

## **Willamette River Coho and the Lower Columbia River Coho ESU Boundary Report**

The newly appointed Lower Columbia Natural Coho Workgroup (LRC Workgroup) met for the first time at the April 4, 2014 Pacific Fishery Management Council meeting. The LRC Workgroup discussed the process to follow, schedule for future meetings, and assignments. Members from NOAA's National Marine Fisheries Service (NMFS) and the Oregon Department of Fish & Wildlife (ODFW) agreed to take the lead on development of a Fact Sheet to provide information relative to coho populations above Willamette Falls and the existing Evolutionarily Significant Unit (ESU) boundary. NMFS was tasked with describing status, background and determination criteria for the existing boundary of the lower Columbia River (LCR) natural coho salmon ESU; ODFW was tasked with summarizing existing information regarding historical upstream passage and releases of hatchery coho salmon in areas above Willamette Falls. This report is intended to complete the assignment as we understood it.

In 2004 the Population Identification Subcommittee of the Willamette-Lower Columbia Technical Recovery Team (WLC-TRT) convened in response to the proposed listing of LCR natural coho under the U.S. Endangered Species Act (ESA). The Subcommittee determined 24 historical demographically independent populations (DIPs) of listed coho salmon (*Onchorhynchus kistuch*) in the LCR coho salmon ESU, with no coho salmon DIPs in the upper Willamette River (Myers et al. 2006). The authors relied on a number of types of information to identify historical populations. In general, there were six different types of information utilized:

- 1) geography,
- 2) migration fidelity,
- 3) genetic attributes,
- 4) life history patterns and morphological characteristics,
- 5) population dynamics, and
- 6) environmental and habitat characteristics.

Genetic analysis of coho salmon populations provided limited information about population distinctiveness. This was thought to be due in large part to the extensive programs of hatchery releases and interbasin transfers between hatcheries, in tandem with the small number of naturally produced fish. Therefore the boundaries for historical DIPs were in part established using information related to two isolating mechanisms: homing fidelity and migration timing. Homing fidelity was examined to estimate the extent of adult exchange among spawning populations, whereas adult run timing often is coordinated with stream hydrology. The WLC-TRT generally believed that the homing fidelity of coho salmon was more similar to steelhead than to Chinook salmon or chum salmon.

The environmental and habitat characteristics of Willamette Falls were determined to provide the isolating mechanism for it to serve as an ESU boundary and likely barrier for fall-migrating salmonids such as coho. This is consistent with the WLC-TRT separating the LCR Chinook salmon ESU from the Upper Willamette River Chinook salmon ESU and the LCR steelhead Distinct Population Segment (DPS) separated from the Upper Willamette River steelhead DPS.

The WLC-TRT noted a number of contemporary references documenting the presence of coho salmon in tributaries to the Willamette River above Willamette Falls. The first recorded observations of naturally occurring coho salmon in all cases followed either opening access to the area via construction of the fish ladder at Willamette Falls in 1882 or the introduction of LCR coho salmon by ODFW into those subbasins<sup>1</sup> (Table 1). The WLC-TRT reported old-time residents claiming that silver salmon were not present in these streams prior to about 1920, and that Dimick and Merryfield (1945) asserted that coho salmon above Willamette Falls were an “artificial establishment from hatchery-reared fish.” These findings lead the WLC-TRT to determine that coho salmon historically would not have ascended Willamette Falls before it was laddered. According to passage records from ODFW dating back to 1966, coho have been observed utilizing the Willamette Falls fish ladder annually (Table 2). Observations of fin-marked adult coho passing the Falls show that hatchery-origin fish continue to make their way into the upper basin (Table 3).

The most current NMFS LCR natural coho salmon ESU status review (Ford 2011) discussed the transitional zone between the gorge boundary and the interior Columbia River region. The WLC-TRT’s LCR coho salmon ESU boundary designation, is based largely on extrapolation from information about the boundaries for Chinook salmon and steelhead, with Ford (2011) suggesting it would be reasonable to assign the Klickitat population to the LCR coho salmon ESU. This would thereby establish the use of Celilo Falls (The Dalles Dam) as a common boundary for LCR ESUs and DPSs. No other boundary modifications have been considered since the original boundary designations were determined.

The NMFS’s next status review is scheduled to be completed by 2016. NMFS’s West Coast Region and Northwest and Southwest Fisheries Science Centers are currently discussing the scope of the next status review. Boundary delineation questions concerning the Willamette Falls and Celilo Falls for the LCR coho salmon ESU have been queued for consideration, but they will not be resolved until then. Therefore NMFS will continue to use the current WLC-TRT designated LCR coho salmon ESU populations when considering the status of the ESU, which does not include coho above Willamette Falls or within the Klickitat River basin.

#### References:

- Dimick, R. E., and F. Merryfield. 1945. *The Fishes of the Willamette River System in Relation to Pollution*. Oregon State College, Engineering Experiment Station, Corvallis.
- Ford, M. J., editor. 2011. *Status Review Update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest*. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113. 281p.
- Myers, J. M., C. Busack, D. Rawding, A. R. Marshall, D. J. Teel, D. M. V. Doornik, and M. T. Maher. 2006. *Historical population structure of Pacific Salmonids in the Willamette River and Lower Columbia River Basins*. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-73, 311p.

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<sup>1</sup> The majority of hatchery fish released into areas above Willamette Falls were sourced from LCR hatcheries. The releases were comprised primarily of fry, sub-yearlings, yearlings, or smolts; however, some adults were also introduced. The vast majority appear to be LCR early stock. There were instances of Oregon coastal stocks released during the late 1950s (two years), the late 1960s (five years), and early 1970s (two years) but these fish made up a relatively small proportion of the releases during those years.

Table 1. Hatchery coho salmon releases into areas above Willamette Falls, Brood Years 1951–1996.

Brood Year	Fry	Fed Fry	Fingerling	Yearling	Pre-smolt	Smolt	Total
1951			500,000				500,000
1952				10,000			10,000
1953			275,000				275,000
1954			56,000	50,486			106,486
1955			80,000	104,877			184,877
1956	24,549		529,862				554,411
1957			722,196	90,316			812,512
1958			344,696				344,696
1959			277,199	91,784			368,983
1960			100,913	105,717			206,630
1961	1,572,068			138,318			1,710,386
1962	5,359,996			61,814			5,421,810
1963				178,571			178,571
1964	6,886,100		816,360	296,224			7,998,684
1965	9,727,546						9,727,546
1966	9,777,986		886,105				10,664,091
1967	6,511,935						6,511,935
1968	5,700,471		249,490	1,154,129			7,104,090
1969	6,613,306		78,020	1,375,798			8,067,124
1970	883,235			1,236,601			2,119,836
1971	1,364,132			1,253,855			2,617,987
1972	1,601,177		469,172	1,270,174			3,340,523
1973	258,366		373,000	189,746			821,112
1974	448,963		330,301	607,522			1,386,786
1975				410,553			410,553
1976	635,742			169,836			805,578
1977				164,983			164,983
1978				60,102			60,102
1979				59,892			59,892
1980	370,560			54,943			425,503
1981						182,000	182,000
1982					2,917,000	60,000	2,977,000
1983					648,000	250,000	898,000
1984					3,891,500		3,891,500
1985					188,000	60,000	248,000
1986					501,000	167,000	668,000
1987						60,000	60,000
1988						60,000	60,000
1989						60,229	60,229
1990						59,913	59,913
1991						60,052	60,052
1992						60,239	60,239
1993						59,250	59,250
1994		15,102				59,919	75,021
1995		7,969				60,000	67,969
1996						60,152	60,152
<b>Totals</b>	57,736,132	23,071	6,088,314	9,136,241	8,145,500	1,318,754	82,448,012

(Information for years 1951-80 from: *Williams, R. 1983. Releases of Coho Salmon into the Upper Willamette River, Oregon. Information Report Number 83-3*; for years 1981-88 from: *Kostow, K. 1991. Columba [sic] Basin Coho, Complied [sic] as comments to NMFS Endangered Species Act Record*; and for years 1989-96 from: *RMPC Data Run 04-29-2014*)

Table 2. Escapement of coho salmon over Willamette falls, 1966–2013. (ODFW 2014)

<b>Year</b>	<b>Adults</b>	<b>Jacks</b>	<b>Total</b>
1966-69 Average	6,800	5,100	11,900
Range	3,300 – 12,000	1,600 – 14,000	6,300 – 17,700
1970-74 Average	10,400	7,800	18,200
Range	1,500 – 17,900	1,600 – 19,500	5,400 – 37,400
1975	5,922	6,927	12,849
1976	2,333	2,217	4,550
1977	1,007	2,120	3,127
1978	1,711	3,891	5,602
1979	1,788	1,691	3,479
1980	1,276	1,365	2,641
1981	1,032	2,417	3,449
1982	1,702	3,517	5,219
1983	949	2,840	3,789
1984	2,735	2,560	5,295
1985	2,788	2,278	5,066
1986	2,930	2,240	5,170
1987	1,589	3,224	4,813
1988	3,707	4,985	8,692
1989	1,946	1,741	3,687
1990	901	1,817	2,718
1991	921	815	1,736
1992	940	588	1,528
1993	427	236	663
1994	685	174	859
1995	582	600	1,182
1996	315	976	1,291
1997	1,407	428	1,835
1998	373	386	759
1999	635	623	1,258
2000	2,839	773	3,612
2001	1,736	402	2,138
2002	2,337	2,417	4,754
2003	7,908	1,869	9,777
2004	2,849	524	3,373
2005	1,322	271	1,593
2006	6,186	1,614	7,800
2007	6,678	924	7,602
2008	4,048	2,971	7,019
2009	25,298	2,094	27,392
2010	20,103	1,988	22,091
2011	3,393	1,969	5,362
2012	6,573	6,370	12,943
2013	18,627	4,111	22,738

Table 3. Fin-mark status of adult coho observed passing Willamette Falls, 2007–2013. (ODFW 2014)

<b>Year</b>	<b>Fin-marked</b>	<b>Unmarked</b>	<b>Total</b>
2007	588	6,092	6,680
2008	462	3,586	4,048
2009	664	24,625	25,298
2010	409	19,691	20,100
2011	128	3,264	3,393
2012	36	6,535	6,571
2013	361	18,261	18,622

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