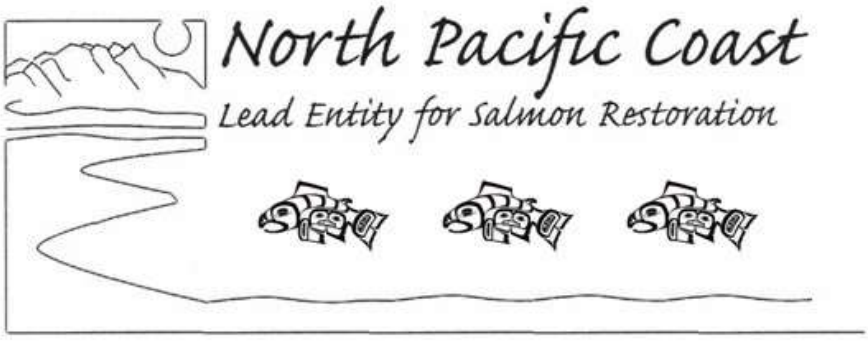

North Pacific Coast (WRIA 20) Salmon Restoration Strategy

(2022 Edition)

North Pacific Coast Lead Entity

Northwest Indian Fisheries Commission, Coastal Office
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Approved by the North Pacific Coast Lead Entity

May 17, 2022

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Acronyms

BDA	Beaver Dam
CC	Citizens Committee
CSP	Coast Salmon Partnership [previously Washington Coast Sustainable Salmon Partnership (WCSSP)]
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)
NGO	Non-Governmental organization
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
SSHEAR	Salmon & Steelhead Habitat Evaluation Restoration
SRFB	Salmon Recovery Funding Board
TC	Technical Committee
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,

and provide REFUGIA. See related discussions under POOLS AND RIFFLES and RIPARIAN in this Glossary. (King County, 2015)

LIFE HISTORY
The specific life cycle of a fish from egg to adult (NWFSC, 2008).

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). 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 by providing aquatic and riparian ecosystem services. 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."

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 presence of LWM in a stream channel can restrict channel width, accelerating flow and increase the water's force on stream bed material and causing downstream SCOUR. 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."

SSHEAR
Salmon and Steelhead Habitat Evaluation and Restoration, a program of the Washington State Department of Fish and Wildlife.

SMOLT
A life stage of salmon that occurs just before the fish leaves fresh water. SMOLTING is the physiological process that allows salmon to transition from fresh to salt water. (NWFSC, 2008). The transitions include altering their color, shape, salt balance, 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 North Pacific Coast is the newest Lead Entity for salmon recovery in Washington State (25th) under the Salmon Recovery Funding Board and encompasses the same boundary as Watershed Resource Inventory Area 20 (WRIA 20). In 2007 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 Coast Salmon Partnership (CSP) [previously named the Washington Coast Sustainable Salmon Partnership (WCSSP)] similarly established in 2007. CSP is a strategic regional association comprised of the four Lead Entities (LEs) along the Washington coast: Willapa Bay LE, Chehalis Basin LE, Quinault Indian Nation LE, and North Pacific Coast LE. The Coast Salmon Foundation (CSF) [previously the Washington Coast Sustainable Salmon Foundation (WCSSF)] was established in 2014 as a non-profit supporting organization to CSP that serves as its fiscal agent and fundraising partner. 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, located in one of three temperate rain forests in the world, experiences some 90-240+ inches of rainfall per year. 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 extending 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 Salmon *Oncorhynchus 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 (NOAA) has finalized the Lake Ozette Sockeye Recovery Plan (NMFS, 2009). NOAA completed 5-year status reviews of the population in 2011, 2016, and is finalizing the most recent status

review for release in early 2022. The Lake Ozette Sockeye Steering Committee provided an initial prioritization of projects but has not met formally since it was dissolved by vote of the committee members in 2019. Former members of the committee continue to work cooperatively and independently to develop projects. Chinook Salmon *Oncorhynchus tshawytscha*, Coho Salmon *Oncorhynchus kisutch*, Chum Salmon *Oncorhynchus keta*, Pink Salmon *Oncorhynchus gorbuscha*, steelhead *Oncorhynchus mykiss* (anadromous Rainbow Trout), and non-Ozette Sockeye Salmon stocks in NPCLE 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). Current 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 Citizens Committee would like to thank all the hard work of the Technical Committee (Appendix E), 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, 2019, 2020, and 2021 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 (NPCLE) is to maintain and improve ecosystem productivity and genetic diversity for all WRIA 20 salmonid species by protecting highly productive habitats and populations as well as 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 that help provide direction and focus in decision-making 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, including but not limited to: 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 is 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.

While state and federal resources have been the primary funding base of WRIA 20 projects to date, this strategy also includes relevant projects that may lie outside those funding criteria.

NPCLE has used "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) as a guideline publication to create a prioritization process for on-the-ground salmon habitat restoration projects in WRIA 20 basins. This publication presents the results of an analysis by the Northwest Fisheries Science Center 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 NPCLE 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 potentially 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 the 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, thus 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 tends 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

In addition to existing restoration efforts identified in Roni et al (2002), NPCLE recognized that climate change has the potential to add new stressors to salmon habitat and aggravate existing conditions. In the 2016 edition of the NPCLE annual strategy, climate change influences were added as an overlay to all goals and to the scoring process. WRIA 20's location and lack of major urban development have shielded it from the most rapid changes, however change has already begun. For example, from 1982 to 2009, Olympic National Park lost 82 glaciers, with a drop in both in surface area and volume of ice (Riedel et al. 2017). Indicators of the shifting variables of climate change can differ even among the respective watersheds of the WRIA. These may include, but are not limited to, new or increased invasive species 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 phenological shifts (shifts in locality because of temperature and/or precipitation changes on land, or temperature and/or chemistry changes in the ocean), leading to the 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 spawning and juvenile stages.[2]

As mentioned, climate-driven phenological effects are also evident for invasive species. New field observations have indicated that some invasive plants 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

Along with habitat restoration projects, RCO has also accepted projects in recent years that support or lead to salmon species restoration through outreach and education. Regardless of the form 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 WRIA 20 geographic region.

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[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.

[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. and Callaway, 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":

For example, citizen science is a valuable contribution, especially in the current financial climate, but it is important that citizens act inside the framework of a managed research or field project. In order for such programs to be eligible for funding, they 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.

1.2 Project Prioritization Method

The process of prioritizing projects within the WRIA 20 boundaries has been revised from the 2007 strategy to focus more on how proposed projects will affect critical watershed processes and biological integrity over the long term relative to climate change. However, most of the key prioritization considerations remain the same, dating back to the Quileute Natural Resources in its assessment (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. Changes reflected in the 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, which has been updated annually ever since.

This newest prioritization matrix (Table 1, below), used for ranking grant applications, has been developed with a suite of characteristics selected by the NPCLE Technical Committee to address the types of projects and strategies 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 grant round, reviewers also consider 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. NPCLE Project Prioritization Matrix, which 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 explain how ranking criteria for potential and proposed projects are applied by the NPCLE review teams.

Project Strategy: NPCLE assesses and scores projects based on five possible strategies they may follow. Projects may follow more than one strategy and will only receive scores for the strategies they employ. Each project is scored according to how adequately it proposes to accomplish each strategy it follows.

- **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:** 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 ongoing 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 next assessed and scored according to how adequately it proposes to apply one or more of the following methods. Projects only receive scores on the methods they utilize.

- **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 material.
- **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 redesigning 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 woody 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 next assessed for each of the following ecological conditions, and then scored as to how well the project either preserves or improves those 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 salmonid 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 salmonid habitat? If there are no 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: Last, the project proposal is assessed and scored 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 does not lack 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 overall cost of the project is realistic relative to the amount of funds available from the granting agency along with those from any project partners or matching funds.
- **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 merit 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 application through NPCLE in the early part of the year, prior to approval from the regional organization (Coast Salmon Partnership), and final submission of the Lead Entity list of approved projects to SRFB. 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 above in concert with the prioritization criteria presented in Table 1.

For questions or assistance in developing a project in WRIA 20 (for example, identifying potential sponsors, partners, and sources for technical assistance) contact, the NPCLE Coordinator, Anna Geffre, at phone: 360-438-1180 ext. 575 or email: ageffre@nwifc.org.

1.4 Annual Project List:

The annual project list identifies actions or programs in WRIA 20 that are reviewed by the Technical and Citizens Committees for additions and subtractions each year. Additions to the list come from ongoing assessments and restoration prioritization processes and from new projects recommended by stakeholders and Technical Committee members over the previous year. Subtractions from the list are undertaken when projects are fully 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 the lower sections of the rivers, out to a depth of 30 m 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.

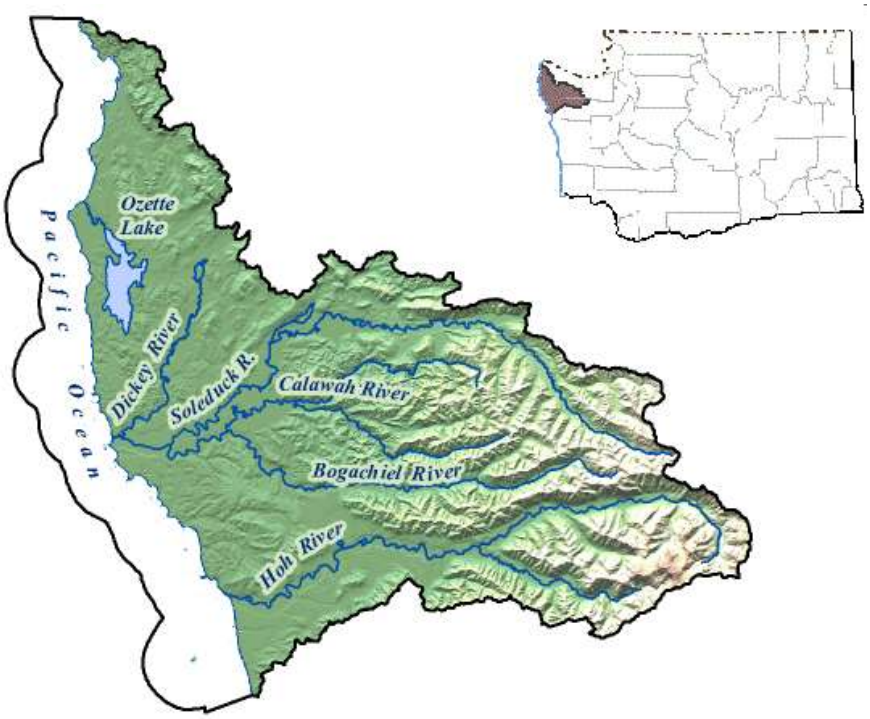
The current suite of potential projects is provided in a table in Appendix B and lists potential restoration actions and projects that have been locally identified and recommended as currently needed to support salmon habitat restoration. From this list, the NPCLE Technical Committee then identifies the top priority projects for each basin, the Independent Drainages, and the Nearshore and ranks them by consensus for that year's round of projects. The prioritized projects described within the text in Section 2 are the “highest” ranked projects on the list in Appendix B. Each project is summarized on the following pages under the habitat region where it occurs. However, any project can be put forward as a potential candidate and considered on its merits for full funding in any year whether or not it is already in Appendix B.

1.5 Eligibility for the Annual Project Rounds:

Any proposed project submitted on time for consideration in an advertised grant round can be fully funded independently 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 awards. Projects for which there is not enough funding may be 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 through the Coast Salmon Partnership before the grant round has officially ended.

Section 2: Priority Projects by Geographic Section



2.0 All WRIA 20 Basins System-wide

Watershed Resource Inventory Area 20 (WRIA 20) encompasses the northwest core of the Olympic Peninsula rainforest ecosystem from Kalaloch to Cape Flattery. As stated in the introduction to this strategy document, “the primary goal of the NPCLE is to maintain and improve ecosystem productivity and genetic diversity for all WRIA 20 salmonid species by protecting highly productive habitats and populations, as well as restoring impaired habitat and populations with the potential to recover.” For most of the landscape assessments and actions recommended in this strategy, it has been deemed appropriate by the Technical Committee to prescribe actions based upon the unique characteristics of each basin even if they are duplicative prescriptions with some of the other basins, rather than inappropriately prescribe them across the entire WRIA. However, two actions rose to the level of agreement to be of WRIA-wide application.

2.0.1 **Title of Project**: Culvert inventories and prioritizations using WDFW protocols.
Location: All WRIA 20 basins and tributaries.
Issue/Limiting Factor being addressed: Water quality and fish passage.
Issue/Limiting Factor being addressed: Fish passage and water quality.
Action to be taken: Comprehensive field assessments of all known culverts on fish-bearing streams in WRIA 20 (County, State, Federal and private).

Stocks being affected: Chinook Salmon, Coho Salmon, Pink Salmon, Chum Salmon, Sockeye Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Underway and seeking additional comprehensive funding.

2.0.2 **Title of Project**: Low Water Access Inventory of seasonal fish barriers.
Location: All WRIA 20 basins and tributaries.
Issue/Limiting Factor being addressed: Fish passage, seasonal access, aquatic habitat quality, quantity, and off-channel habitat connectivity.
Action to be taken: Comprehensive assessment of seasonal flows to identify dewatered mainstem bottlenecks, and off-channel access areas.
Stocks being affected: Chinook Salmon, Coho Salmon, Pink Salmon, Chum Salmon, Sockeye Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding; initial data compilation underway.

2.0.3 Title of Project: Low-Tech Tributary Restoration Planning and Design
Location: All WRIA 20 Systems
Issue/Limiting Factor being addressed: Habitat quality: complexity, water quality (temperature, sediment), water quantity (increased storage), floodplain connectivity (reduced incision).
Action to be taken: Planning and design project will use GIS models to identify high priority areas for low-tech restoration methods in tributary channels throughout WRIA 20. Modeling results will be field verified at high-priority sites within the Calawah watershed. Project goal is to accelerate implementation of low-tech restoration methods that incorporate wood into streams at suitable, high priority locations to restore natural processes and improve climate resilience.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding.

2.1 Hoh River Basin

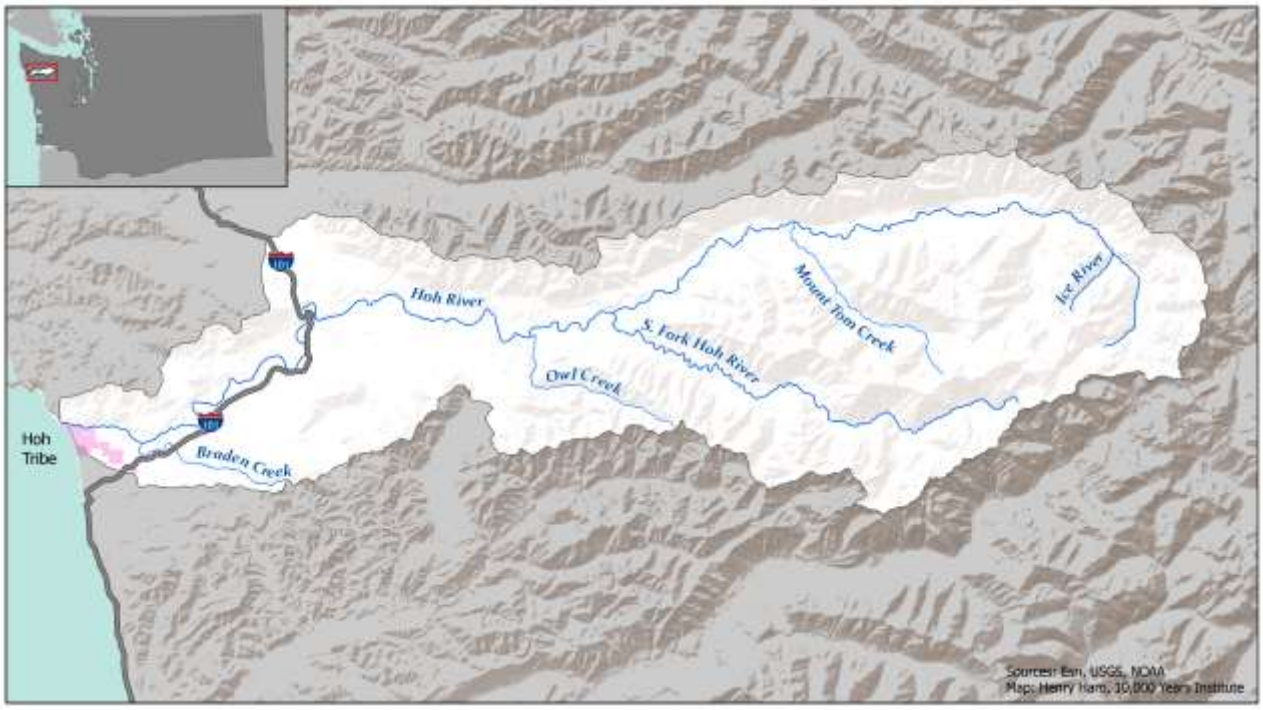


Figure 1. Relief Map of the Hoh River Basin.

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 Olympic National Park (ONP) 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, 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 ONP where land-use practices have degraded salmon rearing and spawning habitat and altered the processes responsible for habitat formation (Smith, 2000; McHenry, 2001). At the mouth of the Hoh River, the Hoh Tribal reservation occupies the south shore, and Olympic National Park the north shore.

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 225 cm (90 inches) near the Pacific Coast to 600 cm (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) and 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 (Cheung and Frölicher 2020).

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 Salmon *O. tshawytscha*, fall Coho Salmon *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 *S. 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. clarkii clarkii*, 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 salmonid 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 Salmon out-migrate as juveniles at age-0, which contrasts sharply with the tendency of the other species to remain in freshwater for at least a full year. Spring/summer Chinook Salmon spawn from mid-August through mid-October while fall Chinook Salmon and Coho Salmon spawn from mid-October through January. Winter steelhead spawn from December through July. No information is available on the spawn timing of summer steelhead, which are believed to spawn in the North Fork and South Fork Hoh Rivers inside ONP (McHenry, 2001). The juvenile and adult life histories and ecology of Coastal Cutthroat Trout and resident Rainbow Trout are completely unstudied.

Bull Trout are believed to spawn primarily in ONP, in the mainstem 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, although data gaps remain. Key factors limiting salmonid productivity in this basin were identified by Smith (2000). Washington State Department of Natural Resources (DNR) 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). U.S. Department of Interior's Bureau of Reclamation (USBR) 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 DNR (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. In 2022, Jefferson County and its partners will provide new hydraulic modeling as well as geomorphic, vegetation and habitat information and reports as part of its Middle Hoh River Resiliency and Action Plans. This effort generated new orthophotos for the reach, five conceptual restoration designs, and defined a "resiliency corridor."

Collectively, these technical reports concluded that while habitat in the Hoh River Basin functions well compared to other watersheds in the western U.S., major impacts on fish habitat have occurred.

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). Climate change and ensuing glacial melt have added to sediment loading (see p. 16, below). 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 (Title 222 WAC), 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 that has disconnected floodplain habitat and exposed layers of clay sediment; these continually erode and reduce water quality in both the mainstem Hoh and tributaries (Smith, 2000).

Glacial retreat is apparent in three major Olympic Peninsula watersheds: Elwha, Hoh and Quinault. ONP staff have 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 (Riedel et al. 2017). Similar studies have been conducted at Mt. Rainier National Park. While the underlying geology differs, the process and outcomes appear similar to research conducted by FEMA and NPS at Mount Rainier National Park, showing 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 migration increasingly exposes a persistent seam of blue clay throughout the watershed. Erosion at the toes of deep-seated landslides near Nolan Creek, Maple and Owl Creeks, and Spruce and Canyon Creeks can destabilize these geologic hazards. The exposed clay increases turbidity and results in a sticky layer of extremely fine sediment over gravel bars and side channel spawning beds.

Channel instability and changes in vectors and pathways such as recreation, restoration construction, road construction, and weather patterns also disrupt riparian succession, increase the impacts of invasive plant species that are documented to alter riparian succession and arrest 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 salmonids and other species (QIN, Lestelle et al. 2011). Succession is very complex and is as dependent on control of erosion as it is on species. Mycorrhiza components, when understood and feasible, need to be part 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, bank instability is just as poor as where no timber grows, although trees of sufficient size and diameter remain in place, providing mass to build back river bars and floodplain terraces. The lack of large riparian timber reduces shading and limits the supply of large wood material (LWM) to that which washes down from Olympic National Park. Few pieces of LWM are large enough to remain stable and embedded during normal peak flows, so most are carried through the system to the beach unless caught up in an existing log jam or in a side channel. In tributaries, habitat has been isolated by fish passage-blocking culverts along the mainstem corridor and in upland tributaries. 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 blocked access to habitat and degraded water quality in several lower elevation tributaries. Targets for restoration include expanding and diversifying riparian forests, retaining sufficient mature forests 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 revegetated 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 complexes 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. 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 the 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 ald 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, thinning 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 salmonid recovery in 2021. Some of these projects have been fully or partially funded, but none of them has been fully implemented on the ground. Each project's "status" at the time of publication is indicated at the end of its description.

2.1.2.1 **Title of Project**: Glacial retreat and sediment flux assessment of the Hoh River.
Location: Hoh River mainstem.
Issue/Limiting Factor being addressed: Water quality and sedimentation.
Action to be taken: Water quality and instream assessment of suspended sediments. sediment in the Hoh Mainstem relative to increased glacial melting.
Stocks being affected: Chinook Salmon, Coho Salmon, and steelhead.
Status: Seeking funding. Initial efforts underway in collaboration with the Upper Hoh Road Phase 2 project # 2.1.2.6).

2.1.2.2 **Title of Project**: New Hoh River LiDAR flight and processing.
Location: Hoh River mainstem and tributaries.
Action to be taken: The Hoh River Basin last had LiDAR flown in 2013. A new "Green LiDAR" flight is needed to measure changes since the last one and for modeling future climate change influences.
Issue/Limiting Factor being addressed: Sediment control and water quality.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding.

2.1.2.3 **Title of Project**: SSHEAR Project Assessment and Repairs.
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed: Fish passage, water temperature and seasonal low flow.
Action to be taken: 16 preliminarily 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.

Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: [SSHEAR] Current WCRRI funding is looking at all 54 SSHEAR projects in WRIA 20 including the 16 in the Hoh.

2.1.2.4 **Title of Project**: SSHEAR Project Invasive Species Assessment and Mitigation.
Location: Hoh River Basin tributaries.
Issue/Limiting Factor being addressed: Fish passage, seasonal access, aquatic habitat quality, quantity and off-channel habitat connectivity.
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 Trout, and Bull Trout.
Status: [SSHEAR] Funded under WCRRI Pulling Together Initiative (10,000 Years Institute).

2.1.2.5 **Title of project:** Hoh River On-going Riparian Assessment and Restoration.
Location: Hoh River mainstem and applicable tributaries.
Issue/Limiting Factor being addressed: Fish passage, seasonal access, aquatic habitat quality, quantity and off-channel habitat connectivity.
Action to be taken: Eliminate or control state listed invasive plants including knotweed, reed canary grass, herb Robert, Scotch broom, Canada thistle, tansy ragwort, etc.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: This requires ongoing funding. Funded off and on since 2013. Seeking long-term funding.

2.1.2.6 **Title of project**: Upper Hoh River Road Phase 2 (Western Federal Highways).
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: Flood plain stability, bank erosion, and sediment control.
Action to be taken: Reduce risk of catastrophic road failure and conduct fish friendly instream work using dolos, rip rap and other anthropogenic structures that mimic nature.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: On-going with designs completed and permits issued.

2.1.2.7 **Title of project:** Hoh River Master Plan Phase I: River miles 17 to 31.
Location: Hoh River from South Fork Hoh to Oxbow Canyon.
Issue/Limiting Factor being addressed: Consolidation of flow, side-channel protection, and off-channel habitat access.
Action to be taken: Resiliency plan that supports fish habitat, traditional uses, local community, and businesses.
Stocks being affected: Hoh Spring and Fall Chinook Salmon, Hoh Fall Coho Salmon, Cutthroat Trout.

Status: WCRRI funded, sponsored by Jefferson County Public Health.

2.1.2.8 **Title of Project**: Hoh River – Lindner Complex Reach
Location: North side of Hoh River, RM 21-23
Issue/Limiting Factor being addressed: Channel instability; protection/enhancement of off-channel and main stem habitats; disconnected floodplain
Action to be taken: Preliminary (525 acres) and final designs (105 acres) and permitting; landowner outreach towards implementation of ELJ project; community meetings towards implementation of resiliency corridor
Stocks being affected: All species but especially spring Chinook, steelhead, coho and bull trout
Status: Seeking funding.

2.1.2.9 **Title of Project**: Oil City Road Culvert Barrier Corrections: Assessment and Designs.
Location: Lower Hoh River along Oil City Road.
Issue/Limiting Factor being addressed: Propose culvert replacement alternatives.
Action to be taken: Replacement with box culvert.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.1.2.10 **Title of Project**: Oil City MP 0.5 Fish Passage Barrier Correction.
Location: Mile Post 0.513.
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: On the Jefferson County Road department list as a “high priority”.
Stocks being affected: Coho Salmon and Cutthroat Trout.
Status: Jefferson County Roads has implemented.

2.1.2.11 **Title of Project**: Owl Creek Assessment and Preliminary Designs.
Location: Owl Creek from the confluence of the Hoh River to RM 1.7.
Issue/Limiting Factor being addressed: Low amounts of woody material and instream habitat complexity.
Action to be taken: Fluvial and riparian audit with preliminary designs incorporating LWM.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Ongoing with WCRRI funding.

2.1.2.12 **Title of Project**: Winfield Creek Restoration Project
Location: Winfield Creek River Mile 0.0-5.0
Issue/Limiting Factor being addressed: Low amounts of woody material and instream habitat complexity.
Action to be taken: Geomorphic & Riparian Assessment; Designs for LWM placement; Implementation.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, sea-run Cutthroat Trout, & resident trout.
Status: Seeking funding.

2.1.2.13 **Title of Project**: Elk Creek Restoration Project
Location: Elk Creek River Mile 0.0-4.0
Issue/Limiting Factor being addressed: Low amounts of woody material and instream habitat complexity.
Action to be taken: Geomorphic & Riparian Assessment; Designs for LWM placement; Implementation.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, sea-run Cutthroat Trout, & resident trout.
Status: Seeking funding.

2.1.2.14 **Title of Project**: Willoughby Creek Assessment and Preliminary Designs.
Location: Willoughby Creek: RM 0.0 to 2.8.
Issue/Limiting Factor being addressed: Low amounts of woody material and instream habitat complexity.
Action to be taken: Fluvial and riparian audit with preliminary designs incorporating LWM.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding.

2.1.2.15 **Title of Project**: Canyon Creek Culvert Blockage.
Location: Canyon Creek: 47.813520, -124.070843
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: Implement design for elimination of the culvert blockage(s)
Stocks being affected: Coho Salmon, Cutthroat Trout, and Bull Trout.
Status: Completed with bridge in place in 2021.
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2.2 Quillayute River Complex

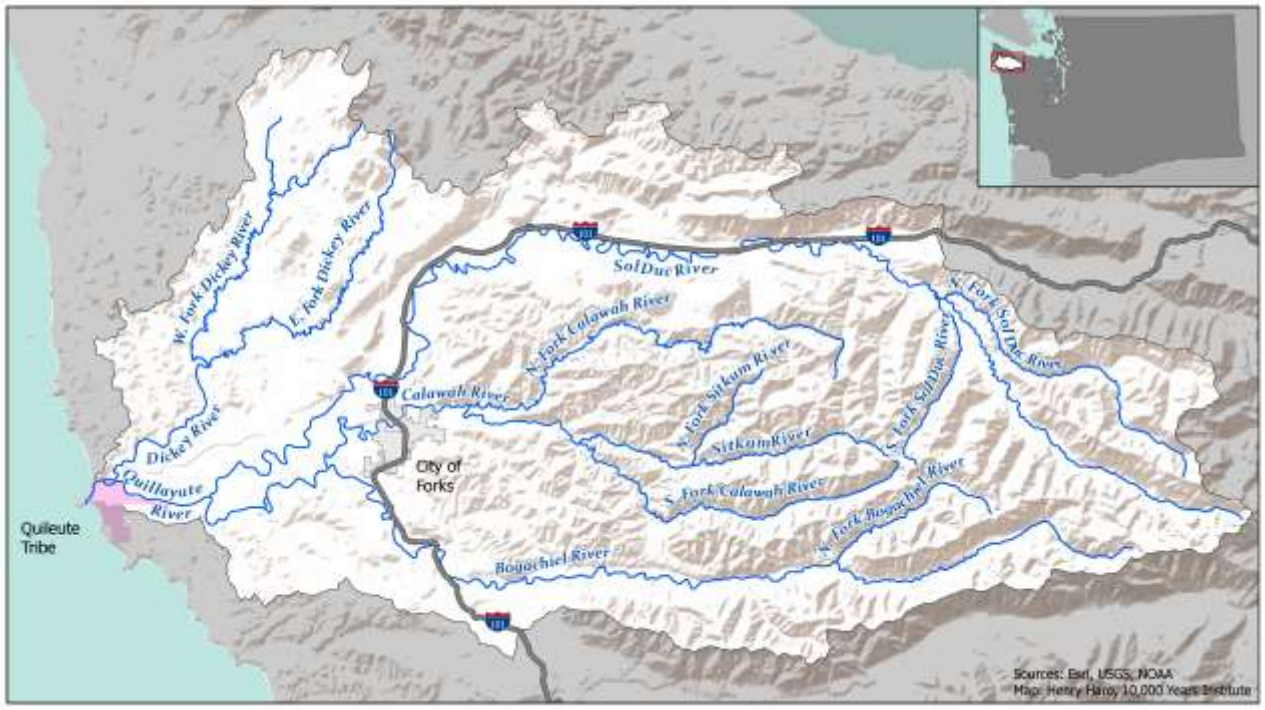


Figure 2. Relief Map of the Quillayute River Basin.

2.2.1 Quillayute Basin Background:

The Quillayute River is the terminal mainstem 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 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 Olympic National Park boundaries.

The Quillayute River has a very short mainstem. At river mile 6.0 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 U.S. Forest Service (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. At the mouth of the Quillayute River lies the Quileute Tribe's reservation.

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 salmonid 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 DNR, 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 influenced by the findings in the preliminary watershed analyses, and input from a team of local biologists. The pdf document referenced above does not have the GPS map work undertaken for the LFA Final Report, but this information is housed with the Quileute Tribe and the Coast Salmon Partnership.

In 2000-2003 the Quileute Tribe assessed fish habitat in the Bogachiel (unpublished), using DNR protocol. The Bogachiel mainstem 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 a DNR 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 Noxious 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 mainstem in 2008 and has worked with 10,000 Years Institute to continue treatments. 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, DNR 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. DNR 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.

In 2020, the Quileute Tribe completed a Quillayute Geomorphic Assessment River and Action Plan with consultant, Tetra Tech, (https://quileutenation.org/natural-resources/salmon-restoration/) that has led to future restoration efforts for the entire 6.0 RM mainstem.

2.2.1.1 Climate Change Forecasts for Restoration

In the spring of 2016, the Quileute Tribe received the final report of a BIA-funded grant to the Quinault Indian Nation (QIN): “Climate Change Vulnerability Assessment for the Treaty of Olympia Tribes”, prepared by the Oregon Climate Change Research Institute of Oregon State University (contractor) on behalf of the three tribes in that treaty

(QIN, Hoh, and Quileute). It is clear from the chapters, presentations and publications coming out of regional climate forums that predictions can only be made in generalities, for example, when significant stream temperature changes will happen (decadally), how much sea level will rise (within a century), or to what degree winter higher flows and summer lower flows will occur, and exactly when these will become truly significant. However, it is clear is that change is coming and remedial action to remediate potential harm must begin immediately. 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).

The authors sum it up well in the introduction of Beechie et al, 2012: *"climate change is not straightforward, as predicted change effects vary widely throughout the Pacific salmon range. … 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."*

It is important to consider what streamflow impact will be on winter rearing habitats. 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 multiple serious changes—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; and
- Remove fish passage barriers.

2.2.2 Quillayute Basin Prioritized Projects:

Prioritized projects for the Quillayute Basin in 2022 are primarily projects still needing funding that are projects identified as part of the U.S. Forest Service Calawah

Focus Watershed Assessment undertaken in 2010 and Quileute Tribe's Quillayute Geomorphic Assessment. 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.

2.2.2.0 Quillayute Basin-Wide Priority Projects:

2.2.2.0.1 **Title of Project**: Quillayute Basin SSHEAR Project Assessment, Prioritization, and Mitigation
Location: Quillayute Basin tributaries.
Issue/Limiting Factor being addressed: Habitat quality.
Action to be taken: Projects are currently being assessed. Individual projects will be brought forward after they are scoped out for repairs.
Assess, inventory, and treat invasive species in SSHEAR sites prior to construction, evaluate clean fill material sources.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and resident trout.
Status: [SSHEAR] Seeking additional funding. Initial assessment completed by PCSC. Invasive species treatments were conducted by 10KYI with funding from WCRRI. Treatments will continue on at least annual basis.

2.2.2.0.2 **Title of Project**: Low-Tech SSHEAR Site Restoration
Location: Quillayute Basin at multiple sites
Issue/Limiting Factor being addressed: Habitat quality.
Action to be taken: Restoration of multiple SSHEAR sites using low-tech, process-based methods. 1) Remove artificial structures and re-place them with woody debris in a way mimics naturally occurring formations. 2) Use low cost, low tech, human-powered methods to address these sites and provide an example of how these techniques could be applied in other locations.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and resident trout.
Status: [SSHEAR] Seeking additional funding, appropriate site assessment underway. Cascade Marsh and Big Beaver SSHEAR Sites are funded in 2021 for Low-Tech restoration.

2.2.2.0.3 **Title of Project**: Quillayute Basin Invasive plant inventory, prioritization, treatment, and control strategy.
Location: Quillayute Basin tributaries.
Issue/Limiting Factor being addressed: Fish passage and riparian habitat quality.
Action to be taken: Invasive plant inventory, mapping, and prioritization of multiple species prevention and control.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and resident trout.
Status: Site specific pilot study underway, seeking additional funding.

2.2.2.0.4 **Title of Project**: Quillayute Basin Restoration through Riparian Planting and Invasive Species Management
Location: Quillayute River Mainstem and Basin tributaries.

Issue/Limiting Factor being addressed: Riparian habitat quality – lack of shade, bank erosion, degraded water quality, Invasive plants
Action to be taken: Riparian planting
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and resident trout.
Status: Seeking additional funding. Funded at Quileute Tribe's Hermison Property through CREP along the Quillayute Riverbank.

2.2.2.1 Quillayute River Mainstem Priority Projects:

2.2.2.1.1 **Title of Project**: Quillayute River Temperature Research.
Location: Surface water temperature monitoring entire 6 miles of Quillayute River and Effectiveness monitoring of Hyporheic Flow on Lower Quillayute Restoration Project
Issue/Limiting Factor being addressed: Water Quality (ground water and surface water temperature), Effectiveness Monitoring and river erosion.
Action to be taken: Task 1) Longitudinal profiles of near-streambed temperature and conductivity; Task 2) Continuous temperature and stage monitoring at discrete locations; Task 3) Estimate of hyporheic exchange near proposed restoration site.
Stocks being affected: Chinook Salmon, Pink Salmon, Chum Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Funded for 2021-2023 by Quileute Tribe, EPA, USGS and WSC.

2.2.2.1.2 **Title of project**: Quillayute River Large Woody Material (LWM) Enhancement
Location: Entire length of the Quillayute River.
Issue/Limiting Factor being addressed: Habitat quality, complexity, and refuge. Inadequate density of instream LWM to maintain natural habitat processes, due to upstream logging practices. The main issue is that the river has lost the natural meander and created a shallow, high-velocity channel that creates warm river conditions and lacks habitat complexity for salmonids
Action to be taken: Install LWM structures, including engineered logjams, to achieve a >80 pieces/mile of wood that are greater than 12" DBH and more than 35' length.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Seeking funding for designs and construction. To be accomplished reach-by-reach.

2.2.2.1.3 **Title of project**: Quillayute River Reach 2 / Mora Road Restoration
Location: Quillayute River Reach 2 (RM 0.8-1.8)
Issue/Limiting Factor being addressed: Habitat quality; fish passage. Mora Road (ONP) is regularly subjected to erosional forces from Quillayute River. Current rip rap to prevent erosion is not fish-friendly. Culverts along Mora Road block access to off-channel habitat.
Action to be taken: Install in-stream wood structures to attenuate high-flow forces. Replace riprap with fish-friendly log revetments. Replace culverts on Mora Road.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.

Status: Partial funding from Federal Highway Administration for preliminary designs on Mora Road (eastern site). Seeking funding through FLTP from Olympic National Park for implementation. Seeking additional funding.

2.2.2.1.4 **Title of project**: Quillayute River Reach 3/Thunder Field Restoration
Location: Quillayute River Reach 3 (RM 1.8-3.7)
Issue/Limiting Factor being addressed: Habitat quality; Erosion. High flows rapidly eroding land at culturally significant Thunder Field. Lack of habitat complexity due to inadequate instream LWM.
Action to be taken: Install fish-friendly log revetment to protect Thunder Field from further erosion. Install engineered log jams and other wood structures to deflect high flows, reactivate historic floodplain, improve tribal fishing access, and increase habitat complexity. Invasive plant management
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Designs 60% complete. The 90% designs will be completed in January 2022. Implementation has been funded and scheduled for summer 2022-23. Collaborating with NPS, BIA, NRCS to complete required permits.

2.2.2.1.5 **Title of project**: Quillayute River Reach 4 Restoration/Historic Oxbow Reactivation
Location: Quillayute River Reach 4 (RM 3.7-4.6)
Issue/Limiting Factor being addressed: Habitat complexity, floodplain connection, downstream erosion.
Action to be taken: Reactivate historic oxbow off Quillayute River to attenuate high flows and reconnect off-channel floodplain habitat. Install LWM structures to increase channel and habitat complexity. Research on existing temperature, macroinvertebrates, and fish use on historical oxbow. Invasive plant management.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Designs for 30% have been funded. Seeking additional funding for research, designs, landowner outreach, permitting, and construction.

2.2.2.1.6 **Title of project**: Quillayute River Reach 5 and 6 Restoration
Location: Quillayute River Reach 5 and 6 (RM 4.6-5.6; 5.6-6.0)
Issue/Limiting Factor being addressed: Development encroachment; bank erosion; habitat Complexity; floodplain disconnection; riparian conditions.
Action to be taken: Install instream LWD to improve habitat complexity and decrease bank erosion. Replace existing riprap with fish-friendly alternatives for erosion control. Invasive plant management.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Seeking funding for designs and construction.

2.2.2.1.7 **Title of project**: Hermison Culvert Replacement and Road Improvement
Location:

Issue/Limiting Factor being addressed: Fish passage, Habitat quality.
Action to be taken: Replace undersized culvert.**Stocks being affected**: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Seeking funding for designs and construction.

2.2.2.2 Dickey River Watershed Priority Projects:

2.2.2.2.1 **Title of project**: Lower Dickey River Restoration
Location: Dickey River: RM 0.0 to 1.0.
Issue/Limiting Factor being addressed: Instream/riparian habitat complexity and reconnecting off-channel habitat.
Action to be taken: Install instream LWM structures to increase habitat complexity and restore more natural riverine processes. Reconnect wetlands isolated by the current alignment of Mora Road and Mora Road Bridge (ONP).
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, Pink Salmon, and resident trout.
Status: Seeking funding.

2.2.2.2.2 **Title of project**: T-Bone SSHEAR Project Restoration
Location: Dickey River: 47.95978 N. / -124.55368 W.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Coho Salmon, steelhead, and resident trout.
Status: [SSHEAR] Funded in SRFB 2019 round PCSC sponsor.

2.2.2.2.3 **Title of project**: Elk Horn Project Restoration
Location: Dickey River: 47.95092 N / -124.57089.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Coho Salmon, steelhead, and resident trout.
Status: [SSHEAR] Funded in SRFB 2019 round, PCSC sponsor.

2.2.2.2.4 **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, and resident trout.
Status: **Completed summer of 2021.**

2.2.2.2.5 **Title of project**: Soot Creek SSHEAR Repair
Location: Dickey River. 48.042685° N / -124.432098°W
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 Salmon, steelhead, and resident trout.
Status: [SSHEAR] Seeking funding.

2.2.2.2.6 **Title of Project**: North Fork Crooked Creek Tributary Culvert Repairs.
Location: Dickey River unnamed tributaries to NF Crooked Creek (5906 Road) Culvert 1: #CWCC.01185 RMAP #CL040141 (48.104086, -124.535661) and Culvert 2: #CWCC.01184 RMAP #CL040139 and CL040140 (48.103156, -124.530118)
Issue/Limiting Factor being addressed: Fish passage, sediment delivery and water Quality.
Action to be taken: Remove/Replace structures that are on an orphan road – Culvert 1 has a wood box culvert that is partially collapsed and fish passage is unknown, but has a potential for failure and sediment delivery. Culvert 2 has a wood stringer crossing with a pipe under the wood (the pipe inlet is blocked).
Stocks being affected: Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.2.2.2.7 **Title of Project**: Dickey River Basin Hydraulic Modeling & Geomorphic Assessment.
Location: Dickey River RM 0 to headwaters.
Issue/Limiting Factor being addressed: Riparian health, groundwater recharge capacity, stream temperatures, sedimentation, road network, LWD in the system.
Action to be taken: Determine current geomorphic conditions and appropriate restoration actions of mainstem and tributaries of the Dickey River from the confluence with the Quillayute River to headwaters.
Stocks being affected: Chinook Salmon, Coho salmon, steelhead, & Cutthroat Trout.
Status: Seeking funding.

2.2.2.3 Bogachiel River Watershed Priority Projects:

2.2.2.3.1 **Title of Project**: Bogachiel River Geomorphic Assessment.
Location: Bogachiel River RM 0 to 22.
Issue/Limiting Factor being addressed: Riparian and floodplain stability.
Action to be taken: Determine current geomorphic conditions and appropriate restoration actions of mainstem Bogachiel River from the confluence with the Sol Duc to the Olympic National Park boundary (RM 0-22).
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding. Funding for assessment was awarded to Quileute Tribe in 2021 through WCRRI.

2.2.2.3.2 **Title of Project**: Bogachiel Cold Water Assessment.
Location: Entire length of the Bogachiel River into ONP.
Issue/Limiting Factor being addressed: Water quality.
Action to be taken: Identify cold water refuges through hydrologic modeling and intensive water quality monitoring.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout,

Status: Seeking funding.

2.2.2.3.3 **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: Bank erosion, sedimentation, riparian habitat, floodplain reconnection.
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 reestablishing larger landscape features such as side channels and/or log jams.
Stocks being affected: Chinook Salmon, Coho Salmon, Sockeye Salmon, Chum Salmon, steelhead, and Cutthroat Trout.
Status: Funding exists for invasive plant management through 10KYI and WCRRI. Seeking additional funding.

2.2.2.3.4 **Title of Project:** Bogachiel Invasive Species, Assessment and Control.
Location: Bogachiel River and tributaries from the confluence with the Sol Duc to the Olympic National Park boundary (RM 0 to 22).
Issue/Limiting Factor being addressed: Fish passage and riparian habitat.
Action to be taken: Invasive plant inventory, mapping, and prioritization of multiple species prevention and control, including partnership with other projects.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: On-going, seeking long-term funding.

2.2.2.3.5 **Title of project**: Kitchel 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 landowners are willing sellers. The property will be purchased, structures and infrastructure removed, invasive species removed, and riparian vegetation reestablished.
Stocks being affected: Chinook Salmon, Coho Salmon, Sockeye Salmon, Chum Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding. Working group established.

2.2.2.3.6 **Title of project**: Tall Timbers Fish Passage. [SSHEAR]
Location: Bogachiel River : 47.93264 N / -124.45252 W.
Issue/Limiting Factor being addressed: Fish passage and habitat quality
Action to be taken: SSHEAR project rehabilitation restoring fish ways.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead and resident trout.
Status: [SSHEAR] Funded in 2019 SRFB round, in process.

2.2.2.3.7 **Title of project**: Morganroth Pond Fish Passage Restoration [SSHEAR]
Location: Bogachiel River : 47.881665° -124.269865°
Issue/Limiting Factor being addressed: Fish passage, flood plain connectivity and habitat complexity.
Action to be taken: Restore natural processes at SSHEAR site.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout..
Status: [SSHEAR] Design funding obtained. Awaiting permitting.

2.2.2.3.8 **Title of project**: Ballard Road/Old La Push Road Old Side Channel Restoration
Location: River mile 1.0
Issue/Limiting Factor being addressed: The 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. Land acquisition, bank hardening and infrastructure removed, invasive species removed, and riparian vegetation re-established.
Stocks being affected: Chinook Salmon, Coho Salmon, and steelhead.
Status: Seeking funding.

2.2.2.4 Calawah River Watershed Priority Projects:

2.2.2.4.1 **Title of Project:** Quantifying suspended-sediment yield and transport characteristics in the Calawah and Upper Bogachiel Rivers, Washington.
Location: Surface water temperature monitoring entire 6 miles of Quillayute River and Effectiveness monitoring of Hyporheic Flow on Lower Quillayute Restoration Project.
Issue/Limiting Factor being addressed: Water quality (suspended-sediment), water quantity (discharge and stage), erosion and mass wasting.
Action to be taken: Task 1) Longitudinal profiles of near-streambed temperature and conductivity; Task 2) Continuous temperature and stage monitoring at discrete locations; Task 3) Estimate of hyporheic exchange near proposed restoration site.
Stocks being affected: Chinook Salmon, Pink Salmon, Chum Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Funded for 2019-2021 by Quileute Tribe, EPA, and USGS. Research publication will be done in 2022.

2.2.2.4.2 **Title of Project:** Calawah Invasive Species, Assessment and Control.
Location: Calawah River and tributaries from confluence to the Olympic National Park boundary
Issue/Limiting Factor being addressed: Fish passage and riparian habitat.
Action to be taken: Invasive plant inventory, mapping, and prioritization of multiple species prevention and control, including partnership with other projects.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: On-going, seeking long-term funding.

2.2.2.4.3 **Title of project**: Sitkum 2900-072, 075, 078 Road Decommissioning.
Location: In the Sitkum drainage of the South Fork Calawah River Basin, T28N, R12W, Sec 11 and 12. USFS landowner.
Issue/Limiting Factor being addressed: Deteriorating culverts and highly unstable landform. Mass wasting that has direct impact on 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 Salmon, Summer and Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout.
Status: Active (WCRRI approved). Funded but delayed due to storm damage in Nov 2021.

2.2.2.4.4 **Title of project**: FS 2900 Road Culvert Replacements: “A”
Location: Sitkum River FS 2900 at MP 15.9 and 18.3.
Issue/Limiting Factor being addressed: Sediment control.
Action to be taken: Replace two deteriorating, undersized culverts on the FS 2900.
Stocks being affected: Sitkum River/South Fork Calawah Fall Coho Salmon, Summer and Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout.
Status: **Completed on the ground in 2021**.

2.2.2.4.5 **Title of Project**: FS 2900 Road - Culvert replacements: “B”
Location: Sitkum River FS 2900 at MP 16.1.
Issue/Limiting Factor being addressed: Sediment control.
Action to be taken: Replace deteriorating culvert at MP 16.1.
Stocks being affected: Sitkum River/South Fork Calawah Fall Coho Salmon, Summer and Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout
Status: Seeking funding.

2.2.2.4.6 **Title of Project**: FS 2900 Road - Culvert replacements: “C.”
Location: Sitkum River FS 2900 at MP 9.9, 10.6, and 11.5.
Issue/Limiting Factor being addressed: Sediment control.
Action to be taken: Replace 3 deteriorating culverts at FS 2900 at MP 9.9, 10.6, and 11.5.
Stocks being affected: Sitkum River/South Fork Calawah Fall Coho Salmon, Summer and Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout.
Status: Seeking implementation funding.

2.2.2.4.7 **Title of Project**: North Fork Calawah Large Woody Material Assessment.
Location: North Fork Calawah RM 0.0 to 17.0.
Issue/Limiting Factor being addressed: Sediment control.
Action to be taken: Feasibility study to determine the placement of ELJs in the mainstem.

Stocks being affected Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout
Status: Seeking funding.

2.2.2.4.8 **Title of project**: North Fork Calawah Hydrological/Geomorphic Assessment.
Location: North Fork Calawah from RM 0.0 to RM 10.
Issue/Limiting Factor being addressed: Feasibility study to determine appropriate restoration actions.
Stocks being affected: North Fork Calawah Fall Coho Salmon, Fall Chinook Salmon, and winter steelhead, resident and anadromous Cutthroat Trout.
Status: Seeking funding.

2.2.2.4.9 **Title of project**: South Fork Calawah Assessment and Preliminary Design.
Location: South Fork Calawah from Hyas Creek to Klahanie Campground.
Action to be taken: Geomorphic assessment and feasibility study to identify potential restoration actions.
Stocks being affected: Sitkum River/South Fork Calawah Fall Coho Salmon, Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout.
Status: Funded and active.

2.2.2.4.10 **Title of project:** FS 2900-030 Road Decommissioning.
Location: FS 2900-030 road, in the Hyas Creek drainage, South Fork 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 with direct impacts to 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 River/South Fork Calawah Fall Coho Salmon, Fall Chinook Salmon, summer and winter steelhead, river run Sockeye Salmon, and anadromous and resident Cutthroat Trout.
Status: Need landowner (Rayonier) permission for road segment on their ownership. Seeking funding. NEPA completed for USFS segment from MP 1.9-3.6.

2.2.2.5 Sol Duc River Watershed Priority Projects:

2.2.2.5.1 **Title of Project:** Sol Duc Invasive Species, Assessment and Control.
Location: Sol Duc River and tributaries, RM 0.0 to 30.0.
Issue/Limiting Factor being addressed: Fish passage and riparian habitat.
Action to be taken: Invasive plant inventory, mapping, and prioritization of multiple species prevention and control, including partnership with other projects.

Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: On-going, funded through WCRRI, seeking additional long-term funding.

2.2.2.5.2 **Title of project**: Lower Sol Duc River Restoration.
Location: Sol Duc River (RM 0.0-7.5).
Issue/Limiting Factor being addressed: Habitat complexity; off-channel habitat connection; erosion.
Action to be taken: In lower 0.5 miles, reoccupy side channels, install LWD structures, and complete bank laybacks. Redesign the Mora Road bridge at confluence of Sol Duc and Bogachiel Rivers to prevent erosive forces in river channel. Install instream LWD and reconnect side channels at RM 1.75 and RM 2.5 to increase off-channel habitat availability and improve habitat complexity.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Sockeye Salmon, Chum Salmon, and resident trout.
Status: Seeking funding for designs and construction.

2.2.2.5.3 **Title of project**: Lake Creek Assessment & Restoration.
Location: Lake Creek to Sol Duc, including Lake Pleasant.
Issue/Limiting Factor being addressed: Seasonal low flows that impede fish passage to the lake, degrading groundwater recharge in Lower Lake Creek, lack of LWM, lack of riparian habitat, and encroaching invasive non-native plants.
Action to be taken: Assessment, riparian restoration and planting, LWD placement.
Stocks being affected: Sol Duc Fall Coho Salmon, Sol Duc winter steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.2.2.5.4 **Title of Project**: Quandary Creek Fish Barrier Correction and Restoration Plan.
Location: Sol Duc River tributary, Quandary Cr. at E. Lake Pleasant Road MP 0.737.
Issue/Limiting Factor being addressed: Fish passage and habitat quality.
Action to be taken: Address fish passage barriers and improve habitat quality in Quandary Creek. This site is a county road fish passage barrier on East Lake Pleasant Road.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout, .
Status: Seeking funding.

2.2.2.5.5 **Title of project**: Bear Creek LWM and Riparian Treatments.
Location: Sol Duc tributary Bear Creek to RM 0 to 4.0 (USFS).
Issue/Limiting Factor being addressed: Sediment quality, channel stability, instream LWM, and water quality,
Action to be taken: LWM assessment placement on Sol Duc tributary Bear Creek to RM 0 to 4 (USFS).
Stocks being affected: Sol Duc Fall Coho Salmon, Sol Duc Winter steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.2.2.5.6 **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 Salmon, Sol Duc Winter steelhead, and Cutthroat Trout.
Status: Funded by WCRRI and SRFB.

2.2.2.5.7 **Title of project**: Eagle Springs riparian restoration [SSHEAR]
Location: Sol Duc River : 48.04205 N / -124.54845 W
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 Salmon, Sol Duc Winter steelhead, and Cutthroat Trout.
Status: [SSHEAR] Funded by SRFB. Spawning gravel placement was completed in 2018. LWD and riparian planting was completed in 2021. Invasive treatment funded by WCRRI, seeking ongoing long-term invasive treatment funding.

2.2.2.5.8 **Title of Project:** Sol Duc Tributaries Assessment
Location: Bockman and Shuwah tributaries of the Sol Duc River.
Issue/Limiting Factor being addressed: Habitat complexity, incision, sedimentation, stream temperature.
Actions to be taken: Habitat assessment, identification of restoration opportunities
Stocks being affected: Sol Duc Fall Coho Salmon, Fall Chinook Salmon, Winter steelhead, and Cutthroat Trout.
Status: Bockman Creek funded by WCRRI in 2021 (Shuwah Creek still seeking funding).

2.2.2.5.9 **Title of Project**: Anton Creek Fish Passage Barrier Corrections
Location: Off Bear Creek, Sol Duc River along Bear Creek Road MP 1.740, 1.785
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: Address fish passage barriers in the Anton Creek drainage (two County road barriers on Bear Creek Road at Mile Post 1.740, and 1.785 and one private road crossing upstream).
Stocks being affected: Sol Duc Fall Coho Salmon, Fall Chinook Salmon, Winter steelhead, and Cutthroat Trout.
Status: Final design funded by SRFB. Implementation seeking funding.

2.2.2.5.10 **Title of project:** Wisen Creek Fish Passage Projects
Location: Two partial barriers on Wisen Creek Road (48.06339, -124.16134 & 48.06464, -124.16107); one partial barrier on Swede Road (48.06379, -124.16174); and two partial barriers on private property in upper Wisen Creek (48.06497, -124.14923 & 48.06530, -124.14604)
Issue/Limiting Factor being addressed: Fish passage.
Action to be taken: Replace five culverts on Sol Duc tributary Wisen Creek (20.0336).

Stocks being affected: Sol Duc Fall Coho Salmon, Sol Duc Winter steelhead, and Cutthroat Trout.
Status: Phase I complete designs completed for lower culverts, Phase II implementation submitted for funding through BAFBRB in 2023. Seeking funding for construction of lower culverts and design of upper culverts.

2.2.2.5.11 **Title of Project**: Sol Duc River Basin Geomorphic Assessment.
Location: Sol Duc River RM 0 to NPS.
Issue/Limiting Factor being addressed: Riparian health, groundwater recharge capacity, stream temperatures, sedimentation, floodplain connectivity, and LWD in the system.
Action to be taken: Determine current geomorphic conditions and appropriate restoration actions of mainstem and tributaries of the Sol Duc River from the confluence with the Quillayute River to NPS land.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding. Seeking willing landowners for restoration project implementation.

2.2.2.5.12 **Title of Project**: Swanson Creek Fish Passage Project.
Location: Culvert on Iverson Road at Swanson Creek stream crossing
Issue/Limiting Factor being addressed: Fish passage, instream complexity.
Action to be taken: Develop preliminary designs to replace an anadromous culvert barrier on Swanson Creek / Iverson Road stream crossing. Once implemented, this project will restore unimpeded fish passage per WDFW stream crossing design standards.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.2.2.5.13 **Title of Project**: Relocation of Tassel Creek Boat Launch.
Location: Tassel Creek Boat Launch
Issue/Limiting Factor being addressed: Sediment delivery, water quality.
Action to be taken: Explore decommissioning DFW boat ramp; identify alternative.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding. Moved to high priority in November 2021 as river is egressing after Nov event; River encroaching into house

2.3 Lake Ozette Basin

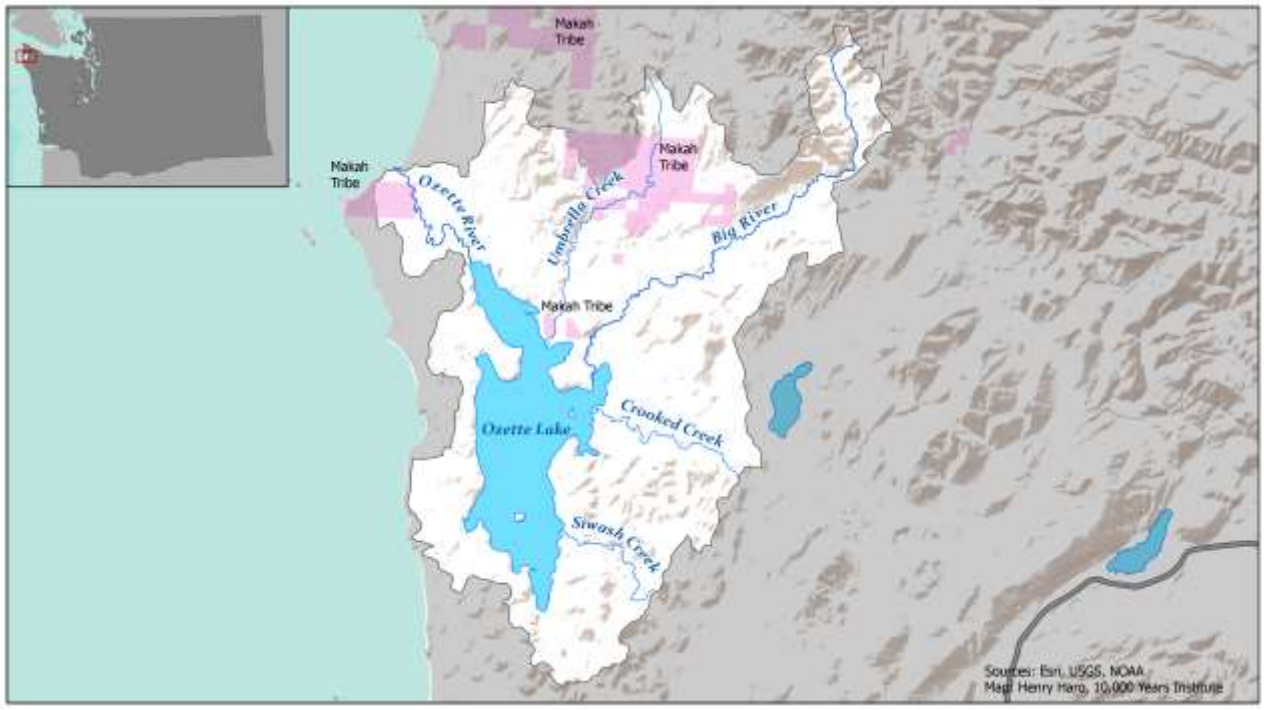


Figure 3. Relief Map of the Lake Ozette Basin.

2.3.1 Lake Ozette Watershed Background

Information contained within this section was derived from the Lake Ozette Sockeye Limiting Factors Analysis and the Lake Ozette Sockeye Recovery Plan (Haggerty et al. 2009; NMFS,2009). The 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 watershed's 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 mi^2 (30.6 km^2; 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 mi^2 (199.4 km^2), an average depth of approximately 130 feet (40 m), and a maximum depth of 320 feet (98 meters) (Dlugokenski, 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 mi^2 (229 km^2). 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 Big River, Crooked Creek, Siwash Creek, South Creek, and Umbrella Creek (Table 2). Several smaller streams also feed the lake and includes: Palmquist, Quinn, Elk, and Lost Net Creeks, as well as several other unnamed streams.

Table 2. Drainage areas for Lake Ozette watershed tributaries.

Tributary	Basin Area (sq. mi.)	Basin Area (sq. km.)
Big River	22.8	59.0
Coal Creek	4.6	11.8
Crooked Creek	12.2	31.6
Siwash Creek	2.9	7.4
South Creek	3.3	8.4
Umbrella Creek	10.6	27.6

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 Sockeye) Salmon, Coho Salmon, Chum Salmon, Chinook Salmon, steelhead, and Coastal Cutthroat Trout (Haggerty et al. 2009). Coho salmon are native to the Ozette watershed and are sustained through wild production (WDF et al., 1994; WDFW, 2002). Although there has been no ESA status assessment of Chinook Salmon and Chum Salmon, the populations are assumed to be critical, threatened, or potentially extirpated (Nehlsen et al.1991; McHenry et al., 1996);

the Lake Ozette Sockeye Limiting Factors Analysis described the populations as "assumed to be nearly or functionally extinct" (Haggerty et al. 2009). 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).

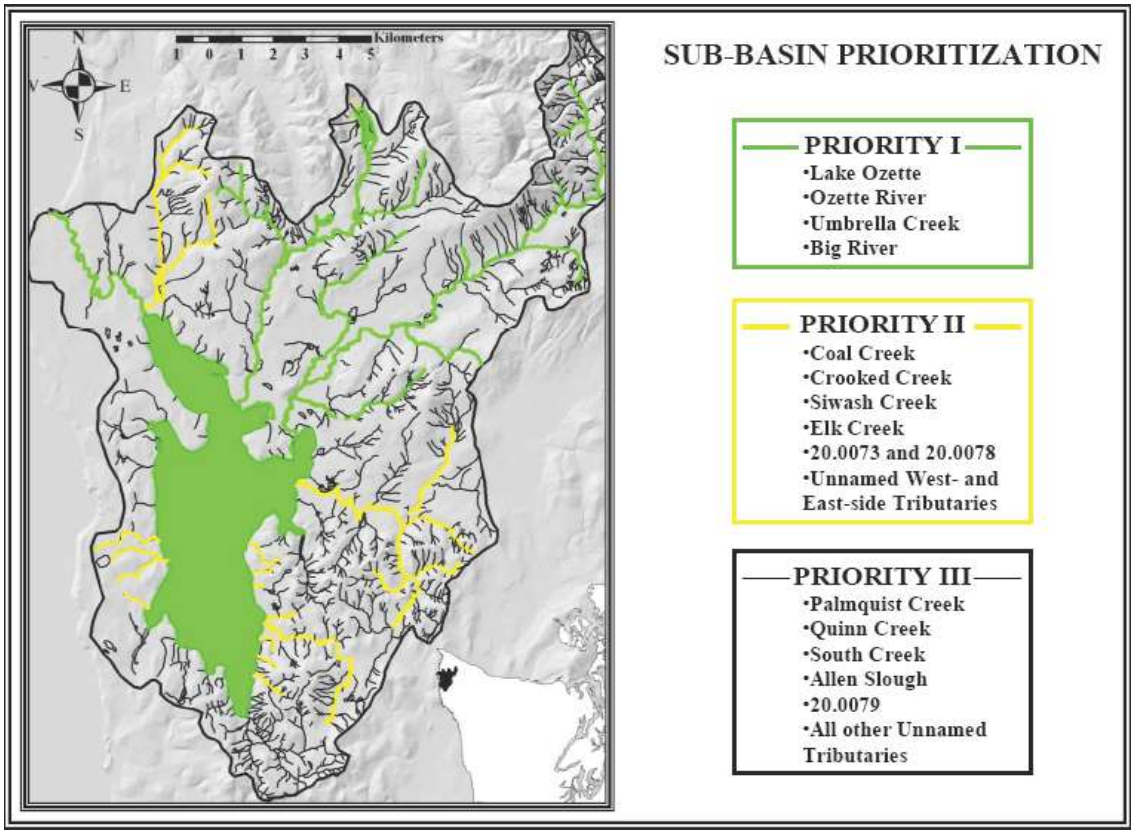
Currently the ESA-listed Lake Ozette Sockeye Salmon is sustained through both wild and hatchery-reared production (NMFS, 2009). An exhaustive review of current and historical population trends for the Lake Ozette Sockeye can be found in the Lake Ozette Sockeye Recovery Plan and its associated technical 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
The Quileute Tribe and the Makah Tribe have shared U&A within in this watershed.

2.3.2 Lake 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 (Haggerty et al. 2009). 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).

In the Lake Ozette Sockeye recovery plan (Haggerty, 2009; 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 LOSSC initiated a process of ranking those actions in order to produce a 3-year implementation plan. Since the LOSSC dissolved on June 26, 2019, restoration project recruitment, review, and integration into regional funding and implementation plans previously facilitated by the LOSSC, are now an integrated part of the North Pacific Coast Lead Entity annual process documented in this strategy. Project development, which had previously been facilitated through LOSSC, is now being conducted either independently by individual entities, or cooperatively by previous members of the LOSSC.

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



2.3.3 Lake Ozette Basin Prioritized Projects:

High priority projects identified here for the Lake Ozette Basin are mostly based upon known Sockeye salmon restoration issues or Limiting Factors outlined in Haggerty et al. 2009, or are unimplemented projects previously prioritized by the Lake Ozette Sockeye Steering Committee. Since 2019 this project list has been reviewed and updated in regular monthly Technical Committee meetings as well as special Lake Ozette Basin Technical Committee meetings hosted by the North Pacific Coast Lead Entity (04-21-20, 09-01-20, 09-15-20, 10-01-2020, 02-05-2021, and 12-04-2021). An update to this list occurs annually in this strategy (See Appendix B for the full list with any Medium and Lower priority projects). Some of the projects identified here have been partially funded but none have been fully 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 **Title of project**: Lake Outlet and Ozette River Riparian Restoration.
Location: Lake Ozette outlet and Ozette River.
Issue/Limiting Factor being addressed: Riparian habitat quality and sedimentation.
Action to be taken: Invasive species assessment, management, and replanting.

Stocks being affected: Sockeye Salmon, Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.3.3.2 **Title of project**: Big River Riparian Restoration.
Location: Big River and upper Lake Ozette Basin.
Issue/Limiting Factor being addressed: Riparian habitat quality and sedimentation.
Action to be taken: Invasive species control and revegetation for Big River then expand to the rest of basin.
Stocks being affected: Sockeye Salmon, Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.3.3.3 **Title of Project**: Ongoing Basin-Wide Invasive Plant Assessment and Mapping
Location: Lake Ozette Basin.
Issue/Limiting Factor being addressed: Riparian and sedimentation. Invasive species disruption of endemic ecological processes.
Action to be taken: Continued monitoring and control of invasive plant species in the basin.
Stocks being affected: Sockeye Salmon, Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout..
Status: Seeking funding.

2.3.3.4 **Title of Project**: Sockeye Lakeside Spawning Habitat Enhancement: Assessment, Designs, and Implementation.
Location: Lake Ozette
Issue/Limiting Factor being addressed: Spawning habitat quality.
Action to be taken: Assessment, design, and implementation
Stocks being affected: Sockeye Salmon and
Status: Seeking funding

2.3.3.5 **Title of Project**: Lake Ozette ARIS Data Analysis and Development of Abundance Estimates.
Location: Lake Ozette
Issue/Limiting Factor being addressed: Predation and abundance.
Action to be taken: Ongoing support for data analysis of ARIS hydroacoustic data to establish annual time, abundance, and predatory impacts.
Stocks being affected: Sockeye Salmon, Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.
Status: Seeking funding.

2.3.3.6 **Title of Project**: Instream Wood design (LWM) for Umbrella Creek
Location: Lake Ozette, lower Umbrella Creek.
Issue/Limiting Factor being addressed: Water quality and spawning habitat.

Action to be taken: Design small scale wood structures to increase pool frequency and floodplain engagement adjacent to the hatchery as a pilot project: RP 7.2.2.5 bullet 3; site specific locations identified in Section 7.2.2.3
Stocks being affected: Sockeye Salmon, Coho Salmon, and Cutthroat Trout.
Status: Seeking funding.

2.4 North Pacific Coast Independent Drainages:

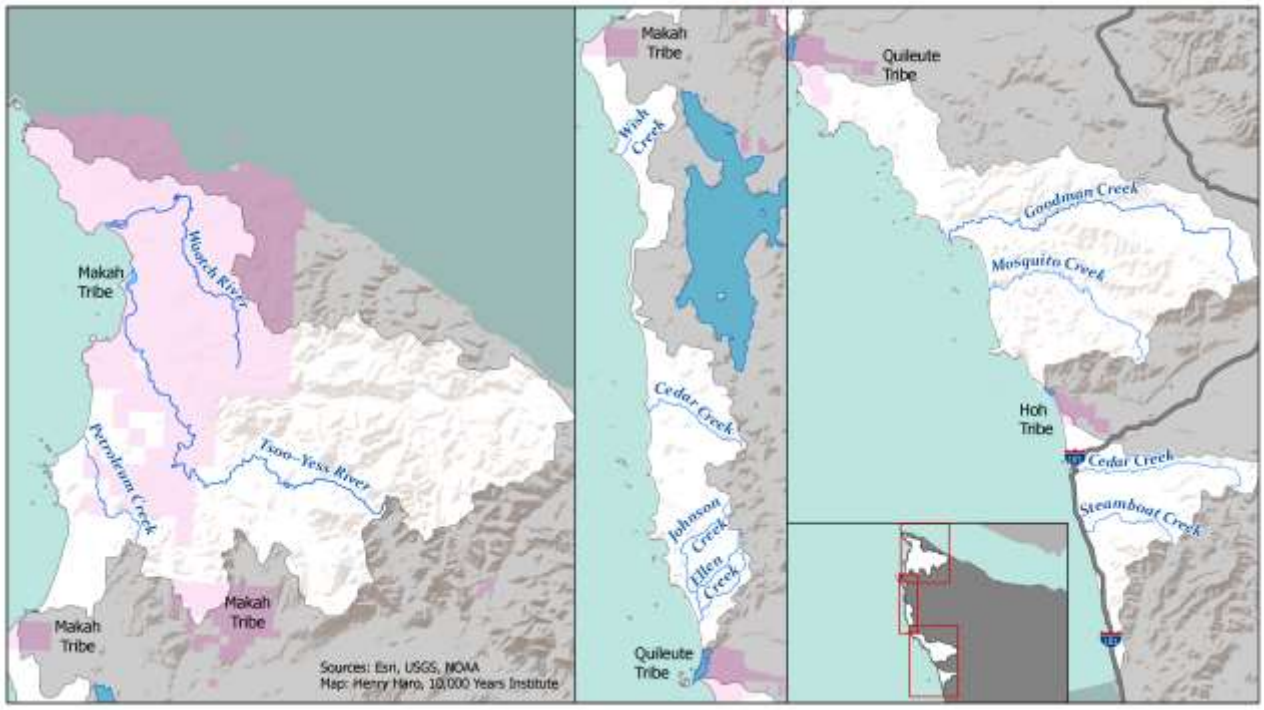


Figure 5. Relief Map of WRIA 20 Independent Drainages.

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 Wa'atch 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, beyond ocean access, 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 have low levels of large woody material that some projects proposed in this strategy are starting to address. According to Phinney and Bucknell (1975), stream clean out of woody material 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 Salmon and steelhead are able to utilize 12 miles of the mainstem Goodman Creek as well as over 8 miles of tributary streams. Mosquito Creek is known to support Coho Salmon production in its lower 7 miles. Coho Salmon 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.

In 2013, the Pacific Coast Salmon Coalition conducted a full habitat and LWD survey of Goodman Creek (WRIA 20.0400), from the mouth of the creek at the Pacific Ocean to the Goodman Creek bridge crossing on the G-3000 Road. Reed canary grass was observed and reported along the entire 4.3 river miles (RM). Goodman Creek is also impacted by increasing populations of invasive plant species in and along the stream corridor and floodplain, and along access roads. As reported in 2013, reed canary grass has established dense monocultures; these reduce stream velocity, increase water temperature and decrease dissolved oxygen, and trap sediment in deep rhizome mats, decreasing channel depth and width. Other invasive species found in Goodman Creek include Canada thistle, Scotch broom and tansy ragwort. These non-native plants all outcompete native vegetation while providing none of their ecosystem services. In 2016, the non-profit 10,000 Years Institute began surveying and treating reed canary grass and other invasive species in Goodman Creek from RM 0.5 to RM 11 at the Goodman Mainline crossing. Surveyed areas have increased each year since, incorporating all of the mainstem and four tributaries, and contributing road sections. Since 2017, the number of acres treated has decreased by 90%; however, the highest density population in the lowest mile of Goodman Creek was not accessible in either 2019 or 2020. Future targets for restoration include restoring fish passage, increasing habitat complexity, and continuing control of invasive plants.

2.4.1.2 Tsoo-Yess River.

The Tsoo-Yess River (previously identified as Sooes River, but in 2014 there was an official gazetteer change) 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 mainstem 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 mainstem 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 mainstem 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 mainstem 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 and internationally, as essential to healthy river systems for freshwater fish species (Peterson, 1982; Collin and Montgomery, 2002; Bramblett et al., 2002; Mertes,1997, 2000; Hohausova et al., 2003; Wydoski and Wick, 2000).

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 mainstem 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 actions, have resulted in moderate channel incision along the lower mainstem Tsoo-Yess river.

The Tsoo-Yess basin contains runs of anadromous Chinook Salmon, Coho Salmon, and Chum salmon, as well as anadromous and resident Cutthroat Trout and steelhead/Rainbow Trout. 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 Salmon. The hatchery prevented extirpation of this stock and currently produces native Chinook Salmon 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 Salmon, Coho Salmon, winter steelhead, Rainbow Trout, and Cutthroat Trout. Primary tributaries are Educket and Bear Creeks.

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.)

Nine of the ten projects on the 2022 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.

In the Tsoo-Yess River, the Makah Tribe is currently 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 mainstem 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**: Wa'atch Creek Fish-blocking Culvert Correction.
Location: Wa'atch Creek
Issue/Limiting Factor being addressed: Fish passage and estuary reconnection
Action to be taken: Replace deteriorating undersized culvert on Wa'atch Creek.
Stocks being affected: Coho Salmon, steelhead, and Cutthroat Trout
Status: Seeking funding.

2.4.2.2 **Title of Project**: European Green Crab Management in Makah Coastal Estuaries.
Location: Wa'atch 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 approximately two miles to mouth and Tsoo-Yess River and estuary approximately two lower river miles to mouth, and Neah Bay nearshore; various areas on west end of the bay
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout
Status: Seeking funding under both estuary and nearshore resources.

2.4.2.3 **Title of project**: Goodman Creek Collapsed Stringer Bridge
Location: Goodman Creek drainage: 47.814630° N / -124.323523° W.
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 Salmon, steelhead, and Cutthroat Trout.
Status: Funded—active. Awaiting permitting.

2.4.2.4 **Title of project**: Goodman Creek Tributary: Boulder Creek Creosote Piling Removal Restoration
Location: Goodman Creek: 47.835287° N / -124.461481°W.
I**ssue/Limiting Factor being addressed**: Water quality and fish passage
Action to be taken: Remove creosote pilings
Stocks being affected: Coho Salmon, steelhead, and Cutthroat Trout.
Status: Funded—active. Awaiting permitting.

2.4.2.5 **Title of project:** Goodman Creek LWM 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 Salmon, steelhead, and Cutthroat Trout.
Status: LWM placement completed in 2021. Tree planting occurring in 2022.

2.4.2.6 **Title of project**: Goodman Creek Invasive Species Removal
Location: Goodman Creek mainstem and tributaries (channel and floodplain); and roadways
Issue/Limiting Factor being addressed: Riparian, sedimentation, and habitat complexity.
Action to be taken: Invasive species prevention and control in Goodman Creek and source points on roadways.
Stocks being affected: Coho Salmon, steelhead, and Cutthroat Trout.
Status: Funded and extended to 2022 but will need maintenance funding for a decade.

2.4.2.7 **Title of Project**: Goodman Creek Riparian Replanting
Location: Goodman Creek RM 4.0 to 13.0.
Issue/Limiting Factor being addressed: Riparian, sedimentation, and habitat complexity.
Action to be taken: Replanting of Goodman Creek riparian corridors after invasive species removal.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding.

2.5 North Pacific Coast Nearshore:

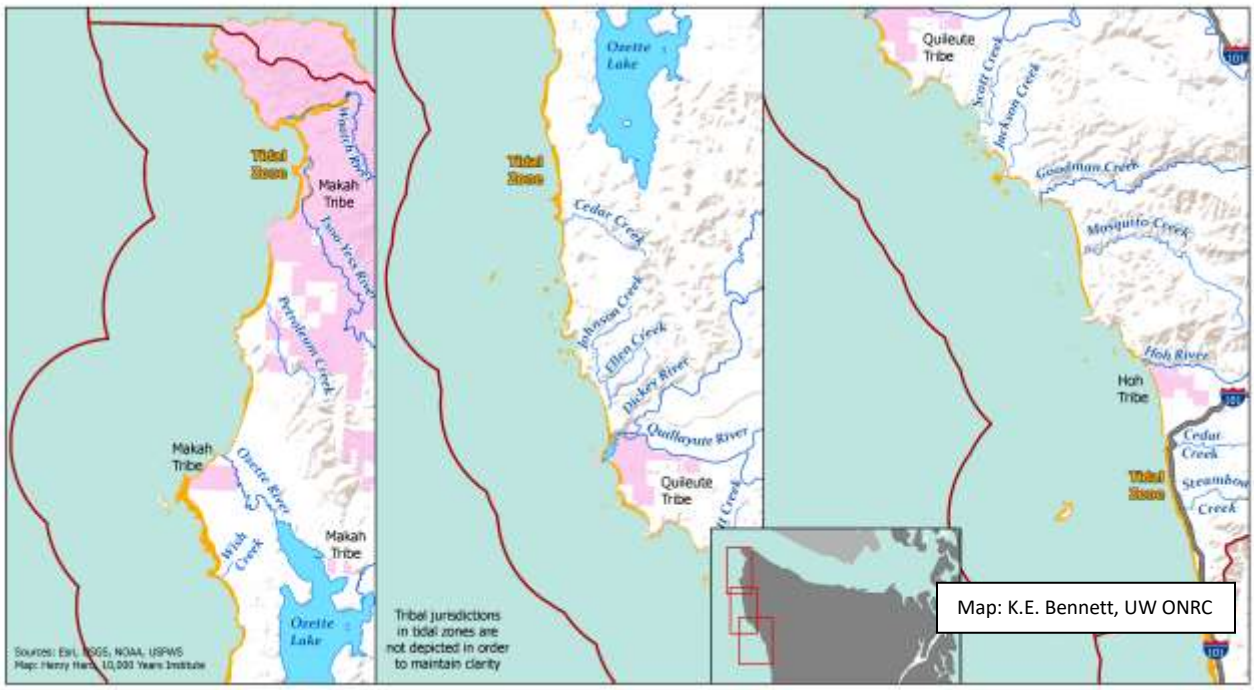


Figure 6. Relief Map of WRIA 20 Nearshore.

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 Area 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 Makah Tribe has started to assess green crab presence (see 2.4.2.2, above and 2.5.2.3, below).

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. 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 UandAs.

2.5.2 Nearshore Priority Projects:

The following 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 presence.
Location: All the estuaries and pocket estuaries in WRIA 20.
Issue/Limiting Factor being addressed: Species presence and life history.
Action to be taken: Beach seine selected nearshore locations near river mouths for adult and juvenile presence.
Stocks being affected: Chinook Salmon, Coho Salmon, steelhead, Cutthroat Trout, and Bull Trout.
Status: Seeking funding.

2.5.2.2 **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.

2.5.2.3 **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 Salmon, Chum Salmon, Coho Salmon, Cutthroat Trout, and steelhead.

Status: Seeking funding under both estuary and nearshore resources.

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APPENDIX A

NPCLE 2022 PROJECT PROPOSAL APPLICATION FORMS

North Pacific Coast (WRIA 20)
SRFB Grant Round # 23
2022 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 23

(Spring/Summer 2022)

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

- Completed proposals must be submitted to the Lead Entity and fully entered into the online grant application website PRISM by **April 4, 2022.**
- To get a PRISM Project Number Contact the North Pacific Coast (WRIA 20) Lead Entity Coordinator, Anna Geffre, ageffre@nwifc.org, Northwest Indian Fisheries Commission, 549 Tillicum Lane *Forks*, WA 98331, (360) 438-1180 ext. 575.
- Go to the RCO website after you have a Project Number from the Lead Entity: 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 Anna Geffre at any time throughout the year. We will then enter the basics of your project into the Salmon Recovery Portal (SRP) and obtain a PRISM Project Number 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 online grant program PRISM. Here is the PRISM link on how to apply: https://www.coastsalmonpartnership.org/wp-content/uploads/2021/01/2021-RCO-Salmon-Grant-Round-Announcement.pdf.

Here are links to the official 2022 Salmon Recovery Grants Manual 18 (https://rco.wa.gov/wp-content/uploads/2019/05/SAL-Manual18.pdf) and all application material https://rco.wa.gov/grant/salmon-recovery/. 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 as well.

Please check with the local salmon Lead Entity for their specific schedule of key dates, as it may differ slightly on some deadlines listed by SRFB https://rco.wa.gov/wp-content/uploads/2019/10/SAL-GrantSchedule.pdf. Specific NPCLE information can be found at https://www.coastsalmonpartnership.org/north-pacific-coast-lead-entity/.

Please contact Anna Geffre, 360-438-1180 ext. 575 (ageffre@nwifc.org) 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 22 Application Schedule
(Winter-Spring 2021)

SCHEDULED ITEM	DATE
Official Release of the NPCLE SRFB Request for Proposals (SRFB online application open Feb 1, 2021)	**January 3**
DUE DATE: Conceptual project forms submitted to Lead Entity Coordinator.	**March 1**
NPCLE March meeting: Proposed project presentations with Information available to NPCLE Technical and IG/Citizen Committee for initial review.	**March 15**
DUE DATE: Applications fully submitted in PRISM.	**April 4**
SRFB Technical Review Panel Site Visit (possibly virtual)	**April 19**
NPCLE April meeting. Presentations on all proposed projects submitted into PRISM	**April 20**
PRISM proposal updates completed for NPCLE Technical review	**May TBD**
NPCLE May meeting: Opportunity for proposal update presentations by project proponents.	**May 17**
NPCLE June meeting: Final Q & A between applicants and the Citizen and Technical Committees. Morning Technical Committee review of scoring criteria.	**June 15**
Final PRISM proposals submitted for final Lead Entity scoring and ranking.	**June 24**
Technical Committee final project scoring session.	**July 12**
NPCLE July meeting: Citizens Committee/Initiating Governments rank and approve projects for submittal to RCO.	**July 19**
Ranked project list and final applications submitted to SRFB by the Lead Entity Coordinator.	**August 1**

*Schedule does not include all application steps and deadlines for the Targeted Investment grant program. Please speak with Lead Entity staff and refer to the Targeted Investment grant program information here: https://rco.wa.gov/wp-content/uploads/2019/05/SAL-Manual18.pdf (Appendix J).

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. A recording of this

year's workshop can be found here:
https://www.youtube.com/watch?v=eoa2iPyyHTo&feature=youtu.be

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.

Overview of SRFB Round 23 NPCLE Proposal Requirements:

(Applications must be fully submitted by April 4, 2022)

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 or some other publicly 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).

NPCLE APPLICATION REVIEW CRITERIA:

The general evaluation criteria used by the NPCLE Technical Committee and Citizen Committee in reviewing projects proposed for Round 23 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_____

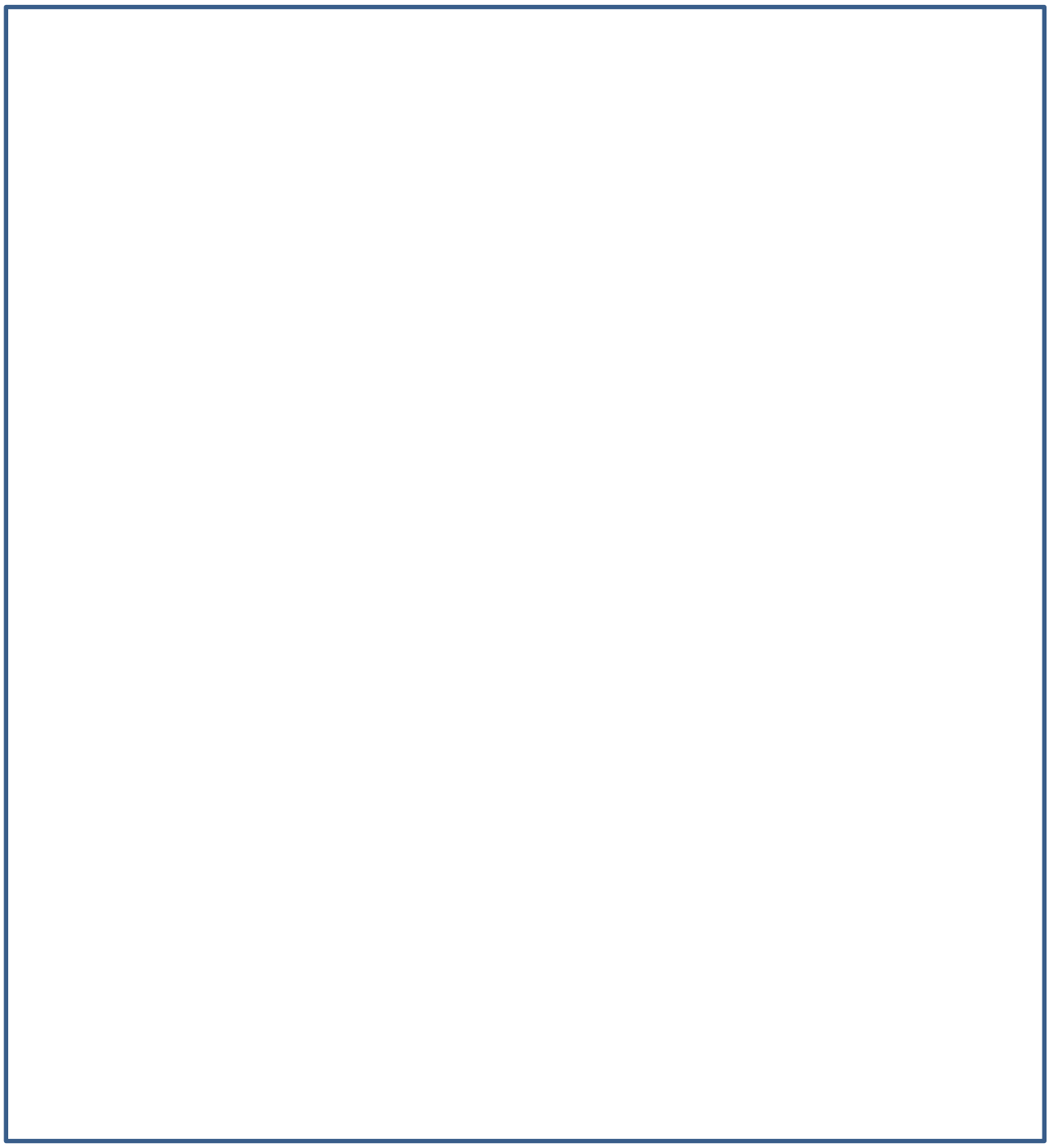
Detailed Project Information (where applicable)

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)	
Partner(s)	
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

(Public Review Draft)

North Pacific Coast Lead Entity

2022 Restoration Project List

(Includes all Tiers of Priority)

DRAFT 2022: North Pacific Coast Lead Entity: Restoration Project List

2022 Strategy #	Priority Rank	BASIN	Project Name	Description	Targeted Limiting Factors	Current Status
2.0.1	High	ALL WRIA 20 SYSTEMS	Culvert inventories and prioritizations using WDFW protocols.	Comprehensive field assessments of all known culverts on fishbearing streams in WRIA 20 (county, DNR, federal and private).	Fish passage	On-going & Seeking funding
2.0.2	High	ALL WRIA 20 SYSTEMS	Low Water Access Inventory of seasonal fish barriers.	Comprehensive assessment of seasonal flows to identify dewatered mainstem bottlenecks, and off-channel access areas.	Fish passage and seasonal access.	Seeking funding
2.0.3	High	ALL WRIA 20 SYSTEMS	Low-Tech Tributary Restoration Planning and Design	Planning and design project will use GIS models to identify high priority areas for low-tech restoration methods in tributary channels throughout WRIA 20. Modeling results will be field verified at high priority sites within the Calawah watershed. Project goal is to accelerate implementation of low-tech restoration methods that incorporate wood into streams at suitable, high priority locations to restore natural processes and improve climate resilience.	Habitat quality: complexity, water quality (temperature, sediment), water quantity (increased storage), floodplain connectivity (reduced incision).	Seeking funding
2.1.2.1	High	HOH SYSTEM	Glacial retreat and sediment flux assessment of the Hoh River.	Water quality and instream assessment of suspended sediment in the Hoh Mainstem relative to increased glacial melting.	Water quality and sedimentation.	On-going & Seeking funding
2.1.2.2	High	HOH SYSTEM	New Hoh River LiDAR flight and processing: preferably "green" LiDAR.	The Hoh River Basin last had LiDAR flown in 2013. A new flight is needed to measure changes since then and for modeling future climate change influences.	Flood plain stability, bank erosion and sedimentation.	Seeking funding
2.1.2.3	High	HOH SYSTEM	SSHEAR Project Assessment & Repairs.	A subset (6) of the 16 preliminarily 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	Seeking funding
2.1.2.4	High	HOH SYSTEM	SSHEAR Project Invasive Species Assessment and Mitigation.	Access, inventory, and treat invasive species in SSHEAR sites prior to construction.	Habitat quality	On-going
2.1.2.5	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.	On-going & Seeking long-term funding
2.1.2.6	High	HOH	Upper Hoh River Road Phase 2 (Western Federal Highways).	Reduce risk of catastrophic road failure and conduct fish friendly instream work using dolos, rip rap and other anthropogenic structures that mimic nature.	Flood plain stability, bank erosion and sediment control.	On-going, Permits Issued
2.1.2.7	High	HOH	Hoh River Master Plan Phase I: River miles 17 to 31.	Assessments and design of channel migration.	Floodplain migration, sediment processes.	On-going
2.1.2.8	High	HOH	Hoh River--Lindner Complex Reach, RM 21-23	Preliminary (525 acres) and final designs (105 acres) and permitting; landowner outreach towards implementation of ELJ project; community meetings towards implementation of resiliency corridor	Channel instability; protection/enhancement of off-channel and main stem habitats; disconnected floodplain	Seeking funding
2.1.2.9	High	HOH	Oil City Rd culvert barrier corrections: assessment and designs.	Propose culvert replacement replacement and barrier corrections	Fish passage.	Seeking funding
2.1.2.10	High	HOH	Oil City Rd, Mile Post 0.513 Culvert Replacement.	Jefferson County high priority culvert replacement.	Fish passage	Funded
2.1.2.11	High	HOH	Owl Creek Assessment & Preliminary Designs.	LWM Enhancement/fluvial audit/riparian	Low LWM	On-going
2.1.2.12	High	HOH	Winfield Creek Restoration Project	Geomorphic & Riparian Assessment; Designs for LWM placement;	Low LWM; poor instream complexity	Seeking funding
2.1.2.13	High	HOH	Elk Creek Restoration Project	Geomorphic & Riparian Assessment; Designs for LWM placement;	Low LWM; poor instream complexity	Seeking funding
2.1.2.14	High	HOH	Willoughby Creek Assessment & Preliminary Designs.	LWM Enhancement/fluvial audit/riparian	Low LWM	Seeking funding
2.1.2.15	High	HOH	Canyon Creek Culvert Blockage.	Eliminate culvert blockage(s)	Access - culvert(s), errosion and invasive species concern.	**Completed**
2.2.2.0.1	High	QUILLAYUTE SYSTEM	Quillayute Basin SSHEAR Project , Assessment, Prioritization, & Mitigation	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	On-going
2.2.2.0.2	High	QUILLAYUTE SYSTEM	Low-tech SSHEAR Site Restoration.	Restoration of multiple SSHEAR sites using low-tech, process-based methods: 1) Remove artificial structures and replace them with woody debris in a way that mimics naturally occurring formations. 2) Use low cost, low tech, human-powered methods to address these sites and provide an example of how these techniques could be applied in other locations.	Habitat quality	Seeking funding
2.2.2.03	High	QUILLAYUTE SYSTEM	Quillayute Basin Invasive plant inventory, prioritization, treatment & control strategy.	Invasive plant inventory, mapping, and prioritization of multiple species prevention and control.	Fish passage, riparian habitat.	On-going; seeking long-term funding
2.2.2.04	High	QUILLAYUTE SYSTEM	Quillayute Basin Restoration through Riparian Planting	Riparian planting	Riparian habitat quality – lack of shade, ban	Seeking additional funding
2.2.2.1.1	High	QUILLAYUTE Mainstem	Quillayute River Temperature Research	Task 1) Longitudinal profiles of near-streambed temperature and conductivity; Task 2) Continuous temperature and stage monitoring at discrete locations; Task 3) Estimate of hyporheic exchange near proposed restoration site.	Water Quality (ground water and surface water temperature), allows Effectiveness Monitoring.	Funded for 2021-2023 by Quileute Tribe, EPA, USGS & WSC.
2.2.2.1.2	High	QUILLAYUTE Mainstem	Quillayute River Large Woody Debris (LWD) Enhancement.	Install LWD structures, including engineered logjams, to achieve a >80 pieces/mile of wood that are greater than 12" DBH and more than 35' length	Habitat quality, complexity, and refuge	Seeking funding
2.2.2.1.3	High	QUILLAYUTE Mainstem	Quillayute River Reach 2 / Mora Rd. Restoration.	Install in-stream wood structures to attenuate high-flow forces. Replace rip-rap with fish-friendly log revetments. Replace culverts on Mora Rd.	Habitat quality & fish passage.	Conceptual designs in hand Seeking additional funding
2.2.2.1.4	High	QUILLAYUTE Mainstem	Quillayute River Reach 3 / Thunder Field Restoration.	Install fish-friendly log revetment to protect Thunder Field from further erosion. Install engineered log jams and other wood structures to deflect high flows, reactivate historic floodplain and increase habitat complexity.	Habitat quality & catastrophic erosion control	60% designs complete;
2.2.2.1.5	High	QUILLAYUTE Mainstem	Quillayute River Reach 4 Restoration / Historic Oxbow Reactivation.	Reactivate historic oxbow off Quillayute River to attenuate high flows and reconnect off-channel floodplain habitat. Install LWM structures to increase channel and habitat complexity.	Habitat quality, floodplain reconection & erosion control.	Seeking additional funding
2.2.2.1.6	High	QUILLAYUTE Mainstem	Quillayute River Reach 5 and 6 Restoration.	Install instream LWM to improve habitat complexity and decrease bank erosion. Replace existing rip rap with fish-friendly alternatives for erosion control.	Habitat quality, floodplain reconnection & erosion control.	Seeking funding
2.2.2.1.7	High	QUILLAYUTE SYSTEM	Hermison Culvert Replacement and Road Improvement	Replace undersized culvert.	Fish passage, Habitat quality	Seeking funding

2022 Strategy #	Priority Rank	BASIN	Project Name	Description	Targeted Limiting Factors	Current Status
2.2.2.2.1	High	DICKEY	Lower Dickey River Restoration.	Install instream LWM. structures to increase habitat complexity and restore more natural riverine processes. Reconnect wetlands isolated by the current alignment of Mora Rd. and Mora Rd. Bridge (ONP).	Instream/riparian habitat complexity & reconnecting off-channel habitat.	Seeking funding
2.2.2.2.2	High	DICKEY	T-Bone SSHEAR Restoration.	SSHEAR project rehabilitation restoring fish ways.	Fish passage and habitat quality.	Funded, in process
2.2.2.2.3	High	DICKEY	Elk Horn.	SSHEAR project rehabilitation restoring fish ways	Fish passage and habitat quality.	Funded, in process
2.2.2.2.4	High	DICKEY	5300 Road decommission.	3.86 miles of habitat gain and removes four culverts.	Fish passage and habitat quality.	**Completed**
2.2.2.2.5	High	DICKEY	Soot Creek SSHEAR Repair.	Impassable SSHEAR project weir that will be replaced with natural features.	Fish passage and habitat quality.	Seeking funding for assessment & design
2.2.2.2.6	High	DICKEY	North Fork Crooked Creek Tributary Culvert Repairs.	Remove/Replace structures that are on an orphan road – Culvert 1 has a wood box culvert that is partially collapsed. Culvert 2 has a wood stringer crossing with a pipe under the wood (the pipe inlet is blocked).	Fish passage, sediment delivery and water q	Seeking funding
2.2.2.2.7	High	DICKEY	Dickey River Basin Hydraulic Modeling & Geomorphic Assessment	Determine current geomorphic conditions and appropriate restoration actions of mainstem and tributaries of the Dickey River from the confluence with the Quillayute River to headwaters.	Riparian health, groundwater recharge capa	Seeking funding
2.2.2.3.1	High	BOGACHIEL	Bogachiel River Geomorphic Assessment.	Determine current geomorphic conditions and appropriate restoration actions of mainstem Bogachiel River from the confluence with the Sol Duc to the Olympic National Park boundary (RM 0-22).	Riparian and flooplain stability	Seeking funding … WCRRI in process?
2.2.2.3.2	High	BOGACHIEL	Bogachiel Cold Water Assessment.	Identify cold water refuges through hydrologic modeling and water quality monitoring.	Water quality	Seeking funding
2.2.2.3.3	High	BOGACHIEL	Lower Bogachiel River Restoration.	Reactivate side channels at high flow to create off-channel habitat. Reinforce banks with log jams, log revetments and/or launchable rock designs. Install LWD structures to increase channel complexity and habitat diversity.	Habitat Complexity; Floodplain / off-channel disreconnection.	Seeking funding
2.2.2.3.4	High	BOGACHIEL	Bogachiel Invasive Species, Assessment and Control.	Invasive plant inventory, mapping, and prioritization of multiple species prevention and control, including partnership with other projects.	Fish passage and riparian habitat.	On-going, seeking long-term funding.
2.2.2.3.5	High	BOGACHIEL	Kitchel Bank Stabilization.	Land Acquisition. Flood plain and habitat restoration	Effects of high flow events . Reduced habitat and sedimentation.	Seeking funding
2.2.2.3.6	High	BOGACHIEL	Tall Timber Fish Passage.	SSHEAR project rehabilitation restoring fish ways.	Fish passage and habitat quality.	Funded, in process
2.2.2.3.7	High	BOGACHIEL	Morganroth Pond Fish Passage Restoration.	SSHEAR: Replace USFS fishway with more permanent structure	Fish passage, flood plain connectivity, habitat complexity	Seeking funding
2.2.2.3.8	High	BOGACHIEL	Ballard Rd./Old La Push Rd. old side-channel Restoration.	Acquisition, infrastructure removal and multiple restoration actions.	Fish passage and sedimentation.	Seeking funding
2.2.2.4.1	High	CALAWAH & BOGACHIEL	Quantifying suspended-sediment yield and transport characteristics in the Calawah and Upper Bogachiel Rivers, Washington.	Task 1) Longitudinal profiles of near-streambed temperature and conductivity; Task 2) Continuous temperature and stage monitoring at discrete locations; Task 3) Estimate of hyporheic exchange near proposed restoration site.	Water quality, water quantity, erosion and mass wasting.	Funded for 2019-2021 by Quileute Tribe, EPA, & USGS
2.2.2.4.2	High	CALAWAH	Calawah Invasive Species, Assessment and Control.	Invasive plant inventory, mapping, and prioritization of multiple species prevention and control, including partnership with other projects.	Fish passage and riparian habitat.	On-going, seeking long-term funding.
2.2.2.4.3	High	CALAWAH (Sitkum)	Sitkum 2900-072, 075, 078 Road Decommissioning.	Remove culverts and decommission road segments (3.8 miles).	Sediment control	Active
2.2.2.4.4	High	CALAWAH (Sitkum)	FS 2900 Road - Culvert replacements: A.	Replace 2 deteriorating, undersized culverts on FS 2900 at MP 15.9 & 18.3, .	Sediment control	**Completed**
2.2.2.4.5	High	CALAWAH (Sitkum)	FS 2900 Road - Culvert replacements: B.	Replace deteriorating culvert on FS 2900 at 16.1	Sediment control	Seeking funding
2.2.2.4.6	High	CALAWAH (Sitkum)	FS 2900 Road - Culvert replacements: C.	Replace 3 deteriorating culverts at FS 2900 at MP 9.9, 10.6, & 11.5.	Sediment control	Seeking implementation funding
2.2.2.4.7	High	CALAWAH (North Fork)	North Fork Calawah Large Woody Material Assessment.	Feasibility study to determine the placement of ELJs in the mainstem.	Sediment control	Seeking funding
2.2.2.4.8	High	CALAWAH (North Fork)	North Fork Calawah Hydrological/Geomorphic Assessment.	Geomorphic analysis to adderess habitat limiting factors and dewatering trends over a 16-mile section.	Fish passage, flood plain connectivity, habitat complexity	Seeking funding
2.2.2.4.9	High	CALAWAH (South Fork)	South Fork Assessment and Preliminary design.	Feasibility study to determine the placement of ELJs in the mainstem.	Improving instream habitat	Active
2.2.2.4.10	High	CALAWAH (South Fork)	FS 2900-030 Road decommission.	Hyas Creek. Decommission road from 2:0- MP 3.6, with possible storage from 0-2 (crosses Rayonier)	Sediment reduction	Seeking funding
2.2.2.5.1	High	SOL DUC	Sol Duc Invasive species, assessment & control.	Invasive plant inventory, mapping, and prioritization of multiple species prevention and control.	Fish passage, riparian habitat.	Seeking long-term funding
2.2.2.5.2	High	SOL DUC	Lower Sol Duc River Restoration.	In lower 0.5 miles, reoccupy side channels, install LWM structures, and complete bank laybacks. Redesign the Mora Rd bridge at confluence of Sol Duc and Bogachiel.	Habitat complexity & reconnecting off-channel habitat	Seeking funding
2.2.2.5.3	High	SOL DUC	Lower Lake Creek Restoration (assessment).	Assessment for LWM, riparian planting	Riparian restoration	Seeking funding
2.2.2.5.4	High	SOL DUC	Quandary Creek fish passage barrier correction and restoration plan.	Address fish passage barriers and improve habitat quality in Quandary Creek. This site is a County Road fish passage barrier on East Lake Pleasant Road at MP 0.737	Fish passage and habitat quality	Seeking funding
2.2.2.5.5	High	SOL DUC	Bear Creek LWM and riparian treatments.	LWM assessment placement on Sol Duc tributary Bear Creek to RM 0 to 4 (USFS).	Sediment control - temperature, hydrology	Seeking funding

2022 Strategy #	Priority Rank	BASIN	Project Name	Description	Targeted Limiting Factors	Current Status
2.2.2.5.6	High	SOL DUC	Kugel Creek Culvert Replacement.	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	Active
2.2.2.5.7	High	SOL DUC	Eagle Springs habitat restoration: SSHEAR.	Large wood and spawning gravel placement, invasive treatment.	Riparian integrety	Active
2.2.2.5.8	High	SOL DUC	Sol Duc Tributaries Assessment.	Habitat assessment and restoration planning (Bockman, Shuwah tributaries initially)	Sediment control, temperature and hydrology assessments.	Seeking funding
2.2.2.5.9	High	SOL DUC	Anton Creek fish passage barrier corrections.	Address fish passage barriers in the Anton Creek drainage (two County road barriers on Bear Creek Rd at Mile Post 1.740, and 1.785 and one private road crossing upstream).	Fish passage	funding for final design & implementation
2.2.2.5.10	High	SOL DUC	Wisen Creek Fish Passage Projects	Replace five culverts on Wisen Creek. Two partial barriers on Wisen Creek Road (48.06339, -124.16134 & 48.06464, -124.16107); one partial barrier on Swede Road (48.06379, -124.16174); and two partial barriers on private property in upper Wisen Creek (48.06497, -124.14923 & 48.06530, -124.14604)	Fish Passage	Designed seeking implementation funds
2.2.2.5.11	High	SOL DUC	Sol Duc River Basin Geomorphic Assessment	Determine current geomorphic conditions and appropriate restoration actions of mainstem and tributaries of the Sol Duc River from the confluence with the Quillayute River to headwaters.	Riparian health, groundwater recharge capa	Seeking funding
2.2.2.5.12	High	SOL DUC	Swanson Creek Fish Passage Project.	Develop preliminary designs to replace an anadromous culvert barrier on Swanson Creek / Iverson Road stream crossing. Once implemented, this project will restore unimpeded fish passage per WDFW stream crossing design standards.	Fish passage, instream complexity.	Seeking funding
2.2.2.5.13	High	SOL DUC	Explore relocation of Tassel Creek Boat Launch.	Explore decommissioning DFW boat ramp at Castle Creek; identify alternative	Sediment delivery, water quality	Seeking funding
2.3.3.1	High	Lake Ozette	Lake Outlet & Ozette River Riparian Restoration.	Invasive species assessment, management and replanting.	Riparian integrity and sedimentation	Seeking funding
2.3.3.2	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.	Seeking funding
2.3.3.3	Med	Lake Ozette	Ongoing Basin-Wide Invasive Plant Assessment and Mapping.	Continued monitoring and control of invasive plant species in the basin	Riparian and sedimentation.	Seeking funding
2.3.3.4	High	Lake Ozette	Sockeye Lake-side Spawning Habitat Enhancement: Assessment and Designs.	Riparian integrity, sedimentation, and water quality (Substrate & vegitation management, DO monitoring … Sec. 7.2.2.5 Bull: 1,2 &4 LOS RP.)	Sediment control, temperature and hydrology assessments.	On-going Seeking additional funding
2.3.3.5	High	Lake Ozette	Lake Ozette ARIS data analysis and development of abundance estimates.	Ongoing support for data analysis of Aeris hydroacoustic data to establish annual time and abundance.	Abundance, competition, predation and phenology	Seeking funding
2.3.3.6	High	Lake Ozette	Instream Wood Design (LWM) for Umbrella Creek.	Design small-scale wood structures to increase pool frequency and floodplain engagement adjacent to the hatchery as a pilot project: RP 7.2.2.5 bullet 3; site-specific locations identified in Section 7.2.2.3.	Water quality and spawning habitat	Seeking funding
2.4.2.1	High	Independent (Waatch & Tsoo-yess)	Waatch Creek fish-blocking culvert correction.	Replace deteriorating undersized culvert on Waatch Creek.	Fish passage and estuary reconnection.	Seeking funding
2.4.2.2	High	Independent (Waatch & Tsoo-Yess)	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	Protection of juvenile fish habitat	Seeking funding
2.4.2.4	High	Independent (Goodman)	Goodman Creek Collapsed Stringer Bridge.	Removal of Stringer Bridge Remains and incorporate into LWM placement	Fish passage, instream complexity	Funded /active
2.4.2.5	High	Independent (Goodman)	Goodman CreekTributary: Boulder Creek Creosote Pile Removal.	Remove creosote pilings.	Water quality and fish passage	Funded/active
2.4.2.6	High	Independent (Goodman)	Goodman Creek 2V Road Culvert.	Replace undersized culvert.	Fish passage	Funded/active
2.4.2.7	High	Independent (Goodman)	Goodman Creek LWM Placement.	LWM enrichment from RM 10.5 to 13.0	Channel complexity and spawning habitat	Funded/active
2.4.2.8	High	Independent (Goodman)	Goodman Crk. Invasive Species Removal.	Invasive species removal	Riparian, sedimentation and habitat complexity	Funded /active long-term
2.4.2.9	High	Independent (Goodman)	Goodman Creek Riparian replanting.	Replanting of Goodman Creek riparian corridores after invasive species removal	Riparian, sedimentation and habitat complexity	Funded/active long-term
2.4.2.10	High	Independent (N. Cedar Creek)	Rayonier 5050 Road Crossing Removal.	Road decommissioning, culvert removal and restoration	Sediment control, riparian and habitat complexity	Active
2.5.2.1	High	NEARSHORE	Nearshore Assessment of Salmonid Presence.	Beach Seine selected nearshore locations near river mouths for adult & juvenile presence	Species and life history presence	Seeking funding
2.5.2.2	High	NEARSHORE	Nearshore Assessment of Salmonid Genetic Stocks.	Sub-sample salmonids from beach seines for genetic stock identification	Identification of salmonid stock ESUs	Seeking funding
2.5.2.3	High	NEARSHORE	European Green Crab Management in Makah Reservation Estuaries.	Long-term removal and control of invasive crabs	Channel stability and habitat quality	Seeking funding

2022 Strategy #	Priority Rank	BASIN	Project Name	Description	Targeted Limiting Factors	Current Status
TIER 2 PROJECTS	Med	ALL WRIA 20 SYSTEMS	WRIA 20 LWM stock pile.	Stockpile available LWM timber for regional projects in the major basins. Include mobilization expenses.	Riparian restoration	Seeking funding
	Med	ALL WRIA 20 SYSTEMS	Recreational impact management.	Signage / outreach for redd protection, LWM protection	Reproductive habitat disturbance	Seeking funding
	Med	ALL WRIA 20 SYSTEMS	WRIA 20 In-situ RCG Experimental Impact Assessment (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	On-going & Seeking short-term funding
	Med	HOH SYSTEM	Riprap Inventory.	Compile existing inventories.	Riparian integrity, mainstem bank errosion	Part of Hoh Master Plan Phase I
	Med	HOH	Spruce Creek Fish Access	Culvert barrier issues	Fish Passage	Part of Hoh Master Plan Phase I
	Med	HOH SYSTEM	Cedar Spalt Assessment & Removal in the Lower Hoh Tributaries.	Winfield- 3 & 4, Braden Creek, Fullerton Tributary, Lost Creek, Steamboat & Cedar Creeks	Fish passage and seasonal access	Seeking assesment funding
	Med	HOH	Willoughby Creek Fish Access.	Fish channel restoration	Fish Passage	Part of Hoh Master Plan Phase I
	Med	HOH	Cassel Creek/Huelsdonk & Anderson Ponds acquisition.	Riparian habitat preservation.	Riparian restoration needed above Oil City Road	Seeking assessment $
	Med	HOH	Braden Creek.	LWM Enhancement/fluvial audit	Low LWM	Seeking assessment $
	Med	HOH	Lost Creek Anthropogenic Clay Erosion.	In-channel and riparian erosion from highway construction resulting in sedimentation of habitat.	Loss of intream and riparian habitat	Seeking assessment $
		HOH	Upper Hoh Road Barrier Corrections Assessment and design			
	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	Seeking complete funding
	Med	CALAWAH (North Fork)	FS Road 2929 030 Fish Passage Barrier on Upper Bonidu.	MP 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	Seeking complete funding
	Med	CALAWAH (North Fork)	FS 2923 Culvert Replacement.	MP 11.3. Undersized culvert on Trail Creek could be upgraded to reduce future risk of failure, possible fish stream	Sediment Control, and fish passage	Seeking complete funding
	Med	CALAWAH (North Fork)	Calawah Road Storage and Decommissioning.	Road Decommissioning (9.1 mi.) & 2.2 miles of storage are proposed in the FS North Fork Calawah Vegetation Management project. 2900530 (0.7 D), 2900540 (2.0 D),2900545 (0.3 D), 2900725 (0.3 D), 2900730 (1.3 D), 2900818 (0.2 D), 2900820 (0.4 D), 2922240 (1.1 D), 2923047 (1.4 D), 2923055 (1.5 D), 2900700 (2.2 Storage)	Sediment Control	Seeking complete funding
	Med	BOGACHIEL	May Creek Fish Passage Barrier.	Design and implementation of culvert replacement and riparian habitat restoration.	Fish passage and habitat restoration.	Seeking funding
	Med	BOGACHIEL	Beyer Culvert Replacement	Replace existing, failing culvert with adequate structure (culvert or stringer bridge)	Fish Passage, Mass wasting	Seeking funding
	Med	SOL DUC	Kugel Creek FS Road 2929 Culvert Removal (Road Storage).	From MP 3-5, deteriorating culverts could be removed while road is in storage to reduce risk of landslides.	Sediment Control	Seeking funding
	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 at 2900653 (0.2 miles), 2929045 (0.9 miles), and 2929055 (0.1 miles).	Sediment Control	Seeking funding
	Med	SOL DUC	Gunderson Off-channel Restoration.	Restore function of off-channel ponds on Sol Duc tributary Gunderson Creek. (20.0304) (PCSC).	Juvenile access - hydrology	Seeking funding
	Med	Lake Ozette	Invasive species control of recreactional vessel vectors.	Install vessel-cleaning stations at boat ramp(s)	Invasive species control.	Seeking funding
	Med	Lake Ozette	Predator assessment (RME-5).	Implement recommendations from the 2016 Lake Ozette Sockeye Predator Workshop.	Predation	Seeking funding
TIER 3 PROJECTS	Low	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	Seeking funding
	Low	SOL DUC	FS 2903 Road Fish Passage Barrier (Bockman Creek).	MP 2.92 is a barrier to resident cutthroat trout and is in poor condition. 0.7 miles of habitat above.	Fish passage	Seeking funding
	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	Seeking funding
	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	Seeking funding
	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.	Seeking funding

APPENDIX C

(Public Review Draft)

WRIA 20

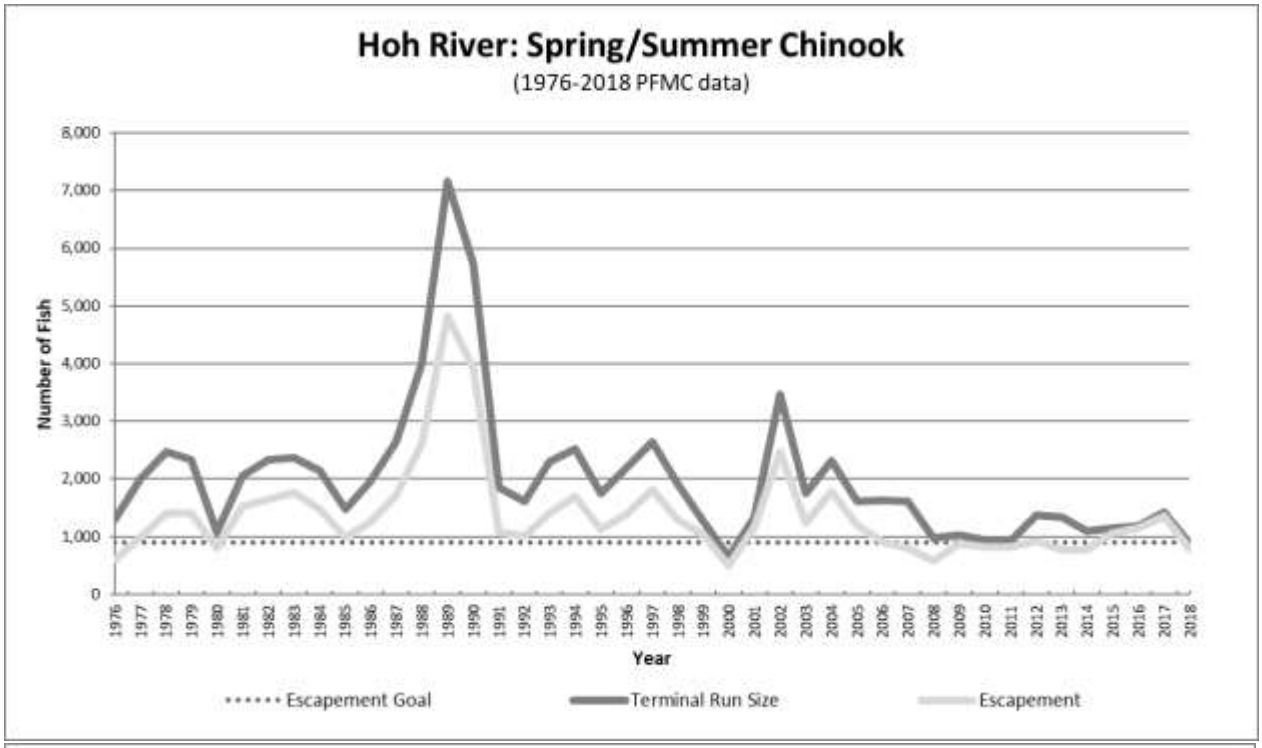
SALMONID TREND GRAPHS

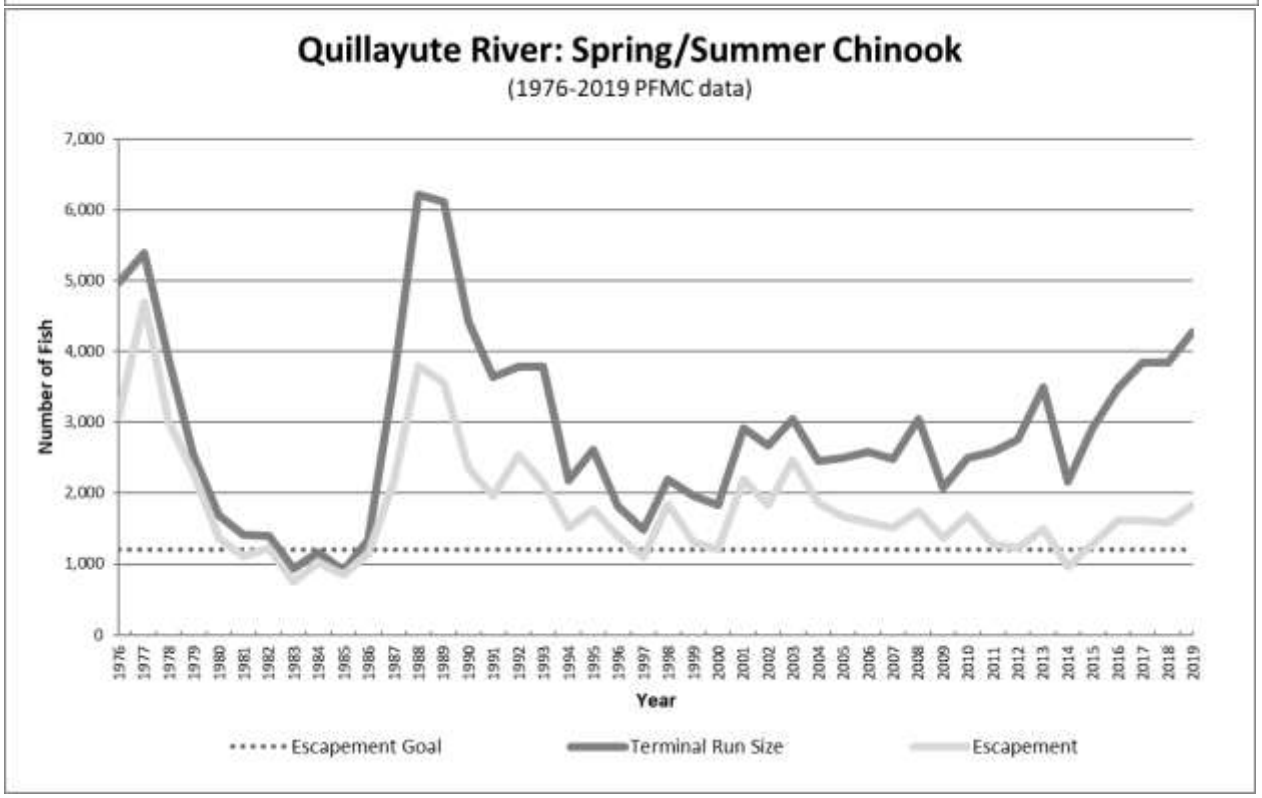
OF SELECTED STOCKS

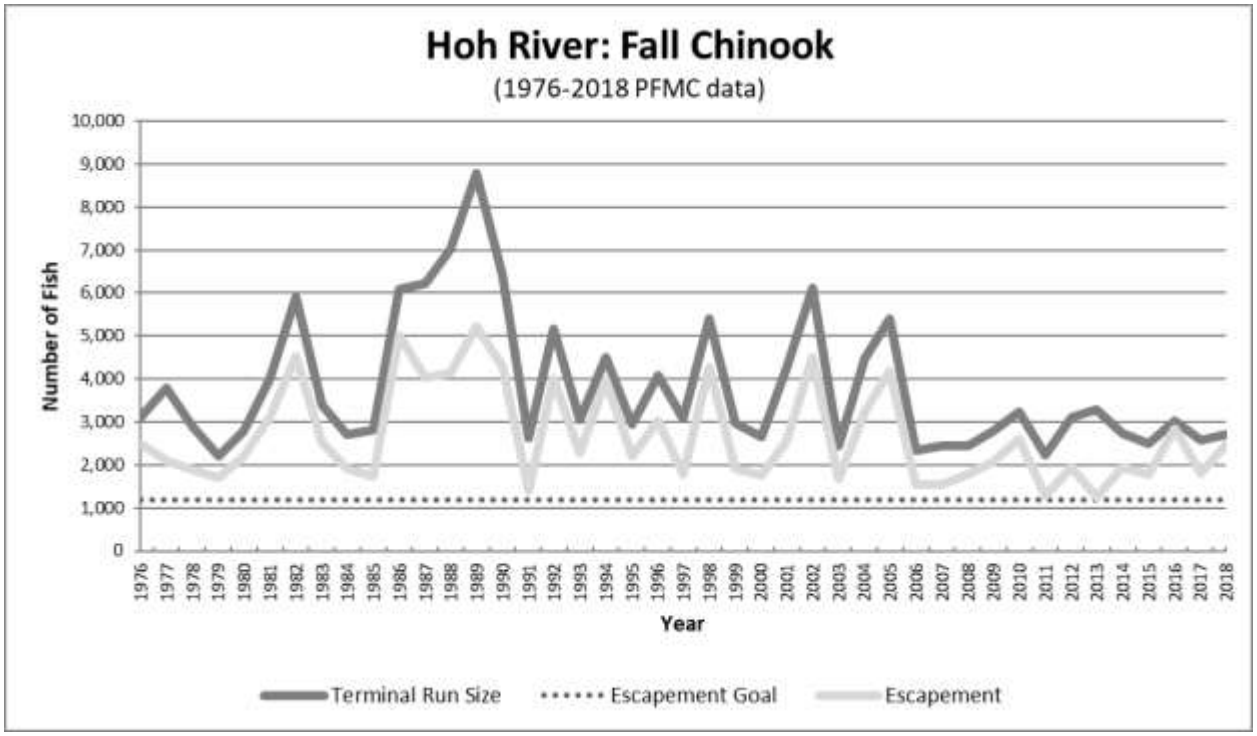
Compiled from the PACIFC FISHERIES MANAGEMENT COUNCIL SUMMARY TABLES

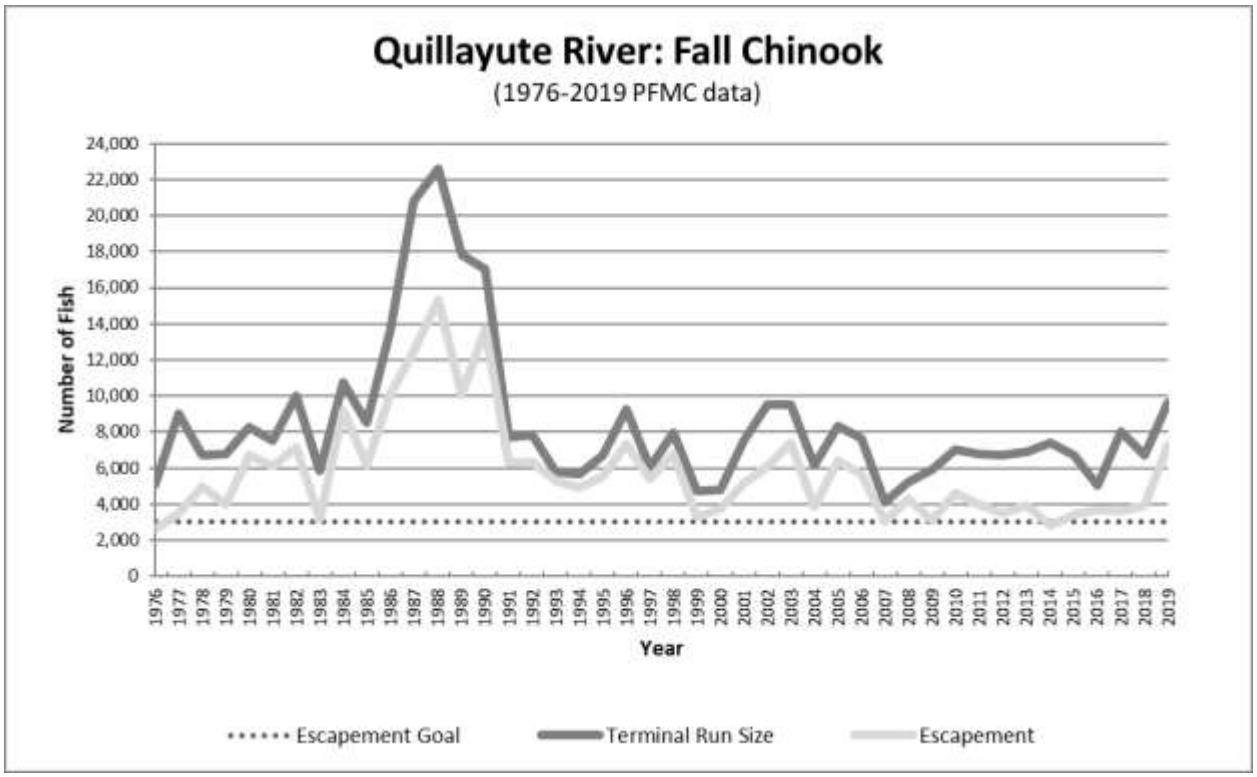
https://www.pcouncil.org/safe-documents-3/

Chinook: Major Rivers

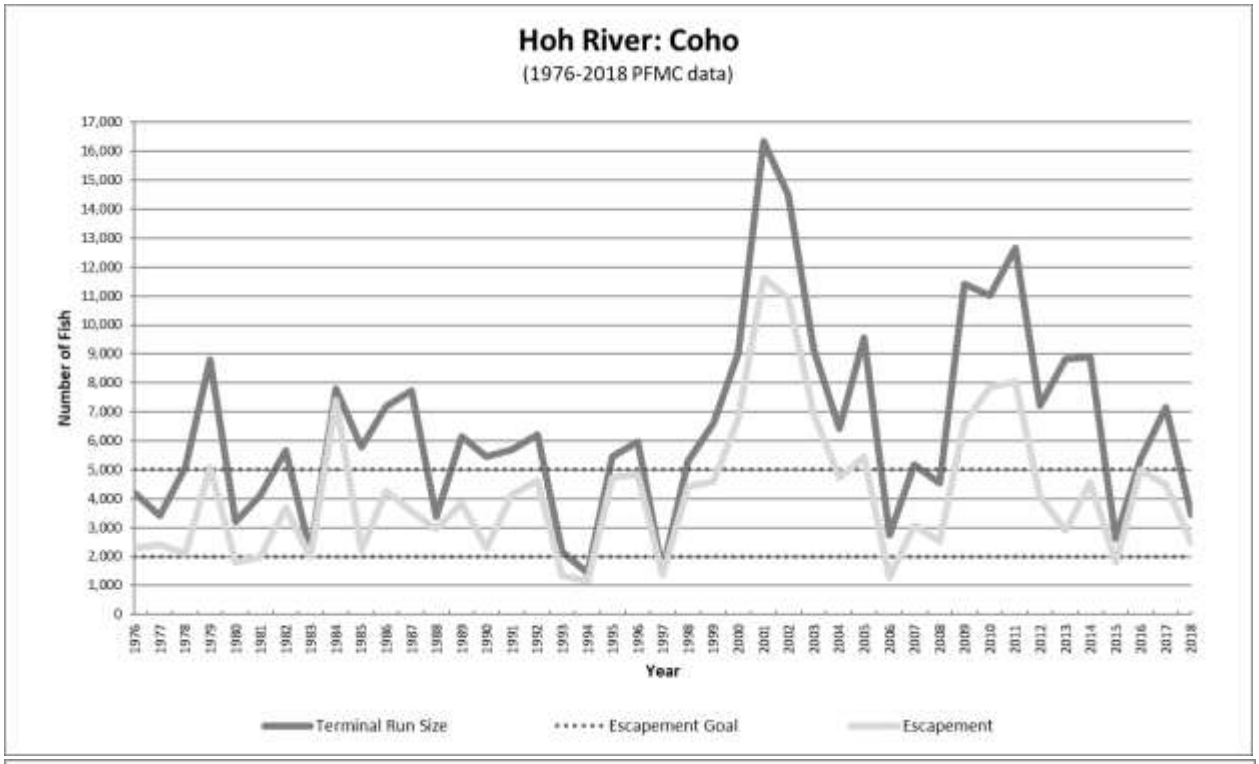


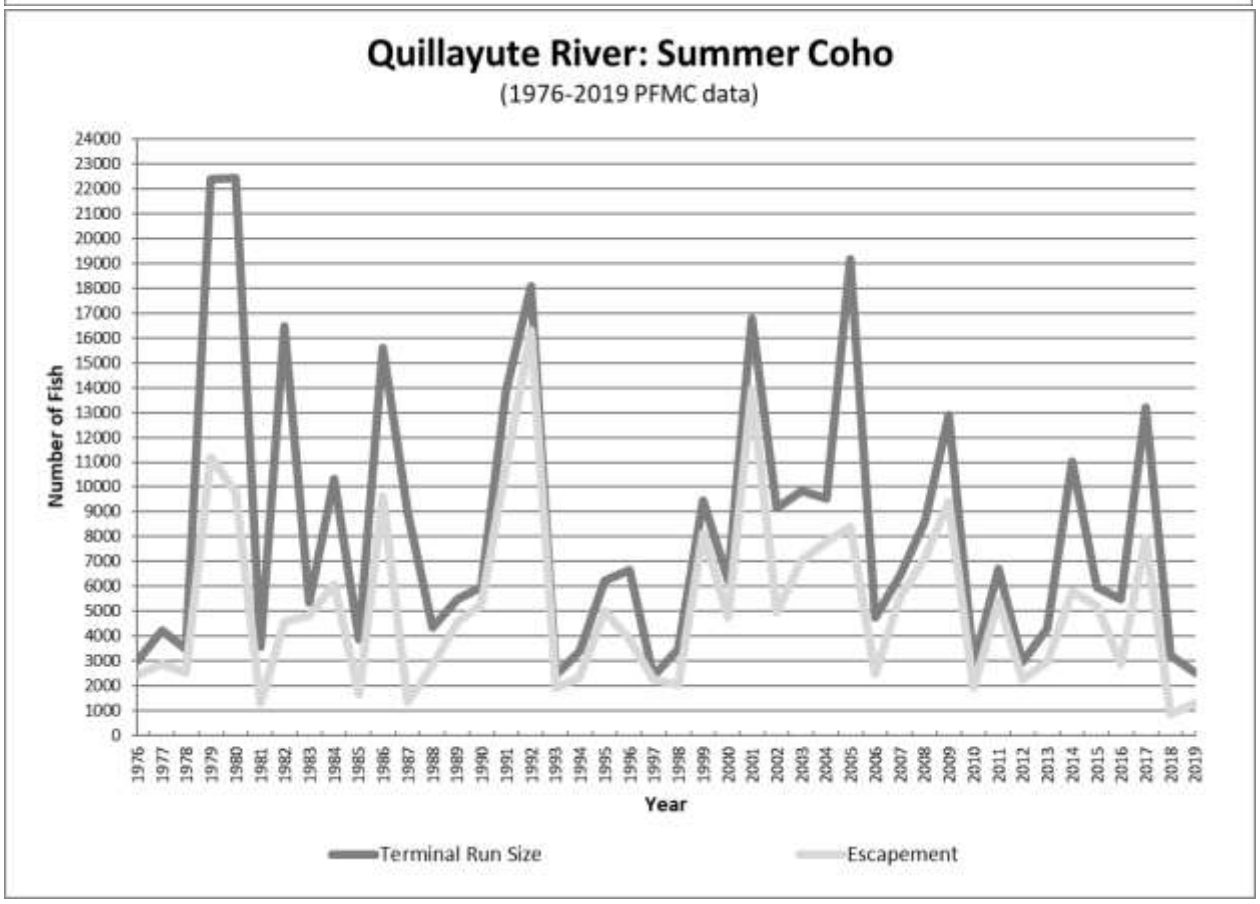


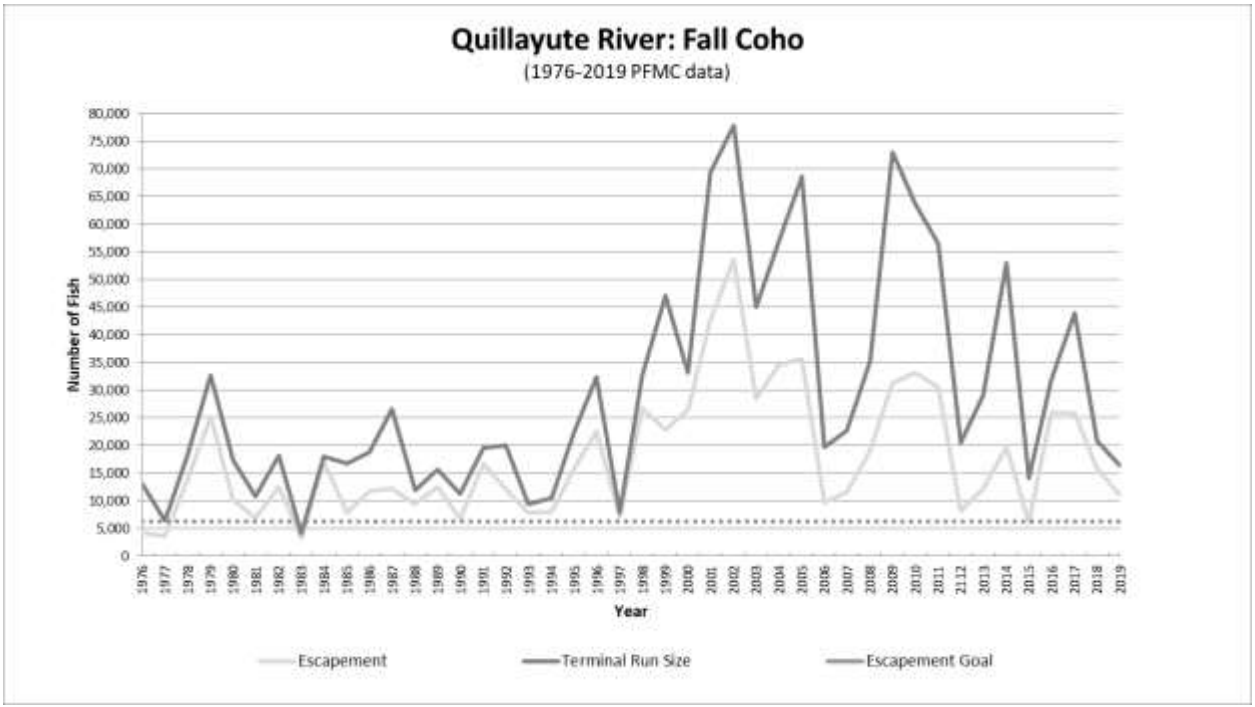




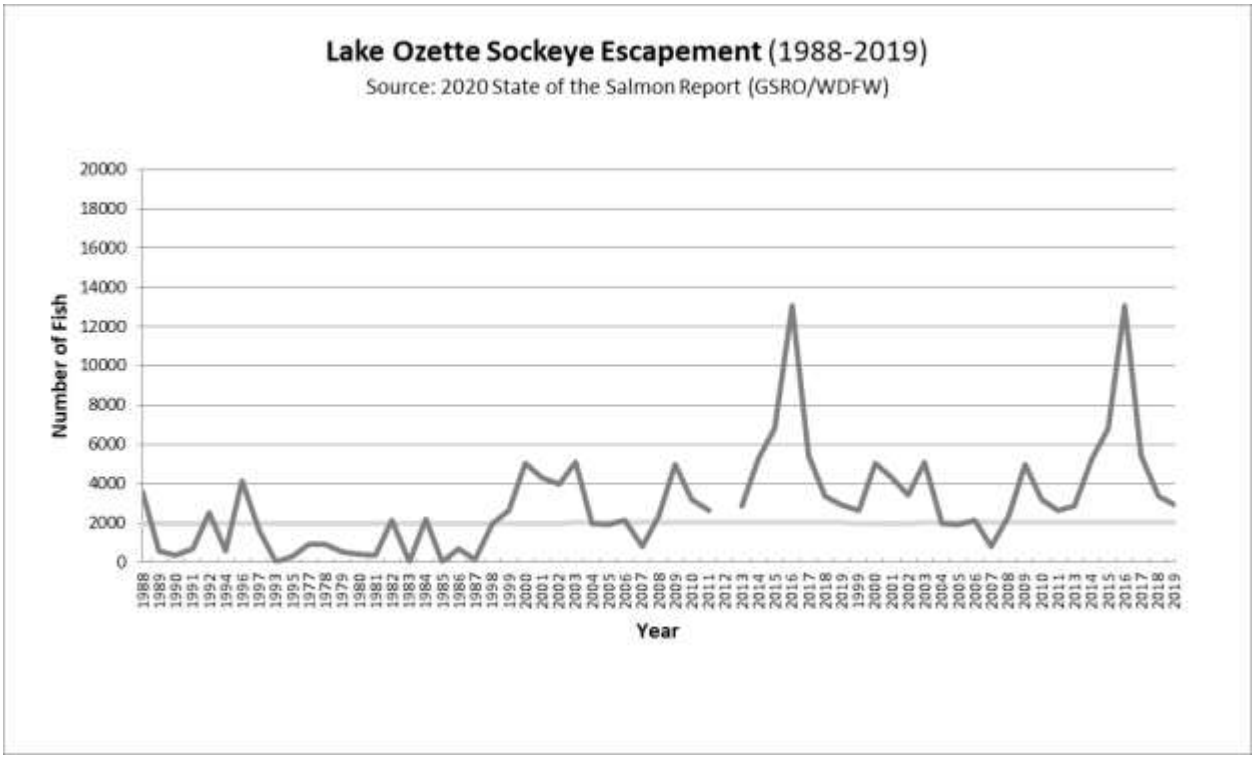
Coho: Major Rivers


Hoh River: Coho
(1976-2018 PFMC data)
Number of Fish
Year
Terminal Run Size
Escapement Goal
Escapement


Quillayute River: Summer Coho
(1976-2019 PFMC data)
Number of Fish
Year
Terminal Run Size
Escapement



Sockeye: **Not Available** (except for Lake Ozette Sockeye)



Steelhead: **Not Available**.

Pink: (mostly unknown)

Chum: (mostly unknown)

NOTE: 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, 2017, and 2021 using data from the Pacific Fisheries Management Council's, Escapements to Inland Fisheries and Spawning Areas (Appendix B), located at: https://www.pcouncil.org/safe-documents-3/ and the Washington State, State of the Salmon Report: https://stateofsalmon.wa.gov/

APPENDIX D

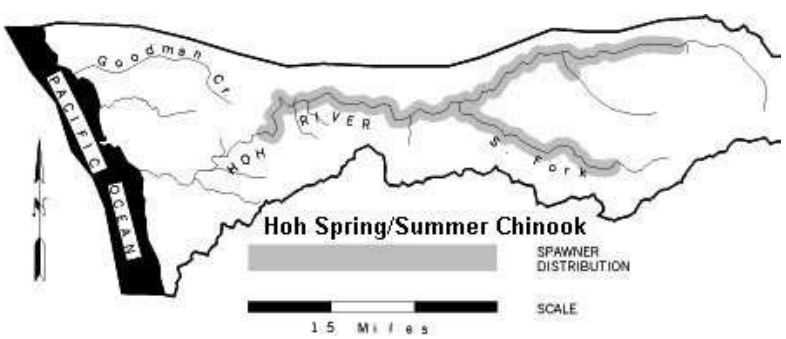
WRIA 20 SALMONID STOCK

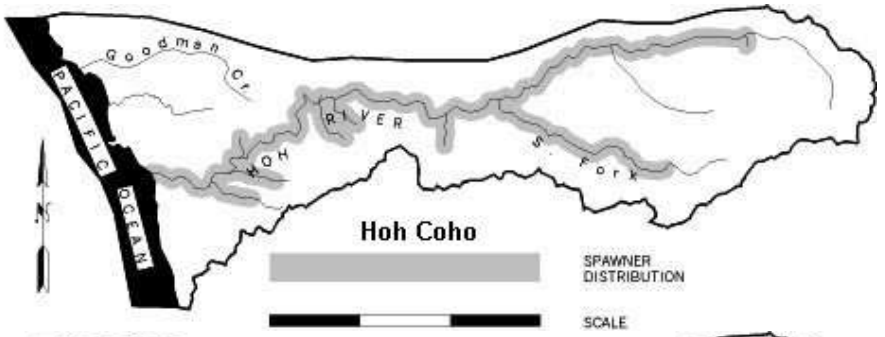
RUN TIMING & SPAWNING DISTRIBUTION[5]

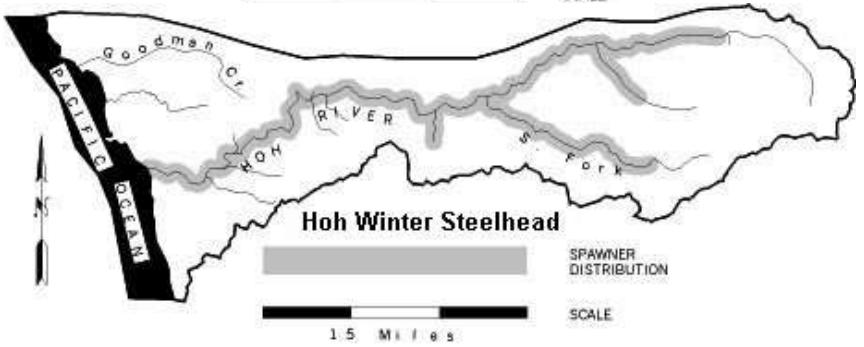
[5] Run timing is based upon historical patterns typical of 2010. Recent variations in seasonal rainfall and temperature patterns have resulted in timing shifts in recent years.

HOH Basin Run Timing

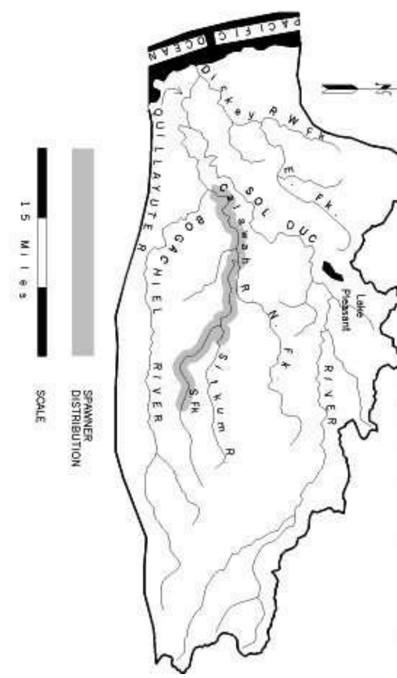
Salmonid Run	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hoh Spring Chinook	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults	Returning Adults		
*	Redds	Redds	Fry	Fry	Fry	Fry	Fry	Smolts	Redds	Redds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



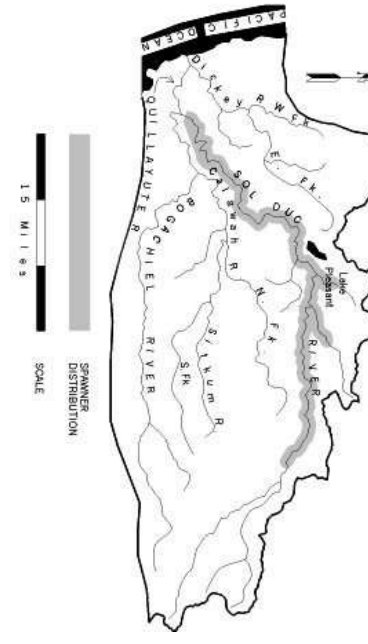




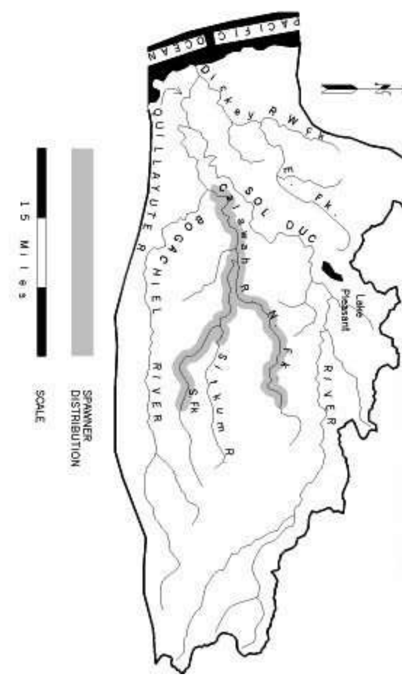
Quillayute Basin Run Timing
Salmonid Run
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Quillayute/Sol Duc/ Bogachiel Summer Chinook
Quillayute/Bogachiel Fall Chinook
Calawah Summer Chinook
Calawah Fall Chinook
Sol Duc Summer Chinook
Sol Duc Fall Chinook
Dickey Fall Chinook
Salmonid Run
Quillayute Fall 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
PACIFIC OCEAN
QUILLAYUTE RIVER
BOGACHIEL
CALAWAH R.
SOL DUC
E. Fk.
DICKEY R.
W. Fk.
N. Fk
S. Fk
SILKUM R.
Lake Pleasant
SPAWNER DISTRIBUTION
SCALE
1 5 Miles
Redds
Returning Adults



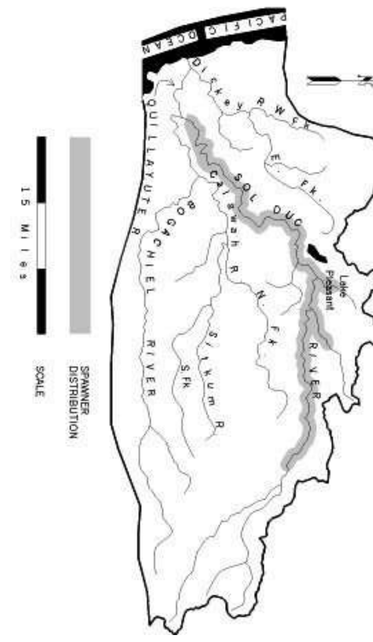
Calawah Summer Chinook



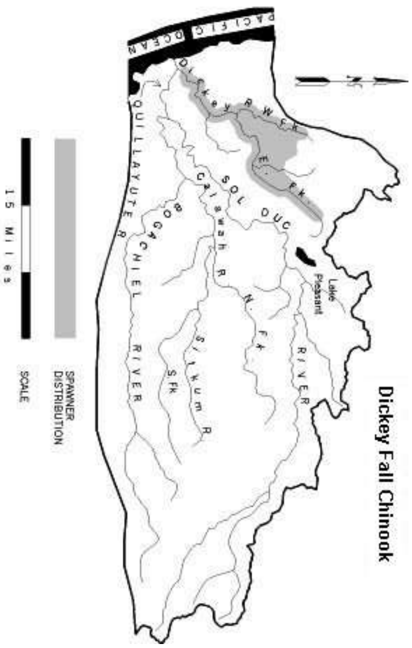
Sol Duc Summer Chinook



Calawah Fall Chinook



Sol Duc Fall Chinook



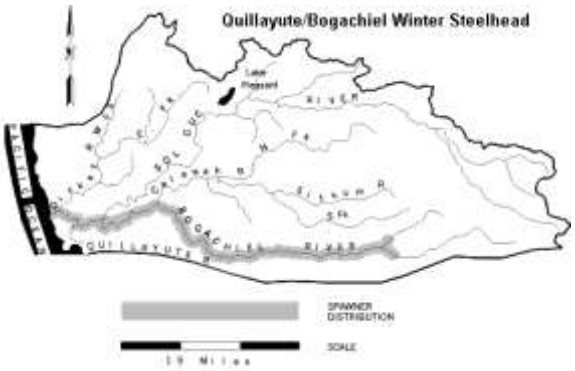
Dickey Fall Chinook

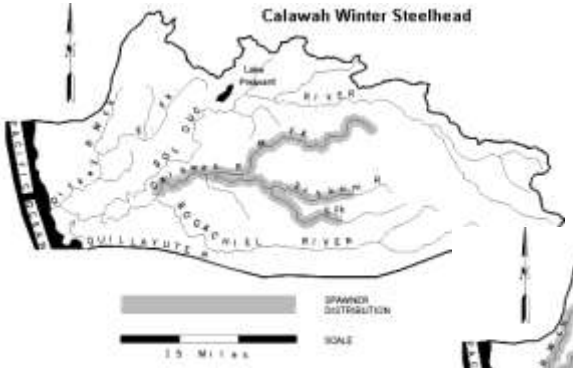
Salmonid Run
Quillayute Fall Chum
Bogachiel Fall Coho
Calawah Fall Coho
Sol Duc Summer Coho
Sol Duc Fall Coho
Dickey Fall Coho
Lake Pleasant Sockeye
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

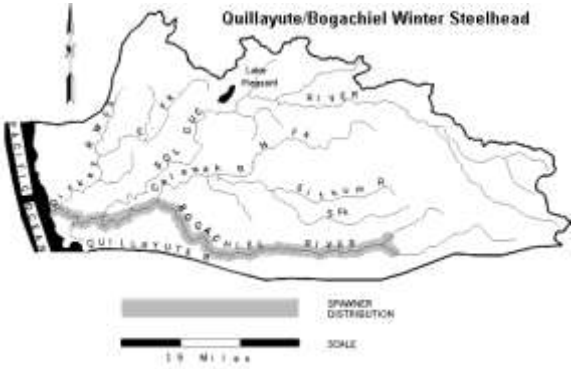
Bogachiel Fall Coho
Sol Duc Summer Coho
Dickey Fall Coho
Calawah Fall Coho
Sol Duc Fall Coho
Lake Pleasant Sockeye
Redds
Returning Adults

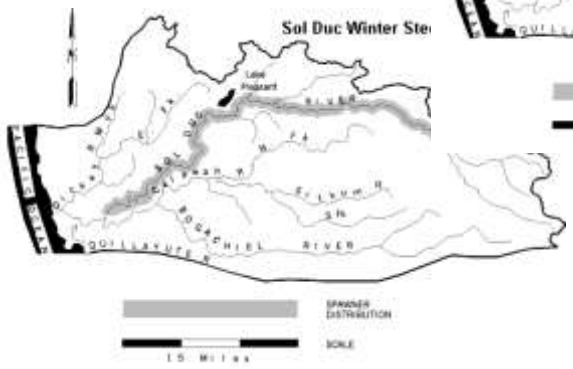
Salmonid Run	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Quillayut/Bogachiel Summer Steelhead					? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?			
Quillayute/Bagachiel Winter Steehead												
Sol Duc Summer Steelhead					? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?	? ? ? ?			
Sol Duc Winter Steelhead										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

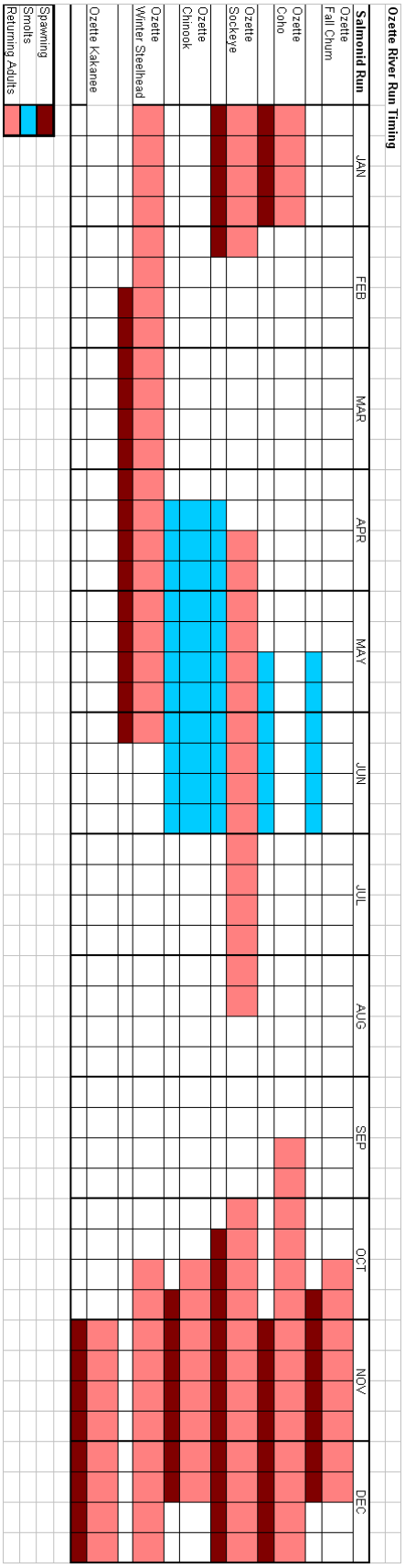
Redds
Returning Adults

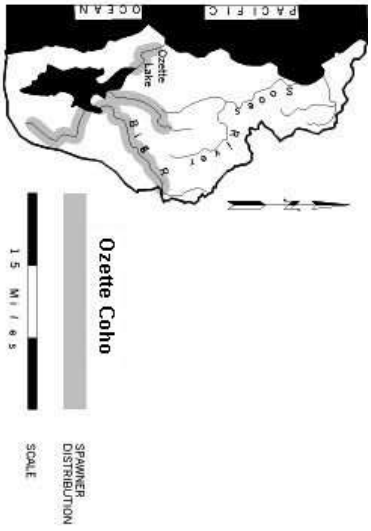


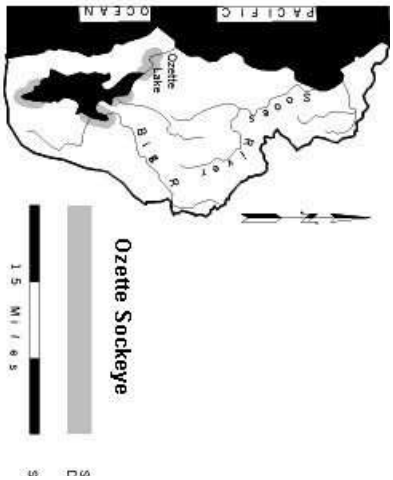


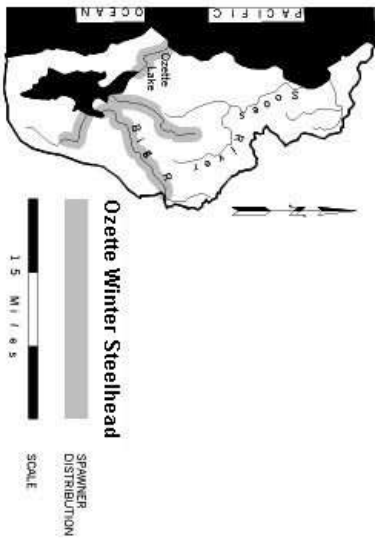


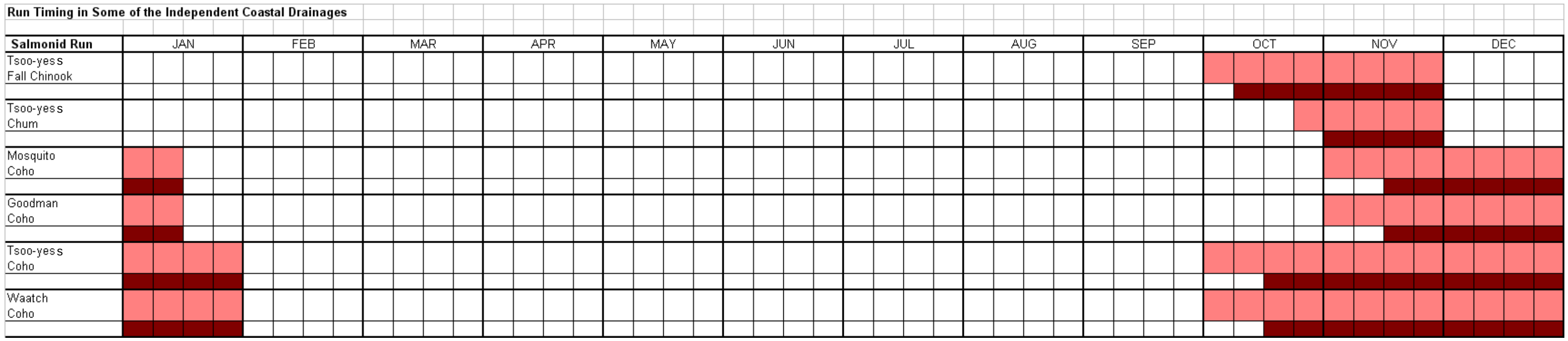


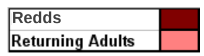

Ozette River Run Timing
Salmonid Run
Ozette Fall Chum
Ozette Coho
Ozette Sockeye
Ozette Chinook
Ozette Winter Steelhead
Ozette Kokanee
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Spawning
Smolts
Returning Adults

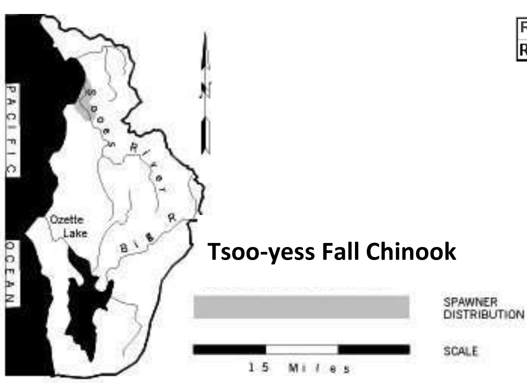

PACIFIC
OCEAN
Ozette Lake
Ozette Coho
SPAWNER DISTRIBUTION
SCALE
1 5 Miles


PACIFIC
OCEAN
Ozette Lake
Ozette Sockeye
1 5 Miles

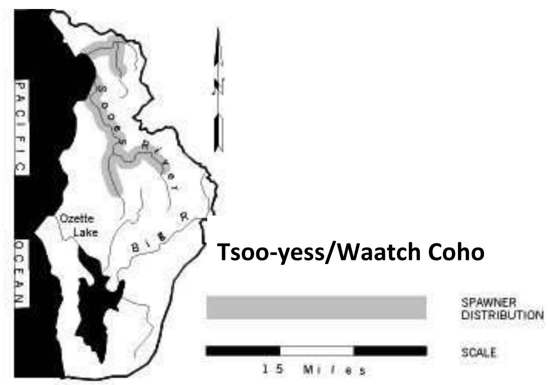

PACIFIC
OCEAN
Ozette Lake
Ozette Winter Steelhead
SPAWNER DISTRIBUTION
SCALE
1 5 Miles



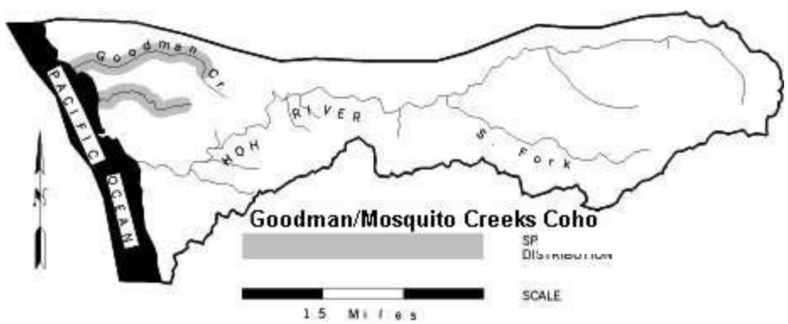




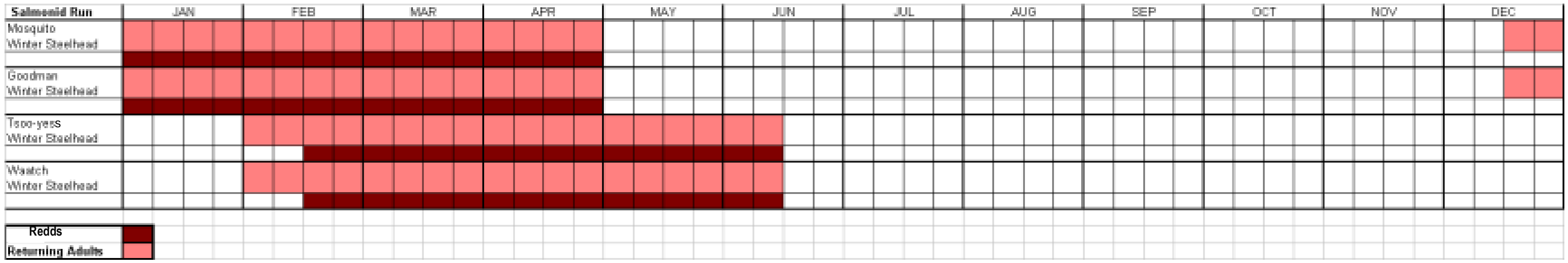
Tsoo-yess Fall Chinook

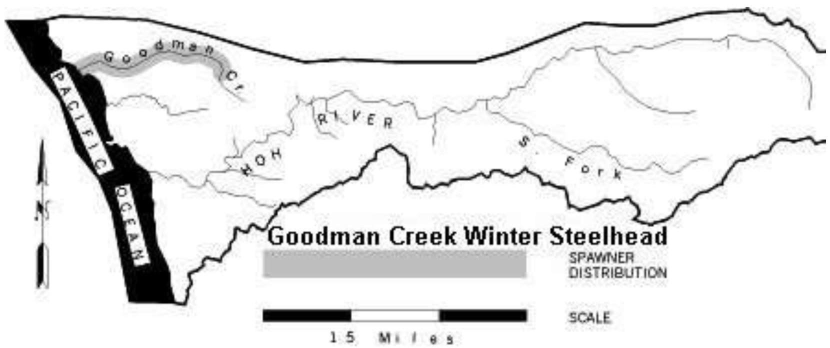


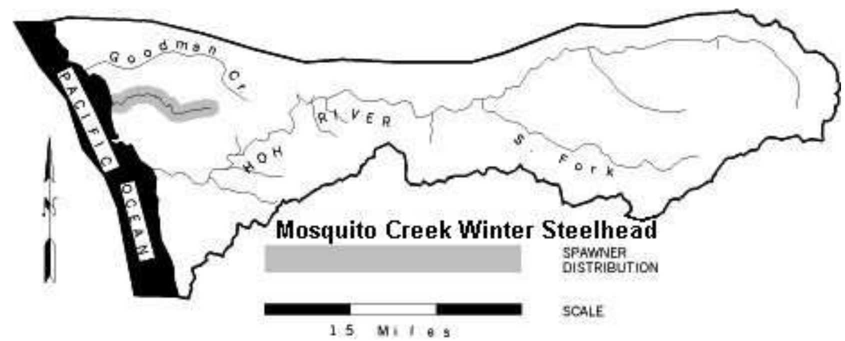
Tsoo-yess/Waatch Coho

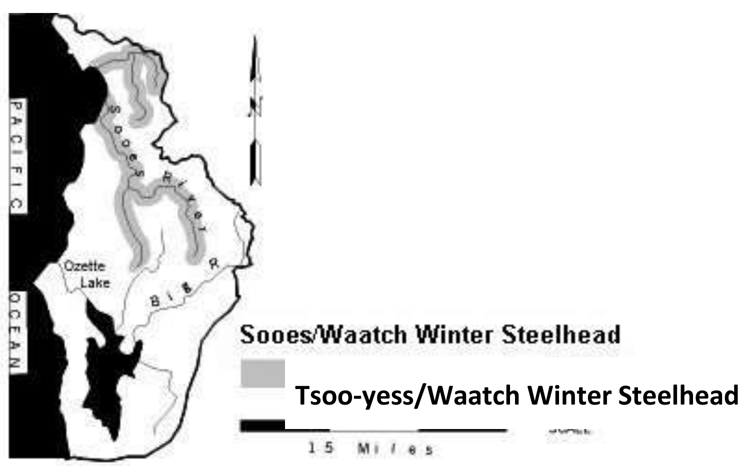


Goodman/Mosquito Creeks Coho


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


Goodman Cr
RIVER
HOH
S. Fork
PACIFIC
OCEAN
Goodman Creek Winter Steelhead
SPAWNER DISTRIBUTION
SCALE
1.5 Miles


Goodman Cr
RIVER
HOH
S. Fork
PACIFIC
OCEAN
Mosquito Creek Winter Steelhead
SPAWNER DISTRIBUTION
SCALE
1.5 Miles


PACIFIC
OCEAN
Sooes River
Ozette Lake
Big R
Sooes/Waatch Winter Steelhead
Tsoo-yess/Waatch Winter Steelhead
1.5 Miles

APPENDIX E

NPCLE COMMITTEES MEMBERSHIP LIST

North Pacific Coast Lead Entity
2022 Membership

Initiating Government Representatives:

Hoh Tribe:	LE Rep – Julie Ann Koehlinger (Jennifer Murphy & Kimberley Bray, Alt.)
Makah Tribe:	LE Rep – Stephanie Martin
Quileute Tribe:	LE Rep – Nicole Rasmussen, (Caroline Walls, Alt.)
City of Forks:	LE Rep – Rod Fleck
Clallam County:	LE Rep – Rebecca Mahan, (Joel Green, Alt.)
Jefferson County:	LE Rep – Tami Pokorny

Citizens of the Citizens Committee:

Mike Rohde	Regional Fisheries Enhancement Group
Griffin Ollar	Citizen-At-Large #1
David Hahn	Citizen-At-Large #2
Eric Carlsen	Citizen-at-Large #3
Rich Osborne	Citizen-at-Large #4
Katie Krueger	Citizen-at-Large #5
Anna Geffre	Coordinator WRIA 20 (NWIFC)

Technical Committee Members:

Anne Shaffer	Coastal Watershed Institute
Betsy Krier	Wild Salmon Center
Bonnie Shorin	NOAA
Caroline Walls	Quileute Tribe
Eric Carlsen	WDNR restoration engineer—Retired
Jessie Huggins	USFS

Jill Silver	10,0000 Years Institute
John Hagan	Northwest Indian Fisheries Commission
Julie Ann Koehlinger	Hoh Tribe
Katie Krueger	Quileute Nat. Resources attorney & Env. Policy Analyst—Retired
Kyle Martens	DNR
Kyle Smith	The Nature Conservancy
Justin Urresti	NRCS
Luke Kelly	Trout Unlimited
Meghan Adamire	Clallam Conservation District
Mike Hagen	Forester & restoration ecologist –Retired
Michele Canale	NOLT
Mike Rohde	Pacific Coast Salmon Coalition (RFEG)
Ned Pittman	CSP/CSF
Nicole Rasmussen	Quileute Tribe
Pat Crain	Olympic National Park
Phil DeCillis	USFS fisheries biologist –Retired
Rebecca Paradis	Clallam County
Rich Osborne	UW ONRC
Stephanie Martin	Makah Tribe
Tami Pokorny	Jefferson County
Theresa Powell	WDFW