

APPENDIX A

Glossary and Abbreviations

Acclimation

Gradual physiological adjustment in response to relatively long-term environmental changes.

Acidification

Ocean acidification is the process by which CO₂ is dissolved in seawater resulting in an increase in hydrogen ion (H⁺) concentration, and a corresponding decrease in the ocean's pH.

Acid Rain

Precipitation which contains sulfate aerosols consisting of sulfuric acid, derived from industrial and other emissions.

Adaptation

The evolutionary process, whereby populations become better suited to deal with their physical and biological environments, and therefore to survive and reproduce. It is driven by a host of factors including population diversity (genetic, phenotypic, physiological, and behavioral), inter and intra-specific competition, natural selection, and genetic processes.

Adaptive Trait

Any specific physical, physiological, or behavioral trait of an organism that promotes the likelihood of an organism's survival and reproduction in a particular environment.

Adfluvial Population

A population of fish which migrates between a lake and streams tributary to the lake.

Adiabatic

Insulated from the surroundings, unable to gain or lose heat from the environment.

Adipose Fin

Small fin composed of fatty tissue and located on the top-side of a fish between the dorsal and caudal fin.

Adjuvant

An agent that modifies the effect of other agents, such as a pesticide. They are sometimes included in pesticides to enhance the effectiveness of the active agent.

Age Class

Individuals in a population of the same age. In Pacific salmonids, an individual of less than one year is referred to a 0+ age class; a fish older than one, but less than two years, is termed a 1+ age class fish, *etc.*

Albedo

The fraction of incoming solar radiation that is reflected back to space without being absorbed.

Alevin

Newly hatched salmon or trout with a visible yolk sac, usually still maturing while still in the redd.

Allele

One of two or more forms of a gene. Sometimes, different alleles can result in different physical or physiological traits. Other times, different alleles will have the same result in the expression of a gene.

Allele Frequency

The relative proportion of all copies of a particular variant gene (allele) among the chromosomes carried by individuals in a population. In population genetics, allele frequencies are used to depict the amount of genetic diversity at the individual, population, and species level.

Allochthonous

Derived from outside a system such as leaves or insects that may fall into a stream.

Alluvial

Deposited by running water.

Alluvium

Material deposited by running water, including the sediments laid down in riverbeds, floodplains, lakes and estuaries.

Anadromous

A life history cycle that involves reproducing in freshwater, maturing in marine waters, and returning to freshwater to reproduce.

Anadromous Fraction

The proportion of a heterogeneous *O. mykiss* population that exhibits an anadromous life history, as opposed to the freshwater-resident life history.

Anadromous Waters

Water bodies typically accessible to fish migrating from the ocean, including estuaries, rivers, and lakes.

Anaerobic

Living, growing, or occurring in an environment with no free oxygen.

Anal Fin

Fin located near the rear, and on the bottom side of a fish; used for stability when swimming.

Annulus

An annual mark formed on the hard parts of fishes (*e.g.*, scales, bones, otoliths), corresponding to a period of growth.

Artificial Propagation

Anthropogenic assistance in the reproduction of an organism. With Pacific salmonids this may include spawning and rearing in hatcheries, transfer of stocks from one system to another, creation or modification of spawning habitat, egg bank programs, captive broodstock programs, and cryopreservation of gametes.

Autecology

Ecological study of a single organism or a single species.

Autochthonous

Derived from within a system, such as organic matter in a stream resulting from photosynthesis by aquatic plants.

Autotrophic

Making food by photosynthesis or requiring only inorganic chemicals for metabolic synthesis.

Baseflow

The portion of a stream discharge derived from natural storage sources such as groundwater, lakes, or groundwater basins that create local surface runoff; the sustained discharge that does not result from direct runoff or from stream regulation, water diversion, or other human activities.

Baseline

A set of reference data sets or analyses use for comparative purposes; they can be based on a reference year or location, or a reference set of standard conditions.

Bayesian

A formal statistical approach in which expert knowledge or beliefs are analyzed together with data. Bayesian methods make explicit use of probability for quantifying uncertainty, and are used in decision making.

Bedform Roughness

The measure of the irregularity of streambed materials that contributes to the resistance to stream flows. Commonly represented by Mannings roughness coefficient (n).

Bed-load Sediment

The part of a stream or river's total sediment load moved along the bottom by running waters.

Benthic

A habitat or organism found on the stream, lake or ocean bottom.

Biological Diversity

The range of characteristics within an ecosystem or taxonomic group, including genetic, phenotypic and physiological variability of individuals, life history strategies, age structure, and fecundity of populations.

Bootstrap

A statistical methodology use to quantify the uncertainty associated with estimates obtained from a model. The bootstrap is often based on Monte Carlo resampling of residuals from the initial model fit.

Brackish Water

Water that contains higher concentrations of salts than fresh water, but not as much as seawater. It may result from mixing of seawater with fresh water, as in estuaries, or it may occur in brackish fossil aquifers. Technically, brackish water contains between 0.5 and 30 grams of salt per liter—more often expressed as 0.5 to 30 parts per thousand (ppt or ‰). Thus, *brackish* covers a range of salinity regimes and is not a

precisely defined condition. By comparison, average, seawater in the world's oceans has a salinity of about 35 ppt.

Braided Stream

Stream that forms an interlacing network of branching and recombining channels separated by branch island or channel bars.

Broodstock

Sexually mature individuals used within a hatchery or other controlled environment for breeding purposes.

Captive Broodstock Program

A form of artificial propagation involving the collection of individuals or gametes from a natural, wild population and rearing the individuals to maturity in captivity.

Carnivore

An organism or species that derives its energy and nutrient requirements from a diet consisting mainly or exclusively of animal tissue, whether through predation or scavenging. Animals that depend solely on animal flesh for their nutrient requirements are considered obligate carnivores while those that also consume non-animal food are considered facultative carnivores.

Carrying Capacity

The maximum population of a species that an area or specific ecosystem can support indefinitely without deterioration of the character and quality of the supporting resources. It can also refer to the maximum level of recreational use, in term of numbers of people and type of activity, which can be accommodated before the ecological value of the area is adversely impacted.

Catadromous

A life history cycle that involves reproducing in saltwater, maturing in freshwater, and returning to saltwater to reproduce.

Caudal Fin

Tail fin, usually with distinct rays; used principally for propulsion and turning.

Climate

The average prevailing conditions in the atmosphere (air temperature, wind speed and direction, humidity, precipitation, *etc.*) based upon an extended series of years.

Coded-wire Tag

Coded-wire tags are small pieces of stainless steel wire that are injected into the snouts of juvenile salmon and steelhead. Each tag is etched with a binary code that identifies its time and place of release.

Coefficient of Variation (CV)

The standard error of a statistic, divided by its point estimate. The CV gives an idea of the precision of an estimate, independent of its magnitude.

Colluvium

Lose deposits of soil and rock moved by gravity; on or below steep slopes or cliffs it is referred to as talus.

Competition

Interaction of individual organisms that occupy or share some part of an ecological niche such that both depend upon the same food source, shelter, or some other resource in the same community; competition may be between individuals of the same or different species.

Cohort

A group of fish generated during the same spawning season, and is part of the same age class.

Confidence Interval (CI)

The probability, based on statistics, that a number will be between and upper and lower bound.

Conspecific

Two or more individuals, populations, or other higher order taxonomic grouping such as a sub-species, are said to be conspecific when they belong to the same species, or other defined taxonomic group.

Continental Shelf

The underwater shelf of the continent, extending seaward from the shore, with a moderate declination, to the edge of the continental slope where the declination increases sharply; water depth varies from 0 to 200 meters.

Demersal

Living in close association with the bottom of a stream or lake and generally dependent upon it.

Demographic

Properties of a population such as rate of growth, age structure, sex ratio, number of reproductive individuals, *etc.*

Density Dependence

In population ecology density-dependence is any population characteristic that varies with the degree of the density of the population.

Density Independence

The character of a population whose condition is determined by external factors that influence all individuals of a population regardless of population density such as climate.

Dimorphism

Existence within a species of two distinct forms according to color, sex, size, organic structure, *etc.*

Distinct Population Segment

The smallest division of a taxonomic species that can be protected under the U.S. Endangered Species Act.

Dorsal Fin

Located on the top side, generally mid-way along the body, and usually with distinct rays; provides stability when swimming.

Ecological Niche

The position a species or population in its ecosystem. The ecological niche describes how an organism or population responds to the distribution of resources and competitors (*e.g.*, by growing when resources are abundant, and when predators, parasites and pathogens are scarce) and how it in turn alters those same factors (*e.g.*, limiting access to resources by other organisms, acting as a food source for predators and a consumer of prey).

Ecosystem

A biological environment consisting of all the organisms living and interacting in a particular area, as well as all the nonliving, physical components of the environment with which the organisms interact, such as air, soil, water and sunlight.

Ecosystem Functions

Intrinsic ecosystem characteristics related to the set of conditions and processes whereby an ecosystem maintains its integrity. Ecosystem functions include such processes as decomposition, production of biomass, nutrient cycling, and fluxes of nutrients and energy.

Ecosystem Services

The benefits that people obtain from functioning ecosystems. They include provisioning services such as food, timber, fiber, fuel and energy, and freshwater; regulating services such as air and water quality; maintaining an equable climate, control of diseases, pests, and sediment supplies (*e.g.*, to coastal beaches); supporting services such as soil formation, photosynthesis, nutrient cycling; and cultural services such as fulfilling spiritual, religious, and aesthetic needs.

Effective Population Size (N_e)

The number of individuals that contribute offspring to the next generation; generally smaller than the absolute population size (N); a basic parameter used in many models in population genetics to express information about expected rates of random genetic change due to inbreeding and/or genetic drift.

El Niño /La Niña Southern Oscillation (ENSO)

A weather pattern that occurs across the tropical Pacific Ocean roughly every five to seven years. It is characterized by variations in the sea-surface temperature of the tropical eastern Pacific Ocean—warming associated with El Niño and cooling with La Niña. The two variations are coupled: the warm oceanic phase, El Niño, accompanies high air surface pressure in the western Pacific, while the cold phase, La Niña, accompanies low air surface pressure in the western Pacific. ENSO causes extreme weather (such as floods and droughts) in many regions of the world, including the west coast of the United States.

Embeddedness

The degree to which large particles (*e.g.*, boulders, rubble, gravel) are surrounded or covered by fine sediment, usually measured in classes according to percent of coverage.

Emigration

Movement of individuals out of an area. With Pacific anadromous salmonids, emigration refers to the movement of juveniles (and also adults) from freshwater to a brackish or marine environment.

Endemic

Species or populations occurring in restricted geographic areas due to the presence of a unique suite of environmental and biological conditions that limit the distribution of the species or population.

Ephemeral Streams

Streams that flow briefly after rainstorms.

Epigenetics

The field of study of the genetic (coding) and non-genetic (non-coding) factors acting upon cells to control the phenotypic expression of genes.

Epigenome

All the epigenetic modifications of the DNA genome and its associated histone proteins.

Escapement

The portion of a run of an anadromous species that is not harvested and escapes to natural or artificial spawning areas.

Essential Fish Habitat

Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity as defined by 16U.S.C. 1802(10).

Estuary

Estuaries form a transition zone between river environments and ocean environments and are subject to both marine influences (such as tides, waves, and the influx of saline water); and riverine influences (such as flows of fresh water and terrestrially derived sediments). The inflow of both seawater and freshwater provide high levels of nutrients in both the water column and saturated sediment, making estuaries among the most productive natural habitats.

Eutrophication

The process by which a body of water becomes enriched in dissolved mineral nutrients (often phosphorus and nitrogen) that stimulates the growth of aquatic plants, and leads to depletion of dissolved oxygen, and the mortality of oxygen dependent organisms.

Evolutionary Significant Unit

A population (or group of populations) which exhibit two biological characteristics: (1) it is substantially reproductively isolated from other conspecific (of the same taxonomic species) population units; and (2) it represents an important component of the evolutionary legacy of the species.

Evolvability

The potential to generate heritable variation of individuals in a population that can be exploited by natural or artificial selection.

Extinction

The disappearance of a species or some other taxonomic group from a region, niche, or biota; the precise moment of extinction is generally considered to be the death of the last individual of the species (although the capacity to reproduce and recover may have been lost before that point).

Eyed Egg

A fish egg containing an embryo that has developed to the point where the eyes are visible through the egg membrane.

Facultative

The characteristic of being able to adjust to a variety of conditions or circumstances; optional or discretionary.

Fecundity

The reproductive potential or capacity of an organism or population, usually expressed as the number of eggs or progeny produced during a reproductive cycle. Fecundity usually increases with age and size up to some upper limit.

Fish Ladder

An artificial facility made of a series of steps, with flowing water and pools, to assist fish in swimming up or downstream of a fish passage barrier such as a dam or diversion.

Fitness

The degree that an individual is adapted to or is able to produce progeny in its local environment.

Fluvial

Pertaining to streams or rivers, or produced by stream flow action; also migrating between rivers and the ocean.

Fork- Length

Refers to the measurement of a fish from the tip of its snout to the fork in the caudal (tail) fin.

Fry

Juvenile fish that have absorbed their yolk sacs and can emerge from a redd and into deeper water to feed on their own.

Genotype

The genotype of an organism is the genetic code of the individual. Not all individuals with the same genotype look or behave the same way because appearance and behavior are modified by environmental, developmental, or epigenetic factors. Similarly, not all individual that look alike necessarily have the same genotype.

Genetic Distance

A measure of the difference in allele frequencies between populations. Genetic distance can be used to compare the genetic similarity between different species, such as humans and chimpanzees. Within a species, genetic distance can be used to measure the divergence between different sub-species, or populations of the same species.

Gravid

The condition of an individual female carrying ripe eggs, usually with a distended body.

Greenhouse Gas

A gas which is capable of absorbing and emitting infrared light (*e.g.*, water vapor H₂O, carbon dioxide CO₂, methane CH₄, nitrous oxide N₂O, and ozone O₃).

Habitat

The area that is inhabited by a particular species of animal, plant or other type of organisms. It is the natural environment in which an organism lives, or the physical environment that surrounds (influences and is utilized by) a population of a species. The term microhabitat is often used to describe the small-scale physical requirements of a particular organism or population.

Herbivore

An organism that derives its principal source of nutrients and energy by consuming living plants or their parts.

Hydrologic Cycle

The continuous movement of water on, above and below the surface of the Earth (such as from a river to the ocean, or from the ocean to the atmosphere) by the physical processes of evaporation, condensation, precipitation, infiltration, runoff, and subsurface flow. Water takes alternative forms of liquid, vapor, and a solid (snow and ice). The hydrologic cycle also involves the exchange of heat energy, which leads to temperature changes. For instance, in the process of evaporation, water takes up energy from the surroundings and cools the environment. Conversely, in the process of condensation, water releases energy to its surroundings, warming the environment.

The water cycle figures significantly in the maintenance of life and ecosystems on Earth. By transferring water from one location to another, the water cycle purifies water, replenishes the land with freshwater, and transports minerals to different parts of the globe. It is also involved in reshaping the geological features of the Earth, through such processes as erosion and sedimentation. The water cycle exerts an influence on climate as well.

Imprinting

The physiological and behavioral process by which migratory fish acquire the ability to recognize environmental cues that aid their return to their stream of origin as adults.

Incidental Take

The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Independent population

Any collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time frame are not substantially altered by exchanges of individuals with other populations. For example, if one independent population were to go extinct, it would not have a significant impact on the 100-year extinction risk experienced by other independent populations.

Indigenous Species

A species occurring naturally in a particular region, and not artificially introduced.

Intermittent Streams

Streams that flow for some portion, but not all, of the year. Such streams usually receive their waters primarily from surface runoff following storm events.

Interspecific

Interactions, such as competition or predation, between different species.

Interrupted Stream

Stream that exhibit surface and sub-surface flow along difference stream reaches contemporaneously. Such streams often flow through coarse gravels, or intersect high groundwater tables.

Intraspecific

Interactions, such as competition or predation, between individuals of a single species.

Introgression

The movement of genes from one gene pool to another as a result of hybridization between individuals from genetically distinct populations.

Iteroparous

An organism that has the potential to reproduce more than once during its life. Steelhead are the only members of the Pacific anadromous salmonids (*Oncorhynchus* spp.) that do not necessarily die after initial spawning, and may emigrate back to the ocean and then return to freshwater to repeat their reproductive phase.

K-Strategist

A species characterized by a relatively later age at first reproduction, small brood size, few progeny, extensive parental care, and long juvenile periods. Populations exhibit exponential growth rate followed by stable population size, and tend to live in stable environments. Mammals and trees are examples of k-strategist species (see **R-Strategist**).

Kelt

A spawned out anadromous fish; it is generally emaciated and weak as a result of its spawning activity and lack of nourishment.

Latent Heat

Heat carried by water, and released when the water vapor condenses to liquid.

Lateral line

A series of sensory receptors (formed of a series of pores with hair-like structures) arrayed along the sides mid-way between top and bottom of the body; these sensory receptors detect water movement around the fish, allowing it to efficiently navigate currents, detect prey, and swim in coordination with other fish of the same species.

Life Cycle

The successive series of changes through which an organism passes, whether through asexual or sexual reproduction, including breeding, gestation, growth and maturation, and death. This cycle of phases of an individual is also referred to as a life history.

Life History Crossover

In Pacific salmonids, the ability of anadromous *O. mykiss* to produce progeny which assume a freshwater reproductive life cycle, and the ability of resident *O. mykiss*, to produce progeny which assume an anadromous reproductive life cycle.

Life History Polymorphism

In Pacific salmonids, the co-occurrence of the anadromous and resident life cycle forms within a population.

Limiting Factor

Any factor that controls a process, such as an organism's growth or a species' population size, or distribution. The availability of food, predation pressure, or availability of shelter are examples of natural limiting factors. An example of an anthropogenic limiting factor is set of barriers to migration, which is necessary to complete an organism's life cycle.

Littoral Zone

The zone along the coast the forms the interface between the land and water, and often includes intertidal and near-shore waters.

Lotic

Pertaining to running water such as a river or stream.

Mediterranean Climate

The climate is characterized by warm to hot, dry summers and mild to cool, wet winters. Mediterranean climate zones are associated with the five large subtropical high pressure cells of the major oceans. These high pressure cells shift toward the poles in the summer and toward equator in the winter.

Meristics

Measurements of an organism's physical characteristics such as length, scale, spine, and fin-ray counts, *etc.*

Metapopulation

A set of populations that is composed of multiple local populations geographically separated but connected through dispersal and periodic interbreeding. Generally individual populations within such a system have a relatively high probability of local extinction and also recolonization by other populations within the metapopulation. Metapopulations persist as a result of a balance between extinctions of subpopulations and recolonization by others.

Migrate

Travelling long distances in search of a specific type of habitat to enable an organism to complete some phase of its life cycle; fish such as Pacific anadromous salmonids migrate between spawning and rearing areas in freshwater habitat and the marine environment to feed and grow to maturity.

Mathematical Model

A quantitative description of anything (including processes) that cannot be directly observed, but for which relevant data can be developed, and used to simulate an approximation or estimate of the thing being modeled.

Natal Stream

A stream in which a returning adult fish was originally spawned and reared.

Natural Selection

The process by which the frequency of genetic traits in a population through differential survival and reproduction of individual bearing those traits is determined. Natural selection acts on the phenotype or the observable characteristics of an organism, but the genetic (heritable) basis of any phenotype which gives a reproductive advantage will become more common in a population (see allele frequency). Over time, this process can result in modifications in individual organisms that adapt populations for a particular ecological niche and may eventually result in the emergence of new species. It is a key mechanism of evolution.

Non-Point Pollution

Pollution from sources that cannot be defined as discrete points; they include areas of surface mining, construction, or developed agricultural or urbanized areas.

Obligate

The characteristic of being unable able to adjust to a variety of conditions or circumstances; a specific life history or response to particular environmental conditions without alternative means of responding.

Omnivore

An organism whose diet is broad, including both plant and animal foods; specifically an organism that feeds on more than one trophic level; omnivorous organisms are opportunistic, general feeders not specifically adapted to eat and digest either meat or plant material primarily.

Operculum

The hard bony gill cover in bony fishes

Orographic Precipitation

Precipitation induced when moving air masses are forced up the side of elevated land formations, such as large mountains. The lift of the air up the side of the mountain results in cooling, and ultimately condensation and precipitation.

Otolith

Calcareous concretions in the inner “ear” of vertebrates such as fish; the daily accumulation of calcareous layers can be used to determine the age of an organism, and in some cases detect the relative amount of time spent in waters with different chemical composition (*e.g.*, salt and freshwater).

Outmigration

The downstream migration of juvenile fish toward the ocean (see **Emigration**).

Oviparous

Producing eggs that develop outside the females’ body. Fertilization may occur either inside a female or after the eggs are released; however, the embryos receive no extra nutrient other than that contained in the original yolk.

Pacific Decadal Oscillation (PDO)

A pattern of climate variability that shifts phases on at least an inter-decadal time scale, usually about 20 to 30 years. The PDO is detected as warm or cool surface waters in the Pacific Ocean north of 20° N. During a "warm", or "positive", phase, a part of the eastern ocean warms, while the west Pacific becomes cool; during a "cool" or "negative" phase, the opposite pattern occurs.

Panmictic Population

A population in which all individuals are potential reproductive partners, that is, there are no restrictions on mating (*e.g.*, genetic or behavioral).

Parameterization

A technique used in constructing models by substituting an unknown feature such as a process or a limit, with a simplified, but informed estimate of the feature.

Parr

The rearing stage of freshwater salmonids between alevins and smolt that is distinguished by vertical bars or oval spots (parr marks) on the side of the fish.

Pectoral Fin

Fin located toward the front of fish; used for precise movements.

Pelvic Fin

Fin located toward the rear of the fish; used for steering and stopping.

Pelagic

Associated with the open sea or at or near the water's surface. Pelagic fish live near the surface or in the water column of coastal, ocean and lake waters, but not on the bottom of the sea or the lake. They are usually agile swimmers with streamlined bodies, capable of sustained cruising on long distance migrations. They can be contrasted with demersal fish which live on or near the bottom, and reef fish which are associated with coral or volcanic reefs.

pH

A measure of the acidity or basicity of an aqueous solution (generally expressed as the concentration of H⁺ ions). pH is normally measured in a range of 0 - 14. Pure water is said to be neutral, with a pH close to 7.0 at 25 °C (77 °F). Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline.

Phenotype

Any observable characteristic or trait of an organism such as its morphology (shape and size) developmental pattern, biochemical or physiological properties, and behavior. Phenotypes result from the expression of an organism's genes working in conjunction with epigenetic factors as well as the influence of environmental factors and interactions between the two.

Phenotypic Plasticity

The ability of an individual to modify behavioral or other phenotypic characteristics to adjust to differing environmental conditions. In some Pacific salmonids such as steelhead, phenotypic plasticity refers to

the ability to adopt either the anadromous or freshwater-resident life cycle, depending on environmental cues or influences.

Photic Zone

The surface layer of water where there is sufficient light for photosynthesis to occur.

Point-Source Pollution

Pollution originating from a confined, discrete source such as a pipe, ditch, oil-well, or factory.

Population

A group of interbreeding individuals that have developed a distinct gene pool and that breed in approximately the same place and time.

Population Density

The number of individuals per unit area, or linear distance.

Population Model

A quantitative description of how a population changes over time. Population models can take a variety of basic forms, including: age/size structured or biomass based, deterministic or stochastic, density-dependent or density-independent, spatially structured or spatially aggregated, equilibrium or nonequilibrium.

Predation

Predation describes a biological interaction in which a predator feeds on its prey. Predators may or may not kill their prey prior to feeding them, but the act of predation always results in the death of its prey and the eventual absorption of the prey's tissue through consumption. The key characteristic of predation however is the predator's direct impact on the prey population.

Primary Productivity

The production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis, with chemosynthesis being much less prevalent. Almost all life on earth is directly or indirectly reliant on primary production. The organisms responsible for primary production form the base of the food chain. In terrestrial ecosystem these are mainly plants; in aquatic ecosystems, algae are primarily responsible.

Radiative Balance

The physical state of a system, such as the earth-atmosphere system, where the incoming and outgoing solar radiation is in equilibrium; greenhouse gases diminish outgoing solar radiation, thus disrupting the radiative balance.

Rainbow Trout

The resident freshwater form of *Oncorhynchus mykiss*. Individuals can interbreed with the anadromous form of *O. mykiss*, but may or may not be the progeny of the anadromous form, and may or may not produce progeny that exhibit an anadromous life cycle (see Steelhead).

R-Strategist

Species characterized by relatively early age of first reproduction, large brood size, numerous progeny, little no parental care, and short generations. Populations exhibit exponential growth rate followed by sudden crashes in population size, and tend to live in unpredictable and rapidly changing environments. Pacific anadromous salmonids are an example of an r-strategist species (See **K-Strategist**).

Recruitment

The number of fish from a year class reaching a certain age; in fisheries management it is generally the number of fish that grow to a size subject to harvesting.

Redd

A shallow gravel depression excavated by a fish for the purpose of depositing its eggs within the stream channel.

Refugia

Habitats where individuals can avoid predation or environmental stressors such as elevated temperatures, or flood flows.

Relative Humidity

The amount of water vapor in the air, compared with complete saturation. If relative humidity is greater than 100%, the vapor will tend to condense to liquid, until 100% is reached.

Residualization

The process by which an anadromous steelhead foregoes smoltification and maintains a resident, freshwater life history.

Riffle

Shallow section of a stream or river with rapid current and surface broken by gravel, rubble, or boulders.

Run

Swiftly flowing stream reach with little surface agitation, and no major flow obstructions.

Salmonids

Fish of the taxonomic family Salmonidae that includes salmon, trout, whitefish, and char.

Seasonal Lagoon

An estuary that becomes separated from the ocean by a sandbar barrier for part of the year.

Sea Level Rise

The rise in average sea level elevation with respect to current terrestrial elevations. Increasing sea level is the result of increasing temperatures causing the thermal expansion of water and the addition of water to the oceans from the melting of mountain glaciers, polar ice caps, and Greenland and Antarctic ice sheets.

Sediment

Fragment of rock, soil, and organic matter transported and deposited in layers (beds) by wind, water, or other natural phenomena. The term can refer to any size of particles but is often used to indicate only fragments smaller than 6 mm.

Sedimentation

Deposition of material suspended in water or air, usually when the velocity of the transporting medium drops below the level at which the material can be supported and moved.

Sediment Loading

The total sediment in a stream system, whether in suspension (suspended load) or on the bottom (bed load).

Self-sustaining Population

A population that perpetuates itself without human intervention, and without chronic decline, in its natural ecosystem, at sufficient levels that listing as threatened or endangered under the ESA is not warranted.

Semelparous

Organisms which reproduce only once. The single reproductive event of semelparous organisms is usually copious, as well as fatal to the reproducing organism. An example of a semelparous organism are the various species of Pacific salmon (*Oncorhynchus* spp.), which live for several years in the ocean before migrating to the freshwater stream of its birth, laying eggs, and dying.

Sink Population

A local population that has a negative growth rate, or a high probability of periodic extinction; its continued persistence is dependent upon immigration from other local populations, or dispersal from more remote populations.

Smolt

A young salmon or steelhead that is undergoing physiological changes in preparation for entering the ocean.

Smoltification

The suite of physiological, morphological, biochemical, and behavioral changes, including the development of a silvery coloration and tolerance of saltwater, which takes place in salmonid parr as they prepare to migrate downstream to the ocean.

Source Population

A local population that has a sufficiently high growth rate when small to persist even without immigration from other local populations, or dispersal from more remote populations.

Spawning Density

The number of potentially spawning individual in a length of stream, tributary, or some other hydrologic unit.

Steelhead

The anadromous form of *Oncorhynchus mykiss*. Individuals can interbreed with the non-anadromous form of *O. mykiss* (Rainbow trout), but may or may not be the progeny of the anadromous form, and may or may not produce progeny that exhibit an anadromous life cycle (see **Rainbow Trout**).

Stochastic

The state where a system's components are affected by random variability. A stochastic model is a model whose behavior is not fully specified by its form and parameters, but which contains an allowance for unexplained effects represented by random variables.

Stratification

The establishment of distinct layers of temperature or salinity in bodies of water such as an ocean, lake, or estuary, based upon the different density of warm and cold water, or saline or freshwater. In statistics, the classification of data into categories or subcategories on the basis of selected criteria.

Stream Order

A numerical designation (from 1 to 6 or higher) that designates the relative position of a stream or stream segment in a drainage basin from headwaters to the rivers downstream terminus.

Substrate

Mineral or organic material that forms the bed of a river or stream.

Sustainable Fishery

A fishery that does not cause or lead to undesirable changes in the biological and/or economic productivity, biological diversity, or ecosystem structure and functioning from one human generation to the next.

Taxon

Any named group of organisms at any taxonomic level (*e.g.*, Phylum, Order, Class, Genus, Species, Sub-species, *etc.*).

Temperature Lapse Rate

The rate of decrease in temperature with altitude in the stationary atmosphere at a given time and location.

Thalweg

A line connecting the deepest parts of a river or stream channel.

Thermocline

A region below the surface layer of the sea or lake, or pool where the temperature gradient increases abruptly (*i.e.*, where temperature decreases rapidly with increasing depth). It is often an ecological barrier, and its oscillations have significant consequences on the distribution of organisms.

Total-Length (TL)

The length of a fish defined as the straight-line distance from the tip of the snout to the tip of the tail (caudal fin) while the fish is lying on its side normally extended.

Triploid

An organism having three sets of chromosomes, rather than the more typical two; triploid individuals are generally infertile, or incapable of reproduction.

Trophic Level

The position an organism or species occupies in the food chain, or web. A food chain represents a succession of organisms that eat other organisms and are, in turn, eaten themselves. The number of energy transfer steps is, from the start of the chain, a measure of its trophic level. Food chains start at trophic level 1 with primary producer such as plants, move to herbivores level 2, predators at level 3 and typically finish with carnivores or predators at level 4 or 5 determined by the number of energy-transfer steps to that level.

Upwelling

An oceanographic phenomenon that involves wind-driven motion of dense, cooler, and usually nutrient-rich water, towards the ocean surface, replacing the warmer, usually nutrient-depleted surface water. The increased availability in upwelling regions results in high levels of primary productivity and thus fish growth and abundance. Wind-driven currents are diverted to the right of the winds in the Northern Hemisphere and to the left in the Southern Hemisphere. When surface water transport is occurring away from the coast, surface waters near the coast are replaced by deeper, colder, and denser water.

Viable Salmonid Population

An independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation (such as population size or sex ratio), local environmental variations, and genetic diversity changes over a 100-year time frame.

Viability Population Parameters

The four measurable characteristics of a viable salmonid population: 1) abundance, 2) growth rate, 3) spatial structure, and 4) diversity (including genetic and phenotypic diversity).

Volitional Fish Passage

The movement of fish at natural rates of migration in response to cues such as natural flow patterns or water temperature, or other natural physiological changes in individuals.

Water Table

The irregular surface of contact between the zone of saturation and the zone of aeration; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

Weathering

The physical/chemical processes in which a material is broken down through exposure to the atmospheric conditions (heat, water, *etc.*)

Winter-Run Fish

Anadromous fish that return to freshwater in the autumn or winter, migrating to spawning areas, and then spawn in later winter or early spring.

Young-of-the-Year

Juvenile fish that are less than a year old (and are in their first year of growth).

Abbreviations

AMCES	AmeriCorps Environmental Stewards
AMBAG	Association of Monterey Bay Area Governments
AC	Audubon California
ACOE	Army Corps of Engineers (United States)
ACWA	Association of California Water Agencies
AG	Arroyo Grande
ASRA	Arroyo Seco River Alliance
BCLC	Big Creek Lumber Company
BSLT	Big Sur Land Trust
BIA	Bureau of Indian Affairs (United States)
BLM	Bureau of Land Management (United States)
BMPs	Best Management Practices
BOR	Bureau of Reclamation (United States)
BPG	Biogeographic Population Group
BRT	Biological Review Team
CAWC	California-American Water Company
CCCOM	California Coastal Commission
CCCON	California Coastal Conservancy
CCCORP	California Conservation Corps
CDSOD	California Division Safety of Dams
CDFW	California Department of Fish and Wildlife
CDF&FP	California Department of Forestry and Fire Protection
CDOT	California Department of Transportation
CDPR	California Department of Parks and Recreation
CDMG	California Division of Mines and Geology
CESA	California Endangered Species Act
CNPS	California Native Plant Society
COC	Chemical of Concern
CRPP	California River Parkway Program
CSFPR	California Sport Fishing Protective Association
CSWMB	California State University, Monterey Bay
CSWRCB	California State Water Resources Control Board
CT	California Trout
CCSD	Cambria Community Services District
CAWD	Carmel Area Wastewater District
CRA	Carmel River Association
CRLC	Carmel River Lagoon Coalition
CRSA	Carmel River Steelhead Association
CRWC	Carmel River Watershed Conservancy
CRWCO	Carmel River Watershed Council
CVPOA	Carmel Valley Property Owners Association
CCRCDC	Central Coast Resource Conservation and Development Council
CCSE	Central Coast Salmon Enhancement, Inc.
CHEER	Coastal Habitat, Education, and Environmental Restoration
CSLRCD	Coastal San Luis Resource Conservation District

CI	Confidence Interval
CMARP	Comprehensive Monitoring Assessment and Research Program
C ⁰	Centigrade
cm	Centimeters
cm/sec	Centimeters per second
COA	City of Atascadero
COC	City of Carmel
COM	City of Monterey
COMB	City of Morro Bay
COG	City of Gilroy
COPS	City of Paso Robles
COPB	City of Pismo Beach
COS	City of Salinas
CSLO	City of San Luis Obispo
COSM	City of San Miguel
COW	City of Watsonville
CV	Coefficient of Variation
CWT	Coded Wire Tag
DOT	Department of Transportation (United States)
DIDSON	Dual-Frequency Identification Sonar
DPS	Distinct Population Segment
DWR	Department of Water Resources (State of California)
EPA	Environmental Protection Agency (United States)
EFH	Essential Fish Habitat
EII	Earth Island Institute
ENSO	El Niño/Southern Oscillation
ESF	Elkhorn Slough Foundation
ESA	Endangered Species Act (United States)
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FL	Fork Length
FOR	Friends of the River
FRGP	Fisheries Restoration Grant Program
ft/sec	Feet per second
GCWC	Garrapata Creek Watershed Council
HCP	Habitat Conservation Plan
IRWMP	Integrated Regional Watershed Management Plan
km/hr	Kilometers per hour
LFPW	Los Padres Forest Watch
m	Meters
mi ²	Square miles
m/sec	Meters per second
mm	Millimeters
MC	Monterey County
MCWD	Marina Coast Water District
MOU	Memorandum of Understanding

MNNEP	Morro Bay National Estuary Program
MBMMS	Monterey Bay National Marine Sanctuary
MBSTP	Monterey Bay Salmon and Trout Project
MCPW	Monterey County Public Works Department
MCSA	Monterey County Service Area 50
MCWRA	Monterey County Water Resources Agency
MPWMD	Monterey Peninsula Water Management District
MRPD	Monterey Regional Park District
MCUSA	Monterey County Unified Sportsmen Association
NGO	Non-Governmental Organization
NFWF	National Fish and Wildlife Foundation
NMFS	National Marine Fisheries Service (United States)
NOAA	National Oceanic and Atmospheric Administration (United States)
NPSPWRO	National Park Service, Pacific Western Regional Office (United States)
NRCS	National Resources Conservation Service (United States)
PCSRF	Pacific Coastal Salmon Recovery Fund
PITT	Passive Integrated Responder Tags
ppt	Parts per thousand
PBCSD	Pebble Beach Community Services District
PCLF	Planning and Conservation League Foundation
PVA	Population Viability Analysis
RFID	Radio Frequency Identification
RM	River Mile
RST	Rotary Screw Trap
RWQCB	Regional Water Quality Control Board (State of California)
RCDMC	Resource Conservation District of Monterey County
RCDSC	Resource Conservation District of Santa Cruz County
SBC	San Benito County
SBCWD	San Benito County Water District
SLOCFB	San Luis Obispo County Farm Bureau
SCC	Santa Clara County
SCCRCD	Santa Cruz County Resource Conservation District
SCRC	Santa Cruz County
SCVWD	Santa Clara Valley Water District
SLP	Santa Lucia Preserve
SLOC	Santa Luis Obispo County
SVFFC	Salinas Valley Fly Fishers Club
SWP	State Water Project
SWRCB	State Water Resources Control Board (State of California)
TBSLT	The Big Sur Land Trust
TCLT	The Cambria Land Trust
TLCSLOC	The Land Conservancy of San Luis Obispo County
TBD	To Be Determined
TNC	The Nature Conservancy
TCFT	Tri-County Fish Team
TL	Total Length
TRT	Technical Recovery Team

TU	Trout Unlimited
TWC	The Wildlands Conservancy
TWI	The Watershed Institute (California State University, Monterey Bay)
USLTRCD	Upper Salinas-Las Tablas Resources Conservation District
USWC	Upper Salinas Watershed Coalition
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VWA	Ventana Wilderness Alliance
VSP	Viable Salmonid Population
USA	United States Army (Fort Hunter Liggett, Camp Roberts)
WCB	Wildlife Conservation Board (State of California)