

12. REFERENCES

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CHICAGO

Quantitative Fisheries Stock Assessment:
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PRUTER
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ALVERSON

PACIFIC SALMON LIFE HISTORIES



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12.1 Acknowledgements

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Marlies Wierenga	Environmental Planner

Consultant Team

Ray Beamesderfer	Cramer Fish Sciences
Gardner Johnston	Interfluve
Kathryn Arndt	Cramer Fish Sciences
Abigail Andrews	Cramer Fish Sciences
Randy Ericksen	Cramer Fish Sciences

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12.3 Acronyms

303d list	State of Washington's list of impaired water bodies
AABM	Aggregate abundance-based management
ACOE	U.S. Army Corps of Engineers
ADFG	Alaska Department of Fish and Game
AEIOU	Adult Equivalent Impacts Occurring Unconditionally
AEQ	Adult equivalent
APRE	Artificial Production Review and Evaluation
ATV	All terrain vehicle
BACI	Before-and-After-Control-Impact
BBS	Breeding Bird Survey
BC	British Columbia
BCWD	Bacterial cold water disease
B-IBI	Benthic Index of Biotic Integrity
BKD	Bacterial kidney disease
BMPs	Best Management Practices
BPA	Bonneville Power Administration
BPH	Bonneville Pool Hatchery
BRT	Biological Review Team
C&S	Ceremonial and subsistence
CBFWA	Columbia Basin Fish and Wildlife Authority
CCD	Cowlitz Conservation District
CD	Conservation District
CDFG	California Department of Fish and Game
CDFO	Department of Fisheries and Oceans of Canada
cfs	Cubic feet per second. A unit commonly used to quantify discharge rate.
CFFCF	Cowlitz Falls Fish Collection Facility
CH	Climate/Ocean hypothesis
CM	Climate/Ocean measure
Corps	U.S. Army Corps of Engineers
CPUE	Catch per unit of effort
CRFMP	Columbia River Fish Management Plan
CRITFC	Columbia River Inter-Tribal Fish Commission
CRRL	Columbia River Research Lab
CRT	Critical risk threshold
CS	Climate/Ocean strategy
CWT	Coded-wire tag
DART	Data access real time
DD	degree days
DDAC	Didcylidimethylammonium chloride
DDE	Dichloro-diphenyl-ethane
DDT	Dichloro-diphenyl-trichlorethane. A chlorinated organic pesticide highly toxic to fish.
DFO	Canadian Department of Fisheries and Oceans

DH	Dam hypothesis
DIP	Demographically independent population
DM	Dam measure
DO	Dissolved oxygen
DPS	distinct population segment
DS	Dam strategy
EA	Environmental assessment
EDT	Ecosystem Diagnosis and Treatment
EF	East Fork
EH	Estuary hypothesis
EIS	Environmental Impact Statement
EM	Estuary measure
ENSO	El Nino Southern Oscillation Index
EPA	Environmental Protection Agency
ES	Estuary strategy
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
ETM	Estuary Turbidity Maximum
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
FGE	fish guidance efficiency
FH	Fisheries hypothesis
FHC	Fish Health Center
FL	Fork length
FM	Fisheries measure
FMEP	Fisheries Management and Evaluation Plan
FMMPA	Federal Marine Mammal Protection Act
FMP	Fish Management Plan
FPR	Forest Practices Rules (for Washington State)
FR	Federal Register
FS	Fisheries strategy
F&W	Fish and Wildlife
GDU	Genetically distinct unit
GIS	Geographic Information System
GMA	WA State Growth Management Act
GSRO	Governor's Salmon Recovery Office (Washington State)
HCP	Habitat Conservation Plan
HGMP	Hatchery and Genetic Management Plan
HH	Hatchery hypothesis
HM	Hatchery measure
HS	Hatchery strategy
HSRG	Hatchery Scientific Review Group
HUC	Hydrologic Unit Code. Number coding system used to identify watersheds.
HWS	Habitat work schedule
IFIM	Instream Flow Incremental Methodology
IFMP	Integrated Fisheries Management Plan

IH	Interaction hypothesis
IHNV	Infectious Hematopoeitic Necrosis Virus
IHOT	Integrated Hatchery Operations Team
IM	Interaction measure
IMA	Interim Management Agreement
IMW	Intensively Monitored Watersheds
INPFC	International North Pacific Fisheries Commission
IPC	Idaho Power Company
IS	Interaction strategy
ISAB	Independent Scientific Advisory Board
ISBM	Individual stock base management
IWA	Integrated Watershed Assessment
KG	kilogram; 1 kilogram = 2.2046 pounds
KM	kilometer; 1 kilometer = 3,280 feet
LC50	Lethal Concentration at 50% mortality
L	Lower
LCN	Lower Columbia natural
LCR	Lower Columbia River
LFA	Limiting Factors Analysis
LLT	nutrient enrichment programs
LOA	Letter of Agreement negotiated as part of the Pacific Salmon Treaty
LRH	Lower river hatchery
LRW	Lower river wild
LWD	Large woody debris
MAG	Mill/Abernathy/Germany
MCB	Mid-Columbia bright
M&E	Monitoring and Evaluation
MM	millimeter; 1 millimeter = .03937 inches
MMOP	Marine Mammal Observer Program
MPG	Major population group
MSY	Maximum sustainable yield
mtDNA	Mitochondrial deoxyribose nucleic acid
N/A or na	Not Applicable
NBS	National Biological Service
NF	National Forest or North Fork
NFH	National Fish Hatchery
NGO	Non-governmental organizations
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOF	North of Falcon
NPCC	Northwest Power and Conservation Council (formerly Northwest Power Planning Council)
NPDES	National Pollutant Discharge Elimination System
NPMP	Northern Pikeminnow Management Plan
NPPC	Northwest Power Planning Council, now called Northwest Power and Conservation Council
NRC	Natural Resource Council
NRCS	Natural Resources Conservation Service

NTU	Nephelometric Turbidity Unit. A unit describing light penetration in water.
OC	Oregon coast
OCN	ESA-listed (1998) Oregon coast coho
OCNL	Oregon coastal natural lake
OCNR	Oregon coastal natural river
ODFW	Oregon Department of Fish and Wildlife
OFC	Oregon Fish Commission
OFWC	Oregon Fish and Wildlife Commission
OPI	Oregon Production Index
OPIA	Oregon Production Index Area
OPIH	Oregon Production Index Hatchery
OSY	Optimum sustained yield
PAH	Polyaromatic hydrocarbons
PCB	Polychlorinated biphenyls. Popular electrical insulator that was determined in the late 1970's to be a probable agent causing cancer and neurological and liver damage.
PCC	Population change criteria
PDO	Pacific Decadal Oscillation
PFC	Properly Functioning Condition
PFMC	Pacific Fisheries Management Council
pHOS	Proportion hatchery origin spawners
PORT	Partners Ongoing Recovery Tracking
PNFHPC	Pacific Northwest Fish Health Protection Committee
PNI	Proportionate natural influence
PRIH	Private hatchery
PSC	Pacific Salmon Commission
PSMFC	Pacific States Marine Fishery Commission
PST	Pacific Salmon Treaty
PUD	Public Utility District
PVA	Population Viability Analysis
QA/QC	Quality assurance/Quality control
RCW	Revised Code of Washington
REAP	Regional Ecosystem Assessment Project
RER	Rebuilding/restoration exploitation rate
RH	Regional hypothesis
RIST	Recovery Implementation Science Team
RM	River mile
RM&E	Research, monitoring and evaluation
RS	Regional strategy
SAFE	Select Area Fishery Enhancement
SAS	Salmon Advisory Subpanel
SASSI	Salmon and Steelhead Stock Inventory (also SaSi)
SCH	Spring Creek Hatchery
SF	Square foot (or South Fork)
SFMP	Salmon Fishery Management Plan
SH	Stream hypothesis
SM	Stream measure
SMTF	Sturgeon Management Task Force

SONC	Southern Oregon/Northern California
SRS	Sediment retention structure
SS	Stream strategy
SSHAP	Salmon and Steelhead Habitat Inventory and Assessment
STEP	Salmon Trout Enhancement Program
STT	Salmon Technical Team
TAG	Technical Advisory Group
TBD	To Be Determined
TDG	Total dissolved gases
TL	Total length
TMDL	Total maximum daily load
TRT	Technical Review Team
TSS	Total suspended solid
TU	Thermal units
U	Upper
UCD	Underwood Conservation District
UCM	Unit characteristic method
UCRTT	Upper Columbia Regional Technical Team
UPGMA	Unweighted pair group method with arithmetic mean
URB	Upriver bright (Chinook)
U.S.	United States
USACE	U.S. Army Corps of Engineers (also USACOE)
USDOI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VSP	Viable Salmonid Population
WA/OR	Washington/Oregon
WAC	Washington Administrative Code
WAU	Watershed Administrative Unit
WCC	Washington Conservation Commission
WCD	Wahkiakum Conservation District
WDFW	Washington Department of Fish and Wildlife
WDG	Washington Department of Game
WDNR	Washington Department of Natural Resources
WDOE	Washington Department of Ecology
WDW	Washington Department of Wildlife
WF	West fork
WFC	Washington Fish Commission
WFWC	Washington Fish and Wildlife Commission
WLC	Willamette/Lower Columbia
WQRP	Water Quality Restoration Plan
WRCC	Western Regional Climate Center
WRIA	Water Resource Inventory Area
WSCC	Washington State Conservation Commission
WSDOT	Washington State Department of Transportation

WSMOC Washington Salmon Monitoring Oversight Committee
YIN Yakama Indian Nation
YOY Young of the year

12.4 Glossary

abiotic: Non-living.

abundance: In the context of salmon recovery, unless otherwise qualified, abundance refers to the number of adult fish returning to spawn, measured over a time series.

adaptive management: Adaptive management in salmon recovery planning is a method of decision making in the face of uncertainty. A plan for monitoring, evaluation, and feedback is incorporated into an overall implementation plan so that the results of actions can become feedback on design and implementation of future actions.

adfluvial: Possessing a life history trait of migrating between lakes or rivers and streams.

adsorption: Physical binding of one substance to another.

aestivation: Temporary state of inactivity.

aggradation: The accumulation of stratigraphic sequences by deposition that stacks beds atop each other, building upwards during periods of balance between sediment supply and accommodation.

alevins: Earliest life stage in the life history of salmon following the hatching of eggs in the redds. Characterized as tiny fish living within the redd subsisting off a yolk sac attached to their bellies. Also known as yolk-sac larvae.

allele: An allele is any one of a number of alternative forms of the same gene occupying a given location on a chromosome.

allochthonous: Material that is formed or introduced from somewhere other than the place it is presently found.

allozyme data: Data pertaining to the form of an enzyme that differs in amino acid sequence from other forms of the same enzyme and is encoded by one allele at a single location on a chromosome.

allozyme: The identification of one of the different forms of an enzyme found in individuals of the same

ammocoetes: Juvenile life stage of Pacific Lamprey during their freshwater residency.

amphidromy: Bi-directional, non-reproductive migration between fresh and saltwater.

anadromous fish: Species that are hatched in freshwater, migrate to and mature in salt water, and return to freshwater to spawn.

anadromy: Spawn in fresh water, spend non-reproductive periods in marine environment

anaerobic respiration: Respiration without the use of oxygen, e.g., microbes.

andesite: A gray to black volcanic rock with 52-63% silica content.

angler trips: A measure of recreational fish harvest effort. One angler trip is equivalent to one person angling for one day.

annulus: Annual variations in growth ring patterns on a scale.

anthropogenic: Human induced.

asymptote: A line that is considered to be the limit to a curve. As the curve approaches the asymptote, the distance separating the curve and the asymptote continues to decrease, but the curve never actually intersects the asymptote.

avulsion: Lateral displacement of a stream from its main channel into a new course across its floodplain.

baseline monitoring: In the context of recovery planning, baseline monitoring is done before implementation, in order to establish historical and/or current conditions against which progress (or lack of progress) can be measured.

bedload: The quantity of large particles including rocks and pebbles mobilized along the bottom of a stream bed.

benthic: Invertebrates whose habitat is in the substrate of a body of water.

bioenergetics: Tracking the flow of energy through trophic levels of an ecosystem.

biogeographical region: an area defined in terms of physical and habitat features, including topography and ecological variations, where groups of organisms (in this case, salmonids) have evolved in common.

biotic : Living.

breccia: A clastic rock composed of particles more than 2 millimeters in diameter and marked by the angularity of its component grains and rock fragments.

broad sense recovery goals: Goals defined in the recovery planning process, generally by local recovery planning groups, that go beyond the requirements for delisting, to address, for example, other legislative mandates or social, economic, and ecological values. In this plan broad sense goals are defined based on harvestability.

buccal cavity: Mouth cavity.

Ceratomyxa: Agent causing ceratomyxosis, an intestinal disease in salmonids resulting in high mortality rates.

char: Common name for several species of fish of the genus *Salvelinus* of the family Salmonidae; these fish have small scales and a red belly.

chevron: A figure, pattern, or object having the shape of a V or an inverted V.

chromosomal: Pictures of chromosomes cut out from a microphotograph of a cell and rearranged

coarse-scale: General; broad scale as opposed to fine scale or detailed.

cobble: Naturally rounded rock fragment between 64-256 mm (2.5-10 inches) in diameter. Typically compose a portion a streams substrate along with fine sediments, gravel, boulders and bedrock.

Columbia River Compact: Joint Oregon & Washington regulating form for mainstem Columbia River Fisheries.

compliance monitoring: Monitoring to determine whether a specific performance standard, environmental standard, regulation, or law is met.

cottids: Members of the family cottidae, also known as sculpins. A family of fishes common to streams throughout the Pacific Northwest.

cyprinid: Members of the family cyprinidae, also known as minnows.

degree-days: A measure of cumulated temperature units. Two days at 10°C is equal to 20 degree days. Usually used to measure incubation periods.

delisting criteria: Criteria incorporated into ESA recovery plans that define both biological viability (biological criteria) and alleviation of the causes for decline (threats criteria based on the five listing factors in ESA section 4[a][1]), and that, when met, would result in a determination that a species is

no longer threatened or endangered and can be proposed for removal from the Federal list of threatened and endangered species. These criteria are a NMFS determination and may include both technical and policy considerations.

demersal: Relating to the bottom, or substrate of a body of water.

diadromy: Migrating between fresh and saltwater.

diel: A day and an adjoining night.

distinct population segment (DPS): A listable entity under the ESA that meets tests of discreteness and significance according to USFWS and NMFS policy. A population is considered distinct (and hence a “species” for purposes of conservation under the ESA) if it is discrete from and significant to the remainder of its species based on factors such as physical, behavioral, or genetic characteristics, it occupies an unusual or unique ecological setting, or its loss would represent a significant gap in the species’ range.

diversity: All the genetic and phenotypic (life history, behavioral, and morphological) variation within a population. Variations could include anadromy vs. lifelong residence in freshwater, fecundity, run timing, spawn timing, juvenile behavior, age at smolting, age at maturity, egg size, developmental rate, ocean distribution patterns, male and female spawning behavior, physiology, molecular genetic characteristics, etc.

DNA variations: Potential combinations or expressions of genetic material.

early-seral: Early stage in the development of an ecosystem from an undisturbed, un-vegetated state. Vegetation is dominated by shade intolerant species.

Ecosystem diagnosis and treatment (EDT): modeling framework utilized in this plan to evaluate fish habitat limiting factors and habitat production potential.

effectiveness monitoring: Monitoring set up to test cause-and-effect hypotheses about recovery actions: Did the management actions achieve their direct effect or goal? For example, did fencing a riparian area to exclude livestock result in recovery of riparian vegetation?

El Nino Southern Oscillation Index (ENSO): a quasi periodic climate pattern that occurs consisting of an oceanic component, called El Niño (or La Niña), which is characterized by warming or cooling of surface waters in the tropical eastern Pacific Ocean, and an atmospheric component, the Southern Oscillation, which is characterized by changes in surface pressure in the tropical western Pacific.

electrophoresis: species, via the movement of charged particles through a fluid following the application of an electric field.

embedded substrates: Substrates partially or completely covered by fine sediment layers.

endangered species: A species in danger of extinction throughout all or a significant portion of its range.

ESA recovery plan: A plan to recover a species listed as threatened or endangered under the U.S. Endangered Species Act (ESA). The ESA requires that recovery plans, to the extent practicable, incorporate (1) objective, measurable criteria that, when met, would result in a determination that the species is no longer threatened or endangered; (2) site-specific management actions that may be necessary to achieve the plan's goals; and (3) estimates of the time required and costs to implement recovery actions.

escapement: The number of salmon returning to the spawning grounds.

evolutionarily significant unit (ESU): A group of Pacific salmon or steelhead trout that is (1) substantially reproductively isolated from other conspecific units and (2) represents an important component of the evolutionary legacy of the species.

extinct: No longer in existence. No individuals of this species can be found.

extirpated: Locally extinct. Other populations of this species exist elsewhere. Functionally extirpated populations are those of which there are so few remaining numbers that there are not enough fish or habitat in suitable condition to support a fully functional population.

factors for decline: Five general categories of causes for decline of a species, listed in the Endangered Species Act section 4(a)(1)(b): (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or human-made factors affecting its continued existence.

facultative: When dams keep fish that are historically anadromous or amphidromous from migrating, some

flashy flow: Flow regime marked by a high frequency of high flows.

fluvial: Migrating between main rivers and tributaries.

fork length (FL): Fish measured from the tip of its nose to the fork in its tail.

fry: The young of various fishes. Salmon fry are typically young of the year less than 6 months of age.

functionally extirpated: Describes a species that has been extirpated from an area; although a few individuals may occasionally be found, there are not enough fish or habitat in suitable condition to support a fully functional population.

furunculosis: A bacterial disease of salmonids usually characterized by boils on the skin of infected fish. When allowed to develop to advanced stages the disease is fatal.

handle: Having a fish in hand. Usually referring to when a fish is caught and released, as opposed to harvest which is caught and retained.

heterozygosity: The presence of different alleles of a gene at one or more locations on a chromosome.

Holarctic region: The northern tier of the hemisphere.

hyporheic zone: Subsurface areas beside and beneath streams where ground and surface waters mix.

hypoxia: Oxygen limitation.

implementation monitoring: Monitoring to determine whether an activity was performed and/or completed as planned.

independent population: Any collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations.

indicator: A variable used to forecast the value or change in the value of another variable.

interim regional recovery plan: A recovery plan that is intended to lead to an ESA recovery plan but that is not yet complete. These plans might address only a portion of an ESU or lack other key components of an ESA recovery plan.

inter-specific: Between different species.

interstitial: Occurring in small spaces or cracks.

intra-specific: Within the same species.

intrinsic potential: The estimated relative suitability of a habitat for spawning and rearing of anadromous salmonid species under historical conditions inferred from stream characteristics including channel size, gradient, and valley width.

intrinsic productivity: The expected ratio of natural-origin offspring to parent spawners at levels of abundance below carrying capacity.

introgressed: To combine; to become a part of

invertebrates: An animal without a skeletal structure (insects, zooplankton, clams, shrimps, etc.).

iodophor: A substance consisting of iodine and a solubilizing agent that releases free iodine when in solution. Used as a cleaner/sanitizer.

iteroparous: Has more than one reproductive cycle in its lifetime (e.g., sturgeon).

jacks: Small reproductively mature male salmon that return to spawn after spending only one winter in the marine environment.

karyotypes: homologous pairs according to size and other physical characteristics. The standardized arrangement of karyotypes allows researchers to discover if an individual is a male or female and if he/she has any gross chromosomal abnormalities.

large woody debris (LWD): A general term for wood naturally occurring or artificially placed in streams, including branches, stumps, logs, and logjams. Streams with adequate LWD tend to have greater habitat diversity, a natural meandering shape, and greater resistance to flooding.

lateritic: A suborder of soils found in warm, temperate, and tropical regions.

legacy effects: Impacts from past activities that continue to affect a stream or watershed in the present day.

lentic: "Standing" water such as a lake or pond.

limiting factor: Physical, biological, or chemical features (e.g., inadequate spawning habitat, high water temperature, insufficient prey resources) experienced by the fish that result in reductions in viable salmonid population (VSP) parameters (abundance, productivity, spatial structure, and diversity). Key limiting factors are those with the greatest impacts on a population's ability to reach a desired status.

lithology: Description of rock composition and texture.

locally developed recovery plan: A plan developed by state, tribal, regional, or local planning entities to address recovery of a species. These plans are being developed by a number of entities throughout the region to address ESA as well as state, tribal, and local mandates and recovery needs.

lotic: "Moving" water such as a stream.

macrothemia: Pacific lamprey juveniles (ammocoetes) in the process of metamorphosis to their marine tolerant physiology. The equivalent of a salmon smolt.

maintained status: Population status in which the population does not meet the criteria for a viable population but does support ecological functions and preserve options for ESU/DPS recovery.

major population group (MPG): A group of salmonid populations that are geographically and genetically cohesive. The MPG is a level of organization between demographically independent populations and the ESU or DPS.

management unit: A geographic area defined for recovery planning purposes on the basis of state, tribal or local jurisdictional boundaries that encompass all or a portion of the range of a listed

species, ESU, or DPS. The lower Columbia Recovery domain is comprised of Washington and Oregon management units.

mass failure: General term for a variety of processes by which large masses of rock or earth material are moved downslope by gravity, either slowly or quickly.

metrics: A metric is something that quantifies a characteristic of a situation or process; for example, the number of natural-origin salmon returning to spawn to a specific location is a metric for population abundance.

morphology: The form and structure of an organism, with special emphasis on external features.

morphometry: The measurement of shape.

natural-origin fish: Fish that were spawned and reared in the wild, regardless of parental origin.

neritic: Describing the environment and conditions of the marine zone between low tide and the edge of the continental shelf, a depth of roughly 200 m.

orographic: Related to or caused by physical geography.

osmoregulation: The process of controlling the amount of water in tissues and cells.

Pacific Decadal Oscillation (PDO): a long-lived El Niño-like pattern of Pacific climate variability.

parr: The stage in anadromous salmonid development between absorption of the yolk sac and transformation to smolt before migration seaward.

pelagic: In ornithology, sea-birds that come to land only to breed; in marine ecology, organisms (e.g. plankton) that inhabit open water.

phenotype: Any observable characteristic of an organism, such as its external appearance, development, biochemical or physiological properties, or behavior.

piscivorous: Describes fish that eat other fish.

piscivorous: Fish-eating.

poikilotherms: Cold-blooded.

pools: A geomorphic stream channel unit characterized by little to no surface turbulence or slope, low flow rate, and residual depth.

population change criteria: population targets derived by a specific analytical method developed by scientists at NMFS' Northwest Science Center based on population trend data.

potadromy: All feeding and reproductive migrations within a freshwater river system.

potadromy: fish (e.g. sturgeon) can migrate entirely within freshwater.

predaceous: Predatory

productivity: The average number of surviving offspring per parent. Productivity is used as an indicator of a population's ability to sustain itself or its ability to rebound from low numbers. The terms "population growth rate" and "population productivity" are interchangeable when referring to measures of population production over an entire life cycle. Can be expressed as the number of recruits (adults) per spawner or the number of smolts per spawner.

reach: A length of stream defined by some functional characteristic. May be defined simply by length, distance between tributaries, or changes in land forms, land use, etc.

recovery domain: An administrative unit for recovery planning defined by NMFS based on ESU boundaries, ecosystem boundaries, and existing local planning processes. Recovery domains may contain one or more listed ESUs.

recovery goals: Goals incorporated into a locally developed recovery plan, which may include delisting (i.e. no longer considered endangered or threatened), reclassification (e.g., from endangered to threatened), and/or other goals. Broad sense goals are a subset of recovery goals (see glossary entry above).

recovery plan supplement: A NMFS supplement to a locally developed recovery plan that describes how the plan addresses ESA requirements for recovery plans. The supplement also proposes ESA delisting criteria for the ESUs addressed by the plan, since a determination of these criteria is a NMFS decision.

recovery scenarios: Scenarios that describe a target status for each population within an ESU, generally consistent with TRT recommendations for ESU viability.

recovery strategy: Statements that identify the assumptions and logic – the rationale – for the species' recovery program.

redd: Nest made in gravel dug by a fish for egg deposition (and then filled) and associated gravel mounds.

riparian area: Area with distinctive soils and vegetation between a stream or other body of water and the adjacent upland.

salmonid: Fish of the family Salmonidae, including salmon, trout, chars, grayling, and whitefish. In general usage, the term usually refers to salmon, trout, and chars.

scute: Large bony scale such as that found on sturgeon.

second-feet: Unit measuring discharge, usually in association with reservoirs.

semelparous: Has only one reproductive cycle in its lifetime (e.g. salmon).

seral-stage: Stage in the development of an ecosystem from an undisturbed, un-vegetated state towards a climax state. Stages are often classified as early, middle, or late.

sexually dimorphic: Species has two forms, one for each sex.

smolt: A juvenile salmonid that is undergoing physiological and behavioral changes to adapt from freshwater to saltwater as it migrates toward the ocean.

smolt: A young salmon or steelhead before it has swum to the sea, typically in its second year

smoltification: Process of physiologically changing from fry or parr to smolt.

spatial structure: Characteristics of a fish population's geographic distribution. Current spatial structure depends upon the presence of fish, not merely the potential for fish to occupy an area.

Sediment Retention Structure(SRS): Earthen dam on the N. Fk. Toutle designed to protect the lower Toutle and Cowlitz from inundation from Mt. St. Helens sediment after the eruption.

stakeholders: Agencies, groups, or private citizens with an interest in recovery planning, or those who will be affected by recovery planning and actions.

stream power: A product of the stream's discharge and slope.

substrates: Layers of sediment particles comprising the bottom of a body of water. The bed of a body of water.

subyearling: Fish that are less than 1 year old

swim bladders: A bladder of gas possessed by certain fishes that allows them to maintain a particular depth in the water column.

sympatric: Individuals, species, populations, etc. that share a common habitat.

Technical Recovery Team (TRT): Teams convened by NMFS to develop technical products related to recovery planning. Planning forums unique to specific states, tribes, or regions may use TRT and other technical products to identify recovery actions.

threatened species: A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

threats: Human activities or natural events (e.g., road building, floodplain development, fish harvest, hatchery influences, volcanoes) that cause or contribute to limiting factors. Threats may exist in the present or be likely to occur in the future.

toe-width: Measures the width of a stream from the toe of the bank on one side of the stream to the toe of methodology - the bank on the other side.

trash racks: Screens at flow diversions or fish diversions that filter debris from the water at the diversion intake.

Trichodina: A protozoan parasite affecting the gills of fish. Only pose a serious threat to fish health under high infestations.

trophic: Having to do with the processes of nutrition.

tule: common name for the early run of fall Chinook returning to the lower Columbia River

turbidity: A measure of light penetration in a body of water. Higher turbidity indicates “murkier” water conditions.

unexploited: Not fished. Absence of harvest.

viability criteria: Criteria defined by NMFS-appointed Technical Recovery Teams to describe a viable salmonid population, based on the biological parameters of abundance, productivity, spatial structure, and diversity. These criteria are used as technical input into the recovery planning process and provide a technical foundation for development of biological delisting criteria.

viability curve: A curve describing combinations of abundance and productivity that yield a particular risk of extinction at a given level of variation over a specified time frame.

viable salmonid population (VSP): an independent population of Pacific salmon or steelhead trout that has a negligible risk of extinction over a 100-year time frame.

volitional: Acting of free will. Volitional releases from hatcheries allow the juveniles to move downstream from the facility on their own accord.

VSP parameters: Viable Salmonid population parameters include abundance, productivity, spatial structure, and diversity. These describe characteristics of salmonid populations that are useful in evaluating population viability. See NOAA Technical Memorandum NMFS-NWFSC-42, Viable salmonid populations and the recovery of evolutionarily significant units (McElhany et al. 2000).

yearling: Fish that are 1 to 1.5 years old