FISHERIES MANAGEMENT AND EVALUATION PLAN

Lower Columbia River Coho
in Oregon Freshwater Fisheries
of the Lower Columbia River Tributaries
(between the Pacific Ocean and Hood River)

Prepared by:
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September 2005

Title: ***Lower Columbia River Coho in Oregon Freshwater Fisheries of the Lower Columbia River Tributaries Between the Pacific Ocean and Hood River***

Responsible Management Agency.

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Date Completed.
First Draft Submitted: August 31, 2005

Wild Coho Impacts of Fisheries Addressed by this Management Plan

Fishery	Impact	
	Average	**Maximum**
Tributary sport – fall salmon	0-2%	< 3%
Tributary sport – winter steelhead	0-1%	< 2%
Tributary sport – trout	0 - 0.14%	< 0.2%
Tributary sport – warmwater gamefish	0%	< 0.1%
Tributary sport – smelt	0%	< 0.1%
Actual Totals	***0-2%***	***< 3%***

SECTION 1. FISHERIES MANAGEMENT

1.1) General objectives of the FMEP.

The objective of this Fish Management and Evaluation Plan (FMEP) is to harvest hatchery-origin salmon, steelhead, and trout in a manner that does not jeopardize the survival and recovery of listed coho in the Lower Columbia River (LCR) Evolutionarily Significant Unit (ESU). This FMEP includes all fisheries which affect or could potentially affect Oregon populations of LCR coho in the Oregon tributaries of the lower Columbia River. The primary focus is on fisheries that target unlisted hatchery coho, fall chinook, and steelhead, but this plan also considers the potential of other tributary fisheries to affect this threatened ESU. Tributary fishery impacts are considered in light of expected mainstem Columbia River, estuary, and ocean fishery impacts. Other FMEPs consider the effects of fisheries on other listed species in the lower river tributaries to the Columbia (e.g., ODFW 2003a). Fisheries in the Columbia River mainstem and ocean are addressed via Section 7 consultations completed in *US v. Oregon* and Pacific Fishery Management Council forums.

1.1.1) List of the "Performance Indicators" for the management objectives.

Performance indicators include fish population indicators by which we assess the status of populations in the listed ESU to determine trends in abundance, risk thresholds, and the impacts of management actions including fisheries. The primary fish population indicators for listed Oregon LCR tributary coho are:

- Counts of adult coho migrating past North Fork Dam on the Clackamas River
- Counts of adult coho migrating past Marmot Dam on the Sandy River
- Counts of adult coho migrating past Powerdale Dam on the Hood River
- Spawner surveys in lower Columbia River tributaries
- Life cycle monitoring in North Fork Scappoose Creek (estimates of marine and freshwater survival)
- Juvenile coho distribution surveys in tributaries downstream from the Willamette River
- Hatchery return counts

Fishery performance is also monitored to regulate impacts. The primary fishery indicators for LCR tributary coho sport fisheries are:

- Catch record card (CRC) estimates of total catch by subbasin from harvest tag returns by anglers
- Periodic angler spot surveys in tributaries for inseason information
- Catch estimation and sampling for biological data in ocean and Columbia River mainstem sport and commercial fisheries
- Annual impact estimates

1.1.2) Description of the relationship and consistency of harvest management with artificial propagation programs.

Coho hatchery programs of the lower Columbia River serve several purposes including: 1) mitigation for tributary habitat impacts, 2) mitigation for inland Columbia River habitat impacts including hydrosystem effects, and 3) production of fish for inland coho reintroduction and supplementation activities. Hatcheries on Oregon LCR tributaries are primarily intended to mitigate local effects of dam construction and operation on the Sandy, Little Sandy, Bull Run, and Clackamas rivers. Significant fisheries for coho occur in these tributaries where coho

hatcheries are present. Hatcheries also provide large numbers of coho for ocean and Columbia River mainstem harvests as well as terminal commercial fisheries along the lower Columbia River mainstem.

There are currently 11 hatchery programs in Oregon, and 14 in Washington within the LCR ESU boundaries. Coho hatchery releases occur at four Oregon hatcheries, and three terminal fishing locations. Coho release numbers by hatchery and location can be found in Table 1. Coho hatchery releases in the Oregon portion of the LCR ESU total roughly 4.7 million smolts annually. Current production goals of State and Federal hatcheries on the Washington side of the river within the LCR coho ESU are 7.7 million coho smolts and 1.2 million fry and fingerlings.

Table 1. Recent annual release levels of hatchery coho by hatchery and location within the Oregon portion of the LCR ESU. SAFE refers to the Select Area Fishery Enhancement Program operated through a cooperative effort by ODFW and the Clatsop Economic Development Council (CEDC).

Hatchery	Release Location	Number Smolts Released
Big Creek	Big Creek	535,000
Sandy	Cedar Creek	700,000
Eagle Creek NFH	Eagle Creek	500,000
Bonneville	Tanner Creek	1,225,000
SAFE Program (CEDC)	Tongue Point	200,000
SAFE Program (CEDC)	Youngs Bay	1,225,000
SAFE Program (CEDC)	Blind Slough	300,000

Hatchery practices have been widely revamped in recent years to address heightened concerns for wild fish populations. Large-scale marking programs have been implemented so that sport fisheries can identify and keep hatchery fish while releasing wild fish. Selective fisheries for hatchery fish in tributaries reduce the numbers of hatchery coho available to potentially stray into natural production areas. All hatchery releases (since the 1995 brood) are adipose fin-clipped. A subsample of releases are uniquely marked, typically with coded-wire tag (CWT) to provide information on survival rates, hatchery practices, and fishery contribution. While fin-clipping releases has increased harvest opportunities on hatchery fish while minimizing impacts on natural fish, straying into natural production areas has been reduced through several actions. Outdated practices included transfer of stocks among hatcheries to meet production goals and outplanting of hatchery fish in or near wild fish production areas.

1.1.3) General description of the relationship between the FMEP objectives and Federal tribal trust obligations.

This FMEP explicitly considers only non-Indian fisheries on portions of the LCR coho ESU which are not subject to Federal court decisions concerning Indian and non-Indian harvest sharing. Federal tribal trust obligations and impacts are jointly managed by the four Columbia River treaty Indian tribes, the federal government, and the states of Oregon, Washington, and Idaho under continuing court jurisdiction in *U. S. v. Oregon*. That process is addressed in a separate consultation. Mainstem Columbia River fisheries which affect salmon and steelhead destined for areas upriver from Bonneville Dam are addressed by harvest sharing plans with treaty Indian tribes (*U. S. v. Oregon*). These mainstem fisheries are addressed under the ESA via Section 7 consultation with the states and tribes. Affected fish include several LCR chinook ESU populations, upriver spring chinook, and upriver fall chinook.

1.2) Fishery management area(s).

1.2.1) Description of the geographic boundaries of the management area of this FMEP.

This management plan describes all freshwater fisheries that affect or could potentially affect LCR coho salmon in Oregon tributaries of the Columbia River upstream to and including the Hood River (Figure 1).

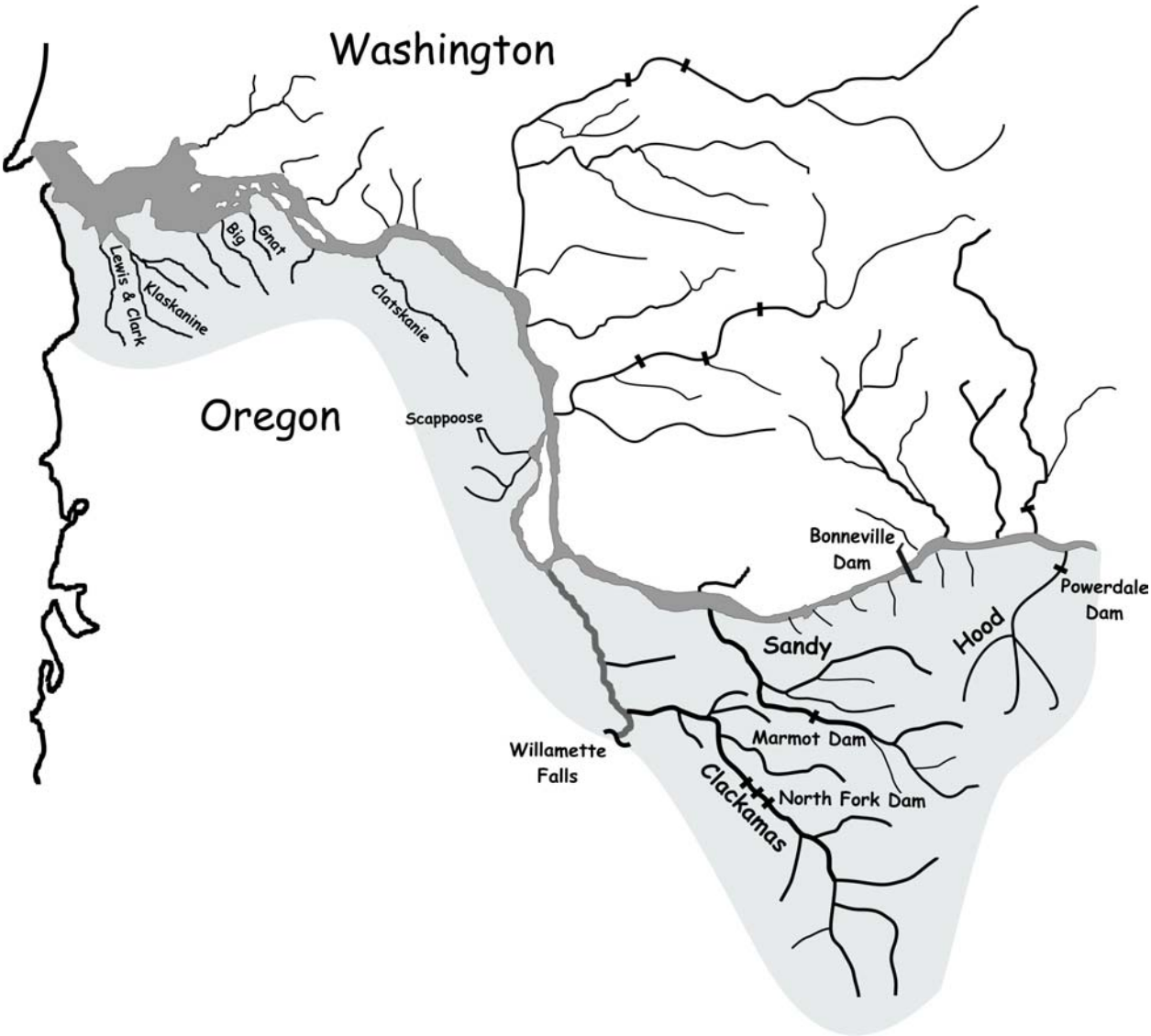

Figure 1. Map of the lower Columbia River including Oregon tributaries addressed by this fishery management plan.

1.2.2) Description of the time periods in which fisheries occur within the management area.

Fisheries within the lower Columbia coho management area are listed in Table 2. Only a subset of all fisheries have the potential to impact listed coho. Fisheries that may encounter adult coho occur from August through November. No fisheries target juvenile coho but they may be incidentally caught in some trout fisheries during spring. Fisheries for other species or during other parts of the year do not encounter coho.

Table 2. Significant fisheries occurring within the lower Columbia River coho management area of the FMEP. Fisheries addressed by this plan are denote with an '*'.

Fishery	Area	Typical open dates	Peak dates	Effect[1]
		Sport		
Coho	Lower Columbia R.	Aug 1 – Dec 31[3]	Aug – Sep	A
	Columbia R. Terminal Fishing Areas[4]	Year-round	Aug – Oct	A
	*Klaskanine, Lewis & Clark, Youngs R.	Aug 1 – Oct 31[3]	Sep – Oct	A
	*Big, Bear, Gnat Cr.	Aug 1– 31, Oct 1– 31	Oct	A
	* Lower Willamette & Clackamas R.	Aug 1 – Oct 31[3]	Sep – Oct	A
	*Eagle Creek (Clackamas)	Aug 1 – Nov 30	Sep – Oct	A
	* Lower Sandy R.	Aug 1 – Oct 31[3]	Sep – Oct	A
	*Herman Creek, Eagle Creek (Gorge)	Aug 1–15, Dec 1–31	Aug, Dec	A
	*Lower Hood R.	Year-round	Sep – Dec	A
Fall Chinook	Lower Columbia R.	Aug 1 – Dec 31[3]	Aug – Sep	A
	Columbia R. Terminal Fishing Areas[4]	Year-round	Aug – Sep	A
	*Youngs R., Klaskanine, Lewis & Clark, Clatskanie R.	Aug 1 – Dec 31	Aug – Sep	A
	*Big, Bear, & Gnat Cr.	Aug 1–31, Oct 1 – Dec 31	Aug, Oct	A
	*Lower Sandy R.	Feb 1 – Oct 31 [3]	Sep – Oct	A
	*Herman Creek, Eagle Creek (Gorge)	Aug 1–15, Dec 1 – Dec 31	Aug, Dec	A
Winter Steelhead	Lower Columbia R.	Aug 1 – Mar 31	Dec – Mar	A
	*Clatskanie R.	Late May – Mar 31	Dec – Mar	A
	*Bear Cr.	Oct 1 – Mar 31[3]		A
	*Big & Gnat Cr.	Oct 1 – Aug 31	Dec – Mar	A
	*Youngs, Klaskanine, Lewis & Clark R.	Year-round	Dec – Mar	A
	*Lower Willamette & Clackamas R.	Year-round	Dec – Mar	A
	*Lower Sandy R.	Year-round	Dec – Mar	A
	*Lower Hood R.	Year-round	Dec – Mar	A
Spring Chinook	Lower Columbia R.	Jan 1 – Mar 31[3]	Mar – Apr	C
	Columbia R. Terminal Fishing Areas[4]	Year-round	Feb – June	C
	Lower Willamette R.	Year-round	Feb – June	C
	Lower Clackamas R.	Year-round	Feb – June	C
	Lower Sandy R.	Feb 1 – Oct 31[3]	Apr – June	C
Summer Steelhead	Lower Columbia R.	May 16 – Dec 31	May – Aug	C
	Willamette, Clackamas, Sandy, Hood	Year-round	Apr – Jul	B
	Herman Creek; Eagle Creek (Gorge)	Jun 16 – Aug 15	Jun – Aug	C
Trout	Columbia, Willamette	Jan 1 – Mar 31, Late May-Dec 31	None	C
	*Upper Clackamas, Upper Sandy, Upper Hood R.	Late May-Late October	None	B
	Standing waters	Year-round	Apr – Sep	C[2]
Smelt	Columbia R., *Sandy R.	Winter/Spring	Jan – Jun	B
Shad	ColumbiaR. , Willamette R.	Year-round	May – Jul	C
Sturgeon	Columbia R., Willamette R.	Year-round [3]	Year-round	C

Warmwater species	Lower Columbia/ *Willamette Rivers	Year-round	Jun – Aug	C
	Standing waters	Year-round	May – Sep	C[2]
	Commercial / Other			
Coho	Lower Columbia River	Determined annually	Aug – Nov	A
	Columbia R. Terminal Fishing Areas[4]	Determined annually	Aug – Nov	A
Fall Chinook	Lower Columbia River	Determined annually	Aug – Nov	A
	Columbia R. Terminal Fishing Areas[4]	Determined annually	Aug – Nov	A
Spring Chinook	Lower Columbia River	Determined annually	Feb – Mar	C
	Columbia R. Terminal Fishing Areas[4]	Determined annually	Feb – Jun	C
Sturgeon	Lower Columbia River	Determined annually	Year-round	A
Smelt	Lower Columbia River	Determined annually	Dec – Mar	C

[1] A = potential for incidental encounter of LCR coho adults, B = limited potential for incidental encounter of LCR coho juveniles, C = LCR coho not encountered.
[2] LCR coho not present in system.
[3] Regulations sometimes modified based on year-specific expectations and goals.
[4] Terminal fishing areas include: Youngs Bay, Tongue Point/South Channel, Blind & Knappa sloughs, Deep River, Steamboat Slough.

Significant tributary fisheries that occur during periods when coho may be present are described in further detail below.

Sport fall salmon tributary fisheries: Significant fall fisheries for hatchery salmon occur in the Oregon tributaries to the Columbia between the Pacific Ocean and Hood River. Tributary fisheries target coho in the Youngs basin, Big Creek, Bear Creek, Gnat Creek, lower Willamette, lower Clackamas, lower Sandy, Eagle Creek (Clackamas), Herman Creek, Eagle Creek (Gorge), and lower Hood River. These fisheries are coincident with coho run timing generally spanning from August through December though some fisheries are closed intermittently during that period (Table 2). Fall Chinook fisheries occur in many of the same areas as coho fisheries and may encounter adult coho. Tule type fall chinook fisheries tend to be earlier than the peak of the coho fishing season, though there is significant overlap in run timing of the two species. In the Hood River, very few anglers, if any, target coho, and there is no fishery for fall Chinook. Most coho catch is incidental during steelhead fisheries. Coho are protected in all fall tributary salmon fisheries by the regulation that only allows retention of adipose fin-clipped coho.

Sport winter steelhead fisheries: Fisheries for winter steelhead occur from November through May and are restricted to adipose fin-clipped hatchery steelhead. Fisheries occur primarily in the lower reaches and tributaries of the Sandy, Clackamas, and Hood rivers, although minor fisheries targeting winter steelhead also occur in lower Columbia Coast Range tributaries such as Big and Gnat creeks, and the Klaskanine River. Until recent years, fisheries were concentrated from December through March, overlapping with the latter portion of the coho run. However, with implementation of native broodstock programs, hatchery winter steelhead are returning later and the fishery doesn't begin to intensify until late January. Small numbers of late running wild coho could be handled incidentally in winter steelhead fisheries primarily in the Clackamas River throughout the winter months though few fish remain by late January.

Sport trout fisheries: Fisheries for trout occur in tributaries and standing waters throughout the LCR and lower Willamette Basin. Within the LCR ESU, plants of hatchery-reared trout for put-

and-take fisheries are restricted to standing waters and streams without anadromous fish to avoid impacts on steelhead and salmon smolts. Many of these plants and fisheries now occur above or in the same reservoirs where dams block historic salmon migrations. Trout fisheries occurring in waters containing LCR coho are restricted to catch and release with artificial flies and lures only. Exceptions include fisheries for adipose fin-clipped rainbow trout in North Fork Reservoir and Estacada Lake where bait is allowed and there is a five fish/day limit. Impacts on adult coho are negligible. Age-0 coho are too small to be vulnerable to trout fisheries. Coho smolts are protected by a series of closed season, size, and gear restrictions to minimize impacts. Trout season opening dates in running waters where salmon and steelhead are present are delayed until late May, after most migrant coho smolts have passed.

Sport warmwater fisheries: Significant warmwater fisheries occur in the Willamette River, Multnomah Channel, and lower sections of some large tributaries for warmwater game species including largemouth bass, smallmouth bass, bullhead, yellow perch, crappie, bluegill, and walleye. Warmwater fisheries also occur in standing waters throughout the basin. Coho impacts in warmwater fisheries are nil. Fisheries are also most active during warm summer months after migrant juvenile coho have left the system. Since warmwater species potentially prey on and compete with juvenile coho, warmwater fisheries could actually provide some marginal benefit for listed salmon if the warmwater catch were significant. The effect of this fishery on LCR coho is nil.

Sport smelt fisheries: Smelt occasionally appear in Oregon tributaries, notably the Sandy River. Smelt runs normally occur in winter or early spring, and are short lived. Sport smelt fisheries are open in the lower reaches of most LCR tributaries, and in the entire Sandy and Clackamas basins. Juvenile coho may be present in the Sandy River at the time, but are rarely caught in smelt dip nets. The effect of this fishery on LCR coho is negligible.

1.3) Listed salmon and steelhead affected within the Fishery Management Area specified in section 1.2.

<u>This plan considers tributary fishery impacts on Oregon populations of lower Columbia River coho which were listed as a threatened, in June, 2005 and is effective August 29, 2005</u>.

The LCR coho ESU includes all naturally spawned populations of coho salmon from Columbia River tributaries up to the Big White Salmon River on the Washington side and the Hood River on the Oregon side (including the Willamette River and tributaries as far upriver as Willamette Falls). Listed Oregon natural populations identified by the Willamette Lower Columbia Technical Recovery Team (WLC-TRT) include coho in Youngs Bay tributaries, Big Creek, Clatskanie River, Scappoose Creek, Clackamas River, Sandy River, Columbia gorge tributaries, and Hood River.

The ESU includes 29 hatchery programs identified by NOAA (Table 19.1 in NOAA Fisheries 2004). A hatchery population was included within the ESU if NOAA determined that the hatchery fish were no more than moderately genetically divergent from a natural population included in the ESU. Hatchery programs included within the ESU by NOAA Fisheries are listed in Table 3.

Table 3. List of coho artificial propagation programs within the Lower Columbia Basin.

Program	Location	Program	Location
Included Within the ESU			
Grays River Type S	Grays River, WA	Cowlitz Type N	Lower Cowlitz, WA
Sea Resources Hatchery Type S	Grays River, WA	Cowlitz Game and Anglers Program	Lower Cowlitz, WA
Peterson Coho Project Type S	Grays River, WA	Friends of the Cowlitz Program	Lower Cowlitz, WA
Deep River Net Pens Type S	Grays River, WA	North Fork Toutle Hatchery Type S	Cowlitz River, WA
Big Creek Hatchery	Big Creek, OR	Lewis River Type N	N. Fk. Lewis R., WA
CEDC Coho Salmon Program – Tongue Pt./Blind Slough	Big Creek, OR	Lewis River Type S	N. Fk. Lewis R., WA
Astoria High School (STEP) Coho Program	Youngs Bay, OR	Fish First Wild Coho	N. Fk. Lewis R., WA
Warrenton High School (STEP) Coho Program	Youngs Bay, OR	Fish First Type N	N. Fk. Lewis R., WA
Elochoman Type S	Elochoman R., WA	Clark PUD Type N Fry Release	Salmon Cr., WA
Elochoman Type N	Elochoman R., WA	Syverson Project Type N	Salmon Cr., WA
Cathlamet High School FFA Type N	Elochoman R., WA	Dist. 5 Firefighters Type N Fry Release	Salmon Cr., WA
Steamboat Slough Net Pen Type S	Elochoman R, WA	Eagle Creek NFH	Clackamas R.
Kalama Type S	Kalama R, WA	Sandy Hatchery (Late)	Sandy River, OR
Kalama Type N	Kalama R, WA	Washougal Type N	Washougal R.
Cowlitz Type N	Upper Cowlitz, WA	Bonneville/Cascade/Oxbow Complex	Lower Columbia River Gorge, OR
Excluded from the ESU			
CEDC – Youngs Bay	Youngs Bay, OR	Little White Salmon/Willard NFH Coho	Upper Gorge Tributaries

All listed salmon and steelhead present at any time of the year within the geographic boundaries of the LCR coho ESU management area are listed in Table 4.

Table 4. Listing status and most recent listing effective date for all ESUs present in the LCR coho ESU.

Salmonid Species	ESU	Current ESA Listing Status	Effective Date of Most Recent Listing
Sockeye	Snake River	Endangered	August 29, 2005
	Okanogan River	Not Warranted	
	Lake Wenatchee	Not Warranted	
Chinook	Upper Columbia Spring-Run	Endangered	August 29, 2005
	Snake River Spring/Summer-run	Threatened	August 29, 2005
	Snake River Fall-run	Threatened	August 29, 2005
	Lower Columbia	Threatened	August 29, 2005
	Upper Willamette	Threatened	August 29, 2005
	Middle Columbia Spring-Run	Not Warranted	
	Upper Columbia River Summer/Fall-run	Not Warranted	
	Deschutes River Summer/Fall run	Not Warranted	
Coho	Southwest Washington	Not Warranted	
	Lower Columbia	Threatened	August 29, 2005
Chum	Columbia River	Threatened	August 29, 2005
Steelhead	Upper Columbia	Endangered	August 18, 1997

Snake River	Threatened	August 18, 1997
Lower Columbia	Threatened	March 19, 1998
Upper Willamette	Threatened	March 25, 1999
Middle Columbia	Threatened	March 25, 1999
Southwest Washington	Not Warranted	

Fishery impacts on other listed stocks are addressed by other consultation processes or fishery management plans. Ocean and mainstem Columbia River fishery impacts on coho and other listed species are addressed by separate Section 7 consultations. Fishery Management Plans for other species include:

- Washington Lower Columbia River Fisheries FMEP
- Oregon Fisheries Affecting LCR Chinook FMEP
- Oregon Fisheries Affecting LCR Steelhead FMEP
- Oregon Fisheries Affecting Hood River Steelhead FMEP
- Oregon Fisheries Affecting Chum Salmon FMEP
- Upper Willamette River Winter Steelhead in Sport Fisheries of the Upper Willamette Basin FMEP
- Upper Willamette River Spring Chinook in Freshwater Fisheries of the Willamette Basin and Lower Columbia River Mainstem FMEP

1.3.1) Description of "critical" and "viable" thresholds for each population (or management unit) consistent with the concepts in the technical document "Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units."

NOAA Fisheries defines population performance in terms of abundance, productivity, spatial structure, and diversity and provides guidelines for each (McElhany et al. 2000). Abundance guidelines include critical and viable population thresholds. Critical thresholds are those below which populations are at relatively high risk of extinction. Critical population size guidelines are reached if a population is low enough to be subject to risks from: 1) density-dependent (depensatory) processes, 2) genetic effects of inbreeding depression or fixation of deleterious mutations, 3) demographic stochasticity, or 4) uncertainty in status evaluations. If a population meets one critical threshold, it would be considered to be at a critically low level. Viability thresholds are those above which populations have negligible risk of extinction due to local factors. Viable population size guidelines are reached when a population is large enough to: 1) survive normal environmental variation, 2) allow compensatory processes to provide resilience to perturbation, 3) maintain genetic diversity, 4) provide important ecological functions, and 5) not risk effects of uncertainty in status evaluations. A population must meet all viability population guidelines to be considered viable.

Productivity or population growth rate guidelines are reached when a population's productivity is such that: 1) abundance can be maintained above the viable level, 2) viability is independent of hatchery subsidy, 3) viability is maintained even during poor ocean conditions, 4) declines in abundance are not sustained, 5) life history traits are not in flux, and 6) conclusions are independent of uncertainty in parameter estimates. Spatial structure guidelines are reached when: 1) number of habitat patches is stable or increasing, 2) stray rates are stable, 3) marginally suitable habitat patches are preserved, 4) refuge source populations are preserved, and 5) uncertainty is taken into account. Diversity guidelines are reached when: 1) variation in life history, morphological, and genetic traits is maintained, 2) natural dispersal processes are maintained, 3) ecological variation is maintained, and 4) effects of uncertainty are considered.

Oregon has recently release a draft Native Fish Status Report (ONFSR)(ODFW 2005 Draft that describes the current conservation status of native fishes in Oregon based on criteria defined in Oregon's Native Fish Conservation Policy (ODFW 2003b). The Native Fish Conservation Policy provides a basis for managing hatcheries, fisheries, habitat, predators, competitors, and pathogens in balance with sustainable natural fish production. The ONFSR summarizes risk assessments completed for native salmon, steelhead, trout, and selected native species using the Native Fish Conservation Policy interim criteria. The interim criteria provide temporary guidance to ensure the conservation of native fish prior to completion of more detailed conservation plans for each species or group of populations. The six interim criteria evaluated in the ONFSR examine: 1) proportion of historic populations now extinct; 2) distribution of naturally produced fish; 3) abundance of naturally produced fish; 4) productivity of naturally spawning fish; 5) proportion of naturally spawning fish that are hatchery origin; 6) hybridization. Risks evaluated based on interim criteria refer to the immediate possibility that a unique group of populations may become extinct or fall to low levels where future prospects for recovery are damaged in the interim until an effective conservation plan can be developed and implemented. The interim criteria do not describe long term conservation risks of continuing downward trends, increasing threats, or extended intervals of unfavorable environmental conditions. Long term risks will be considered in conservation plans. The interim risk assessment will help guide priorities for conservation planning.

The Willamette/Lower Columbia Technical Review Team (WLC-TRT) has not determined critical and viable population thresholds for the Oregon lower Columbia coho populations. However, the WLC-TRT has established "default value" minimum population viability criteria of 1,400 for Chinook and 1,100 for chum for use as a general value for lower Columbia Chinook and chum populations. A default minimum viable population criterion has not been identified by the WLC-TRT for coho, although the Lower Columbia Fish Recovery Board (LCFRB) has assumed a value of 600 for Washington lower Columbia coho populations, which is the same criterion identified by the WLC-TRT for lower Columbia steelhead. The Oregon Recovery Planning Process will identify critical and viable population thresholds for Oregon populations of LCR coho.

1.3.2) Description of the current status of each population (or management unit) relative to its "Viable Salmonid Population thresholds" described above. Include abundance and/or escapement estimates for as many years as possible.

The endangered species management plan prepared by ODFW in 2001 describes the lower Columbia River coho as being historically comprised of six populations (Figure 1) (ODFW 2004). These populations are similar to those identified by the WLC-TRT (Myers et al. 2003) except that Oregon combined the Big Creek and Youngs Bay populations into the Astoria population, and the two gorge populations and Hood River population are referred to in aggregate as the Bonneville population. Coho were historically distributed in many Washington lower Columbia River tributaries but these populations have been heavily influenced by hatchery production and the status of wild or natural spawning in Washington is unclear. No coho were historically present upstream from Willamette Falls although significant numbers of naturally-produced coho now pass Willamette Falls in some years.

Coho salmon in the LCR ESU display one of two major life history types. Early returning, or Type S, coho salmon return to freshwater from August to October and spawn from October to November. Coded-wire tagged Type S hatchery fish are predominately recovered

(approximately 40% of ocean recoveries) to the south of the Columbia river (Weitkamp et al. 1995; Weitkamp et al. 2001). The other major life history type, late returning or Type N coho salmon, return to freshwater from October through November or December and spawn primarily from November through January. Oregon coho populations consist almost entirely of early run stocks although a late run occurs in the Clackamas River. Populations in the Clatskanie and Scappoose arrive in mid-November to December and spawn throughout December. Washington populations include both early and late run stocks.

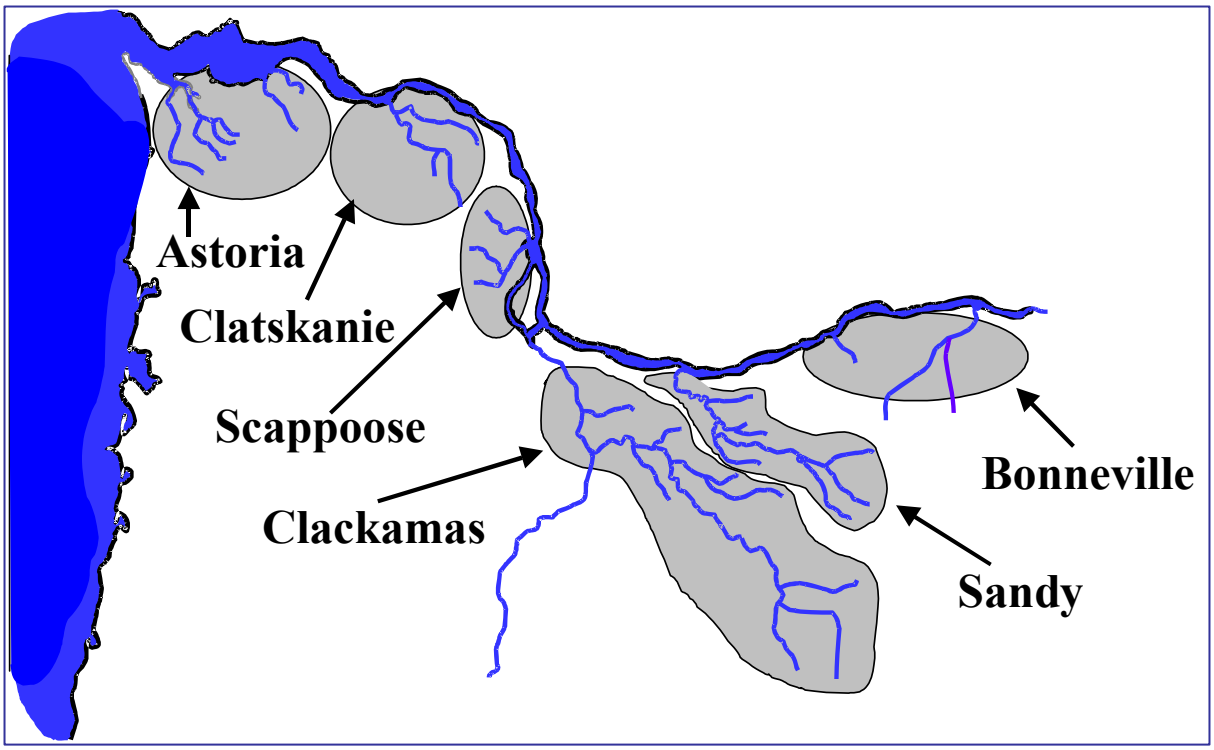

Figure 2. Map of lower Columbia River showing locations of six populations of naturally producing coho identified by the 2001 endangered species management plan of ODFW.

The Clackamas and Sandy rivers have long been known to support significant numbers of wild coho and most of the wild production of lower Columbia River coho was thought to occur in these systems. In fact, a previous status review by NOAA Fisheries (Weitkamp et al. 2001) found that only these two of the 18 historical natural populations of coho in the lower Columbia could be confirmed to exist. However, spawning survey data collected by ODFW since 2001 indicates that significant natural production of coho occurs in the Astoria, Clatskanie, Scappoose, and Bonneville populations has occurred in recent years. It is not clear if these populations were historically sustained by stray hatchery fish, however with recent reductions in the incidence of stray hatchery fish, all but the Astoria and Bonneville populations are at least partially self-sustaining. Anecdotal information also suggests that significant natural production of coho may also be occurring in some Washington streams.

Two methods are used to estimate the number of coho that spawn within Oregon's portion of the lower Columbia River basin. In the upper Clackamas, Sandy, and Hood rivers, counts are made of returning coho as they pass existing dams. A fishway on North Fork Scappoose Creek at Bonnie Falls provides counts as well. In other locations, estimates are derived from counts of spawning coho observed in randomly selected stream survey sections. Although spawning

surveys have been conducted since the 1950s, significant improvements in coverage and methodology were initiated in 2002. These improvements have been carried forward into the subsequent survey seasons.

Since 1998, there has been a substantial increase in the total number of state-listed LCR coho, with the most recent year, 2004, having an estimate of 5,488 naturally produced spawners (Figure 3). Numerically, the Clackamas population is the dominant native population, comprising 50% or more of the total spawners in nearly every year. Since 2002 the relative contribution of the Clackamas population to the total abundance of the listed species has been less with increasing numbers of naturally-produced fish in lower Columbia River tributaries.

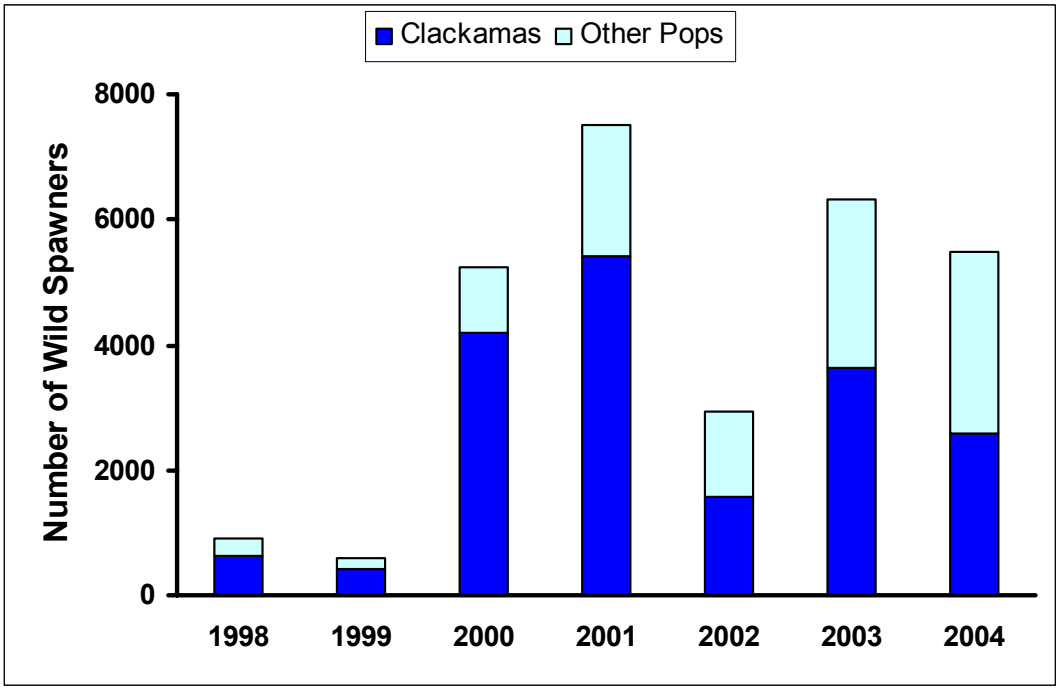

Figure 3. Estimated total number of wild LCR coho spawners displayed as those belonging to the Clackamas population (heavy blue portion of vertical bar) and those belonging to all other populations (light blue portion of vertical bar), 1998 to 2004.

Lower Columbia Tributaries

Wild coho historically spawned in many small Oregon tributaries downstream from the Willamette River. Each of the four main lower Columbia river tributary basins has shown a substantial drop in peak counts since the 1950s and 1960s (Figure 4). By 1998, spawning fish surveys and juvenile sampling indicated that these populations had disappeared or fallen to very low levels. However, over the last five years an increasing number of naturally produced fish have been observed throughout LCR sub-basins (Figure 5).

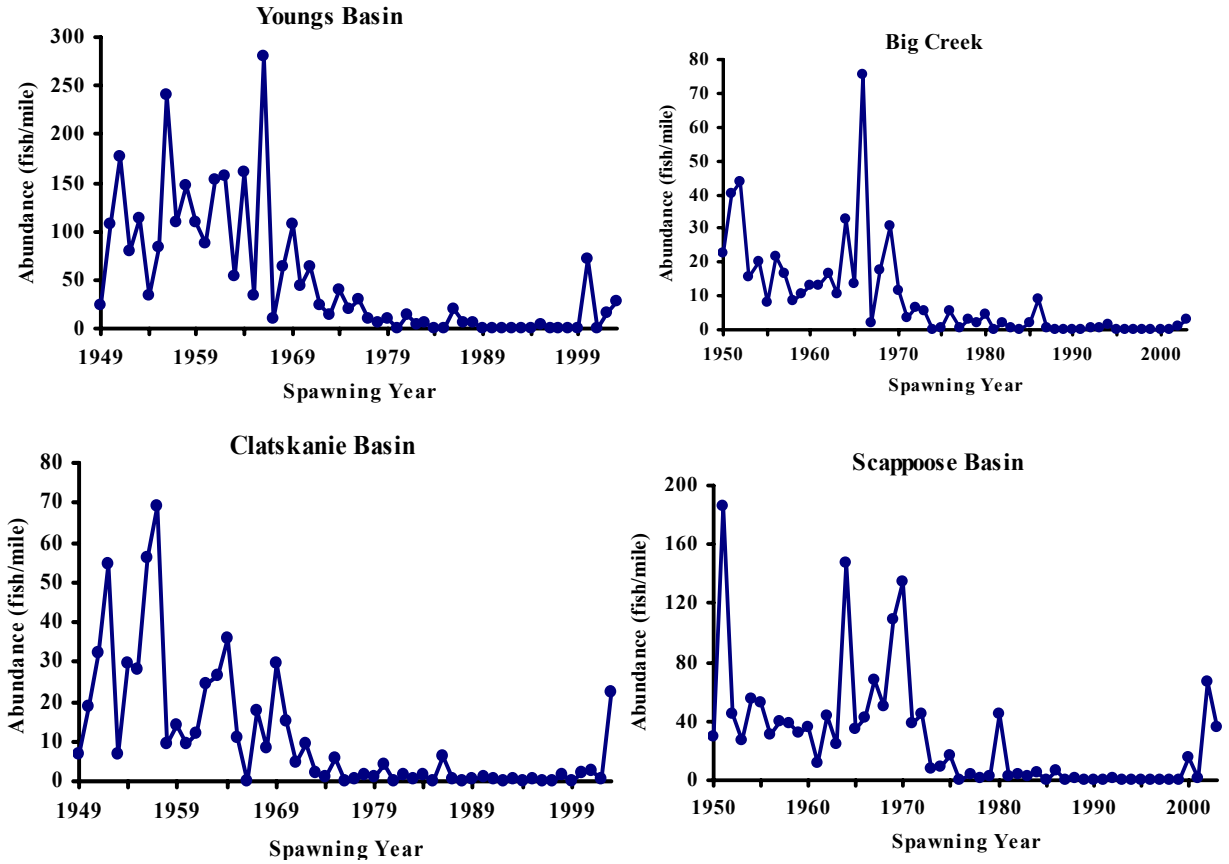

Figure 4. Peak counts (fish/mile) in lower Columbia River tributary basins, 1949-2003. Counts from 1999-2003 are adjusted to reflect naturally produced fish only. No estimates of hatchery-to-wild fractions prior to 1999.

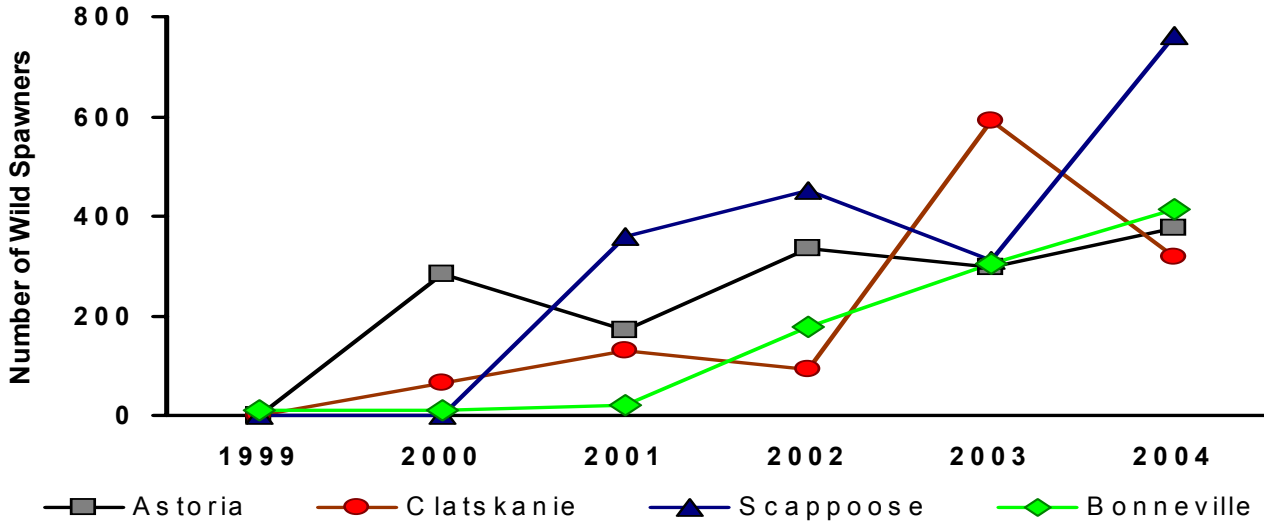

Figure 5. Recent naturally-produced coho trends in Oregon populations within lower Columbia tributaries.

Clackamas River

The Clackamas natural coho run originates primarily above North Fork Dam although some natural production of late run fish occurs in a few lower Clackamas River tributaries. The Clackamas natural run includes an early stock that originated from hatchery plants in 1960-1972 and a late stock that recolonized the upper river after upstream passage was restored in 1939. The two runs are genetically distinct. The early run passes North Fork Dam from early September through November 15. The late-run migrates into the upper basin between November 15 and early April. Note, that these early and late run classifications are separate from the Type-S and Type-N coho defined earlier. Eagle Creek continues to release early stock adipose fin-clipped coho in the lower Clackamas but only wild fish are passed at North Fork Dam.

Abundance of coho in the Clackamas River is indexed based on counts at North Fork Dam (Figure 6). As illustrated in Figure 7, the number of fish in each run, expressed as a 3-year running average, was essentially equal from 1980 to the early 1990s. Coinciding with the downturn in marine survival in the mid 1990s, the early run became more abundant than the late run. When marine survival conditions improved in the 2000s, the early run had a strong positive response and increased dramatically. In contrast, the late run had a weak response to the improved survival conditions and in recent years has come to represent a minor component of the total return of wild coho to the Clackamas Basin.

It is not known what factors are responsible for this apparent divergence in the productivity of late and early run coho in the Clackamas. However, it is apparent that the survival of the late run has decreased relative to the early run. There is also preliminary evidence that this deteriorating recruitment response in late-run coho is associated with a month's advance in average run timing. It appears that the average run-timing as observed at the Faraday counting facility (Clackamas River) has changed from mid-January to mid-December in the years from 1985 to 2003. The cause for this timing change is unknown.

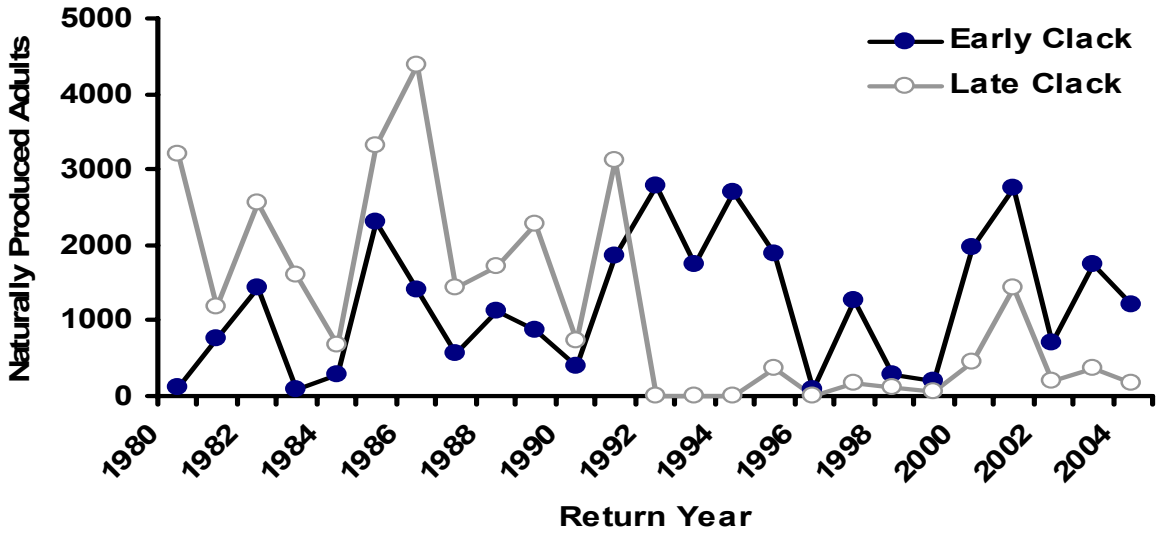

Figure 6. Returns of wild early and late adult coho to North Fork Dam on the Clackamas River, 1980-2004.

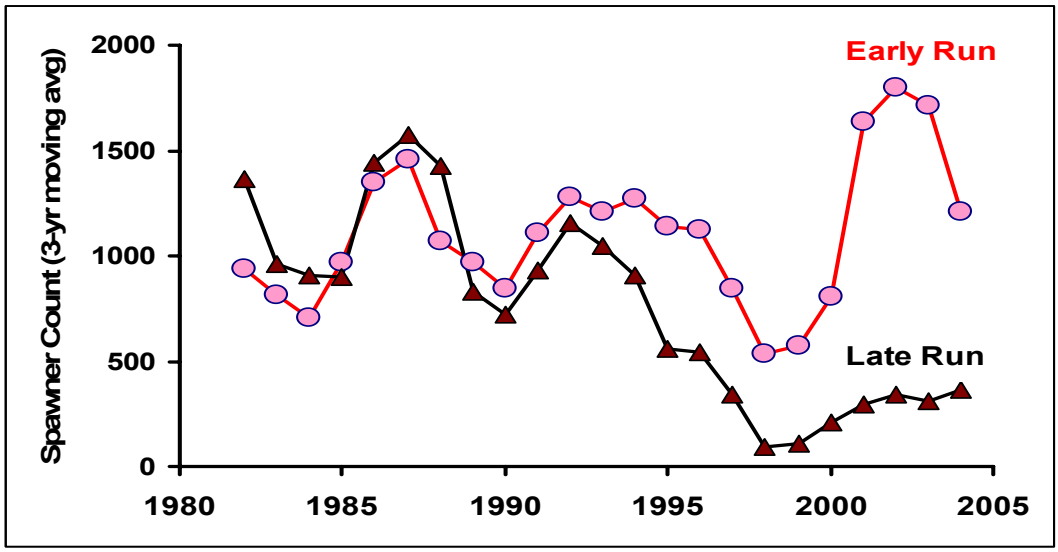

Figure 7. Spawner estimates for wild Clackamas River early and late run coho passing NF Dam , expressed as moving, 3-year averages; 1980 to 2004.

Sandy River

Abundance of coho in the Sandy River is indexed based on counts at Marmot Dam. Counts increased from 1980-1989, decreased from 1989-2000, and have increased since 2000 (Figure 8). This population was historically supplemented with hatchery adults and juveniles during 1961-1973 and 1979-90 but only naturally-produced fish are currently passed upstream from Marmot Dam. The Sandy Hatchery releases early stock adipose fin-clipped coho in the lower river.

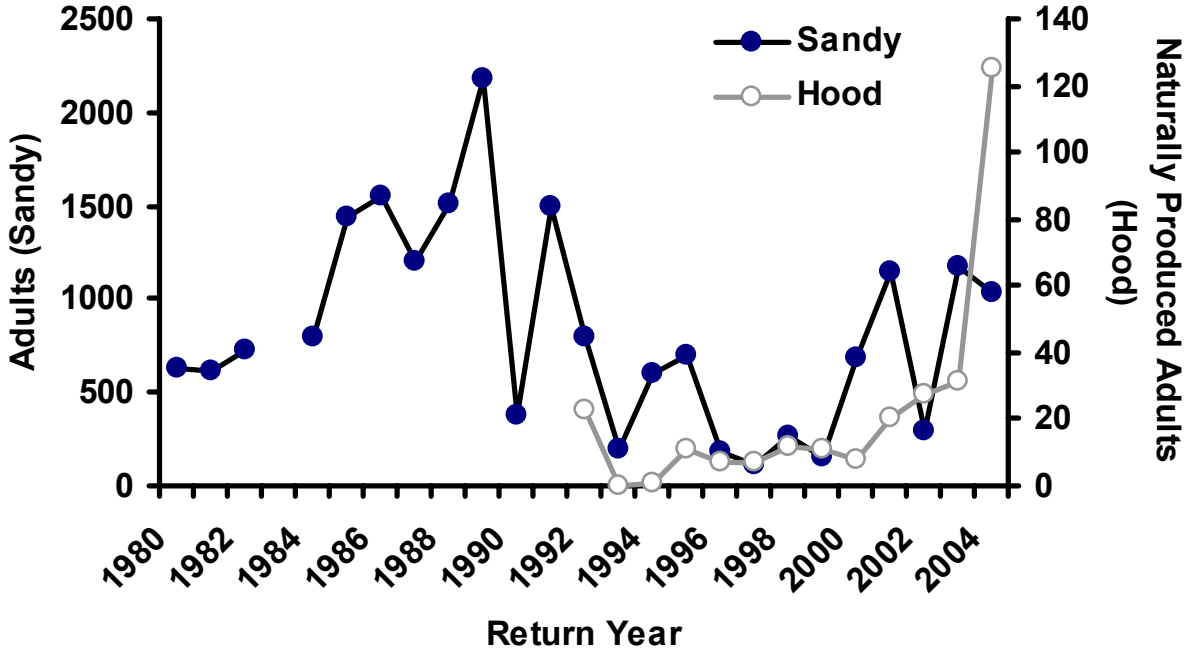

Figure 8. Returns of coho to Marmot Dam on the Sandy River, and Powerdale Dam on the Hood River. Marmot Dam counts prior to 1999 did not distinguish between naturally produced and hatchery fish, though it is likely a large majority of fish passing the dam were naturally produced.

Hood River

Abundance of coho in Hood River is indexed based on counts at Powerdale Dam. Counts of naturally produced fish at Powerdale Dam have been made since 1992 and have been very small with the largest count in 2004 at only 125 fish, and a median return from the period of only 11 fish (Figure 8). Since not all coho hatcheries in the mid-Columbia basin fin-clip their releases, hatchery and wild fish are distinguished in the Hood via scale analysis of fish returning to Powerdale Dam.

Local fishery managers believe that the current Hood population is made up of little more than marked and unmarked out of basin hatchery strays. WDFW and the Yakama Tribe release large numbers of unclipped coho into the Klickitat River each year which stray into the Hood upon return. Stray hatchery coho in the Hood River also come from releases at the Little White Salmon NFH. Downstream migrant trapping suggests that natural production within the Hood is negligible.

Willamette River above Willamette Falls

Each year a substantial number of coho pass through the Willamette Falls fish ladder to areas upstream of Willamette Falls. Historically, Willamette Falls was a natural barrier to coho migration and thus there is no native population above Willamette Falls. As such, these fish are not included in any ESU designation by NOAA Fisheries, and are not considered a native fish by ODFW (ODFW 2005 draft). Fishway improvements at Willamette Falls beginning in the late 1800s have provided for coho passage upstream of the falls. In addition, frequent attempts have been made to establish populations above the falls through hatchery supplementation, though those efforts were terminated in the 1990s. Hatchery coho were historically released in the Tualatin, Yamhill, Molalla, Pudding, Rickreal, and Upper Willamette rivers.

Today, a significant number of coho pass the falls and in some years Willamette Falls passage exceeds the Clackamas return. During 2001-2004, anywhere from 1,736 to 7,908 adults passed through the Willamette Falls fish ladder annually. This is a naturally reproducing population likely of hatchery origin. Fish return from August through December, with a peak in late September, similar to the early returning, or Type S, coho salmon within the LCR coho ESU. Genetic information is not available on the population above Willamette Falls. Though spawning distribution is unknown, it is believed spawners are widely dispersed throughout the Willamette Valley. All returns are non-adipose fin-clipped thereby protecting them through selective fisheries regulations.

Ocean effects

The primary factor controlling the abundance of adult coho from 1998 to 2004 was likely the natural fluctuation of the ocean environment and the associated impact on marine survival of juvenile coho. The 1998 to 2004 pattern of total LCR coho abundance (Figure 3) is nearly identical to the pattern observed for the survival index (Figure 9). For example, the largest spawner escapements and highest marine survival rates both were observed in the same years (2001, 2002, and 2003). Indeed, through regression analysis it can be shown that between 1998 and 2004, 85% of the variation in the observed total wild spawner abundance (response variable) can be explained by variations in the OPI marine survival index (predictor variable), which means marine survival is the primary factor regulating run-size.

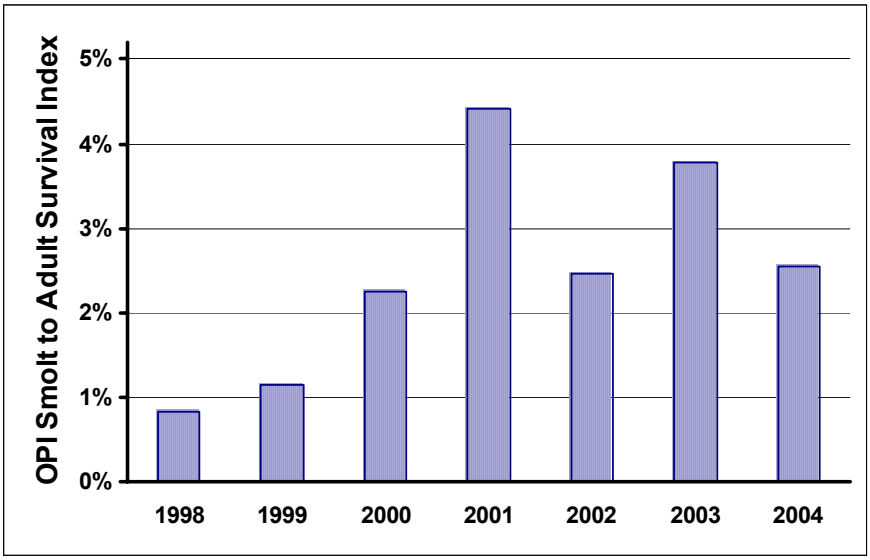

Figure 9. Annual estimates for the OPI smolt to survival index for coho salmon that returned as adults in 1998 to 2004.

Over a longer time frame, the OPI marine survival index for coho is cyclic and variable (Figure 10). Because this survival index appears to be strongly associated with wild spawner abundance, the overall abundance of wild LCR coho is likely to decline in response to reduced marine survival rate. The period of years starting in 2000 has been marked by a sharp positive rebound in survival rates (and spawner abundance) following the extremely low survival experienced by coho populations in the mid-1990s. However, the survival rates achieved at the peak of this rebound in 2001 were only slightly greater than the long-term average. Further, if the predictions for 2005 are correct, the survival rate may be slipping back into a downward mode. The forecast OPI survival rate for the 2005 adult return is 1.72%; which is lower than any rate observed prior to the record poor survivals of the 1990s.

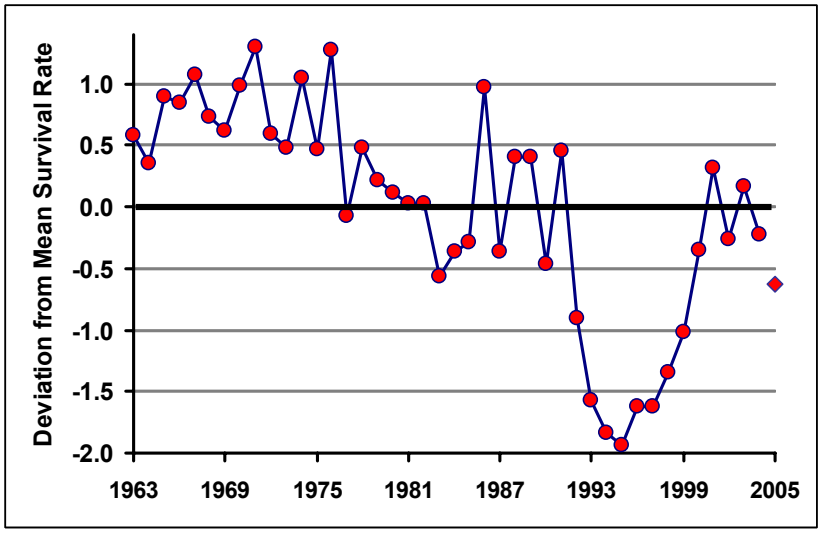

Figure 10. OPI smolt to survival index for coho salmon that returned as adults in 1963 to 2004 and estimated smolt to survival index for 2005 based upon the preseason adult coho return forecast (represented by the single diamond shaped point); all data transformed into natural log form and expressed as the deviation from the mean 1963 to 2004 survival rate.

Hatchery influence

Natural spawning by hatchery fish is significant within the Oregon lower Columbia coho populations. Expanded spawning surveys and 100% mark rates on hatchery fish releases have enabled managers to produce reasonable estimates of hatchery-to-wild fractions on the spawning grounds in the last three years. While in each population, the hatchery fish fractions have declined the past couple years, fractions are still exceedingly high (>50%) in the Astoria and Bonneville populations. The 2004 hatchery fractions in the remaining populations were less than 20% of naturally spawning fish (Figure 11).

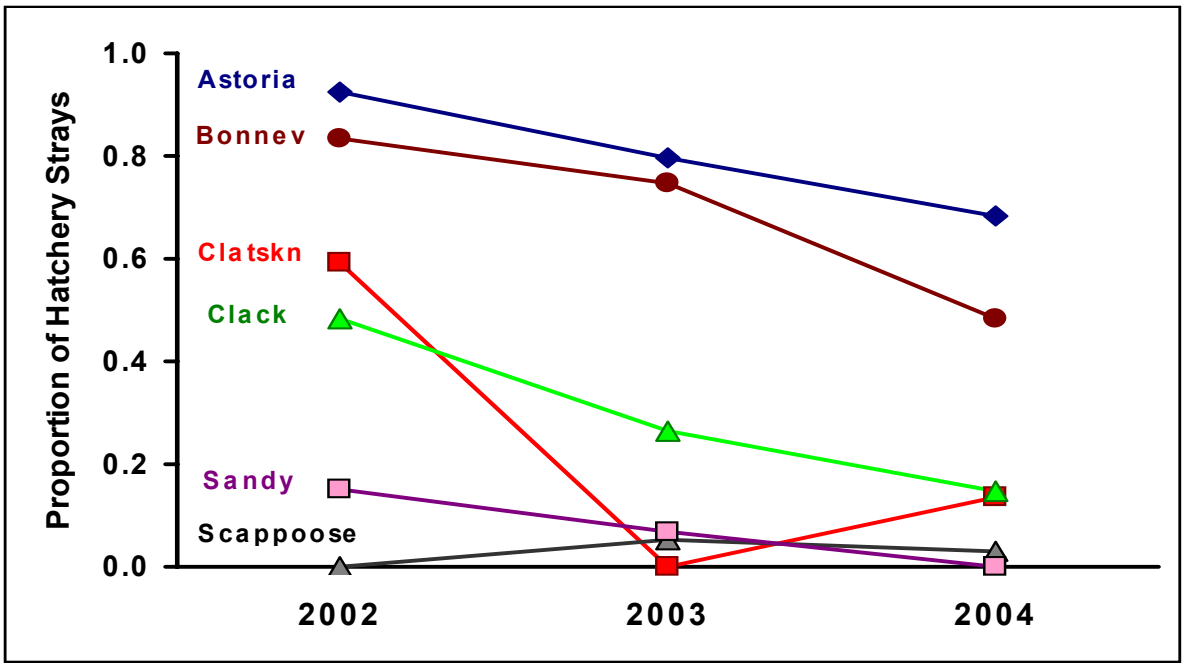

Figure 11. Estimated proportion of hatchery fish in naturally spawning populations of LCR coho; 2002-2004.

Population Productivity

As illustrated in Figure 12, the average recruit to spawner ratio for North Oregon coast coho populations was substantially greater in every year than for LCR populations, providing insight as to risk and recovery status of LCR coho. Recruitment performance for fish that spawned in 1998, 1999, and 2000 was evaluated as this was generally a period of rebound from the very depressed spawner levels of the 1990s and therefore the exact circumstances that innate recruitment performance of different populations would be most detectable. In this comparison, LCR coho were represented by the early-run Clackamas, late-run Clackamas, and Sandy populations, and North coast coho were represented by the Necanicum, Nehalem, Tillamook and Nestucca populations. Productivity is generally related to intrinsic factors such as high diversity and low influence from non-local or domesticated hatchery stocks, and extrinsic factors such as habitat quality. The lower productivity of lower Columbia River could reflect historic hatchery effects, loss of genetic diversity due to demographic bottlenecks, and habitat limitations. Populations with low inherent productivity are at risk of additional mortality factors and do not recover as quickly from low levels.

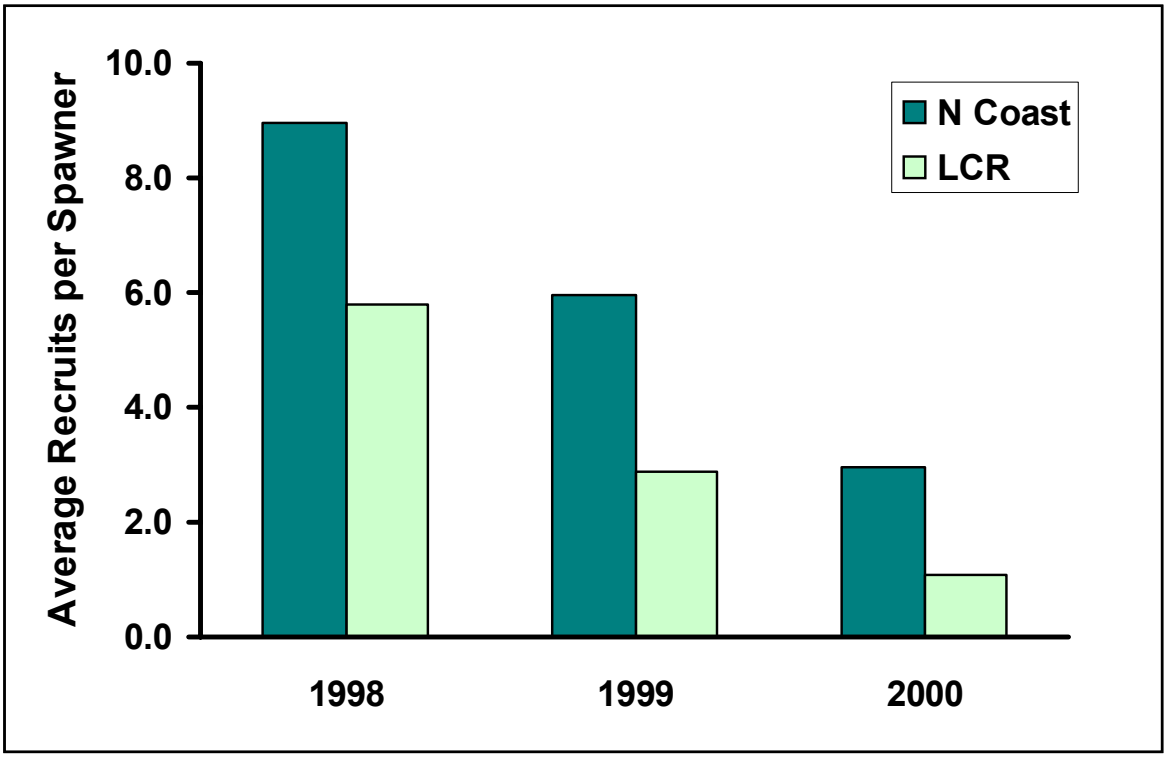

Figure 12. Average recruits per spawner for North Coast coho populations (Necanicum, Nehalem, Tillamook, and Nestucca) and for LCR coho populations (Early-run Clackamas, Late-run Clackamas, and Sandy); 1998 to 2000 brood years.

Population Viability

The WLC-TRT and ODFW have both assessed the current viability status of salmon and steelhead populations in the lower Columbia and Willamette ESUs. Both assessments used the same persistence probability criteria to estimate extinction risk for each population. The TRT identified 22 populations within the LCR coho ESU. Nine populations identified by the TRT are present on the Oregon side of the Columbia River and include Youngs Bay, Big Creek, Clatskanie River, Scappoose Creek, Clackamas River, Sandy River, Lower Gorge tributaries, Upper Gorge tributaries, and Hood River. The TRT further grouped these populations into three strata (Coastal, Cascade, and Gorge) based on similar ecological zones and life histories. ODFW identified six populations within the ESU including Astoria, Clatskanie, Scappoose, Clackamas, Sandy, and Bonneville. To estimate the extinction risk, four key attributes were evaluated: 1) abundance and productivity, 2) diversity, 3) spatial structure, and 4) habitat. The populations were ranked from 0-4, with category 0 representing a 0-40% chance of persistence in the next 100 years and category 4 representing a 99% chance of persistence in the next 100 years. A population was considered viable with a category 3 or higher score. The status assessment includes all the populations evaluated by the WLC-TRT and ODFW. Population viability scores are presented in Table 5. Differences in scores reflect the uncertainty in the existing information on the status of each population and scores should be considered as the corresponding range.

Table 5. Population persistence scores of the WLC-TRT and ODFW for lower Columbia River coho.

Strata/Population	Population Score WLC-TRT	ODFW
Coastal Stratum		
Youngs Bay	0.86	1.43
Big Creek	0.81	1.42
Clatskanie R.	0.85	1.68
Cascade Stratum		
Clackamas R.	1.79	2.27
Sandy R.	1.66	2.24
Gorge Stratum		
Lower Gorge	0.84	1.48
Upper Gorge	0.75	1.66
Hood River	0.89	0.42

1.4) Harvest Regime

This FMEP primarily addresses fisheries within Oregon tributaries of the LCR ESU that target coho, fall chinook, and winter steelhead, although impacts from other fisheries are considered (see Table 2). A primary goal of management conducted by ODFW is to limit combined ocean and freshwater fishery impacts at or below levels which preserve and recover wild fish populations. Fisheries for coho within the tributaries are largely restricted to protect naturally spawning fish. Many hatchery releases of summer steelhead and catchable trout have been discontinued or modified to eliminate potential fishery conflicts with listed adults and smolts. Management of fisheries for species other than coho including chinook, steelhead, trout, and warmwater fisheries has been tailored to minimize impacts on wild coho adults and juveniles.

1.4.1) Escapement objectives and/or maximum exploitation rates for each population (or management unit) based on its status.

Oregon tributary fishery impacts on listed lower Columbia River coho have been reduced to low levels by full marking of hatchery coho, required release of wild coho and other fishery and hatchery actions implemented over the last decade to protect weak and listed wild salmon populations. Tributary fishery impacts on listed wild coho are managed in the context of greater Columbia River mainstem and ocean fishery impacts which are described in fuller detail in Section 1.4.2. Impacts of specific tributary coho fisheries are described below.

Tributary sport – Fall salmon fisheries

Fall salmon fisheries in tributaries target hatchery coho and less frequently, tule chinook. Encounter rates with wild coho are highly variable depending on fishing effort which is related to the strength of the hatchery coho run. In large run years, hatchery coho harvest rates may reach 30% in some streams with intensive fisheries. Coho do not bite well in freshwater upstream from the Columbia River estuary and hence are not susceptible to high harvest rates, particularly in tributary streams. Hatchery harvest rates more typically average 10-20% in streams with hatchery programs. In low return years, hatchery harvest rates are less and fisheries may be closed to protect escapement. In streams without hatchery programs, encounter rates with wild coho are near zero. Encounter rates of wild coho in these fisheries are estimated based on hatchery harvest rates which are derived from salmon catch record card information. This data will provide for conservative estimates of wild coho impact rates because of time and area

differences between wild and hatchery fish. Impact estimates will also be conservative because catch record card data has been typically found to overestimate angler catch. Thus, actual impact rates on wild coho are less than those projected based on hatchery coho catch record card data.

All fall salmon tributary fisheries require release of non-fin marked coho and all hatchery coho returning to Oregon lower Columbia River tributaries are marked unless part of experimental index groups. Catch and release mortality of wild coho is estimated at 10% based on values reported in other salmon fisheries. According to a literature cited in the Washington Lower Columbia Fisheries Management and Evaluation Plan, catch and release mortality of salmon and steelhead has been estimated in a series of research studies to range from 1% to 9%. The *U.S. v Oregon* Technical Advisory Committee currently uses a catch and release mortality estimate of 10% as representative of the best available information. At the modest encounter rates observed for coho, the population-level effect of multiple catch and release mortality is small.

Based on observed encounter and hooking mortality rates, we estimate a maximum fishery impact of less than 3% for these fall tributary salmon fisheries. Average rates more typically average 0-2%.

Tributary sport – Winter steelhead fisheries

In most Oregon systems, tributary winter steelhead fisheries occur after adult coho have completed spawning. The exception is the Clackamas River where late run coho are present. Coho are less susceptible to winter steelhead fisheries than to coho fisheries and for the purposes of this assessment we assumed a maximum encounter rate of 20%. To provide a conservative estimate of fishery impacts, we applied the same 10% hooking mortality rate we used for fall salmon fishery impacts. However, catch and release mortality rates typically decline with water temperature. Based on these numbers, the net impact of the winter steelhead fishery on late wild run coho was assumed to be 2% in the Clackamas River. These late run Clackamas coho are not subjected to other fall tributary salmon fisheries. Winter steelhead fishery impacts in other streams are negligible because of timing differences.

Tributary sport - Trout fisheries

Significant trout fisheries in Oregon tributaries are limited to the Clackamas and Sandy rivers, particularly the three Clackamas River reservoirs. Tributary trout fisheries are managed to protect Lower Columbia River coho salmon. For example, efforts have been made to minimize the time when anglers may encounter coho smolts, to minimize the likelihood of coho smolts being legally hooked or kept, and to minimize the concentration of anglers in these areas. Estimated coho impacts in Clackamas River trout fisheries are <0.2%. Impacts in other tributaries are negligible (coho are never or only rarely encountered).

<u>Lower Clackamas River.</u> Juvenile coho in the lower Clackamas River basin, below Portland General Electric's (PGE) hydroelectric projects, rear in small headwater tributaries and migrate out of the basin as smolts (<15 cm) during the month of May (Clear Creek trap data from USFS). Trout angling in streams of the basin does not open until late May (4th Saturday) and remains open until October 31. All stream angling for trout in the lower Clackamas River basin is be catch and release only and restricted to artificial flies and lures (no bait). No hatchery trout are released into streams in the basin. This results in light angling effort for trout, especially in the small headwater tributaries where juvenile coho salmon rear. The likelihood of encounter is

extremely rare due to the small size of the rearing juveniles and the semi-remote nature of their rearing areas.

North Fork Reservoir (Clackamas). Trout angling in North Fork Reservoir is similarly restricted to the summer-time period of late May to October 31, annually. However, a significant trout fishery is present in the reservoir targeting stocked adipose fin-clipped hatchery rainbow trout. Harvest limits allow the take of only adipose fin-clipped trout in the reservoir, and use of bait is permitted. Due to cold water temperatures in the upper Clackamas Basin above North Fork Reservoir, coho smolt emigration is significantly later than in the lower basin. Long-term smolt emigration data collected at North Fork Dam by PGE indicates approximately 40% of coho smolt emigration through the reservoir occurs after the fishery opens in late May. Based on creel survey data collected at the reservoir in 1988, approximately 0.6% of the smolts still present in the reservoir after the fishery opens in late May could be caught and released in the fishery. Applying a 30% hooking mortality rate on smolts caught and released using bait, approximately 0.18% of the coho smolts in the reservoir during the fishery are incidentally harvested during this fishery. This affects 0.072% of the coho population.

River Mill Reservoir (Clackamas). River Mill Reservoir (Estacada Lake) is downstream of North Fork Dam and is separated by a short reach of stream between the two reservoirs. Most coho smolts emigrating past North Fork Dam are bypassed around River Mill Reservoir (through PGE's juvenile bypass system) and are released in the Clackamas River downstream of River Mill Dam. The number of coho smolts passing through River Mill Reservoir is variable between years, but is unlikely to exceed 1,000 smolts, based on estimates by PGE Staff. Similar to North Fork Reservoir, a trout fishery is present in River Mill Reservoir targeting adipose fin-clipped hatchery rainbow trout. Trout season is open from late May to October 31, harvest limits allow the take of only adipose fin-clipped trout in the reservoir, and use of bait is permitted. For the purposes of this assessment, coho smolts may be assumed to be encountered by trout anglers at the same rate as at North Fork Reservoir.

Faraday Reservoir (Clackamas). Similar to River Mill Reservoir, a trout fishery is present in Faraday Reservoir regulated under general Willamette Zone regulations. Faraday Reservoir is an off channel reservoir situated between North Fork Dam and River Mill Reservoir. The intake to the reservoir at Faraday Diversion Dam is not screened to prevent juvenile coho from entering the reservoir. However, since most outmigrant smolts are collected at North Fork Dam and bypassed around River Mill Reservoir and Dam, juvenile coho are only diverted into Faraday Reservoir during periodic high flow spills at North Fork Dam. This event occurs on average approximately 1 out of every 4 years for short duration. Typically, few juvenile coho enter the reservoir. PGE conducts annual inventory of juvenile coho entering the reservoir through the use of trapnetting. In 1998-99 PGE captured 266 total juvenile coho smolts in Faraday Reservoir during 3,084 hours of netting. During the winter of 1999-2000, PGE captured 37 total juvenile coho smolts in 6,143 hours of netting effort. Given this information, we estimate that no coho smolts or listed coho smolts will be caught or taken in the Faraday Reservoir fishery.

Upper Clackamas River. Juvenile coho in the upper Clackamas River basin above PGE's hydroelectric projects principally rear in the Big Bottom area of the upper Clackamas River, and in the North Fork Clackamas and approximately 11 km of the mainstem Clackamas between Fish Creek and North Fork Reservoir. Similar to the lower basin, trout angling in streams of the upper Clackamas basin is open during the period from late May (4th Saturday) until October 31, annually. All stream angling for trout in this area is catch and release only and restricted to

artificial flies and lures only (no bait). No hatchery trout are released into streams of the upper Clackamas River, and trout angling effort is light, especially in the Big Bottom area of the upper basin where juvenile coho salmon rear. Given the likely rarity of encounter with wild coho smolts by anglers during catch-and-release trout fisheries, take is zero.

Sandy River. Juvenile coho in the Sandy River basin rear in small headwater tributaries and migrate out of the basin as smolts (<15 cm) during the month of May (Still Creek trap data from USFS). Trout angling in streams of the basin will not be opened until late May (4th Saturday) and will remain open until October 31. All stream angling for trout in the Sandy River basin will be catch and release only and restricted to artificial flies and lures (no bait). No hatchery trout are released into streams in the basin. This results in light angling effort for trout, especially in the small headwater tributaries where juvenile coho salmon rear. The exact level at which juvenile coho will be encountered during summer trout fisheries is unknown. It is likely, however, that encounters will be extremely rare due to the small size of the rearing juveniles and the semi-remote nature of their rearing areas. Given the likely rarity of encounter with wild coho smolts by anglers during catch-and-release trout fisheries, take is zero.

Other lower Columbia River tributaries. No significant trout fisheries occur.

Tributary sport – warmwater gamefish fisheries

Tributary warmwater gamefish fisheries do not impact wild LCR coho, due to seasonal timing, locations, and fishing methods.

Tributary sport – smelt fisheries

The occasional smelt dipnet fisheries that occur in the Sandy River do not impact wild LCR coho due to seasonal timing, locations, and fishing methods; though juvenile coho are encountered .

1.4.2) Description of how the fisheries will be managed to conserve the weakest population or management unit.

Mortality associated with tributary, Columbia mainstem, and ocean fisheries are and will continue to be managed in a manner that is consistent with the conservation and recovery of the species. The approach to accomplish this goal is to scale annual fishery impacts to the forecast run strength of each year's return of naturally produced wild coho. The tools used to adjust fishery mortality rates include selective fisheries, wherein only hatchery fish may be retained, adjustments in number of days open to fishing, and special fishing regulations that allow selective access to hatchery fish by directing fishing effort to times or areas where impacts to naturally produced fish are reduced. Each year a suite of these regulatory actions will be undertaken to ensure that the impact of fisheries is less than the maximum harvest mortality rate determined for that year.

The method to determine the annual maximum harvest mortality rates for wild lower Columbia River coho salmon will be based upon two predictive factors that are known to influence run size: parental spawner abundance and ocean survival (ODFW 2004). The integration of these two factors in setting maximum harvest rates will be accomplished using the same harvest matrix approach as currently used in the management of Oregon Coastal Natural (OCN) stocks of coho through the Amendment 13 Pacific Fishery Management Council (PFMC) process.

However, for lower Columbia River coho, two independent harvest matrices will be used: one for ocean fisheries and one for fisheries that occur within the Columbia River. In both cases, to

calculate the index of marine survival, the number of hatchery origin jack coho will be divided by the number of hatchery smolts released in the spring of the same year. This will be referred to as the "marine survival index". The other factor, parental escapement, will be the number of wild adult coho that spawned 3 years prior to the upcoming adult return.

For example, to set the maximum harvest rate for the 2005 fishing season, the two controlling factors would be determined as follows. The marine survival index would be calculated as the number of jacks that returned in the fall of 2004 divided by the number of smolts released in the spring of 2004. The parental abundance would be the number of wild fish that spawned in 2002.

Sandy and Clackamas wild populations are used to set harvest rates for lower Columbia River coho. The parental escapement for each population will be applied to a harvest matrix and a maximum harvest rate for each population estimated. These two harvest rates will then be averaged to obtain the overall maximum impact rate for wild lower Columbia River coho. These populations are the most significant wild coho populations in the Oregon lower Columbia River and protection of these populations is critical to the long-term viability of the ESU. These populations are also subject to a full suite of fisheries. Hence, limitations of all fisheries based on Sandy and Clackamas should result in lesser impacts on other coho populations.

Ocean Fisheries Management

Ocean fisheries which affect listed LCR coho include Oregon, Washington, and California coastal sport and commercial fisheries regulated by Pacific Fishery Management Council processes. The Canadian salmon fishery may take an insignificant number of LCR coho. As noted earlier, an ocean and an in-river harvest matrix is used to set the maximum fishery rates. The matrix used for the maximum ocean rates will be essentially the same as described for OCN coho and shown below in Table 6. Within the matrix table, parental escapement is expressed as some fraction of "full seeding". Full seeding for the Sandy and Clackamas populations was estimated by ODFW (2004) to be 1,340 and 3,800, respectively.

Table 6. Harvest management matrix for lower Columbia River wild coho salmon showing maximum allowable OCEAN fishery mortality rates.

Parental Escapement		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 8.0%	< 15.0%	< 30.0%	< 45.0%
Medium	0.75 to 0.50 full seeding	< 8.0%	< 15.0%	< 20.0%	< 38.0%
Low	0.50 to 0.20 full seeding	< 8.0%	< 15.0%	< 15.0%	< 25.0%
Very Low	0.20 to 0.10 of full seeding	< 8.0%	< 11.0%	< 11.0%	< 11.0%
Critical	< 0.10 of full seeding	0 – 8.0%	0 – 8.0%	0 – 8.0%	0 – 8.0%

It should be emphasized that ODFW alone does not set or control the ocean harvest rates. Multiple state and federal agencies are involved in making this decision. However, as long as the parental abundance levels for the Columbia and coastal populations are relatively similar, the maximum rates expressed in Table 6 can be expected with some degree of certainty. A problem occurs when the parental escapement for the Columbia population is very low and the escapement for coastal populations very high. Under these circumstances, the maximum allowable harvest rates for OCN coho would be too high for the Columbia population.

To explore the likelihood of this situation occurring, past spawner escapement data for OCN and Clackamas coho populations were compared. In most years the parental escapement matrix category for OCN coho would have been the same as it was Clackamas River coho. Further, when discrepancies occurred they tended to favor the Clackamas population. In other words, the parental matrix category of the OCN coho was at a lower level than for Clackamas coho. Only in 3 of the 27 years was the parental abundance category greater for OCN coho than it was Clackamas coho.

Therefore, in the future it appears unlikely that Columbia wild coho populations will fall into a lower harvest matrix category for spawner abundance relative to coastal populations. However, in the event that such a situation does occur, ODFW will negotiate for an ocean harvest rate that is consistent with the level specified by the matrix for Columbia River coho.

Columbia River Fisheries Management

A second harvest matrix will be used to set the maximum harvest rate for Columbia River fisheries which also include tributary fisheries. It is based upon the same concepts but has different limits as shown in Table 7. These harvest rate limits were set at levels demonstrated to be considerably less than the maximum sustainable rate for these populations (ODFW 2004).

Table 7. Harvest management matrix for lower Columbia River wild coho salmon showing maximum allowable mortality rates for COLUMBIA RIVER fisheries.

Parental Escapement		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 4.0%	< 7.5%	< 15.0%	< 22.5%
Medium	0.75 to 0.50 full seeding	< 4.0%	< 7.5%	< 11.5%	< 19.0%
Low	0.50 to 0.20 full seeding	< 4.0%	< 7.5%	< 9.0%	< 12.5%
Very Low	0.20 to 0.10 of full seeding	< 4.0%	< 6.0%	< 8.0%	< 10.0%
Critical	< 0.10 of full seeding	0.0 – 4.0%	0.0 – 4.0%	0.0 – 4.0%	0.0 – 4.0%

Interpretation of Matrices and Special Circumstances

The impact of all fisheries on lower Columbia River coho can be described by combining the ocean and in-river harvest matrices. When combined the two matrices yield a table of maximum overall exploitation rates for all fisheries (Table 8). These exploitation rates were determined to not impair the conservation and recovery of lower Columbia River coho. This determination was based on a population recruitment simulation model that estimated the probability of recovery under the combined harvest matrix protocols (ODFW 2004). This simulation determined that the probability of the population failing to meet numerical recovery levels (greater than 50% of full seeding) was less than 0.05. This estimate was obtained under the assumption that in the future ocean survival rates will be low. Specifically, the 13 lowest survival rates for wild Clackamas coho observed over the last 39 years were used within the simulation model as the basis for estimating the survival rates expected for the next 36 years.

With respect to these harvest matrices, there are several critical points that should be recognized. First, all harvest rates are expressed as maximums and not desired targets. Therefore, a harvest rate lower than maximum can be selected if it is biologically warranted. For example in Table 7, if the observed parental abundance was 0.60 of full seeding and the observed marine survival index was 0.0009, the "low" survival matrix column would be used to find the maximum harvest rate. However, because 0.0009 is much closer to the threshold for the "critical" survival column, the actual harvest rate might be set at 5.0% rather than the maximum indicated this matrix cell (7.5%). The harvest matrix tables are intended to be used in a manner that will provide this kind of flexibility.

Table 8. Likely cumulative exploitation rates for lower Columbia River coho under the combined management protocols proposed for setting ocean and in-river fishery harvest rates.

Parental Escapement		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 11.7%	< 21.4%	< 40.5 %	< 57.4%
Medium	0.75 to 0.50 full seeding	< 11.7%	< 21.4%	< 29.2%	< 49.8%
Low	0.50 to 0.20 full seeding	< 11.7%	< 21.4%	< 22.7%	< 34.4%
Very Low	0.20 to 0.10 of full seeding	< 11.7%	< 16.3%	< 18.1%	< 19.9%
Critical	< 0.10 of full seeding	0.0 – 11.7%	0.0 – 11.7%	0.0 – 11.7%	0.0 – 11.7%

For 2005, additional consideration was given to the fact that parental escapement was near the borderline between a "low" and "very low" classification (i.e., 0.20 of full seeding is the threshold). Since the "very low" classification corresponds with a maximum fishery impact rate of 6.0%, it was felt that the 2005 rate should be set closer to 6.0% than 7.5%. Therefore, for 2005 a maximum allowable impact for Columbia River fisheries was set at a mortality rate not to exceed **6.5%**.

The LCR coho management plan also provides guidance with respect to coho mortality rates in ocean fisheries. The prescription for setting maximum impact rates for ocean fisheries is not formalized in administrative rule as it is for Columbia River fisheries, however, the LCR coho management plan does contain an ocean fishery harvest matrix similar Table 6 that ODFW uses to provide a similar degree of quantification. Using the inputs for the predicted 2005 return, this ocean harvest matrix yields a maximum rate of 15% if a parental escapement classification of "low" is used and a maximum rate of 11% for a parental escapement classification of "very low". For the same rationale used earlier in setting maximum mortality rates for Columbia River fisheries, it was recommended that the maximum rate for ocean fisheries should correspond closest to the "very low" parental escapement classification. Therefore, a maximum impact rate for ocean fisheries on LCR wild coho was set at **12%** for 2005.

Second, when the parental abundance declines below 0.10 of full seeding (critical category), the relationship between spawners and subsequent recruits becomes increasingly uncertain and unreliable. It is possible that at these levels population recruitment will largely fail. Biologically, any additional mortality at such levels is risky. Ideally, when a population gets to these levels, fishery impacts should be scaled back to zero. However, both the ocean and in-river matrices have an allowable harvest rate within this zone. These rates (8% for the ocean and 4% for in-river) do not represent a threshold of biological risk. They are fishery management thresholds, below which the number and magnitude of fisheries that must be shut down has a very high social and economic cost. Therefore, when the parental escapement is within this range all efforts will be made to reduce fishery impact to as close to zero as possible, recognizing that other practical considerations may make it necessary to allow fishery rates as high as 8% in the ocean and 4% within the Columbia.

As noted earlier, the proposed harvest management strategies for the ocean and in-river fisheries are expected to result in the conditional total exploitation rates for lower Columbia River wild coho as described in Table 8. Although these cumulative harvest rates may appear excessive for the recovery of an endangered species, the analyses performed by ODFW suggests that as long as the structure of the matrix is adhered to, the likelihood and speed to recovery will not be adversely effected (ODFW 2004). This, perhaps counter-intuitive, conclusion likely has its origin in several key characteristics of coho salmon in the lower Columbia River and the harvest management strategy that is proposed in this plan.

First, ocean survival rates that fall into matrix column category of "high" are relatively rare. For example, over the last 30 years there have been only 4 times when ocean survival rates have been in this range. In contrast, survival rates in the "low" or "critical" matrix categories have been more common (12 of the last 30 years), as have been survival rates that would fit into the "medium" survival category (14 of the last 30 years). Therefore, if the recent past is a predictor of the future, the maximum harvest rates imposed on this species will most likely be those found in the "critical" through "medium" survival columns of the harvest matrix.

Secondly, the capacity of the species to rebuild from very depressed levels appears quite strong as long as the ocean conditions are better than the "critical" matrix category. For example, it can be demonstrated for the Clackamas population, that even when the parental escapement is very low (580 fish or 0.15 of full seeding), recovery is still likely under most ocean survival conditions. More specifically, the number of smolts produced by 580 spawners in the Clackamas Basin would be sufficient to yield an adult return 2,733 coho under survival conditions that would be categorized in the matrix table as "low". Under the management scenario described by these matrices, the cumulative harvest rate for this combination of conditions would be 11.7%.

This would result in a post-fishery escapement of 2,413 spawners into the Clackamas Basin. Such an escapement is 60% of the level necessary for full seeding and would meet the de-listing criteria for spawner abundance described by ODFW (2004).

Using the same example, if ocean survival rates were in the "medium" range, the post-fishery escapement for the Clackamas would be 3,835 spawners and if the survival rates were in the "high" range, 5,330 spawners could be expected. Both of these escapements would exceed the level of spawners necessary for full seeding of the habitat for smolt production.

However, this apparent robust performance deteriorates rapidly when ocean survival rates descend into the "critical" range of the matrix. In fact, if the ocean survivals observed for the worst 3 years in the recent past occurred for the next 30 years, extinction of this species would be virtually assured – even if fishery impacts were reduced to zero.

In summary, variations in ocean conditions can yield extreme differences in the number of returning adult coho, and thereby the trajectory of species recovery. Because this extreme variation in recruitment response is primarily a function of ocean survival rates, a modest scaling up of harvest rates linked to increased ocean survivals when parental escapements are not at critical levels, will not adversely effect the conservation of this species.

1.4.3) Demonstrate that the harvest regime is consistent with the conservation and recovery of commingled natural-origin populations in areas where artificially propagated fish predominate.

Artificially produced coho make up the dominant returns throughout much of the ESU. Implementation of 100% adipose fin-clipping of all hatchery coho releases within the ESU and prohibition of retention of unmarked fish serves to reduce deleterious effects of the fishery on the natural population. While not all coho released outside the ESU are adipose fin clipped, these fish make up a small portion of the return to the Columbia River mouth. Further, hatchery practices throughout the ESU have selected early-returning broodstock causing the peak in hatchery return timing to precede the returns of natural fish by several weeks. Coupling return timing with fisheries that close prior to peak natural fish immigration helps to protect natural populations from fishery pressures. Finally, at Big Creek and Klaskanine hatcheries as well as North Fork Dam and Marmot Dam, fin marked fish are not allowed to pass upstream to natural spawning grounds, thereby preventing hatchery fish from intermixing with natural fish in a large portion of the spawning habitat of the ESU.

1.5) Annual Implementation of the Fisheries

The coordination and integration of numerous fora and processes are required to implement fisheries consistent with conservation and use goals. This FMEP represents one of those processes, and as such must account for impacts from other fisheries.

Ocean Processes: Ocean harvest management takes place in the Pacific Fishery Management Council and Pacific Salmon Treaty fora. Ocean and inriver fishery allocation decisions are closely related and implemented in an annual process. ESA coverage for ocean fisheries normally takes place through Section 7 consultation. This consultation specifies the rebuilding exploitation rates (RERs) for LCR salmon stocks to guide cumulative harvest impacts in all ocean and freshwater fisheries. Fisheries will be managed so that the RERs are not exceeded in a given year.

Columbia River Processes: The process for setting in-basin fisheries is closely related and concurrent with the process for establishing sport and commercial seasons in the lower Columbia

River. Commercial seasons in concurrent Oregon and Washington waters of the Columbia River are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact) in a series of public hearings which begin in January for winter and spring fisheries, and in August for fall fisheries. The ODFW and WDFW directors or their delegates comprise the Compact and act consistent with delegated authority from the respective state commissions. Sport seasons in concurrent waters are adopted by the individual states, but great effort is expended to ensure a coordinated process occurs between Oregon and Washington which results in consistent regulations.

Columbia River seasons are also regulated by the *U. S. v. Oregon* process which dictates sharing of Columbia River fish runs between treaty Indian and non-Indian fisheries. Mainstem Columbia River harvest management is normally based on annual agreements between the parties to *U. S. v. Oregon* and implemented though the Columbia River Compact. ESA coverage for mainstem Columbia River and ocean fisheries normally takes place through Section 7 consultation. Impacts on upriver spring and fall chinook and steelhead in Columbia River fisheries are not subject to this FMEP and are addressed by Section 7 consultations for *U. S. v. Oregon* fisheries. Because the Section 7 process is an annual process in many cases, it is important that harvest levels in this FMEP are considered as part of those processes as well. The RERs specified in the section 7 consultations will be used to manage cumulative harvest rates in ocean and freshwater fisheries.

Subbasin Management Planning Process: Management objectives and measures for tributary fish populations and fisheries are detailed in plans for key subbasins which are periodically revised following a lengthy public review process and adopted by the Oregon Fish and Wildlife Commission (OFWC). Fisheries in the Willamette, Sandy, and Clackamas rivers are managed based on subbasin plans.

Permanent Regulation Process: Specific fishery regulations consistent with subbasin management plan goals and objectives are based on a quadrennial angling regulation review process that includes ODFW staff and public input. This process addresses regulations for all fisheries addressed by this FMEP (salmon, trout, warmwater, sturgeon, smelt, etc.). The public process involves: 1) solicitation of proposals for regulation changes from ODFW staff, Oregon State Police (OSP), and the public, 2) categorization of proposals for substance and opportunity by a Regulation Review Board which includes representatives from the public, ODFW, OSP, OFWC, and the Oregon Governor's office, 3) review of proposals in a series of public meetings held around the state, and 4) review and adoption of rules by the OFWC at public commission meetings.

Regulation changes may be implemented in off-years of the 4-year cycle to address emergency or conservation issues. Emergency regulations can be adopted by the Commission within 2 weeks if a Commission meeting is scheduled near the same date. The Commission has also delegated to the Director of ODFW the authority to adopt emergency regulations. If the Director adopts emergency regulations, they can be implemented within a matter of days from the time they are submitted. ODFW will consult with NMFS regarding the proposed regulations changes prior to implementation to ensure that effects on listed LCR chinook salmon will be consistent with limitations described in this FMEP.

State ESA Process: Lower Columbia River coho salmon were listed by the Oregon Fish and Wildlife Commission (OFWC) as a state endangered species in July 1999. One provision of the administrative rules that govern the management of state endangered species is the requirement

for an incidental take permit (ITP) for activities that cause an unintended "taking" of the species. The primary causes of these lethal takings are ocean and in-river fisheries.

The state endangered species rules also provide that for ITP activities conducted by ODFW (e.g., fishery management, operation of hatcheries, and monitoring) the OFWC is the entity that must approve the permits. Issuance of ITPs is dependent on whether permit applications are in compliance with Oregon Administrative rules (OAR 635-100-0190) which describe the protocol by which the maximum allowable impact of Columbia River commercial and sport fisheries on wild lower Columbia River (LCR) coho. That protocol is outlined in Section 1.4.1 above. This process is different than for ITPs granted for non-ODFW activities. For ITPs related to non-ODFW activities the approval authority is given directly to ODFW and Commission approval is not a requirement.

SECTION 2. EFFECTS ON ESA-LISTED SALMONIDS

2.1) Description of the biologically-based rationale demonstrating that the fisheries management strategies will not appreciably reduce the likelihood of survival and recovery of the affected ESU(s) in the wild.

Mortality associated with ocean and in-river fisheries will be managed in a manner that is consistent with the conservation and recovery of the species. The approach to accomplish this goal will be to scale annual fishery impacts to the forecast run strength of each year's return of naturally produced wild coho. The tools used to adjust fishery mortality rates will include selective fisheries, wherein only hatchery fish may be retained, adjustments in number of days open to fishing, and special fishing regulations that allow selective access to hatchery fish by directing fishing effort to times or areas where impacts to naturally produced fish are reduced. Each year a suite of these regulatory actions will be undertaken to ensure that the impact of fisheries is less than the maximum harvest mortality rate determined for that year.

2.1.1) Description of which fisheries affect each population (or management unit).

Numerous fisheries have the potential to impact lower Columbia River coho (Table 9). Mainstem and tributary sport fisheries for fall Chinook, coho, winter steelhead, and summer steelhead each may have impacts on naturally produced coho, though incidental impacts from the steelhead fisheries are likely to be very minor. These impacts would affect each of the populations, with the lone exception being that there is no tributary fishery on the Scappoose. Commercial fisheries for fall Chinook in the mainstem and Columbia River select areas could also affect coho from each of the tributary populations. A tributary fishery for spring Chinook in the Sandy has the potential to have minor incidental impacts on coho there.

Table 9. Fisheries potentially affecting each Oregon population of wild LCR coho.

Fishery	Area	Astoria	Clatskanie	Scappoose	Clackamas	Sandy	Bonneville
Spring Chinook	Lower Sandy Sport					X	
Fall Chinook	Mainstem Sport	X	X	X	X	X	X
	Tributary Sport	X	X		X	X	X
	Mainstem Commercial	X	X	X	X	X	X
	Col R. Terminal	X	X	X	X	X	X

	Commercial						
Coho	Mainstem	X	X	X	X	X	X
	Tributary Sport	X	X		X	X	X
Winter Steelhead	Mainstem	X	X	X	X	X	X
	Tributary Sport	X	X		X	X	X

2.1.2) Assessment of how the harvest regime will not likely result in changes to the biological characteristics of the affected ESUs.

Low harvest rates will result from implementation of selective fisheries for hatchery coho of all populations. This management regime will substantially reduce the potential for fishing related changes in biological characteristics of wild coho. In addition, low fishing rates for wild fish will result in increased numbers of wild spawners even in periods of poor freshwater migration and ocean survival conditions. Larger populations will be less subject to genetic risks and loss of diversity associated with small population sizes. Finally, increased harvest rates of hatchery coho in selective fisheries should benefit wild stock integrity and diversity by removing a greater fraction of the hatchery fish which could potentially stray into wild production areas.

Fishing impact rates for all management units are spread over the breadth of the run so that no subcomponent of the wild stocks will be selectively harvested at a rate substantially larger than any other portion of the run. No significant harvest differential will occur for different size, age, or timed portion of the run.

2.1.3) Comparison of harvest impacts in previous years and the harvest impacts anticipated to occur under the harvest regime in this FMEP.

Coho salmon received significant harvest pressure beginning in the late 1800s particularly on the lower Columbia River. Peak commercial catches of wild coho in the Columbia River occurred in 1925 (Lichatowich et al. 1995); since the 1960s, Columbia River commercial catch has consisted primarily of hatchery produced coho. Commercial landing estimates of coho from Washington, Oregon, and California from 1882-1982 show relatively constant landings since 1895, ranging mainly between 1.0 and 2.5 million fish, with a low of 390,000 fish (1920) and a high of 4.1 million fish (1971). Columbia River coho became an important marine, as well as freshwater, harvest species in the 1960s.

Ocean harvest of coho in the Oregon Production Index (OPI) area peaked in the 1970s and early 1980s (Figure 13). Ocean harvest of coho in the OPI dropped significantly beginning in 1994 with management of the fishery to reduce impacts on OCN coho. Oregon coastal coho were listed as threatened under the ESA.

Beginning with the 1995 brood, most Columbia River hatcheries mass marked hatchery-released fish with an adipose fin clip. Since marked fish began returning in 1998, fisheries managers have been able to prosecute selective sport fisheries for marked hatchery coho where all unmarked fish were required to be released. In addition, because there are run timing differences between some hatchery and wild stocks, Columbia River commercial fisheries have employed select area (e.g. SAFE programs) and time strategies to target hatchery fish to reduce impacts on wild coho. As a result of these selective management strategies employed during 1998-2002, combined fisheries harvest of ESA-listed coho was less than 15% annually, while harvest of Columbia River hatchery coho was maintained near 50% (Figure 14).

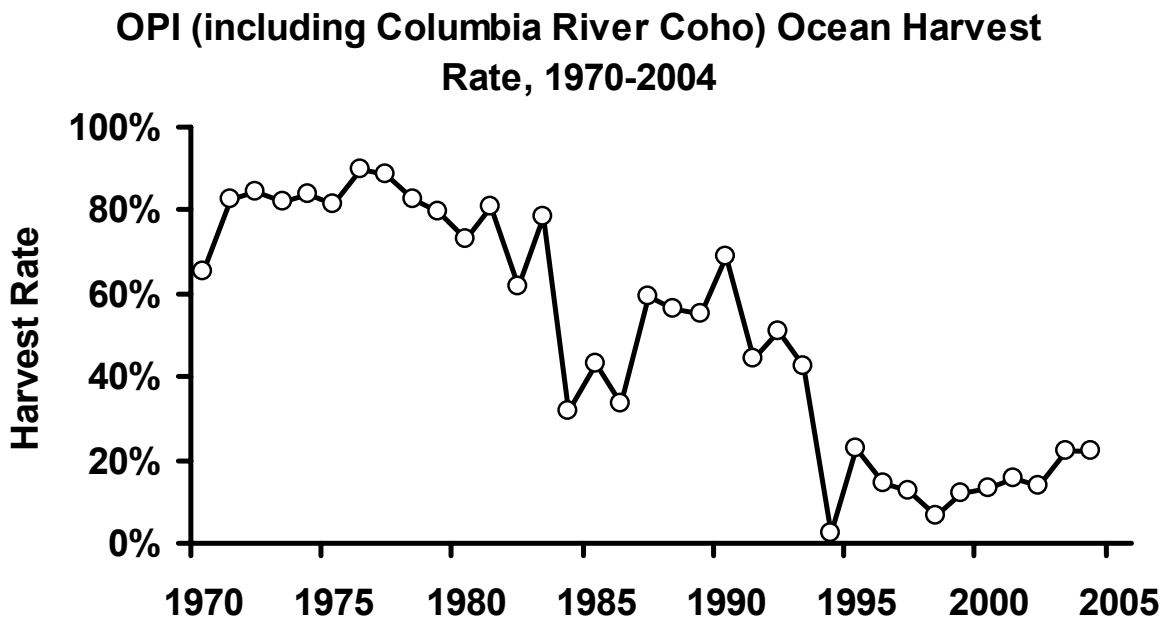

Figure 13. Coho ocean harvest rates in the based on Oregon Production Index ocean area. These harvest rates are for the general ocean population of all coho, including hatchery and wild fish.

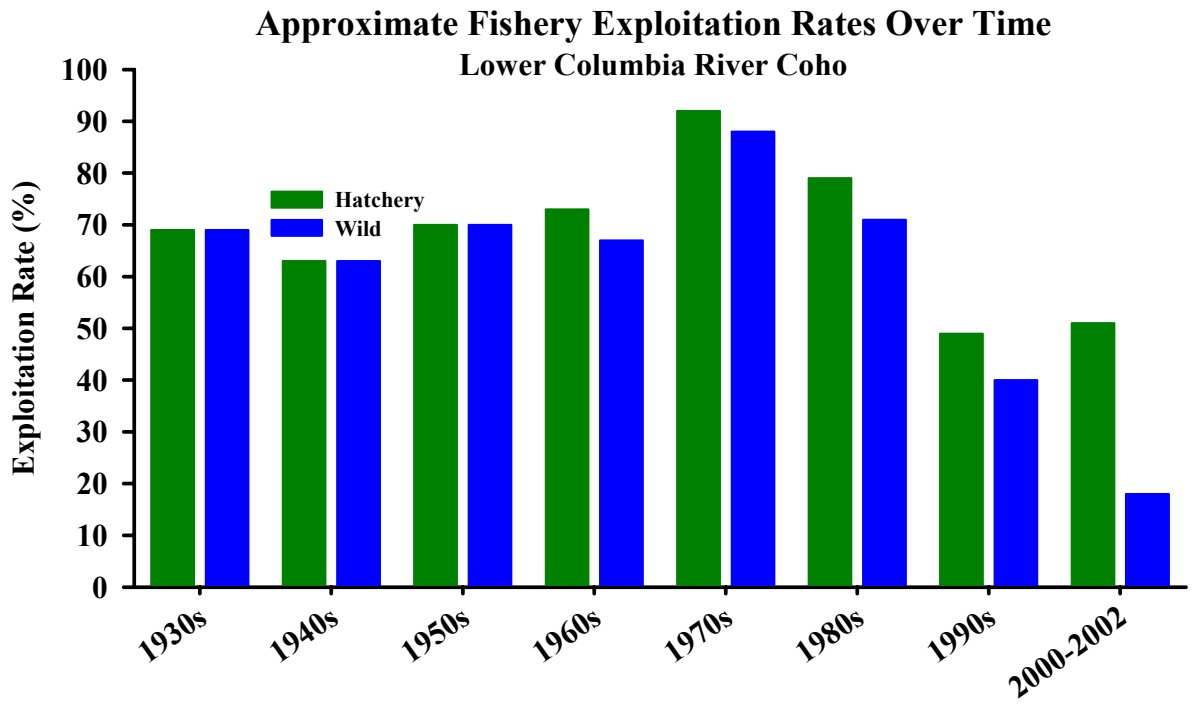

Figure 14. Approximate coho fishery exploitation rates over time. Primarily Columbia River harvest until 1950s. Ocean harvest peaked 1970s–80s. Coho remain an ocean sport fishery focus. Sport harvest in Lower Columbia estuary began to be significant in 1980s. Columbia commercial harvest focused on late September–October. Differential harvest of wild fish commenced in 1960s when late fall fisheries were reduced. Selective harvest in ocean and Columbia began in 1998 and provided greater differences in wild and hatchery harvest rates.

2.1.4) Description of additional fishery impacts not addressed within this FMEP for the listed ESUs specified in section 1.3. Account for harvest impacts in previous year and the impacts expected in the future.

All fishery impacts have been addressed.

SECTION 3. MONITORING AND EVALUATION

3.1) Description of the specific monitoring of the "Performance Indicators" listed in section 1.1.3.

Population Indicators

Performance indicators for lower Columbia coho populations in Oregon tributaries include adult spawning surveys, adult trapping at the Big Creek and Klaskanine hatcheries, a life-cycle monitoring site, monitoring of adult passage at three dams including North Fork Dam on the Clackamas River, Marmot Dam on the Sandy River, and Powerdale Dam on the Hood River.

Since 1949, spawning fish surveys have been conducted in ten standard index areas and have been used to assess trends of naturally spawning populations of lower Columbia River coho (Brown et al. 2003). Index surveys are located in the Astoria, Clatskanie, Scappoose and Clackamas populations. In addition to the index surveys, supplemental surveys were conducted between 1959 and 1974 to obtain a wider perspective on lower Columbia River coho escapement and productivity. An escapement index is provided by peak counts per mile, and area-under-curve estimates (Beidler and Nickelson 1980) of spawners per mile. In 2001, funds were secured to develop a systematic monitoring program to more comprehensively assess each of the populations. Since then, ODFW has employed monitoring efforts described by Jacobs et al. (2002) to generate population abundance estimates. Data are also collected pertinent to hatchery:wild ratios, sex ratios, CWT experiments, and DNA analysis (Brown et al. 2003).

ODFW operates adult traps at both Big Creek and Klaskanine hatcheries. These traps provide information on trends in abundance of naturally produced fish in these basins. Since all returning hatchery coho and steelhead are adipose fin clipped, non-fin marked returns of these species are passed above the adult traps to reproduce. Scale sampling of fish passed above the weir has shown that a substantial portion of the unmarked fish are hatchery origin, being either mis-marked fish, or strays from outside the lower Columbia.

ODFW maintains a life-cycle monitoring site on North Fork Scappoose Creek in the Scappoose population. The life cycle monitoring program's aim is to provide information to answer the following questions:

- *Are there trends in abundance of adult or downstream migrant anadromous salmonids in selected index streams?*
- *Are trends in abundance of adult coho salmon in selected index streams primarily due to changes in freshwater survival or to changes in marine survival?*
- *Are there geographic differences in the patterns of freshwater and marine survival of coho salmon?*
- *Are trends in freshwater and marine survival of coho salmon in western Oregon correlated?*
- *Are geographic patterns of freshwater survival of coho salmon associated with differences in habitat quality? (Addressed in conjunction with the Aquatic Inventory Project)*
- *What are the influences of climate and land-use activities on coho salmon survival rates?*

- *How do survival rates of wild and hatchery coho salmon compare? Addressed in conjunction with the Stock Assessment Project)*
- *What are the life history characteristics (time, size, and age at juvenile and adult migration) of the anadromous salmonids in the index streams?*
- *How accurate are methods of estimating spawning abundance of different anadromous salmonid species? (Addressed in conjunction with the Coastal Salmonid Inventory Project)*

These questions are addressed through annual monitoring of juvenile outmigration and adult monitoring. Rotary screw traps or rotating incline-plane traps are used to capture outmigrating juvenile salmonids. Traps generally begin fishing in early March and fish continuously until catches diminish to low levels (or low streamflows precluded further operation of the traps), usually by mid June. The traps are normally checked and cleared of fish and debris once a day, although, to ensure fish safety, visits are more frequent during storm events and periods of high debris (Solazzi et al. 2003).

Adult salmonids are trapped in a fish ladder located at Bonnie Falls on North Fork Scappoose Creek. The fish ladder provides passage around a waterfall that is considered a complete barrier to upstream migration of adult salmon and steelhead. The trap operates throughout the period of adult coho migration. All fish that enter the trap are examined for fin marks, identified as male or female, measured for fork length, given a lower caudal mark, then released upstream from the trap (Solazzi et al. 2003).

Upstream migrant fish traps are in operation at North Fork Dam on the Clackams, Marmot Dam on the Sandy River, and Powerdale Dam on the Hood River. At each of these locations, fish arriving at the dam are enumerated. In both the Clackamas and Sandy, only non-fin marked fish are passed above the dam to minimize the proportion of hatchery fish that spawn naturally. Both Marmot Dam on the Sandy and Powerdale Dam on the Hood have been decommissioned and are scheduled for removal in 2007 for Marmot Dam, and 2010 for Powerdale Dam.

Fishery Indicators

Historic data on coho salmon fisheries in lower Columbia River tributaries are available from catch record cards. The analysis of CRC returns involves fisheries statewide, and requires about two years for a preliminary catch estimate and another year to finalize the estimate.

Commercial fishery landings are estimated inseason by contacting wholesale buyers regarding their purchases. The number of active buyers is small and all are contacted for daily accounting of the catch. Landings are verified post-season from fish receiving tickets. All fish buyers are required to complete and return fish receiving tickets for all purchases as a condition of their license. The commercial catch is subsampled inseason at fish buying sites to gather biological data including CWTs. Mainstem and Select Area commercial fisheries for salmon and sturgeon are sampled at a minimum 20% rate.

Fishery catch data, when combined with North Fork Dam and Marmot Dam counts and/or estimates of spawner abundance provides estimates of the aggregate run sizes to the tributary and the mouth of the Columbia River. These run size estimates and estimated harvest are the basis of fishery harvest rate estimates.

3.2) Description of other monitoring and evaluation not included in the Performance Indicators (section 3.1) which provides additional information useful for fisheries management.

All of the monitoring and evaluation programs which provide information useful to management of fisheries addressed in this plan have been addressed in section 3.1. A variety of research and restoration activities are currently underway on fish status, habitat conditions, and limiting factors in areas where coho occur. These activities are addressed in other consultations.

3.3) Public Outreach

The ODFW conducts extensive public involvement and outreach activities related to salmon fishery management and recovery. The annual fishery regulation process involving a series of public meetings, information mailouts, press releases, and public hearings was described in detail in section 1.5. Anglers are keenly aware of and accustomed to abrupt inseason management changes including closures and reopenings with short notice. Permanent regulations are detailed in published pamphlets of fishing regulations. Annual regulation and inseason changes are widely publicized with press releases, phone calls, or faxes of action notices to key constituents, and signs posted at fishery access points. The ODFW also operates an information line, a tape-recorded hotline, and an Internet web page where timely information is available.

3.4) Enforcement

Sport fishing regulations in Oregon are enforced by the Fish and Wildlife Division of the Oregon State Police working in close partnership with the Oregon Department of Fish and Wildlife. The OSP and ODFW work together to develop enforceable regulations to achieve fish and wildlife resource management goals. The Fish and Wildlife Enforcement Division of the OSP currently includes 119 Supervisors and Troopers including 98 assigned to general fish, wildlife, and natural resources law enforcement, and 13 Troopers assigned specifically to protection of anadromous fish and their habitat under the "Oregon Plan for Salmon and Watersheds." Another seven Troopers are assigned to commercial fish enforcement and one is assigned to the Oregon Department of Environmental Quality for environmental protection. Permanent staff are also supplemented with part time seasonal officers. Enforcement activities in the LCR ESU are conducted from offices in Astoria, Scappoose, Portland, Hood River, and The Dalles.

ODFW and OSP work together to facilitate enforcement of resource management goals through an annual cooperative enforcement planning process where local Troopers meet yearly with local biologists to set enforcement priorities by species. Troopers then develop tactical plans to address priority issues and gain desired compliance levels to protect resources and meet management goals. The results of each tactical plan are quantified and compared to the compliance level considered necessary to meet management goals. Compliance is typically estimated based on the percentage of angler contacts where no violations are noted. Tactical plans are adjusted if necessary based on compliance assessments to make the best use of limited resources in manpower and equipment to achieve the goals.

3.5) Schedule and process for reviewing and modifying fisheries management.

Addressed in section 3.5.1.

3.5.1) Description of the process and schedule that will be used on a regular basis (e.g. annually) to evaluate the fisheries, and revise management assumptions and targets if necessary.

To ensure that fish population and fishery management is meeting the goals described in this plan, annual monitoring will include wild fish escapement numbers and/or indices, projected future wild and hatchery numbers based on data from historical returns, fishery harvest, fin mark rates in the escapement areas, and projected fishery impacts on wild fish. This information and preseason cumulative fishery harvest rates for the next fishing season will be provided to NMFS' Hatcheries and Inland Fisheries Branch in Portland, Oregon, by March 31st of each year the FMEP is in effect. This information will be used to ensure tributary fishery impacts do not exceed RER harvest limits specified in Section 7 consultations.

One key question is whether wild populations are above or below critical abundance and productivity thresholds. In years where thresholds are not expected to be achieved, fishery limitations described in the harvest management matrices will be adopted to reduce fishery impacts on wild populations. Additional restrictions in mainstem Columbia River fisheries will also be considered based on the specifics of the problem, the effects of tributary closures, and the benefits of additional closures. Fishery restrictions may involve a combination of time and area closures, reduced bag limits, and quotas as necessary. Sport fishery restrictions would be regulated as part of the annual review process for permanent regulations, or through emergency action by the ODFW and the OFWC. Mainstem commercial fishery restrictions would occur in the Columbia River Compact forum as part of the normal inseason management process.

Before ODFW proposes any changes to the existing angling regulations that may affect listed juvenile or adult chinook salmon in the management area of the FMEP, ODFW will provide to NMFS information and analyses on how the regulation change will impact listed salmon. This information will be provided at least two weeks before a decision will be made by the Oregon Fish and Wildlife Commission.

3.5.2) Description of the process and schedule that will occur every X years to evaluate whether the FMEP is accomplishing the stated objectives. The conditions under which revisions to the FMEP will be made and how the revisions will likely be accomplished should be included.

This FMEP is intended to remain in effect indefinitely. Wild population status and fishery performance will continue to be assessed by the Oregon Department of Fish and Wildlife on an annual basis. ODFW will brief the Oregon Fish and Wildlife Commission annually on the status of lower Columbia River wild coho and the progress being made to implement the conservation plan.

The Oregon Department of Fish and Wildlife will conduct a comprehensive review of this plan after the 2008 fisheries to evaluate whether fisheries and wild populations are performing as expected. This will coincide with the 5-year review of the other LCR tributary fisheries. Comprehensive reviews will be repeated by the Oregon Department of Fish and Wildlife at 5-year intervals thereafter until such time as the wild stocks are recovered and delisted. Consultations between the Oregon Department of Fish and Wildlife and the National Marine Fisheries Service regarding management of fisheries impacting listed LCR coho will be

reinitiated only if significant changes in the status or designation of LCR coho, projected benefits of selective sport fishery implementation, habitat conditions, management processes, or other unforeseen developments necessitate revision.

One likely change will be the outcome of the proposed decommissioning of Marmot and Little Sandy dams in the Sandy River, and Powerdale Dam in the Hood River. Decisions regarding removal options, fish passage facilities, mitigation programs, hatchery practices, and fish management plans may have significant ramifications to the management regime proposed in this FMEP for Sandy River and Hood River salmon populations. It is anticipated that ODFW and NMFS will remain actively involved with the process that drives the decisions on removal options and fish passage issues, and will consult on subsequent fish management issues as they arise.

SECTION 4. CONSISTENCY OF FMEP WITH PLANS AND CONDITIONS SET WITHIN ANY FEDERAL COURT PROCEEDINGS

Actions and objectives contained in this proposed FMEP related to LCR coho do not directly impact Federal tribal trust resources. There are no existing court orders with continuing jurisdiction over tribal harvest allocations that are relevant to the implementation of the proposed FMEP with respect to LCR coho.

SECTION 5. REFERENCES

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