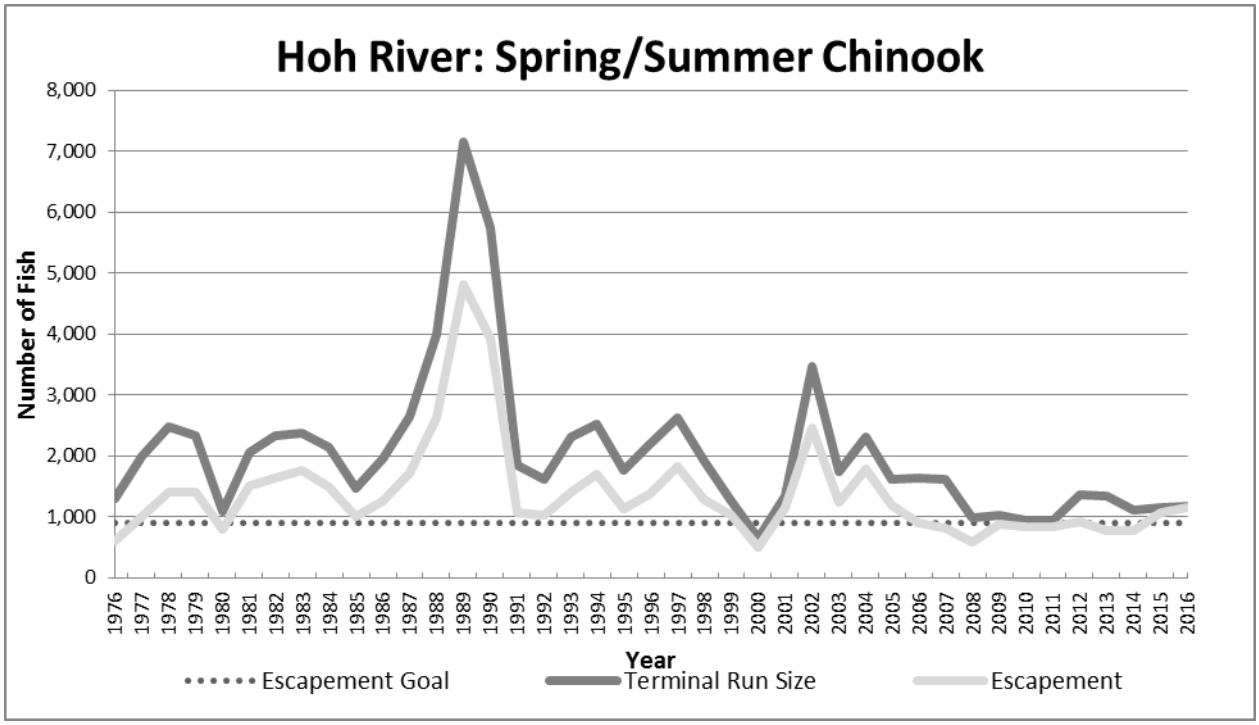
(1976-2016)

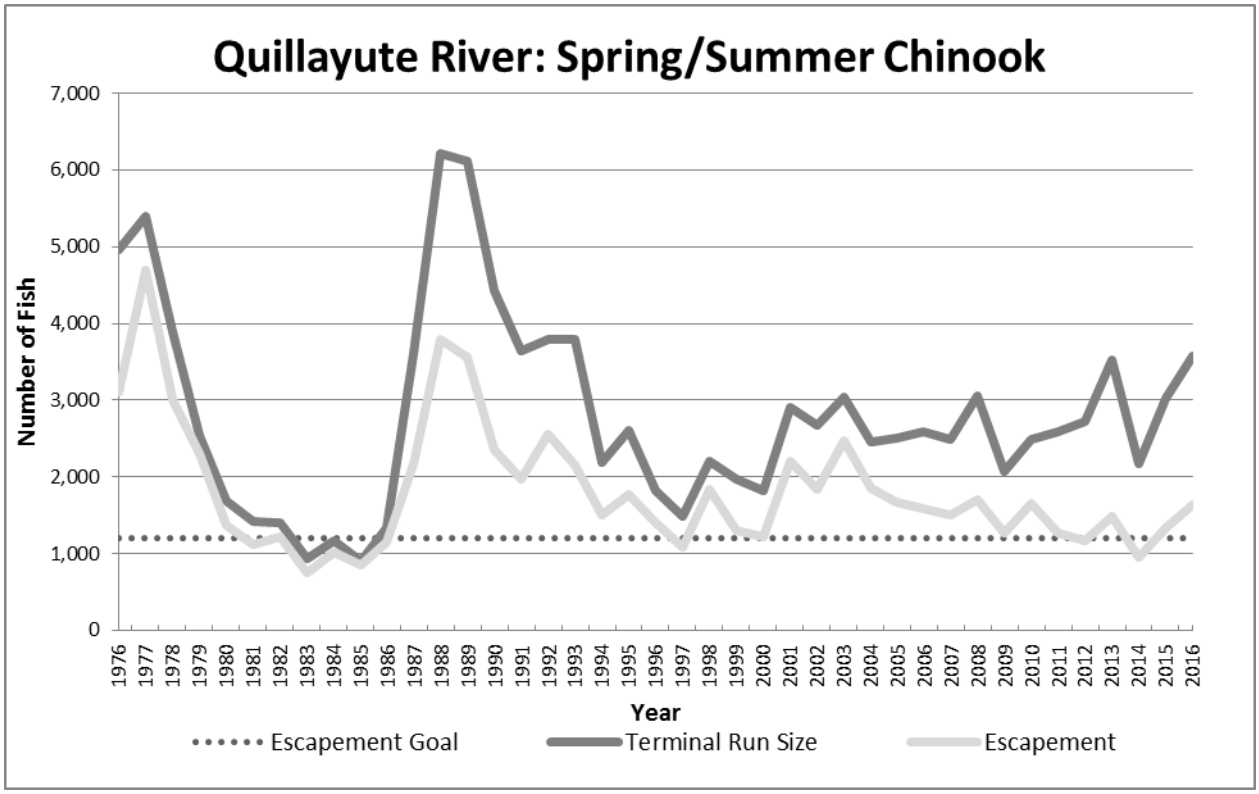
Compiled from the PACIFC FISHERIES MANAGEMENT COUNCIL SUMMARY TABLES

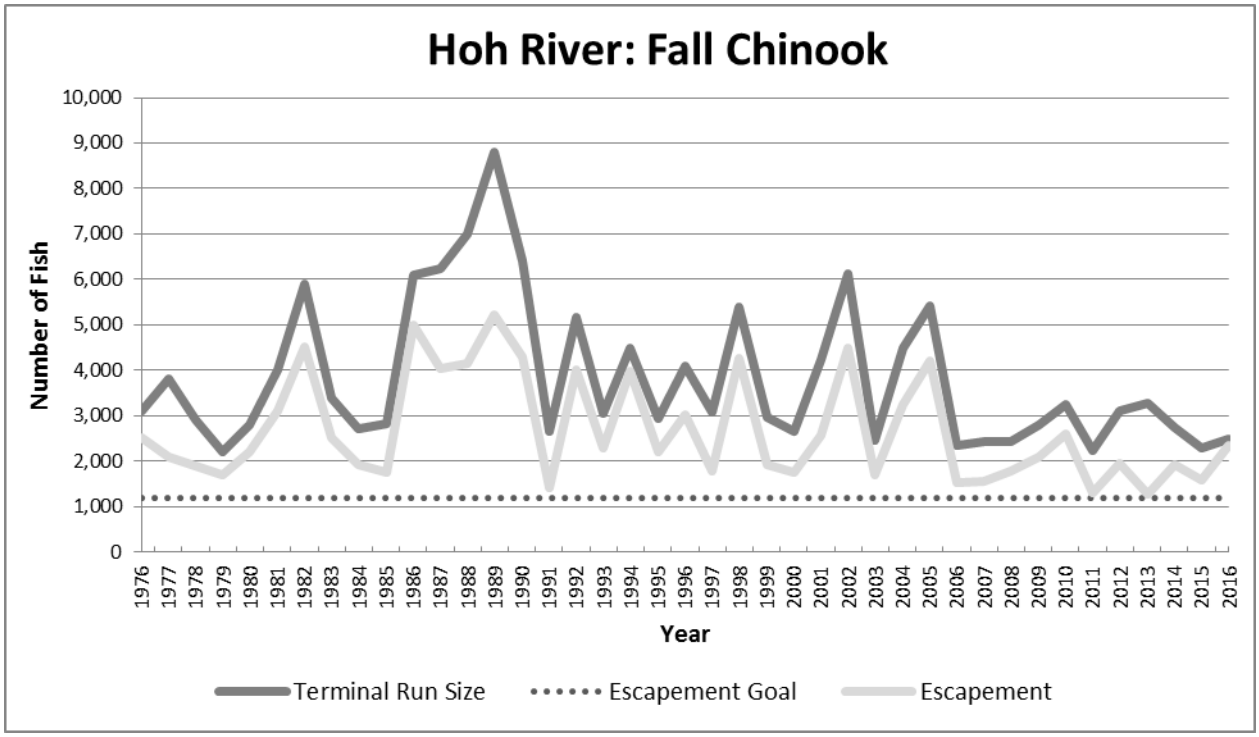
https://www.pcouncil.org/salmon/stock-assessment-and-fishery-evaluation-safe-documents/review-of-2017-ocean-salmon-fisheries/

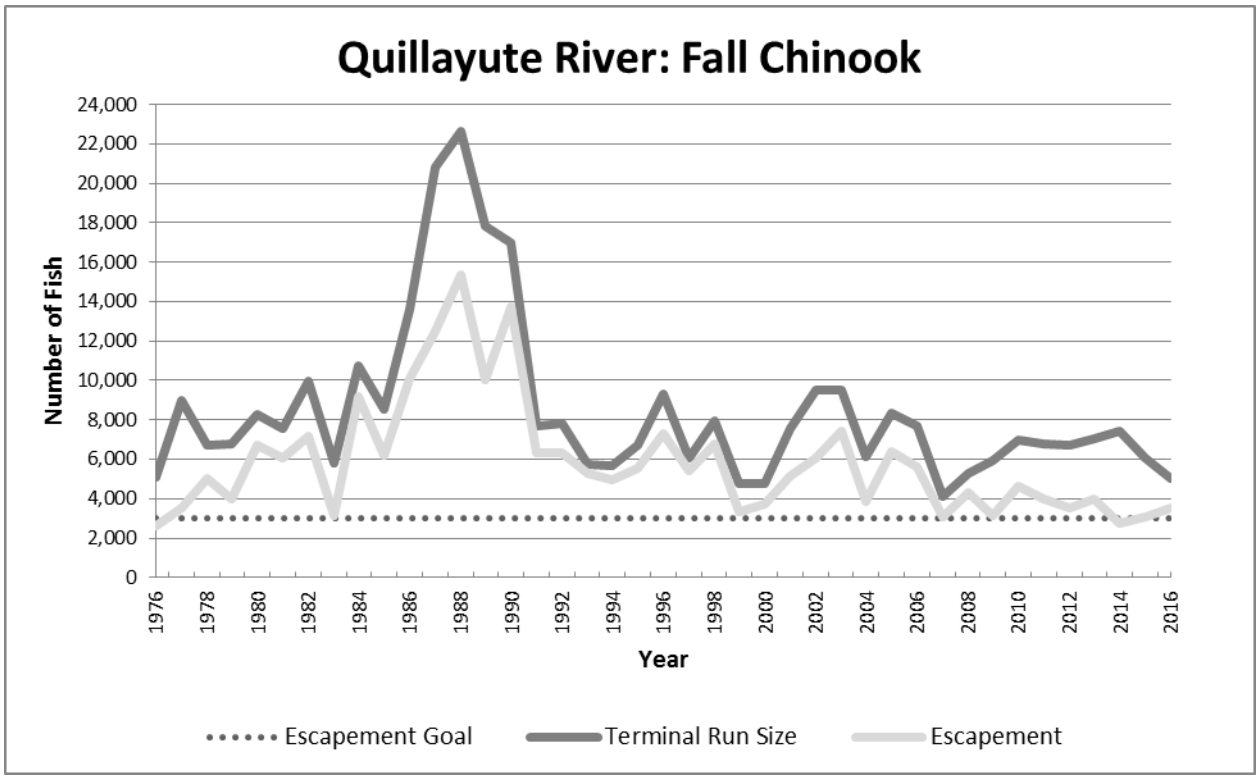
Chinook:

Major Rivers



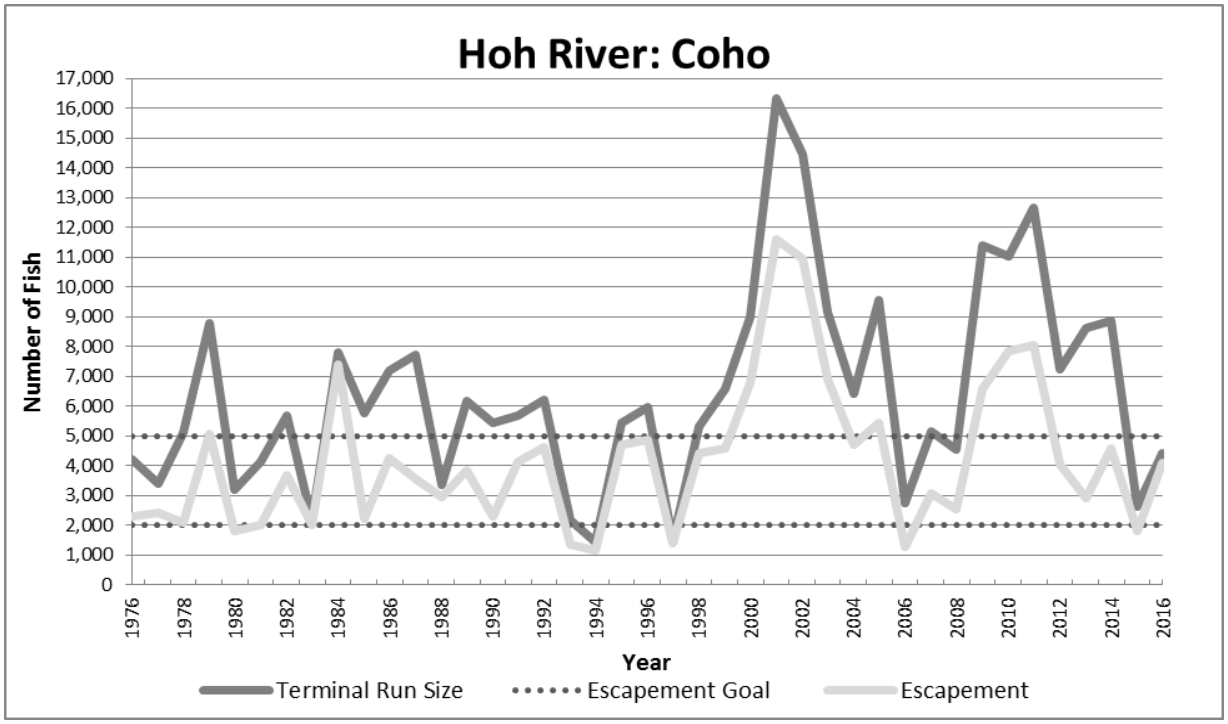


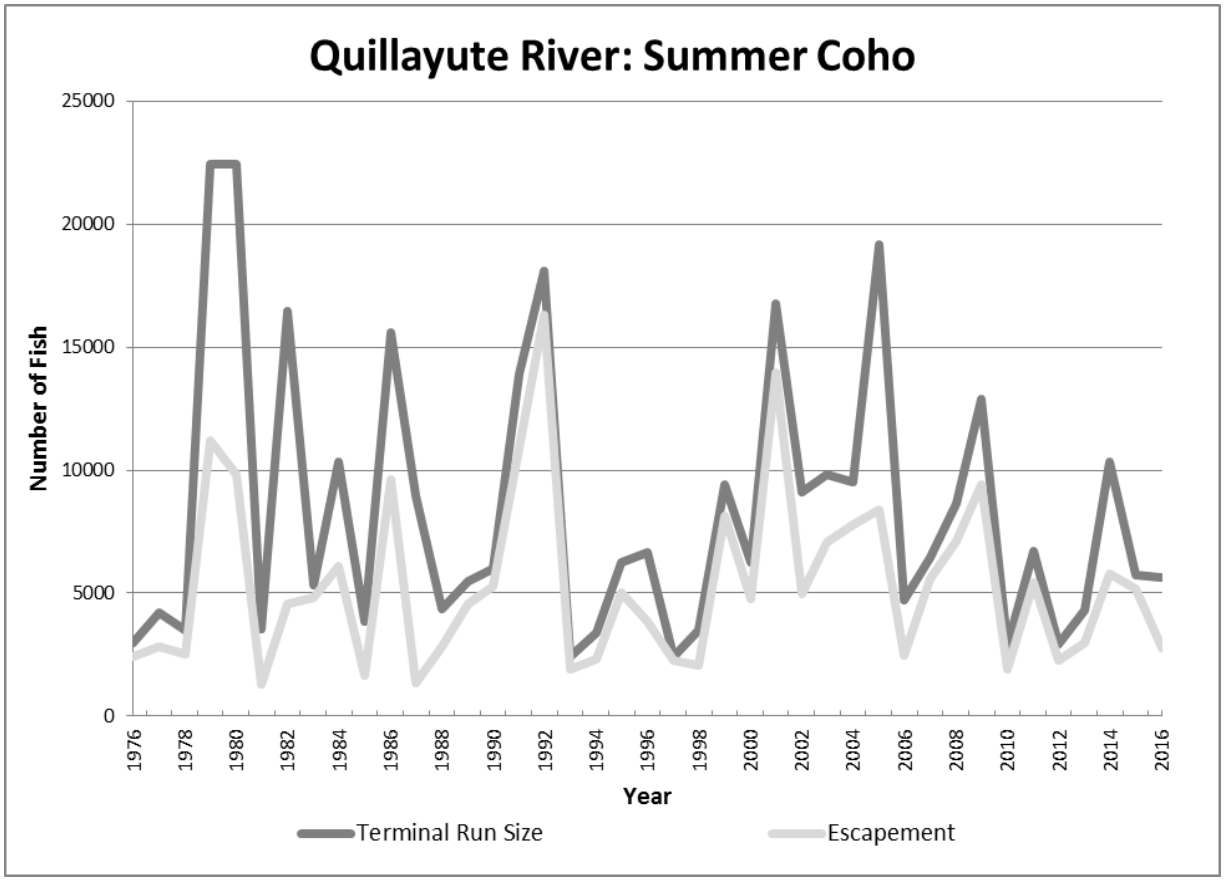

Hoh River: Fall Chinook
Number of Fish
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Year
Terminal Run Size
Escapement Goal
Escapement

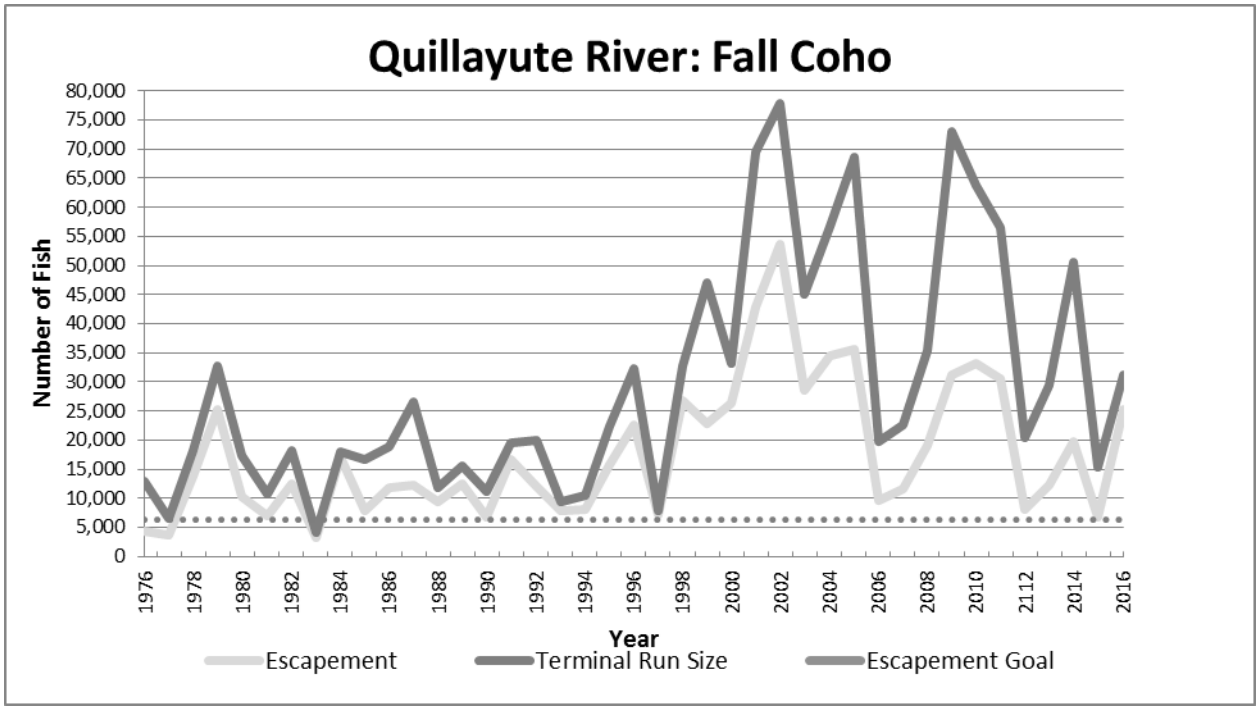

Quillayute River: Fall Chinook
Number of Fish
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Year
Escapement Goal
Terminal Run Size
Escapement

Coho:

Major Rivers







Sockeye: **Not Available**

Steelhead: **Not Available**.

Pink: (mostly unknown)

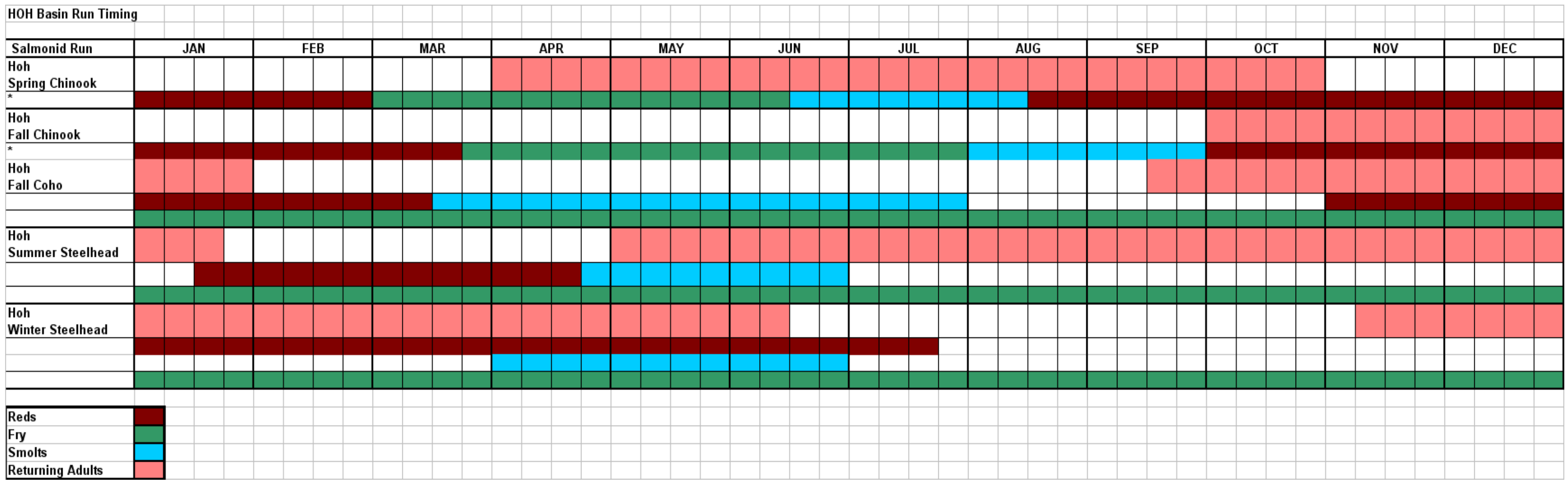
Chum: (mostly unknown)

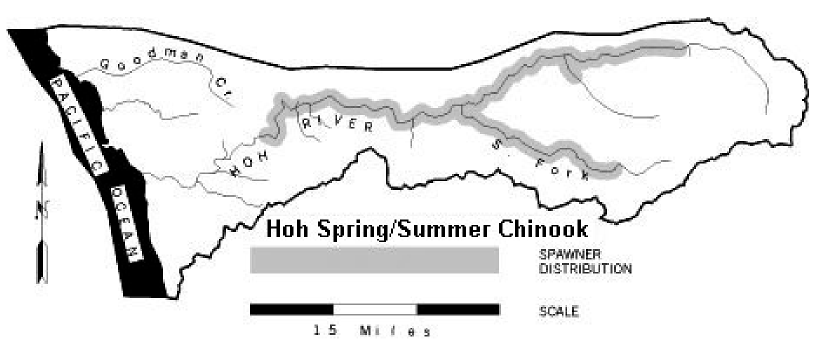
NOTE: Seven above charts compiled by Devona Ensmenger from the Wild Salmon Center in November 2009 and updated by Rich Osborne (NPCLE / UW ONRC) in 2012, 2014 , 2015 and 2017 using data from the Pacific Fisheries Management Council's, Escapements to Inland Fisheries and Spawning Areas (Appendix B), located at: https://www.pcouncil.org/salmon/stock-assessment-and-fishery-evaluation-safe-documents/review-of-2017-ocean-salmon-fisheries/ .

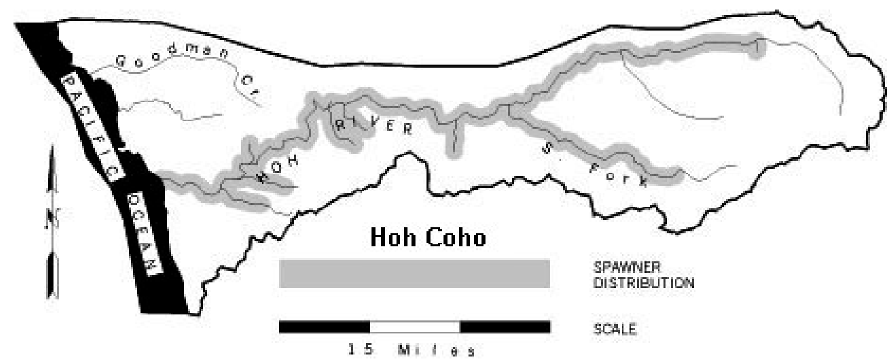
APPENDIX D

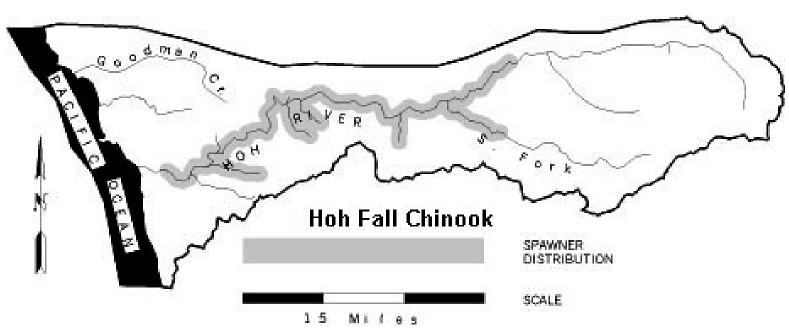
WRIA 20 SALMONID STOCK
RUN TIMING & SPAWNING DISTRIBUTION[1]

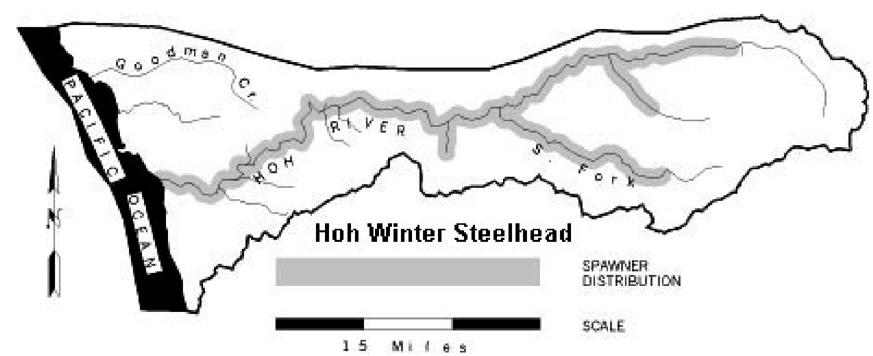
[1] Run timing is based upon historical patterns typical of 2010. Recent variations in seasonal rainfall and temperature patterns have resulted in some timing shifts of up to 3-4 weeks in recent years.

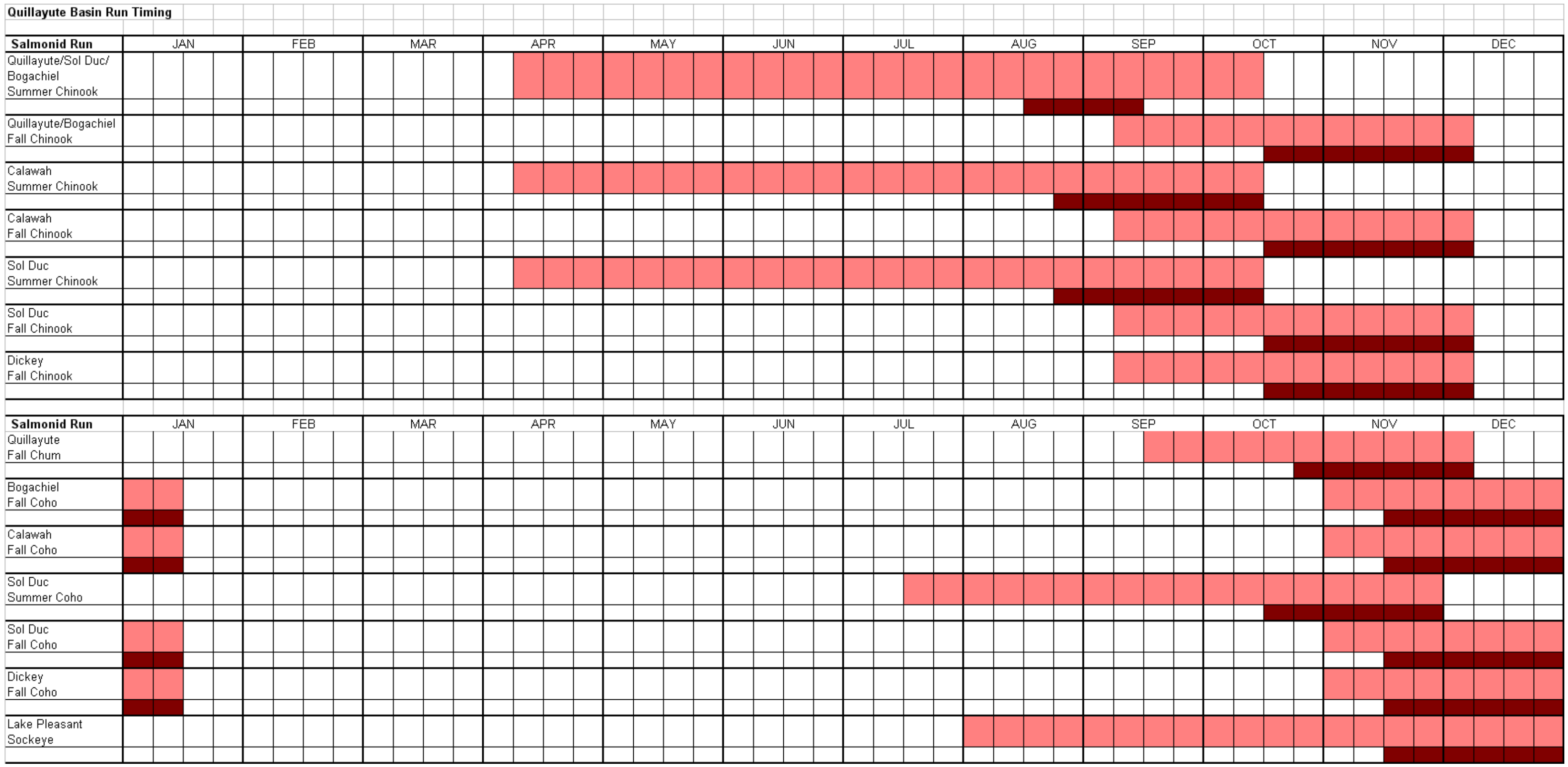

HOH Basin Run Timing
Salmonid Run
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Hoh Spring Chinook
Hoh Fall Chinook
Hoh Fall Coho
Hoh Summer Steelhead
Hoh Winter Steelhead
Reds
Fry
Smolts
Returning Adults

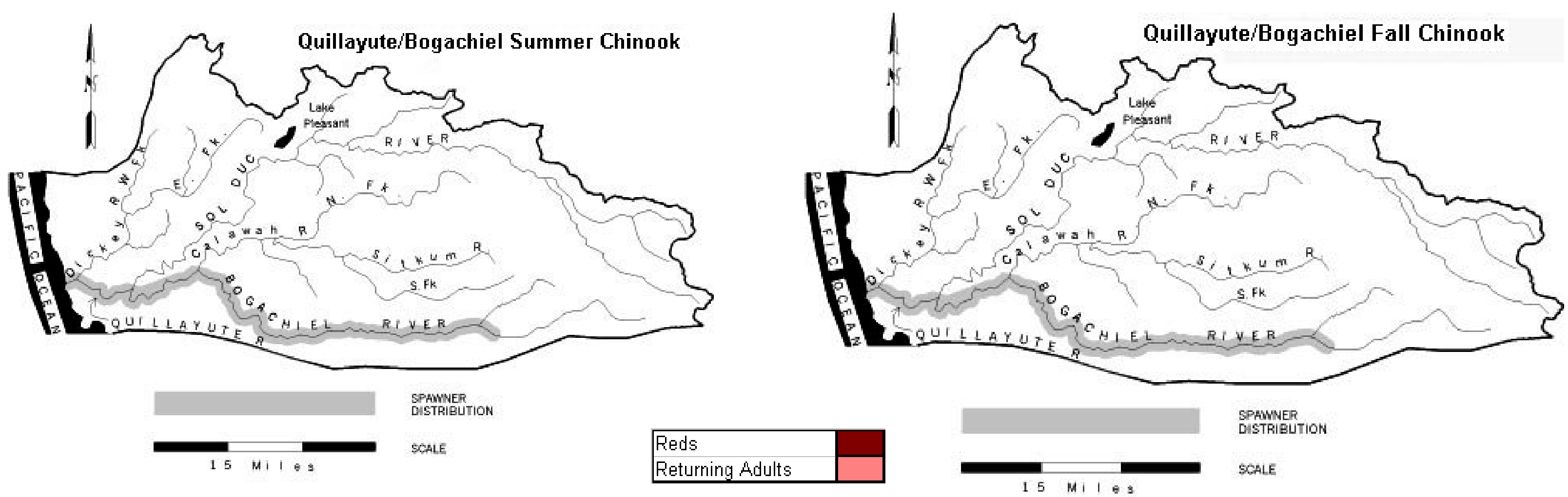

Hoh Spring/Summer Chinook
SPAWNER DISTRIBUTION
SCALE
15 Miles
PACIFIC OCEAN
Goodman Cr
HOH RIVER
S. Fork

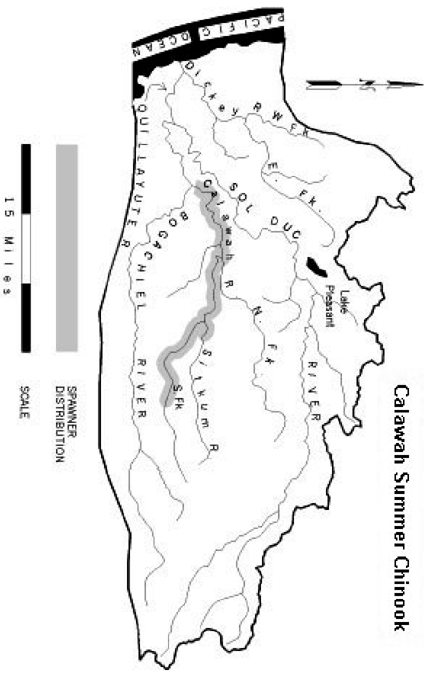

Hoh Coho
SPAWNER DISTRIBUTION
SCALE
15 Miles
PACIFIC OCEAN
Goodman Cr
HOH RIVER
S. Fork

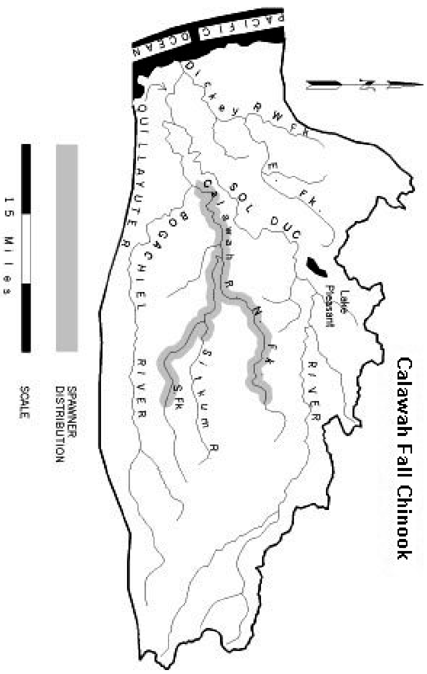

Hoh Fall Chinook
SPAWNER DISTRIBUTION
SCALE
15 Miles
PACIFIC OCEAN
Goodman Cr
HOH RIVER
S. Fork

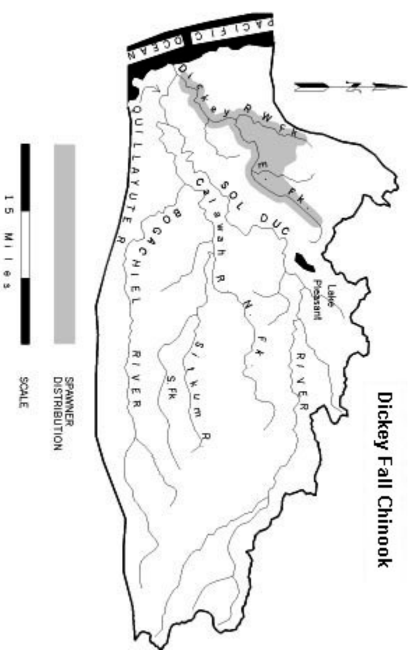

Hoh Winter Steelhead
SPAWNER DISTRIBUTION
SCALE
15 Miles
PACIFIC OCEAN
Goodman Cr
HOH RIVER
S. Fork

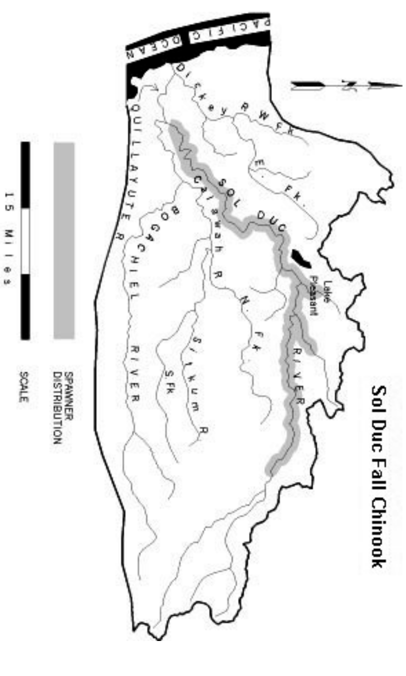

Quillayute Basin Run Timing
Salmonid Run
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Quillayute/Sol Duc/ Bogachiel Summer Chinook
Quillayute/Bogachiel Fall Chinook
Calawah Summer Chinook
Calawah Fall Chinook
Sol Duc Summer Chinook
Sol Duc Fall Chinook
Dickey Fall Chinook
Quillayute Fall Chum
Bogachiel Fall Coho
Calawah Fall Coho
Sol Duc Summer Coho
Sol Duc Fall Coho
Dickey Fall Coho
Lake Pleasant Sockeye

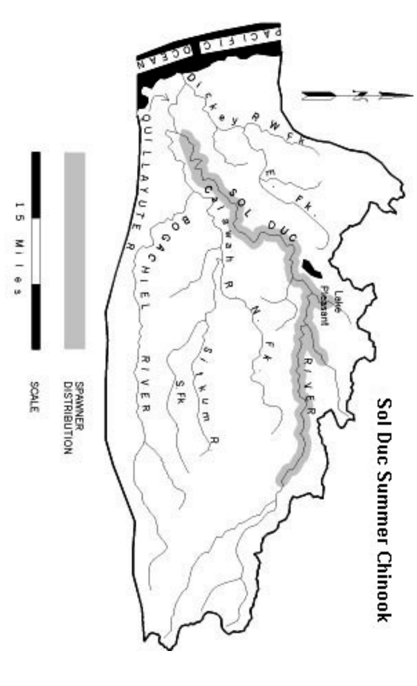

Quillayute/Bogachiel Summer Chinook
Quillayute/Bogachiel Fall Chinook
SPAWNER DISTRIBUTION
SCALE
15 Miles
Reds
Returning Adults

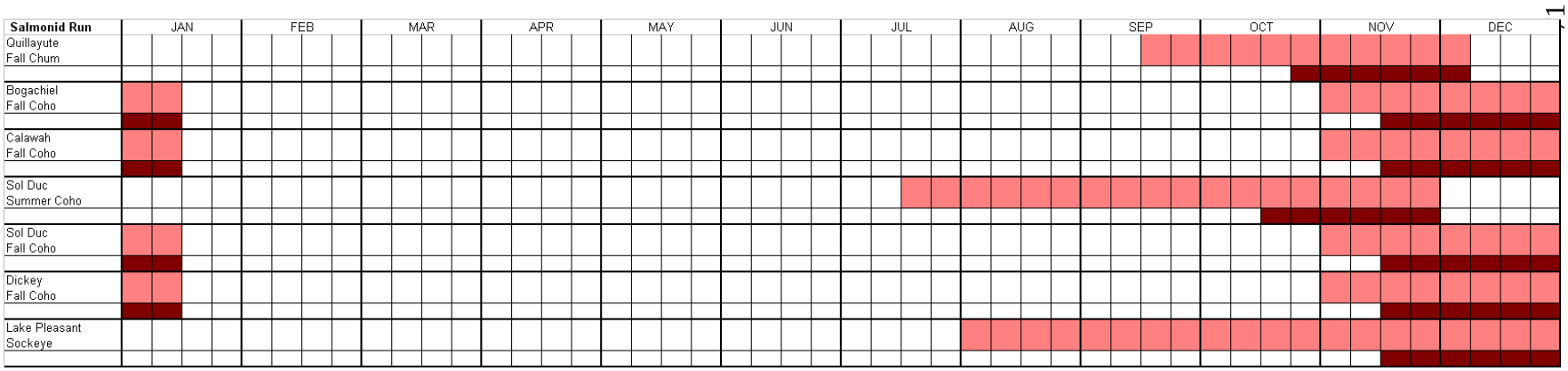

Calawah Summer Chinook
PACIFIC OCEAN
Dickey R W Fk
E. Fk.
SOL DUC
Lake Pleasant
RIVER
QUILLAYUTE R
BOGACHIEL
RIVER
Calawah R
N. Fk
Sitkum R
S Fk
SPAWNER DISTRIBUTION
15 Miles
SCALE

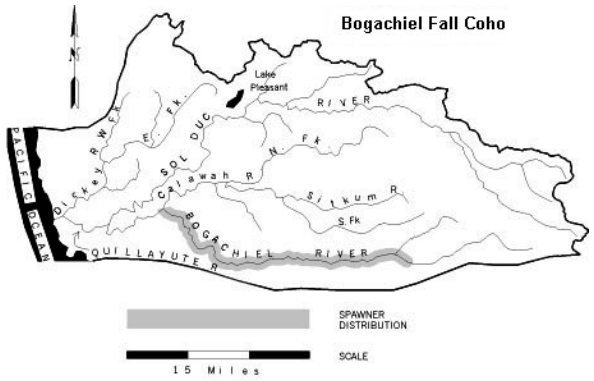

Calawah Fall Chinook
PACIFIC OCEAN
Dickey R W Fk
E. Fk.
SOL DUC
Lake Pleasant
RIVER
QUILLAYUTE R
BOGACHIEL
RIVER
Calawah R
N. Fk
Sitkum R
S Fk
SPAWNER DISTRIBUTION
15 Miles
SCALE

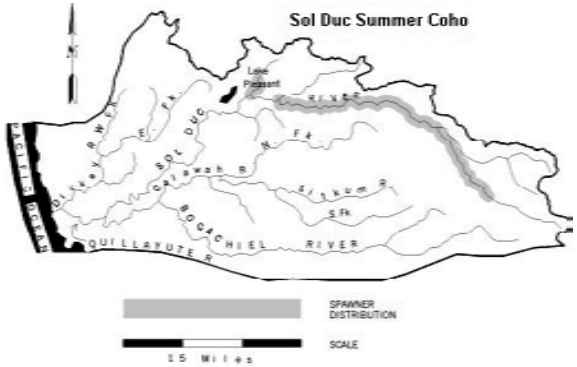

Dickey Fall Chinook
PACIFIC OCEAN
Dickey R W Fk
E. Fk.
SOL DUC
Lake Pleasant
RIVER
QUILLAYUTE R
BOGACHIEL
RIVER
Calawah R
N. Fk
Sitkum R
S Fk
SPAWNER DISTRIBUTION
15 Miles
SCALE

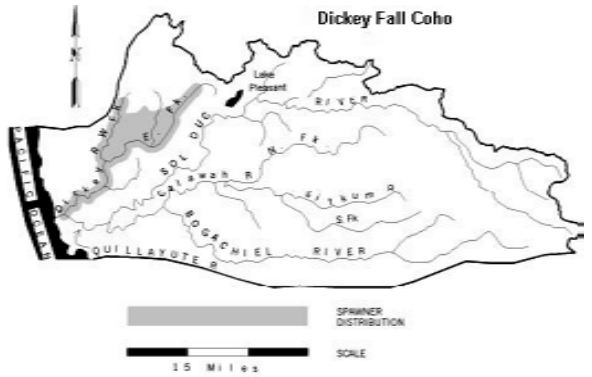

Sol Duc Fall Chinook
PACIFIC OCEAN
Dickey R W Fk
E. Fk.
SOL DUC
Lake Pleasant
RIVER
QUILLAYUTE R
BOGACHIEL
RIVER
Calawah R
N. Fk
Sitkum R
S Fk
SPAWNER DISTRIBUTION
15 Miles
SCALE

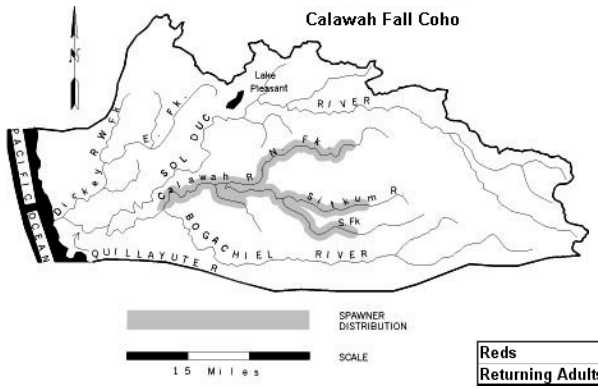

Sol Duc Summer Chinook
PACIFIC OCEAN
Dickey R W Fk
E. Fk.
SOL DUC
Lake Pleasant
RIVER
QUILLAYUTE R
BOGACHIEL
RIVER
Calawah R
N. Fk
Sitkum R
S Fk
SPAWNER DISTRIBUTION
15 Miles
SCALE

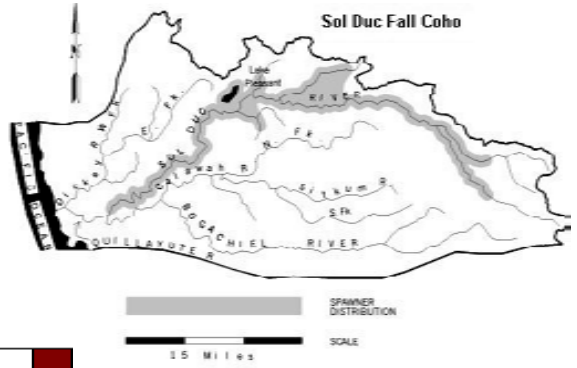

Salmonid Run
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Quillayute Fall Chum
Bogachiel Fall Coho
Calawah Fall Coho
Sol Duc Summer Coho
Sol Duc Fall Coho
Dickey Fall Coho
Lake Pleasant Sockeye

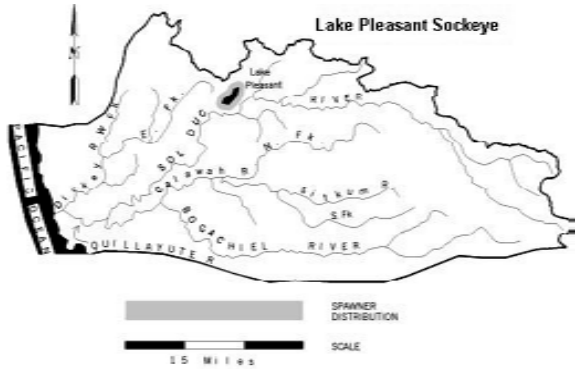

Bogachiel Fall Coho
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles


Sol Duc Summer Coho
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles


Dickey Fall Coho
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles


Calawah Fall Coho
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles

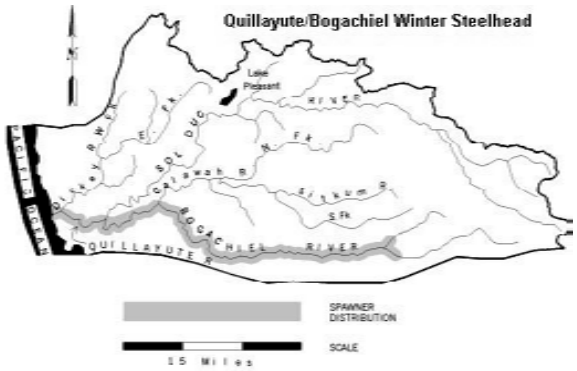

Sol Duc Fall Coho
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles

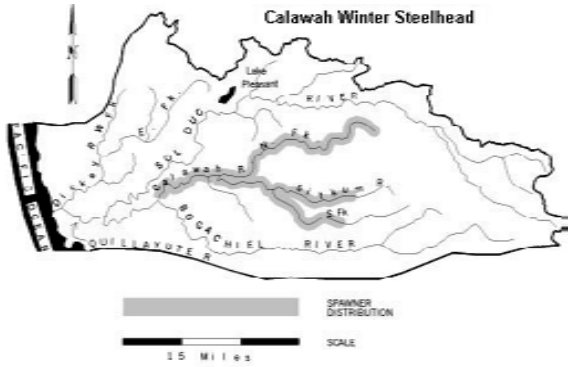

Lake Pleasant Sockeye
Lake Pleasant
RIVER
E. Fk.
SOL DUC
Dickey R
W Fk
Calawah R
N Fk
Sitkum R
S Fk
BOGACHIEL RIVER
QUILLAYUTE R
SPAWNER DISTRIBUTION
SCALE
15 Miles

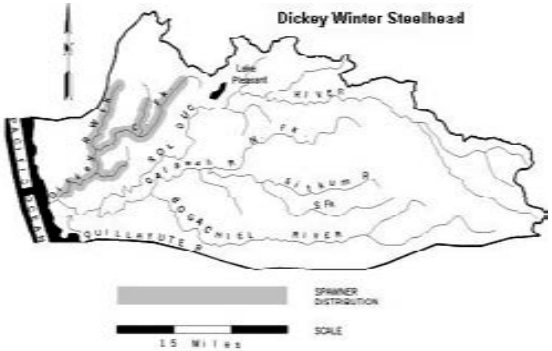
Reds
Returning Adults

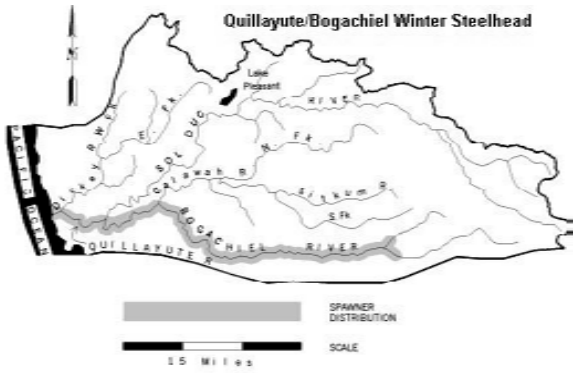
Salmonid Run	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Quillayut/Bogachiel Summer Steelhead					? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?			
Quillayute/Bagachiel Winter Steehead												
Sol Duc Summer Steelhead					? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?			
Sol Duc Winter Steelhead												
Calawah Summer Steelhead					? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?			
Calawah Winter Steelhead												
Dickey Winter Steelhead												

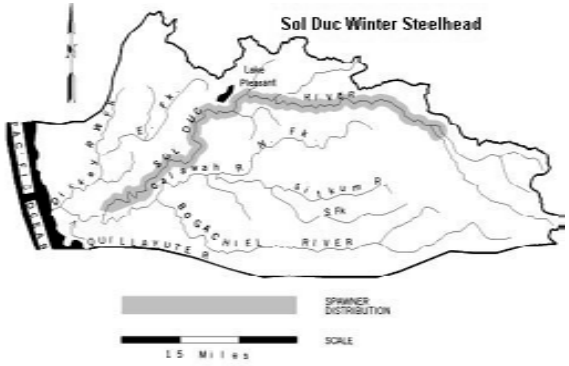
Reds
Returning Adults

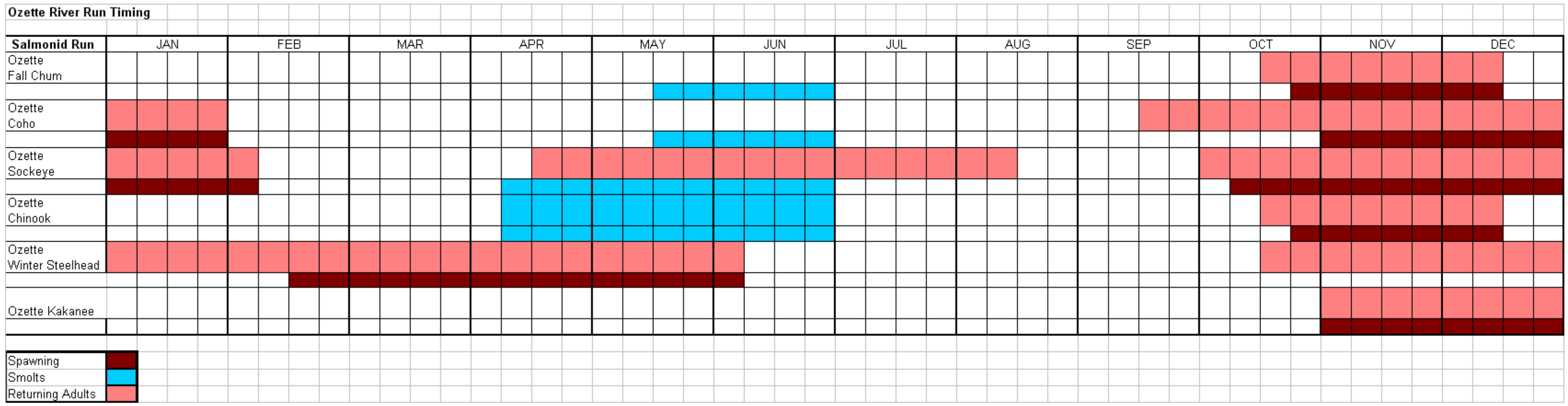


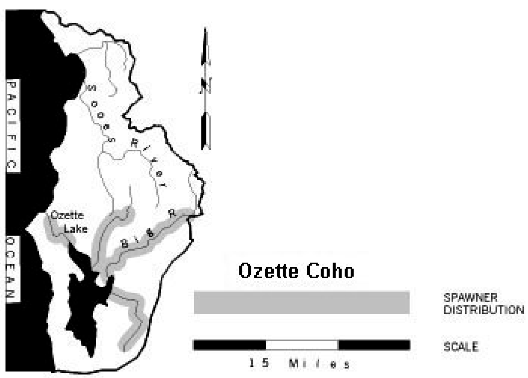


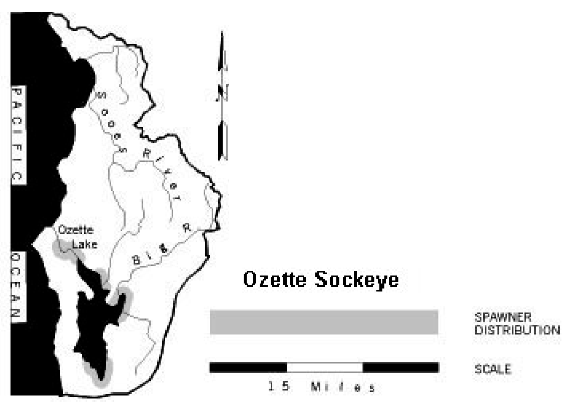


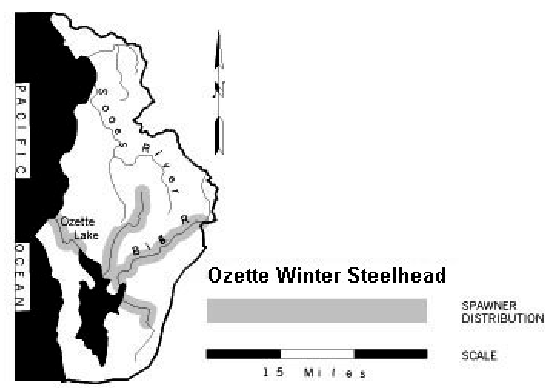





Ozette River Run Timing
Salmonid Run
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Ozette Fall Chum
Ozette Coho
Ozette Sockeye
Ozette Chinook
Ozette Winter Steelhead
Ozette Kakanee
Spawning
Smolts
Returning Adults


PACIFIC
OCEAN
Ozette Lake
Sooes River
Big R
N
Ozette Coho
SPAWNER DISTRIBUTION
SCALE
15 Miles

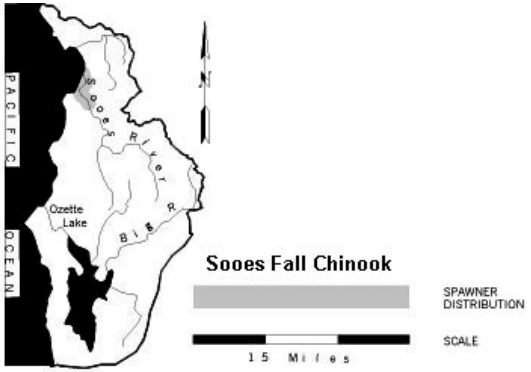

PACIFIC
OCEAN
Ozette Lake
Sooes River
Big R
N
Ozette Sockeye
SPAWNER DISTRIBUTION
SCALE
15 Miles

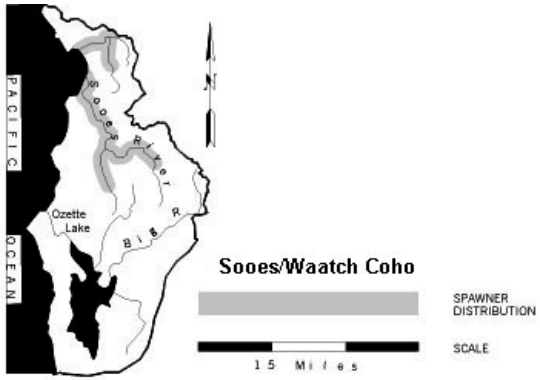

PACIFIC
OCEAN
Ozette Lake
Sooes River
Big R
N
Ozette Winter Steelhead
SPAWNER DISTRIBUTION
SCALE
15 Miles

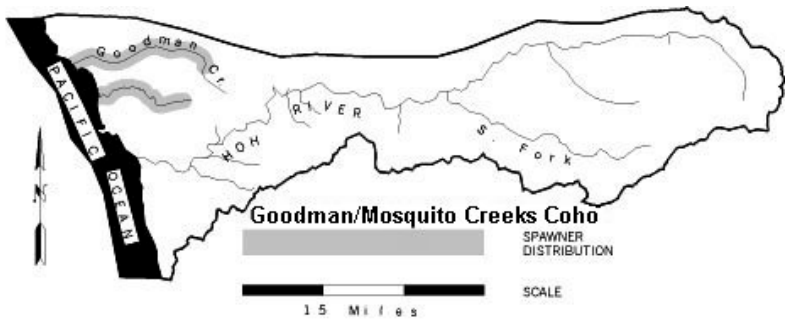
Run Timing in Some of the Independent Coastal Drainages

Salmonid Run	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tsoo-yes Fall Chinook												
Tsoo-yes Chum												
Mosquito Coho												
Goodman Coho												
Tsoo-yes Coho												
Waatch Coho												

Reds
Returning Adults

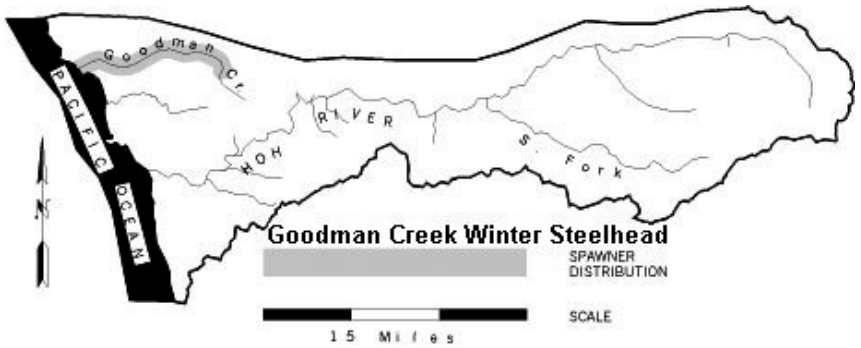


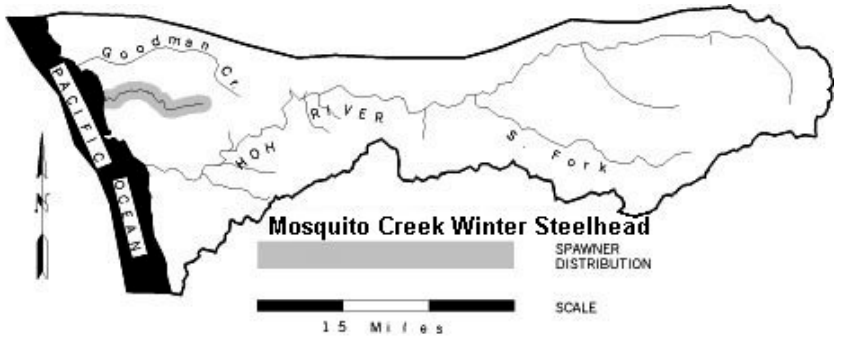


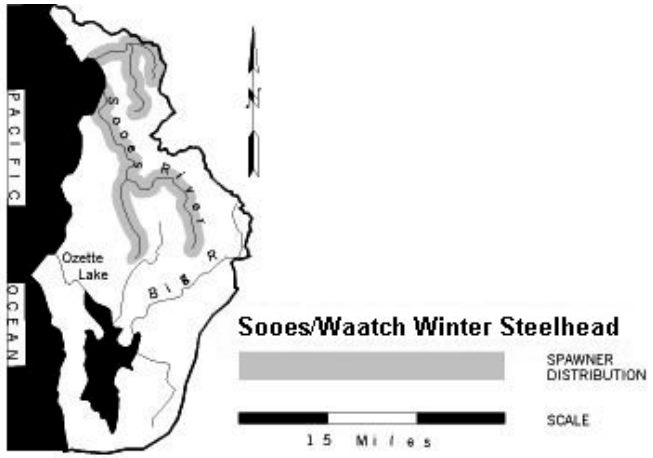


Salmonid Run	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mosquito Winter Steelhead												
Goodman Winter Steelhead												
Tsoo-yes Winter Steelhead												
Waatch Winter Steelhead												

Reds
Returning Adults







APPENDIX E

NPCLE COMMITTEES MEMBERSHIP LIST

North Pacific Coast Lead Entity
(NPCLE) 2020-21 Membership

Initiating Government Representatives of the Citizen/Initiating Government Committee:

Hoh Tribe:	LE Rep – Enrique Barragan & Derek Benally, (Wendy Largent, Alt.)
Makah Tribe:	LE Rep – Stephanie Martin
Quileute Tribe:	LE Rep – Dwayne Pecosky, (Nicole Rasmussen, Alt.)
City of Forks:	LE Rep – Rod Fleck
Clallam County:	LE Rep – Deborah Kucipeck (in transition to new representation)
Jefferson County:	LE Rep – Tami Pokorny

Citizen Representatives of the <u>Citizen/Initiating Government Committee</u>:

Alex Huelsdonk	Regional Fisheries Enhancement Group
Vacant TBD	Citizen-At-Large #1
David Hahn	Citizen-At-Large #2
Eric Carlsen	Citizen-at-Large #3
Chris Clark	Citizen-at-Large #4
Katie Krueger	Citizen-at-Large #5

Frank Hanson	Coordinator (UW Olympic Natural Resources Center)

Technical Committee Members:

Meghan	Adamire	Clallam Conservation District
Jamie	Bass	The Nature Conservancy
Eric	Carlsen	WDNR - Retired
Kim	Clark	UW Olympic Natural Resource Center
Chris	Clark	Cramer Fish Sciences
Phil	DeCillis	USFS - Retired
John	Hagan	NW Indian Fish. Comm.
Mike	Hagen	Retired Forester / Restoration Ecologist
Jess	Helsley	Wild Salmon Center
Alex	Huelsdonk	Pacific Coast Salmon Coalition (RFEG)
Jessie	Huggins	Wa. Dept. Natural Resources
Luke	Kelly	Trout Unlimited
David	Kloempken	Wa. Dept. Fish & Wildlife
Julie Ann	Koehlinger	Hoh Tribe
Betsy	Krier	Wild Salmon Center
Katie	Krueger	QNR-Retired
Deborah	Kucipeck	Clallam County
Wendy	Largent	Hoh Tribe
Stephanie	Martin	Makah Tribe
Rich	Osborne	UW ONRC/Coast Salmon Partnership
Dwayne	Pecosky	Quileute Tribe
Tami	Pokorny	Jefferson County
Theresa	Powell	Wa. Dept. Fish & Wildlife
Nicole	Rasmussen	Quileute Tribe
Kirk	Sehlmeyer	Natural Resources Conservation Service
Anne	Shaffer	Coastal Watershed Institute
Jill	Silver	10,0000 Years Institute