

NWW Juvenile Fish Passage Status Report (March 1-November 1, 2021)
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This report summarizes 2021 juvenile fish passage, collection and transport operations through the end of transport operations (November 1st).

Early Start - Juvenile Bypass Systems (JBS) water-up dates, timing of condition sampling and transport operations at NWW projects for 2021 are summarized in Table 1. Sampling at Lower Granite Dam began approximately 1 month early in 2021 to assess whether passage timing is shifting earlier in the year due to climate change. Lower Granite Dam collection during the March 1-31 early start-up totaled 2,673 smolts in 2021 compared to 8,099 in 2020. McNary Dam early start collection was scheduled to start in March as well but was delayed because repairs were needed to the collection channel cleaning brush. A summary of early start collection numbers for 2018 through 2021 was sent to FPOM in June. The attached spreadsheet provides daily collection, bypass, and transport numbers passing through the bypass systems from the start of sampling through November 1st for Lower Granite, Little Goose, Lower Monumental, Ice Harbor and McNary dams.

Table 1. JBS water-up date, condition sample period and transport operations at NWW projects, 2021.

Location	JBS Operational	Condition Sampling	Barge Transport	Truck Transport
Lower Granite	2/22/2021*	3/1-11/1*	4/23-6/20	7/4-11/1
Little Goose	3/22/2021	4/1-11/1	4/23-6/20	7/6-11/1
Lower Monumental	3/25/2021	4/1-10/1	4/23-6/20	NA
Ice Harbor	3/24/2021	4/1-7/1	NA	NA
McNary	3/26/2021	4/2-9/30	NA	NA

* Early start operation to inform passage timing

Spring FOP - The 2021 spring fish passage spill operation (Spring FOP) was from 00:01 April 3rd to 23:59 June 20th at Snake River projects and from 00:01 April 10th to 23:59 June 15th at Columbia River projects. Snake River average river flow was 60% of the 10-year average from April 3rd through June 20th (Table 2). Average river flow in the Columbia River at McNary Dam was 68% of the 10-year average from April 10th through June 15th. Percent spill levels during the 2021 Spring FOP averaged 165% of the 10-year average at the three upper Snake River projects while Ice Harbor and McNary averaged 102% and 117% of the 10-year average, respectively.

Table 2. Average flow, spill and percent spill during the 2021 Spring FOP versus the 10-year average (2011-2020) at Walla Walla projects on the Snake and Columbia rivers.

Location (Spring FOP Timing)	Average Flow (kcfs)		Average Spill (kcfs)		% Spill	
	2021	10-year avg.	2021	10-year avg.	2021	10-year avg.
Lower Granite Dam (4/3-6/20)	61	100	39	37	64%	37%
Little Goose Dam (4/3-6/20)	55	97	34	39	61%	38%
Lower Monumental Dam (4/3-6/20)	60	98	42	40	69%	42%
Ice Harbor Dam (4/3-6/20)	62	102	41	65	65%	64%
McNary Dam (4/10-6/7)	203	299	129	168	63%	54%

Summer FOP - The 2021 summer fish passage spill operation (Summer FOP) was from 00:01 June 21st to 23:59 August 31st at Snake River projects and from 00:01 June 15th to 23:59 August 31st at Columbia River projects. Snake River average river flow (Table 3) was 63% of the 10-year average from June 21st to August 31st. Average river flow in the Columbia River at McNary Dam was 78% of the 10-year average from June 16th through August 31st. Percent spill levels during the 2021 Summer FOP averaged 97% of the 10-year average at the three upper Snake River projects while Ice Harbor and McNary averaged 58% and 94% of the 10-year average, respectively.

Table 3. Average flow, spill and percent spill during the 2021 Summer FOP versus the 10-year average (2011-2020) at Walla Walla projects on the Snake and Columbia rivers.

Location (Spring FOP Timing)	Average Flow (kcfs)		Average Spill (kcfs)		% Spill	
	2021	10-year avg.	2021	10-year avg.	2021	10-year avg.
Lower Granite Dam (6/21-8/31)	26	42	11	18	42%	46%
Little Goose Dam (6/21-8/31)	25	41	8	13	31%	33%
Lower Monumental Dam (6/21-8/31)	27	41	12	16	45%	43%
Ice Harbor Dam (6/21-8/31)	27	43	9	24	32%	56%
McNary Dam (6/16-8/31)	158	202	79	106	48%	51%

Juvenile Fish Collection - Collection numbers at Snake River transport projects in 2021 (April 1st to November 1st) were 14% of the 10-year average (2011-2020) (Table 4). The significantly lower collection this year was likely due to a combination of the higher levels of spill during the Spring FOP and that most of the outmigration occurred during the Spring FOP. A total of 3,249 smolts were sampled at Ice Harbor Dam and 734,185 smolts were collected at McNary Dam. Smolts collected at Ice Harbor and McNary dams were bypassed. The median migration timing in 2021 at Lower Granite Dam for all species was similar to the historical record (Table 5).

Table 4. Number of smolts collected in 2021 versus the 10-year average (2011-2020) at Lower Granite Dam, Little Goose Dam, Lower Monumental Dam and overall.

	April 1-June 20		June 21-October 31		April 1-October 31		
	2021	10y avg.	2021	10y avg.	2021	10y avg.	2021 vs 10y avg.
Lower Granite Dam	571,193	5,015,726	197,248	169,484	768,441	5,185,211	15%
Little Goose Dam	282,571	3,062,522	170,871	207,498	453,442	3,270,020	14%
Lower Monumental Dam	246,792	2,128,026	60,055	84,292	306,847	2,212,318	14%
Overall	1,100,556	10,206,274	428,174	461,275	1,528,730	10,667,549	14%

Table 5. Median outmigration arrival timing at Lower Granite Dam in 2021 compared to the historical record.

	2021 median	Historical median	Historical record	2021 vs Historical timing (days)
Yearling Chinook salmon	5-May	3-May	1985-2020	2
Steelhead	20-Apr	7-May	1985-2020	-17
Sockeye salmon	9-May	18-May	1985-2020	-9
Coho salmon	12-May	19-May	1996-2020	-7
Subyearling Chinook salmon	25-Jun	26-Jun	1985-2020	-1

Juvenile Fish Transportation - Collection for barge transport began April 23rd, transitioned from daily to every other day barging on May 17th, and concluded June 20th. Before 2018 barge transport operations did not begin until May 1st. From 2018-2020 collection for barge transport began April 23rd. Historically transport methods changed from barge to truck on August 15th except in 2019 when this change occurred August 1st. In 2021, barge transport ended June 20th and truck transportation operations were implemented early, beginning on July 4 and July 6 at Lower Granite and Little Goose, respectively, due to warm water conditions. NOAA conducted the Seasonal Effects Transport study this year with a single trip occurring on April 15th. The number of smolts transported in 2021 was 14% of the 10-year average (Table 6). The significantly lower numbers transported this year were likely due to lower collection numbers associated with the increased spill levels during the Spring FOP combined with barge transport ending earlier than during the majority of the previous 10-years. The passage index when barging ended (June 20th) was 100% ($\pm 1\%$) of the combined yearling Chinook salmon, 100% ($\pm 2\%$) of the combined juvenile steelhead, 99% ($\pm 31\%$) of the juvenile sockeye salmon, 99% ($\pm 31\%$) of the juvenile Coho salmon, and 56% ($\pm 83\%$) of the combined subyearling Chinook salmon that had passed Lower Granite Dam. NOAA Fisheries estimated 9.8% of the wild and 5.9% of the hatchery Snake River spring/summer Chinook salmon were transported in 2021. They estimated 11.1% of the wild and 4.3% of the hatchery Snake River steelhead were transported in 2021. The proportions transported in 2021 were the lowest since the transport program began.

From June 21st through July 4th, no transport occurred as recommended by Technical Management Team (TMT). During this time approximately 73,973 smolts were bypassed at Lower Granite Dam and 71,769 smolts were bypassed at Little Goose Dam. Truck transport began on July 4th and July 6th at Lower Granite and Little Goose dams, respectively (Table 6). No truck transport occurred at Lower Monumental Dam as recommended by TMT. The number of smolts transported by truck was 596% of the 10-year average overall (575% of the 10-year average at Lower Granite Dam and 702% of the 10-year average at Little Goose Dam). The large number of fish transported by truck in 2021 is likely due to the earlier than normal truck transport operations.

Table 6. Number of smolts transported in 2021 versus the 10-year average (2010-2019) at Lower Granite Dam, Little Goose Dam, Lower Monumental Dam and overall.

	Barge Transport ¹		Truck Transport ²		Overall Transport		
	2021	10y avg.	2021	10y avg.	2021	10y avg.	2021 vs 10y avg.
Lower Granite Dam	366,654	3,057,350	122,356	21,289	489,010	3,076,510	16%
Little Goose Dam	256,026	2,452,106	95,683	13,630	351,709	2,465,735	14%
Lower Monumental Dam	209,181	1,697,115	0	1,639	209,181	1,698,591	12%
Overall	831,861	7,206,571	218,039	36,558	1,049,900	7,240,836	14%

¹ Before 2018, barge transport operations began May 1st and ended around August 15th. From 2018-2020 collection for barge transport began April 23rd. Barge transport ended August 15th in 2018, July 31st in 2019, and June 21st in 2020. Numbers of smolts from research trips prior to normal transport are included in collection and transport totals.

² Truck transport did not occur in 2017 at Lower Granite or in 2020 or 2021 at Lower Monumental and therefore those years were excluded from the 10-year average.