WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Root River Steelhead Facility

Fall 2024 and Spring 2025

September 2025

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WRITTEN BY

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Summary – A total of 1,899 Chinook salmon, 3,839 coho salmon, 4,599 steelhead, and 26 brown trout were examined during fall 2024 and spring 2025 at the Root River Steelhead Facility (RRSF). A total of 1,999 coho were spawned, and approximately 1,115,335 coho eggs were collected for our hatcheries.

The fall 2024 return of 1,899 Chinook salmon was 14% below the ten-year average return. The fall 2024 return of 3,839 coho salmon was the second-highest return in the past 15 years and 62% above the ten-year average. 23 brown trout were encountered in the facility in the fall, which is typically shut down for the season before the majority of brown trout are in the Root River. The 60 steelhead encountered in fall 2024 was the highest fall return since 2010.

The spring 2025 return of 4,539 steelhead was the highest number of steelhead handled at RRSF since the facility was built in 1994. A total of 3,037 steelhead were spawned, and a total of 4,520,097 eggs were collected for our hatcheries.

The number of fish captured at RRSF is a subset of the seasonal migration in the Root River. RRSF does not stop every fish in the river, as they are able to move upstream past the facility before it is operational in early spring and fall, and some fish are able to bypass the facility during the sampling season when the river is at high flows. In 2025, high flows in late March and early April due to multiple rain events allowed some fish to move upstream past the facility during the sampling season.

In the fall of 2024 at RRSF the standard weight of a 30-inch Chinook salmon was 9.0 pounds, which was slightly lower than the previous year and the ten-year average (Figure 1). The standard weight for a 22-inch coho salmon, which has remained mostly stable over the past ten years, was 3.6 pounds. The standard weight for a 22-inch steelhead was 3.7 pounds, which was about the same as the ten-year average. The standard weight for a 20-inch brown trout was 3.5 pounds.

The following tables and figures report the results of data collected at the RRSF during the fall of 2024 and spring 2025. These data contribute to a long-term index of Chinook, coho and steelhead populations in the Root River and are collected to fulfill three objectives: 1) track the abundance of salmonid returns, 2) measure the growth and condition of each species and/or strain, and 3) estimate return rate of each species. For a complete description of methods and calculations, see Thompson and Eggold (2007).

REFERENCES

Thompson, J. and B. Eggold. 2007. Root River Steelhead Facility, Fall 2006 and Spring 2007. Publication number PUB-FH-836 2007. Wisconsin Department of Natural Resources, Milwaukee, Wisconsin. 22 pages.

Table 1. Summary of Chinook salmon, coho salmon, steelhead and brown trout captured at the Root River Steelhead Facility during 2015 to 2025.

HARVEST YEAR	HARVESTED	PASSED UPSTREAM	MISC. SAMPLES	TOTAL
Chinook Salmon				
Fall 2015	384	880	45	1,309
Fall 2016	518	1,375	152	2,045
Fall 2017	696	1,542	524	2,762
Fall 2018	794	326	5	1,125
Fall 2019	578	818	36	1,432
Fall 2020	727	2,889	311	3,927
Fall 2021	417	1,635	122	2,174
Fall 2022	23	2,905	160	3,088
Fall 2023	4	2,342	63	2,409
Fall 2024	6	1,854	39	1,899
Coho Salmon				
Fall 2015	60	1,351	25	1,436
Fall 2016	60	1,324	133	1,517
Fall 2017	66	2,290	180	2,536
Fall 2018	61	2,397	29	2,487
Fall 2019	60	1,117	38	1,215
Fall 2020	30	1,508	14	1,552
Fall 2021	39	2,263	38	2,340
Fall 2022	40	4,693	54	4,787
Fall 2023	64	1,939	7	2,010
Fall 2024	65	3,704	70	3,839
Steelhead				
Fall 2015	0	9	0	9
Spring 2016	60	1,293	0	1,353
Fall 2016	0	43	0	43
Spring 2017	120	774	1	895
Fall 2017	0	9	0	9
Spring 2018	62	990	0	1,052
Fall 2018	0	20	0	20
Spring 2019	91	651	0	742
Fall 2019	8	13	0	21
Spring 2020	18	110	0	128
Fall 2020	8	2	0	10
Spring 2021	167	429	0	596
Fall 2021	40	15	0	55
Spring 2022	222	1,408	8	1,638
Fall 2022	9	1	0	10
Spring 2023	151	299	0	450
Fall 2023	8	9	0	17
Spring 2024	204	1,032	0	1,236
Fall 2024	45	15	0	60
Spring 2025	194	4,305	40	4,539
Brown Trout				
Fall 2015	0	52	34	86
Fall 2016	0	11	5	16
Fall 2017	0	12	3	15
Fall 2018	0	80	0	80
Fall 2019	0	9	0	9
Fall 2020	0	2	0	2
Fall 2021	0	12	0	12
Fall 2022	0	2	0	2
Fall 2023	0	13	0	13
Fall 2024	0	23	0	23

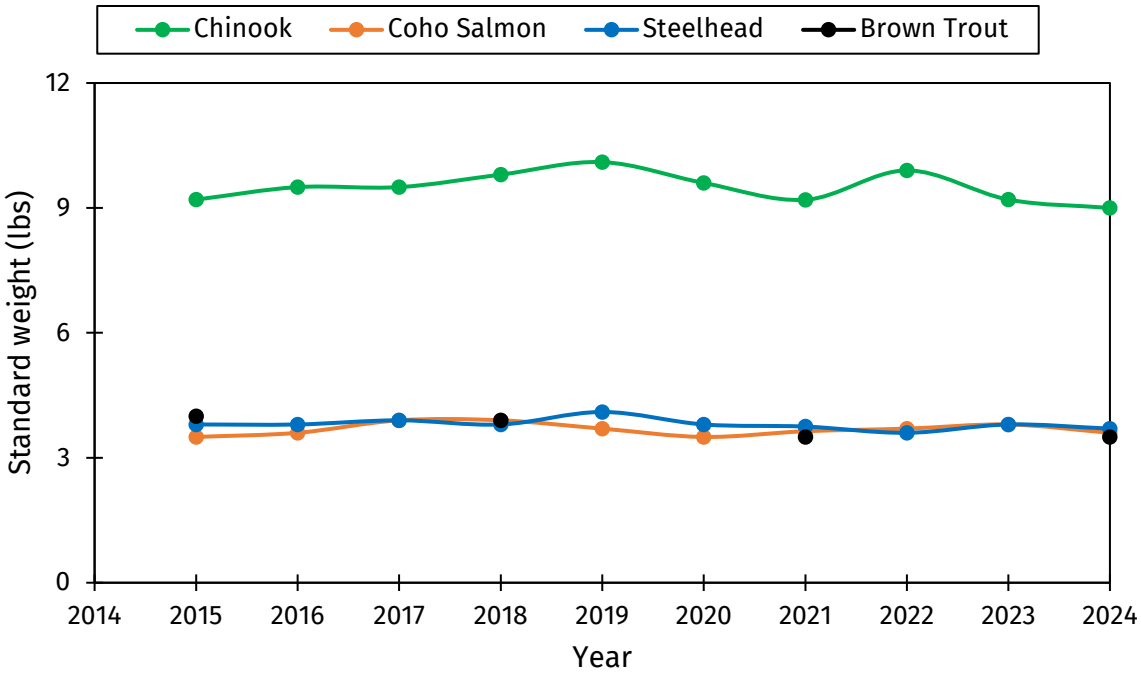

Figure 1. Standard weight for the major salmonid species returning to the Root River Steelhead Facility from 2015 to 2024. For brown trout, breaks in the graph represent years where returns were too low to estimate standard weight.

CHINOOK SALMON

In fall 2024, 97% of Chinook salmon handled were passed upstream of the dam after processing (Table 1).

Analysis of length-weight data (Table 6) revealed that average length (31.2 inches) and weight (11.0 pounds) of returning Chinook salmon decreased from the previous year. The standard weight (9.0 pounds) was lower than the previous fall (9.2 pounds) and the ten-year average (9.5 pounds). This was the third consecutive fall with declining average lengths and weights of Chinook returning to RRSF.

From 2012-2022, a total of 4,822 tags were recovered from known-age Chinook salmon, providing insight into the age structure and growth rates of Chinook returning to the river. For detailed descriptions and results, please refer to the Root River Steelhead Facility Fall 2020 and Spring 2021 report.

Based on an age-length key developed from these known-age Chinook, in fall 2024, age 1 fish comprised approximately 34.4% of the return, age 2 fish comprised

approximately 27.4% of the return, age 3 fish were 36.6% of the return, and age 4 fish were 1.4% of the return (Table 2). Approximately 64% of the return was fish ages 2 or 3. Age 1 fish showed up in higher numbers than the previous two falls, but this is not inconsistent with previous results. In six of the ten years where coded-wire tags were collected, at least 80% of the sampled Chinooks were ages 2 or 3; in the remaining years, age 1s showed up in higher numbers (Table 3).

Table 2. Estimated age composition of Chinook salmon (sexes combined) examined at the Root River Steelhead Facility in fall 2022 through 2024. Age is based on an age-length key developed from known-age Chinook salmon from 2012-2021.

Year of Return	Percent age composition							Number used in analysis
	0	1	2	3	4	5	6	
2022	0.3%	13.4%	40.9%	43.7%	1.8%	0.0%	0.0%	1,526
2023	0.3%	3.6%	56.3%	38.4%	1.4%	0.0%	0.0%	1,324
2024	0.2%	34.4%	27.4%	36.6%	1.4%	0.0%	0.0%	1,107

Table 3. Age composition of known-age coded-wire tagged Chinook salmon (sexes combined) examined at the Root River Steelhead Facility during fall, 2012 through 2021. Note: 2022 is excluded from the table due to the low number of tagged Chinooks in the lake.

Year of Return	Number at age							Total number
	0	1	2	3	4	5	6	
2012	-	26.8%	73.2%	-	-	-	-	183
2013	0.2%	50.2%	22.4%	27.2%	-	-	-	460
2014	0.8%	4.2%	59.9%	33.6%	1.5%	-	-	476
2015	2.7%	8.3%	14.0%	74.7%	0.3%	-	-	372
2016	1.3%	53.2%	14.3%	26.2%	5.0%	-	-	477
2017	-	52.1%	35.4%	12.0%	0.4%	-	-	675
2018	-	20.0%	50.1%	29.5%	0.4%	-	-	721
2019	-	14.0%	53.8%	31.6%	0.4%	0.2%	-	513
2020	-		40.1%	58.7%	1.0%	-	0.2%	601
2021	-	-	0.3%	96.4%	3.3%	-	-	331

Coded-wire tag data also revealed a large overlap in length-at-age for tagged Chinook salmon returning to the weir (Figure 2). In some years (2012, 2015, and 2019), age-1 Chinooks were on average 5-8 inches smaller than older fish, which could possibly be explained by alewife year-class strength. However, in most years, length could not be used as an indicator of age.

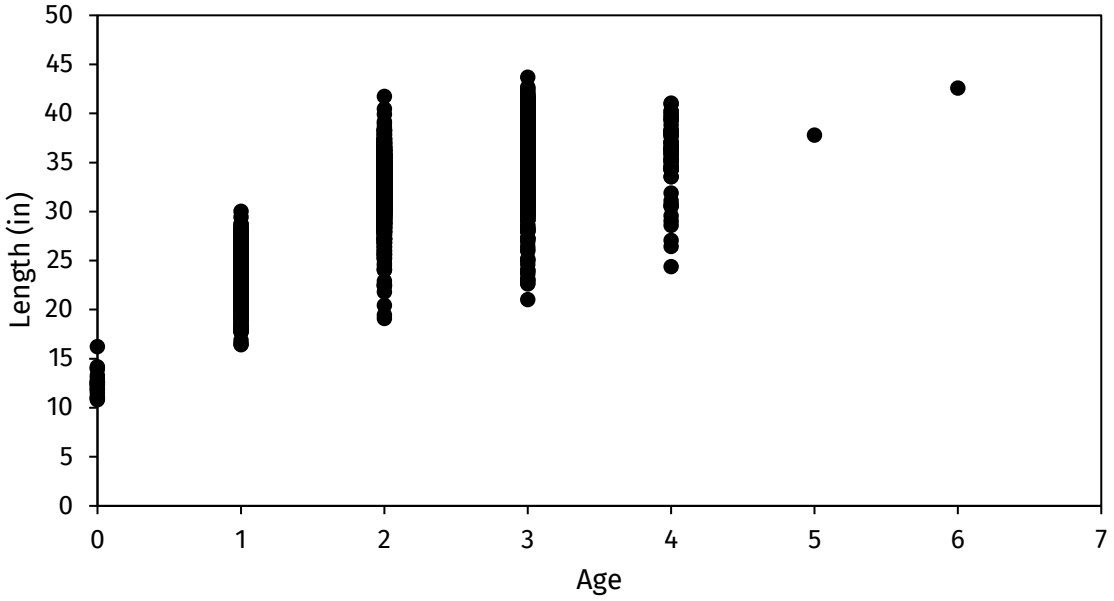

Figure 2. Length-at-age of coded-wire tagged Chinook salmon recovered at RRSF from 2012-2021.

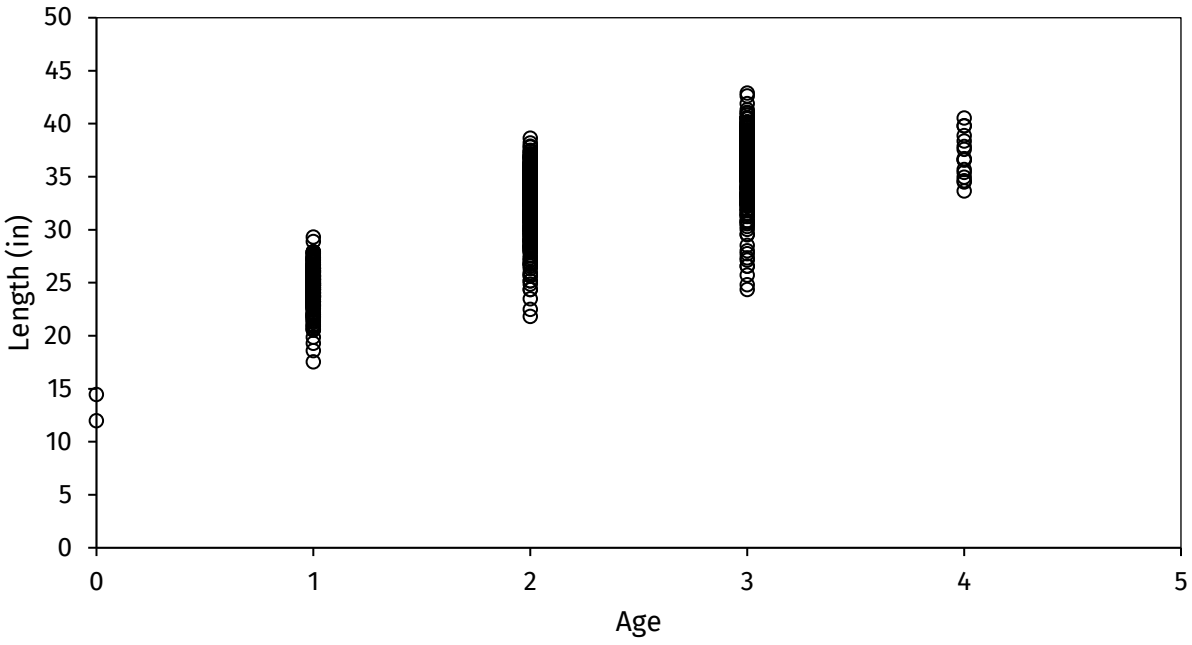

Figure 3. Estimated length-at-age of Chinook salmon captured at RRSF during fall 2024, based on age-length key developed from known-age Chinook salmon from 2012-2021.

COHO SALMON

In fall 2024, 96% of coho salmon handled were passed upstream of the dam after processing (Table 1). Most harvested fish were kept for fish health checks.

Analysis of length-weight data (Table 6) revealed that average length (23.3 inches) and average weight (4.9 pounds) increased from the previous year. The standard weight (3.6 pounds) was only slightly lower than the previous fall (3.8 pounds) and was about the same as the ten-year average.

The age composition (based on length-frequencies) indicated that the 2024 run was comprised of 30% age 1+ and 70% age 2+ coho salmon (Table 4).

Table 4. Estimated age composition of coho salmon (sexes combined) examined at the Root River Steelhead Facility during fall, 2013 through 2024. Ages were assigned by length-frequency of measured fish.

YEAR OF RETURN	PERCENT AGE COMPOSITION		NUMBER USED IN ANALYSIS	TOTAL RETURN
	1+	2+		
2013	5%	95%	786	1,666
2014	6%	94%	1,353	1,388
2015	9%	91%	1,161	1,436
2016	29%	71%	1,042	1,517
2017	5%	95%	1,249	2,536
2018	5%	95%	1,746	2,487
2019	15%	85%	1,178	1,215
2020	10%	90%	1,061	1,551
2021	36%	64%	1,841	2,340
2022	5%	95%	1,669	4,787
2023	59%	41%	1,575	2,010
2024	30%	70%	3,211	3,839

STEELHEAD

In fall 2024, 15 of the 60 steelhead (25%) captured were passed upstream of the dam after processing (Table 1). The remainder were kept for coded-wire tag analysis, described below.

All steelhead that are stocked into the broodstock rivers (the Root and Kewaunee Rivers) are marked with differential fin clips to identify strain for purposes of spawning. Prior to 2017, each strain (Chambers Creek and Ganaraska) was given fin clips on a 3-year rotational basis to assist in estimating age composition.

In 2018, after completion of the Chinook salmon study, the U.S. Fish and Wildlife Service's mass-marking program began marking all rainbow trout stocked into Lake Michigan with an adipose-clip and coded-wire tags, which will provide data for analysis of movement, growth rates, and estimates of natural reproduction.

To simplify the mass marking process, in which all steelhead are adipose-clipped through the USFWS mass marking trailer but broodstock fish are hand-clipped for strain identification, a standard fin clip per strain was chosen. As the years of data collection continue, a length-age key will be developed to estimate ages of returned fish to the weir.

In addition to the adipose-clip, broodstock Chambers Creek strain steelhead were given a left maxillary clip (ALM) and broodstock Ganaraska strain steelhead were given a left ventral clip (ALV). Broodstock fish stocked in 2021 did not have an adipose-clip due to the COVID-19 pandemic.

Skamania strain steelhead, a fall-run strain, were stocked in 2018 and 2019 (2017 and 2018 year-classes) after obtaining eggs from Indiana. These fish were given an adipose-clip and right maxillary-clip (ARM) for identification in the field. Skamania were stocked again in 2022, but these fish were only given an adipose-clip.

Of the 60 steelhead processed in fall 2024, 5 were Chambers Creek strain marked with ALM clips, 5 were Ganaraska strain fish marked with ALV clips, 1 was unclipped and presumed to be wild or an unclipped stray, and the remaining 49 (82%) were adipose-only.

Coded-wire tags were recovered from 41 steelhead captured in the fall. All 41 were age-3 Skamania-strain steelhead from the 2021 year-class, stocked in 2022. One of these fish was stocked in Indiana, while the remainder were stocked into large rivers on the southern Wisconsin shoreline (the Sheboygan, Milwaukee and Root rivers). These fish ranged in length from 23-31 inches.

In spring 2025, 95% of steelhead handled were passed upstream of the dam after processing (Table 1). Most harvested steelhead were kept for coded-wire tag analysis.

Analysis of length-weight data (Table 6) revealed that average length (24.8 inches) and average weight (5.4 pounds) of returning steelhead were higher than the previous spring. The standard weight (3.7 pounds) was slightly lower than the previous spring, but about the same as the ten-year average.

Of the 4,539 steelhead processed, 1,977 (44%) were Chambers Creek strain marked with ALM or LM-only clips. 1,607 steelhead (35%) were Ganaraska strain fish marked with ALV or LV-only clips. 46 fish (1%) were unclipped and presumed to be wild or unclipped strays. The remaining 909 fish (20%) were adipose-only, identifying them in the field as strays.

Over half (65%) of steelhead that were collected for analysis (n=207) were broodstock stocked into the Root River (Figure 4). The remaining strays were primarily from southern Wisconsin waters. In figure 4, the "WI small tribs" location includes all small tributaries along the Wisconsin shoreline that are stocked with steelhead. The "WI South Large Rivers" location includes the Root River, the Kinnickinnic/Milwaukee Rivers, the Sheboygan River and the Manitowoc River. The "WI North Large Rivers" location includes the Kewaunee River, the Branch River, the East and West Twin Rivers and the Ahnapee River. For more detailed information, please refer to the Lake Michigan Salmonid Stocking Summary.

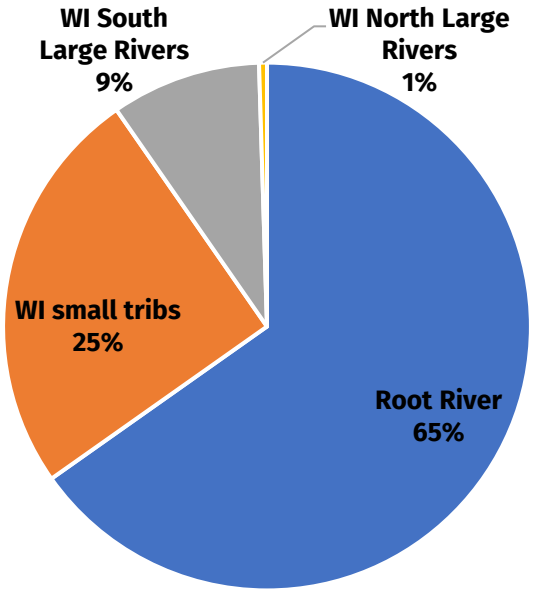

Figure 4. Stocking locations of CWT Steelhead returning to the Root River weir in spring 2025.

Steelhead stocked into the Root River continue to make up the majority of the spring run (Table 5). In 2025, steelhead stocked into small tributaries on the Wisconsin shoreline made up 25% of the returns, the highest contribution seen so far.

Table 5. Stocking locations of CWT Steelhead returning to the Root River in the spring by year.

Year of Return	Stocking Location							Number of CWTs recovered
	Root River	WI South Large Rivers	WI North Large Rivers	WI small tribs	Michigan	Illinois	Indiana	
2021	66.4%	16.8%	0.7%	15.4%	0.7%	0.0%	0.0%	150
2023	81.0%	11.0%	1.0%	5.0%	0.0%	1.0%	1.0%	100
2024	74.8%	9.3%	0.0%	14.8%	1.1%	0.0%	0.0%	182
2025	65.2%	9.2%	0.5%	25.1%	0.0%	0.0%	0.0%	207

Preliminary results from known-age steelhead allow for early analysis of growth rates (Figure 5). In 2025, age 2 steelhead ranged from 17-20 inches, age 3 and age 4 steelhead ranged from 21-32 inches, age 6 steelhead ranged from 27-34 inches and age-7 fish ranged from 29-30 inches, demonstrating an overlap in length among older age fish. Note that the 2020 year-class, stocked in 2021, was not coded-wire tagged due to the COVID-19 pandemic, explaining the lack of age-5 tagged fish in the figure below.

In addition, as in 2024, there appears to be significant overlap in length-at-age between strains.

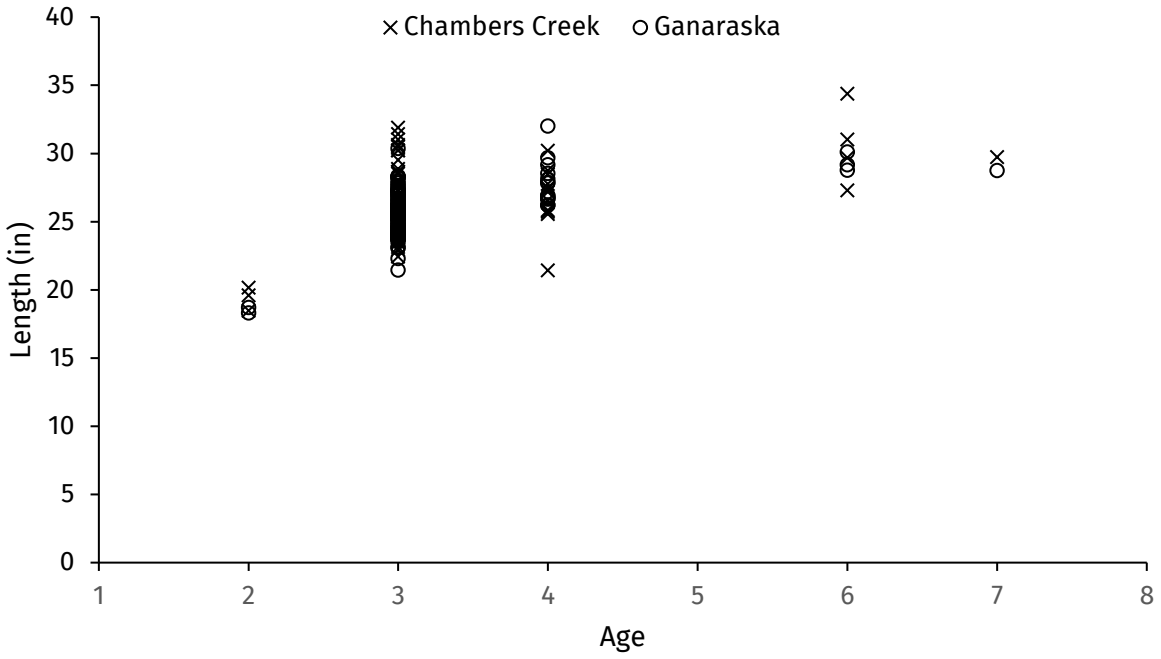

Figure 5. Length-at-age of coded-wire tagged steelhead (Chambers Creek and Ganaraska only) recovered at RRSF in spring 2025.

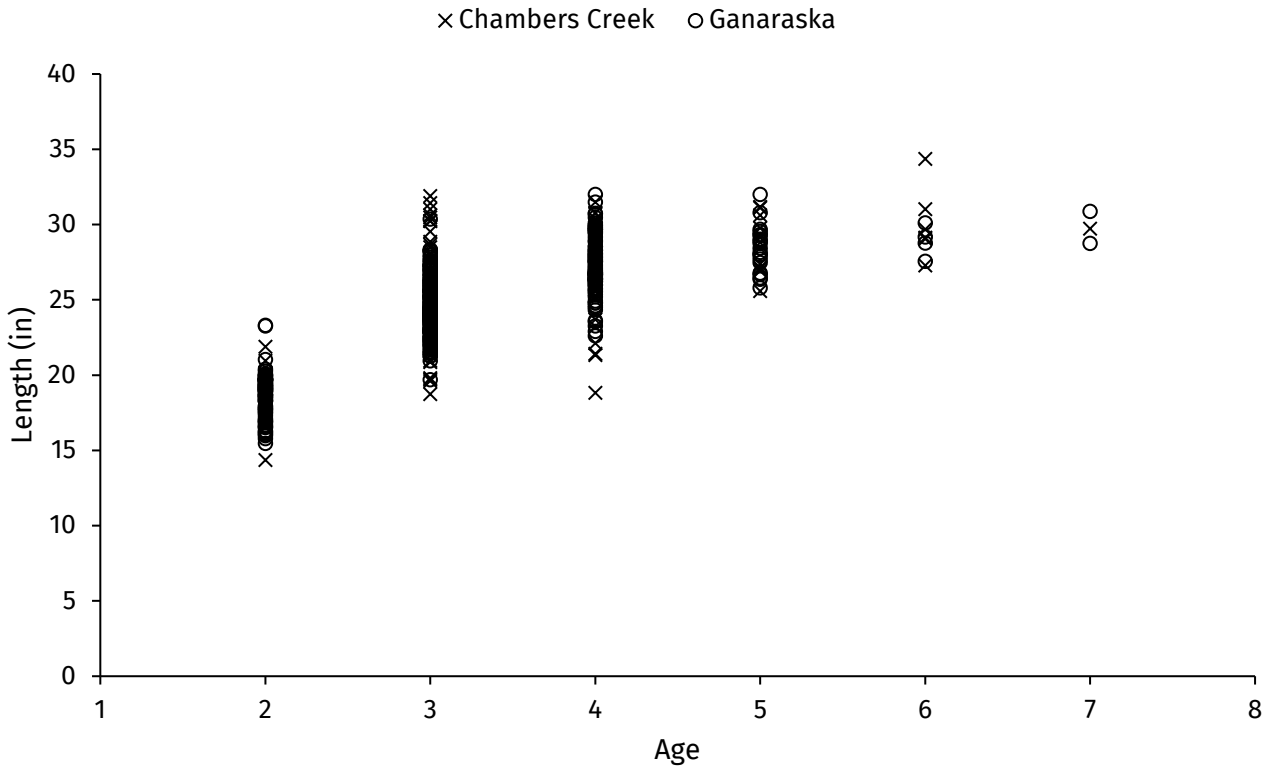

Figure 6. Length-at-age of coded-wire tagged steelhead (Chambers Creek and Ganaraska only) recovered at RRSF in spring 2021, 2023, 2024 and 2025.

Table 6. Average weight, average length, standard weight (predicted weight at a given length based on a length-weight regression) and trophy weight (95th percentile) for the major salmonid species returning to the Root River Steelhead Facility from fall 2015 to spring 2025. The lengths used for the calculation of standard weight are: 30 inches for Chinook, 22 inches for coho, 22 inches for steelhead and 20 inches for brown trout. Note: brown trout are not listed due to low returns.

Season	Number used in analysis	Average weight (pounds)	Average length (inches)	Standard weight	Trophy weight
CHINOOK SALMON					
2014-15	945	11.8 ± 3.0	32.2 ± 3.2	9.0	16.4
2015-16	920	11.7 ± 3.7	31.6 ± 4.2	9.0	16.9
2016-17	870	10.1 ± 5.3	29.5 ± 5.4	9.5	19.1
2017-18	868	11.1 ± 5.3	30.3 ± 5.0	9.5	19.1
2018-19	852	13.8 ± 6.0	32.6 ± 5.6	9.8	22.5
2019-20	1,415	15.3 ± 5.6	33.6 ± 4.5	10.1	24.6
2020-21	1,739	16.7 ± 5.5	34.9 ± 4.3	9.6	24.9
2021-22	1,521	13.1 ± 5.9	32.4 ± 5.6	9.2	22.0
2022-23	1,525	14.3 ± 5.0	33.2 ± 4.4	9.9	21.7
2023-24	1,324	12.6 ± 3.7	32.9 ± 3.4	9.2	19.0
2024-25	1,107	11.0 ± 5.4	31.2 ± 5.7	9.0	19.5
COHO SALMON					
2014-15	1,353	6.2 ± 1.8	25.9 ± 3.3	3.5	8.6
2015-16	1,161	4.5 ± 1.5	23.3 ± 2.9	3.5	7.0
2016-17	1,042	5.2 ± 2.8	23.8 ± 5.0	3.6	9.4
2017-18	1,249	8.3 ± 2.4	27.7 ± 3.2	3.9	11.6
2018-19	1,742	7.8 ± 2.4	26.9 ± 3.3	3.8	11.2
2019-20	1,177	7.4 ± 3.2	26.5 ± 4.7	3.7	11.6
2020-21	1,061	6.9 ± 2.8	26.2 ± 4.3	3.5	10.9
2021-22	1,841	4.3 ± 2.5	22.1 ± 4.7	3.6	8.3
2022-23	1,667	8.8 ± 2.7	28.6 ± 3.6	3.7	12.3
2023-24	1,575	3.3 ± 2.1	19.8 ± 4.2	3.8	7.8
2024-25	1,605	4.9 ± 2.7	23.3 ± 4.8	3.6	9.2
STEELHEAD					
2014-15	779	4.1 ± 1.9	22.6 ± 3.9	3.3	7.6
2015-16	1,047	4.9 ± 1.9	24.0 ± 2.2	3.8	7.3
2016-17	933	6.6 ± 2.2	25.9 ± 3.5	3.8	9.8
2017-18	1,044	6.9 ± 2.1	26.3 ± 2.9	3.9	10.8
2018-19	747	6.7 ± 2.5	25.7 ± 3.4	3.8	11.1
2019-20	143	6.2 ± 2.8	24.9 ± 4.6	4.1	10.3
2020-21	596	4.2 ± 2.5	22.0 ± 4.2	3.8	8.8
2021-22	1,685	5.5 ± 2.1	24.6 ± 3.3	3.7	9.4
2022-23	460	5.9 ± 2.3	25.4 ± 3.7	3.6	9.7
2023-24	1,253	4.3 ± 2.3	22.4 ± 4.0	3.8	8.9
2024-25	1,995	5.4 ± 1.5	24.8 ± 2.7	3.7	7.8

APPENDIX A. ROOT RIVER STOCKING NUMBERS

Table A-1. Number of fingerling Chinook salmon stocked in the Root River during 2015-2024. Chinook salmon were marked with an adipose clip and coded-wire tag from 2011 through 2018, and with an adipose clip in 2019. Fish were not marked in 2020 due to the COVID-19 pandemic. Marking with an adipose clip resumed in 2021.

YEAR STOCKED	TOTAL NUMBER	STRAIN	FINCLIP
2015	52,120	Lake Michigan	A-CWT (regular stocking)
	25,640	Lake Michigan	A-CWT (net pen stocking)
2016	50,918	Lake Michigan	A-CWT (regular stocking)
	25,352	Lake Michigan	A-CWT (net pen stocking)
2017	7,467	Lake Michigan	A (regular stocking)
	43,561	Lake Michigan	A-CWT (regular stocking)
	31,300	Lake Michigan	A-CWT (net pen stocking)
2018	51,383	Lake Michigan	A-CWT (regular stocking)
	32,748	Lake Michigan	A-CWT (net pen stocking)
2019	42,626	Lake Michigan	A (regular stocking)
	42,079	Lake Michigan	A (net pen stocking)
2020	101,919	Lake Michigan	None
2021	101,329	Lake Michigan	A
2022	53,040	Lake Michigan	A (regular stocking)
	32,823	Lake Michigan	A (net pen stocking)
2023	101,964	Lake Michigan	A (regular stocking)
2024	65,625	Lake Michigan	A (regular stocking)
	39,585	Lake Michigan	A (net pen stocking)

Table A-2. Number of coho salmon stocked in the Root River during 2015 – 2024.

YEAR STOCKED	TOTAL NUMBER	STRAIN	FINCLIP	AGE
2015	83,015	Lake Michigan	None	Spring yearling 1+
	10,008	Lake Michigan	None	Fall fingerling 0+
2016	60,021	Lake Michigan	None	Spring yearling 1+
	10,010	Lake Michigan	None	Fall fingerling 0+
2017	76,432	Lake Michigan	None	Spring yearling 1+
	13,001	Lake Michigan	None	Fall fingerling 0+
2018	76,241	Lake Michigan	None	Spring yearling 1+
2019	76,609	Lake Michigan	None	Spring yearling 1+
2020	73,702	Lake Michigan	None	Spring yearling 1+
	26,182	Lake Michigan	None	Fall fingerling 0+
2021	101,509	Lake Michigan	None	Spring yearling 1+
2022	79,932	Lake Michigan	None	Spring yearling 1+
2023	73,130	Lake Michigan	None	Spring yearling 1+
	26,756	Lake Michigan	None	Fall fingerling 0+
2024	100,450	Lake Michigan	None	Spring yearling 1+

Table A-3. Number of yearling steelhead stocked in the Root River during 2015-2024. Steelhead stocked into Lake Michigan in 2021 were not adipose-clipped or coded-wire tagged due to the COVID-19 pandemic.

YEAR STOCKED	TOTAL NUMBER	STRAIN	FINCLIP
2015	31,389	Chambers Creek	LMLV
	31,459	Ganaraska	BV
2016	27,134	Chambers Creek	LM
	28,218	Ganaraska	ALV
2017	28,085	Chambers Creek	ALM
	27,048	Ganaraska	ARV
2018	30,293	Chambers Creek	ALM
	26,252	Ganaraska	ARV
	34,027	Skamania	ARM
2019	34,511	Skamania	ARM-CWT
	8,503	Chambers Creek	A-CWT
	32,034	Chambers Creek	ALM-CWT
	33,884	Ganaraska	ALV-CWT
2020	32,191	Chambers Creek	ALM-CWT
	34,467	Ganaraska	ALV-CWT
2021	33,207	Chambers Creek	LM
	33,176	Ganaraska	LV
2022	28,361	Chambers Creek	ALM-CWT
	29,686	Ganaraska	ALV-CWT
	17,644	Skamania	A-CWT
2023	40,054	Chambers Creek	ALM-CWT
	41,868	Ganaraska	ALV-CWT
2024	27,757	Chambers Creek	ALM-CWT
	25,236	Ganaraska	ALV-CWT
	11,811	Lake Michigan	A-CWT

Table A-4. Number of brown trout stocked in the Root River during 2015-2024.

YEAR STOCKED	TOTAL NUMBER	STRAIN	FINCLIP
2015	42,743	Seeforellen	ALP
2016	31,690	Seeforellen	ARP
2017	19,122	Seeforellen	A (regular stocking)
	9,383	Seeforellen	A (net pens)
2018	31,448	Seeforellen	A
2019	31,736	Seeforellen	A
2020	32,066	Seeforellen	A
	4,996	Seeforellen	None-fall fingerling
2021	34,160	Seeforellen	ARV
2022	34,074	Seeforellen	A
2023	34,041	Seeforellen	A
2024	35,988	Seeforellen	A