



Fish Passage Center

Weekly Report #17-02

March 17, 2017

This Week's Highlights

Dworshak Operations

Over the last month, numerous FPAC (Fish Passage Advisory Committee) and TMT (Technical Management Team) meetings have taken place concerning project operations at Dworshak Dam. This year at Dworshak, Unit #3 is out of service for rehabilitation through at least the early summer period. As Unit #3 is the largest in terms of outflow capacity of the three units at Dworshak, flow through the powerhouse is limited to 4.5-4.8 Kcfs. Any outflow beyond the constrained powerhouse capacity at Dworshak, must be spilled; creating concerns over TDG (Total Dissolved Gas supersaturation) in the river environment below Dworshak Dam and subsequently at Dworshak Hatchery as water to the hatchery is supplied by river water. Although Dworshak Hatchery has been outfitted with TDG degassing columns "degassers" which significantly reduce TDG in hatchery supply water, there is still much concern over very high discharges and spill levels at Dworshak that will create unknown levels of TDG below the Dam, and it is also unknown how well the TDG "degassers" will decrease TDG in the water supply to hatcheries at these high levels. At the higher levels of spill that occurred last week, 13.5-17.3 Kcfs at Dworshak, TDG directly below the dam has ranged between 124.5-126%, with the water supply to the hatcheries at approximately 104.8%. The reduction in outflows that began at 6pm on 3/16/17, reduced spill levels to 7.5 Kcfs with TDG directly below the dam reduced to between 119-120%. Hatchery personnel reported this week that 9/10 chinook sampled for GBT had bubbles in their gills, 6/10 had bubbles along their lateral line, and 1/10 had bubbles in caudal fin. Additionally, of the steelhead sampled this week that 4/10 chinook sampled for GBT had bubbles in their gills and 2/10 had bubbles along their dorsal and caudal fins. Overall, hatchery personnel stated that signs of GBT have been steadily increasing as exposure time continues to lengthen.

Over the last month, the Official Water Supply (calculated by USACE) at Dworshak has increased from 2.54 Maf in February to 2.87 Maf in March. With these increasing water supply forecasts, USACE has continued expressing the need to increase outflows at Dworshak to reach deeper flood control elevations. At a TMT call last week (3-3-17), the planned operation was presented by the USACE to increase outflows to a total discharge of 22 Kcfs (17.2 Kcfs spill) then holding that discharge through at least April 15th, while drafting to a System Flood Control elevation of 1,471.1 ft. (based on the March Forecast of 2.87 Maf). The USACE presented two options of getting to the 22 Kcfs by providing a flat flow of 17 for 10 days, followed by an increase to 22 Kcfs; or by increasing 1 Kcfs per day from the present discharge until reaching the 22 Kcfs. Neither operation was preferred regarding fish concerns, but USACE agreed to implement the second strategy giving the hatchery the ability to collect information regarding the efficiency of the degassers.

At last week's TMT call (3-8-17), USACE stated their unofficial "early bird" forecast estimated the April - July Water Supply at Dworshak to be near 3.1 Maf, which would necessitate an April 15th draft to the bottom of the active storage at Dworshak (1445 ft.) and require outflows to be increased to 25 Kcfs (20.2 Kcfs spill). At the 3-8-17 TMT meeting, USACE presented a long term scenario of Dworshak operations that modeled outflows of 25 Kcfs through April 15th to meet a Flood Control Elevation of 1,445 ft., followed by a ramp down in outflows over late April to outflows in May and June of 1.5-2.0 Kcfs, with this operation the project refilled to within several feet of full by the end of June. Under this scenario, if future water supply decreases relative to early April estimates (3.1 Maf), Dworshak will have trouble refilling by the end of June as minimum outflows of 1.5-1.6 have to be released during the refill period. Because of the powerhouse constraints at Dworshak, a delay in refill into July or failing to refill could impact summer (July, August, and early September) release volumes which are needed for temperature control in the

lower Snake River.

The FPC has provided multiple modeling scenarios to describe possible alternatives to the USACE operations, the last of which modified operations by targeting the April 15th Local Flood Control Elevation of 1,497.7 ft. that was based on USACEs early April estimate of 3.1 Maf. Under this alternative, outflows would be expected to remain near 18 Kcfs through April 15th in order to meet the local flood control elevation of 1,497.7 ft. Flows would continue at 18 Kcfs through the end of April if an early runoff pattern exists, and then drop to 3.5 Kcfs for all of May and June. The Alternative May and June discharge is slightly higher than that modeled by the COE but is still less than the current limited powerhouse capacity (so would not require excess spill and TDG) and allows some buffer to refill if forecasts decrease.

In summary, this alternative plan for operations at Dworshak would provide a more manageable outflow in terms of TDG production from now through April, provide slightly higher outflows in May and June, and safeguard refill by June 30th if forecasts decline. The latest alternative operates to the local flood control elevation at Dworshak, rather than the system flood control elevation (typically deeper draft). At present, USACE has not agreed to any operation other than operating to hard system flood control elevations. USACE has so far largely ignored requests to show/analyze the potential risk to system flooding (lower Columbia) that could result from an operation of Dworshak to local Flood Control Elevations as opposed to System Flood Control Elevations. As shown by the long term figure at the 3-8-17 TMT (http://www.nwd-wc.usace.army.mil/tmt/agendas/2017/0308_DWR_Long-term-Dwr-Operations-1996-AY.pdf), this type of operation will lead to very high discharges and spill levels (with unknown TDG levels), followed by decreases in discharge in May and June to minimum (or near minimum) outflows, which if forecasted inflows diminish, could impact refill by June 30th. From the perspective of the millions of hatchery fish currently in the Dworshak hatchery, the USACE operation seems very risky in terms of GBT (Gas Bubble Trauma) and potential mortality.

At this week's TMT call, the COE again stated that the April forecasts at Dworshak would likely be

greater than 3.0 Maf, which would necessitate a 25 Kcfs outflows to reach deep flood control elevations. However, at the time, lower Columbia flood control operations restricted their outflow to 22.5 Kcfs until river flows at Vancouver, Washington began to decrease. Further reductions in outflow were needed at Dworshak late on 3/15/17 as high flows/runoff created concern downstream of Dworshak. Currently, Dworshak is releasing a total outflow of 12.5 Kcfs, with spill levels around 7.5 Kcfs, which is producing TDG below Dworshak between 119-120%. This situation is one in which Dworshak was releasing very high flow levels to reach flood control elevations in the reservoir; however, in doing so, these outflows contributed to flooding concerns downstream of the project, which ultimately forced the project to reduce outflows. It is uncertain how long Dworshak outflows will remain at 12.5 Kcfs. The COE has repeatedly stated the need to strictly operate to system Flood Control at Dworshak, with the reductions in outflows, the end of March system flood control elevation will not be met without increasing outflows to some level greater than 25 Kcfs. The COE has also stated that they do not intend to increase outflows at Dworshak to beyond 25 Kcfs as they did not want to risk the flooding of hatcheries below the dam. Another TMT call is scheduled for this afternoon at 1:30 PM.

Water Supply

Precipitation throughout the Columbia Basin has varied between 83% and 320% of average at individual sub-basins over March. Precipitation above The Dalles has been 195% of average over March. Over the 2017 water year, precipitation has ranged between 122% and 145% of average.

Table 1. Summary of March precipitation and cumulative October through March precipitation with respect to average (1971-2000), at select locations within the Columbia and Snake River Basins.

Location	Water Year 2017 March 1-15, 2017		Water Year 2017 October 1, 2016 to March 15, 2017	
	Observed (inches)	% Average	Observed (inches)	% Average
	Columbia Above Coulee	4.16	254	26.4
Snake River Above Ice Harbor	1.76	154	17.3	137
Columbia Above The Dalles	2.52	195	19.9	126
Kootenai	3.70	229	27.4	132
Clark Fork	3.49	286	16.9	122
Flathead	5.20	320	26.9	142
Pend Oreille River Basin above Waneta Dam	4.35	292	23.4	133
Salmon River Basin	2.56	174	22.7	144
Upper Snake Tributaries	1.06	83	20.4	145
Clearwater	6.03	297	29.6	125
Willamette River above Portland	6.78	189	63.9	139

Snowpack within the Columbia Basin has been above average. Average snowpack in the Columbia River for basins above the Snake River confluence is 106% of average, for Snake River Basins the average snowpack is 138% of average, and for lower Columbia Basins between McNary and Bonneville Dam average snowpack is 128% of average.

Table 2 displays the March 16th ESP runoff volume forecasts for multiple reservoirs along with the March COE forecasts at Libby and Dworshak. The March 16th ESP forecast at The Dalles between April and August is 99,144 Kaf (113% of average).

Table 2. March ESP Runoff Volume Forecasts for various reservoirs within the Columbia and Snake River Basins.

Location	March 16, 2017 5-day QPF ESP	
	% Average (1981-2010)	Runoff Volume (Kaf)
The Dalles (Apr-Aug)	113	99,144
Grand Coulee (Apr-Aug)	109	61,693
Libby Res. Inflow, MT (Apr-Aug)	113 115*	6,621 6,783*
Hungry Horse Res. Inflow, MT (Apr-Aug)	113	2,197
Lower Granite Res. Inflow (Apr- July)	134	26,670
Brownlee Res. Inflow (Apr-July)	178	9,741
Dworshak Res. Inflow (Apr-July)	107 118*	2,594 2,867*

* Denotes COE March Forecast

Grand Coulee Reservoir is at 1,254.4 feet (3-16-17) and drafted 1.3 feet over the last week. Outflows at Grand Coulee have ranged between 89.1 Kcfs and 114.2 Kcfs over the last week. The end of March FC Elevation at Grand Coulee is 1,267.1 feet and the April 15th FC Elevation is 1249.6 ft. Drum gate maintenance is currently occurring at Grand Coulee.

The Libby Reservoir is currently at elevation 2,395.2 feet (3-16-17) and has drafted 0.4 ft. over the past week. Daily average outflows at Libby Dam have been 4.0 Kcfs. The end of March FC Elevation at Libby is 2,382.1 feet.

Hungry Horse is currently at an elevation of 3,540.6 feet (3-16-17) and has drafted 0.2 feet last week. Outflows at Hungry Horse have been 3.9-5.1 Kcfs over the last week. The end of March FC Elevation at Hungry Horse is 3,539.8 feet.

Dworshak is currently at an elevation of 1,514.0 feet (3-16-17) and has refilled 2.9 feet over the last week. Inflows to Dworshak increased to as high as 35.7 Kcfs on 3/15/17. Dworshak outflows continued to increase last week, from 19.5 Kcfs to 22.5 Kcfs; however, were reduced to 12.5 Kcfs around 6 pm on 3/16/17 due

to downstream flood control. The end of March FC Elevation is 1,493.1 feet.

The Brownlee Reservoir was at an elevation of 2,020.1 feet on March 16, 2017, and drafted 1.2 feet last week. Outflows at Hells Canyon have ranged between 58.7 and 69.5 Kcfs over the last four days. The minimum flow at Hells Canyon is 8.5 Kcfs. The end of March FC Elevation at Brownlee is 2,036.0 feet.

Spill

Flow in the Snake River has been very high over the past weeks, as a function of increased precipitation, some snowmelt, and flood control operations at Dworshak and Brownlee Dam. Flow at Lower Granite Dam reach 200 Kcfs yesterday and the Snake River flows are contributing to high flows in the middle Columbia River. Flows in the Upper Columbia have been more average for this time of year.

Due to the high Snake River flows, significant spill has occurred at all of the mainstem federal projects, while very little spill has occurred at the Upper Columbia PUD projects. BPA has indicated that the involuntary spill that is occurring in the Federal Columbia River Power System is excess to hydraulic capacity, as several projects are presently operating with generation unit outages, limiting hydraulic capacity.

Variations in total dissolved gas levels for the implementation of the voluntary fish spill programs begin in April, therefore, the 110% standard for total dissolved gas is currently in place. However, since the spill is considered involuntary, the exceedences of the 110% standards are not interpreted as violations by the US Army Corps of Engineers.

High TDG supersaturation levels are occurring below Dworshak Dam, as well as at the Hells Canyon Complex dams on the Snake River, due to discharge in excess of hydraulic capacity for flood control operations. Consequently, TDG supersaturation levels are already in excess of 100% when the river water enters the mainstem hydrosystem. All forebay monitoring sites are now operational, and TDG supersaturation at Lower Granite Dam forebay monitor ranged from a 12 hour average of 107% to 109% over the first four days of operation.

TDG production during lack of load involuntary spill conditions is managed throughout the FCRPS by the US Army Corps of Engineers with implementation of a spill priority list to evenly distribute spill throughout

the FCRPS in an effort to manage/minimize TDG production to the extent possible. However, since the present spill is not due to lack of load, TDG supersaturation levels are variable throughout the system and are a function of hydraulic capacity. The highest flow and spill levels over the past week were observed Thursday. Yesterday's tailwater TDG supersaturation average of 12 highest hourly levels were 132% at Lower Granite Dam, 124% at Little Goose Dam, 128% at Lower Monumental Dam and 133% at Ice Harbor Dam. Saturation levels were somewhat lower at the Middle Columbia projects ranging from a low of 115% at the tailrace of The Dalles Dam to a high of 124% below John Day Dam.

Smolt Monitoring

Bonneville Dam is the only bypass facility that is currently sampling for the Smolt Monitoring Program (SMP). Sampling at the Imnaha and Salmon river traps continued this week while sampling at the Snake River Trap did not occur due high flows and debris loads. Sampling at the Grande Ronde River Trap has been delayed due to high flows and debris levels. SMP sampling at the other bypass facilities is expected to begin in late March (at Lower Granite Dam) or early April (at Little Goose, Lower Monumental, McNary, John Day, and Rock Island dams).

Subyearling Chinook continued to dominate the samples at Bonneville Dam (BON) this week. This week's daily average passage index for subyearling Chinook was nearly 3,700, which is much higher than last week's daily average passage index of about 875 per day. All of the subyearling Chinook sampled so far this year have been fry. A relatively small number of yearling Chinook, coho, sockeye, and steelhead juveniles were also been collected this week. Pacific lamprey macrophthalmia were encountered every day this week. This week's daily average collection for pacific macrophthalmia was about 125 per day, which is a decrease from for last week daily average collection of nearly 2,400 per day.

The Salmon River Trap at Whitebird (WTB) is located at river kilometer 103 and is operated by Idaho Department of Fish and Game. Sampling at WTB began on March 5th, with the first sample being tallied and reported on March 6th. Similar to recent years, sampling at WTB in 2017 will only occur on weekdays. Yearling Chinook dominated this week's

collections at WTB. This week's daily average collection for yearling Chinook was 322 per day, which is much higher than last week's daily average collection of only 23 per day. WTB collected its first known hatchery yearling Chinook for the 2017 season in the March 14th sample. Since then, the yearling Chinook collection has consisted of approximately 38% known hatchery fish. The first steelhead for the 2017 season was collected in the sample for March 13th. However, steelhead collections at WTB remain very low. Sampling at WTB was suspended after the March 16th sample due to high flows and high debris loads. Sampling will resume when river conditions are deemed safe.

The Snake River Trap at Lewiston, ID (LEW) is located at river kilometer 225 and operated by Idaho Department of Fish and Game. Sampling at LEW began on March 5th, with the first sample being tallied and reported on March 6th. However, due to high river flows and debris, sampling at LEW was suspended after the March 9th sample. Sampling will resume when river conditions are deemed safe.

The Imnaha River Trap (IMN) is located at river kilometer 7 and is operated by the Nez Perce Tribe. Sampling at the Imnaha River Trap is year round. For 2017, the FPC currently has data from IMN for the period of January 27th through March 7th. In that period, a total of 425 yearling Chinook and eight steelhead were sampled at the trap.

Hatchery Release

Effective 2017, the FPC has reorganized our hatchery release zones in an effort to more closely match the geographical regions used by NOAA in their ESU designations. The new river zones are: 1) Lower Columbia, 2) Middle Columbia, 3) Upper Columbia, and 4) Snake River. In addition, the FPC will now provide a summary of hatchery releases below Bonneville Dam (i.e., Lower Columbia River Zone) in the weekly report.

Snake River Zone: The Snake River Zone encompasses the Snake River and its tributaries from its confluence with the Columbia River to Hells Canyon Dam. Approximately 4.6 million yearling spring Chinook juveniles were scheduled to be released into this zone this week. Of these, approximately 60% were scheduled to be released into the Little Salmon River, 25% were scheduled to be released into the Clearwater River, 10% were scheduled to be released

into the Snake River at Hells Canyon Dam, and 5% were scheduled to be released into the Imnaha River. The majority of the spring Chinook juveniles that were scheduled for release into the Little Salmon River this week were from Rapid River hatchery. The Rapid River Hatchery release is volitional, expecting to run through mid-April. Approximately 620,000 yearling summer Chinook were scheduled to be released into the Lochsa River, a tributary of the Clearwater River, this week. Approximately 574,000 coho juveniles were scheduled to be released into tributaries of the Clearwater River this week. Of these, nearly 90% were scheduled to be unmarked. Finally, 169,500 steelhead juveniles were released from the Big Canyon Acclimation Pond on the Wallowa River this week. This was an emergency release necessitated by high flows and debris loads at the acclimation pond.

Nearly 4.0 million yearling spring Chinook juveniles are scheduled to be released to this zone over the next two weeks, all of which are scheduled to be released into the Clearwater River and its tributaries. Of these, approximately 1.5 million and 390,000 are scheduled for release from Dworshak NFH and Clearwater Hatchery, respectively, on April 20th. These releases are earlier than originally planned and are due to high total dissolved gas (TDG) in the Dworshak Dam tailrace, resulting in high TDG at Dworshak Hatchery. The high TDG in the Dworshak tailrace is due to flood control operations at the dam. In addition, 155,000 yearling summer Chinook are scheduled to be released into the Selway River, a tributary of the Clearwater River, over the next two weeks. Approximately 136,000 coho juveniles are scheduled to be released into Lapwai Creek, beginning on or around March 21st. Finally, about 1.5 million steelhead juveniles are scheduled to be released to this zone over the next two weeks. These releases are scheduled to occur on the Pahasimeroi (54%), Snake at Hells Canyon Dam (38%), and Salmon (8%) rivers.

Upper Columbia Zone: The Upper Columbia Zone encompasses the area of the Columbia River and its tributaries from Priest Rapids Dam to Chief Joseph Dam. No releases were scheduled for this zone this week. Furthermore, no releases are scheduled to begin over the next two weeks for this zone.

Middle Columbia Zone: The Middle Columbia Zone is defined as the Columbia River and its tributaries from Bonneville Dam to Priest Rapids Dam (excluding the

Snake River). Nearly 656,000 yearling spring Chinook juveniles were scheduled for release to this zone this week. All of these spring Chinook juveniles were reared at Cle Elum Hatchery and were released from acclimation ponds throughout the Yakima River basin. These were all volitional releases that were scheduled to start this week and will likely run through mid-May.

Approximately 280,000 yearling fall Chinook juveniles are scheduled to be released in to the Umatilla River, on or around March 22nd. In addition, about 274,000 yearling spring Chinook juveniles are scheduled to be released to this zone over the next two weeks. Of these, approximately 249,000 (91%) are scheduled to be released into Walla Walla River while the remaining 25,000 (9%) are scheduled to be released into various tributaries of the Deschutes River. No other releases are scheduled for this zone over the next two weeks.

Lower Columbia Zone: The Lower Columbia Zone is defined as the Columbia River and its tributaries below Bonneville Dam. Approximately 2.16 million yearling spring Chinook juveniles were scheduled for release into this zone this week. These releases were scheduled to occur in various Columbia River tributaries located below Bonneville Dam, including: 1) the Willamette and its tributaries (50%), 2) the Kalama River (25%), and 3) Gnat Creek (18%). The remaining 7% of the yearling spring Chinook that were scheduled for release in this zone this week were scheduled to be released from the Select Area Net Pens near Blind Slough. In addition, approximately 25,000 winter steelhead were scheduled to be released into the Clackamas River this week.

Nearly 1.38 million yearling spring Chinook juveniles are scheduled for release into this zone over the next two weeks. Of these, approximately 950,000 (69%) are scheduled to be released from the Select Area Net Pens at Tongue Point, and Young's Bay. The remaining 436,000 (31%) are scheduled to be released to the Willamette River and its tributaries. In addition, 290,000 chum juveniles scheduled to be released into Big Creek, on or around March 31st. Finally, approximately 121,000 summer steelhead juveniles are scheduled to be released into the South Santiam River and 100,000 winter steelhead are scheduled to be released in to the Clackamas River over the next two weeks.

Adult Passage

Bonneville Dam uses video counts from January 1st through March 31st and direct counting after this period. Bonneville Dam counts adult salmon and steelhead year round. Lower Granite Dam uses video counts from March 1st through March 31st and direct counting after this period. Lower Granite Dam counts adult salmon and steelhead through December 30th each year. Willamette Falls Dam also uses video counts and reports adult counts year round. Video counts can cause a delay in posting the count data to the web, because the counting staff at the projects has to review the tapes. The FPC collects the adult count data from projects several times a day and updates Adult Dam Count Report linked on our homepage (<http://www.fpc.org/>). During the winter season at Bonneville Dam (from 1/1/2017 through 3/15/2017), 10 adult Chinook and 995 adult steelhead were counted. In 2016 for the same time frame, 40 adult Chinook and 2,032 adult steelhead were counted. The 2017 Bonneville Dam winter season count of adult steelhead had 1,037 fewer fish than the 2016 count.

The Willamette Falls cumulative steelhead count from January 1st through March 13th is 405. The 2017 Willamette Falls winter steelhead count is about 11.6% of the 2016 count of 3,496 and 14.7% of the 10-year average count of 2,756. This year's Lower Granite steelhead count of 1,858 had 80 more fish than the 2016 count of 1,778 and has 44 more fish than the 10-year average count of 1,814.

This winter, based on estimates made by the Technical Advisory Committee (TAC) for U.S. v. Oregon, the spring Chinook run for 2017 is expected to be 227,890. The TAC reported that 274,652 spring Chinook had returned to the river in 2016 (see U.S. v. Oregon, Technical Advisory Committee's March 8, 2017, document *Columbia River Mouth Fish Returns* which displays 2016 actual and 2017 forecasts of spring Chinook, summer Chinook, sockeye, and steelhead counts from the Oregon and Washington Departments of Fish and Wildlife). This is available at: http://www.dfw.state.or.us/fish/QSCR/CRM/returns_and_expectations/docs/2016_returns_17forecasts.pdf

The Bonneville Dam corner collector was opened on March 2nd for kelt passage. Between March 2nd and March 15th, a total of 18 steelhead were observed over the separator at the Bonneville Juvenile Monitoring Facility (JMF). Kelt passage at the Bonneville JMF can be found at: <http://www.fpc.org/adultsalmon/bonkeltcounts>.

Hatchery Releases Last Two Weeks

Hatchery Release Summary										
From:			3/4/2017	to	03/17/17					
Agency	Hatchery	Species	Race	MigYr	NumRel	RelStart	RelEnd	RelSite	RelRiver	Zone
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SU	2017	618,242	03-16-17	03-20-17	Powell Acclim Pond	Lochsa River	SNAK
Idaho Dept. of Fish and Game	Rapid River Hatchery	CH1	SP	2017	250,000	03-17-17	03-17-17	Pinehurst Bridge	Little Salmon River	SNAK
Idaho Dept. of Fish and Game	Rapid River Hatchery	CH1	SP	2017	480,000	03-13-17	03-16-17	Hells Canyon Dam	Snake River	SNAK
Idaho Dept. of Fish and Game	Rapid River Hatchery	CH1	SP	2017	2,500,000	03-13-17	04-28-17	Rapid River Hatchery	Little Salmon River	SNAK
Idaho Dept. of Fish and Game Total					3,848,242					
Nez Perce Tribe	Cascade Hatchery	CO	UN	2017	350,000	03-16-17	03-18-17	Lapwai Creek	Clearwater River M F	SNAK
Nez Perce Tribe	Clearwater Hatchery	CH1	SP	2017	483,463	03-13-17	03-16-17	Selway River	Clearwater River M F	SNAK
Nez Perce Tribe	Eagle Creek NFH	CO	UN	2017	224,000	03-12-17	03-12-17	Clear Creek	Clearwater River M F	SNAK
Nez Perce Tribe	Eagle Creek NFH	CO	UN	2017	290,000	03-10-17	03-10-17	Lapwai Creek	Clearwater River M F	SNAK
Nez Perce Tribe	Eagle Creek NFH	CO	UN	2017	500,000	03-09-17	03-09-17	Lostine Accim Pond	Wallowa River	SNAK
Nez Perce Tribe	Kooskia NFH	CH1	SP	2017	680,000	03-17-17	03-17-17	Kooskia Hatchery	Clearwater River M F	SNAK
Nez Perce Tribe Total					2,527,463					
Oregon Dept. of Fish and Wildlife	Clackamas Hatchery	CH1	SP	2017	66,000	03-07-17	03-07-17	Bull Run Acclimation	Sandy River	LCOL
Oregon Dept. of Fish and Wildlife	Clatsop County Fisheries	CH1	SP	2017	150,000	03-15-17	03-15-17	Blind Slough	Col R Bel. Bon Dam	LCOL
Oregon Dept. of Fish and Wildlife	Eagle Creek NFH	CH1	SP	2017	240,000	03-15-17	03-15-17	Eagle Creek Hatchery	Eagle Creek	LCOL
Oregon Dept. of Fish and Wildlife	Enhancement Program	CH1	SP	2017	55,000	03-15-17	03-15-17	Clackamas River	Clackamas River	LCOL
Oregon Dept. of Fish and Wildlife	Enhancement Program	ST	WI	2017	25,000	03-15-17	03-15-17	Clackamas River	Clackamas River	LCOL
Oregon Dept. of Fish and Wildlife	Gnat Creek Hatchery	CH1	SP	2017	400,000	03-15-17	03-15-17	Gnat Creek Hatchery	Col R Bel. Bon Dam	LCOL
Oregon Dept. of Fish and Wildlife	Irrigon Hatchery Complex	ST	SU	2017	169,500	03-16-17	04-15-17	Big Canyon Acclim.Pd (Grande Ronde)	Wallowa River	SNAK
Oregon Dept. of Fish and Wildlife	Lookingglass Hatchery	CH1	SP	2017	210,000	03-15-17	03-15-17	Imnaha River	Imnaha River	SNAK
Oregon Dept. of Fish and Wildlife	Marion Forks Hatchery	CH1	SP	2017	50,000	03-15-17	03-15-17	S Fk Santiam River	Santiam River	LCOL
Oregon Dept. of Fish and Wildlife	Marion Forks Hatchery	CH1	SP	2017	100,000	03-15-17	03-15-17	Mollala River	Willamette River	LCOL
Oregon Dept. of Fish and Wildlife	Marion Forks Hatchery	CH1	SP	2017	635,000	03-15-17	03-15-17	S Fk Santiam River	Santiam River	LCOL
Oregon Dept. of Fish and Wildlife	South Santiam Hatchery	CH1	SP	2017	421,000	03-10-17	03-10-17	South Santiam Hatchery	Santiam River	LCOL
Oregon Dept. of Fish and Wildlife Total					2,521,500					
Washington Dept. of Fish and Wildlife	Fallert Creek Hatchery	CH1	SP	2017	535,000	03-01-17	03-15-17	Fallert Creek Hatchery	Kalama River	LCOL
Washington Dept. of Fish and Wildlife Total					535,000					
Yakama Tribe	Cle Elem Hatchery	CH1	SP	2017	208,500	03-15-17	05-15-17	Clark Flat Acclim Pond	Yakima River	MCOL
Yakama Tribe	Cle Elem Hatchery	CH1	SP	2017	218,451	03-15-17	05-15-17	Easton Pond	Yakima River	MCOL
Yakama Tribe	Cle Elem Hatchery	CH1	SP	2017	228,881	03-15-17	05-15-17	Jack Creek Acclim Pond	Yakima River	MCOL
Yakama Tribe Total					655,832					
Grand Total					10,088,037					

Hatchery Releases Next Two Weeks

Hatchery Release Summary

From: 3/18/2017 to 3/31/2017

Agency	Hatchery	Species	Race	MigYr	NumRel	RelStart	RelEnd	RelSite	RelRiver	Zone
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SP	2017	388,783	03-20-17	03-20-17	N Fk Clearwater River	Clearwater River M F	SNAK
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SP	2017	767,632	03-22-17	03-23-17	Kooskia Hatchery	Clearwater River M F	SNAK
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SP	2017	1,289,231	03-27-17	03-30-17	Red River	S Fk Clearwater River	SNAK
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SU	2017	155,055	03-20-17	03-21-17	Selway River	Clearwater River M F	SNAK
Idaho Dept. of Fish and Game	Clearwater Hatchery	CH1	SU	2017	618,242	03-16-17	03-20-17	Powell Acclim Pond	Lochsa River	SNAK
Idaho Dept. of Fish and Game	Niagara Springs	ST	SU	2017	560,000	03-20-17	03-29-17	Hells Canyon Dam	Snake River	SNAK
Idaho Dept. of Fish and Game	Niagara Springs	ST	SU	2017	805,000	03-30-17	04-17-17	Pahsimeroi River	Pahsimeroi River	SNAK
Idaho Dept. of Fish and Game Total					4,583,943					
Nez Perce Tribe	Cascade Hatchery	CO	UN	2017	136,000	03-21-17	03-21-17	Lapwai Creek	Clearwater River M F	SNAK
Nez Perce Tribe	Cascade Hatchery	CO	UN	2017	350,000	03-16-17	03-18-17	Lapwai Creek	Clearwater River M F	SNAK
Nez Perce Tribe Total					486,000					
Oregon Dept. of Fish and Wildlife	Big Creek Hatchery	CM	UN	2017	290,000	03-31-17	03-31-17	Big Creek Hatchery	Big Creek	LCOL
Oregon Dept. of Fish and Wildlife	Clatsop County Fisheries	CH1	SP	2017	250,000	03-31-17	03-31-17	Tongue Pt	Col R Bel. Bon Dam	LCOL
Oregon Dept. of Fish and Wildlife	Clatsop County Fisheries	CH1	SP	2017	300,000	03-22-17	03-22-17	Youngs Bay	Youngs River	LCOL
Oregon Dept. of Fish and Wildlife	Clatsop County Fisheries	CH1	SP	2017	400,000	03-31-17	03-31-17	Youngs Bay	Youngs River	LCOL
Oregon Dept. of Fish and Wildlife	Eagle Creek NFH	ST	WI	2017	100,000	03-31-17	03-31-17	Eagle Creek Hatchery	Eagle Creek	LCOL
Oregon Dept. of Fish and Wildlife	McKenzie Hatchery	CH1	SP	2017	202,000	03-21-17	03-21-17	McKenzie Hatchery	Willamette River	LCOL
Oregon Dept. of Fish and Wildlife	South Santiam Hatchery	ST	SU	2017	55,000	03-31-17	03-31-17	Minto Pond	Santiam River	LCOL
Oregon Dept. of Fish and Wildlife	Willamette Hatchery	CH1	SP	2017	234,000	03-24-17	03-24-17	Dexter Pond	Willamette River	LCOL
Oregon Dept. of Fish and Wildlife	Willamette Hatchery	ST	SU	2017	66,000	03-31-17	03-31-17	Minto Pond	Santiam River	LCOL
Oregon Dept. of Fish and Wildlife	Wizard Falls Hatchery	CH1	SP	2017	7,500	03-25-17	03-25-17	Metolius River	Deschutes River	MCOL
Oregon Dept. of Fish and Wildlife	Wizard Falls Hatchery	CH1	SP	2017	7,500	03-25-17	03-25-17	Wychus Creek	Deschutes River	MCOL
Oregon Dept. of Fish and Wildlife	Wizard Falls Hatchery	CH1	SP	2017	10,000	03-25-17	03-25-17	Crooked River (OR)	Deschutes River	MCOL
Oregon Dept. of Fish and Wildlife Total					1,922,000					
U.S. Fish and Wildlife Service	Dworshak NFH	CH1	SP	2017	1,500,000	03-20-17	03-20-17	Dworshak Hatchery	Clearwater River M F	SNAK
U.S. Fish and Wildlife Service	Hagerman NFH	ST	SU	2017	120,000	03-31-17	04-01-17	McNabb/Salmon River	Salmon River (ID)	SNAK
U.S. Fish and Wildlife Service Total					1,620,000					
Umatilla Tribe	Bonneville Hatchery	CH1	FA	2017	283,101	03-22-17	03-22-17	Pendelton Acclim Pond	Umatilla River	MCOL
Umatilla Tribe	Carson NFH	CH1	SP	2017	249,095	03-28-17	03-28-17	Walla Walla River	Walla Walla River	MCOL
Umatilla Tribe Total					532,196					
Grand Total					9,144,139					

CH = Chinook, ST = Steelhead, CO = Coho, SO = Sockeye, CT = Cutthroat Trout, CM = Chum

Daily Average Flow and Spill (in Kcfs) at Mid-Columbia Projects

Date	Grand Coulee		Chief Joseph		Wells		Rocky Reach		Rock Island		Wanapum		Priest Rapids	
	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill
03/03/2017	144.3	0.0	144.3	16.0	148.9	7.0	150.2	14.5	153.7	4.1	169.0	0.0	172.2	59.0
03/04/2017	132.0	0.0	138.7	4.7	144.6	0.0	144.3	10.9	147.6	1.2	152.8	0.0	154.6	46.8
03/05/2017	126.7	0.0	126.4	0.0	131.1	0.0	131.2	0.0	135.4	0.0	138.6	0.0	128.5	0.0
03/06/2017	125.3	0.0	126.5	0.0	126.5	0.0	123.9	0.0	128.3	0.0	142.4	0.0	138.3	26.5
03/07/2017	118.1	0.0	117.0	0.0	124.7	0.0	126.4	0.2	131.8	0.0	148.0	0.0	144.7	0.0
03/08/2017	114.5	0.0	109.4	0.0	113.9	0.0	110.6	0.0	112.8	1.5	131.5	0.0	134.0	0.0
03/09/2017	114.2	0.0	118.1	0.0	123.6	0.0	123.1	2.6	126.0	0.0	137.6	0.0	137.0	0.0
03/10/2017	101.5	0.0	106.9	0.0	107.5	0.0	104.4	0.0	107.5	0.4	102.2	0.0	104.9	0.0
03/11/2017	107.1	0.0	110.6	0.0	111.7	0.0	108.4	0.0	114.6	0.0	107.7	0.0	110.7	0.0
03/12/2017	104.1	0.0	100.5	0.0	100.1	0.0	96.9	0.0	98.2	0.0	99.1	0.4	94.5	12.7
03/13/2017	90.3	0.0	95.2	0.0	103.3	0.0	105.4	0.0	111.6	0.0	121.6	0.0	117.7	0.0
03/14/2017	89.1	0.0	86.3	0.0	76.3	0.0	71.0	0.2	74.0	0.0	94.0	2.8	101.3	0.0
03/15/2017	106.7	0.0	108.0	0.0	111.4	0.0	108.3	0.0	115.5	0.0	100.8	10.3	95.4	0.0
03/16/2017	103.4	0.0	100.9	3.5	110.4	0.0	109.0	0.1	117.4	0.0	131.4	5.5	126.5	0.0

Daily Average Flow and Spill (in Kcfs) at Snake Basin Projects

Date	Dworshak		Brownlee Inflow	Hells Canyon	Lower Granite		Little Goose		Lower Monumental		Ice Harbor	
	Flow	Spill		Outflow	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill
03/03/2017	12.6	7.7	---	38.6	69.7	0.0	68.2	0.0	70.8	0.0	71.9	0.2
03/04/2017	13.9	9.1	---	40.7	67.1	0.0	65.2	0.0	67.1	0.0	67.3	0.0
03/05/2017	14.6	9.7	---	44.5	76.7	0.0	70.3	0.0	73.7	0.0	73.7	0.0
03/06/2017	15.6	10.7	---	47.8	82.3	0.0	80.3	0.0	83.6	2.4	80.1	16.7
03/07/2017	16.6	11.7	---	50.0	84.4	0.0	87.2	0.0	89.0	6.1	93.6	40.4
03/08/2017	17.6	12.6	---	44.2	90.0	9.3	80.4	0.0	84.0	1.9	86.7	31.1
03/09/2017	18.5	13.5	---	49.9	101.7	14.0	93.1	0.0	100.0	15.9	101.8	46.2
03/10/2017	19.5	14.5	---	57.1	133.9	45.5	127.3	10.0	128.3	43.7	131.7	75.6
03/11/2017	20.5	15.5	---	59.4	151.2	62.0	146.8	21.2	161.4	77.4	166.1	108.2
03/12/2017	21.5	16.4	---	59.6	141.0	52.3	138.7	17.0	146.3	62.4	153.0	95.1
03/13/2017	22.4	17.3	---	59.6	137.3	49.6	133.1	15.7	142.8	60.0	148.3	90.6
03/14/2017	22.4	17.2	---	59.6	144.0	56.3	137.3	11.1	147.5	66.7	147.3	90.0
03/15/2017	22.4	17.3	---	59.6	162.6	74.8	154.0	22.9	163.2	80.2	167.6	110.0
03/16/2017	19.3	14.3	---	63.2	191.6	100.7	178.5	49.2	200.2	118.0	201.8	143.2

Daily Average Flow and Spill (in Kcfs) at Lower Columbia Projects

Date	McNary		John Day		The Dalles		Bonneville			
	Flow	Spill	Flow	Spill	Flow	Spill	Flow	Spill	PH1	PH2
03/03/2017	240.6	29.6	237.6	36.1	231.2	57.5	235.1	3.1	90.7	133.4
03/04/2017	246.0	34.5	256.7	23.1	248.8	58.6	267.0	15.8	100.1	138.8
03/05/2017	223.4	12.3	228.5	20.1	225.1	21.4	267.3	15.6	102.8	136.8
03/06/2017	227.6	24.3	214.3	40.5	209.4	14.5	229.4	2.7	96.2	122.7
03/07/2017	237.1	39.4	237.5	80.4	224.0	22.2	247.2	22.7	96.9	118.3
03/08/2017	241.6	40.0	247.2	89.7	228.5	12.3	252.9	22.4	98.4	120.2
03/09/2017	252.9	49.7	251.9	81.6	245.8	25.9	277.5	46.8	101.6	116.8
03/10/2017	271.2	63.3	265.5	32.3	260.2	35.0	299.6	67.5	103.9	115.8
03/11/2017	298.0	83.6	292.8	59.4	280.1	37.2	306.8	79.1	99.8	115.5
03/12/2017	280.0	69.5	303.7	68.0	289.1	40.9	336.4	103.9	106.7	113.5
03/13/2017	274.7	69.3	286.8	49.0	277.6	49.7	320.6	87.7	105.3	115.2
03/14/2017	282.8	73.8	319.0	78.3	315.9	83.4	351.2	122.9	102.5	113.4
03/15/2017	295.4	91.9	338.1	96.2	327.1	103.7	370.8	137.5	107.1	113.8
03/16/2017	338.7	132.0	340.2	90.6	319.0	105.4	371.2	143.3	103.5	113.0

Total Dissolved Gas Saturation (%) - Average of 12 Highest Hours, 24 h Average and 24 h High

Total Dissolved Gas Saturation Data at Upper Columbia River Sites

Date	<u>Hungry H. Dnst</u>			#	<u>Boundary</u>			#	<u>Grand Coulee</u>			#	<u>Grand C. Tlwr</u>			#	<u>Chief Joseph</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>	
3/3	96.8	97.1	97.5	24	---	---	---	0	99.6	100.3	100.6	24	98.9	99.6	99.9	24	99.3	99.9	100.2	24
3/4	97.5	97.6	97.8	24	---	---	---	0	100.4	100.6	100.7	24	99.7	100.0	100.3	24	100.0	100.1	100.2	22
3/5	97.9	98.1	98.2	24	---	---	---	0	100.9	101.0	101.1	24	100.2	100.5	100.7	24	100.5	100.5	100.8	16
3/6	97.2	97.4	97.6	24	---	---	---	0	100.0	100.2	100.4	24	99.6	100.0	100.3	24	99.7	99.7	99.9	8
3/7	96.8	97.1	98.5	24	---	---	---	0	99.5	99.9	100.0	24	99.0	99.4	99.7	24	---	---	---	0
3/8	96.7	96.9	97.1	24	---	---	---	0	99.4	99.5	99.7	24	99.2	99.2	99.5	11	98.9	98.9	99.1	13
3/9	96.1	96.2	96.3	24	---	---	---	0	99.5	99.8	100.1	24	99.2	99.4	99.6	21	98.9	99.1	99.4	24
3/10	96.3	96.4	96.6	24	---	---	---	0	99.9	100.1	100.1	24	100.0	100.3	100.5	24	99.5	99.6	99.7	24
3/11	96.5	96.8	96.9	24	---	---	---	0	100.2	100.6	100.7	24	99.9	100.3	100.7	24	99.7	99.9	100.2	24
3/12	96.2	96.4	96.6	23	---	---	---	0	100.1	100.2	100.4	23	100.0	100.2	100.4	23	99.3	99.5	99.7	23
3/13	96.3	96.4	96.5	24	---	---	---	0	100.7	101.0	101.1	24	100.4	100.7	100.8	24	100.1	100.3	100.4	24
3/14	96.0	96.0	96.2	24	---	---	---	0	101.6	101.8	101.9	24	101.2	101.5	102.3	24	100.6	100.9	101.1	24
3/15	96.3	96.5	96.6	24	---	---	---	0	102.3	102.5	102.6	24	101.6	101.8	102.1	24	101.6	102.0	102.1	24
3/16	96.3	96.5	96.6	23	---	---	---	0	101.6	101.8	102.4	23	101.2	101.5	101.9	23	101.0	101.2	101.7	23

Total Dissolved Gas Saturation Data at Mid Columbia River Sites

Date	<u>Chief J. Dnst</u>			#	<u>Wells</u>			#	<u>Wells Dwnstrm</u>			#	<u>Rocky Reach</u>			#	<u>Rocky R. Tlwr</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>	
3/3	106.4	109.5	109.9	24	99.5	100.7	101.5	22	101.5	102.5	104.1	22	101.4	103.5	105.3	24	111.1	113.3	114.3	23
3/4	101.8	104.0	109.7	24	100.8	101.2	101.4	24	101.1	101.3	101.5	24	103.0	103.6	104.1	24	108.7	111.1	112.0	22
3/5	100.0	100.2	100.5	24	100.5	101.0	101.4	24	100.9	101.4	101.7	24	103.0	103.2	103.7	24	103.4	103.7	104.4	22
3/6	99.2	99.4	99.5	24	98.8	99.1	99.3	24	99.1	99.5	99.9	24	101.2	101.4	101.8	24	101.3	101.6	102.2	24
3/7	98.4	98.7	98.9	24	97.9	98.1	98.1	24	98.2	98.5	98.9	24	99.5	99.7	100.3	24	99.7	100.0	100.4	22
3/8	98.7	98.7	98.7	1	97.8	98.0	98.2	24	98.2	98.5	98.9	24	98.9	99.0	99.5	24	99.0	99.1	99.6	22
3/9	98.5	98.8	99.3	21	98.1	98.3	98.4	24	98.4	98.7	98.7	24	98.9	99.1	99.3	24	100.6	102.0	108.7	21
3/10	99.2	99.4	99.7	24	98.5	98.7	98.9	22	98.9	99.2	99.6	22	99.2	99.4	99.5	24	99.4	99.5	99.9	23
3/11	99.2	99.6	99.8	24	99.0	99.4	99.7	24	99.3	99.8	100.3	24	99.6	100.0	100.1	24	99.7	100.0	100.1	23
3/12	99.0	99.2	99.4	23	98.5	98.6	98.8	23	98.9	99.1	99.5	23	99.5	99.6	99.9	23	99.5	99.6	99.9	20
3/13	99.7	99.9	100.2	24	99.0	99.4	99.6	24	99.4	99.8	100.1	24	100.2	100.5	100.8	24	100.1	100.3	100.7	20
3/14	100.4	100.8	101.4	24	100.0	100.4	100.5	24	100.4	100.8	101.1	24	101.0	101.3	101.4	24	101.0	101.3	102.3	22
3/15	101.2	101.5	101.6	24	100.6	100.9	101.1	24	101.0	101.3	101.5	24	101.6	101.9	102.2	24	101.5	101.8	102.0	24
3/16	101.7	102.7	104.4	23	100.3	100.7	101.2	23	100.4	100.7	101.2	23	100.9	101.2	101.6	23	100.8	101.0	101.8	21

Total Dissolved Gas Saturation at Mid Columbia River Sites

Date	<u>Rock Island</u>			#	<u>Rock I. Tlwr</u>			#	<u>Wanapum</u>			#	<u>Wanapum Tlwr</u>			#	<u>Priest Rapids</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>		<u>Avg</u>	<u>Avg</u>	<u>High</u>	
3/3	102.8	103.8	104.1	23	103.8	104.1	104.4	21	100.3	100.9	101.3	24	100.2	100.9	101.4	24	101.9	102.3	103.5	24
3/4	104.3	105.0	105.3	23	104.4	105.1	105.3	21	102.0	102.7	103.5	24	102.7	103.6	104.3	24	102.0	102.2	102.4	24
3/5	103.1	103.7	105.0	23	103.4	104.0	105.2	22	103.9	104.0	104.0	24	104.5	104.7	104.9	24	102.4	102.5	102.6	24
3/6	100.7	101.0	101.8	24	100.8	101.1	102.0	24	103.1	103.3	103.7	24	103.9	104.2	104.4	24	101.5	101.8	102.1	24
3/7	99.4	99.5	100.0	23	99.5	99.7	100.1	20	102.5	102.6	102.8	24	102.3	102.5	102.9	24	101.1	101.5	101.7	24
3/8	98.5	98.7	98.8	23	98.9	99.3	100.8	22	101.2	101.5	102.1	24	100.8	101.0	101.4	24	100.9	101.0	101.4	24
3/9	98.6	99.0	101.1	22	98.6	99.0	100.1	20	100.5	100.5	100.6	24	100.3	100.4	100.5	24	100.6	100.8	101.1	24
3/10	99.4	99.8	101.3	24	99.6	100.1	101.5	22	100.0	100.2	100.5	24	100.1	100.2	100.5	24	100.7	101.0	101.3	24
3/11	99.2	99.6	99.9	23	99.3	99.6	99.9	22	100.1	100.3	100.5	24	100.2	100.5	100.9	24	100.8	101.1	101.4	24
3/12	99.0	99.3	99.7	21	99.1	99.3	99.7	20	99.7	99.8	99.9	23	100.4	100.9	103.6	23	100.2	100.3	100.6	23
3/13	99.5	100.1	100.4	23	99.8	100.0	100.5	19	100.3	100.4	100.6	24	100.5	100.6	101.0	24	100.6	100.8	100.8	24
3/14	100.4	100.7	100.8	22	100.8	100.9	101.2	20	100.9	101.1	101.2	24	101.8	102.9	117.2	24	101.2	101.4	101.6	24
3/15	101.2	101.3	101.5	24	101.3	101.4	101.6	20	101.4	101.7	101.9	24	106.4	111.0	122.3	24	101.8	102.0	102.1	24
3/16	100.3	100.6	100.9	22	100.4	100.7	101.1	20	---	---	---	0	---	---	---	0	---	---	---	0

Total Dissolved Gas Saturation (%) - Average of 12 Highest Hours, 24 h Average and 24 h High

Total Dissolved Gas Saturation Data at Lower Columbia and Snake River Sites

Date	<u>Priest R. Dnst</u>			#	<u>Pasco</u>			#	<u>Dworshak</u>			#	<u>Clwrtr-Peck</u>			#	<u>Anatone</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High	
3/3	110.3	111.5	113.8	24	---	---	---	0	119.2	119.9	121.3	24	111.0	111.9	112.5	24	---	---	---	0
3/4	108.2	109.4	109.9	24	---	---	---	0	121.4	122.0	122.2	24	112.1	112.7	113.1	24	---	---	---	0
3/5	103.2	103.5	104.7	24	---	---	---	0	122.2	122.3	122.4	24	112.1	112.3	112.5	24	---	---	---	0
3/6	105.7	108.3	110.0	24	---	---	---	0	122.2	122.3	122.5	24	112.3	112.8	113.2	24	---	---	---	0
3/7	102.7	103.0	103.3	24	---	---	---	0	122.5	122.7	122.9	24	113.2	113.8	114.2	24	---	---	---	0
3/8	101.7	102.0	102.6	24	---	---	---	0	122.4	122.7	123.0	24	113.5	113.5	113.9	9	---	---	---	0
3/9	100.7	100.8	101.0	24	---	---	---	0	123.5	123.8	124.5	24	---	---	---	0	---	---	---	0
3/10	100.6	100.8	100.9	24	---	---	---	0	124.3	124.4	124.5	24	---	---	---	0	---	---	---	0
3/11	100.4	100.7	101.0	24	---	---	---	0	124.6	124.7	125.1	24	109.7	110.2	110.5	24	---	---	---	0
3/12	101.9	104.0	113.5	23	---	---	---	0	124.7	124.8	125.2	23	110.7	111.3	111.7	23	---	---	---	0
3/13	100.6	101.0	101.2	24	---	---	---	0	125.2	125.3	125.4	24	111.8	111.9	112.0	24	---	---	---	0
3/14	101.3	101.7	102.0	24	---	---	---	0	125.3	125.4	126.0	24	110.8	111.3	111.9	24	---	---	---	0
3/15	102.2	102.7	104.9	24	---	---	---	0	125.4	125.5	125.7	24	108.7	109.1	109.7	24	---	---	---	0
3/16	---	---	---	0	---	---	---	0	124.0	125.4	125.6	23	106.2	107.0	107.8	23	104.8	105.0	105.4	15

Total Dissolved Gas Saturation Data at Snake River Sites

Date	<u>Clwrtr-Lewiston</u>			#	<u>Lower Granite</u>			#	<u>L. Granite Tlwr</u>			#	<u>Little Goose</u>			#	<u>L. Goose Tlwr</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High	
3/3	---	---	---	0	---	---	---	0	104.5	105.3	105.8	24	---	---	---	0	104.8	105.5	105.7	24
3/4	---	---	---	0	---	---	---	0	106.5	106.9	107.2	24	---	---	---	0	105.8	106.2	107.2	24
3/5	---	---	---	0	---	---	---	0	107.0	107.2	107.3	24	---	---	---	0	105.7	105.9	106.2	24
3/6	---	---	---	0	---	---	---	0	105.0	105.7	106.2	24	---	---	---	0	104.0	104.2	104.3	18
3/7	---	---	---	0	---	---	---	0	103.4	103.7	104.0	24	---	---	---	0	103.7	104.2	104.5	24
3/8	---	---	---	0	---	---	---	0	106.2	108.0	108.1	24	---	---	---	0	103.6	103.8	104.2	24
3/9	---	---	---	0	---	---	---	0	108.5	108.9	111.4	24	---	---	---	0	103.1	103.3	103.4	24
3/10	---	---	---	0	---	---	---	0	119.4	122.5	123.2	24	---	---	---	0	106.3	108.7	109.3	24
3/11	---	---	---	0	---	---	---	0	125.1	126.1	127.1	24	---	---	---	0	111.9	112.8	114.3	24
3/12	---	---	---	0	---	---	---	0	122.1	122.7	123.3	23	---	---	---	0	113.6	114.3	114.7	23
3/13	---	---	---	0	107.8	107.9	108.4	13	119.7	121.5	123.4	24	---	---	---	0	115.2	115.5	115.7	24
3/14	106.3	106.4	106.8	17	108.5	108.5	108.6	24	120.2	121.4	122.5	24	---	---	---	0	115.9	116.2	116.5	24
3/15	105.6	105.8	106.0	24	108.3	108.5	108.6	24	123.9	124.9	125.0	24	---	---	---	0	115.8	116.8	117.9	24
3/16	104.9	105.3	105.7	23	106.1	106.6	107.7	23	130.6	132.3	133.3	23	116.1	116.1	116.9	10	121.3	123.8	126.9	23

Total Dissolved Gas Saturation Data at Snake and Lower Columbia River Sites

Date	<u>Lower Mon.</u>			#	<u>L. Mon. Tlwr</u>			#	<u>Ice Harbor</u>			#	<u>Ice Harbor Tlwr</u>			#	<u>McNary-Oregon</u>			#
	<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>			<u>24 h</u>	<u>12 h</u>		
	Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High		Avg	Avg	High	
3/3	---	---	---	0	103.0	103.7	103.9	24	---	---	---	0	102.8	103.3	104.3	24	---	---	---	0
3/4	---	---	---	0	104.7	105.5	109.0	24	---	---	---	0	103.4	103.8	103.9	24	---	---	---	0
3/5	---	---	---	0	105.4	105.5	105.6	24	---	---	---	0	103.9	104.1	104.3	24	---	---	---	0
3/6	---	---	---	0	105.5	106.6	108.9	24	---	---	---	0	108.3	113.4	115.7	24	---	---	---	0
3/7	---	---	---	0	106.2	107.8	109.9	24	---	---	---	0	116.3	117.3	117.6	24	---	---	---	0
3/8	---	---	---	0	103.8	104.9	108.3	24	---	---	---	0	114.7	115.0	117.2	24	---	---	---	0
3/9	---	---	---	0	110.6	112.4	112.8	24	---	---	---	0	116.9	117.2	117.6	24	---	---	---	0
3/10	---	---	---	0	116.4	118.8	119.1	24	---	---	---	0	120.1	121.4	122.1	24	---	---	---	0
3/11	---	---	---	0	122.3	123.4	124.1	24	---	---	---	0	123.0	124.5	125.2	24	---	---	---	0
3/12	---	---	---	0	120.6	120.9	121.1	23	---	---	---	0	121.0	121.4	121.6	23	---	---	---	0
3/13	---	---	---	0	120.3	120.3	120.4	24	115.6	115.6	115.7	8	120.4	120.5	120.6	24	---	---	---	0
3/14	---	---	---	0	121.5	122.3	123.0	24	116.7	117.1	117.3	24	120.3	121.2	121.9	24	---	---	---	0
3/15	116.9	116.9	117.4	11	123.8	124.8	125.9	24	118.5	118.9	119.0	24	123.9	125.7	126.0	24	---	---	---	0
3/16	114.3	114.8	115.6	23	126.6	127.5	128.1	23	117.9	118.3	118.8	23	130.3	133.1	135.0	23	---	---	---	0

Total Dissolved Gas Saturation (%) - Average of 12 Highest Hours, 24 h Average and 24 h High

Total Dissolved Gas Saturation Data at Lower Columbia River Sites

Date	<u>McNary-Wash</u>			#	<u>McNary Tlwr</u>			#	<u>John Day</u>			#	<u>John Day Tlwr</u>			#	<u>The Dalles</u>			#
	<u>24 h</u>	<u>12 h</u>	<u>High</u>		<u>24 h</u>	<u>12 h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>	
	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>AVG</u>	<u>High</u>	<u>hr</u>
3/3	---	---	---	0	108.8	111.2	111.7	24	---	---	---	0	113.6	114.1	114.2	24	---	---	---	0
3/4	---	---	---	0	111.4	111.7	112.1	24	---	---	---	0	112.1	113.5	113.7	24	---	---	---	0
3/5	---	---	---	0	109.9	110.1	110.4	24	---	---	---	0	109.7	113.7	118.2	24	---	---	---	0
3/6	---	---	---	0	109.5	110.4	111.1	24	---	---	---	0	112.6	116.3	117.2	24	---	---	---	0
3/7	---	---	---	0	110.7	111.5	111.9	24	---	---	---	0	118.5	119.3	119.5	24	---	---	---	0
3/8	---	---	---	0	110.5	111.0	111.7	24	---	---	---	0	119.0	119.1	119.2	24	---	---	---	0
3/9	---	---	---	0	111.9	112.3	112.5	24	---	---	---	0	118.5	119.4	119.5	24	---	---	---	0
3/10	---	---	---	0	112.6	113.2	114.3	24	---	---	---	0	112.9	113.9	114.3	24	---	---	---	0
3/11	---	---	---	0	114.6	115.7	116.1	24	---	---	---	0	116.4	118.9	119.3	24	---	---	---	0
3/12	---	---	---	0	113.9	114.3	115.4	23	---	---	---	0	117.2	119.1	119.4	23	---	---	---	0
3/13	---	---	---	0	113.9	114.7	115.2	24	---	---	---	0	115.6	117.0	118.3	24	---	---	---	0
3/14	108.1	108.1	109.0	12	114.1	115.3	115.5	24	---	---	---	0	119.3	120.2	120.8	24	---	---	---	0
3/15	106.9	107.5	107.7	24	116.0	116.4	116.7	24	---	---	---	0	122.6	124.3	127.7	24	111.0	111.1	112.3	13
3/16	103.8	104.1	104.5	23	117.9	119.7	120.4	23	109.7	109.7	110.0	13	120.5	123.5	124.5	23	110.5	111.4	112.1	23

Total Dissolved Gas Saturation Data at Lower Columbia River Sites

Date	<u>The Dalles Dnst</u>			#	<u>Bonneville</u>			#	<u>Warrendale</u>			#	<u>CamasWashougal</u>			#	<u>Cascade Island</u>			#
	<u>24 h</u>	<u>12 h</u>	<u>High</u>		<u>24 h</u>	<u>12 h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>		<u>24h</u>	<u>12h</u>	<u>High</u>	
	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>	<u>Avg</u>	<u>Avg</u>	<u>High</u>	<u>hr</u>
3/3	108.3	109.0	109.5	24	109.3	110.0	111.0	24	---	---	---	0	107.7	108.8	109.6	24	110.5	111.6	114.0	24
3/4	108.4	108.9	109.5	24	110.5	110.9	111.2	24	---	---	---	0	109.5	110.7	111.5	24	114.3	114.6	114.8	24
3/5	106.2	106.6	106.9	24	110.3	110.7	110.9	24	---	---	---	0	109.4	109.7	109.8	24	114.4	114.6	114.8	24
3/6	105.2	106.7	108.3	24	106.8	107.6	108.3	24	---	---	---	0	107.0	107.6	108.3	24	109.9	111.7	114.2	24
3/7	106.4	108.7	109.7	24	105.7	106.6	107.4	24	---	---	---	0	105.0	105.2	105.4	24	114.5	115.0	121.6	24
3/8	109.2	109.5	110.0	24	104.8	105.9	107.5	24	---	---	---	0	105.0	105.5	105.7	24	114.3	114.9	115.3	24
3/9	110.6	110.9	111.3	24	109.2	110.0	110.4	24	---	---	---	0	106.6	108.1	109.6	24	116.5	117.6	118.6	24
3/10	108.7	110.9	111.5	24	109.8	110.0	110.4	24	---	---	---	0	109.3	109.7	109.9	24	116.9	117.5	122.7	24
3/11	105.9	106.2	107.2	24	110.2	111.3	111.5	24	---	---	---	0	110.2	110.6	110.9	24	117.2	117.5	117.6	24
3/12	108.3	108.8	109.1	23	106.8	107.2	107.8	23	---	---	---	0	110.0	110.3	110.7	23	118.2	118.4	118.5	23
3/13	108.3	108.7	108.9	24	110.1	110.7	110.9	24	111.9	111.9	112.5	11	109.8	110.2	110.8	24	117.8	118.0	118.5	24
3/14	110.1	111.0	111.7	24	110.2	110.4	110.5	24	113.0	113.5	113.9	24	111.2	111.5	111.7	24	119.6	120.2	122.3	24
3/15	113.0	113.8	114.4	24	111.8	112.6	113.1	24	114.4	114.6	115.0	24	112.9	113.3	113.4	24	120.5	120.8	121.2	24
3/16	114.0	114.6	115.9	23	112.3	113.1	114.1	23	114.7	115.4	115.9	23	113.2	114.1	114.6	23	120.9	121.1	121.6	23

Two-Week Summary of Passage Indices

* See sampling comments <http://www.fpc.org/currentDaily/smpcomments.htm>

Smolt indices, clipped & unclipped or combined, are presented in the following order: yearling chinook (chinook 1's), subyearling chinook (chinook 0's), steelhead, coho, sockeye, and lamprey juveniles.

Three classes of fish counts are shown in these tables:

Sample counts (Samp) are provided for juvenile lamprey at LGR. See note below for details †.

Collection counts (Coll), which account for sample rates but are not adjusted for flow;

Passage indices (INDEX), which are collection counts divided by the proportion of water passing through the sampled powerhouse.

Passage indices are not population estimates, but are used to adjust collection counts for daily fluctuations in the site's or project's operations.

The classes of counts presented in the report are defined below for each site. Most samples occur over a 24-hr period that spans two calendar days. In this report, the date shown corresponds with the sample end date.

Combined lamprey juvenile collection counts are provided for all sites. Combined lamprey juveniles is a combination of pacific lamprey ammocoetes, brook lamprey ammocoetes, unknown lamprey ammocoetes, pacific lamprey macrophthalmia, and unidentified lamprey species.

† In 2013 it was confirmed that juvenile lamprey can escape the sample tank at LGR which would lead to unreliable estimates of collection. Therefore, only sample counts are provided in this report.

Definitions for Smolt Index Counts

WTB (Collection) = Salmon River Trap at Whitebird : Collection Counts

IMN (Collection) = Imnaha River Trap : Collection Counts

GRN (Collection) = Grande Ronde River Trap : Collection Counts

LEW (Collection) = Snake River Trap at Lewiston : Collection Counts

LGR (Index) = Lower Granite Dam Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse Flow / (Powerhouse Flow + Spill)}

LGS (Index) = Little Goose Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse Flow / (Powerhouse Flow + Spill)}

LMN (Index) = Lower Monumental Dam Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse Flow / (Powerhouse Flow + Spill)}

RIS (Index) = Rock Island Dam Second Powerhouse Bypass Trap : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse 2 Flow / (Powerhouse 1 & 2 Flow + Spill)}

MCN (Index) = McNary Dam Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse Flow / (Powerhouse Flow + Spill)}

JDA (Index) = John Day Dam Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse Flow / (Powerhouse Flow + Spill)}

BO2 (Index) = Bonneville Dam Second Powerhouse Bypass Collection System : Passage Index Counts

Passage Index = Collection Counts / {Powerhouse 2 Flow / (Powerhouse 1 & 2 Flow + Spill)}

JDA and BO2 data collected for the FPC by Pacific States Marine Fisheries Commission.

RIS data collected for the FPC by Chelan Co. PUD.

LGR, LMN, and MCN data collected for the FPC by Washington Dept. of Fish and Wildlife.

LGS and GRN data collected for the FPC by Oregon Dept. of Fish and Wildlife.

IMN data collected for the FPC by the Nez Perce Tribe.

Fall (post SMP season) trapping at the Imnaha River Fish Trap (IMN) is funded by the Lower Snake River Compensation Program (LSRCP)

WTB and LEW data collected for the FPC by Idaho Dept. of Fish and Game.

Cumulative Adult Passage at Mainstem Dams Through: 03/16

dam	enddate	Spring Chinook						Summer Chinook						Fall Chinook					
		2017		2016		10-Yr Avg.		2017		2016		10-Yr Avg.		2017		2016		10-Yr Avg.	
		Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack
BON	03/15	10	0	40	2	46	0	0	0	0	0	0	0	0	0	0	0	0	0
TDA	03/15	5	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
JDA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCN	03/15	0	-2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0
IHR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LGS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LGR	03/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PRD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WAN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RIS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRH		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WFA	03/13	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0

DAM	ENDDATE	Coho						Sockeye			Steelhead						Lamprey		
		2017		2016		10-Yr Avg.		2017	2016	10-Yr Avg.	2017	2016	10-Yr Avg.	Unclipped	Unclipped	10-Yr Avg.	2017	2016	10-Yr Avg.
		Adult	Jack	Adult	Jack	Adult	Jack												
BON	03/15	0	0	0	0	0	0	0	1	0	995	2032	1463	407	850	535	0	-1	0
TDA	03/15	0	0	0	0	0	0	0	0	0	577	0	616	201	0	246	0	0	0
JDA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCN	03/15	0	0	0	0	1	0	0	0	0	979	0	1768	252	0	500	0	0	0
IHR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LMN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LGS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LGR	03/15	0	0	0	0	0	0	0	0	0	1858	1778	1814	665	784	536	0	0	0
PRD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WAN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RIS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRH		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WFA	03/13	0	0	0	0	0	0	0	0	0	405	3496	2756	0	0	0	0	0	0

PRD does not post wild steelhead numbers.
 These numbers were collected from USACE, Grant PUD, Douglas PUD, Chelan PUD, ODFW and DART.
 Wild steelhead numbers are included in the total. Wild Steelhead are defined as unclipped fish.
 Historic counts (pre-1996) were obtained from CRITFC and compiled by the FPC.
 Historic counts 1997 to present were obtained from the Corps of Engineers.