



Introductory Glossary

This glossary is intended to help new committee members and board members get up to speed—it’s tailored to focus on the acronyms and terminology you are most likely to encounter during your service with the Recovery Board. For a comprehensive glossary, visit [Yakipedia](#).

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Terminology to Get You Started

Unless otherwise noted, each letter in acronyms is pronounced.

Acre-foot: The volume of water needed to cover an acre of land to a depth of one foot (≈325,000 gallons), a common unit for quantifying how much water is needed for irrigation or stored in our reservoirs

Adfluvial: Resident fish that spawn and rear in streams, but live in lakes or reservoirs as subadults and adults. All of the Yakima Basin’s kokanee and many of our bull trout populations are adfluvial. See *Resident*, *Fluvial*.

Alevin: Freshly hatched salmonids that still have the yolk sac from their eggs attached to their bellies. Once they have consumed the yolk sac and grown in size, they emerge from their nest gravel (*Redd*) and are considered *Fry*.

Anadromous: Fish that are born and rear in freshwater, migrate to and mature in salt water, and return to freshwater to spawn. Most salmon are anadromous. Some fish species, like *Oncorhynchus mykiss*, have both anadromous (steelhead) and resident (rainbow trout) individuals. Contrast with *Resident*.

Bankfull: the point at which a stream or river is filled to the brim, carrying the maximum flow it can hold within its regular channel before spilling over into the *floodplain*. Typically, streams reach bankfull levels at least once a year.

BDA: Beaver dam analog. Human-constructed habitat features that function like a beaver dam—holding back water to inundate the *floodplain* and raise the water table. BDA's may be installed to get the benefits of beaver dams in places without beavers, or to encourage beavers to settle in a particular area.

BT: Common abbreviation for bull trout.

BTAP: Yakima Bull Trout Action Plan. The primary guiding document for bull trout recovery in the Yakima Basin. The Bull Trout Working Group (BTWG) works to update and implement the plan. Pronounced, “bee-tap.”

CC: Citizen Committee. One of two committees, along with the *TAG*, that evaluate *SRFB* project proposals. The CC is composed of 16 local citizens, with four from each county in the Lead Entity (Benton, Kittitas, and Yakima) and the Yakama Nation. The CC evaluates *SRFB* proposals on social, economic, and cultural value/impact.

cfs: Cubic feet per second, a common unit for quantifying streamflow

Diversion: a structure that redirects water from a natural stream for another purpose, such as irrigation. Diversion projects may include the construction of dams, weirs, levees, pumping stations, irrigation canals, or any other manmade structure that modifies the natural flow of a waterway. These structures can be harmful to fish if the fish are redirected along with the water into the irrigation system (*see entrainment*), if the fish get caught on the water intake structure, or if the structure blocks fish from moving further up the stream.

ELJ: Engineered Log Jam. ELJ's mimic natural log jams, which provide [numerous benefits](#) to fish. See *LWD*.

Entrainment: When a fish passes through or over a dam/barrier/screen such that it can't return to where it came from, it is considered “entrained”. We see two main forms; when fish enter and are then trapped in an irrigation canal, and when fish pass downstream through a major dam and are unable to return to habitat upstream of the dam. We also talk about entrainment into fish sampling facilities, in which case fish typically are returned to the river after sampling.

ESA: Endangered Species Act.

ESA-listed: a species or *population* of a species that is classified by the federal government under the ESA as either “endangered” with extinction or “threatened”

with becoming endangered. In the Yakima Basin, we have no “endangered” fish species, but we have two ESA-listed “threatened” fish species, steelhead (the anadromous form of *Oncorhynchus mykiss*) and bull trout. These are the highest priority species the Recovery Board works to recover.

Fishery: the act or business of catching fish, or an area where fish are caught.

Floodplain: The relatively flat areas adjacent to river channels that are partially or totally covered with water in flood events. A floodplain is “well-connected” when water is able to spread out from the main channel in flood events (as opposed to a “channelized” stream that has been artificially straightened or restricted by manmade structures). Well-connected floodplains have numerous ecological benefits—they lead to less intense flood events by allowing the water to disperse and slow down, give young fish a refuge from being swept downstream, and more. [Read more about floodplains here.](#)

X-year floodplain: The area which has a 1/X annual chance of flooding. For example, the 100-year floodplain has a 1/100 or 1% annual chance of flooding, while the 2-year floodplain has a ½ or 50% annual chance of flooding.

Fluvial: Resident fish that spawn and rear in tributaries, but occupy habitats in larger streams and mainstem rivers as subadults and adults. Examples include bull trout in the Naches River and its tributaries, and many rainbow and cutthroat trout. See *Afluvial, Resident*.

Fry: A juvenile salmonid that has consumed its yolk sac, about 1-2 inches in length. Following life stages include *Parr* and *Smolt*.

Hab: short for habitat.

High Flow Event: Describes when the amount of water in a stream increases above the *OHWM*. Floods count as high flow events, but not all high flow events cause flooding. High flow events generally mean increased stream velocity, which means greater movement of sediment and a less hospitable environment for fish, which will try to move to lower velocity areas like *side channels*.

Hold: when fish pause their migration and hang out in an area in the interim. Reasons fish might hold include waiting for better migration conditions, or waiting for the right season to smolt or spawn.

HUC: Hydrologic Unit Code, pronounced, “huck.” [Hydrologic units](#) are a set of standardized hydrologic geographic units in the US, typically referred to as HUC’s. There are several different layers of HUC’s ([see here](#)); the largest units are called HUC-2’s (e.g., the Pacific Northwest), and the smallest sub-units are HUC-12’s (a small local watershed).

HUC codes can be pretty inscrutable to the uninitiated (just a string of numbers) and don't always match the way we talk about watersheds locally, so the Recovery Board has developed [our own regional geographic units](#) with names that match local usage but can be tied back to HUCs.

Incubation: the period after salmon eggs are laid in *redds* during which they remain in the gravel for months while the embryos develop. When the eggs hatch, *alevin* emerge.

Introgression, aka Introgressive Hybridization: the transfer of genetic material from one species into the gene pool of another. Introgression is a major issue for bull trout; when they breed with brook trout, the result is hybrid offspring that are generally not able to reproduce.

Juvenile Rearing: period during which young salmon grow in freshwater; includes *Fry* and *Parr* life stages. Ends when they turn into *smolts* and begin their migration to the ocean.

Kelt: A steelhead that has survived spawning and may return to the ocean before returning to freshwater to spawn a second (or even third) time. Unlike Pacific salmon, steelhead (as well as Atlantic salmon and European sea trout) don't all die after spawning.

Lead Entity (LE): A local salmon recovery organization created in accordance with [RCW 77.85.050](#) to solicit, evaluate, and rank proposals for salmon recovery projects, so as to develop an annual ranked project list(s) for consideration for funding by the Salmon Recovery Funding Board (SRFB). There are 25 LE's across WA, each with their own specific geographic area. LE's typically include a technical and a citizen advisory committees and are managed by a designated LE Coordinator; LE operating costs are funded through a contract with RCO. The Yakima Basin Fish and Wildlife Recovery Board serves as the lead entity for the Yakima Basin.

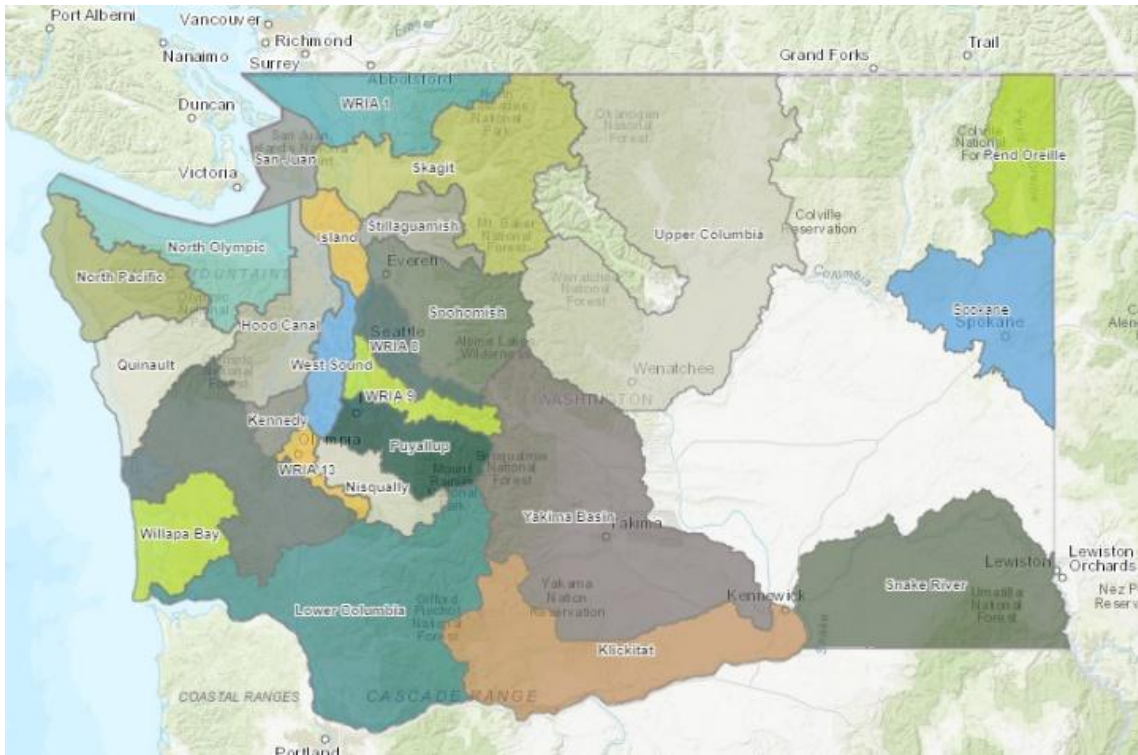


Figure 1. The 25 Lead Entities

Life History Stage: a specific period during the life cycle of a fish such as spawning, incubation, juvenile rearing, smolt migration, etc.

Life History Strategy: the distinct patterns of how fish use different habitats at different points in their life. For example, a fish with a *resident* life history may live its whole life within the same mile of stream, while a fish with a *fluvial* winter migrant life history may migrate to floodplains far downstream during the winter and return to its home stream in summer. Life history categories include *Afluvial*, *Anadromous*, *Fluvial*, and *Resident*, but the term is also used to talk about specific patterns in habitat usage over time within each of these larger categories.

LWD: Large Woody Debris. Trees and tree limbs that have fallen into a stream or river and are often pushed together into log jams. [Important for stream health](#); may be added to streams where it is lacking as part of restoration projects. See *ELJ*.

Mainstem: Term applied to the principal channel of a major stream or river. Mainstems are fed by numerous tributaries and may have side channels.

Middle Columbia Steelhead Recovery Plan: The Recovery Plan for the [Middle Columbia Steelhead DPS](#) (the whole steelhead population of the Mid-Columbia Region) developed by

NOAA Fisheries as required by the *ESA*. The 2009 Yakima Steelhead Recovery Plan developed by the Recovery Board is incorporated into the federal plan as a chapter.

Migration: the regular, often seasonal, movement of all or part of an animal population to and from a given area. Salmon migrate from freshwater streams to the ocean as *smolts* and migrate back from the ocean as adults to their natal streams to *spawn*.

Mobilization: in habitat restoration projects (and construction projects more generally), this is the phase of preparing, organizing, and transporting materials, equipment, and personnel before construction begins. This step ensures all elements are in place for construction to proceed efficiently once started. Often shortened to “mob.”

(River) Mouth: where a river or stream enters into another body of water, such as an ocean, lake, or another river.

NMI (Needs More Information): A rating the SRFB review panel can give projects after site tours when the review panel needs more information before they can clear the project. A sponsor may get their project cleared by supplying the requested additional information, but if concerns remain, the review panel may switch the designation to POC (Project of Concern). *Contrast with POC.*

OHWM: Ordinary High-Water Mark. The highest elevation of the regularly inundated stream channel, as marked by erosion patterns, changes in vegetation, and debris deposits. Typically at or just below the *bankfull* level.

Parr: Once *fry* have grown to several inches long and developed vertical fingerprint marks on their sides called “parr marks”, they are considered *Parr*. If they are *anadromous*, when they journey to the ocean to mature, they become *Smolts*.

PCSRF: Pacific Coastal Salmon Recovery Fund, a primary source of funding for the SRFB grant program. Established by Congress to reverse the decline of West Coast salmon. Managed by NOAA fisheries and made available to Pacific Salmon States (AK, CA, ID, OR, and WA) and federally recognized tribes in the region. Commonly pronounced “Pack-Surf.”

PIT tag: Passive Integrated Transponder tag (a tracking device implanted in fish to study their movements). Pronounced like the word, “pit”.

POC (Project of Concern): A rating the SRFB review panel can give projects when the review panel has such significant concerns about a project that it recommends that it not be funded. Lead Entities typically remove POC’s from the annual funding list they submit to the SRFB. *Contrast with NMI.*

PPFL: Planned Project Forecast List. A list of projects that are anticipated to be pursued in the coming two years. Projects are solicited from project sponsors by the Lead Entity Coordinator. The list is then used by RCO as it develops funding requests to the legislature. See *RCO*.

PRISM: RCO's online database for grant management. Pronounced like the word, "prism." (It stands for "Performance and Registration Information Systems Management", but nobody calls it that.) Contrast with *SRP*.

RCO: the Recreation & Conservation Office. This is a state agency that manages numerous grant programs, including SRFB. Lead Entities are contracted through RCO. See *Lead Entity*, *SRFB*.

Rear: to mature and grow. Salmon and steelhead undergo a period of juvenile rearing in freshwater and adult rearing in the ocean.

Redd: A salmonid spawning bed, or "nest". Redds are dug by female salmonids in streambed gravels, and females deposit and bury fertilized eggs in them.

Resident: Fish that spend their entire life cycle in freshwater, without making significant migrations. The Ahtanum Bull Trout Population is our only resident bull trout population in the Yakima Basin; many other species of trout also have a resident life history. Contrast with *Anadromous*.

Review Panel (RP): Shorthand for the SRFB State Review Panel, a group of engineers, fisheries experts, and habitat experts hired by the SRFB to review projects for technical soundness simultaneously with the local review process. The panel provides an independent, third-party review of the technical merits of SRFB proposals from throughout the state.

Regional Fisheries Enhancement Groups (RFEG): 14 nonprofits created around WA in 1990 through the [RFEG program](#) to involve local communities, volunteers, and landowners in WA's salmon recovery efforts. RFEG's are partially funded by WDFW, but they also seek grants and donations, and their boards are composed of local citizens. Our RFEG is the Mid-Columbia Fisheries Enhancement Group, often referred to as Mid-Columbia Fisheries or MCF. See *Fishery*.

RFP: Request for Proposal (to solicit grant applications)

Riparian: relating to, living on, or located on the bank of a stream, creek, river, pond, lake, marsh, estuary, or tidewater. We often talk about riparian areas in reference to the area that grows vegetation supported by stream and flood waters, and contrast those to "uplands".

RM: River Mile. River miles count upward from a stream’s mouth, that is, its lowest point (where it either joins a larger stream or a lake, or meets the ocean). So, “Yakima River RM 0” would be the confluence with the Columbia River, “Naches River RM 0” would be where the Naches River joins the Yakima River, etc.

Salmonid: a family of genetically similar fish species that includes salmon, trout, char, and white fish. [Visit this website](#) to learn all about the various species!

SARM: Salmon Recovery Model (a project scoring matrix developed by the TAG). Pronounced like a word, “sarm”.

SRFB: the Salmon Recovery Funding Board, which runs the annual grant round for all Lead Entities across the state. Pronounced "surf-board". See *Lead Entity, RCO*.

SH: Common abbreviation for steelhead.

Side Channel: a small channel that branches from the mainstem of a river and returns to the river further downstream. Side channels are formed by the erosive power of the river and may move, fill in, or become the new mainstem over time.

Smolt: A juvenile fish that is migrating out to the ocean. “Smoltification” is a series of bodily changes that salmonids undergo to transition from a freshwater to saltwater environment.

Spawning Adult: a sexually mature adult fish that is ready to spawn or in the process of spawning (laying/fertilizing eggs). Spawning adult salmonids look distinct from their adult ocean counterparts; depending on the species, their body color changes from silver to shades of brown, green, or red. The males of some species develop a hooded snout, humped back, and elongated teeth. Salmonids do not feed once they leave the ocean and begin the migration to their freshwater spawning grounds; they spend all their energy navigating back to their natal streams to spawn. After spawning, Pacific salmon die. Some trout (and Atlantic salmon) become *Kelts*.

Sponsor: Shorthand used to refer to SRFB grant applicants, aka project sponsors.

SRP: [Salmon Recovery Portal](#). A database like *PRISM* where you can find and learn about all SRFB projects online, but also planned or conceptual projects as well. See the [SRP Map](#). Does not contain documents associated with the projects, though; for that *PRISM* is the place to go.

Staging: in habitat restoration projects, the action of temporarily storing machinery and materials leading up to and/or during the project. The staging area is the site where machinery/materials are stored.

- Also, when fish hold in anticipation of future movements (e.g., fish staging in deep pools near a spawning area that they'll spawn in soon).

Subadult: a life stage, typically referred to for bull trout, where larger juvenile fish (typically 2-4 years old) migrate widely in search of food before returning to their natal streams to spawn at 4-5 years old.

TAG: Technical Advisory Group. One of two committees, along with the CC, that evaluate SRFB project proposals in the Yakima Basin. The TAG is composed of local biologists, scientists, and natural resource professionals who represent a variety of agencies and expertise, and evaluate the technical soundness and biological priority of proposals. Pronounced like the word, "tag".

Targeted Investments (TI): A newer SRFB grant program for large projects (over \$1M) that takes place in even numbered years.

Tributary: A river or stream flowing into a larger river, stream, or lake. Commonly referred to as "trib" for short.

Uplands: See *Riparian*.

Watershed: The entire geographic area upstream of a point that drains precipitation past that point. Watersheds vary in scale; the Yakima Basin is a watershed, but it also contains many smaller watersheds within it (for example, the Naches watershed, the Teanaway watershed, the Toppenish watershed, etc). Used interchangeably with "catchment" and "basin".

WRIA: Water Resource Inventory Area, commonly pronounced, "Rye-uh." A standardized definition of large watersheds used by the State of Washington. The Yakima Basin is made up of WRIA's 37, 38, and 39, which are consistent with *HUC-8*'s.

YBFWRB: Yakima Basin Fish & Wildlife Recovery Board. "The Recovery Board" for short.

YBTAP: see *BTAP*.

YSRP: Yakima Steelhead Recovery Plan. The primary guiding document for steelhead recovery in the Yakima Basin. Completed by the Steelhead Working Group (SWG) in 2009 and formally adopted by NOAA Fisheries as a chapter in the ESA-required Middle Columbia Steelhead Recovery Plan.

Young of Year (YOY): Young fish in their first year of life. Term overlaps with *Fry* and *Parr*.

Organizations & Groups to Know

Unless otherwise noted, each letter in acronyms is pronounced.

BLM: Bureau of Land Management. A federal agency that manages federal lands in the Yakima Basin, mainly in the Yakima Canyon, Cowiche Creek, and Swauk Creek watersheds and upland areas in the Lower Yakima Basin.

BPA: Bonneville Power Administration, the federal hydropower marketing administration within the federal Department of Energy. The Northwest Power Act directs BPA to fund fish and wildlife projects to mitigate the impacts of federal dams; this funding is widely used in the Yakima Basin.

BTWG: Bull Trout Working Group. A local group convened by the Recovery Board that updates and monitors progress on the Yakima Bull Trout Action Plan (BTAP) and coordinates bull trout recovery activities in the Yakima Basin.

CD: Conservation District, county-level natural resource conservation organizations. The North Yakima CD (NYCD), South Yakima CD (SYCD), Kittitas County CD (KCCD), and Benton CD (BCD) are the conservation districts in the Yakima Basin. They frequently sponsor SRFB projects.

DOE: WA Department of Ecology, which implements state water quality and quantity programs along with many other pollution reduction programs.

DOT: WA Department of Transportation, which is frequently involved in salmon recovery projects where state highways cross or are adjacent to stream and rivers.

DNR: WA Department of Natural Resources. Manages most state-owned lands, including the riverbeds of most rivers, and regulates forestry activity.

FWS: see *USFWS*.

GSRO: Governor's Salmon Recovery Office. Coordinates salmon and [orca recovery](#) for the state and develops the state's strategy to guide those efforts and track progress. Produces the annual [State of Salmon in Watersheds](#) report. Administered by the RCO, but works under the authority of the governor.

KCT: Kittitas Conservation Trust. A non-profit organization working in upper Kittitas County that is a frequent SRFB project sponsor.

Kittitas County Public Works: An occasional SRFB project sponsor and agency in charge of roads and floodplain management in the County.

MCF(EG): Mid-Columbia Fisheries (Enhancement Group). A frequent SRFB project sponsor. See *RFEG*.

NOAA: National Oceanic & Atmospheric Administration. Their fisheries department helps fund our SRFB grants via PCSRF. Also involved in reviewing projects to ensure their compliance with the ESA.

NPCC: Northwest Power & Conservation Council, created following the 1980 Northwest Power Act to “inform and advance a regional vision for power and fish & wildlife in the Columbia Basin”. Provides funding recommendations for BPA’s fish and wildlife programs.

RCO: the WA Recreation & Conservation Office. LE’s are contracted and SRFB grant programs (plus other grant programs) are run through this office. Administers the GSRO.

RC&D: Washington Resource Conservation & Development council, a nonprofit that supports communities’ adaptation to changing environmental and economic conditions, including salmon habitat restoration and wildfire planning.

Reclamation (also **BOR, USBR**): the Bureau of Reclamation, a water management agency in the Western US. A source of grant funds.

SRFB: the Salmon Recovery Funding Board, which runs the annual grant round for all LE’s across the state. Run by RCO. Pronounced "surf-board".

TU: Trout Unlimited. A nonprofit focused on trout conservation that is a frequent SRFB project sponsor.

USFS (also, **FS**): United States Forest Service. The Recovery Board works primarily with the Naches and Cle Elum Ranger Districts of the Okanogan-Wenatchee National Forest.

USFWS (also, **FWS**): United States Fish & Wildlife Service. The USFWS is a federal agency that manages fish and wildlife resources in the public trust, including more than 560 national wildlife refuges and dozens of national fish hatcheries. It also provides funding and project review for fish restoration projects.

WDFW (also, **DFW**): Washington Department of Fish & Wildlife. WDFW is a state agency that preserves and protects WA’s fish, wildlife, and ecosystems while providing sustainable recreational and commercial opportunities. Also an occasional SRFB project sponsor.

WWT: Washington Water Trust, a nonprofit focused on protecting instream flows across WA. A frequent SRFB project sponsor.

Yakama Nation Fisheries: A program of the Yakama Nation that conserves culturally important fish populations and their habitats, and protects the rights of YN members to use

those natural resources. Partner in the Yakima-Klickitat Fisheries Project. A frequent SRFB project sponsor.

[YBFWRB](#): Yakima Basin Fish & Wildlife Recovery Board. “The Recovery Board” for short.

[YBIP](#): Yakima Basin Integrated Plan, a 30-year collaborative water resource plan (2013-2045). The Lead Entity coordinates with the YBIP habitat subcommittee to fund fish habitat restoration projects in the Yakima Basin. Pronounced, “why-bip.” See *YRBWEP*.

[YKFP](#): Yakima-Klickitat Fisheries Project. A joint fisheries management project of the Yakama Nation and WDFW in the Yakima and Klickitat River Basins. A frequent SRFB project sponsor.

YN: Yakama Nation. A frequent SRFB project sponsor. Key programs include Yakama Nation Fisheries, Lower Yakima, Yakama Watersheds, and [Yakama Wildlife](#).

[YRBWEP](#): Yakima River Basin Water Enhancement Project, a program of the Bureau of Reclamation that was created by Congress in 1979 and has federal direction and funding to support habitat restoration, water conservation, and other activities that meet water supply and fisheries goals in the Yakima Basin. In 2009, the YRBWEP program joined with the state Department of Ecology to create the Yakima Basin Integrated Plan (also referred to as YRBWEP Phase III). The YBIP program is overseen by a partnership called the YBIP workgroup that is co-chaired by the Department of Ecology and the Bureau of Reclamation. Pronounced, “yurb-wep.”

[YTAHP](#): Yakima Tributary Access & Habitat Program, organized in 2002 by RC&D with regional partners including the North Yakima and Kittitas County Conservation Districts, the Yakama Nation and MCF to help restore fish passage and habitat on Yakima River tributaries by providing technical and financial assistance. Primarily funded by BPA and a frequent source of cost-share funds for SRFB proposals. Pronounced, “why-tap.”

Places to Know

See maps with watershed names on Yakipedia [here](#).

Bonneville Dam: the most downstream dam on the Columbia River.

The Dalles Dam: the second most downstream dam on the Columbia River.

Gap-to-Gap: The 8-mile stretch between Selah Gap and Union Gap.

John Day Dam: the third most downstream dam on the Columbia River, and second dam downstream of the Yakima River.

Lower Yakima: The stretch of the Yakima River that is downstream of Union Gap.

McNary Dam: the fourth most downstream dam on the Columbia River, and first dam downstream of the Yakima River.

Naches Basin: the watershed upstream of the mouth of the Naches River. The watershed supports its own distinct population of steelhead (one of four in the basin).

Naches River: A tributary of the Yakima River running from the Cascade Crest near White and Chinook Passes by the town of Naches to its confluence with the Yakima in the City of Yakima; a significant watershed for steelhead and bull trout.

Prosser Dam: a dam on the Yakima River mainstem in Prosser, WA. Commonly called just "Prosser". Serves as an irrigation diversion for farms downriver in the Lower Yakima Valley.

Roza Dam: a dam on the Yakima River mainstem in the Yakima River Canyon. Commonly called just "Roza". Serves as an irrigation diversion for much of the Lower Yakima Valley.

Satus Creek: A tributary of the Yakima River on the Yakama Reservation; supports its own distinct population of steelhead (one of four in the basin).

Toppenish Creek: A tributary of the Yakima River on the Yakama Reservation; supports its own distinct population of steelhead (one of four in the basin).

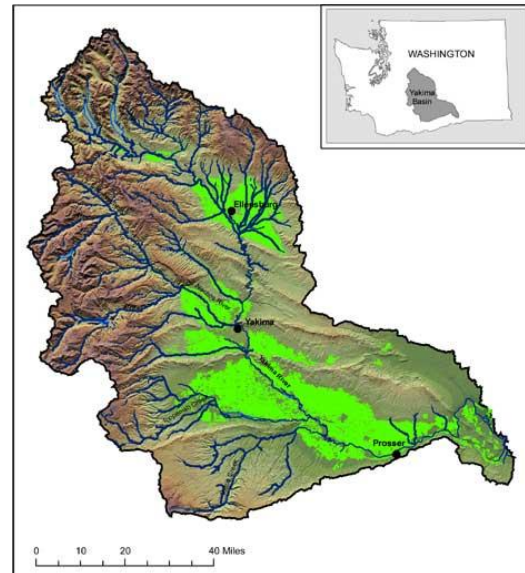
Upper Yakima: Refers to the stretch of the Yakima River that is upstream of the confluence with the Naches River; a significant watershed for salmon, steelhead and bull trout.

Upper Yakima Basin: the watershed upstream of the confluence of the Naches River. The watershed supports its own distinct population of steelhead (one of four in the basin).

Wapatox Dam: A diversion dam on the Naches River just downstream of the confluence of the Naches and Tieton Rivers. Commonly called just "Wapatox". Serves as an irrigation diversion for farms in the Naches Heights and Upper Yakima Valley.

Yakima Basin: Our watershed, within which all surface and groundwater drains to the Yakima River, and eventually to the Columbia River. The basin extends from Snoqualmie Pass, Chinook Pass, and White Pass all the way to the mouth of the Yakima River where it meets the Columbia River.

The Yakima Basin



Timing of life stages for Yakima Basin salmon and focal species

Charts pulled from the [2004 Yakima Sub-Basin Plan](#). For in-depth explanations, see pages 211-269.

Steelhead (*Oncorhynchus mykiss*, commonly referred to as “O. mykiss”)

Adult steelhead typically return from the ocean in late July through early September, but then hold somewhere between Bonneville Dam and their tributary spawning areas until they finish their migrations and spawn in February through June. Juveniles emerge in the late spring/summer and rear in freshwater for 1-4 years (sometimes more) before migrating out to the ocean as smolts in the spring.

Steelhead do not die after spawning, and may migrate back to the ocean as kelts and return to spawn again in future years.

Steelhead are classified as summer or winter steelhead depending on when the adults reenter freshwater; all steelhead in the Yakima Basin are summer steelhead.

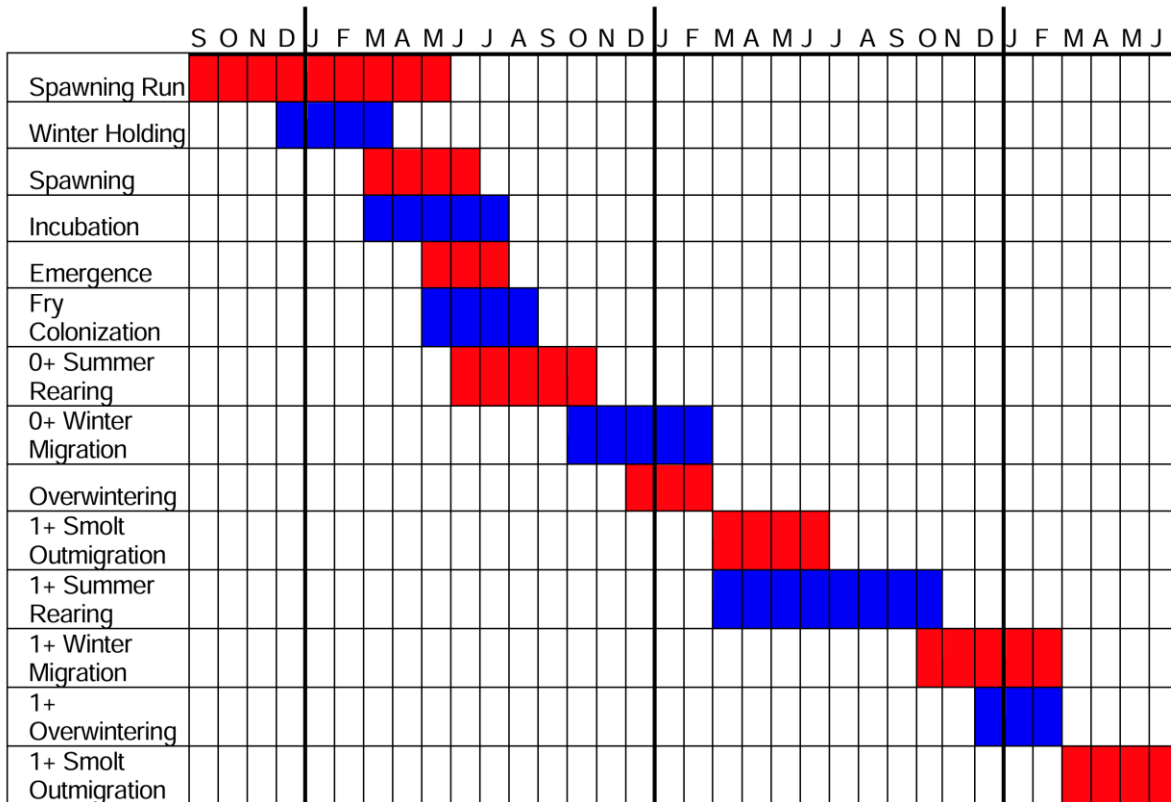


Figure 2-51. General duration of successive life stages in for Yakima Basin summer steelhead (all stocks)

Bull Trout (*Salvelinus confluentus*)

Bull trout in the Yakima Basin are resident, fluvial, or adfluvial. They rear for 2-4 years before becoming fully mature at ages 5-6 for males and 6-8 for females. They may then spawn multiple times in their lifetime, as they do not die after spawning like salmon. Different bull trout populations spawn at different times from late August to as late as mid-December, depending on life history (resident/fluvial/adfluvial), elevation, and size of adult.

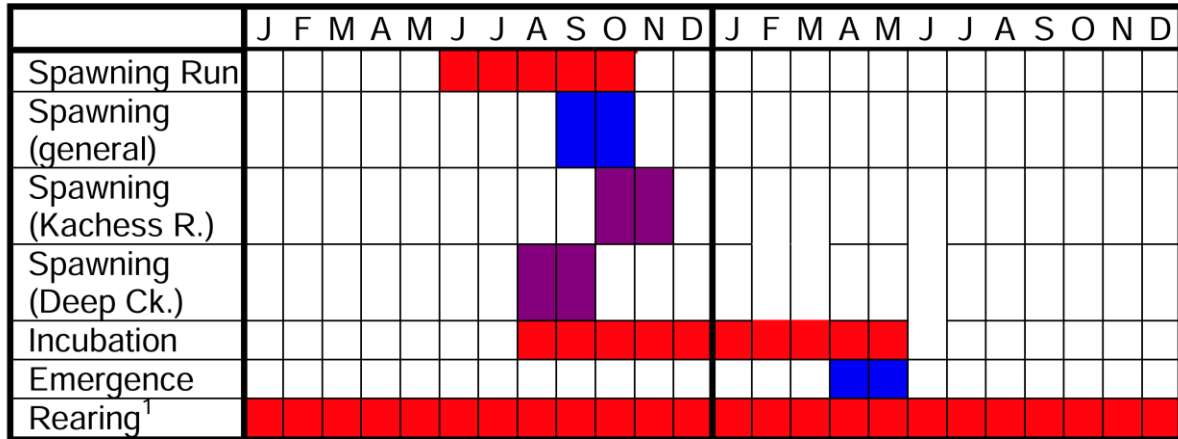


Figure 2-54. Mean timing of successive life stages of bull trout. (Sources: Wydoski and Whitney 2003, Meehan and Bjornn 1991, USFWS 2002, Reiss 2003)

Spring Chinook (*Oncorhynchus tshawytscha*)

Spring Chinook salmon start migrating back from the ocean in spring, giving them their name, and then hold through the summer near their headwater spawning areas, where they spawn in August and September. The juveniles hatch in the late winter/spring, spend approximately one year rearing in freshwater, and then smolt the next spring. They spawn in the Upper Yakima and Naches basins.

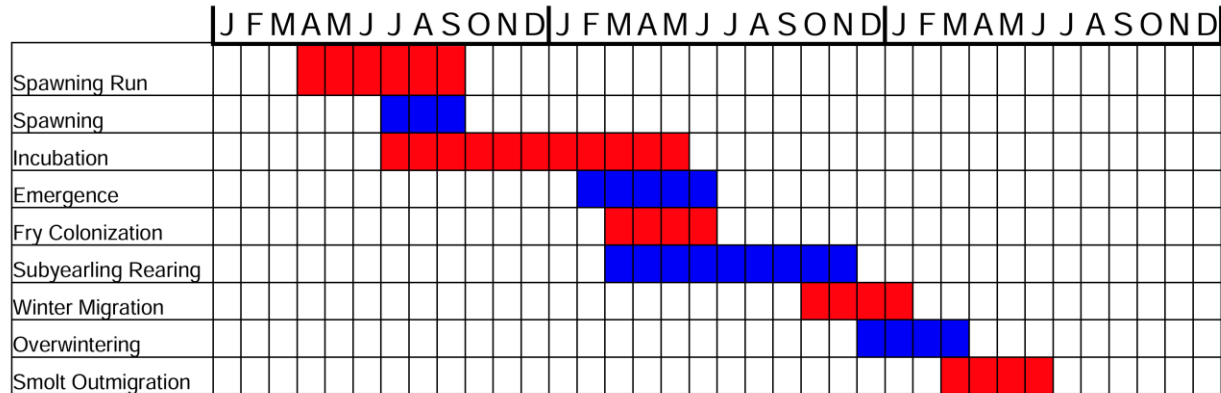


Figure 2-40. Mean timing of successive freshwater life stages of Yakima Basin spring chinook

Fall Chinook (*Oncorhynchus tshawytscha*)

Fall Chinook salmon migrate back from the ocean and spawn in the fall, giving them their name. They are the only salmon species that spawns primarily in the Lower Yakima River. Their juveniles emerge in late winter/spring and migrate out to the ocean in their first year prior to inhospitable late summer habitat conditions.

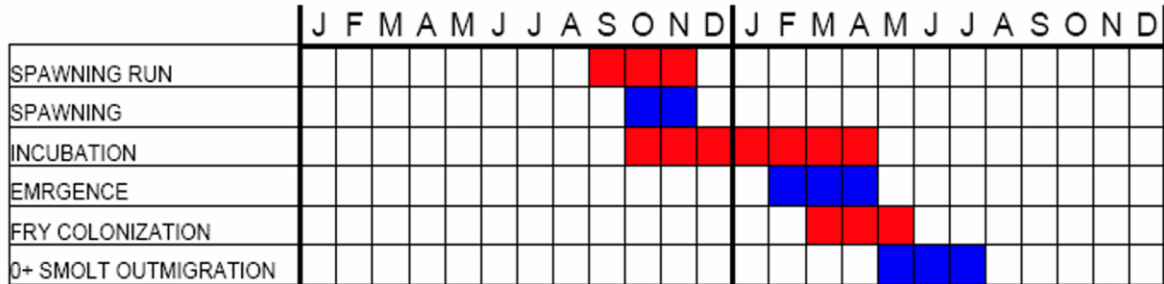


Figure 2-44. Mean timing of successive life stages of Yakima basin fall chinook

Sockeye (*Oncorhynchus nerka*)

The species *Oncorhynchus nerka* has an anadromous form commonly called sockeye salmon and a resident form called kokanee salmon.

Yakima Basin sockeye smolt in April-June, return from the ocean in June-September, and spawn in the fall. Kokanee also spawn in the fall.

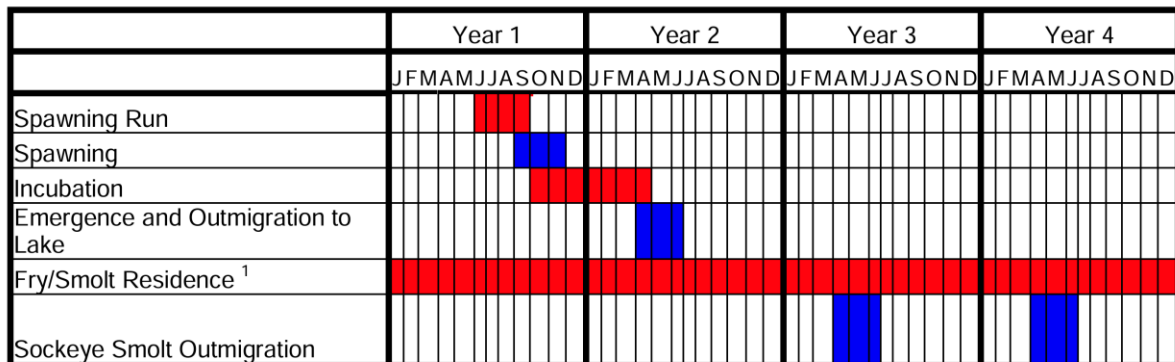


Figure 2-56. Mean timing of successive life stages of sockeye. (Sources: Gustafson et al. 1997, Meehan and Bjornn 1991, Wydoski and Whitney 2003)

¹ Whether remaining in freshwater for their entire life (kokanee) or migrating to sea (sockeye), juveniles progress from fry to outmigrating capability over a period of years. Kokanee reach mature spawning capability between 3 and 5 years, post emergence. Sockeye remain in fresh water for 1-2 years and then outmigrate to saltwater for an additional 2 to 4 years, before returning to spawn.

Lamprey (*Entosphenus tridentatus*)

The Pacific lamprey is a prehistoric jawless fish with a cartilaginous skeleton that is also anadromous. These fish are a culturally significant food source for the Yakama Nation.

Lamprey spawn from April to August. Eggs hatch after only 2-3 weeks. Juvenile lamprey (“ammocoetes”) rear for 4-7 years buried in the fine sediments, and then migrate to the ocean in April-June. They migrate back from the ocean in May-October, then overwinter before spawning. Like salmon, they die after spawning.

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Spawning Run																																				
Spawning																																				
Incubation																																				
Ammocoete FW Residence																																				
Metamorphosis																																				
Outmigration																																				
Ocean rearing																																				

Figure 2-57. Pacific lamprey life history in the Yakima Basin (Wydoski and Whitney 2003)