

Appendix S1. Historical hierarchical biodiversity characteristics.

The following hierarchical biodiversity characteristics for Pacific salmon are substantially modified from those presented in Waples et al. (2001). Historic ecological regions, life history types, and genetic entities characteristic of extirpated Pacific salmon populations, or expansions to the study area, are presented here in *italics*. An asterisk (*) indicates major life history or genetic groups that do not occur within the study area.

I. ECOLOGICAL DIVERSITY

A. Georgia Basin

Puget Lowland and Cascades (part) Ecoregions; between Coast and Cascade ranges; moderate rainfall; short- or moderate-length rivers discharge into protected fjord-like sounds/inlets; peak river-flow timing dependant on snowmelt; groundwater/snowmelt maintain relatively high minimum summer flows; high relief in headwaters; extensive alluvial plains in lowlands; freshwater fish assemblage derived from Columbia River fauna; western hemlock forests dominant to ~1000 m; glacial soils.

1. Streams not fed by snowmelt (generally small streams draining low elevations; strongly affected by seasonal low flows)
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
2. Streams fed by snowmelt (generally larger streams draining higher elevations; not as strongly affected by seasonal low flows)
 - a) Rivers with extensive floodplain
 - b) Rivers without significant floodplain

B. Coastal Rainforest

Coastal Range Ecoregion (part); Olympic Peninsula and western Vancouver Island; warm, moist summers; very wet, mild winters; rivers generally short, relatively high flows maintained year-round; steep-sided, glacier-shaped valleys; freshwater fish assemblage derived from Columbia River fauna; western hemlock, western red cedar, yellow cedar, Sitka spruce, and salal dominate low elevations; mountain hemlock dominates higher elevations.

1. Rivers not fed by snow/glacier melt (generally small streams draining low elevations; not strongly affected by seasonal low flows)
 - a) Rivers with large lakes
 - b) Rivers without large lakes
2. Rivers fed by snow and glacier melt (generally larger streams draining higher elevation areas; not as strongly affected by seasonal low flows)
 - a) Rivers with large lakes
 - b) Rivers without large lakes

C. Northern Coastal (Southwest Washington to Cape Blanco)

Coastal Range Ecoregion (part); rivers short, draining west slope of Coast Range and portion of Cascades; tributaries short, high-gradient; basin-area rainfall and runoff large; peak river flows occur in December/January; freshwater fish assemblage derived

from Columbia River fauna; Sitka spruce community dominates low elevations; western hemlock community dominates higher elevations; coastal upwelling weak, episodic.

1. Columbia River tributaries, draining west slope of Coast Range (stream discharge to major river system/estuary, not open coast)
2. Rivers with large estuaries
 - a) Chehalis and Umpqua rivers (headwaters penetrate Coast Range)
 - b) Others
3. Rivers with large lakes
4. Other, generally smaller, coastal streams

D. Klamath Mountains Province

Coastal Range and Sierra Nevada Ecoregions (parts); geologically unique; transverse mountains run east to west; moderate rainfall; significant endemic flora and fauna; distinct Klamath-Rogue freshwater fish assemblage; mixed hardwoods, pine, and chaparral dominate relatively arid upper Rogue/Klamath basins; lower basins dominated by redwood and Sitka spruce forests; borders highly productive marine waters.

1. Rogue River (penetrates Cascade Range)
2. Klamath River (penetrates Cascade Range)
3. Smaller coastal streams

E. Northern California (south of Klamath River to San Lorenzo River)

Coastal Range Ecoregion (part); soils dominated by highly erosive Franciscan formation; rivers typically short, drain high elevation coastal mountains; rainfall relatively high, strongly seasonal, little snowmelt; river flows peak January-February, typically much lower in summer; mouths of smaller streams seasonally closed by sand berms; freshwater fish assemblage derived from Sacramento-San Joaquin fauna; redwood community dominates coastal vegetation; coastal upwelling strong, consistent.

1. South of Klamath River to Punta Gorda
2. Punta Gorda to Monterey Bay (north of Pajaro River)

F. Southern California

Southern California Plains and Hills and Southern California Mountains Ecoregions; climate warmer, drier than coastal areas to the north; river flows low, peak in March; many rivers seasonally closed by sand berms; lower stream reaches, occasionally dewatered for periods lasting months; water temperatures high; fires, floods, and drought conditions common; freshwater fish assemblage derived from Pajaro-Salinas fauna; chaparral, coastal scrub, and grassland dominate.

1. Monterey Bay (Pajaro River and south) to Point Conception
2. South of Point Conception

G. California Central Valley

Central California Valley and Sierra Nevada (part) Ecoregions; between Coast and Cascade/Sierra Nevada ranges; Sacramento and San Joaquin River systems dominate; tributaries extend beyond 1500 m elevation; river flows peak in February in Sacramento and April in San Joaquin and remain strong for 6 months; freshwater fish

assemblage derived from Sacramento-San Joaquin fauna; bunchgrass prairie, willows, and cottonwoods historically dominated broad, flat lands bordering lower river reaches; extensive freshwater migration required for anadromous fish.

1. Upper Sacramento River (south to the Feather)
 - a) Tributaries draining Cascade Range
 - b) Tributaries draining Sierra Nevada
 - c) Tributaries draining Coast Range
2. Merced and San Joaquin rivers (drain the high Sierra Nevada)
3. Middle tributaries of Central Valley

H. Willamette River Valley and Lower Columbia River

Willamette Valley Ecoregion and Columbia River tributaries between crests of Cascade and Coastal ranges; moderate rainfall; river flows peak in December-January, relatively high summer minimum flows; never glaciated; strongly affected by pre-historic catastrophic flooding from glacial Lake Missoula; Willamette Falls historical migration barrier, except during high spring flows.

1. Upper Willamette River (Willamette Falls, strong ecological isolating mechanism)
 - a) Tributaries draining Coast Range; no snowmelt; seasonally extremely low flows
 - b) Tributaries draining Cascade Range; snowmelt modulates seasonal flows
2. Large lower-Columbia River tributaries
3. Small lower-Columbia River tributaries

I. Mid-Columbia River

Columbia Basin Ecoregion (part); Columbia River mainstem and tributaries, crest of Cascade Range upstream to Yakima River, inclusive; large tributaries drain arid basins in Cascade Range rain shadow; streamflow peaks April-June, primarily due to snowmelt and springs; low flows occur August - October; water temperatures fluctuate seasonally, often diurnally; freshwater fishes derived from Columbia River fauna; glacial and alluvial soils, prone to erosion; pine, juniper, and sagebrush dominate; extensive freshwater migration required for anadromous fish; Celilo Falls, on mainstem Columbia River, historical migration challenge.

1. Oregon tributaries
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
2. Yakima River
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
3. Mainstem Columbia River

J. Upper-Columbia River

Columbia Basin Ecoregion (part); Columbia River tributaries draining east slope of northern Cascade Range and the Okanogan Highlands; water temperatures low; low productivity habitat; freshwater fishes derived from Columbia River fauna; glacial and

alluvial soils, prone to erosion; hot dry summers; cold, wet winters; extensive freshwater migration required for anadromous fish; Celilo Falls, on mainstem Columbia River, historical migration challenge; upstream boundary at historic Kettle Falls; borders Northern Rockies Ecoregion to north.

1. Rivers draining east slope of northern Cascade Mountains
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
2. Okanogan River
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
3. Mainstem Columbia River
4. Crab Creek
5. *Rivers draining Okanogan Highlands (Sanpoil and Kettle rivers)*
6. *Rivers draining west slope of Northern Rocky Mountains below Kettle Falls (Spokane and Colville rivers)*

K. Lower Snake River

Blue Mountains and Rocky Mountains Ecoregions (parts); Clearwater, Grande Ronde, Imnaha, and Salmon River basins; higher rainfall than Interior Columbia River; peak flows occur April - June, snowmelt dominated; low flows occur late summer-early fall; water temperatures fluctuate seasonally, often diurnally; freshwater fishes derived from Columbia River fauna; conifer forests dominate; prairie and mixed forest grasslands common; mix of older sedimentary deposits, ancient, highly-erosive Idaho batholithic granite, and younger volcanic peaks; extensive freshwater migration required for anadromous fish; Celilo Falls, on mainstem Columbia River, historical migration challenge; includes world's highest elevation (up to 2000m) salmon spawning habitat.

1. Clearwater River
2. Blue Mountains
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
3. Salmon River
 - a) Rivers with accessible lakes
 - b) Rivers without accessible lakes
4. Mainstem Snake River

L. Upper-Snake River

Snake River Basin/High Desert Ecoregion (part); Snake River tributaries in southeastern Oregon and southern Idaho; annual precipitation on Snake River Plateau, less than 30 cm, 60 cm at higher elevations; streamflows substantial year round only in large rivers; freshwater fishes derived from Columbia River fauna; sagebrush and wheatgrass dominate; extensive freshwater migration required for anadromous fish; Celilo Falls, on mainstem Columbia River, historical migration challenge; Shoshone Falls, historical upstream boundary (Hells Canyon Dam currently blocks upstream access).

1. *Rivers draining south slope of Northern Rocky Mountains*
 - a) *Rivers with accessible lakes.*

- b) *Rivers without accessible lakes.*
- 2. *Rivers draining Snake River Plateau*
- 3. *Small streams above Hells Canyon*
- 4. *Mainstem Snake River*

M. Columbia River Headwaters

Northern Rockies Ecoregion (part); Columbia River and tributaries (Kootenai and Pend Oreille rivers) above historic Kettle Falls; annual precipitation, 50 to 150 cm or more; snowpack contributes to river flows that peak in May-June and recede in August-September; freshwater fishes derived from Columbia River fauna; forests dominated by conifers (western white pine, lodgepole pine, western red cedar, western hemlock, western larch, Englemann spruce, subalpine fir, and Douglas fir); mixed forest/grassland common; extensive freshwater migration required for anadromous fish; Celilo Falls and Kettle Falls, on mainstem Columbia River, historical migration challenge.

- 1. *Kootenai River*
 - a) *Rivers with accessible lakes*
 - b) *Rivers without accessible lakes*
- 2. *Pend Oreille River*
- 3. *Mainstem Columbia River*
 - a) *Rivers with accessible lakes*
 - b) *Rivers without accessible lakes*

II. LIFE HISTORY DIVERSITY

Pink salmon

Intertidal spawners (Alaska)*

A. Pink salmon

- 1. Even-year cycle (rangewide, but rare south of central British Columbia)
 - a) Stream maturing
 - b) Ocean maturing
- 2. Odd-year cycle (rangewide)
 - a) Stream maturing
 - b) Ocean maturing

Chum salmon

Long distance freshwater migration; spawn up to 3000 km from ocean (Yukon, Mackenzie, and Amur rivers)*

A. Short or moderate freshwater migration; spawn < 300 km from ocean

- 1. Smolt entry into protected inland waters (Georgia Basin)
 - a) September-October run and spawn timing; spawn in streams with strong summer flows
 - b) November-December run and spawn timing
 - c) January-February run and spawn timing

- d) Intertidal spawning
- 2. Smolt entry into large estuaries or major river basin; November-December run and spawn timing
- 3. Smolt entry into open ocean; November-December run and spawn timing
- 4. Smolt entry into major river basin; August-September run and spawn timing
- B. *Moderate to extensive freshwater migration; spawn in mid-Columbia River Basin*
 - 1. *Smolt entry into mid- Columbia River*
- C. *Moderate freshwater migration; spawn in Sacramento River Basin*
 - 1. *Smolt entry into Sacramento River estuary*

Sockeye salmon

Supragroup River-/Sea-type: Spawn soon after arriving in fresh water in rivers or tributaries without access to lakes; often associated with glacier-fed rivers

- A. River-type sockeye salmon (widely distributed Puget Sound to Kamchatka); juveniles rear in side-channel or estuarine river habitats for 1 to 2 years before migrating to sea.
- B. Sea-type sockeye salmon (Alaska, lower Fraser River); juveniles rear in side-channel river habitats for several months and go to sea as subyearlings.

Supragroup Lake-type: Spawn in inlet or outlet tributaries of lakes or along the shoreline of lakes; juveniles rear in nursery lakes for 1, 2, or rarely 3 years in southern areas and 1, 2, 3, or rarely 4 years in northern areas.

C. Anadromous form undergoes short (< 50 km) freshwater migration and enters fresh water many (up to 10) months before spawning; juveniles rear for 1 to 2 years in high productivity, coastal lakes (Washington coast populations and extinct populations in Alouette and Coquitlam lakes in lower Fraser River Basin).

- 1. Anadromous (sockeye salmon)
 - a) Spawn in lake inlet streams
 - b) Spawn on lakeshore beaches
- 2. Resident (kokanee); rare in coastal lakes with ocean access

D. Anadromous form undergoes short (50-100 km) freshwater migration and enters fresh water several months before spawning; juveniles rear for 1 to 2 years in low productivity, moderate elevation (up to 250 m) mountain lakes (Puget Sound and Strait of Georgia populations).

- 1. Anadromous (sockeye salmon)
 - a) Spawn in lake inlet streams
 - b) Spawn on lakeshore beaches
 - c) Spawn in lake outlet streams
- 2. Resident (kokanee)

E. Anadromous form undergoes moderate to extensive (500–1000 km) freshwater migration and spawns within two months of reaching natal lake; juveniles rear for 1 to 2 years in moderate to high productivity inland lakes (mid Columbia River populations).

- 1. Anadromous (sockeye salmon)
 - a) Spawn in lake inlet streams
 - b) Spawn on lakeshore beaches
- 2. Resident (kokanee)

F. Anadromous form undergoes extensive (> 1000 km) freshwater migration and spawns

within two months of reaching natal rearing lake; juveniles rear for 1 to 2 years in low productivity, high-elevation (> 1000 m) mountain lakes.

1. Anadromous (sockeye salmon)
 - a) Spawn in lake inlet streams
 - b) Spawn on lakeshore beaches
2. Resident (kokanee)

Coho salmon

A. 3-year life cycle; short to moderate freshwater migration (Central British Columbia and south to Monterey)

1. Smolt entry into protected inland waters; ocean migration includes coastal Washington and British Columbia; run timing August-December; spawn timing October-December; adult size generally smaller than in other areas (Puget Sound and Strait of Georgia populations)
2. Smolt entry into open coast; ocean migration primarily to coastal British Columbia; run timing September-December; spawn timing October-January (Washington and West Coast Vancouver Island coastal populations)
3. Smolt entry into mainstem Columbia River; ocean migration primarily along Oregon and Washington Coasts; run timing September-December; spawn timing October-January (Lower Columbia River populations)
4. Smolt entry into open coast; ocean migration primarily off Oregon coast; run timing October-January; spawn timing November-January (Oregon coast populations)
5. Smolt entry into open coast; ocean migration primarily off southern Oregon and northern California coasts; run timing October-January; spawn timing November-February (coastal populations from Cape Blanco to Punta Gorda)
6. Smolt entry into open coast; ocean migration primarily off north-central California coast; run timing November-February; spawning occurs soon after river entry (coastal populations south of Punta Gorda)

B. 3-4 year life cycle; extensive freshwater migration in Columbia River Basin (Upper Columbia and Snake River populations)

C. Sacramento River populations (unknown life-history pattern)

Chinook salmon

Supragroup Stream-type (Interior Columbia and Fraser River basins and coastal areas from northern British Columbia to the north).

A. Extensive freshwater migration (Interior Columbia Basin)

1. Long (up to 1500 km) freshwater migration; high altitude (1000-2000 m) spawning and rearing (most populations in the Snake River, including those that spawn at higher elevation than any other populations of the species)
2. Moderate to long (500-1000 km) migration; moderate altitude (500-1000 m) spawning and rearing (populations in mid- and upper-Columbia River and lower Snake River tributaries)

Supragroup Ocean-type (lower parts of Columbia and Fraser rivers, Central Valley, and coastal areas south of northern British Columbia).

B. Moderate to long (> 300 km) freshwater migration; historic ability to surmount Celilo Falls; stream maturing; spawn primarily in mainstems of large rivers (upriver "brights")

- a) Ocean migration includes Alaska (Columbia River populations)
- b) More southern ocean migration (Snake River populations)

C. Moderate to long (up to 600 km) freshwater migration; historic ability to surmount Willamette Falls; stream maturing, with very early run-timing; commonly captured in Alaskan fisheries; modal age at spawning 4 years; relatively high proportion of yearling smolts (upper Willamette River)

D. Short to moderate (< 350 km) freshwater migration; spawn in tributaries draining into protected inland waters or major river basin, modal age at spawning 3-4 years; marine distribution includes Washington and British Columbia but not Alaska (populations in Strait of Georgia, Puget Sound, and lower Columbia River).

- a) Ocean maturing populations
- b) Stream maturing populations

E. Short (<150 km) freshwater migration, river entry to open coast; modal age at spawning 4-5 years; relatively late (late November - January) run and spawn timing for the dominant ocean-maturing life history type; stream-maturing life history rare; ocean migration extends into Alaska (coastal populations north of Cape Blanco)

- a) Ocean maturing populations
- b) Stream maturing populations

F. Short to long (up to 500 km) freshwater migration; modal age at spawning 4-5 years; ocean migration primarily off Oregon and California (coastal populations south of Cape Blanco)

1. Freshwater migration up to 500 km; spawning and rearing in large river systems; (populations in Upper Klamath, Trinity, Eel, and Rogue rivers)
 - a) Ocean maturing populations
 - b) Stream maturing populations
2. Short (< 150 km) freshwater migration; spawning and rearing in small river systems (southern Oregon and California coastal rivers)
 - a) Ocean maturing populations
 - b) Stream maturing populations

G. Moderate to long (up to 600 km) freshwater migration; river entry to protected inland waters; modal age at spawning historically was 4-5 years; ocean migration includes southern Oregon and California coasts (Central Valley)

- a) Ocean maturing populations
- b) Stream maturing populations

Steelhead

[In the text below, designations for age structure are: (smolt age)/(winters spent at sea).]

A. Anadromous form undergoes extensive (up to 1500 km) freshwater migration; stream maturing; low incidence of repeat spawning; historic ability to surmount Celilo Falls (Interior Columbia Basin)

1. Anadromous (steelhead)

- a) Age structure predominantly 2/1; early run timing ("A" run populations)
 - b) Age structure predominantly 2/2; later run timing ("B" run populations)
 - 2. Resident (rainbow trout)
- B. Anadromous form undergoes moderate freshwater migration; modal age structure 2/3; historic ability to surmount Willamette Falls; ocean maturing (upper Willamette River)
 - 1. Anadromous (steelhead)
 - 2. Resident (rainbow trout)
- C. Anadromous form undergoes short to moderate freshwater migration; modal age structure 2/2; co-occurrence and natural hybridization with coastal cutthroat trout (populations in Puget Sound, Strait of Georgia, lower Columbia River, and in coastal streams north of Cape Blanco)
 - 1. Anadromous
 - a) Stream maturing
 - b) Ocean maturing
 - 2. Resident
- D. Anadromous form undergoes short to moderate freshwater migration; modal age structure 2/2 or 2/1; unusual half-pounder life history strategy common in many streams; co-occurrence and natural hybridization with coastal cutthroat trout; southern extent of stream-maturing life history (Cape Blanco to Punta Gorda)
 - 1. Anadromous
 - a) Stream maturing
 - b) Ocean maturing
 - 2. Resident
- E. Anadromous form undergoes short freshwater migration; age structure 2/1, 1/2, or 2/2; ocean maturing (Punta Gorda to Monterey Bay)
 - 1. Anadromous
 - 2. Resident
- F. Anadromous form undergoes short freshwater migration; intermittent freshwater entry/egress; age structure 2/1, 2/2, or 1/2; multiple spawning more common; ocean maturing; resident fish increasingly important part of life history (South of Monterey Bay)
 - 1. Anadromous
 - 2. Resident
- G. Anadromous form undergoes moderate to extensive freshwater migration; modal age structure 2/1 or 2/2; ocean maturing; (Central Valley)
 - 1. Anadromous
 - 2. Resident

III. GENETIC DIVERSITY

Pink salmon

Supragroup even-year lineage

Western Alaska*

South Central and Southeast Alaska*

- A. British Columbia and U.S. Northwest
 - 1. Northern British Columbia
 - 2. Central and Southern British Columbia
 - 3. Snohomish River, U.S.

Supragroup odd-year lineage

Asia*

Alaska/Northern British Columbia*

- B. Southern British Columbia and U.S.
 - 1. Southern British Columbia
 - 2. Puget Sound
 - 3. Dungeness River and Olympic Peninsula
 - a) Upper Dungeness River
 - b) Lower Dungeness River + others

C. *California*

- 1. *Klamath/Trinity, Mad and Russian rivers*
- 2. *Sacramento River*

Chum salmon

Asia and Western Alaska*

Southeast Alaska and Northern British Columbia*

A. *Southern British Columbia/Washington/Oregon*

- 1. Strait of Georgia
- 2. Puget Sound
- 3. Hood Canal
- 4. Washington Coast
- 5. Oregon Coast
- 6. *Lower Columbia River*
- 7. *Lower Fraser River*
- 8. *West Coast Vancouver Island*
- 9. *Mid-Columbia River*
- 10. *Cowlitz River summer-run*

B. Hood Canal Summer-run

- 1. Hood Canal
- 2. Strait of Juan de Fuca

C. *California*

- 1. *Northern California coast (Klamath, Trinity, Mad, Eel and Russian rivers)*
- 2. *Sacramento River*

Sockeye salmon

Supragroup Asia, Alaska, N. British Columbia*

Supragroup Southern British Columbia and U.S.

A. *Salmon River*

- 1. *Stanley Basin lakes*
- 2. *Warm Lake*

B. Lake Wenatchee

C. Okanogan River

- D. Ozette Lake
- E. Quinault Lake
- F. Lake Pleasant
- G. Baker Lake
 - 1. Baker Lake
 - 2. Sakinaw Lake (Strait of Georgia)
- H. Lake Washington (Big Bear Creek)
- I. River-/sea-type sockeye
- J. Wallowa Lake (Grande Ronde/Wallowa Rivers)*
- K. Payette River (Payette Lakes)*
- L. Suttle Lake*
- M. Yakima River*
- N. Columbia River headwater lakes*
- O. Comox Lake*
- P. Coquitlam Lake/Alouette Lake (Lower Fraser River early run time)*
- Q. Birkenhead River/Harrison Lake/Weaver Creek/upper Pitt River (Lower Fraser River)*
- R. Cultus Lake*
- S. Chilliwack Lake*
- T. Mason Lake*
- U. Lake Cushman*
- V. Lake Sutherland*
- W. Christina Lake (Kettle River)*
- X. Chain Lake (Little Spokane River)*
- Y. Cheewhat Lake/Hobiton Lake*
- Z. Sproat Lake/Great Central Lake/Henderson Lake*
- AA. Kennedy Lake*
- AB. Muriel Lake*
- AC. Megin Lake*
- AD. Cecilia Lake/Hesquiat Lake/Kanim Lake*
- AE. Muchalat Lake*
- AF. Owossitsa Lake/Creek and Park Lake/River*
- AG. Jansen Lake/Power Lake*
- AH. O'Connel Lake (Mahatta River)*
- AI. Brink & William Lakes (Fisherman River)*

Coho salmon

Northern British Columbia and Alaska*

Upper Fraser River*

- A. Northern Coastal and Inland
 - 1. Georgia Basin
 - a) Strait of Georgia
 - b) Puget Sound
 - c) Olympic Peninsula
 - 2. Lower Columbia - Southwest Washington
 - a) Lower Columbia River
 - b) Southwest Washington

- 3. Oregon coastal (south to Cape Blanco)
- 4. *Klamath-Rogue and northern California coastal (Cape Blanco to Punta Gorda)*
- 5. *West Coast Vancouver Island*
- B. California coastal (South of Punta Gorda)
- C. *Interior Columbia Basin*
 - 1. *Mid-Columbia River tributaries*
 - 2. *Upper Columbia River tributaries*
 - 3. *Snake River tributaries*
- D. *Sacramento River and tributaries*

Chinook salmon

Supragroup ocean-type lineage

Central British Columbia coast*

- A. *Strait of Georgia and Vancouver Island*
 - 1. Lower Fraser River
 - 2. East coast Vancouver Island and mainland Strait of Georgia
 - 3. *West Coast Vancouver Island*
- B. Puget Sound
 - 1. Nooksack River
 - 2. Puget Sound proper
 - a) Central Sound
 - b) South Sound
 - 3. Elwha River
- C. North Coastal
 - 1. Washington Coast
 - a) Olympic Peninsula
 - b) Southern coast
 - 2. Oregon Coast (North of Cape Blanco)
 - a) Northern coast
 - b) Central coast
 - c) Umpqua River
 - d) Sixes + Elk rivers
- D. Southern Oregon and northern California Coastal
 - 1. Cape Blanco to Klamath River
 - 2. South of Klamath River
- E. Klamath/Trinity River Basin
 - 1. Trinity and Salmon rivers
 - 2. Upper Klamath River tributaries
- F. Central Valley
 - 1. Winter run
 - 2. Spring run
 - 3. Fall and late-fall run
- G. Lower Columbia River
 - 1. Columbia River Gorge tributaries
 - 2. Lower tributaries

H. Upper Willamette River

I. Interior Columbia Basin

1. Snake River
2. Columbia River

Supragroup stream-type lineage

Asia*

Alaska and British Columbia coastal*

Interior Fraser River*

J. Interior Columbia Basin

1. Mid Columbia River
 - a) Yakima River
 - b) Deschutes River
 - c) John Day River
 - d) Other populations
2. Upper Columbia and Snake rivers
 - a) Upper Columbia River
 - b) Snake River
 - c) *Columbia River headwaters*

Steelhead

Kamchatka (mikizha) subspecies, *O. mykiss mykiss* (Asia)*

Inland subspecies, *O. mykiss gairdneri* (Interior Columbia and Fraser River basins)

Interior Fraser River*

A. Interior Columbia River

1. Mid Columbia River
2. Upper Columbia River
3. Snake River
4. North Fork Clearwater River
5. *Columbia River headwaters*

Coastal subspecies, *O. mykiss irideus* (Alaska to California)

Alaska and northern British Columbia*

B. Western Washington, Oregon and southwestern British Columbia

1. Puget Sound
2. Washington Coast
3. Lower Columbia River
4. Upper Willamette River
5. Oregon Coast
6. *Strait of Georgia*
7. *Lower Fraser River*
8. *West Coast Vancouver Island*

C. Klamath Mountains Province

D. Northern California

E. Central California

F. Southern California

G. Central Valley

Oregon Basin subspecies, *O. mykiss newberri* (Upper Klamath Lake and isolated Oregon)

lakes)

H. Upper Klamath Basin (tributaries of Upper Klamath Lake)