

Willamette Spring Chinook Hatchery and Genetic Management Plan Implementation  
Reporting Period: 2019-2021

In May 2019, the National Marine Fisheries Service (NMFS) issued its Section 7 Biological Opinion on the Evaluation of Hatchery Programs for spring Chinook salmon, summer steelhead and rainbow trout in the Upper Willamette River Basin (BiOp). NMFS concluded the proposed action, primarily the continued operation and maintenance of hatchery programs in the Upper Willamette River basin, was not likely to jeopardize the species of concern, nor destroy or adversely modify any designated critical habitat for the identified species. However, in the Terms and Conditions of the BiOp for the proposed action, in order to reduce any effects, NMFS required the continued monitoring and evaluation of the hatchery programs into the future.

This report is provided to address item 4b of the Terms and Conditions, which requires the Oregon Department of Fish and Wildlife (ODFW), in collaboration with the U.S. Army Corps of Engineers (USACE/Corps), to provide a report to NMFS Sustainable Fisheries Division (SFD) every three years on the implementation of the Willamette spring Chinook salmon Hatchery and Genetic Management Plans (HGMP).

**4b. The ODFW, in collaboration with the Corps, shall provide a report to NMFS SFD every three years on the implementation of the spring Chinook salmon HGMPs, specifically describing:**

**a. The number of natural-origin salmon collected and used for broodstock.**

Collection Facility	Return Year	Total Number of Natural-origin salmon (NOR) collected	Number of NOR used in Broodstock	Number of NOR Released/Outplanted
Minto	2019	827	0	827
	2020	1,626	46	1,580
	2021	482	0	482
Foster	2019	133	0	133
	2020	354	0	354
	2021	173	0	173
McKenzie <sup>1</sup>	2019	138	100	38
	2020	34	34	0
	2021	15	5	10
Dexter	2019	190	87	0
	2020	196	74	0
	2021	58	5	0

<sup>1</sup> Total includes fish collected at McKenzie and Leaburg Hatchery traps. Total does not include fish handled at the Leaburg Sorter.

**b. The impact of broodstock integration on the respective natural-origin population, with reference to the HGMP criteria for maximum impact levels.**

Allowed broodstock integration rates are based on the number of natural-origin spring Chinook salmon returning to their natal rivers, as referenced in *Section 6.2.3 Past and proposed level of natural-origin*

*fish in the broodstock* in the HGMPs. Abundance of natural-origin spring Chinook salmon are indexed based on counts at Upper and Lower Bennett dams on the North Santiam River for the Minto Fish Facility, Lebanon Dam on the South Santiam River for the Foster Fish Facility (not currently monitored), and Leaburg Dam on the McKenzie River for McKenzie Fish Hatchery. All unmarked fish collected at Dexter Fish Facility are allowed to be integrated into Middle Fork Willamette brood.

Collection Facility	Return Year	NOR Dam Count <sup>1</sup>	Number of NOR used in Broodstock	Total Number of Broodstock Spawned	Impact to Natural-Origin Returns <sup>2</sup> (maximum impact allowed in HGMP)	pNOB <sup>3</sup> (maximum allowed in HGMP)
Minto	2019	829	0	952	0 (0.02)	0 (0.04)
	2020	1,638	46	1,194	0.03 (0.06)	0.04 (0.22)
	2021	529	0	1,024	0 (0)	0 (0)
Foster	2019	N/A	0	730	N/A	0
	2020	N/A	0	1,734	N/A	0
	2021	N/A	0	1,766	N/A	0
McKenzie <sup>4</sup>	2019	2,899	100	654	(0.06)	0.15 (0.35)
	2020	1,528	34	471	(0.04)	0.07 (0.15)
	2021	668 <sup>5</sup>	5	555	(0.02)	0.01 (0.04)
Dexter <sup>6</sup>	2019	N/A	87	1,502	N/A	0.06
	2020	N/A	74	1,545	N/A	0.05
	2021	N/A	5	870	N/A	0.01

<sup>1</sup> Minto Fish Facility relies on counts at Upper and Lower Bennett dams (number provided is a sum of unmarked Chinook counted at both dams); Foster Fish Facility will rely on counts from Lebanon Dam once a counting station is in place; McKenzie Hatchery relies on counts from Leaburg Dam; there is no dam or counting facility downstream of the Dexter facility

<sup>2</sup> Maximum impact to natural-origin returns is based on the number provided from the HGMP and depends on the return number for a given year (see Table 6.2.3-2 for North Santiam and South Santiam and Table 6.2.3-1 for McKenzie). All natural-origin returns to Dexter may be incorporated into broodstock (see narrative of Section 6.2.3 of the Middle Fork Willamette HGMP).

<sup>3</sup> pNOB is calculated as the number of unmarked (NOR) broodstock divided by the total number of broodstock.

<sup>4</sup> Total includes fish collected at McKenzie and Leaburg Hatchery traps. Total does not include fish handled at the Leaburg Sorter.

<sup>5</sup> Leaburg Dam counts are incomplete for 2021 due to a video system issue in May.

<sup>6</sup> Dexter Facility brood numbers include planned releases into the Coast Fork Willamette River basin.

**c. The proportion of hatchery- and natural-origin salmon spawning in their respective population areas (pHOS)**

Data are based on counts of adipose fin-clipped and unclipped carcasses and recovered otoliths from the spawning grounds. Fish are initially categorized as naturally produced based on an intact adipose fin. Final estimates of the proportion of hatchery-origin spawners are derived after otolith analyses allow adjustments based on the proportion of unclipped hatchery-origin fish. Data are collected by ODFW unless otherwise noted. For more detailed information, see Whitman et al., 2022.

Peak Redd Counts and Estimated pHOS by Reach and Weighted pHOS by Basin.

North Santiam Basin											
Subbasin, Section	Year	Peak Redd Count	Unclipped	Clipped	% Thermally Marked Otoliths	Wild Fish	Hatchery Fish	pHOS	pHOS Lower 95% CI	pHOS Upper 95% CI	Weighted Basin-wide pHOS
Below Detroit Dam <sup>1</sup>	2019	379	73	5	4.5%	70	8	10.6%	4%	18%	57.4%
Above Detroit Dam		416	0	191	100%	0	191	100.0%	100%	100%	
Below Detroit Dam	2020	Data not available due to wildfires.									N/A
Above Detroit Dam											
Below Detroit Dam	2021	ODFW did not collect data to inform pHOS due to limited resources.									
Above Detroit Dam		ODFW did not survey due to limited resources.									

<sup>1</sup> Includes survey data collected by Environmental Assessment Services (EAS).

South Santiam Basin											
Subbasin, Section	Year	Peak Redd Count	Unclipped	Clipped	% Thermally Marked Otoliths	Wild Fish	Hatchery Fish	pHOS	pHOS Lower 95% CI	pHOS Upper 95% CI	Weighted Basin-wide pHOS
Below Foster Dam <sup>2</sup>	2019	148	29	36	0.0	29	36	55.4%	43%	69%	36.9%
Above Foster Dam		74	11	0	0.0	11	0	0.0%	0%	0%	
Below Foster Dam	2020 <sup>3</sup>	399	81	97	6.4%	76	102	57.4%	50%	65%	49.2%
Above Foster Dam		82	38	0	9.1%	35	3	9.1%	0%	19%	
Below Foster Dam	2021	ODFW did not survey due to limited resources.									N/A
Above Foster Dam											

<sup>2</sup> Survey data collected by EAS.

<sup>3</sup> ODFW shifted survey efforts to the South Santiam basin due to wildfires in the McKenzie basin in 2020.

McKenzie Basin											
Subbasin, Section	Year	Peak Redd Count	Unclipped	Clipped	% Thermally Marked Otoliths	Wild Fish	Hatchery Fish	pHOS	pHOS Lower 95% CI	pHOS Upper 95% CI	Weighted Basin-wide pHOS
Below Leaburg Dam	2019	156	19	40	0.0%	19	40	67.8%	56%	82%	33.6% <sup>4</sup>
Above Leaburg Dam		1,976	528	222	1.8%	518	232	30.9%	28%	34%	
SFk McKenzie above Cougar Dam		149	5	34	0.0%	5	34	87.2%	77%	100%	37.1% <sup>5</sup>
Below Leaburg Dam	2020	654 <sup>6</sup>	64	206	13.3%	55	215	79.4%	75%	85%	N/A
Above Leaburg Dam		Surveys not completed due to wildfire.									
SFk McKenzie above Cougar Dam											Surveys not completed due to wildfire.

<sup>4</sup> Weighted basin-wide pHOS value excludes area above Cougar Dam.

<sup>5</sup> Weighted basin-wide pHOS value includes area above Cougar Dam.

<sup>6</sup> Redd densities in the McKenzie River below Leaburg Dam were higher than usual in 2020 because the Leaburg Dam roll gates were opened during the wildfires to pass debris.

Below Leaburg Dam	2021	486	17	146	6.7%	16	147	90.3%	86%	96%	54.9% <sup>7</sup>
Above Leaburg Dam		670	102	37	3.6%	98	41	29.3%	22%	37%	
SFk McKenzie above Cougar Dam		65	3	14	0.0%	3	14	82.4%	64%	100%	56.4% <sup>8</sup>

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<sup>7</sup> Weighted basin-wide pHOS value excludes area above Cougar Dam.

<sup>8</sup> Weighted basin-wide pHOS value includes area above Cougar Dam.

Middle Fork Willamette Basin											
Subbasin, Section	Year	Peak Redd Count	Unclipped	Clipped	% Thermally Marked Otoliths	Wild Fish	Hatchery Fish	pHOS	pHOS Lower 95% CI	pHOS Upper 95% CI	Weighted Basin-wide pHOS
Below Dexter Dam <sup>9</sup>	2019	2	3	9	0.0	3	9	75.0%	51%	100%	N/A
Above Fall Creek Dam		ODFW did not survey due to lack of resources.									
NFk MFk											
Above Hills Creek Dam											
Below Dexter Dam	2020	ODFW did not survey due to lack of resources.									N/A
Above Fall Creek Dam <sup>10</sup>		16	62	0	0.0%	62	0	0.0%	0%	0%	
NFk MFk		ODFW did not survey due to lack of resources.									
Above Hills Creek Dam											
Below Dexter Dam <sup>11</sup>	2021	25									N/A

<sup>9</sup> Data collected by EAS.

<sup>10</sup> Data collected by Oregon State University (OSU).

<sup>11</sup> Data collected by EAS on Fall Creek below Fall Creek Dam.

Above Fall Creek Dam <sup>12</sup>		0	6	0	0.0%	6	0	0.0%	0%	0%	
NFk MFk	ODFW did not survey due to lack of resources.										
Above Hills Creek Dam											

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<sup>12</sup> Data collected by OSU.



**d. The total number of hatchery salmon released by brood year for the programs operating in the UWR.**

<b>Release Subbasin</b>	<b>Brood Year</b>	<b>Number Released</b>
North Santiam	2018	703,888
	2019	700,604
	2020	705,043
South Santiam	2018	1,028,300
	2019	1,026,822
	2020	1,019,846
McKenzie	2018	595,870
	2019 <sup>1</sup>	565,201
	2020	559,663
Middle Fork Willamette	2018	1,576,885
	2019	1,621,780
	2020	1,658,878
Coast Fork Willamette	2018	516,355
	2019	253,363
	2020	356,968

<sup>1</sup> McKenzie BY2019 release numbers are estimated due to Holiday Farm Fire September 2020.

e. **Any proposed changes to the HGMPs and/or future hatchery production?**

Size at Release

Target size at release should reflect what can be achieved under a range of expected environmental conditions. Fish size at release fluctuates annually depending on environmental conditions beyond fish managers’ control and will likely fluctuate greater in the future with realized climate impacts. The management objective is to release fish as smolts that are biologically ready to migrate, shifting focus to the biological and physiological indices of “smolting” rather than a set size target. We proposed allowing for variability of  $\pm 4$  fish per pound (fpp) around a target release size to maximize the ability to release fish as smolts that are ready to migrate and  $\pm 20$  fpp for fingerling releases. This release size range is greater than the  $\pm 10\%$  variation identified in the BiOp to better reflect the range of size variability that results from unpredictable environmental conditions.

Time of Release

Actual release dates may differ from target release dates. Release timing varies to optimize outmigration and to take advantage of freshets or other environmental conditions and may be influenced by fish size and pathology recommendations. The need for release timing flexibility should be documented in the HGMP.

Specific proposed changes to time of release, target size and size at release by hatchery program are noted in the table below with specific changes highlighted in bold font. This updated information should be reflected in Table 1.9-1 *Recommended performance targets for rearing and release of hatchery fish* and elsewhere in the HGMPs

Sub-basin	HGMP-Current Release Target Size	Proposed Release Target Size and Range	HGMP-Current Release Timing	Proposed Release Timing
McKenzie	10-11 fpp	<b>10 <math>\pm 4</math></b> fpp	Feb, Mar and Apr	Target release is early Feb, March and April; <b>however, date may change based on environmental conditions, fish size and pathology recommendations</b>
Middle Fork Willamette	MFk Will: 8.0 fpp (Nov); 12 fpp (Feb); 9 fpp (Mar); 9 fpp (April). Hills Creek Res.: 100 fpp (June) Coast Fork: 9.5 fpp (Feb)	MFk Will: 8.0 <b><math>\pm 4</math></b> fpp (Nov); 12 <b><math>\pm 4</math></b> fpp (Feb); 9 <b><math>\pm 4</math></b> fpp (Mar); 9 <b><math>\pm 4</math></b> fpp (April). Hills Creek Res.: 100 fpp <b><math>\pm 20</math></b> fpp (June) Coast Fork: 9.5 <b><math>\pm 4</math></b> fpp (Feb)	Nov, Feb, March, April, June	Target release is Nov, Feb, March, April and June; <b>however, date may change based on environmental conditions, fish size and pathology recommendations</b>
North Santiam	12 fpp	<b>14 <math>\pm 4</math></b> fpp	February and March	Target release is Feb and March; <b>however, date may change based on</b>

				<b>environmental conditions, fish size and pathology recommendations</b>
South Santiam	9.0 fpp (Feb/Mar) and 8.0 fpp (Nov)	<b>9 ±4 fpp</b>	February 15 - March 15; November 1	Target release is Feb 15- March 15 and November 1; <b>however, date may change based on environmental conditions, fish size and pathology recommendations</b>

Use of natural-origin salmon for broodstock

Past and proposed levels of natural-origin salmon used in broodstock are described in Section 6.2.3 of the HGMPs. Except for the Middle Fork Willamette River population where all natural-origin returning fish may be incorporated into the broodstock, the proposed action relies on a sliding scale to determine the take of natural-origin salmon for broodstock once minimum natural-origin abundance thresholds are met. The purpose of the sliding scale is to minimize the impacts of broodstock collection on the natural population while providing genetic benefits to the hatchery broodstock and increasing the proportionate natural influence values. For natural-origin returns above minimum thresholds, 2% of the natural-origin run may be taken for broodstock, up to a maximum impact of 10%. The South Santiam River does not have a counting station downstream of the hatchery, precluding the ability to monitor natural-origin salmon returns prior to fish entering the hatchery facility. In addition, very few natural-origin salmon have returned to the South Santiam River in recent years. Consequently, natural-origin salmon are not incorporated into the broodstock in this basin.

Because it can be relatively late in the season when enough information on in-season return is available to determine that abundance thresholds for integration are met and natural-origin Chinook may be collected for brood, late-returning natural-origin salmon may be over-represented in the broodstock. To address concerns for artificially selecting for late returning natural-origin salmon while also minimizing potential impacts to the wild run, **we propose collecting and holding a proportion of natural-origin salmon returns up to the minimum number allowed once collection begins.** On the North Santiam River, counts of natural-origin Chinook at Bennett dams have exceeded the minimum threshold of 650 natural-origin fish in eight of the last ten years (2013-2022). On the McKenzie River, counts of natural-origin Chinook at Leaburg Dam have exceeded the minimum threshold of 650 natural-origin fish every year since at least 2004. If a higher natural-origin return abundance threshold is met, natural-origin collection will increase to meet the higher integration target identified in the HGMP. If minimum natural-origin return abundance thresholds are not met by the end of the collection season, natural-origin salmon collected for brood may be returned to the river system to spawn naturally. This will involve some additional handling of natural-origin salmon that would not have occurred otherwise.

## References

[Whitman, L.D., Cannon, B., Hogansen, M., B. DeBow. 2022. Monitoring for Spring Chinook Salmon in the Upper Willamette Basin, 2018-2021. Science Bulletin 2022-3. Oregon Department of Fish and Wildlife, Salem, OR.](#)

- f. These reports in written form shall be sent to:

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